

Towards a realizational approach to morphology in Role & Reference Grammar

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1 Introduction

The traditional view of the lexicon is that it is a list of the indivisible morphological units, or morphemes, in a language. In this view, the English word *dogs* consists of two morphemes: the root *dog* and the suffix *-s*. According to this view, roots and affixes are treated similarly in the lexicon with both being defined in terms of at least a phonological representation, a syntactic category, and a semantic representation. Role & Reference Grammar (RRG) has inherited this traditional view of the lexicon in which lexical units are morphemes (both words and affixes). According to Van Valin (2005:161), “[I]t is necessary to think of the lexicon as having at least two parts, one the traditional storehouse of words and morphemes, and the second a ‘workshop’ where lexical rules and other lexical processes can create new lexical forms which would not otherwise be stored.”

A competing view of the lexicon is that lexical entries are lexemes, rather than morphemes. In this view, the English words *dog* and *dogs* are the singular and plural forms/shapes of the same lexeme DOG. The property ‘PLURAL’ is a paradigmatic relationship between forms, not a unit listed in the lexicon (Spencer 1998:124). According to this view, affixes like *-s* are not lexical entries; instead, affixation is thought of as the result of an operation (Spencer 1998:124). Derived lexemes, like the adjective *doggish*, are present in the lexicon, but regular inflected forms, like *dogs*, are not in the lexicon, and neither are affixes.

A number of morphologists have argued against lexicalist approaches to morphology in which inflectional affixes are assumed to have the same status as words, and have argued for realizational approaches in which the lexicon consists of lexemes, not morphemes. In realizational approaches to morphology, inflectional morphemes are replaced by rules which relate the form of an inflected word to its morphosyntactic representation (Anderson 1984:190). The primary purpose of this paper is to describe a realizational approach to inflectional morphology within RRG, and to show that an RRG lexicon need not contain inflectional morphemes.

Section 2 introduces some basic morphological concepts, while §3 briefly summarizes some of the arguments against morpheme-based approaches to the lexicon. Section 4 provides an overview of semantic representations in an RRG lexicon, while §5 briefly describes syntactic representations in RRG. Section 6 introduces a paradigm-based approach to morphology, and §7 describes the linking between semantic and syntactic representations in RRG. Section 8 shows how a paradigm-based approach to morphology operates within the RRG linking system. Finally, §9 summarizes the implications of these findings for Role & Reference Grammar.

Most of the data for this paper comes from Bonggi, a Western Austronesian language spoken in the Kudat District of Sabah, Malaysia.

2 Basic morphological concepts

“A **lexeme** is a word with a specific sound and a specific meaning. Its shape may vary depending on syntactic context” (Aronoff & Fudeman 2005:42). *Dog* and *dogs* are two different **word-forms** of

¹ I appreciate the comments which I received on a draft from Debbie King, students in my morphology course, and participants at an academic forum at the Graduate Institute of Applied Linguistics.

the same lexeme DOG.² *Dog* occurs in contexts appropriate for a singular noun, and *dogs* in contexts appropriate for a plural noun.

Lexemes are defined by (at least) three dimensions: phonological representation, syntactic category, and semantic representation (Spencer 2004:71). A lexical entry for DOG might look something like (1), where the syntactic dimension includes subcategory information and the semantic representation specifies the meaning.

(1) DOG

Phonological representation:	/dɒg/
Syntactic category:	N
Subcategory:	count noun
Semantic representation:	dog (x) animate-object' (x), domesticated' (x), related-to-wolf' (x), natural-kind' (x)

Morphosyntactic categories are categories which are relevant to both morphology and syntax, including case, number, and gender for nouns, and tense, aspect, and modality for verbs. Each morphosyntactic category is associated with a set of **morphosyntactic properties** such as singular, plural, nominative, past, realis, etc. Word-forms are assigned **morphosyntactic features** such as [*Number:SG*] and [*Number:PL*].³

Inflection involves the formation of word-forms from a single lexeme, such as singular *dog* and plural *dogs* from the lexeme DOG. The two word-forms *dog* and *dogs* realize the morphosyntactic features ‘singular form of DOG’ and ‘plural form of DOG’. **Derivation** involves the creation of one lexeme from another. For example, the verb stem DOG₂ meaning ‘to track like a dog’ is formed by **zero-derivation** from the noun DOG₁.⁴ The verb stem DOG₂ can be inflected for tense (e.g., *dogged*) or aspect (e.g., *dogging*).

Classical morphology was concerned with the arrangement of morphemes in a particular order. For example, *dogs* results from the concatenation of the two morphemes *dog* and *-s*. In this **item-and-arrangement** view (cf. Hockett 1954), affixes have the same status as words and are listed in the lexicon. This paper takes a **word-and-paradigm** or **realizational** approach to inflectional morphology, whereby complex words such as *dogs* result from the lexeme DOG being assigned the morphosyntactic feature [*Number:PL*] with the [z] in [dɒgz] being an **exponent** of the feature [*Number:PL*].⁵

3 Arguments against morpheme-based approaches to the lexicon

Anderson (1992), Stump (2001), and Spencer (2004) are among the morphologists who have argued for realizational approaches to inflectional morphology in which the lexicon consists of lexemes, not morphemes. This section summarizes some of their arguments. Readers are referred to their papers and references therein for elaboration of the arguments against morpheme-based lexicons.

² Lexemes occur in caps, while word-forms occur in italics. See chapter 1 of Matthews (1974) for a detailed discussion of differences between lexemes and word-forms.

³ Morphosyntactic categories occur in bold italics, while morphosyntactic properties occur in small caps.

⁴ Zero-derivation is a word-formation process which changes the lexical category of a word without changing its phonological shape.

⁵ Exponents are markers of morphosyntactic features.

The form *dogs* consists of the root *dog* and a suffix *-s*. In the American Structuralist tradition associated with Bloomfield and Pike, *dog* and *-s* are morphemes which are the smallest meaningful components in a word. Under a morpheme-based theory, or lexical theory, *dog* and *-s* are both lexical entries. This means that *dogs* is no different structurally than the compound *doghouse*.

Both affixes and compounds are bound. Furthermore, affixes and compounds cannot be distinguished on the basis of potential allomorphy. Affixes (such as the English plural suffixes) frequently exhibit phonologically-conditioned allomorphy, and Mathiassen (1996:537) provides evidence of allomorphy in Lithuanian compounds. The alternation of the English indefinite article *a(n)* is evidence that allomorphy is not restricted to affixes or compounds. Neither boundedness nor allomorphy can distinguish affixation from compounding.

A morpheme-based approach treats morphemes as a linear string of phonemes which are attached to a base. However, morphosyntactic properties can be realized by suprasegmental features such as tone, stress, and nasalization. For example, in Ngambay (a language of Southern Chad with both lexical and grammatical tone), some differences in subject agreement properties are marked by grammatical tone. As seen in Table 1, 3SG subject-agreement forms are marked by low tone, while the otherwise identical 2SG subject-agreement forms have a different tone.⁶

Table 1: Ngambay

1SG	2SG	3SG
m-si\ ‘I sit’	si\ ‘you sit’	si\ ‘he/she sits’
m-ai\ ‘I drink’	ai\ ‘you drink’	ai\ ‘he/she drinks’

Morphological properties can also be realized by changes in stress pattern (e.g., *cóntrast* – noun vs. *contrást* – verb), ablaut (e.g., *sing* ~ *sang* ~ *sung*), and consonant mutation (e.g., *house* /haus/ – noun vs. *to house* /hauz/ – verb).

