New Perspectives in Role and Reference Grammar

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Edited by

Wataru Nakamura

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Edited by Wataru Nakamura

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EDITOR'S INTRODUCTION

WATARU NAKAMURA

Role and Reference Grammar [RRG] (Van Valin and LaPolla 1997; Van Valin 2005) is a functionalist framework with a particular emphasis on typological adequacy. RRG started out as a theory of linking and complex sentences (clause linkage) with a direct mapping between semantic and syntactic representations (Foley and Van Valin 1984) and has since developed into a brand of parallel architecture theory (Jackendoff 1997, 2002; cf. Sadock 1991; Bresnan 2000) with a set of linking rules that relates syntax, semantics, and discourse-pragmatics and a principled typology of complex sentences and grammatical relations as its hallmark (see Foley and Van Valin 1984; Van Valin 1990, 1993, 2005, 2008; Ohori 1992; Hasegawa 1996; Van Valin and LaPolla 1997; Bentley 2006; Kailuweit et al. 2008; Guerrero et al. 2009; and Narrog 2009, among others). What is notable about the RRG linking theory is that it allows discourse-pragmatics to play an important role in the linking.

The present collection of papers, all of which were presented in the 10th International RRG Conference, held at University of California, Berkeley, in August 2009, represents a continued investigation in a number of important areas of linguistic theory including the linking between syntax and semantics, argument structure, the interaction between the lexicon and construction, the distinction between argument and adjuncts, control in complex sentences, and the interface between syntax and information structure. The papers not only exemplify analytical tools available in RRG, but also present notable advances in the component of morphology and the syntax-morphology and syntax-information structure interface. Essentially, the volume extends the parallel architecture of RRG to morphology, one of the previously neglected areas in RRG, and elaborates on the theory of syntax-semantics-information structure interface. The volume also has a computational dimension, for instance in applying the linking algorithm that relates lexical semantics and syntax to a machine translation system.

The book is divided into five sections: inflectional and derivational morphology (Part 2), lexicon, argument structure, and constructions (Part

3), syntax-semantics interface (Part 4), syntax-information structure interface (Part 5), and computational applications of RRG (Part 6).

Part 2 contains three papers, all of which address the question of what the RRG theory of morphology should include. Two of them, Michael Boutin's and Wataru Nakamura's paper, propose two related but distinct views of inflectional morphology. With an illustration from verbal conjugation paradigms in Bonggi (Austronesian), Boutin presents a lexeme-based, inferential-realizational model (e.g. Anderson 1992, Stump 2001), which derives inflectional affixes from applying word-formation rules to a full set of morphosyntactic features characterizing a cell within the paradigm. In contrast, Nakamura argues for a lexical-realizational view of inflectional morphology (e.g. Halle and Marantz 1993), which derives inflectional affixes from an OT-style constraint hierarchy, while allowing independent status to affixes (as well as stems) in the lexicon.

Brian Nolan's paper, "Meaning construction and grammatical inflection in the layered structure of the Irish word", sketches a constructional approach to the derivational and inflectional morphology in RRG. Specifically, he proposes to extend the layered structure of the clausal and nominal structure (Van Valin and LaPolla 1997; Van Valin 2005) to the word-internal structure. Nolan characterizes a derivational affix as a construction that contains a skeletal structure for an input lexeme, treats both derivation and compounding with an illustration from the Irish derivational morphology, and proposes a division of labor between the constituent projection (derivational morphology) and operator projection (inflectional morphology).

Part 3 contains four papers centering on the theory of argument structure and interactions between the lexicon and constructions. RRG has committed itself to establishing the lexical decomposition system whose main ingredients are the control structure and four-way aspectual classification à la Vendler (1967). Both Rolf Kailuweit's and Carlos González Vergara's paper focus on Romance anti-causative constructions formed from their transitive counterparts with the help of reflexivization. Kailuweit's paper purports to be a semantic classification of the Romance anti-causative alternations. Kailuweit builds on Reinhart's (2002) feature-based classification of transitive verbs and locates the Romance anti-causative constructions on an active-passive continuum (with respect to the role of undergoer) ranging from genuine reflexive to reflexive passive constructions.

