A Summary of Role and Reference Grammar

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Role and Reference Grammar [RRG] (Van Valin 1993a, 2005, Van Valin & LaPolla 1997) grew out of an attempt to answer two basic questions: (i) what would linguistic theory look like if it were based on the analysis of languages with diverse structures such as Lakhota, Tagalog, Dyirbal and Barai, rather than on the analysis of English?, and (ii) how can the interaction of syntax, semantics and pragmatics in different grammatical systems best be captured and explained? RRG takes language to be a system of communicative social action, and accordingly, analyzing the communicative functions of grammatical structures plays a vital role in grammatical description and theory from this perspective. It is a monostratal theory, positing only one level of syntactic representation, the actual form of the sentence. The overall organization of the theory is given in Figure 1.

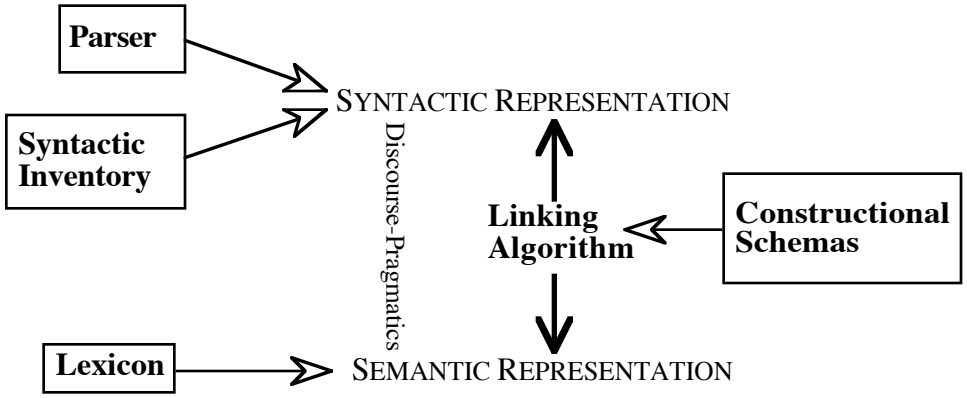

Figure 1: Organization of Role and Reference Grammar

Central concepts of the theory

Clause structure RRG rejects the standard formats for representing clause structure (grammatical relations, X-bar syntax), because they are not universal and hence necessarily impose aspects of structure on at least some languages where it is not appropriate. The RRG conception of clause structure, the 'layered structure of the clause' [LSC], is made up of the 'nucleus', which contains the predicate(s), the 'core', which contains the nucleus plus the argument(s) of the predicate(s), and the 'clause'. Syntactic arguments occurring in the core are referred to as 'core arguments', and they may be direct or oblique. Direct core arguments are those not marked by an adposition, in languages like English and German, or those marked by direct cases (nominative, accusative, dative or ergative, absolutive, dative) in case-marking languages like Russian or Dyirbal. Oblique core arguments are marked by adpositions or oblique cases, e.g. instrumental, locative. Modifying each level of the clause is a 'periphery', which contains adjunct modifiers, both phrasal (PPs or clauses, modifying the core and clause) and non-phrasal (adverbs, modifying all three layers). These aspects of the LSC are universal.

Some language have a ‘pre-core slot’ [PrCS], which is the position of WH-words in languages like English and Icelandic, and a ‘left-detached position’, [LDP], which is the position of the pre-clausal element in a left-dislocation construction. In addition, some verb-final languages have a ‘post-core slot’ [PoCS] (e.g. Japanese; Shimojo 1995), and some languages also have a ‘right-detached position’, [RDP], which is the position of the post-clausal element in a right-dislocation construction. Each of the major layers (nucleus, core, clause) is modified by one or more operators, which include grammatical categories such as tense, aspect, modality and evidentiality. The LSC applies equally to fixed word-order and free word-order languages, to head-marking and dependent-marking languages, to languages with and without grammatical relations. It is assumed that noun phrases and adpositional phrases have a comparable layered structure; operators in the NP include determiners and quantifiers. In the formal representation of the LSC, operators are represented in a distinct projection of the clause from the predicates and arguments (the constituent projection). This is presented in Figures 2-5. In Figure 2, the peripheries have been omitted from this diagram for the sake of simplicity.

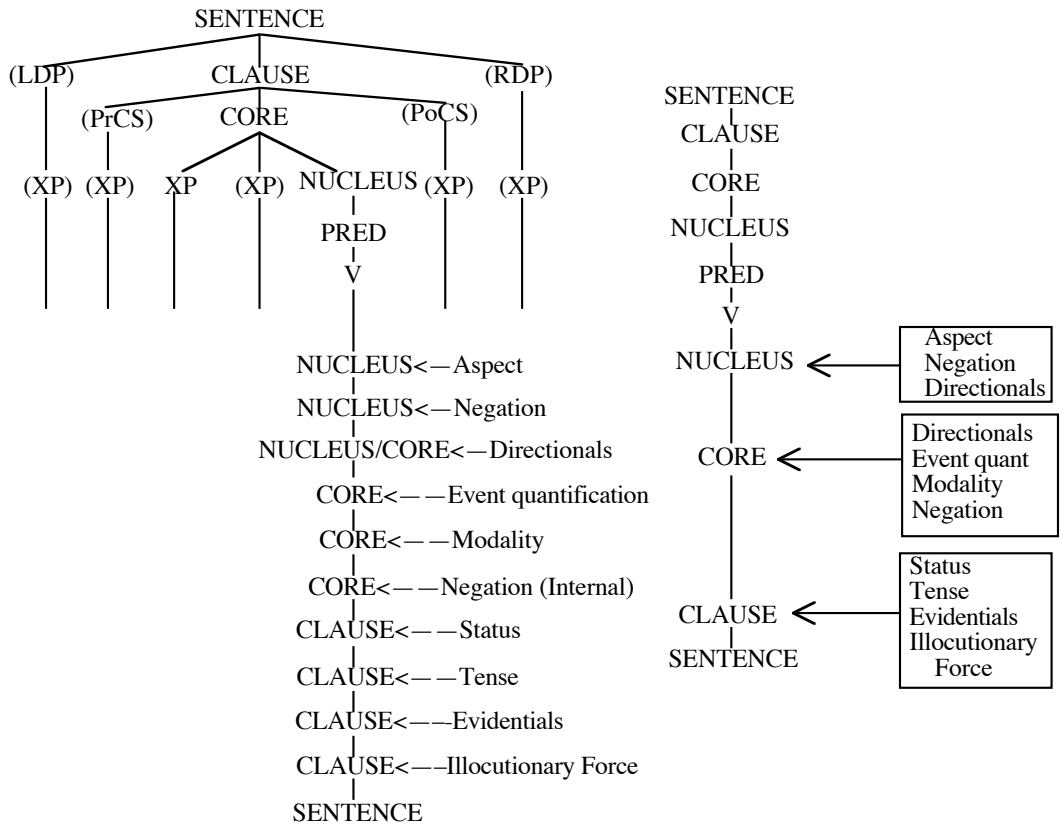

Figure 2: The Layered Structure of the Clause

In Figure 3, *did* is labeled both ‘tense’ and ‘IF’ in the operator projection, because the position of the tense operator signals illocutionary force in English: core-medial tense signals declarative IF, core-initial (pre-core) tense signals interrogative IF, and the absence of tense in a matrix core signals imperative IF.

