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# Affix Ordering in Imbabura Quichua\*

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## 1 Introduction

Imbabura Quichua is a Quechua II-B language spoken by over 300,000 people in the Imbabura province of Ecuador (Lewis 2009). It is a prototypical example of an agglutinating language, and rarely blends two distinct concepts in a single morpheme.<sup>1</sup> Imbabura Quichua (henceforth IQ) possesses no prefixes, and verbs containing up to nine distinct suffixes have been recorded, as shown in the elicited example in (1).

- (1) Pay-kuna ish kay sumax ushi-gu-kuna-ta      papa-kuna-ta  
3P-PL    two    pretty daughter-DIM-PL-ACC potato-PL-ACC  
yanu-chi<sub>1</sub>-riya-gri-naya-chi<sub>2</sub>-naxu-ra-pa-nga  
cook-CAUS-DUR-PROSP-DESID-PERSZR-JACT-STILL-DULC-3P.FUT  
“They will still want to make the two pretty little daughters cook potatoes together for a while.”<sup>2</sup>

When so many suffixes are present and able to co-occur, one wonders what principles underlie the formation of such complex words. While one can imagine extralinguistic factors, such as mental processing, playing a significant role, this work will concentrate on formal linguistic factors due to the absence of experimental evidence. Formal linguistic factors underlying the formation of complex, polyaffixal words may be phonological, morphological, syntactic, and semantic in nature. This work will focus especially on the interaction of morphological and semantic factors in constraining possible affix orderings.

This study will restrict its investigation to affix ordering in the IQ verb, specifically between the root and person marking, which are both required in every form and represent, respectively, the leftmost and rightmost peripheries of each verbal form. This study does not consider clitics, such as evidential markers, because they invariantly appear to the right of person marking suffixes. This study also does not consider part-of-speech changing morphology, such as nominalizers, and does not consider subordinating morphology. These elements seem to limit the number of possible morphemes that can occur and tend to occur as far rightward as possible.

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<sup>1</sup> There is syncretism only in the suffixes *sha*, *shun*, and *nga*, which encode future tense and, respectively, first person singular, first person plural, and third person (unspecified for number). These suffixes are grouped together for the purposes of affix ordering and are symbolized by the abbreviation FUT.PERS.

<sup>2</sup> See the Appendix for a key to abbreviations. In IQ, stress almost always falls on the penultimate syllable. Deviations from IPA: ch = /tʃ/, sh = /ʃ/, y = /j/, r = [z] word-initially, otherwise [r].

The first section reviews the main affix ordering tendencies of all fifteen verbal affixes or affix classes.<sup>3</sup> The second section discusses how the affix ordering data are problematic for a variety of approaches to affix ordering, including the Mirror Principle (Baker 1985), semantic scope (Rice 2000), position classes (Inkelas 1993), and templates (Hyman 2002). The third section presents an alternative analysis that uses Construction Morphology (Booij 2009) to define formal constructions that each apply to single morphemes.<sup>4</sup> These constructions are then brought together under a construction hierarchy, which helps to highlight the commonalities between the constructions.

## 2 Data and Pre-Theoretical Generalizations

The cited data for this study come from targeted elicitation sessions with a single speaker, Mariana, who served as a consultant for the UC Berkeley Department of Linguistics 2009-2010 Field Methods class. As such, this study must be considered preliminary (but is, the author hopes, indicative of overall tendencies). Another speaker, Augusto, also served as a consultant for the Field Methods class and provided valuable insights, especially into the meaning of the morphemes described here. Both consultants are middle-aged, from the Imbabura Province of Ecuador, native speakers of IQ, and have used the language continuously since childhood. Both are also fluent in Spanish and English.

Several pre-theoretical generalizations limit the variability in affix ordering and help to structure the data. First, the root must be the leftmost element in the verb, and person marking must be the rightmost element. Clitics, such as evidential markers, invariably appear to the right of person marking. Two phonologically and semantically identical morphemes cannot occur in a single form. Finally, there is an absence of morphologically-conditioned phonology. The following subsections review the affix ordering tendencies of the fifteen verbal affixes or affix classes in IQ.

### 2.1 Causative *chi*<sub>1</sub> (CAUS)

Causative *chi*<sub>1</sub> preferentially appears as root-adjacent (i.e., as far left) as possible. In 12/17 acceptable sentences with *chi*<sub>1</sub> present, *chi*<sub>1</sub> was root-adjacent. Of the 5 acceptable sentences in which *chi*<sub>1</sub> was not root-adjacent, it was never at a distance of more than one morpheme from the root.

- (2) Pishku-gu pay-ta kalpa-chi-pa-n  
 bird-DIM 3SG-ACC run-CAUS-DULC-3P  
 “The little bird makes him run.”

Causative *chi*<sub>1</sub> is able to alternate in position with the morphemes *ri* REFL.RECIP and *riya* DUR without producing semantic differences. Positional alternations between *chi*<sub>1</sub> and *ri* might be expected to produce different meanings attributable to one affix taking semantic scope over the other, as is attested in Chichewa (Hyman 2002:248-9) and other Bantu languages. However, such differences in meaning do not occur.<sup>5</sup> In the following example, both sentences have the same

<sup>3</sup> The person marking morphemes are considered to be a single affix class, since there is no differentiation in ordering between the individual person marking morphemes. It seems reasonable, then, to treat all the person marking morphemes as a single morpheme for the purposes of affix ordering generalizations.

<sup>4</sup> As will be explained in more detail, a bigram morphotactic analysis as in Ryan (2010) is promising, but infeasible here for lack of a suitably large corpus.

<sup>5</sup> Cole (1982:190) reports not being able to elicit any acceptable utterances with the two morphemes co-occurring.

meaning.

- (3) a. Kwitsa-kuna papa-kuna-ta yanu-chi-ri-xu-n  
 girl-PL potato-PL-ACC cook-CAUS-REFL.RECIP-IMPV-3  
 b. Kwitsa-kuna papa-kuna-ta yanu-ri-chi-xu-n  
 girl-PL potato-PL-ACC cook-REFL.RECIP-CAUS-IMPV-3  
 “The girls make each other cook potatoes.”

Causative *chi*<sub>1</sub> is able to alternate in position with *mu* TRANSLOC, *xu* IMPV, and *wa* 1OBJ, but such alternations lead to differences in meaning, as shown in (4) and (5).<sup>6</sup>

- (4) a. Kan kalpa-chi-wa-ngi  
 2SG run-CAUS-1OBJ-2SG  
 “You make me run.”  
 b. Kan kalpa-wa-chi-ngi  
 2SG run-1OBJ-CAUS-2SG  
 “You make me run (= You’re turning me out / kicking me out / making me leave.)”
- (5) a. Nyuka pay-ta kalpa-chi-xu-ni  
 1SG 3SG-ACC run-CAUS-IMPV-1SG  
 “I am making him run / am kicking him out / am making him run (out of the house).”  
 b. Nyuka pay-ta kalpa-xu-chi-ni  
 1SG 3SG-ACC run-IMPV-CAUS-1SG  
 “I am making him run / keep running.”

The additional meaning in (4b) might arise in two ways. First, *chi*<sub>1</sub> may be taking semantic scope over *wa* and in effect reglossing the utterance as, “You make it so that I run,” where the additional meaning arises from a closer association between the root and the first person object. This points to a hypothesis whereby being root-adjacent is being in a position of prominence. A second possibility is that because *chi*<sub>1</sub> occurs more peripherally and outside its normal position in (4b), it is able to take scope over the affixes occurring left of it, and the causativity or forcing of the action is thereby brought into focus. I follow Rice (2000) in calling this the semantic scope hypothesis.

The following table summarizes the ordering of *chi*<sub>1</sub> relative to the other verbal affixes and the consequences of ordering alternations.

(6) Affix Positions Relative to *chi*<sub>1</sub>

LEFT	<i>chi</i> <sub>1</sub> Freely Varying	Varying with Semantic Consequences	RIGHT
	<i>chi</i> <sub>1</sub> ri, riya	<i>mu, wa, xu</i>	<i>gri, naxu, naya, pa, rka, shka, FUT.PERS</i>

## 2.2 Prospective Aspect *gri* (PROSP)

In contrast to *chi*<sub>1</sub> CAUS, the prospective aspect marker *gri*, which can be translated as “going to,” does not seem to be root-adjacent by default. It occurs root-adjacent in only 11 of the 26 (42%)

<sup>6</sup> See Cole (1982:190) for an example involving *mu* TRANSLOC.

acceptable sentences containing it. The morphemes *chi*<sub>1</sub> and *riya* seem to precede *gri*.