Word-and-paradigm or realizational approaches to morphology stress the existence of non-concatenative phenomena. The process involves relating a basic form to a derived form by a set of phonological operations. Affixation or concatenation is treated the same as non-concatenative morphology.

Other problems in a morpheme-based approach relate to how morphemes contribute to the meaning of words. Consider the Finnish data in (2) in which the lexeme *TALO* ‘house’ is inflected for number and case.

(2)	talo	‘house’	nominative singular
	talo-t	‘houses’	nominative plural
	talo-ssa	‘in the house’	inessive singular
	talo-i-ssa	‘in the houses’	inessive plural
	talo-lla	‘at the house’	adessive singular
	talo-i-lla	‘at the houses’	adessive plural

The Finnish plural suffix *-i* occurs in all cases except nominative where the plural marker is *-t*. This means there would have to be two lexical entries meaning ‘plural’. How does the grammar know which plural marker to select when constructing a word form? In an item-and-arrangement or concatenative approach, the morphotactics of the language first has to select the plural suffix and then the case suffix. The only way to get the right form would be to subcategorize the nominative case

⁶ The prefix *m-* marks 1SG subject-agreement. Ngambay has three register tones: \ ‘high’, \ ‘mid’ and \ ‘low’, as well as phonetic tone glides such as the high to mid glide in *si* ‘you sit’. The Ngambay data and analysis are from Christy Melick and Sarah Moeller.

suffix so that it appears following *-t*. In a word-and-paradigm or realizational approach, *-t* is a portmanteau affix simultaneously conveying two features: [*Number*:PL] and [*Case*:NOMINATIVE].

Morphosyntactic properties can exhibit extended exponence as illustrated by the Swahili marking of negation in (4) where negation is marked by both *h(a)-* ‘NEG’ and *ku-* ‘NEG.PST’.⁷ In negative clauses like (4), past tense is marked by *ku-* ‘NEG.PST’, whereas past tense is marked by *li-* ‘PST’ in positive clauses like (3).

(3) \emptyset -simba a-li-m-shambulia m-bwa
 CLASS9-lion 3SG.SUBJECT.AGR-PAST-3SG.OBJECT.AGR-attack CLASS9-dog
 ‘The lion attacked the dog.’

(4) \emptyset -simba h-a-ku-m-shambulia m-bwa
 CLASS9-lion NEG-3SG.SUBJECT.AGR-NEG.PST-3SG.OBJECT-attack CLASS9-dog
 ‘The lion did not attack the dog.’

While non-realizational theories assume that a morphosyntactic property has one exponent, realizational theories do not require that a single property be realized by at most one exponent per word (Stump 2001:4).

Like American Structuralism, Distributed Morphology (Halle & Marantz 1993) and much of the work in Optimality Theory (McCarthy and Prince 1998) is morpheme-based. For that matter, most of work on the lexicon in RRG has also been morpheme-based.

4 Semantic representation in an RRG lexicon

Because Bonggi nouns are not inflected for case, number, or gender, the remainder of this paper deals with verbs which involve both derivational and inflectional morphology.⁸

The primary mechanism in the RRG approach to semantics is a system of lexical representation involving lexical decomposition. The RRG system of lexical representation is based on the classification of predicates into *Aktionsart* classes; i.e., classes based on inherent aspectual properties (Van Valin 1993:34). Vendler (1967) devised a universal four-way semantic distinction between: 1) states, 2) accomplishments, 3) achievements, and 4) activities. The distinctive features of the four *Aktionsart* classes are shown in Table 2.

Table 2: Distinctive features of basic *Aktionsart* classes

State	Accomplishment	Achievement	Activity
+static	-static	-static	-static
-telic	+telic	+telic	-telic
-punctual	-punctual	+punctual	-punctual

These four *Aktionsart* classes correspond to major verb classes which are encoded in the verbal morphology of Bonggi. For example, the verbs in (5), (6), and (7) belong to different *Aktionsart* classes; however, all three verbs are derived from the root *korij* ‘dry’.⁹

⁷ The negative prefix *ha-* is realized as [h] before *a-* ‘3SG.SUBJECT.AGR’.

⁸ Van Valin & LaPolla (1997:184ff.) illustrate how the semantics of nominals described in Pustejovsky (1995) can be integrated within Role & Reference Grammar.

⁹ The Bonggi data is taken from unpublished texts and an unpublished dictionary. Bonggi has seventeen consonants /p t k b d g ʔ s d̥ʒ m n ɲ l r y w/ and five vowels /i u e o a/. The symbol ‘g’ is used for /g/ and ‘r’ is used for flap /r/.

- (5) Piasu ku η-koriŋ.¹⁰ /m-/ + /koriŋ/
 coconut 1SG.GEN ATTR.ST-dry 'ATTR.ST' 'dry'
 'My coconut is dry.'
- (6) Piasu ku k<om>oriŋ. /-m-/ + /koriŋ/
 coconut 1SG.GEN <ACL>dry 'ACL' 'dry'
 'My coconut is drying.'
- (7) Sia η-oriŋ piasu ku. /η-/ + /koriŋ/
 3SG.NOM ISA.AV-dry coconut 1SG.GEN 'ISA.AV' 'dry'
 'He is drying my coconut.'

Example (5) illustrates an attributive stative verb.¹¹ **States** are static situations with no activity. Attributive states have the morphosyntactic feature [*Vclass*:ATTR.ST] which is realized morphologically as a prefix *m-*. As seen in Table 3, the prefix *m-* has several phonologically-conditioned allomorphs. In (5), the morphosyntactic feature [*Vclass*:ATTR.ST] is realized as a velar nasal [ŋ] due to nasal assimilation.

Table 3: Sample attributive stative verbs and accomplishment verbs

Roots	Attributive stative verbs		Accomplishment verbs	
ayad	m-ayad	'ATTR.ST-pretty'	kam-ayad	'ACL-pretty'
iŋi	m-iŋi	'ATTR.ST-crazy'	kim-iŋi	'ACL-crazy'
odom	m-odom	'ATTR.ST-black'	kom-odom	'ACL-black'
ubas	m-ubas	'ATTR.ST-common'	kum-ubas	'ACL-common'
basa?	m-basa?	'ATTR.ST-wet'	kam-basa?	'ACL-wet'
buka?	m-buka?	'ATTR.ST-open'	kum-buka?	'ACL-open'
panas	m-panas	'ATTR.ST-hot'	kam-panas	'ACL-hot'
puti?	m-puti?	'ATTR.ST-white'	kum-puti?	'ACL-white'
dalam	n-dalam	'ATTR.ST-deep'	d<am>alam	'ACL-deep'
doot	n-doot	'ATTR.ST-bad'	d<om>oot	'ACL-bad'
sega?	n-sega?	'ATTR.ST-red'	sega?	'ACL-red'
tikuŋ	n-tikuŋ	'ATTR.ST-crooked'	t<im>ikuŋ	'ACL-crooked'
tuug	n-tuug	'ATTR.ST-dry'	t<um>uug	'ACL-dry'
kapal	η-kapal	'ATTR.ST-thick'	k<am>apal	'ACL-thick'
gia	mi-gia	'ATTR.ST-big'	g<im>ia	'ACL-big'
lompun	mo-lompun	'ATTR.ST-fat'	l<om>ompun	'ACL-fat'
ramig	ma-ramig	'ATTR.ST-cold'	r<am>amig	'ACL-cold'

¹⁰ The abbreviations and glossing conventions used follow the Leipzig Glossing Rules which are available at <http://www.eva.mpg.de/lingua/files/morpheme.html>. Underlying forms of verb roots and affixes are shown in phonemic brackets following each example. Infixes are marked by hyphens within phonemic brackets, but separated from their base by angle brackets in examples and glosses. Abbreviations used include: 1 first person, 2 second person, 3 third person, ACL accomplishment, ACT actor, ACY activity, AGR agreement, ASP aspect, ATTR attributive, AV actor voice, CAU causative, DEC declarative, DET determiner, GEN genitive, IF illocutionary force, IMP imperative, INGR ingressive, ISA induced states of affairs, LS logical structure, MOD modality, NEG negative, NIMP non-imperative, NOM nominative, NP noun phrase, PL plural, PP prepositional phrase, PSA privileged syntactic argument, RLS realis, SG singular, SR semantic representation, ST state, UND undergoer, UV undergoer voice, VCLASS verbclass.