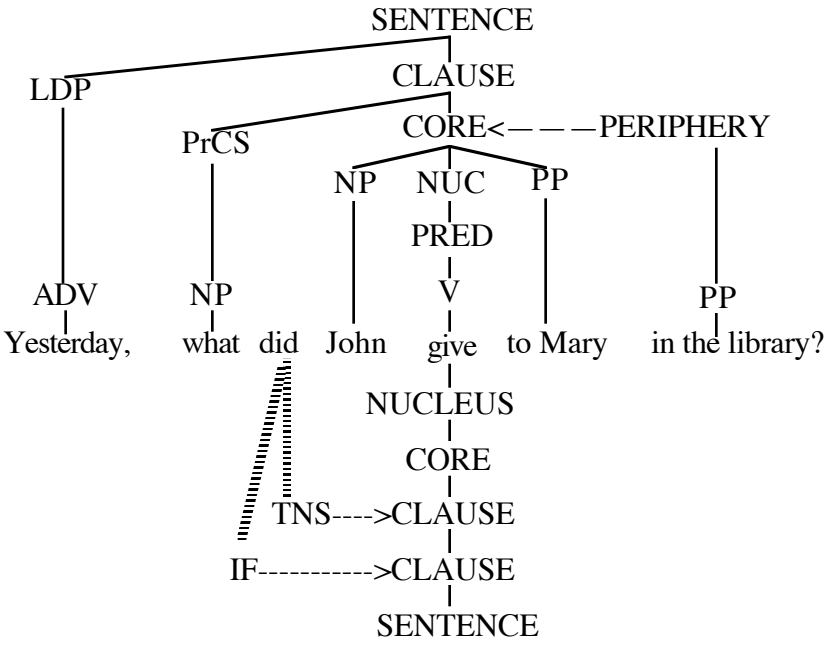

Figure 3: The LSC in English

The operator projections of the clause have been omitted in the Dyirbal (Dixon 1972) and Lakhota examples in Figures 4 and 5. The Dyirbal and English sentences in Figure 4 are translations of each other.

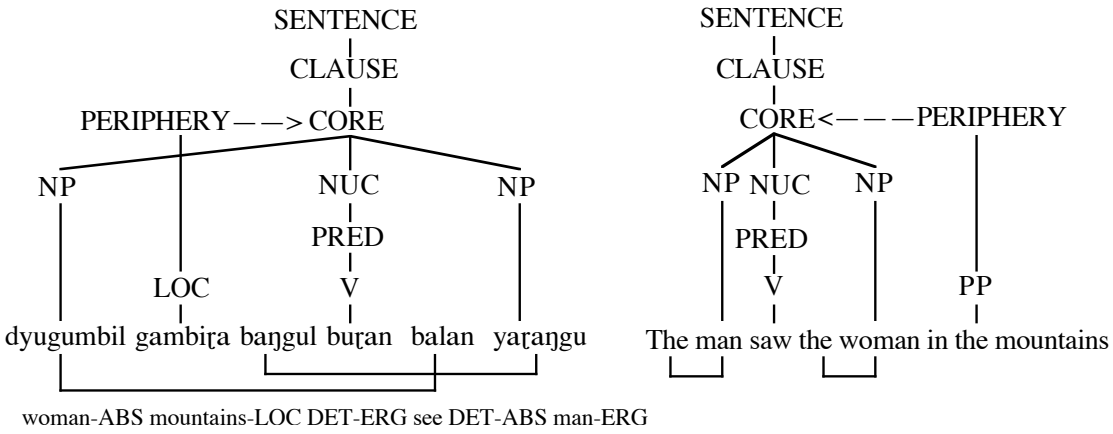

Figure 4: The LSC in Dyirbal and English

The lines connecting the determiners to the head nouns are the operator projection within the NP, analogous to the operator projection within the clause, as in Figures 2-3. In head-marking languages like Lakhota, the bound pronominals on the verb are considered to be the core arguments; overt NPs are within the clause in apposition to them. Note that despite the differences between the three languages in Figures 4-5, comparable structural relations, e.g. core argument, peripheral adjunct, are represented in the same way.

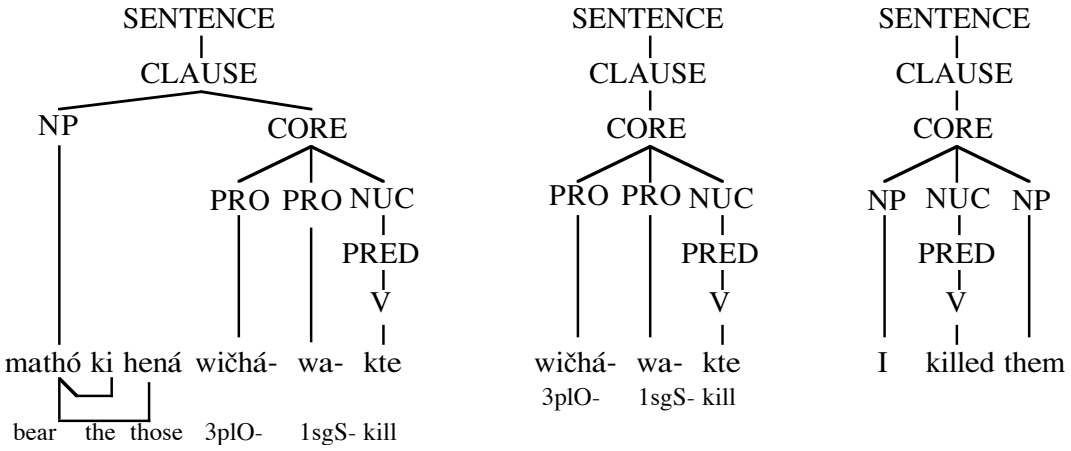

Figure 5: The LSC in Lakhota (Head-marking) and English (Dependent-marking)

It should be noted that these representations are not abstract, unlike relational networks or functional structures; they are intended to be concrete, in the sense that they should represent the actual form of the sentence, including the linear sequence of its constituent elements and their morphological properties. RRG does not allow phonologically null elements in the syntactic representation, e.g., traces, null pronominals. The representation may be abstract with respect to phonology or morphophonology, e.g. the output could be in terms of abstract morphophonological units rather than concrete phonetic ones.

Representations of constituent projections such as these should be viewed as 'syntactic templates', the inventory of which in a language constitutes an important component of its grammar. It may be termed the 'syntactic inventory' and complements the lexicon. See Figure 1.

The three central components of the LSC also turn out to be the three fundamental building blocks of complex sentences in human language. The unmarked pattern for the construction of complex sentences involves combining nuclei with nuclei, cores with cores, clauses with clauses, or sentences with sentences. These are called levels of 'juncture' in RRG, i.e. nuclear juncture, core juncture, clausal juncture, and sentential juncture. Sentential junctures are complex constructions made up of multiple sentences, while clausal junctures involve sentences containing multiple clauses. Examples of nuclear junctures from French, English and Mandarin are given in (1) and the representation of (1a) is in Figure 6. Justifications for these structures can be found in Van Valin (2005).

(1) a. Je ferai manger les gâteaux à Jean.
1sg make.FUT eat the cakes to John
'I will make John eat the cakes.'
[two nuclei, *faire* and *manger*, in a single core]

b. John forced open the door.
[two nuclei, *push* and *open*, in a single core]

c. Tā qiāo pò le yī ge fànwǎn.
3sg hit break PRFV one CL bowl

'He broke (by hitting) a ricebowl.'
[two nuclei, *qiāo* 'hit' and *pò* 'break', in a single core] (Hansell 1993)

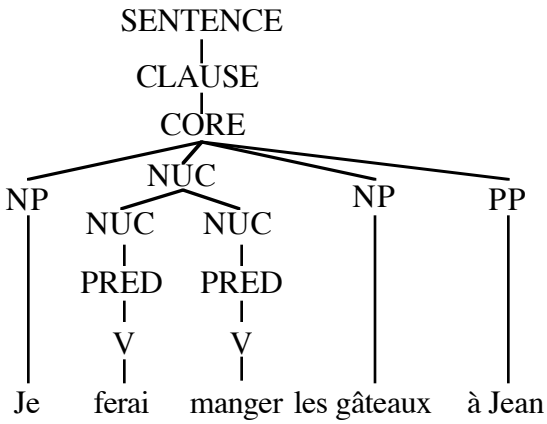

Figure 6: The structure of (1a)

Core junctures involve two or more cores (which may themselves be internally complex) in a clause. Examples from French, English and Mandarin are given in (2), and the structure of (2a) is presented in Figure 7. In this type of core juncture, the two cores share a core argument; 'sharing a core argument' is defined formally in terms of the linking algorithm mapping syntactic and semantic representations into each other.

(2) a. Je laisserai Jean manger les gâteaux.
1sg let.FUT John eat the cakes
'I will let John eat the cakes.'
b. I ordered Fred to force the door open.
c. Tā jiāo wǒ xǐe zì.
3sg teach 1sg write characters
'She teaches me to write characters.'