- (7) a. Kan papa-kuna-ta yanu-chi<sub>1</sub>-riya-gri-wa-ngi  
2SG potato-PL-ACC cook-CAUS-DUR-PROSP-1OBJ-2SG  
b. Kan papa-kuna-ta yanu-riya-chi<sub>1</sub>-gri-wa-ngi  
2SG potato-PL-ACC cook-DUR-CAUS-PROSP-1OBJ-2SG  
“You’re going to make me cook potatoes for a while.”

While Cole (1982:193) finds that *gri* precedes *naxu* JT.ACT, it was *naxu* that preceded *gri* in two out of the three acceptable sentences elicited. The only difference between these data (shown in (8)) and those discussed by Cole (1982:193) is that in these data, one other morpheme, *mu* TRANSLOC, is present.

- (8) a. Nyukanchi chaya-mu-naxu-gri-nchi  
1PL arrive-TRANSLOC-JACT-PROSP-1PL  
b. Nyukanchi chaya-naxu-mu-gri-nchi  
1PL arrive-JACT-TRANSLOC-PROSP-1PL  
c. Nyukanchi chaya-mu-gri-naxu-nchi  
1PL arrive-TRANSLOC-PROSP-JACT-1PL  
“We’re going to arrive together.”

These sentences show the general tendency for *mu* TRANSLOC to precede *gri*. This appears to be the preferred order, especially given the data in (9), which show that *mu* precedes *gri* in isolation.<sup>7</sup> However, this has to be called a tendency rather than an absolute rule, given the data below in (10a).

- (9) Nyuka chaya-mu-gri-ni  
1SG arrive-TRANSLOC-PROSP-1SG  
“I am going to arrive here.”  
(10) a. Kanguna chaya-gri-ra-mu-ngichi  
2PL arrive-PROSP-STILL-TRANSLOC-2PL  
b. Kanguna chaya-mu-ra-gri-ngichi  
2PL arrive-TRANSLOC-STILL-PROSP-2PL  
c. Kanguna chaya-ra-mu-gri-ngichi  
2PL arrive-STILL-TRANSLOC-PROSP-2PL  
“You all are still going to arrive here.”

The following data show that *gri* alternates with *wa* 1OBJ and *pa* DULC. Another interesting aspect of these data is that they seem to lend support to the idea that root-adjacent position is the most prominent position for affixes.

- (11) a. Pishku-gu kashtu-gri-wa-pa-n  
bird-DIM bite-PROSP-1OBJ-DULC-3

<sup>7</sup> Because the root and person marking are obligatory, “in isolation” means that the morphemes occur in the position of the ellipsis in ROOT-...-PERSON.NUMBER.

- b. Pishku-gu kashtu-gri-pa-wa-n  
bird-DIM bite-PROSP-DULC-1OBJ-3  
“The little bird is going to bite me (right now).”
- (12) a. Pishku-gu kashtu-pa-gri-wa-n  
bird-DIM bite-DULC-PROSP-1OBJ-3  
b. Pishkugu kashtu-wa-gri-pa-n  
bird-DIM bite-1OBJ-PROSP-DULC-3  
“The little bird is going to bite me (soon).”
- (13) Pishku-gu kashtu-wa-pa-gri-n  
bird-DIM bite-1OBJ-DULC-PROSP-3  
“The little bird is going to bite (sometime, now or later, it’s unknown).”

In (11a) and (11b), we see that *gri* is root-adjacent and that the meaning of the sentence is that the bird will bite right now, this instant. However, in (12a) and (12b), *gri* occurs one morpheme away from the root, and the change in meaning is that the bird will bite soon, but not immediately. In effect, the immediateness of the action is slightly decreased when *gri* is moved away from root-adjacent position. In (13), when *gri* is as far as possible from the root, the immediateness of the action is decreased to null, and *gri* functions only to assure that the action definitely will happen at some point in the future. These data show that the intensity of *gri* correlates directly with its adjacency to the root, not with its adjacency to the right periphery, where one might expect it to take scope over other affixes. The degree to which the morpheme is root-adjacent correlates with its intensity of meaning while the degree to which it is able to take scope over other morphemes seems to be irrelevant.

Finally, although it seems to precede it in isolation, *gri* is able to alternate with *xu* without producing any differences in meaning.

- (14) a. Nyuka papa-kuna-ta yanu-gri-xu-sha  
1SG potato-PL-ACC cook-PROSP-IMPV-1SG.FUT  
b. Nyuka papa-kuna-ta yanu-xu-gri-sha  
1SG potato-PL-ACC cook-IMPV-PROSP-1SG.FUT  
“I am going to/will be cooking the potatoes.”

The following table summarizes the ordering of verbal affixes relative to *gri*.

(15) Affix Positions Relative to *gri*

LEFT	<i>gri</i> Freely Varying	Varying with Semantic Consequences	RIGHT
<i>chi<sub>1</sub>, ri, riya</i>	<i>gri mu, naxu, ra, xu</i>	<i>pa, wa</i>	<i>naya, rka, shka, FUT.PERS</i>

### 2.3 Translocative *mu* (TRANSLOC)

The translocative *mu*, roughly meaning “to here,” strongly favors root-adjacent order. Out of the 21 occurrences of *mu* in acceptable sentences, 15 were root-adjacent. Of the remaining 6 non-root-adjacent occurrences, only one had *mu* occurring at a distance greater than one morpheme from

the root. This one example, in (16) below, is also the only acceptable sentence elicited in which *gri* does not follow *mu*.

- (16) Kanguna chaya-gri-ra-mu-ngichi  
 2PL arrive-PROSP-STILL-TRANSLOC-2PL  
 “You all are still going to arrive here.”

The translocative *mu* does not seem to occur with *naya* DESID in isolation, and never with *ra* STILL or *riya* DUR. The affixes *mu* and *wa* alternate, apparently without any semantic effects, as shown in (17) and (18).

- (17) a. Kan waxta-mu-wa-ngi  
 2SG hit-TRANSLOC-1OBJ-2SG  
 b. Kan waxta-wa-mu-ngi  
 2SG hit-1OBJ-TRANSLOC-2SG  
 “You come and hit me.”
- (18) a. Kan waxta-mu-wa-xu-ngi  
 2SG hit-TRANSLOC-1OBJ-IMPV-2SG  
 b. Kan waxta-mu-xu-wa-ngi  
 2SG hit-TRANSLOC-IMPV-1OBJ-2SG  
 c. Kan waxta-wa-mu-xu-ngi  
 2SG hit-1OBJ-TRANSLOC-IMPV-2SG  
 “You’re coming and hitting me.”

The following table summarizes the order of affixes relative to *mu*.

- (19) Affix Positions Relative to *mu*

LEFT	<i>mu</i> Freely Varying	Varying with Semantic Consequences	RIGHT
<i>ri</i>	<i>mu chi<sub>1</sub>, gri, naxu, ra, wa</i>		<i>naya, pa, rka, shka, xu, FUT.PERS</i>

## 2.4 Joint Action *naxu* (JT.ACT)

The morpheme *naxu* signifies joint action and is translated as “together.” Out of the 9 occurrences of *naxu* in acceptable sentences, 6 were in root-adjacent position. The morpheme *naxu* does not combine in isolation with *ra* STILL or *naya* DESID, but these two morphemes do occur with many others in the example in (1). The following chart shows the possible alternations in the ordering of the ten affixes in (1).