¹¹ Bonggi has several subclasses of states.

Example (6) illustrates an accomplishment verb. **Accomplishments** are non-punctual changes of state. They have the morphosyntactic feature [*Vclass*:ACL] which is realized morphologically as either a prefix *km-* or an infix *-m-*. As seen in Table 3, prefixes occur before vowel-initial roots and roots whose initial consonant is a bilabial (i.e., /b/ and /p/); infixes occur elsewhere. The prefix or infix vowel is epenthetic, being a copy of the initial vowel in the root.

Example (7) illustrates an induced state of affairs in which an actor does something resulting in a change of state to an undergoer. Induced state of affairs can occur in actor or undergoer voice. Example (7) is in actor voice. The morphosyntactic features in (7) are [*Vclass*:ISA, *Voice*:AV, *IF*:DEC]. The features [*Vclass*:ISA, *Voice*:AV] are realized morphologically as a prefix *η-*. As seen in Table 4, this prefix has several phonologically-conditioned allomorphs.¹² In (7), the morphosyntactic features [*Vclass*:ISA, *Voice*:AV] are realized as a velar nasal [ŋ] as a result of the coalescence of the prefix *η-* ‘ISA.AV’ with the initial consonant of the root *korij* ‘dry’.

Table 4: Induced states of affairs in actor voice

Root		
ala	η-ala	‘defeat someone’
elu	η-elu	‘get someone drunk’
beroit	m-eroit	‘tear something’
binasa	m-inasa	‘break something’
pali?	m-ali?	‘burn someone’
pesa?	m-esa?	‘break something’
guab	ηu-guab	‘split something open’
kakas	η-akas	‘uncover something’
kotop	η-otop	‘break something off’
loput	ηo-loput	‘snap something off’
lomos	ηo-lomos	‘choke something’
sekat	n-ekat	‘detach something’
tedak	n-edak	‘puncture something’
tutuŋ	n-utuŋ	‘burn something’

The verbs in (8), (9), and (10) are derived from the root *dabu?* ‘fall’. Example (8) illustrates an activity verb, (9) illustrates an achievement verb, and (10) illustrates an induced state of affairs in actor voice.

- | | | | |
|-----|--------------------------|---------|---------|
| (8) | Dolok kaa? na d<am>abu? | /-m-/ + | /dabu?/ |
| | rain near now <ACY>fall | ‘ACY’ | ‘fall’ |
| | ‘Rain is about to fall.’ | | |
| (9) | Sia n-dabu? | /n-/ + | /dabu?/ |
| | 3SG.NOM RLS-fall | ‘RLS’ | ‘fall’ |
| | ‘She/he fell.’ | | |

¹² The prefix vowels in Table 4 are epenthetic, being a copy of the initial vowel in the root.

- (10) Sia i-ŋa-dabu? sou. /i-/ + /ŋ-/ + /dabu?/
 3SG.NOM RLS-ISA.AV-fall anchor ‘RLS’ ‘ISA.AV’ ‘fall’
 ‘He cast an anchor.’

Activities are dynamic situations which are inherently temporally unbounded. They have the morphosyntactic feature [*Vclass*:ACY] which is realized morphologically as either a prefix *m-* or an infix *-m-* when the illocutionary force is non-imperative (i.e., declarative or interrogative). Table 5 lists some motion activity verbs whose illocutionary force is non-imperative.¹³ As seen in Table 5, prefixes occur before vowel-initial roots and roots whose initial consonant is a bilabial; infixes occur elsewhere. The infix vowel is epenthetic, being a copy of the initial vowel in the root. In (8), the morphosyntactic feature [*Vclass*:ACY] is realized as an infix because the root begins with /d/. The infix vowel in (8) is a copy of the root-initial vowel.

Table 5: Motion activity verbs with non-imperative illocutionary force

Root		
ilan	m-ilan	‘ACY-lie.down’
upug	m-upug	‘ACY-sit.down’
uli?	m-uli?	‘ACY-return.home’
usag	m-usag	‘ACY-stand.up’
panu	m-panu	‘ACY-walk; go’
piit	m-piit	‘ACY-send’
dua?	d < um > ua?	‘ACY-descend’
loŋi	l < om > oŋi	‘ACY-swim’
luas	l < um > uas	‘ACY-exit’
selekei	s < em > elekei	‘ACY-ascend’
suak	s < um > uak	‘ACY-enter’
tindiaŋ	t < im > indiaŋ	‘ACY-turn.at.intersection’
tulak	t < um > ulak	‘ACY-depart’

Achievements are punctual changes of state. They have the morphosyntactic feature [*Vclass*:ACH]; however, this feature is not morphologically marked. The prefix *n-* in (9) marks the morphosyntactic feature [*Modality*:REALIS].

In RRG, verbs are analyzed in terms of a lexical decomposition system in which state and activity predicates are basic and the other classes are derived from them (Van Valin 2005:42). The decompositional representations of verbs are called logical structures. Logical structures express the relationship between a predicate and its arguments. Table 6 shows the lexical representations for different types of *Aktionsart* classes (cf. Van Valin 2005:45).¹⁴

¹³ The imperative form of these verbs is the bare root.

¹⁴ Operators like BECOME are presented in small caps, constants like **predicate** are presented in boldface followed by a prime, and variables like x are presented in normal typeface.

Table 6: Lexical representations for *Aktionsart* classes

Verb class	Logical Structure
State	predicate' (x) or (x, y)
Accomplishment	BECOME predicate' (x) or (x, y)
Achievement	INGR predicate' (x) or (x, y)
Activity	do' (x, [predicate' (x) or (x, y)])
Active Accomplishment	do' (x, [predicate' ₁ ' (x, (y))]) & INGR predicate' ₂ ' (z, x) or (y)
Causative	α CAUSE β , where α, β are logical structures of any type

The generic logical structure (LS) for attributive stative verbs is shown in (11). The logical structure for the attributive stative verb *η-korij* 'ATTR.ST-dry' in (5) is shown in (12), and the semantic representation (SR) for the clause in (5) is shown in (13).¹⁵

(11) Generic LS for attributive stative verbs: **be'** (x, [**predicate'**])

(12) LS for *η-korij* 'ATTR.ST-dry': **be'** (x, [**dry'**])

(13) SR for (5): **be'** (*piasu* 1SG, [**dry'**])

The generic logical structure for accomplishment verbs with an underlying attributive stative predicate is shown in (14). The logical structure for the accomplishment verb *k<om>orij* '<ACL>dry' in (6) is shown in (15), and the semantic representation (SR) for the clause in (6) is shown in (16).