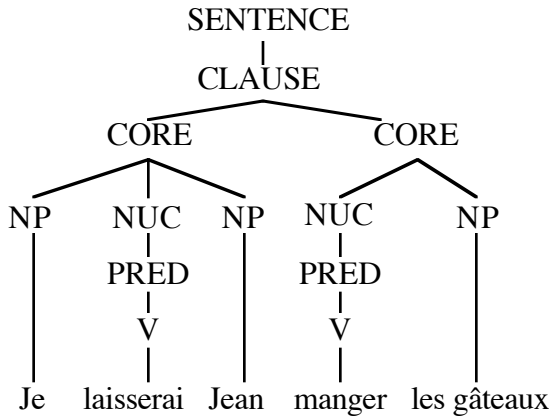

Figure 7: The structure of (2a)

Of equal importance in the RRG theory of complex sentences is the set of possible syntactic and semantic relations between the units in a juncture; the semantic relations are discussed below. The syntactic relations between units are called 'nexus' relations in RRG. Traditionally, only two basic nexus relations are recognized, coordination and subordination. Subordination is divided into two subtypes, daughter subordination and peripheral subordination. They are illustrated in Figure 8.

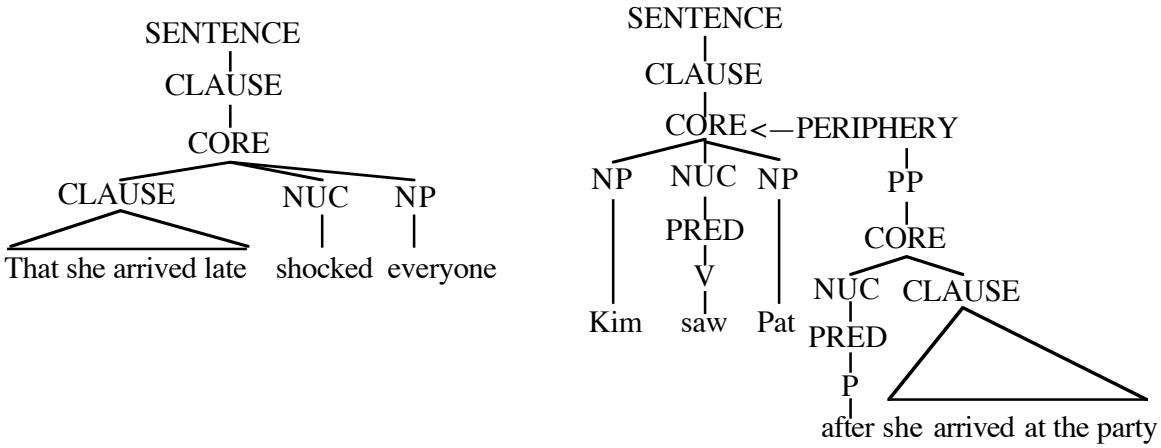

Figure 8: Daughter and peripheral subordination at the core level in English

The embedded clause in the first sentence is a daughter of the core node, while in the second the embedded clause is an adjunct in the periphery modifying the core.

In addition to distinguishing two types of subordination, RRG, following Olson's (1981) analysis of clause linkage in Barai (a Papuan language), posits a third nexus type: 'cosubordination', which is essentially tight, dependent coordination. The dependence is operator dependence; that is, in cosubordination, the units obligatorily share one or more operators at the level of juncture. In the Mandarin example in (2c), aspect obligatorily has scope over both nuclei, and therefore the nexus is cosubordination. This is represented as in Figure 9.

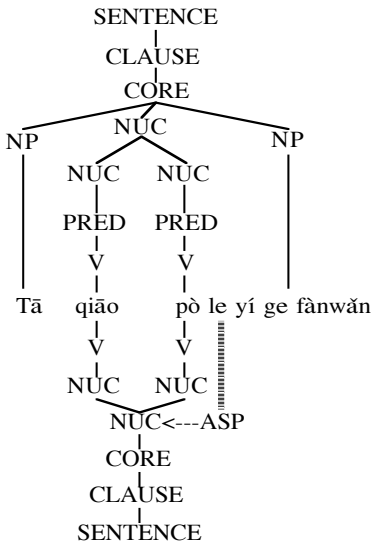

Figure 9: Nuclear cosubordination in Mandarin

The following examples from Turkish (Watters 1993) illustrate obligatory operator sharing and the lack of it in Turkish core cosubordination and coordination, respectively. The term 'co-ordination' here is being used for an abstract linkage relation referring to a relationship of equivalence and operator independence at the level of juncture. It is distinct from conjunction, which is a construction type of the general form 'X conj Y', which may be one of the formal instantiations of coordinate nexus.

(3) a. Core cosubordination
Gid-ip gör-meli-yiz.
go-CMPL see-MODAL-1pl
'We ought to go and see.'

b. Core coordination
Müzik dinle-yerek, uyu-yabil-ir-im.
music listen-CMPL sleep-MODAL-AOR-1sg
'While listening to music, I can sleep.'

In (3a), the modal operator *-mElI-* 'ought' has scope over both cores, and therefore the nexus is cosubordinate; in (3b), on the other hand, the modal operator *-yAbIl-* 'able' has scope only over the final core, hence coordinate nexus.

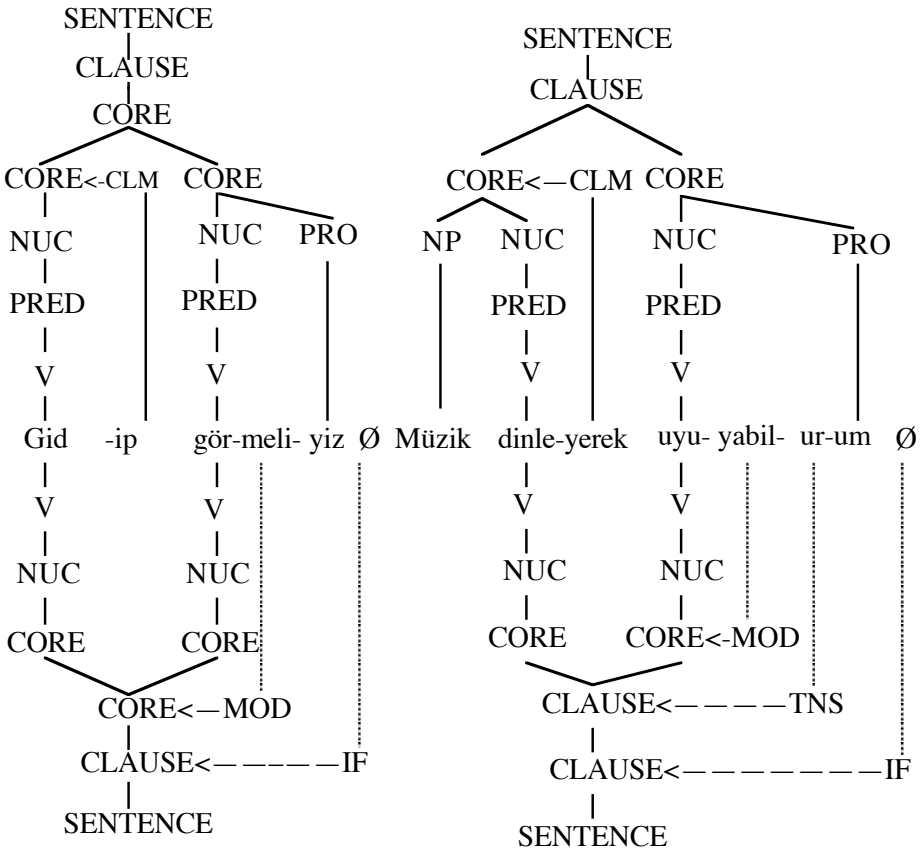

Figure 10: Turkish Core Junctures

The following sentences from Kewa (Franklin 1971) are a minimal triple for the three nexus types at the clause level.

(4) a. Nipú ípu-la pare ní paalá na-pía. Coordination
3sg come-3sgPRES but 1sg afraid NEG-be.1sgPRES
'He is coming, but I am not afraid.'

b. (Ní) Épo lá-ri épa-wa. Cosubordination
(1sg) whistle say-SIM.SS come-1sgPAST
'I whistled while I came,' or 'I came whistling.'

c. (Ní) Épo lá-lo-pulu irikai épa-lia. Subordination (peripheral)
(1sg) whistle say-1sgPRES-CAUSAL dog come-3sgFUT
'Because I am whistling, the dog will come.'