- (20) Possible Affix Reorderings in *yanu-chi<sub>1</sub>-riya-gri-naya-chi<sub>2</sub>-naxu-ra-pa-nga* from (1)
- |      |                        |             |            |                        |                        |                        |             |           |            |
|------|------------------------|-------------|------------|------------------------|------------------------|------------------------|-------------|-----------|------------|
| yanu | <i>chi<sub>1</sub></i> | <i>riya</i> | <i>gri</i> | <i>naya</i>            | <i>chi<sub>2</sub></i> | <i>naxu</i>            | <i>ra</i>   | <i>pa</i> | <i>nga</i> |
|      |                        |             |            |                        |                        | <i>ra</i>              | <i>naxu</i> |           |            |
|      |                        |             |            |                        | <i>naxu</i>            | <i>chi<sub>2</sub></i> |             |           |            |
|      |                        |             |            | <i>chi<sub>2</sub></i> | <i>naya</i>            |                        |             |           |            |
|      |                        | <i>naya</i> | <i>gri</i> |                        |                        |                        |             |           |            |
|      | <i>gri</i>             | <i>riya</i> |            |                        |                        |                        |             |           |            |

The morpheme *naxu* appears to alternate with *gri* and *mu* without any semantic consequence.

- (21) a. Nyukanchi *chaya-mu-naxu-gri-nchi*  
 1PL arrive-TRANSLOC-JACT-PROSP-1PL  
 b. Nyukanchi *chaya-naxu-mu-gri-nchi*  
 1PL arrive-JACT-TRANSLOC-PROSP-1PL  
 c. Nyukanchi *chaya-mu-gri-naxu-nchi*  
 1PL arrive-TRANSLOC-PROSP-JACT-1PL  
 “We’re going to arrive together.”

The full ordering of affixes relative to *naxu*, then, is as follows in (22).

- (22) Affix Positions Relative to *naxu*

LEFT	<i>naxu</i> Freely Varying	Varying with Semantic Consequences	RIGHT
<i>chi<sub>1</sub>, naya, ri, xu</i>	<i>naxu chi<sub>2</sub>, gri, mu, riya, ra</i>		<i>pa, rka, shka, wa,</i> FUT.PERS

## 2.5 Desiderative *naya* (DESID)

The desiderative marker *naya* appears in root-adjacent position in only 4 out of 12 acceptable sentences containing it. Cole (1982:195) claims that *naya* alternates with *xu* IMPFV and that their ordering shows semantic scope effects. I was not able to confirm this, but *naya* is able to alternate with *wa* and *pa* similarly to how *gri* is able to alternate with those same two affixes. The data below show the alternation of *naya* with *wa* and *pa*, and show how this alternation seems not to have any semantic effects.

- (23) a. Pishku-gu *kashtu-naya-pa-wa-nga*  
 bird-DIM bite-DESID-DULC-1OBJ-3SG.FUT  
 b. Pishku-gu *kashtu-naya-wa-pa-nga*  
 bird-DIM bite-DESID-1OBJ-DULC-3SG.FUT  
 c. Pishku-gu *kashtu-wa-pa-naya-nga*  
 bird-DIM bite-1OBJ-DULC-DESID-3SG.FUT  
 “The little bird will want to bite me.”

The morphemes *naya* and *ra* do not combine in isolation. When they occur in the presence of other suffixes, however, *ra* is able to alternate freely in position with respect to *naya*.

- (24) Nyuka *chaya-ra-mu-naya-ni*  
 1SG arrive-STILL-TRANSLOC-DESID-1SG  
 “I still want to arrive here.”

The overall ordering of affixes relative to *naya* is as follows.



(25) Affix Positions Relative to *naya*

LEFT	Freely Varying	Varying with Semantic Consequences	RIGHT
<i>chi</i> <sub>1</sub> , <i>gri</i> , <i>mu</i> , <i>ra</i> , <i>ri</i>	<i>naya</i> <i>chi</i> <sub>2</sub> , <i>pa</i> , <i>wa</i> , <i>xu</i>		<i>naxu</i> , <i>riya</i> , <i>rka</i> , <i>shka</i> , FUT.PERS

**2.5.1 Personalizer *chi*<sub>2</sub> (PERSZR)**

Cole (1982:192) discusses a “personalizing” construction involving *naya* and *chi*<sub>2</sub> in which the otherwise accusative-marked subject of an impersonal construction is instead marked as nominative. The verb then overtly agrees with this subject rather than showing the default third person agreement characteristic in impersonal constructions in IQ. Impersonal constructions are used with certain roots that denote experiential or sensory notions. In the pair of sentences below, (26a) is an example of a standard impersonal construction while (26b) is an example of the “personalized” construction.

(26) Examples of the personalizing construction with *naya* and *chi*<sub>2</sub> (Cole 1982:192)

- a. Nyuka-ta miku-naya-n  
1SG-ACC eat-DESID-3  
“I want to eat.” / “I feel like eating.”
- b. Nyuka miku-naya-chi<sub>2</sub>-ni  
1SG.NOM eat-DESID-PERSZR-1SG  
“I want to eat.”

This personalizing *chi*<sub>2</sub> most often directly follows *naya*. It does not require that *naya* be present as long as the root calls for an accusative experiencer subject (when *chi*<sub>2</sub> is not present). The data shown in (20) demonstrate that *chi*<sub>2</sub> may occur before *naya* or after it, and may alternate with *naxu*.<sup>8</sup>

The overall ordering of affixes relative to *chi*<sub>2</sub> is as follows.

(27) Affix Positions Relative to *chi*<sub>2</sub>

LEFT	Freely Varying	Varying with Semantic Consequences	RIGHT
<i>chi</i> <sub>1</sub> , <i>gri</i> , <i>mu</i> , <i>ra</i> , <i>ri</i>	<i>chi</i> <sub>2</sub> <i>naya</i> , <i>pa</i> , <i>wa</i> , <i>xu</i> , <i>naxu</i>		<i>riya</i> , <i>rka</i> , <i>shka</i> , FUT.PERS

**2.6 Dulcitive *pa* (DULC)**

The morpheme *pa* encodes a “dulcitive” meaning on verbs.<sup>9</sup> Cole (1982:185) calls this affix “honorific,” but our consultants described it as indicating that the situation described by the verb was viewed “with affection” by the speaker.

<sup>8</sup> The consultant for this study noted that ordering *chi*<sub>2</sub> before *naya* is something that an elderly speaker would do.

<sup>9</sup> The term “dulcitive” was coined by Tom Recht.

With regard to ordering, *pa* tends to be positioned toward the right periphery of the word. Only 11 of 43 acceptable sentences which contained *pa* featured it in root-adjacent position. *pa* is able to alternate freely with *gri*, *naya*, *ra*, *riya*, *shka*, *wa*, and *xu*. The total affix ordering relative to *pa* appears to be as follows.

(28) Affix Positions Relative to *pa*

LEFT	<i>pa</i> Freely Varying	Varying with Semantic Consequences	RIGHT
<i>chi</i> <sub>1</sub> , <i>mu</i> , <i>naxu</i> , <i>ri</i>	<i>pa</i> <i>gri</i> , <i>naya</i> , <i>ra</i> , <i>riya</i> , <i>shka</i> , <i>wa</i> , <i>xu</i>		<i>rka</i> , FUT.PERS

2.7 “Still” *ra* (STILL)

The morpheme *ra* implies a continuity of the action of the verb and is rendered as “still” in English. The affix *ra* seems to have stricter co-occurrence restrictions than many of the other verbal morphemes in Imbabura Quichua and may be of limited productivity. In isolation, *ra* may only combine with *gri* PROSP, *riya* DUR, and *xu* IMPFV, which appear to be the dedicated aspectual markers in Imbabura Quichua.<sup>10</sup>

While the reason why *ra* should combine only with aspectual morphemes is unclear, its ordering with respect to them in isolation is apparent. The morpheme *ra* precedes *gri* and *riya* in isolation, but follows *xu*.

- (29) a. Nyuka kalpa-ra-gri-ni  
1 SG run-STILL-PROSP-1 SG  
“I am still going to run.”
- b. Warmi papa-kuna-ta yanu-ra-riya-n  
woman potato-PL-ACC cook-STILL-DUR-3  
“The woman still cooks potatoes (for a while).”
- c. Nyuka chalwa-ta miku-xu-ra-ni  
1 SG fish-ACC eat-IMPFV-STILL-1 SG  
“I am still eating the fish.”

In the presence of additional morphemes, these ordering statements remain true for *riya* and *xu*, but *gri* may alternate in position with *ra* without semantic effects. In addition, the morphemes *mu*, *naxu*, *naya*, *pa*, and *ri* were able to alternate in position with *ra* without semantic effects.