(14) Generic LS for accomplishment verb
with underlying attributive stative: BECOME **be'** (x, [**predicate'**])

(15) LS for *k<om>orij* '<ACL>dry': BECOME **be'** (x, [**dry'**])

(16) SR for (6): BECOME **be'** (*piasu* 1SG, [**dry'**])

Verbs which belong to the same class share the same generic logical structure. For example, all the attributive stative verbs in Table 3 have the generic logical structure in (11), and all the accomplishment verbs in Table 3 have the generic logical structure in (14).

The difference in meaning between verbs in the same class is captured by replacing the **predicate'** in the logical structure with a specific verb constant such as **dry'** in (12) and (15).¹⁶

As stated in §2, lexemes are defined by three dimensions: phonological representation, syntactic category, and semantic representation. The word-form *η-korij* 'ATTR.ST-dry' is derived from the adjective root *korij* 'dry'. The lexeme *DKORID* contains the information in (17) in its lexical entry (cf. the lexical entry for *DOG* in (1)). The semantic representation in (17) shows the logical structure of the verb.

(17) *DKORID*
 Phonological representation: /ηkorij/
 Syntactic category: V
 Subcategory: attributive state 'ATTR.ST'
 Semantic representation: **be'** (x, [**dry'**])

Levin and Rappaport Hovav (1998:258) point out that lexical representations can be related in two ways. First, they can share the same lexical semantic template, but have a different constant. For

¹⁵ Possessive NPs like *piasu ku* 'my coconut' in (5) involve a possessive predication within the NP which would be captured in a more detailed semantic representation than (13). This paper ignores information focus structure. A richer semantic representation would include the activation status of arguments (Van Valin 2005:79-80).

¹⁶ Constants are English words since English is the semantic metalanguage used.

example, the accomplishment verbs *k<om>orij* ‘<ACL>dry’ in (15) and *kam-ayad* ‘ACL-pretty’ in (18) share the same lexical semantic template, but have different constants, **dry**’ and **pretty**’. The shared lexical semantic template is the generic logical structure for accomplishment verbs with an underlying attributive stative predicate shown in (14). All of the accomplishment verbs in Table 3 share the lexical semantic template in (14).

(18) LS *kam-ayad* ‘ACL-pretty’: BECOME **be**' (x, [**pretty**'])

Second, lexical representations can contain the same constant, but have a different lexical semantic template. For example, *η-korij* ‘ATTR.ST-dry’ in (12) and *k<om>orij* ‘<ACL>dry’ in (15) share the same constant **dry**’, but have a different lexical semantic template. The logical structure for the accomplishment verb *k<om>orij* ‘<ACL>dry’ includes the operator BECOME which is not part of the lexical semantic template of stative verbs (cf. Table 6).

Van Valin (2005:47ff.) argues that related verbs can be derived by lexical rules. For further discussion of the *Aktionsart* classes listed in Table 6, including tests for determining *Aktionsart* classes, readers are referred to chapter 2 of Van Valin (2005). For detailed descriptions of other *Aktionsart* classes in Bonggi see Boutin (2007) and Boutin (2009).

5 Syntactic representation in RRG

Section 4 provided an overview of semantic representations in an RRG lexicon, whereas this section briefly describes syntactic representations in RRG.

5.1 Predicates, arguments, adjuncts, and constituent projection

“Every language makes a distinction between predicates and arguments, and every language distinguishes between NPs/PPs which are arguments of the predicate and those which are adjuncts” (Van Valin & LaPolla 1997:27). These distinctions in clause structure are illustrated in Figure 1.

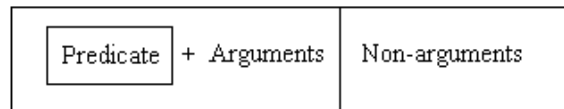


Figure 1: Universal oppositions underlying clause structure

The primary syntactic constituents of a clause are the **nucleus**, which contains the predicate, the **core**, which includes the predicate and its arguments, and the **periphery**, which consists of non-arguments (adjuncts) of the predicate. This layered structure of the clause is illustrated in Figure 2.

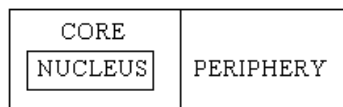


Figure 2: Layered structure of the clause

RRG only recognizes one level of syntactic representation, which is the surface syntax. The morphosyntactic representation represents the actual form of the sentence, including the linear

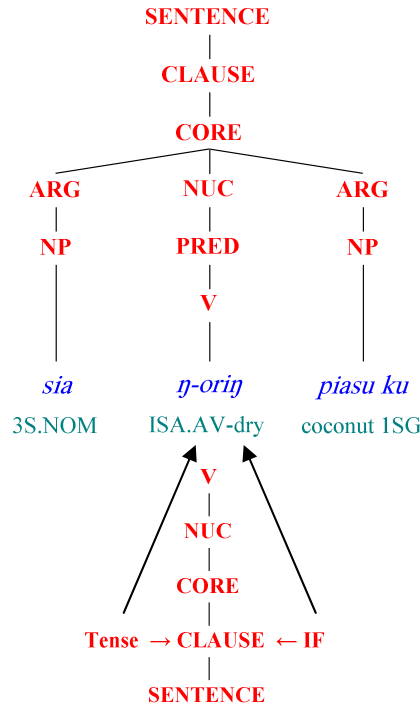


Figure 4: Constituent and operator projections for (19)

RRG recognizes only one level of syntactic representation which is directly linked with the semantic representation of the sentence (Van Valin & LaPolla 1997:21). The general structure of an RRG-based theory of grammar is presented in Figure 5.

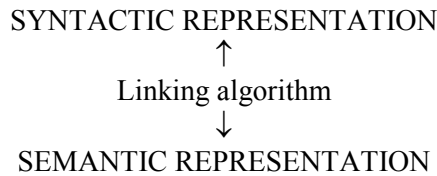


Figure 5: General structure of RRG (Van Valin & LaPolla 1997:21)

The heart of the grammar in RRG is the linking between semantic representations like (20) and syntactic representations like Figure 4 (Van Valin & LaPolla 1997:645). Before describing this linking system in §7, section 6 introduces a realizational approach to morphology.

(20) SR for (19): **do'** (3SG, Ø) CAUSE [BECOME **dry'** (*piasu* 1SG)]

6 Paradigm-based approach to morphology

A **morphological paradigm** is a set of morphological contrasts that a given class of lexemes can make. Morphological paradigms are defined in terms of morphological categories (e.g., *Number*), their permissible values (e.g., PLURAL), and any co-occurrence restrictions.

This section introduces a paradigm-based approach to Bonggi morphology in which morphological rules are formulated as operations on morphological expressions. Consider the subparadigm of induced states of affairs in (21)-(26).

(21) η-orij 'ISA.AV-dry' actor voice, irrealis modality, non-imperative illocutionary force

(22) i-η-orij 'RLS-ISA.AV.dry' actor voice, realis modality, non-imperative illocutionary force

- (23) po- η -ori η ‘IMP-ISA.AV.dry’ actor voice, imperative illocutionary force
 (24) kiri η -in ‘dry-ISA.UV’ undergoer voice, irrealis modality, non-imperative
 (25) k<i>ori η ‘<RLS>dry’ undergoer voice, realis modality, non-imperative
 (26) kiri η -a? ‘dry-ISA.UV.IMP’ undergoer voice, imperative illocutionary force

The word-forms in (21)-(26) are representative of simple causative verbs in Table 6. These verbs are described in §4 as induced state of affairs in which an actor does something resulting in a change of state to an undergoer. All induced states of affairs have a CAUSE operator in their logical structure (e.g., (20)). They are semantically transitive, having both an actor and an undergoer, either of which can be the subject. Examples (7) and (19) illustrate the verb η -ori η ‘ISA.AV-dry’ which is an induced state of affairs in actor voice. The actor voice (which occurs when the subject is the actor) has two prefix slots, one for modality (realis/irrealis) and illocutionary force (imperative), and one for voice. The undergoer voice (which occurs when the subject is the undergoer) has a suffix slot for voice when the verb is irrealis, and an infix slot for modality when the verb is realis. Table 7 provides a subset of morphosyntactic categories which are associated with Bonggi verbs and a subset of morphosyntactic properties which are possible values for each category. Together, the categories and properties in Table 7 show some morphosyntactic features, such as [*Vclass*:ACL] and [*Mod*:RLS].