The four levels of juncture combine with the three nexus types to generate eleven possible complex sentence types; there is no sentential cosubordination, because there are no sentence-level operators, hence no possible operator sharing. In addition, both subtypes of subordination are possible at the clause, core and nuclear levels. Not all of them are instantiated in every language. English, for example, has all except for nuclear subordination and coordination. The juncture-nexus types found in a language may be realized by more than one formal construction type; for example, both *Mary sat playing the guitar* and *Robin tried to open the door* instantiate core cosubordination, while both *For Sam to leave now would be a mistake* and *Lisa's losing her job shocked everyone* instantiate core subordination in English. The juncture-nexus types may be ordered into a hierarchy in terms of the tightness of the syntactic link between the units. This is given in Figure 11.

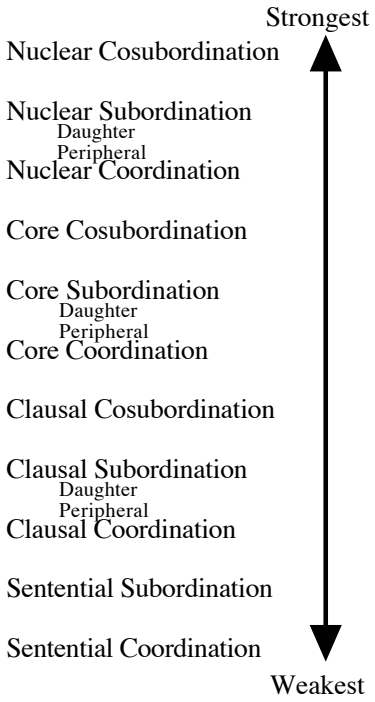

Figure 11: Interclausal syntactic relations hierarchy

Semantic structure Semantics plays a central role in Role and Reference Grammar [RRG], and the aspects of semantics in RRG to be addressed herein are: (1) the lexical representation of verbs and other predicating elements, (2) semantic roles, (3) the role of the lexicon in grammar, and (4) interclausal semantic relations..

The lexical representation of verbs

The heart of the RRG approach to lexical representation is a system of lexical decomposition based on Vendler's (1967) *Aktionsart* classification of verbs into states, activities, achievements and accomplishments. In addition, there is a class of semelfactive verbs (Smith 1997). The telic uses of activity verbs are termed active accomplishments. Each of these classes has a causative counterpart, and examples of each class are given in (5).

(5)	a. State:	The boy is afraid of the snake.
	a´. Causative state:	The snake frightens/scares the boy.
	b. Achievement:	The soap bubble popped.
	b´. Causative achievement:	The cat popped the soap bubble.
	c. Semelfactive	The light flashed.
	c´. Causative semelfactive	The policeman flashed the light.
	d. Accomplishment:	The water froze.
	d´. Causative accomplishment:	The cold froze the water.
	e. Activity:	The soldiers marched in the park.
	e´. Causative activity:	The sergeant marched the soldiers in the park.
	f. Active accomplishment	The soldiers marched to the park.
	f´. Causative active accomplishment:	The sergeant marched the soldiers to the park.

These classes can be characterized in terms of four features, [± static], [± dynamic], [± telic], and [± punctual].

(6)	a. State:	[+ static], [– dynamic], [– telic], [– punctual]
	b. Activity:	[– static], [+ dynamic], [– telic], [– punctual]
	c. Achievement:	[– static], [– dynamic], [+ telic], [+ punctual]
	d. Semelfactive:	[– static], [± dynamic], [– telic], [+ punctual]
	e. Accomplishment	[– static], [– dynamic], [+ telic], [– punctual]
	f. Active accomplishment:	[– static], [+ dynamic], [+ telic], [– punctual]

The most fundamental contrast is between static and non-static verbs, which distinguishes verbs which code a 'happening' from those which code a 'non-happening'. The feature 'dynamic' refers to whether the state of affairs involves action or not. The feature 'telic' concerns whether a verb indicates a state of affairs with an inherent temporal boundary or not; this can be either the onset of an action or the end of a process or action leading to a result state. Finally, The feature [± punctual] differentiates events with internal duration from those without. Achievements and semelfactives are both punctual, but they differ with respect to telicity: achievements have a result state or action, hence they are telic, while semelfactives do not, hence they are atelic.

These distinctions underlie the syntactic and semantic tests for the six non-causative classes. The tests are given in Table 1. The '*' means that certain complications arise with this test (see

Van Valin (2005) for detailed discussion of the tests and their complications); 'Irr' stands for 'irrelevant'. The causative versions of these class all pass the causative paraphrase test.

Criterion	State	Ach	Seml	Acc	Act	ActAcc
1. Occurs with progressive	No*	No*	No*	Yes	Yes	Yes
2. Occurs with adverbs like *vigorously*, *actively*, etc.	No	No	Some*	No	Yes	Yes
3. Occurs with adverbs like *quickly*, *slowly*, etc.	No	No*	No*	Yes	Yes	Yes
4. Occurs with *X for an hour, spend an hour Xing*	Yes*	No*	Yes*	Irr*	Yes	Irr*
5. Occurs with X *in an hour*	No	No*	No*	Yes	No	Yes
6. Can be used as stative modifier	Yes	Yes	No	Yes	No	Yes
7. Has causative paraphrase	No	No	No	No	No	No

Table 1: Tests for *Aktionsart* classes

The formal representation of the *Aktionsart* classes is based on, but not identical with, the decompositional system proposed originally in Dowty (1979). The representations for the classes are given in (7).

(7) a. State — **predicate´** (x) or (x, y)
b. Activity — **do´** (x, [**predicate´** (x) or (x, y)])
c. Achievement — INGR(ESSIVE) **predicate´** (x) or (x, y), or INGR **do´** (x, [**predicate´** (x) or (x, y)])
d. Semelfactive — SEML **predicate´** (x) or (x, y), or SEML **do´** (x, [**predicate´** (x) or (x, y)])
d. Accomplishment — BECOME **predicate´** (x) or (x, y), or BECOME **do´** (x, [**predicate´** (x) or (x, y)])
e. Active accomplishment — **do´** (x, [**predicate$_1$´** (x, (y))]) & INGR **predicate$_2$´** (z, x) or (y)
f. Causative — α CAUSE β, where α, β are representations of any type

INGR or BECOME plus state predicate signals a change of state, e.g. (8c) or (8e), while INGR or BECOME plus activity predicate signals an onset of an action, e.g. Russian *zaplakat'* 'burst out crying' (INGR **do´** (x, [**cry´** (x)])) vs. *zagovorit'* 'start talking' (BECOME **do´** (x, [**talk´** (x)])). Semelfactives may be based either on an activity predicate, e.g. *flash* (SEML **do´** (x, [**flash´** (x)])) or a state predicate, e.g. *glimpse* (SEML **see´** (x, y)). Some work has been done on decomposing state and activity predicates; see Van Valin & Wilkins (1993), Mairal & Faber (2002, 2005).

The decompositional representation of a predicate is referred to as its 'logical structure' [LS]. Examples of English verbs (and also some non-verbal predicates) with their LSs are given in (8). The order of arguments will be discussed in the next section.