Semantic scope effects were present in the data when *ra* and the FUT.PERS affixes co-occurred. These data were the only cases in which person marking was able to be re-ordered with another morpheme.<sup>11</sup>

<sup>10</sup> The morpheme *riya* is the subject of debate. Cole (1982:184) calls it durative, but recent investigation points to interpreting it as a non-recent past marker. In addition, *shka* seems not to function as an aspectual marker (Cleary-Kemp 2013).

<sup>11</sup> For elicitation, I situated these phrases in the hypothetical context that a person had recently gotten drunk to the point of sickness on *chicha* (a traditional Andean homebrew made from masticated and fermented maize), and yet was determined to drink it again. (30a) was said to be “more aggressive” while (30b) implied continuity, and a

- (30) a. Nyuka-ka aswa-ta ufya-ra-sha  
 1SG-TOP chicha-ACC drink-STILL-1SG.FUT  
 “I *will* still drink chicha.”  
 b. Nyuka-ka aswa-ta ufya-sha-ra  
 1SG-TOP chicha-ACC drink-1SG.FUT-STILL  
 “I *still* will drink chicha.”

The overall ordering of affixes relative to *ra* is as follows in (31).

- (31) Affix Positions Relative to *ra*

LEFT	<i>ra</i> Freely Varying	Varying with Semantic Consequences	RIGHT
<i>chi</i> <sub>1</sub>	<i>ra gri, mu, naxu, naya, pa, ri, xu</i>	FUT.PERS	<i>riya, shka, rka</i>

## 2.8 Reflexive or Reciprocal *ri* (REFL.RECIP)

The REFL.RECIP morpheme *ri* is strongly root-adjacent and occurs in that position in 12/17 sentences which were deemed acceptable. As explained in §2.1, *ri* can be freely ordered with respect to *chi*<sub>1</sub> CAUS. The affix *ri* also seems to be able to freely vary in position with *ra* STILL, *riya* DUR, and *xu* IMPFV. This ordering freedom is illustrated by the pairs in (32), (33), and (34).

- (32) a. Nyukanchi riku-ra-ri-xu-nchi  
 1PL see-STILL-REFL.RECIP-IMPFV-1PL  
 b. Nyukanchi riku-ri-ra-xu-nchi  
 1PL see-REFL.RECIP-STILL-IMPFV-1PL  
 “We are still looking at each other.”
- (33) a. Pishku-gu-kuna riku-riya-ri-pa-rka  
 bird-DIM-PL see-DUR-REFL.RECIP-DULC-PA  
 b. Pishku-gu-kuna riku-ri-riya-pa-rka  
 bird-DIM-PL see-REFL.RECIP-DUR-DULC-PA  
 “The little birds looked at each other (for a while).”
- (34) a. Nyukanchi riku-ri-xu-nchi  
 1PL see-REFL.RECIP-IMPFV-1PL  
 b. Nyukanchi riku-xu-ri-nchi  
 1PL see-IMPFV-REFL.RECIP-1PL  
 “We are looking at each other.”

The total affix ordering relative to *ri* is as below in (35).

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sentiment like “let’s keep on drinking.” It is possible that the context set up during elicitation may have influenced acceptability judgments to be more liberal or allow a more idiomatic interpretation.

(35) Affix Positions Relative to *ri*

LEFT	<i>ri</i> Freely Varying	Varying with Semantic Consequences	RIGHT
	<i>ri chi<sub>1</sub>, ra, riya, xu</i>		<i>gri, mu, naxu, naya, pa, shka, rka, FUT.PERS</i>

**2.9 Durative *riya* (DUR)**

The morpheme *riya* occurs in root-adjacent position in 11/19 acceptable sentences that contain it. The affix *riya* may co-occur with every verbal morpheme examined here except for *mu*, with which it may not co-occur in isolation or with other morphemes present. The ordering of affixes relative to *riya* is as follows.

(36) Affix Positions Relative to *riya*

LEFT	<i>riya</i> Freely Varying	Varying with Semantic Consequences	RIGHT
<i>gri, naya, ra</i>	<i>riya chi<sub>1</sub>, naxu, pa, ri, shka</i>		<i>rka, wa, FUT.PERS</i>

**2.10 Eyewitness Past Tense *rka* (PA)**

The morpheme *rka* indicates not only past tense, but that the action of the verb was witnessed (see Cleary-Kemp 2013, this volume). The affix *rka* is strongly biased towards occurring on the right periphery. Every affix must appear to the left of *rka* except for *shka*. The affixes *shka* and *rka* together form the pluperfect, or past perfect (Cleary-Kemp 2013). In this instance, *shka* is sometimes able to vary in order with *rka*, as shown below.<sup>12</sup>

- (37) a. Nyuka chaya-mu-shka-rka-ni  
 1SG arrive-TRANSLOC-PERF-PA-1SG  
 b. Nyuka chaya-mu-rka-shka-ni  
 1SG arrive-TRANSLOC-PA-PERF-1SG  
 “I had arrived here.”
- (38) a. Kanguna papa-kuna-ta yanu-naxu-shka-rka-ngichi  
 2PL potato-PL-ACC cook-JACT-PERF-PA-2PL  
 b. Kanguna papa-kuna-ta yanu-naxu-rka-shka-ngichi  
 2PL potato-PL-ACC cook-JACT-PA-PERF-2PL  
 “You all had cooked potatoes together.”

As is clear from the glosses, the re-ordering of *shka* and *rka* has no semantic impact. The more prevalent order and the one that occurs in isolation is *shka-rka*. The ordering of all verbal morphemes with respect to *rka* is as follows.

<sup>12</sup> It should be noted that Jessica Cleary-Kemp, in specific elicitation of sentences with *rka* and *shka* was unable to elicit an acceptable verbal complex with the order *rka-shka*. This prompts doubt that the variation in the ordering of *rka* and *shka* is unmarked or common.

(39) Affix Positions Relative to *rka*

LEFT	<i>rka</i> Freely Varying	Varying with Semantic Consequences	RIGHT
<i>chi</i> <sub>1</sub> , <i>chi</i> <sub>2</sub> , <i>gri</i> , <i>mu</i> , <i>naxu</i> , <i>naya</i> , <i>pa</i> , <i>ra</i> , <i>ri</i> , <i>riya</i> , <i>wa</i> , <i>xu</i>	<i>rka shka</i>		

**2.11 Non-Eyewitness Past Tense *shka* (PA.NWIT)**

The morpheme *shka* is heavily biased toward appearing at the right periphery. It is able to vary in ordering to a very limited degree with *rka*, and is able to vary in ordering more robustly with *pa* DULC and *riya* DUR. The morpheme *rka* appears preferentially to the right of *shka*, and all other morphemes must appear to the left. The following examples show the free ordering of *shka* with *pa* and *riya*.

- (40) a. Uchila ushi-kuna papa-kuna-ta yanu-riya-pa-shka  
daughter-PL potato-PL-ACC cook-DUR-DULC-PA.NWIT
- b. Uchila ushi-kuna papa-kuna-ta yanu-pa-shka-riya-n  
daughter-PL potato-PL-ACC cook-DULC-PA.NWIT-DUR-3
- c. Uchila ushi-kuna papa-kuna-ta yanu-shka-pa-riya-n  
daughter-PL potato-PL-ACC cook-PA.NWIT-DULC-DUR-3  
 “The little daughters have cooked the potatoes for a while.”

The ordering of all verbal morphemes with respect to *shka* is as follows. Cleary-Kemp (2013) reports that *shka* seems not to be able to co-occur with the FUT.PERS morphemes for our speakers, even though this is attested in Cole (1982). For detailed information on *shka*, see Cleary-Kemp (2013).

(41) Affix Positions Relative to *shka*

LEFT	<i>shka</i> Freely Varying	Varying with Semantic Consequences	RIGHT
<i>chi</i> <sub>1</sub> , <i>gri</i> , <i>mu</i> , <i>naxu</i> , <i>naya</i> , <i>ra</i> , <i>ri</i> , <i>wa</i> , <i>xu</i>	<i>shka pa, riya, rka</i>		

**2.12 First Person Object Marker *wa* (1OBJ)**

As mentioned in §2.1, *wa* exhibits semantic scope effects with *chi*<sub>1</sub>. The first person object marker *wa* is able to vary freely with the morphemes *gri*, *mu*, *naya*, *pa*, and *xu*. (18) shows the alternation of *wa* with *mu* and *xu*. The ordering of all morphemes with respect to *wa* is as follows.