Table 7: Selected morphosyntactic features of Bonggi verbs

Categories	Abbreviation	Properties	Abbreviation
Verb class	Vclass	attributive state	ATTR.ST
		accomplishment	ACL
		achievement	ACH
		activity	ACY
		induced states of affairs	ISA
Voice	Voice	actor	AV
		undergoer	UV
Modality	Mod	realis	RLS
		irrealis	IRR
Aspect	Asp	progressive	PRO
		iterative	ITER
Illocutionary force	IF	imperative	IMP
		non-imperative	NIMP
		declarative	DEC

Each *Aktionsart* class in Table 6 has a unique lexical representation with a unique meaning; however, a unique morpheme cannot be assigned to each *Aktionsart* class. All the verbs in (21)-(26) share the same logical structure: **do'** (x, \emptyset) CAUSE [BECOME **dry'** (y)]; however, they do not share the same stem. The three actor voice forms (i.e., (21), (22), and (23)) share a derived stem η -ori η ‘ISA.AV-dry’; however, the three undergoer voice forms in (24), (25), and (26) do not share a derived stem. The choice between actor or undergoer voice is an option in the linking between syntax and semantics. Tense, aspect, modality, and illocutionary force are operators (cf. §5.2).

A set of functions are needed to realize the features in Table 7. These functions are realization rules (RRs) like (27).

$$(27) \text{RR}_{\{Vclass:ISA, Voice:AV\}, V} (\langle X, \sigma \rangle) = \langle \eta X, \sigma \rangle$$

Following Stump (2001), the features to be realized and the lexical class that the function refers to are given as subscripts. The function maps a pair consisting of a form X and the complete set of features characterizing the final word form. The output is another form (e.g., a root + affix, or a stem

+ affix) and the same complete feature set. The variable σ stands for the complete feature set of the word being computed. The realization rule in (27) states that induced states of affairs in actor voice are formed by adding η - to a form X. Realization rules apply whenever the set of features which they realize is found as a subset of σ .

The rule in (28) states that induced states of affairs in actor voice and realis modality are formed by adding i - to a form X.

$$(28) \text{ RR}_{\{Vclass:ISA, Voice:AV, Mod:RLS\}, V} (\langle X, \sigma \rangle) = \langle iX, \sigma \rangle$$

When both rule (27) and rule (28) apply, (28) applies to the output of (27). Rules occur in distinct, extrinsically-ordered blocks. The ordering is defined by an index as seen in (29) and (30).

$$(29) \text{ RR}_{I, \{Vclass:ISA, Voice:AV\}, V} (\langle X, \sigma \rangle) = \langle \eta X, \sigma \rangle$$

$$(30) \text{ RR}_{II, \{Vclass:ISA, Voice:AV, Mod:RLS\}, V} (\langle X, \sigma \rangle) = \langle iX, \sigma \rangle$$

Because (29) is in block I, it applies to a root. Rule (30) applies to the stem which is the output of block I rules. The realization rule needed to produce the imperative form in (23) is shown in (31) which is a block II rule.¹⁹

$$(31) \text{ RR}_{II, \{Vclass:ISA, Voice:AV, IF:IMP\}, V} (\langle X, \sigma \rangle) = \langle pX, \sigma \rangle$$

Because imperatives are always irrealis, irrealis is part of the complete feature set σ in (31). Rule (30) cannot apply to the output of (31) or vice versa, because the two rules belong to the same block. This is expected since the features realis and irrealis are incompatible.

The realization rules needed to produce the undergoer voice forms in (24), (25), and (26) are shown in (32), (33), and (34).

$$(32) \text{ RR}_{I, \{Vclass:ISA, Voice:UV, IF:NIMP, Mod:IRR\}, V} (\langle X, \sigma \rangle) = \langle Xon, \sigma \rangle$$

$$(33) \text{ RR}_{II, \{Vclass:ISA, Voice:UV, Mod:RLS\}, V} (\langle CX, \sigma \rangle) = \langle CiX, \sigma \rangle^{20}$$

$$(34) \text{ RR}_{II, \{Vclass:ISA, Voice:UV, IF:IMP\}, V} (\langle X, \sigma \rangle) = \langle Xa?, \sigma \rangle$$

The rule in (32) belongs to block I and applies to roots producing new stems. Because the infix $-i$ does not co-occur with the undergoer voice suffix $-on$,²¹ the rule in (33) does not apply to the output of the rule in (32). Instead, the rules in block I apply vacuously, then rules (33) and (34) in block II apply to the output of the rules in block I producing forms like (25) and (26).

In a realizational approach to morphology, a word's association with a particular set of morphosyntactic properties licenses the introduction of those properties' exponents (Stump 2001:2). Morphological rules establish a correspondence between the morphosyntactic properties and phonological forms. The rules replace a list or lexicon of grammatical morphemes (cf. Anderson 1984:158). "The crucial insight behind paradigm-based morphology is that once we have paradigms we don't need (inflectional) morphemes. Inflected word forms are realizations of cells in paradigms" (Spencer 2004:72).

¹⁹ The prefix vowel in (23) is epenthetic, being a copy of the first vowel in the stem.

²⁰ The rule in (33) inserts an infix after the initial consonant of consonant-initial roots. The prefix $in-$ occurs before vowel-initial roots.

²¹ This is a general feature of Philippine-type languages like Bonggi.

7 Linking in RRG

The RRG linking system works both from semantics to syntax and from syntax to semantics. The linking between semantics and syntax is governed by the Completeness Constraint in (35) (Van Valin & LaPolla 1997:325).

(35) *Completeness Constraint*

All of the arguments explicitly specified in the semantic representation of a sentence must be realized syntactically in the sentence, and all of the referring expressions in the syntactic representation of a sentence must be linked to an argument position in a logical structure in the semantic representation of the sentence.

7.1 *Linking from semantics to syntax*

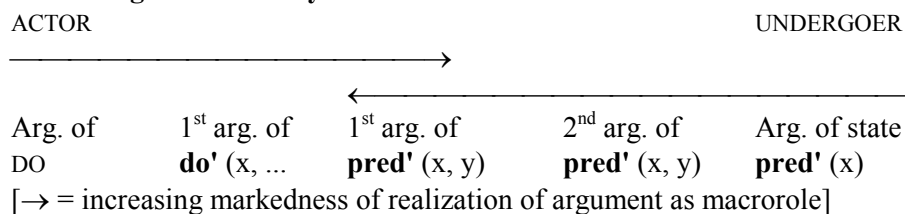
The first step in linking from semantics to syntax is to construct the semantic representation of the sentence, based on the logical structure of the predicate (Van Valin 2005:136). Returning to the example in (7) and (19), the semantic representation is shown in (20), repeated here as (36).