(8) a. States

Sam is a lawyer.	**be´** (Sam, [**lawyer´**])
The vase is shattered.	**shattered´** (vase)
Chris is at the office.	**be-at´** (office, Chris)
Kim saw the photo.	**see´** (Kim, photo)

b. Activities

The door squeaks.	**do´** (door, [**squeak´** (door)])
Lee drank beer.	**do´** (Lee, [**drink´** (Lee, beer)])

c. Achievements

The vase shattered.	INGR **shattered´** (vase)
The bubble popped.	INGR **popped´** (bubble)

d. Semelfactives

Lee sneezed.	SEML **do´** (Lee, [**sneeze´** (Lee)])
Chris glimpsed Pat.	SEML **see´** (Chris, Pat)

e. Accomplishments

The water froze.	BECOME **frozen´** (water)
The sky reddened.	BECOME **red´** (sky)
Kim learned Swahili.	BECOME **know´** (Kim, Swahili)

f. Active accomplishments

Lee drank a beer.	**do´** (Lee, [**drank´** (Lee, beer)]) & INGR **drunk´** (beer)
Paul ran to the store.	**do´** (Paul, [**run´** (Paul)]) & INGR **be-at´** (store, Paul)

g. Causatives

The dog scared the boy.	[**do´** (dog, Ø)] CAUSE [**feel´** (boy, [**afraid´**])]
Mary broke the pencil.	[**do´** (Mary, Ø)] CAUSE [BECOME **broken´** (pencil)]
The cat popped the bubble.	[**do´** (cat, Ø)] CAUSE [INGR **popped´** (bubble)]
Fred rolled the ball.	[**do´** (Fred, Ø)] CAUSE [**do´** (ball, [**roll´** (ball)])]

Despite having 'INGR' in their LSs, the telic use of activity verbs is, following the literature, referred to as '(active) accomplishments'.

In many languages, verbs in these different classes may be overtly morphologically inflected to signal their class, and verbs in different classes may be morphologically related to each other. State predicates are the basis of change of state verbs, achievements and accomplishments, and these in turn are the basis for causative change of state verbs, causative achievements and accomplishments. There are languages which represent these relationships explicitly in their verbal morphology. These languages fall into a number of groups (Haspelmath 1993), two of which will be discussed here. In the first group, the base is a state predicate, either a verb or an adjective, and to this base a morpheme is added indicating BECOME or INGR, deriving an accomplishment or achievement. Then to this derived form is added a causative morpheme, deriving a causative accomplishment or achievement. In Qiang, a Tibeto-Burman language (Van Valin & LaPolla 1997), the relationship is straightforward: *ba* 'big' [state], *tə-ba* 'become big' [accom-

plishment], and *tə-ba-ʐ* ‘cause to become big’ [causative accomplishment]. Consider the following examples from Huallaga Quechua (Weber 1989).

(9)	State	Accomplishment	Causative Accomplishment
a.	*qarwash-*	*qarwash-ta:-*	*qarwash-ta:-chi-*
	yellow	yellow-become	yellow-become-cause
	‘be yellow’	‘become yellow’	‘make something yellow’
b.	*hanq̇a-*	*hanq̇a-ya:-*	*hanq̇a-ya:-chi-*
	above.on.slope	above.on.slope-become	above.on.slope-become-cause
	‘above’	‘become higher’	‘make something higher’
c.	*hatun-*	*hatun-ya:-*	*hatun-ya:-chi-*
	big	big-become	big-become-cause
	‘be big’	‘become bigger’	‘make something bigger’
d.	*umasapa-*	*umasapa-ya:-*	*umasapa-ya:-chi-*
	big.headed	big.headed-become	big.headed-become-cause
	‘be big-headed’	‘become big-headed’	‘make someone big-headed’
e.	----	*wañu-*	*wañu-chi-*
		die	die-cause
		‘die’	‘kill’
f.	---	*yacha-*	*yacha-chi-*
		learn	learn-cause
		‘learn’	‘teach’

In (9a-d) accomplishment verbs are formed from state predicates by the addition of the suffix –*ya:-* ‘become’, and causative accomplishments are formed from them by the addition of the causative suffix *-chi-*. As (9e-f) show, *-chi-* can be added to underived accomplishment verbs as well.

The second group of languages exhibits a rather different pattern expressing the same relationships; it includes Yagua (Peru; Payne & Payne 1989), Russian and French.

(10)	Causative Accomplishment	Accomplishment	State
a.	Yagua *-muta-* ‘open’	*-muta-y-* ‘open’	*-muta-y-maa* ‘ be open’
b.	French *briser* ‘break’	*se briser* ‘break’	*brisé* ‘broken’
c.	Russian *razbit’* ‘break’	*razbit’sja* ‘break’	*razbitij* ‘broken’

In these three languages, the base form of the verb is a transitive causative accomplishment, and the intransitive accomplishment and state forms are derived morphologically from it. The derivational relationships illustrated in (9) and (10) can be readily accounted for in terms of this system of lexical decomposition. The state → accomplishment → causative accomplishment pattern found in Qiang and Huallaga Quechua follows directly from the lexical representations, e.g. in (9c), *hatun-* (**big´** (x)) –> *hatun-ya:-* (BECOME **big´** (x)) –> *hatun-ya:-chi-* (...CAUSE [BECOME **big´** (x)]). The pattern in Yagua, French and Russian also indicates a systematic relationship among these classes, but the function of the morphological markers is to cancel part of the LS rather than to add components to it, e.g. in (10a), *-muta-* (...CAUSE [BECOME **open´** (x)]),

-muta-y- (BECOME **open´** (x)), in which *-y-* cancels the '...CAUSE' part of the LS, and *-muta-y-maa* (**open´** (x)), in which *-maa* cancels the BECOME part of the LS. Examination of the verbal systems of a number of languages had led to the conclusion that this set of distinctions is one of the fundamental organizing principles of verbal systems in human language.

The semantic representation of a clause contains information about operators like illocutionary force and tense in addition to the LS of the predicating element. A simple example is given in (11).

(11) a. Are the children playing?
b. ⟨$_{\text{IF}}$ *INT* ⟨$_{\text{TNS}}$ *PRES* ⟨$_{\text{ASP}}$ *PROG* ⟨[**do´** (children, [**play´** (children)])]⟩⟩⟩⟩

Semantic roles

The RRG theory of semantic roles is rather different from that of other theories, in that it posits two types of semantic roles. The first are specific thematic relations, the traditional (since Fillmore 1968 and Gruber 1965) notions of agent, theme, patient, experiencer, etc. The second are generalized semantic roles called 'semantic macroroles'; they were introduced in Van Valin (1977) and have no exact analog in other theories, although Jackendoff's 'action tier' and Dowty's proto-roles bear some resemblance. (See Van Valin (1999) for a comparison of different theories of generalized semantic roles.) Following the ideas of Gruber (1965) and Jackendoff (1976), RRG defines thematic relations in terms of argument positions in LSs such as those in (7)-(8). All thematic relations are defined in terms of argument positions in state and activity LSs; all other LS types are composed of them plus elements like BECOME, INGR and CAUSE. The thematic relations posited in RRG are given in Table 2.

I. State verbs		
A. Single argument		
1. State or condition	**broken´** (x)	x = patient
2. Existence	**exist´** (x)	x = entity
B. Two arguments		
1. Pure location	**be-LOC´** (x, y)	x = location, y = theme
2. Perception	**hear´** (x, y)	x = perceiver, y = stimulus
3. Cognition	**know´** (x, y)	x = cognizer, y = content
4. Desire	**want´** (x, y)	x = wanter, y = desire
5. Propositional attitude	**consider´** (x, y)	x = judger, y = judgment
6. Possession	**have´** (x, y)	x = possessor, y = possessed
7. Internal experience	**feel´** (x, y)	x = experiencer, y = sensation
8. Emotion	**love´** (x, y)	x = emoter, y = target
9. Attributive	**be´** (x, [**pred´**])	x = attributant, y = attribute
10. Identificational	**be´** (x, [**pred´**])	x = identified, y = identity
11. Specificational	**be´** (x, y)	x = variable, y = value
12. Equational	**equate´** (x, y)	x, y = referent

II. Activity verbs		
A. Single argument		
1. Unspecified action	**do´** (x, Ø)	x = effector
2. Motion	**do´** (x, [**walk´** (x)])	x = mover
3. Static motion	**do´** (x, [**spin´** (x)])	x = st-mover
4. Light emission	**do´** (x, [**shine´** (x)])	x = l-emitter
5. Sound emission	**do´** (x, [**gurgle´** (x)])	x = s-emitter
B. One or two arguments		
1. Performance	**do´** (x, [**sing´** (x, (y))]	x = performer, y = performance
2. Consumption	**do´** (x, [**eat´** (x, (y))])	x = consumer, y = consumed
3. Creation	**do´** (x, [**write´** (x, (y))])	x = creator, y = creation
4. Directed perception	**do´** (x, [**hear´** (x, (y))])	x = observer, y = stimulus
5. Use	**do´** (x, [**use´** (x, y)])	x = user, y = implement

Table 2: Definitions of thematic relations in terms of LS argument positions

Well-known relations like recipient and goal are possessor or location arguments embedded under BECOME/INGR, while motion and transfer sources are location and possessor arguments embedded under BECOME/INGR NOT. Instruments are intermediate inanimate effectors in a causal chain. In verbs that lexicalize agency, e.g. *murder*, agent is represented by 'DO (x, ...', following Dowty (1979). However, in most cases agent is an implicature related to human effectors with certain types of activity predicates and would not be represented in the LS of the verb; see Holisky (1987), Van Valin & Wilkins (1996). Since thematic relations have no independent status, they are really just mnemonics for the argument positions in LSs. That is, 'experiencer' stands for 'the first argument of a two-place state predicate of internal experience', for example.