(42) Affix Positions Relative to *wa*

LEFT	wa Freely Varying	Varying with Semantic Consequences	RIGHT
<i>naxu, riya</i>	<i>wa gri, mu, naya, pa, xu</i>	<i>chi<sub>1</sub></i>	<i>rka, shka, FUT.PERS</i>

**2.13 Imperfective *xu* (IMPFV)**

The imperfective *xu* can be re-ordered with *chi<sub>1</sub>* to produce semantic scope effects, as shown in (5). The ordering of all affixes with respect to *xu* is as follows.

(43) Affix Positions Relative to *xu*

LEFT	<i>xu</i> Freely Varying	Varying with Semantic Consequences	RIGHT
<i>mu, ri</i>	<i>xu gri, naya, pa, ra, wa</i>	<i>chi<sub>1</sub></i>	<i>naxu, rka, shka, FUT.PERS</i>

**2.14 Future Tense Person Markers (FUT.PERS)**

One means of marking future tense (use of *gri* is the major alternative) is to use the syncretic suffixes *sha*, *shun*, and *nga*, for 1SG, 1PL, and 3rd person, respectively. These suffixes are much like *rka* in that they vary only with one morpheme, *ra*. Every other morpheme appears to the left of FUT.PERS, and none must obligatorily appear to the right.

(44) Affix Positions Relative to FUT.PERS

LEFT	FUT.PERS Freely Varying	Varying with Semantic Consequences	RIGHT
<i>chi<sub>1</sub>, mu, naxu, naya, pa, ri, riya, wa, xu</i>	FUT.PERS	<i>ra</i>	

**2.15 Summary of Affix Ordering Data**

The following table is a compilation of the tables provided for each morpheme showing which morphemes must appear to its left, which can be freely ordered with respect to it, which can be re-ordered with it but with semantic scope complications, and which morphemes must be to its right.

(45) Summary of Affix Ordering Data

LEFT	M	Freely Varying	Varying with Semantic Consequences	RIGHT
	<i>chi</i> <sub>1</sub>	<i>ri, riya</i>	<i>mu, wa, xu</i>	<i>gri, naxu, naya, pa, rka, shka, FUT.PERS</i>
<i>chi</i> <sub>1</sub> , <i>gri, mu, ra, ri</i>	<i>chi</i> <sub>2</sub>	<i>naya, pa, wa, xu, naxu</i>		<i>riya, rka, shka, FUT.PERS</i>
<i>chi</i> <sub>1</sub> , <i>ri, riya</i>	<i>gri</i>	<i>mu, naxu, ra, xu</i>	<i>pa, wa</i>	<i>naya, rka, shka, FUT.PERS</i>
<i>ri</i>	<i>mu</i>	<i>chi</i> <sub>1</sub> , <i>gri, naxu, ra, wa</i>		<i>naya, pa, rka, shka, xu, FUT.PERS</i>
<i>chi</i> <sub>1</sub> , <i>naya, ri, xu</i>	<i>naxu</i>	<i>chi</i> <sub>2</sub> , <i>gri, mu, riya, ra</i>		<i>pa, rka, shka, wa, FUT.PERS</i>
<i>chi</i> <sub>1</sub> , <i>gri, mu, ra, ri</i>	<i>naya</i>	<i>chi</i> <sub>2</sub> , <i>pa, wa, xu</i>		<i>naxu, riya, rka, shka, FUT.PERS</i>
<i>chi</i> <sub>1</sub> , <i>mu, naxu, ri</i>	<i>pa</i>	<i>gri, naya, ra, riya, shka, wa, xu</i>		<i>rka, FUT.PERS</i>
<i>chi</i> <sub>1</sub>	<i>ra</i>	<i>gri, mu, naxu, naya, pa, ri, xu</i>	FUT.PERS	<i>riya, shka, rka</i>
	<i>ri</i>	<i>chi</i> <sub>1</sub> , <i>ra, riya, xu</i>		<i>gri, mu, naxu, naya, pa, shka, rka, FUT.PERS</i>
<i>gri, naya, ra</i>	<i>riya</i>	<i>chi</i> <sub>1</sub> , <i>naxu, pa, ri, shka</i>		<i>rka, wa, FUT.PERS</i>
<i>chi</i> <sub>1</sub> , <i>gri, mu, naxu, naya, pa, ra, ri, riya, wa, xu</i>	<i>rka</i>	<i>shka</i>		
<i>chi</i> <sub>1</sub> , <i>gri, mu, naxu, naya, ra, ri, wa, xu</i>	<i>shka</i>	<i>pa, riya, rka</i>		FUT.PERS
<i>naxu, riya</i>	<i>wa</i>	<i>gri, mu, naya, pa, xu</i>	<i>chi</i> <sub>1</sub>	<i>rka, shka, FUT.PERS</i>
<i>mu, ri</i>	<i>xu</i>	<i>gri, naya, pa, ra, wa</i>	<i>chi</i> <sub>1</sub>	<i>naxu, rka, shka, FUT.PERS</i>
<i>chi</i> <sub>1</sub> , <i>mu, naxu, naya, pa, ri, riya, shka, wa, xu</i>	FUT.PERS		<i>ra</i>	

**3 Problems for Previous Accounts of Affix Ordering**

Five main kinds of analyses have figured prominently in explaining affix ordering. Those five kinds of analyses are: 1) the Mirror Principle (Baker 1985), 2) relevance (Bybee 1985), 3) position

classes (Inkelas 1997), 4) semantic scope (Rice 2000), and 5) templates (Hyman 2002). Some of these analyses are able to offer insight into affix ordering in IQ, but all face problems with the data.

### **3.1 Mirror Principle**

Baker's (1985:374) Mirror Principle states informally that "morphological derivations must directly reflect syntactic derivations." The idea that morphology should reflect syntax is powerful, and has been developed most clearly in Distributed Morphology (Halle and Marantz 1993 *inter alia*). Both the Mirror Principle and Distributed Morphology assume that a universal syntactic structure, provided by the theoretical frameworks of Government and Binding or Minimalism, is what is reflected in affix ordering.

However, an explanation based on the Mirror Principle must grapple with the fact that affixation and morphological constructions play such a large role in IQ that there are relatively few interword syntactic relationships that can be brought to bear on affix ordering data. This is not a formal problem since the syntactic derivation is assumed to proceed according to principles inherent in Universal Grammar. However, it is an empirical problem in that there is very little language-internal evidence that the syntactic derivation inherent in the morphological derivation is correct, which weakens the reliability of a Mirror Principle explanation.

### **3.2 Relevance**

Muysken (1986:639) discusses affix ordering in Bolivian Cochabamba Quechua, and in doing so provides a synopsis of how Bybee's (1985) principle of relevance as a determiner of affix ordering operates in a Quechua language. The idea of relevance determining affix ordering is that affixes which are more directly relevant to the root's lexical content will be positioned closer to the root while those that are relevant either mostly or exclusively to the syntax will be expressed farther from the root. Bybee's theory predicts the order: STEM-VALENCE.CHANGING-VOICE-ASPECT-TENSE-MOOD-NUMBER-PERSON-GENDER.

Muysken (1986:639) shows that this order does not match the order attested in Cochabamba Quechua. Similarly, one can confirm through examining (45) that Bybee's predicted order is not attested as a general tendency in IQ. Bybee's proposal wins some support in that *chi*<sub>1</sub> CAUS occurs root-adjacently by default. However, it is able to freely alternate with an aspectual marker, *riya* DUR. This may not pose a problem since aspect is also very close to the root in Bybee's theory. However, the first person object marker *wa*, predicted to be far to the right, can appear before *chi*<sub>1</sub> CAUS. Moreover, the derivational TRANSLOC morpheme *mu* seems to be able to vary freely with *wa*. Upon consulting the table in (45), it becomes clear that there are many such alternations that straddle the informal position classes embedded in Bybee's theory. The theory predicts that this variation should not occur since presumably the semantic content of the morphemes does not change from use to use, and thus one might expect them to stand in the same relevance relations and thus to be positioned in a fixed order. Because of this variation, Bybee's theory is unable to explain all the affix ordering tendencies in IQ.