(36) SR for (19): **do'** (3SG, Ø) CAUSE [BECOME **dry'** (*piasu* 1SG)]

The semantic representation in (36) shows the argument structure of the verb *η-orij* 'ISA.AV-dry' in (19). Notice that the semantic representation makes no reference to semantic roles or grammatical relations (cf. Kroeger 2005:67-69). RRG uses two semantic macroroles: actor and undergoer. **Actor** refers to the entity which instigates, controls, or effects the action expressed by the verb. **Undergoer** indicates the entity affected by the action or state expressed by the verb (Walton 1986:45).

The second step in linking from semantics to syntax is to determine the actor and undergoer assignments (Van Valin 2005:136). The information that is necessary for mapping from semantic arguments to syntactic arguments can be read off the semantic representations. The relationship between macroroles and argument positions in logical structures is captured in the Actor-Undergoer Hierarchy in (37) (Van Valin & LaPolla 1997:146). This double hierarchy states that the argument position that is leftmost on the cline will be the actor and the argument position that is rightmost will be the undergoer. This is the unmarked situation; marked assignments to undergoer are possible.

(37) **Actor-Undergoer Hierarchy**



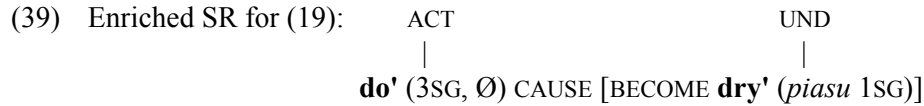
The principles for determining the number and nature of macroroles are shown in (38) (Van Valin & LaPolla 1997:152).

(38) **DEFAULT MACROROLE ASSIGNMENT PRINCIPLES:**

- a. Number: the number of macroroles a verb takes is less than or equal to the number of arguments in its LS.
 1. If a verb has two or more arguments in its LS, it will take two macroroles.
 2. If a verb has one argument in its LS, it will take one macrorole.
- b. Nature: for verbs which take one macrorole,
 1. If the verb has an activity predicate in its LS, the macrorole is actor.
 2. If the verb has no activity predicate in its LS, the macrorole is undergoer.

The number of macroroles a verb takes is either \emptyset , 1, or 2, and is largely predictable from the logical structure of the verb (Van Valin 1993:46-47). According to principle a.1 in (38), the verb *η-oriŋ* ‘ISA.AV-dry’ takes two macroroles since it has two arguments in its logical structure. The argument ‘3SG’ is the actor since it is the 1st arg. of **do'** in (36), and *piasu* 1SG ‘my coconut’ is the undergoer since it is single argument of a one-place state predicate **dry'** in (36).

The output of the second step in the linking process is shown in (39).



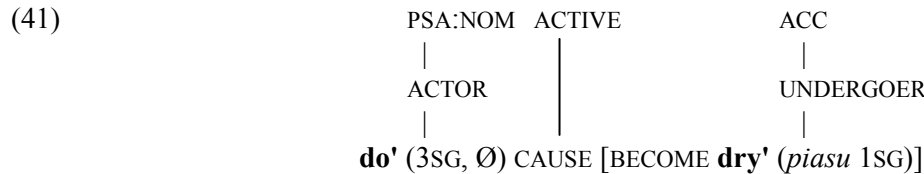
Macroroles provide the primary link between semantic representation and syntactic representation. Once arguments have been assigned to macroroles, the third step is determine the morphosyntactic coding of the arguments (Van Valin 2005:136). The most important morphosyntactic status is the subject (the privileged syntactic argument).²² For verbs with two macroroles, the default choice for subject is the actor (or active voice); however, undergoer subjects are possible resulting in a type of passive voice construction.

Part of the process involved in assigning actor and undergoer to specific morphosyntactic statuses is case and preposition assignment. Case marking rules make crucial reference to macroroles and direct core argument status (Van Valin 1993:72). The case marking rules for accusative languages like Bonggi are given in (40) (Van Valin 2005:108). The rules in (40) apply only to direct core arguments in main clauses.²³

(40) **Case marking rules for accusative constructions**

- a. The highest ranking macrorole takes NOMINATIVE case.
- b. The other macrorole takes ACCUSATIVE case.

The output of the third step in linking from semantics to syntax is shown in (41).



The fourth step is syntactic template selection, and the fifth step assigns arguments to positions in the syntactic representation as seen in Figure 6.²⁴

²² In RRG, the most important morphosyntactic status is normally referred to as the **privileged syntactic argument**. Although the grammatical relation subject is not a universal in RRG, I have elected to use the term *subject* for simplicity in this paper.

²³ Direct core arguments are non-oblique syntactic arguments which correspond to arguments in the LS. “Core arguments are those arguments which are part of the semantic representation of the verb” (Van Valin & LaPolla 1997:26). Languages typically code core arguments differently from adjuncts.

²⁴ Readers are referred to Van Valin & LaPolla (1997) and Van Valin (2005) for a description of syntactic template selection and a more detailed discussion of linking.

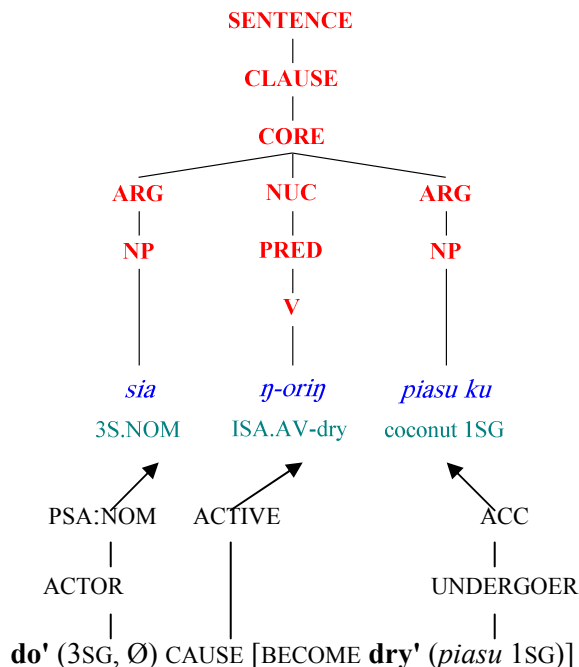


Figure 6: Linking from semantics to syntax in active voice clause

7.2 Linking from syntax to semantics

The linking between the syntactic and semantic representations is bidirectional. Linking from the syntactic representation to the semantic representation requires reference to morphosyntactic features and is illustrated in Figure 7.

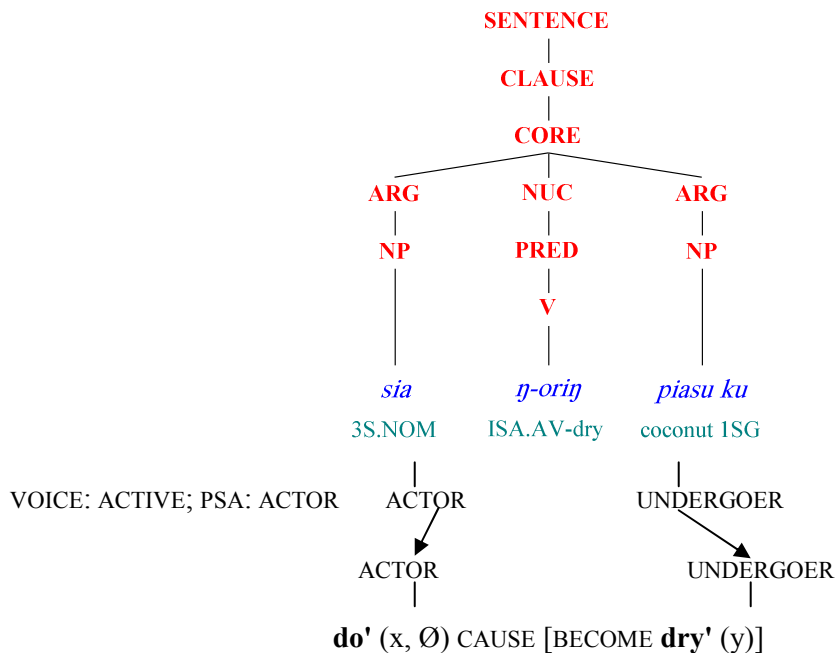


Figure 7: Linking from syntax to semantics in active voice clause

The first step in linking from syntax to semantics is to identify the verb and its voice (Van Valin 2005:151). The verb *η-orig* ‘ISA.AV-dry’ in (19) is an actor voice transitive verb.