González Vergara argues that the basic function of Spanish reflexive clitic *se* is to promote the role of undergoer, while diminishing that of actor. Under this analysis, González Vergara explains why some Spanish verbs

cannot occur with *se*. The reason is that they already privilege the role of undergoer or have no macrorole argument in the first place. It is worthy of mention here that Kailuweit and González Vergara presuppose constructional schemata accommodating the set of language-specific generalizations in addition to the universal argument reduction rule that realizes a non-actor argument as the "subject" and reduces the number of core arguments by one.

Anna Riccio's paper, "Three-participant events in serial verb constructions and the syntax-semantics interface", provides a typological survey of three-participant serial verb constructions and illustrates an RRG account of them. The serial verb constructions under Riccio's examination overlap with ditransitive constructions, which have attracted a great deal of attention (since they involve an intriguing interaction of semantic roles, grammatical relations, and information structure (see Malchukov et al. 2010 and Dalrymple and Nikolaeva 2011), but Riccio argues that they also instantiate a particular type of clause linkage constructions, i.e. a nuclear or core juncture.

Elke Diedrichsen's paper, "The theoretical importance of constructional schemas in RRG", capitalizes on the growing role played by constructional schemata for describing argument structure constructions (cf. Goldberg 1995, 2006) and examines the role played by macroroles in the linking. Diedrichsen argues that using constructional schemata beyond the realm of idiosyncratic, language-specific features (cf. Van Valin 2005) allows us to dispense with macroroles, a key notion in the RRG linking theory, and to accommodate the ambiguity and flexibility of constructions.

Part 4 contains three papers. Sergio Ibáñez Cerda's paper, "PP types in RRG", recasts the familiar distinction between arguments and adjuncts in terms of a combination of semantic and syntactic considerations. Ibáñez Cerda builds on Jolly (1993), the first RRG account of preposition assignments, and proposes to classify prepositional phrases according to whether they encode a semantic argument of a verb or not ([±argument]), whether they belong to a core or not ([±core]), and whether they are predicative (i.e. have their own semantics) or not ([±predicative]). Given these three distinctions, Ibáñez Cerda proposes a logical typology of PP types, with illustrations drawn mainly from Spanish.

Lilián Guerrero's paper, "Clause linkage and purpose clauses in Southern Uto-Aztecan languages", is an extension of the RRG account of control constructions, according to which aspectual, modal, and desiderative verbs (e.g. *hope*) involve actor control, while implicative and jussive verbs (e.g. *order*) involve undergoer control (Foley and Van Valin 1984; cf. Sag and Pollard 1991; Jackendoff and Culicover 2003). Guerrero investigates

control phenomena outside the realm of complement clauses. Specifically, she selects purposive constructions in Southern Uto-Aztecan languages (e.g. Yaqui, Guarijío) as her target and argues that controllers in those constructions are determined by semantic and pragmatic factors.

Chien-hung Lin and Jung-hsing Chang's paper, "Modality in Taiwan Sign Language", explores the syntactic distribution of modal expressions and its correlation with speakers' subjectivity in Taiwan Sign Language. What is interesting about their account is that the modal expressions at the clause-final position are accompanied by non-manual features that are meant to convey stronger subjectivity.

Part 5 comprises two papers, which target the syntax-information structure interface. Mitsuaki Shimojo's paper, "The left periphery and focus structure in Japanese", proposes to extend the scope of the RRG theory of information structure (focus structure; cf. Lambrecht 1994) by incorporating subordinate focus structure, detailed in Erteschik-Shir (2007). He focuses on various uses of the nominative marker *-ga* and topic marker *-wa* in Japanese. It is customary in Japanese linguistics to assume that *-wa* has two uses, topical and contrastive, while *-ga* has two uses, neutral and exhaustive-listing. Shimojo notes that both *-wa* and *-ga* have marked uses and derives their non-canonical uses from focus structure augmented by the subordinate focus structure. Finally, Antoinette Hawayek's paper, "Topic, focus, and word order in the acquisition of Spanish", applies the RRG view of focus structure to L1 acquisition of Spanish, with a focus on the acquisition of word order in intransitive and transitive clauses.