### 3.3 Position Class Morphology

The data in (47) present an interesting problem for a Position Class analysis (à la Inkelas 1993) given the data in (46). The data in (46) (repeated from (9)) seem to show unambiguously that *mu* precedes *gri* in isolation.

- (46) Nyuka chaya-mu-gri-ni  
 1SG arrive-TRANSLOC-PROSP-1SG  
 “I am going to arrive here.”

Under a position class analysis, one might take this as evidence for two position classes. However, the data show that this division cannot be fully maintained. First, (47b) (repeated from (10b)) shows *mu* preceding *ra* and *gri*. One might suppose that *ra* and *gri* should be put together into one position class. However, consider the data in (47c) (repeated from (10c)), which show that *mu* may intrude between *ra* and *gri*.

- (47) a. Kanguna chaya-gri-ra-mu-ngichi  
 2PL arrive-PROSP-STILL-TRANSLOC-2PL  
 b. Kanguna chaya-mu-ra-gri-ngichi  
 2PL arrive-TRANSLOC-STILL-PROSP-2PL  
 c. Kanguna chaya-ra-mu-gri-ngichi  
 2PL arrive-STILL-TRANSLOC-PROSP-2PL  
 “You all are still going to arrive here.”

This destroys the validity of the claim that *ra* and *gri* form a position class to the exclusion of *mu*. The problem of a position class analysis can be shown as below in (48).

- (48) [mu] [ [ra] [gri] ]  
 [ [ra] [mu] ] [gri]  
 [ [gri] [ra] ] [mu]

This series of data shows that a bracketing paradox arises when attempting to formulate a position class analysis because it shows that *mu* and *ra* cannot be considered one position class to the exclusion of *gri*, nor can *gri* and *ra* form a position class to the exclusion of *mu*. The only solution is to unify all three into one position class where variation is possible. The data from (8) show a bracketing paradox of exactly the same kind except that *ra* is replaced by *naxu* there. The only solution to these two bracketing paradoxes together is to fuse the position classes further so that we have a position class composed of *gri*, *mu*, *ra*, and *naxu*.

Examination of additional data through the table in (45) shows that attempting to maintain such a position class analysis will result in very few position classes. The reason for this is that there are many alternations involving multiple suffixes. If one assumes a certain order for the morphemes in a position class, this becomes apparent. For example, if one assumes the order [ *mu gri naxu* ], then an alternation involving *mu* and a morpheme outside of the current position class, for example *ra* will necessitate broadening the position class to include *ra* such that the position class is now [ *mu ra gri naxu* ]. This is a persistent problem that reduces the number of position classes and in turn reduces their explanatory and restrictive power. Further examination of alternations in this way shows that a single position class will encompass the majority of morphemes, and thus the divides

like those made between affixes in Nimboran (Inkelas 1993) do not exist in IQ. A position class analysis, then, will not be able to distinguish between morphemes in such a way as to elucidate their interactions.

### 3.4 Semantic Scope

Rice (2000) makes the claim that semantic scope determines affix order in the Athabaskan verb and that the verb root in languages in that family moves to its surface position. She puts forth the idea that semantic scope is instrumental in determining affix order in other languages. Effects of semantic scope are attested in IQ. For example, the morphemes *chi*<sub>1</sub>, *gri*, and *ra* all participate in alternations that seem to show semantic scope effects. These effects can be seen for *chi*<sub>1</sub> in the examples below, repeated from (4) and (5).

- (49) a. Kan kalpa-chi-wa-ngi  
 2SG run-CAUS-1OBJ-2SG  
 “You make me run.”  
 b. Kan kalpa-wa-chi-ngi  
 2SG run-1OBJ-CAUS-2SG  
 “You make me run (= You’re turning me out / kicking me out / making me leave.)”
- (50) a. Nyuka pay-ta kalpa-chi-xu-ni  
 1SG 3SG-ACC run-CAUS-IMPFV-1SG  
 “I am making him run / am kicking him out / am making him run (out of the house).”  
 b. Nyuka pay-ta kalpa-xu-chi-ni  
 1SG 3SG-ACC run-IMPFV-CAUS-1SG  
 “I am making him run / keep running.”

In these examples, semantic scope seems to extend from the rightmost suffix leftward to the root. However, scope does not seem to operate uniformly this way, as shown below (repeated from (11), (12), and (13)), where instead root-adjacency seems to correlate directly with semantic prominence.

- (51) a. Pishku-gu kashtu-gri-wa-pa-n  
 bird-DIM bite-PROSP-1OBJ-DULC-3  
 b. Pishku-gu kashtu-gri-pa-wa-n  
 bird-DIM bite-PROSP-DULC-1OBJ-3  
 “The little bird is going to bite me (right now).”
- (52) a. Pishku-gu kashtu-pa-gri-wa-n  
 bird-DIM bite-DULC-PROSP-1OBJ-3  
 b. Pishkugu kashtu-wa-gri-pa-n  
 bird-DIM bite-1OBJ-PROSP-DULC-3  
 “The little bird is going to bite me (soon).”
- (53) Pishkugu kashtu-wa-pa-gri-n  
 bird-DIM bite-1OBJ-DULC-PROSP-3  
 “The little bird is going to bite (sometime, now or later, it’s unknown).”

As explained in §2.2, semantic prominence (here, immediateness of the impending action) seems to be directly correlated with root-adjacency.

This means that semantic considerations influence affix ordering according to at least two independent principles: 1) semantic scope proper, where one affix seems to “scope over” another, influencing its interpretation, and 2) prominence by root-adjacency, where the closer an affix is to the root, the more influential it is as part of the verb complex’s overall meaning. Semantic scope proper, then, is only half of what must be explained when considering semantically-influenced affix ordering.

IQ, however, seems to exhibit non-semantically-driven affix ordering in which variation occurs without semantic effects. Where one might expect scope considerations to come into play, for example with the causative and reflexive/reciprocal morphemes *chi*<sub>1</sub> and *ri*, one instead finds variation without semantic effects. Given the different types of semantic considerations that may come into play and the fact that semantics does not obligatorily influence affix ordering, it is clear that semantic scope, and even a broader notion of semantically-driven ordering, cannot fully explain affix ordering in IQ, even though semantic factors do explain some ordering tendencies.

### 3.5 Templates

Hyman (2002) shows that morphological templates are what determine affix ordering for at least a portion of the affixes in many Bantu languages (such as Chichewa), and that these templates must be strictly adhered to even in the face of semantic scope considerations that would seem to require a different affix ordering. Templates do play a role in IQ affix ordering. The template ROOT+. . .+PERSON must be adhered to in every form. Any additional (non-clitic) verbal morphemes that occur must be placed in the area indicated by the ellipsis.

However, strict templates do not seem to play a substantial role in IQ affix ordering beyond establishing the peripheries of verbal forms (that is, verbal forms not including clitics, which are invariantly placed to the right). Affix ordering that varies according to semantic scope shows that templates do not govern those combinations of affixes. Affix ordering that is able to vary independently of semantic considerations also speaks against the presence of templates for the affected affix combinations. Templates, then, do play some role in IQ affix ordering, but templatic restrictions are unable to account for all the affix ordering phenomena shown in this study.

### 3.6 Bigram Morphotactics

Due to the high variability of affix ordering in IQ, the method of discovering bigram morphotactics described in Ryan (2010) is especially promising. This approach allows for variation to be described in a principled, quantitative manner that compares very favorably to data generated by plausible artificial learning paradigms, such as gradual learning algorithms. Bigram morphotactics would also directly capture the variation in ordering between pairs of affixes, which is a major source of variation in IQ affix ordering. While a bigram morphotactic analysis is extremely promising for IQ and would quantitatively capture the variation that is described here only in a qualitative manner, it requires a sufficiently large corpus of verb forms that can be parsed. While the Field Methods class built a corpus of over 15 narratives in IQ that were subsequently parsed, this is too small of a corpus for conducting a bigram morphotactic analysis.