The second step in linking from syntax to semantics is to determine the macrorole(s) and other core argument(s) in the clause. Because the verb in (19) is an actor voice transitive verb, the subject is the actor. The NP following the verb in (19) is a direct core argument so it must be the undergoer.

The third step involves retrieving the logical structure of *η-orig* 'ISA.AV-dry' from the lexicon, **do'** (x, Ø) CAUSE [BECOME **dry'** (y)], and assigning macroroles: x = actor and y = undergoer. The arguments from the sentence are then linked to the logical structure arguments as seen in Figure 7.

8 Linking in RRG within a paradigm-based approach to morphology

Sections 7.1 and 7.2 have provided an overview of the bidirectional linking system in RRG. While the linking algorithms neatly link semantic predicates and their arguments with predicates and arguments in syntax, differences in inflectional morphology of the verb have not been addressed in the algorithms described. According to §7.2, linking from syntax to semantics involves retrieving the logical structure of the verb from the lexicon. The implication is that the lexicon includes every inflected form of every verb!

8.1 Linking from semantics to syntax

Van Valin (2005:52-53) shows how the inflectional features of modality, aspect, and illocutionary force which are described in Table 7 can be incorporated into semantic representations. This is illustrated by the enriched semantic representation in (42) which excludes nominal operators.

(42) SR for (19): $\langle_{\text{IFDEC}} \langle_{\text{MODIRR}} \langle \mathbf{do'}$ (3SG, Ø) CAUSE [BECOME **dry'** (*piasu* 1SG)] $\rangle \rangle \rangle$

Each verb class has a unique lexical representation (cf. Table 6). Therefore, the inclusion of information about tense, aspect, modality, and illocutionary force in semantic representations means that all of the morphosyntac features in Table 7 (with the exception of voice) can be determined from semantic representations. As stated in §7.1, the choice between actor or undergoer voice is an option in the linking from semantics to syntax.

The inflectional features (e.g., modality, aspect, and illocutionary force) included in enriched semantic representations like (42) match the inflectional morphosyntac features in realization rules. In other words, the realization rules in §6 are part of the system of linking from semantics to syntax. They produce the exponents of the feature sets found in each rule.

Stump (2001) is concerned with inflectional morphology; yet, the features in Table 7 are a mixture of derivational and inflectional features. According to Stump (1998:13), "The structure of paradigms in a given language is determined by the inventory of morphosyntactic properties available in that language." Stump's morphosyntactic properties of verbs include the properties associated with the categories voice, modality, aspect, and illocutionary force in Table 7, but exclude the properties associated with verb class (cf. Stump 1998:28). The verb class or *Aktionsart* class properties (e.g., state, accomplishment, achievement, activity, etc.) belong to what Stump refers to as lexicosemantic properties. According to Stump (1998:2), lexicosemantic properties like 'stative' determine the semantic composition.

Stump and Spencer make a clear distinction between inflection and derivation. Derivation encodes lexicosemantic relations within the lexicon, while inflection encodes phrase-level properties and relations (Stump 1998:22).

Like Stump, RRG views differences in *Aktionsart* classes as lexical. The different verb classes in Table 6 have different logical structures and different meanings. Differences in morphology which correspond to differences in *Aktionsart* classes are clearly derivational. On the other hand, operators like tense, aspect, modality, and illocutionary force are clearly inflectional (see §5.2). Differences in voice, which are accounted for by the principles in (37) and (38), result from different linking choices outside of the lexicon.

Linguists widely assume that derivational morphological processes within the lexicon take place before inflectional processes. Given this view and an item-and-arrangement approach to morphology, one would assume that verbs which belong to the same class share the same stem. Consider the Bonggi stems in Table 8 which are inflected for realis modality.

Table 8: Realis allomorphs

	Root	Inflected stem	Gloss	Verb class & voice	Realis marker	Inflectional form
a.	ala	i-ŋala	‘defeat someone’	ISA.AV	i-	prefix
b.	ala	in-ala	‘defeat someone’	ISA.UV	in-	prefix
c.	tutuŋ	n-tutuŋ	‘burnt’	ACHIEVEMENT	n-	prefix
d.	tutuŋ	i-nutuŋ	‘burnt something’	ISA.AV	i-	prefix
e.	tutuŋ	t < i > utuŋ	‘burnt something’	ISA.UV	<i>	infix
f.	pesaʔ	i-pesaʔ	‘broken’	ACHIEVEMENT	i-	prefix
g.	pesaʔ	i-mesaʔ	‘broke something’	ISA.AV	i-	prefix
h.	pesaʔ	p < i > esaʔ	‘broke something’	ISA.UV	<i>	infix
i.	titik	i-nitik	‘beat an instrument’	ISA.AV	i-	infix
j.	titik	b < in > ereit	‘tear something’	ISA.UV	<in>	infix
k.	odom	k < i > modom	‘became black’	ACCOMPLISHMENT	<i>	infix
l.	panas	k < i > mpanas	‘became hot’	ACCOMPLISHMENT	<i>	infix
m.	tikuŋ	t < i > mikuŋ	‘became crooked’	ACCOMPLISHMENT	<i>	infix
n.	upug	m < i > upug	‘sat down’	ACTIVITY	<i>	infix
o.	tindiaŋ	t < i > mindiaŋ	‘turn at intersection’	ACTIVITY	<i>	infix
p.	mati	meti	‘died’	ACHIEVEMENT	e	ablaut

Table 8 shows that Bonggi has six distinct forms for marking realis modality: three prefixes *i-*, *in-*, and *n-* as seen in rows (a-c); two infixes <i> and <in> as seen in rows (e and j); and ablaut as seen in row (p). With the exception of ablaut, which is a suppletive form, both the phonological shape (/i/, /in/, or /n/) and the position (prefix or infix) are predictable. The shape of the inflected forms is conditioned by the phonology; however, the position of the inflected forms is conditioned by lexical semantics (i.e., *Aktionsart* class). Realis modality is always marked by a prefix for achievements (e.g., rows c and f in Table 8) and actor voice induced states of affairs (e.g., rows a, d, g, and i). Infixes can only occur with undergoer voice induced states of affairs (e.g., rows e, h, and j), activity verbs (e.g., rows n and o), and accomplishment verbs (rows k, l, and m). The position of the realis modality marker provides information about the possible verb class. In other words, part of the functional yield of the realis marker is carried by the templatic position, rather than exclusively by the segmental make-up.