The present volume ends with a paper with a computational application of RRG. Brian Nolan and Yasser Salem's paper, "UniArab: RRG Arabic-to-English machine translation", argues that the RRG linking algorithm is able to serve as a model for sentence comprehension and generation, for instance in machine translation.

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PART 1.

INFLECTIONAL AND DERIVATIONAL MORPHOLOGY

TOWARDS A REALIZATIONAL APPROACH TO MORPHOLOGY IN RRG

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Abstract

Role and Reference Grammar has assumed a traditional morpheme-based approach to verb morphology in which changes in verb classes are described as a combination of a base with a derivational morpheme which expresses the meaning of the derived class. This paper argues for a process-based approach in which changes in verb classes are explained in terms of changes in features. In the realizational approach to morphology described in this paper, *Aktionsart* classes are a key morphosyntactic feature of inflectional rules. The fundamental insight of processual approaches to morphology is that morphology is a set of relationships rather than a set of morphemes.

Keywords

Realizational morphology, verbs, paradigm

1. Introduction[1]

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

[1] I appreciate the helpful comments which I received from Debbie King on an earlier version of this paper.

and 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 RRG.

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 and Fudeman

2005:42). *Dog* and *dogs* are two different word-forms of 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:	/dɔg/
Syntactic category:	N
Subcategory:	count noun
Semantic representation:	**dog** (x) **animate'** (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, perfective, 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 DOG_2 meaning "to track like a dog" is formed by zero-derivation from the noun DOG_1.[4] The verb stem DOG_2 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-

[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.

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 [dɔgz] being an exponent of the feature [***Number***:PL].[5]

3. Arguments against Morpheme-based Approaches

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.

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, Ngambay, a Nilo-Saharan language of Southern Chad, has both lexical and grammatical tone marking subject agreement properties (Ndjerareou et al. 2010).

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.

[5] Exponents are markers of morphosyntactic features.

Word-and-paradigm or realizational approaches to morphology stress the existence of non-concantenative 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 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".[6] 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)	ø-simba	a-li-m-shambulia	m-bwa
	CL9-lion	3SG.SBJ.AGR-PAST-3SG.OBJ.AGR-attack	CL9-dog
	"The lion attacked the dog."		

(4)	ø-simba	h-a-ku-m-shambulia	m-bwa
	CL9-lion	NEG-3SG.SBJ.AGR-NEG.PST-3SG.OBJ-attack	CL9-dog
	"The lion did not attack the dog."		

[6] The negative prefix *ha-* is realized as [h] before *a-* "3SG.SBJ.AGR".

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 and 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.[7]

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 1.

Table 1: 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 classes of predicates which are encoded in the morphology of Bonggi. For example, the predicates in (5), (6), and (7) belong to different *Aktionsart* classes; however, all three predicates are derived from the root *koriŋ* "dry".[8]

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

[8] The Bonggi data is taken from unpublished texts and an unpublished dictionary. Bonggi has seventeen consonants /p t k b d g ʔ s dʒ m n ɲ ŋ l ɾ y w/ and five vowels /i u e o a/. The symbol *g* is used for /g/ and *r* is used for flap /ɾ/.

(5)	Piasu	ku	ŋ-koriŋ.[9]	/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	ŋ-oriŋ	piasu	ku.	/ŋ-/ +	/koriŋ/
	3SG.NOM	ISA.AV-dry	coconut	1SG.GEN	"ISA.AV"	"dry"
	"He is drying my coconut."					