#### 4 A Construction Morphology Analysis of Affix Ordering in IQ

Construction Morphology (Booij 2009) offers a means of beginning to formally describe and relate verbal morphemes and their similarities with respect to affix ordering. The abstract schema below is the representation of a morphological construction in Construction Morphology.

$$(54) \quad \left[ [a]_x [b]_{y_i}^\alpha \right]_y^\alpha$$

This construction (adapted from Booij 2009:3(3')) is the representation of element  $y$ , which is defined as  $y_i$  (represented by the morpheme  $b$ ) with relation  $R$  to  $x$  (represented by the morpheme  $a$ ).  $y_i$  is the head of  $y$ .  $R$  is the relation between the elements in the construction, which “is left unspecified in the schema, since it is not predictable on structural grounds” (Booij 2009:1).  $\alpha$  is a relevant set of subclass features. Subclass features can be associated both with individual morphemes (like  $y_i$ ) and constructions as a whole (like  $y$ ). Constructions can be arranged into a hierarchy such that commonalities between them are inherited. The intent in using constructions is to formally indicate affix ordering restrictions and to group morphemes whose ordering restrictions are similar. I will first discuss the general shape that constructions take for IQ verbal morphemes, and will then go on to explore the arrangement of the constructions for each of the verbal morphemes into a hierarchy.

##### 4.1 The Structure of IQ Morphological Constructions

Constructions for verbal morphemes in IQ take the following shape.

$$(55) \quad \left[ [\text{ROOT}]_{V_1} [X, Y^{sem}]_a [\dots]_b [Z]_c [\text{PERS}]_d \right]_{V-X} \{W\}$$

This construction is the representation of a verbal complex  $V$  for the morpheme  $X$ , which is defined as a ROOT with relation  $R$ , modified by *sem*, to  $a$ ,  $b$ ,  $c$ , and  $d$ . For IQ, the relation  $R$  is the theoretical mechanism responsible for producing a semantically interpretable structure.<sup>13</sup> The subscripts  $a$ ,  $b$ ,  $c$ , and  $d$  are simply notational devices used to divorce the bracketed group from the phonological content inside. The ROOT is a lexical root, such as *yanu-* “cook.”  $X$ ,  $Y$ , and  $Z$  are the verbal morphemes that this study has focused on. PERS represents person agreement morphemes. The position represented by an ellipsis (...) instead of a letter is a position in the construction in which any member of the verbal morphemes examined in this study may appear. This position may appear in its own bracketed group or in another bracketed group. It is assumed that a very strict version of the repeated morph constraint (Menn and MacWhinney 1984) acts as a filter on this position such that morphemes which are already present in the construction are not inserted again. The diacritic feature *sem* signals that semantic interpretation is sensitive to the ordering of the morpheme to which it is attached. This feature is used to formally indicate that scope effects may occur.

For the purposes of this analysis, the modification of meaning which is accomplished by the ordering of a *sem*-bearing morpheme happens in the semantics of the language, which is represented here as the relation  $R$ . This places the burden of accomplishing either a semantic scope or root-adjacency analysis on the semantics of the language. While this analysis does not provide an

<sup>13</sup> While deserving a great deal of attention, the mechanism for producing a semantically interpretable structure will not be further explored here.

explanation of specific theoretical machinery, it does provide a structured input for such machinery to operate on.

In IQ morphological constructions as in (55), the ordering of elements matters. The order of the bracketed groups from left to right within the construction reflects the first to last ordering of those elements in spoken surface forms. Variability in ordering between affixes is modeled by putting the elements which vary in position together in the same bracketed group and separating the morphemes themselves with commas. These bracketed groups are position classes *within the construction*, but not across the language as a whole.

Each construction is meant to capture the affix ordering generalizations particular to a given morpheme. This given morpheme is positioned leftmost in one of the bracketed groups. In order to indicate which morpheme the construction pertains to, the morpheme is listed in the position of X in the V–X subscript on the entire construction. Here, this is strictly a notational device, but it could be used as a formal device to identify the construction uniquely, should the grammar require it.<sup>14</sup> Note that here, the ROOT is always assumed to be the head of the construction and the element that bears the syntactic category feature V.

The construction indicates important facts that must be adhered to when the morpheme X is employed in a verbal construction. For example, the construction in (55) indicates the following about the morpheme X. First, the root must appear to the left of X. X may alternate in position with Y, but because of Y's *sem* diacritic, alternations with Y will produce differences in meaning. If Z co-occurs with X, it must be immediately before person marking and must be to the right of X. Any other morphemes employed will go to the right of X, but to the left of Z. Person marking will be the rightmost element in the construction. The struck-out morpheme in braces to the right of the construction may not appear if X appears in the construction.

## 4.2 Building a Hierarchy of Constructions

Arranging morphological constructions into a hierarchy allows one to show that certain affix orderings are shared between constructions. This is important because it provides a degree of explanatory insight to the constructions that keeps them from just being convenient presentational devices. A construction hierarchy shows that constructions are related by the degree to which they share structure and by which structure they share. The construction hierarchy formalizes such similarity, and this formalization makes falsifiable predictions about which affix orderings are possible and which are not.<sup>15</sup>

A construction hierarchy for IQ morphemes can be established using certain principles. The highest node of the hierarchy contains the least information about affix ordering while the lowest nodes of the hierarchy contain the most information. In the construction hierarchy for IQ, the construction for the node X immediately above a given node Y is imposed on that node Y. The construction in node Y may add or delete material in bracketed groups or may add or delete bracketed groups themselves. When adding material, however, the construction in node Y may add only material that is not already present in the construction. That is, when adding material, the construction in node Y may only add material that was a part of the position represented by the ellipsis

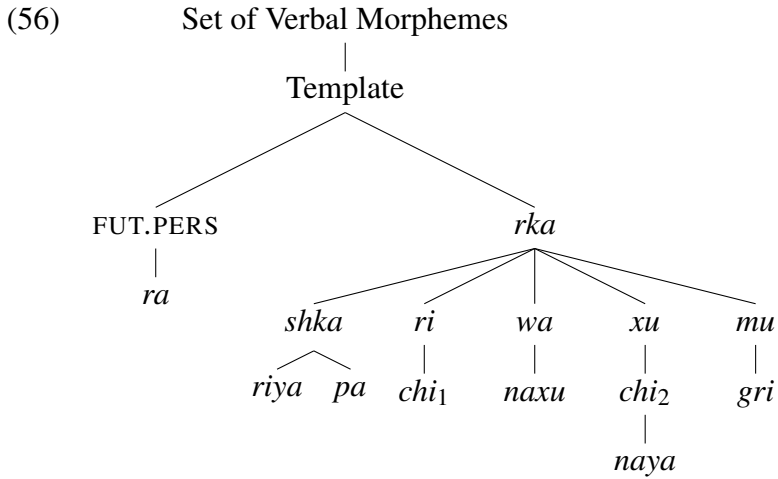
<sup>14</sup> For example, if a construction was associated with a particular phonological subgrammar, such as a different stress pattern, the label would be a formal device used to co-index the construction and its cophonology.

<sup>15</sup> The motivation for a construction hierarchy is similar to the motivation for Partial Ordering (Anttila 2002), which helps model and explain relationships between cophonologies, which may share most of their constraints or rules.

(...) in the construction in node X.<sup>16</sup> The extent to which material is deleted is kept to a minimum because, ideally, affix ordering would be strictly more specified at lower levels by stipulating that material from a dominating construction could not be deleted.

### 4.3 The Hierarchy of Constructions for IQ Verbal Morphemes

Using those principles, it is possible to build a construction hierarchy for IQ in which constructions represented at lower levels in the hierarchy have more strict affix ordering requirements. I represent the hierarchy of constructions for IQ below in a tree structure in which each construction is represented by its namesake morpheme.