Table 2 could give the impression that RRG posits a great many thematic relations, but in fact there are only five relevant distinctions. The five distinctions correspond to the five possible argument positions in LSs. This may be represented as in Figure 12.

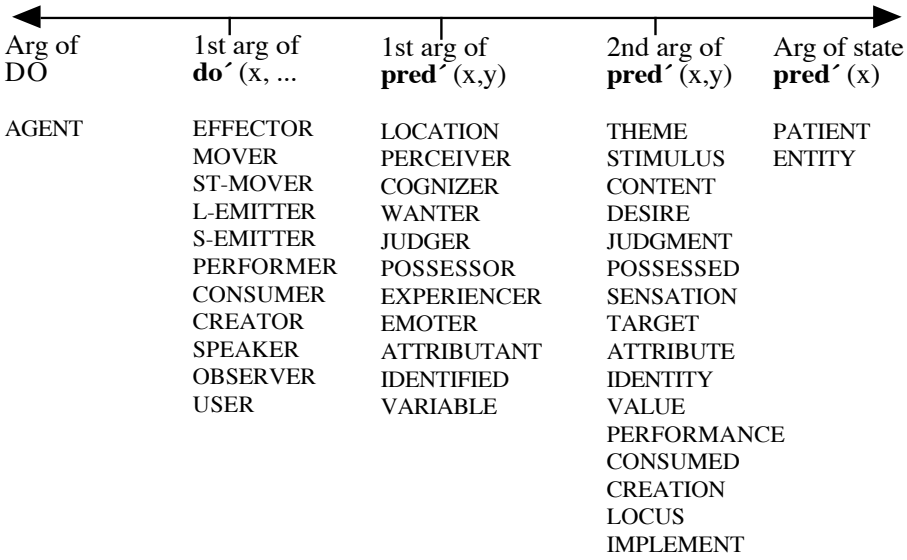

Figure 12: Thematic relations continuum in terms of LS argument positions

Agents are willful, controlling, instigating participants in states of affairs, while patients are strongly affected participants. Positing these as endpoints on the cline makes it possible to locate the other role-types with regard to them. The DO of lexicalized agency always co-occurs with **do´** (x, ..., which defines effector and its subtypes, and therefore the first two columns are closely related to each other; both of them express participants which do something. At the other end of the continuum are patient and theme, etc. The single argument of state **predicate´** (x) includes those participants which are crushed, killed, smashed, shattered, broken, destroyed, etc., while the second argument of **predicate´** (x, y) includes those participants which are placed, moved, thrown, given, possessed, transferred, seen, heard, loved, etc. In terms of affectedness, the former type of participant is much more affected than the latter, hence the placement of the single argument of state **predicate´** (x) at the end of the hierarchy. Into the middle of the continuum falls the first argument of **predicate´** (x, y). If it is contrasted with the first argument of **do´** , it is clear that seeing, thinking, believing, possessing, etc. are less agent-like than are speaking, doing, moving, performing, consuming, hence their placement to the right of effector, etc. If, on the other hand, the contrast is with the second argument of **predicate´** (x, y), then the reverse conclusion follows. Seeing, thinking, liking, believing, etc. involve some kind of internal activity (mental, emotional or perceptual) on the part of the participant, whereas being seen, being thought about, being liked or being believed does not require any action or effort of any kind on the part of the participant. Hence the participant referred to by the first argument is more active and hence more agent-like than the participant referred to by the second argument, and accordingly, the first argument is closer to the agent end of the hierarchy than the second argument. Thus, the place of the different argument positions in the continuum in Figure 12 is indicative of the semantic contrasts among them.

The second type of semantic role plays a crucial role in the theory; macroroles act as the primary interface between the LS and syntactic representations. There are only two macroroles, actor and undergoer, corresponding to the two primary arguments in a prototypical transitive relation. They are called 'macroroles' because each subsumes a number of specific thematic relations. Consider the range of thematic relations that can function as subject and direct object in English. The subject NPs and their thematic relation are in italics; the direct object NPs and their thematic relations are in boldface.

(12) a.	*The farmer* killed **the duckling**.	*Effector/Agent*	**Patient**
b.	*The rock* broke **the window**.	*Effector/Inst.*	**Patient**
c.	*The lawyer* received **the summons**.	*Recipient*	**Theme**
d.	*Many tourists* saw **the accident**.	*Perceiver*	**Stimulus**
e.	*Sally* presented **Bill** with the award.	*Effector/Agent*	**Recipient**
f.	*The mugger* robbed **Sam** of $50.	*Effector/Agent*	**Source**
g.	*The clown* showed **the child** a trick.	*Effector/Agent*	**Perceiver**

(13) a. **The duckling** was killed by *the farmer*.
b. **The window** was broken by *the rock*
c. **The summons** was received by *the lawyer*.
d. **The accident** was seen by *many tourists*.
e. **Bill** was presented with the award by *Sally*.
f. **Sam** was robbed of $50 by *the mugger*.
g. **The child** was shown a trick by *the clown*.

There is a range, sometimes overlapping, of thematic relations that can serve as subject and direct object; the subject can be an agent (effector), instrument (effector), perceiver or recipient, while the direct object can be a patient, theme, stimulus, recipient, source or perceiver. The passive versions of these sentences are given in (13), and the very same grouping of thematic relations that functions as the direct object in (12) serves as the subject in (13), and similarly, the same grouping of thematic relations that functions as the subject in (12) appears as the object of *by* in the passive versions. The grammatical relations are different in (12) and (13), and yet the groupings of thematic relations are the same. This shows that these groupings do not constitute a grammatical relation but rather another, more general type of semantic role. The role of the subject of an active voice transitive verb and the object of *by* in a passive construction is actor, and the role of the direct object of an active voice transitive verb and the subject of a passive verb is undergoer. In terms of (12), the thematic relations in the left column function as the actor with each of those verbs, and the relations in the right column function as the undergoer with each of them. Actor and undergoer are thus generalizations across the thematic relations in each column. The single argument of an intransitive verb is either an actor, as with verbs like *run,* or an undergoer, as with verbs like *die*.

The relationship between the macroroles and the argument positions in LSs is captured in the actor-undergoer hierarchy in Figure 13.

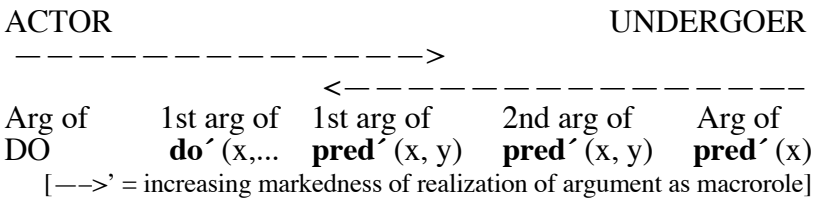

Figure 13: Actor-undergoer hierarchy

The positions in the actor-undergoer hierarchy are the same LS argument positions ranked as in Figure 12. Given the LS of a verb, the most agent-like argument will be actor, the most patient-like undergoer, in the default case. Macroroles are not equivalent to grammatical relations, as shown in (14).