Example (5) illustrates an attributive stative predicate.[10] States are static situations with no activity. Attributive states have the morphosyntactic feature [***Akclass***:ATTR.ST] which is realized morphologically as a prefix *m-*. As seen in Table 2, the prefix *m-* has several phonologically-conditioned allomorphs. In (5), the morphosyntactic feature [***Akclass***:ATTR.ST] is realized as a velar nasal [ŋ] due to nasal assimilation.

[9] 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 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. A list of abbreviations follows the conclusion.

[10] Bonggi has several subclasses of states.

Table 2: Sample attributive stative and accomplishment predicates

Roots	Attributive stative predicates		Accomplishment predicates	
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
basaʔ	*m-basaʔ*	ATTR.ST-wet	*kam-basaʔ*	ACL-wet
bukaʔ	*m-bukaʔ*	ATTR.ST-open	*kum-bukaʔ*	ACL-open
panas	*m-panas*	ATTR.ST-hot	*kam-panas*	ACL-hot
putiʔ	*m-putiʔ*	ATTR.ST-white	*kum-putiʔ*	ACL-white
dalam	*n-dalam*	ATTR.ST-deep	*d<am>alam*	ACL-deep
doot	*n-doot*	ATTR.ST-bad	*d<om>oot*	ACL-bad
segaʔ	*n-segaʔ*	ATTR.ST-red	*segaʔ*	ACL-red
tuug	*n-tuug*	ATTR.ST-dry	*t<um>uug*	ACL-dry
kapal	*ŋ-kapal*	ATTR.ST-thick	*k<am>apal*	ACL-thick
gia	*mi-gia*	ATTR.ST-big	*g<im>ia*	ACL-big
ramig	*ma-ramig*	ATTR.ST-cold	*r<am>amig*	ACL-cold

Example (6) illustrates an accomplishment verb. Accomplishments are non-punctual changes of state. They have the morphosyntactic feature [***Akclass***:ACL] which is realized morphologically as either a prefix *km-* or an infix *-m-*. As seen in Table 2, 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 [***Akclass***:ISA, ***Voice***:AV, ***IF***:DECL]. The features [***Akclass***:ISA, ***Voice***:AV] are realized morphologically as a prefix *ŋ-*. As seen in Table 3, this prefix has several phonologically-conditioned allomorphs.[11] In (7), the morphosyntactic features [***Akclass***:ISA, ***Voice***:AV] are realized as a velar nasal [ŋ] as a result of the coalescence of the prefix *ŋ-* "ISA.AV" with the initial consonant of the root *koriŋ* "dry".

[11] The prefix vowels in Table 3 are epenthetic, being a copy of the initial vowel in the root.

Table 3: Induced states of affairs in actor voice

Root	Stem	Gloss
ala	*ŋ-ala*	"defeat someone"
elu	*ŋ-elu*	"get someone drunk"
bereit	*m-ereit*	"tear something"
binasa	*m-inasa*	"break something"
paliʔ	*m-aliʔ*	"burn someone"
pesaʔ	*m-esaʔ*	"break something"
guab	*ŋu-guab*	"split something open"
kakas	*ŋ-akas*	"uncover something"
kotop	*ŋ-otop*	"sever something"
loput	*ŋo-loput*	"snap (rope/chain)"
lomos	*ŋo-lomos*	"suffocate something"
sekat	*n-ekat*	"uproot something"
tedak	*n-edak*	"puncture something"
tutuŋ	*n-utuŋ*	"burn something"

The verbs in (8), (9), and (10) are derived from the root *dabuʔ* "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 kaaʔ na d<am>abuʔ. /-m-/ + /dabuʔ/
rain near now <ACY>fall "ACY" "fall"
"Rain is about to fall."

(9) Sia n-dabuʔ. /n-/ + /dabuʔ/
3SG.NOM PFV-fall "PFV" "fall"
"She/he fell."

(10) Sia i-ŋa-dabuʔ sou. /i-/ + /ŋ-/ + /dabuʔ/
3SG.NOM PFV-ISA.AV-fall anchor "PFV" "ISA.AV" "fall"
"He dropped the anchor."