The set of verbal morphemes is unordered and shown in (57).

$$(57) \left[ \dots = \left[ \text{chi}_1, \text{chi}_2, \text{gri}, \text{mu}, \text{naxu}, \text{naya}, \text{pa}, \text{PERS}, \text{ra}, \text{ri}, \text{riya}, \text{rka}, \text{shka}, \text{ROOT}_V, \text{wa}, \text{xu}, \text{FUT.PERS} \right] \right]$$

The next level in the hierarchy is represented by the template common to all IQ verbal complexes. The category feature of  $\text{ROOT}_V$  percolates up and establishes that morpheme as the head of the construction and formally indicates that the construction characterizes an element of syntactic category V (verb).

$$(58) \left[ \left[ \text{ROOT}_V \right] \left[ \dots \right] \left[ \text{PERS} \right] \right]_V$$

Two branches split from the template construction. The first branch is that of the FUT.PERS construction. This construction is as follows.

$$(59) \left[ \left[ \text{ROOT}_V \right] \left[ \dots \right] \left[ \text{FUT.PERS}^{\text{sem}}, \text{ra} \right] \right]_{V-\text{FUT.PERS}} \{ \text{shka} \}$$

The construction for *ra* can be derived from that in (59) using the principles in §4.2. This is shown below.

$$(60) \left[ \left[ \text{ROOT}_V \right] \left[ \text{chi}_1 \right] \left[ \text{ra}, \dots, \text{FUT.PERS}^{\text{sem}} \right] \left[ \text{riya}, \text{rka}, \text{shka} \right] \right]_{V-\text{ra}}$$

<sup>16</sup> I assume that the position of the ellipsis may be moved freely as needed. This may need to be restricted later, but it seems necessary here.

The second branch from the template is that of the *rka* construction. This construction is the basis for all remaining constructions and takes the following form.

$$(61) \left[ [\text{ROOT}_V] [\dots] [rka, shka] [\text{PERS}] \right]_{V-rka}$$

The construction for *shka* represents the first subbranch from *rka*, and takes the following form.

$$(62) \left[ [\text{ROOT}_V] [\dots] [shka, pa, riya, rka] [\text{PERS}] \right]_{V-shka} \{\text{FUT.PERS}\}$$

This subbranch in turn gives rise to those for *riya* and *pa* given below in that order.

$$(63) \left[ [\text{ROOT}_V] [gri, naya, ra] [\dots] [riya, shka, pa] [wa] [rka] [\text{PERS}, \text{FUT.PERS}] \right]_{V-riya} \{\mu\}$$

$$(64) \left[ [\text{ROOT}_V] [chi_1, mu, naxu, ri] [pa, \dots, riya, shka] [rka] [\text{PERS}, \text{FUT.PERS}] \right]_{V-pa}$$

The second subbranch from *rka* is occupied by the construction for *ri* and its daughter construction for *chi*<sub>1</sub>, presented below in that order.

$$(65) \left[ [\text{ROOT}_V] [ri, chi_1, ra, riya, xu] [\dots, rka, shka] [\text{PERS}, \text{FUT.PERS}] \right]_{V-ri}$$

$$(66) \left[ [\text{ROOT}_V] [chi_1, ri, riya, mu^{sem}, wa^{sem}, xu^{sem}] [\dots, rka, shka] [\text{PERS}, \text{FUT.PERS}] \right]_{V-chi_1}$$

The third subbranch from *rka* is occupied by the construction for *wa* and its daughter construction for *naxu*, presented below in that order.

$$(67) \left[ [\text{ROOT}_V] [naxu, riya] [wa, \dots, chi_1^{sem}] [rka, shka] [\text{PERS}, \text{FUT.PERS}] \right]_{V-wa}$$

$$(68) \left[ [\text{ROOT}_V] [\dots] [naxu, riya, chi_2, gri, mu, ra] [wa, pa] [rka, shka] [\text{PERS}, \text{FUT.PERS}] \right]_{V-naxu}$$

The construction for *xu*, its daughter construction for *chi*<sub>2</sub>, and finally *chi*<sub>2</sub>'s daughter construction for *naya*, are all represented in the fourth subbranch of the construction for *rka*. The forms of these new constructions are as follows.

$$(69) \left[ [\text{ROOT}_V] [mu, ri] [xu, \dots, chi_1^{sem}] [naxu] [rka, shka] [\text{PERS}, \text{FUT.PERS}] \right]_{V-xu}$$

$$(70) \left[ [\text{ROOT}_V] [mu, ri, \dots] [chi_2, naya, pa, wa, xu, naxu] [riya] [rka, shka] [\text{PERS}, \text{FUT.PERS}] \right]_{V-chi_2}$$

$$(71) \left[ [\text{ROOT}_V] [mu, ri, \dots] [naya, chi_2, pa, wa, xu] [naxu, riya] [rka, shka] [\text{PERS}, \text{FUT.PERS}] \right]_{V-naya}$$

The fifth and final subbranch of the construction for *rka* is occupied by the construction for *mu* and its daughter construction for *gri*.

$$(72) \left[ [\text{ROOT}_V] [ri] [mu, \dots] [naya, pa, xu] [rka, shka] [\text{PERS}, \text{FUT.PERS}] \right]_{V-mu} \{riya\}$$

- (73)  $\left[ \begin{array}{l} [\text{ROOT}_V] [chi_1, ri, riya] [gri, \dots, pa^{sem}, wa^{sem}] [naya] [rka, shka] \\ [\text{PERS, FUT.PERS}] \end{array} \right]_{V-gri}$

## 5 Summary

This paper has sought to provide a descriptively adequate and formally-framed account of affix ordering in Imbabura Quichua. First, the data on affix ordering in IQ were summarized and synthesized. Second, this paper attempted to present the main arguments of prominent theories of affix ordering and show that although they are insightful, no single theory is entirely adequate for accounting for all the IQ data. Third, this paper presented an analysis of IQ affix ordering that was framed in terms of Construction Morphology (Booij 2009). That analysis defined one construction for each verbal morpheme and then grouped those constructions according to a set of principles into a construction hierarchy. This construction hierarchy was built on commonalities and subregularities shared among sets of affixes.

### Appendix: Abbreviations & Affix Glosses

The Leipzig glossing rules were taken as the standard for the abbreviations used here. In the event that an abbreviation is not glossed, it is to be assumed that it follows those conventions.

$\emptyset$	3	Unpronounced third person marking (unspecified for number or tense)
<i>chi</i> <sub>1</sub>	CAUS	Causative
<i>chi</i> <sub>2</sub>	PERSZR	Personalizer
	FUT.PERS	The future tense person marking suffixes: <i>sha</i> , <i>shun</i> , and <i>nga</i>
<i>gri</i>	PROSP	Prospective aspect; “going to”
<i>gu</i>	DIM	Diminutive
	IQ	Imbabura Quichua
<i>mu</i>	TRANSLOC	Translocative; “to here” (Cole 1982:184)
<i>n</i>	3	3rd person subject agreement marker (unspecified for tense or number, but cannot be future tense)
<i>naxu</i>	JT.ACT	Joint action; “together” (Cole 1982:185)
<i>naya</i>	DESID	Desiderative
<i>nchi</i>	1PL	1st person plural subject agreement (unspecified for tense, but cannot be future tense)
<i>nga</i>	3.FUT	3rd person future tense (singular or plural)
<i>ngi</i>	2SG	2nd person singular subject agreement
<i>ngichi</i>	2PL	2nd person plural subject agreement
<i>ni</i>	1SG	1st person singular subject agreement (unspecified for tense, but cannot be future tense)
<i>pa</i>	DULC	Dulcitive, action viewed with affection; term coined by Thomas Recht
	PL	plural



<i>ra</i>	STILL	Translates to English “still”; may not be fully productive
<i>ri</i>	REFL.RECIP	Reflexive or Reciprocal; indicates that action of the verb is directed back at the subject
<i>riya</i>	DUR	Durative (Cole 1982:184)
<i>rka</i>	PA	Past tense, witnessed (Jessica Cleary-Kemp, p.c.)
	SG	singular
<i>sha</i>	1SG.FUT	1st person singular future tense
<i>shka</i>	PA.NWIT	Past tense, non-witnessed (Jessica Cleary-Kemp, p.c.)
<i>shun</i>	1PL.FUT	1st person plural future tense
<i>ta</i>	ACC	Accusative
<i>ka</i>	TOP	Topic marker
<i>wa</i>	1OBJ	First person singular object marker; “me”
<i>xu</i>	IMPFV	Imperfective aspect

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**REPORT 15**

**SURVEY OF CALIFORNIA AND  
OTHER INDIAN LANGUAGES**

*Structure and Contact in  
Languages of the Americas*

**John Sylak-Glassman and Justin Spence, Editors**

**Andrew Garrett and Leanne Hinton, Series Editors**

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