The two rules in (30) and (33) interact with a set of phonological processes to produce the realis markers for the induced states of affairs in Table 8 (i.e., rows a, b, d, e, g, h, i, and j). Rules (30) and (33) do not produce the realis markers for other verb classes since they only apply to verbs with the feature [*Vclass*:ISA]. Other rules, such as the one for achievement verbs in (43), are required to produce the realis forms for other verb classes.

$$(43) \text{ RR}_{\text{II}, \{V\text{class}:\text{ACH}, \text{Mod}:\text{RLS}\}, V} (\langle X, \sigma \rangle) = \langle n/iX, \sigma \rangle$$

Rule (43) interacts with a set of phonological processes to produce the realis prefixes for the achievement verbs in rows c and f of Table 8. Realis achievement verbs are marked by [n] if the root begins with an alveolar, otherwise they are marked by [i]. Rule (43) does not apply to the ablaut form *meti* ‘died’ in row p because an ablaut rule which belongs to the same morphological block is more narrowly applicable than rule (43). Ablaut overrides rule (43) in accordance with the Pāṇini principle. “Choices among rules belonging to the same block are determined by a single universal principle (Pāṇini’s principle), according to which the narrowest applicable rule always overrides other applicable members of the same block” (Stump 2001:33).

A single affix frequently serves as a cumulative exponent. For example, the infix <i> in row e of Table 8 serves simultaneously as an exponent of the morphosyntactic features [*Vclass*:ISA], [*Voice*:UV], and [*Mod*:RLS].

Although the realis allomorphs in Table 8 are dependent upon the verb class, verbs that belong to the same class are not necessarily inflected the same. Specifically, induced states of affairs are treated differently depending on whether they are actor voice or undergoer voice. Furthermore, as pointed out in §6, the three undergoer voice forms in (24), (25), and (26) do not share a derived stem. This is not a problem in a paradigm-based approach.

8.2 Linking from syntax to semantics

Because linking from syntax to semantics involves interpreting overt morphosyntactic forms, it is more difficult than linking from semantics to syntax (Van Valin 2005). However, Bonggi speakers can predict much of the semantics from the morphological shape of the verb. For example, given a hypothetical verb root whose shape is /root/, listeners can usually determine the following from the surface morphology of the verb: verb class, voice, modality, and whether or not the illocutionary force is imperative as seen in Table 9.

Table 9: Verb class, voice, modality, and illocutionary force predictions given hypothetical root /root/

Morphological Shape	Verb class	Voice	Modality	IF
mo-root	attributive state/ achievement		irrealis	
i-root	achievement		realis	
r<om>oot	activity/accomplishment		irrealis	
r<i><m>oot	activity/accomplishment		realis	
root	activity		irrealis	imperative
ŋo-root	induced state of affairs	actor	irrealis	
i-ŋo-root	induced state of affairs	actor	realis	
po-ŋo-root	induced state of affairs	actor	irrealis	imperative
r<i>oot	induced state of affairs	undergoer	realis	
root-on	induced state of affairs	undergoer	irrealis	
root-a?	induced state of affairs	undergoer	irrealis	imperative
root-an	induced state of affairs	marked undergoer	irrealis	
root-ei	induced state of affairs	marked undergoer	irrealis	imperative

Although activity verbs and accomplishment verbs usually cannot be distinguished on the basis of morphological shape alone, if the subject is an actor then it is an activity, if the subject is an undergoer it is an accomplishment.

9 Conclusion

This paper has argued for a realizational approach to inflectional morphology within RRG in which inflectional morphemes are replaced by rules which relate the form of an inflected word to its morphosyntactic representation. Previous work on a realizational approach to morphology in RRG includes Everett (2002) and Martín Arista (2008).

Van Valin and LaPolla (1997), Van Valin (2005:158), and Cortés Rodríguez's (2006) claim that derivational affixes which change syntactic category occur in the lexicon. For example, both Cortés Rodríguez (2006:43) and Van Valin and LaPolla (1997:188) explain English agent nominalization by means of the lexical rule in (44).

(44) verb + er \rightarrow [_N verb + er] 'x_i which verbs' ([_{LS}...(x_i,...)]), where 'x' is the actor argument in the logical structure.

The rule in (44) is a word formation rule which applies to a verb base to produce a noun. The lexical material in (44) includes both lexemes and affixes. Cortés Rodríguez (2006) argues that derivational affixes are lexical units. According to him, derivational affixes should have a logical structure like lexemes.²⁵

This paper has not addressed whether or not derivational affixes which change syntactic category should occur in the lexicon. The derivational processes which are described in this paper do not involve a change in syntactic category. Instead, they involve a change in verb class as when the logical operator BECOME is added to the stative predicate **be'** (x, [**dry'**]) in (12), resulting in the accomplishment BECOME **be'** (x, [**dry'**]) in (15) with its concomitant morphology. This type of derivational process is extremely productive in Bonggi as when the attributive state in (5), the accomplishment in (6), and the induced states of affairs in (7), (21), (22), (23), (24), (25), and (26) are all derived from the root *korin* 'dry'.

Van Valin (2005:47) has argued that the relationship between activity verbs and active accomplishments can be derived by lexical rules, and has suggested that other verb classes might also be derived by lexical rule. In a morpheme-based theory, changes in verb classes are described as a combination of a base with a derivational morpheme which expresses the meaning of the derived class. In a process-based approach like the one described here, changes in verb classes are explained in terms of changes in features. In the realizational approach to morphology described in this paper, verb class is a key morphosyntactic feature of inflectional rules (cf. Table 7).²⁶ The fundamental insight of processual approaches to morphology is that morphology is a set of relationships rather than a set of morphemes.

In a morpheme-based approach, morphological rules/operations are defined in terms of morphemes. In a realizational approach, morphological rules/operations are defined in terms of features. From either perspective, the morphological operations involved in verb class changes are lexical; i.e., they occur in the lexicon. Furthermore, in both approaches, information about verb classes is available in the logical structure of verbs and semantic representations of clauses.

The analysis of realis and irrealis modality in §6 and §8 provides evidence that a realizational approach is superior to a morpheme-based approach. In a morpheme-based approach, one would expect to inflect an invariant stem with realis modality [*Mod*:RLS] or irrealis modality [*Mod*:IRR]. However, undergoer voice [*Voice*:UV] induced state of affairs [*Vclass*:ISA] do not share an invariant

²⁵ Being a lexicalist theory, traditionally RRG has not made an issue of the inflectional versus derivational distinction. Instead, RRG has presumed some version of the Lexicalist Hypothesis in which inflectional affixes are accounted for in the lexicon and are not sensitive to syntax.

²⁶ RRG can inform Stump's theory of Paradigm-Function Morphology via careful attention paid to *Aktionsart* classes in RRG.

stem. As shown in (32) and (33), *-on* is a cumulative exponent of the features [*Vclass*:ISA], [*Voice*:UV], and [*Mod*:IRR], while the infix <ɨ> is a cumulative exponent of the features [*Vclass*:ISA], [*Voice*:UV], and [*Mod*:RLS]. Verb class is a lexical category, modality is an inflectional category, and the choice of voice takes place during the linking from semantics to syntax. In other words, different morphosyntactic features can be added throughout the linking process.

Work by Marial Usón, Faber, and Guest on a semantic metalanguage for RRG is compatible with a realizational approach to morphology (e.g., Marial Usón & Faber (2005), and Marial Usón & Guest (2005)), as is Nolan's work on a feature-based computational lexicon for RRG (e.g., Nolan 2004).²⁷

This paper has taken a conservative approach to morpheme eradication by not trying to expunge all morphemes from the lexicon. I have simply argued that neither fully inflected words nor inflectional affixes should be included in an RRG lexicon.²⁸

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²⁷ Nolan's lexicon includes both lexemes and affixes. Although his feature system accounts for the operator projection suggesting inflectional affixes, it appears to be compatible with a realizational approach to morphology.

²⁸ In his argument for a realizational approach to morphology in RRG, Martín Arista (2008:122) claims that derivational affixes occur in the lexicon.

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