Activities are dynamic situations which are inherently temporally unbounded. They have the morphosyntactic feature [***Akclass***: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 4 lists some motion activity verbs whose illocutionary force is non-

imperative.[12] As seen in Table 4, 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 [***Akclass***: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 4: Motion activity verbs with non-imperative illocutionary force

Root	Stem	Gloss
ilaŋ	*m-ilaŋ*	"ACY-lie.down"
upug	*m-upug*	"ACY-sit.down"
uliʔ	*m-uliʔ*	"ACY-return.home"
usag	*m-usag*	"ACY-stand.up"
panu	*m-panu*	"ACY-walk; go"
piit	*m-piit*	"ACY-send"
duaʔ	*d<um>uaʔ*	"ACY-descend"
loŋi	*l<om>oŋi*	"ACY-swim"
luas	*l<um>uas*	"ACY-exit"
selekei	*selekei*	"ACY-ascend"
suak	*s<um>uak*	"ACY-enter"
tindiaŋ	*t<im>indiaŋ*	"ACY-turn.at.intersection"
tulak	*t<um>ulak*	"ACY-depart"

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

In RRG, verbs and other predicates 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 predicates are called logical structures. Logical structures express the relationship between a predicate and its arguments. Table 5 shows the lexical representations for different types of *Aktionsart* classes (cf. Van Valin 2005:45).[13]

[12] The imperative form of these verbs is the bare root.

[13] 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 5: Lexical representations for *Aktionsart* classes

Aktionsart 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 and β are logical structures of any type

The generic logical structure [LS] for attributive stative predicates is shown in (11). The logical structure for the attributive stative predicate *ŋ-koriŋ* "ATTR.ST-dry" in (5) is shown in (12), and the semantic representation [SR] for the clause in (5) is shown in (13).[14]

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

(12) LS for *ŋ-koriŋ* "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>oriŋ* "<ACL>dry" in (6) is shown in (15), and the semantic representation 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>oriŋ* "<ACL>dry": BECOME **be'** (x, [**dry'**])

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

Predicates which belong to the same class share the same generic logical structure. For example, all the attributive stative predicates in Table 2 have

[14] 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).

the generic logical structure in (11), and all the accomplishment predicates in Table 2 have the generic logical structure in (14).

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

As stated in §2, lexemes are defined by three dimensions: phonological representation, syntactic category, and semantic representation. The word-form *ŋ-koriŋ* "ATTR.ST-dry" is derived from the adjective root *koriŋ* "dry". The lexeme *ƆKORIƆ* 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 predicate.

(17) *ƆKORIƆ*

Phonological representation:	/*ŋkoriŋ*/
Syntactic category:	Adj
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 example, the accomplishment verbs *k<om>oriŋ* "<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 2 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, *ŋ-koriŋ* "ATTR.ST-dry" in (12) and *k<om>oriŋ* "<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>oriŋ* "<ACL>dry" includes the operator BECOME which is not part of the lexical semantic template of stative predicates (cf. Table 5).

Van Valin (2005:47ff.) argues that related verbs can be derived by lexical rules. For further discussion of the *Aktionsart* classes listed in Table 5, including tests for determining *Aktionsart* classes, readers are

[15] Constants are English words since English is the semantic metalanguage used.

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. 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 and LaPolla 1997:27). These distinctions in clause structure are illustrated in Figure 1.

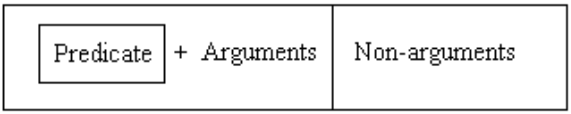

Figure 1: Universal oppositions underlying clause structure

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.

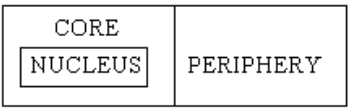

Figure 2: Layered structure of the clause

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 sequence of its constituent