(14)a. Der Junge [SUBJ, ACTOR] hat den Kuchen [OBJ, UNDERGOER] aufgegessen.
'The boy [SUBJ, ACTOR] ate the cake [OBJ, UNDERGOER].'
b. Der Kuchen [SUBJ, UNDERGOER] wurde vom Jungen [ACTOR] aufgegessen.
'The cake [SUBJ, UNDERGOER] was eaten by the boy [ACTOR].'
c. Der Hund [SUBJ, ACTOR] ist um das Haus herumgelaufen.
'The dog [SUBJ, ACTOR] ran around the house.'
d. Der Hund [SUBJ, UNDERGOER] ist gestorben.
'The dog [SUBJ, UNDERGOER] died.'

The exact role of macroroles in the mapping (or linking) between semantic and syntactic representations is discussed below.

The lexicon

The lexicon plays a very important role in RRG, and it should be considered a lexicalist theory. Lexical entries for verbs are built around LSs; the lexical representation of nouns is based on the theory of nominal qualia proposed in Pustejovsky (1995). RRG takes the position that lexical entries for verbs should contain only idiosyncratic information, with as much as possible derived from general lexical principles or rules. Information about transitivity is very important, and RRG defines transitivity in terms of the number of macroroles that a verb takes (Narasimhan 1998): M[acrorole]-transitive = 2, M-intransitive = 1, M-atransitive = 0. In RRG, no syntactic subcategorization information is included in lexical entries; all of the relevant information is derivable from the LS of the verb plus information about its transitivity. Thus these principles have the effect of predicting the syntactic subcategorization of a verb from its semantic representation. All theories must specify the transitivity of exceptional verbs, and this is done in RRG by specifying their M-transitivity in terms of [MRα], where 'α' is 0, 1 or 2. Sample lexical entries for some English verbs are given in (15).

(15) a. *kill* [**do´** (x, Ø)] CAUSE [BECOME **dead´** (y)]
b. *own* **have´** (x, y)
c. *belong (to)* **have´** (x, y) [MR1]
d. *put* [**do´** (w, Ø)] CAUSE [BECOME **be-LOC´** (x,y)]
e. *seem* **seem´** (x,y) [MR0]
f. *see* **see´** (x,y)
g. *watch* **do´** (x, [**see´** (x,y)])
h. *show* [**do´** (w, Ø)] CAUSE [BECOME **see´** (x,y)]
i. *run* **do´** (x, [**run´** (x)])
j. *melt* BECOME **melted´** (x)

The prepositions that mark oblique core arguments can in many instances be predicted from the LS of the verb and therefore need not be listed in the lexical entry (cf. Jolly 1993, Van Valin & LaPolla 1997).

RRG distinguishes lexical from syntactic phenomena in terms of the linking scheme (see below). Basically, any process which affects LSs or the arguments therein or the mapping between LSs and macroroles is considered to be lexical. Examples include causativization, regardless of whether it is morphologically unmarked (as in English) or marked (as in Japanese and Lakhota), noun incorporation, the 'dative alternation' (which is analyzed as variable linking to undergoer; cf. Van Valin 1993a, 2005), and some types of passivization and antipassivization. Syntactic phenomena involve the mapping between macroroles and the syntactic representation, e.g. some types of passivization and antipassivization, WH-question formation in languages like English and Icelandic, and 'raising' constructions (cf. Van Valin 2005).

The semantics of clause linkage

The syntactic clause-linkage relations discussed earlier are used to express certain semantic relations between the units in the linkage, e.g. causation, purpose, and temporal sequence. The interclausal semantic relations are given in (16).

(16) Interclausal Semantic Relations

a. Causative [1]: the bringing about of one state of affairs directly by another state of affairs, usually an event or action, e.g. *Max painted the door green, Larry pushed the window open*.
b. Phase: a separate verb describes a facet of the temporal envelope of a state of affairs, specifically its onset, its termination, or its continuation, e.g. *Chris started crying, Fred kept singing, Hari finished writing the chapter.*
c. Modifying subevents
    1. Manner: the manner in which a motion event is carried out, e..g *Bill entered the room skipping*.
    2. Motion: motion accompanying another action, e.g. Mparntwe Arrerente *angk-tyantye-* [speak-go.upwards] 'speak while going up' (Wilkins 1991).
    3. Position: stance while doing an action, e.g. *Dana sat reading a newspaper.*
    4. Means: the means by which an action is carried out, e.g. *Sam opened the box by slicing it with a knife*.
d. Psych-action: a mental disposition regarding a possible action on the part of a participant in the state of affairs, e.g. *Max decided to leave, Sally forgot to open the window, Tanisha wants to go to the movies*.
e. Purposive: one action is done with the intent of realizing another state of affairs, e.g. *Juan went to the store to buy milk, Susan brought the book to read*.
f. Jussive: the expression of a command, request or demand, e.g. *Pat asked the student to leave, The king ordered the troops to attack the city.*
g. Causative [2]: the bringing about of one state of affairs through a distinct action or event, e.g. *Fred forced Max to paint the table*.
h. Direct perception: an unmediated apprehension of some act, event, or situation through the senses, e.g. *Rex saw the child open the door, Yolanda heard the guests arrive*.
i. Indirect perception: the deduction of some act, event or situation from evidence of it, e.g. (looking at an empty desk) *I see that John has gone home early.*
j. Propositional attitude: the expression of a participant's attitude, judgment or opinion regarding a state of affairs, e.g. *Carl believes that UFOs are a menace to the earth, Paul considers Carl to be a fool, Most fans want very much for their team to win*.
k. Cognition: an expression of knowledge or mental activity, e.g. *Aaron knows that the earth is round, George is thinking about Madeleine's refusal to go out with him*.
l. Indirect discourse: an expression of reported speech, e.g. *Frank said that his friends were corrupt*.
m. Direct discourse: the direct quotation of a speech event, e.g. *Frank said, "My friends are corrupt."*
n. Circumstances: the spatial or temporal parameters of an event, e.g. *Sam talked to Sally at the library after work.*
o. Reason: the motivation or cause for an action or event, e.g. *The baby cried, because she was hungry.*
p. Conditional: an expression of what consequence would hold, given the conditions in a particular state of affairs, e.g. *If it rains, we won't be able to have a picnic, Were Fred to leave now, he would look like a fool*.
q. Concessive: the content of the main clause holds unexpectedly, given the content of the

subordinate clause, e.g. *Bill made it to work, even though it was snowing heavily.*

r. Temporal
   1. Simultaneous states of affairs: one state of affairs is temporally coterminous with another, e.g. *Max danced and Susan played the piano, Kim had chicken pox and at the same time Leslie had the measles*.
   2. Sequential states of affairs: one state of affairs follows another temporally, with or without any temporal overlap, e.g. *Juan had finished talking, and then Carlos entered the room, Vidhu was sitting down, and the band began to play.*

s. Temporally unordered states of affairs: the temporal relation between states of affairs is unexpressed, e.g. *Tyrone talked to Tanisha, and Yolanda chatted with Kareem.*

These relations may be given a formal characterization in terms of the RRG decompositional system, following a suggestion of Ohori (2001); see Ohori (2005) for an alternative formalization. This is presented in (17).

(17)

a.	Causative [1]	... CAUSE ...
b.	Phase	BECOME/INGR, KEEP, TERMINATE
c.	Modifying subevents	
	1. Manner	**do´** (x, [**MOTION´** (x)] ... ∧ [**MANNER.OF.MOTION´** (x)])
	2. Motion	**do´** (x, [**MOTION´** (x)] ... ∧ [**pred$_2$´** (x, (z))])
	3. Position	**do´** (x, [**STANCE´** (x)] ∧ [**pred$_2$´** (x, (z))])
	4. Means	**do´** (x, [...] ∧ [**pred$_2$´** (x, z)])
d.	Psych-action	**MENTAL.DISPOSITION´** (x, [$_{LS}$ ... x ...])
e.	Purposive	**want´** (x, LS$_2$) ∧ DO (x,[[LS$_1$] ◊ CAUSE [LS$_2$]])
f.	Jussive	[**do´** (x, [**say´** (x, y)])] CAUSE [**MENTAL.DISP´** (y, [$_{LS}$ ... y ...])]
g.	Causative [2]	[**do´** (x, Ø)] CAUSE [**undergo´** (y, [$_{LS}$ ... y ...])]
h.	Direct perception	**PERCEIVE´** (x, [$_{LS}$ ... y ...])
i.	Indirect perception	**PERCEIVE´** (x, [LS])
j.	Propositional attitude	**BELIEVE´** ((x,) [LS])
k.	Cognition	**KNOW´** (x, [LS])
l.	Indirect discourse	**do´** (x, [**say´** (x, [$_{LS}$ ⟨ $_{TNS}$ ... ⟩])])
m.	Direct discourse	**do´** (x, [**say´** (x, [$_{LS}$ ⟨ $_{IF}$ ... ⟩])])
n.	Circumstances	**be-LOC/TEMP´** ([LS$_1$], [LS$_2$])
o.	Reason	[LS$_1$] **BECAUSE´** [LS$_2$]
p.	Conditional	[LS$_1$] ⊃ [LS$_2$]
q.	Concessive	[LS$_1$] **IN.SPITE.OF´** [LS$_2$]
r.	Temporal	[LS$_1$] ∧ [LS$_2$]
		[LS$_1$] & [LS$_2$]
s.	Situation-Situation	[LS$_1$] + [LS$_2$]

A few explanatory notes on these representations are in order. '∧' means 'and simultaneously', while '&' means 'and then'; '+' indicates temporally neutral coordination. Causative [1] has the same LS as a lexical causative verb, e.g. (8g), while Causative [2] involves a matrix LS, the LS of an overt causative verb and an embedded LS, as in *Kim forced Chris to wash the dishes*. See

Jolly (1993) for an explication of the purposive LS. '(x, [$_{LS}$ ... x ...])' means that the participant denoted by *x* is involved in both states of affairs signaled by the matrix and embedded LSs. The *x* argument in (13j) is optional, because some propositional attitude predicates are one-place and take only a propositional argument, e.g. *be true, be false, be certain*. The contrast between direct and indirect discourse is signaled by the existence of an illocutionary force operator in the embedded LS in direct discourse and by the lack of one in the embedded LS in indirect discourse.

The semantic relations form a continuum expressing the degree of semantic cohesion between the propositional units linked in the complex structure, i.e. the degree to which they express facets of a single action or event or discrete actions or events. This may be represented as in Figure 14.

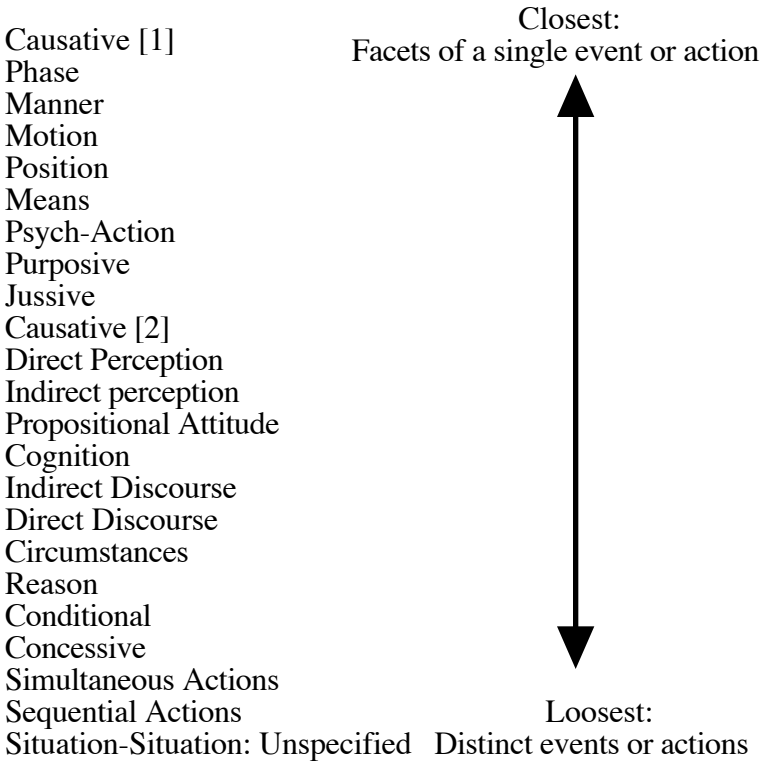

Figure 14: Interclausal semantic relations hierarchy

The syntactic linkage relations may be ranked hierarchically in terms of the strength of the syntactic bond between the units, i.e. in terms of how integrated the units are into a single unit or are coded as distinct units, as in Figure 11. The interaction of the two hierarchies is expressed in the interclausal relations hierarchy in Figure 15. The relationship between the syntactic and semantic relations in clause linkage is very complex, i.e. it is not one-to-one, but there are some striking regularities cross-linguistically. The primary principle governing the interaction of the two hierarchies is iconic: the closer the semantic relation between two propositions is, the stronger the syntactic link joining them (Silverstein 1976, Givón 1980). In other words, the semantic relations at the top end of the hierarchy should be realized by the linkage categories at the top as well, and the relations at the bottom of the hierarchy should be realized by the linkage categories at the bottom of the syntactic side. Moreover, while there is often more than one syn-

tactic realization of a particular semantic relation, the tightest syntactic linkage realizing it should be tighter than the tightest syntactic linkage realizing looser semantic relations.

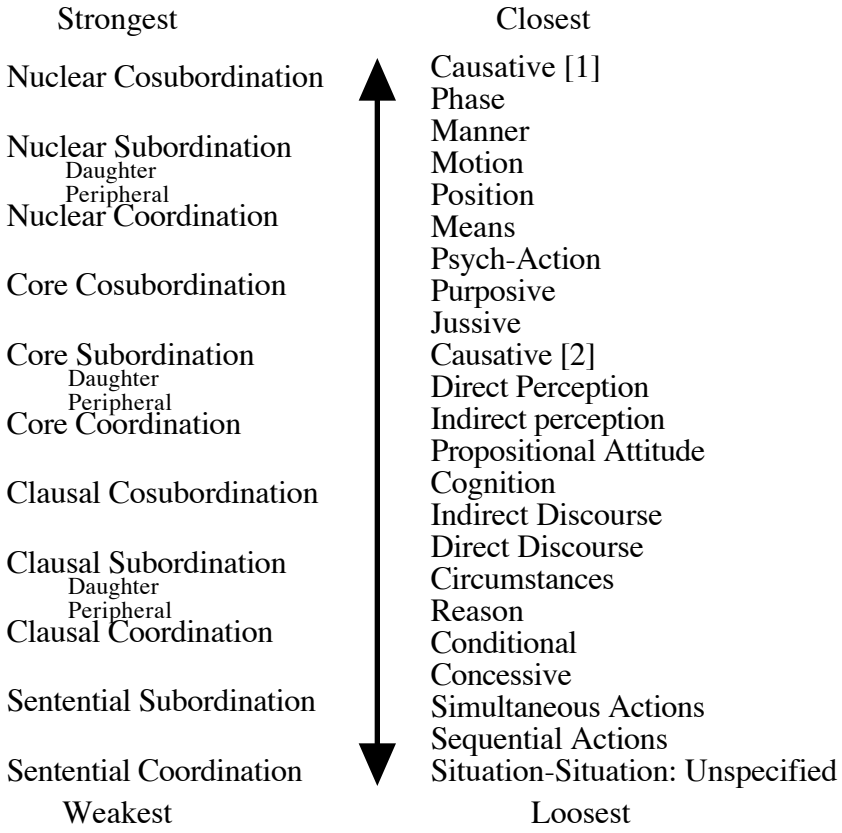

Figure 15: Interclausal relations hierarchy

Focus structure Focus structure is the grammatical system which serves to indicate the scope of the assertion in an utterance in contrast to the pragmatic presupposition (Lambrecht 1994), and it is vital to the RRG analysis of many grammatical phenomena, e.g. constraints on pronominalization (Van Valin & LaPolla 1997, §5.6), the interpretation of quantifier scope (ibid., §5.5, Van Valin 2005, §3.6), the origin of VPs in languages that have them (Van Valin 2005, §3.5), and extraction restrictions (Van Valin 1995, 1998, Van Valin & LaPolla, §9.5, Van Valin 2005, §7.6). An innovation in RRG is the distinction between the 'potential focus domain' [PFD] i.e. the syntactic domain in the sentence where focus may fall, and the 'actual focus domain', i.e. the part that is focussed in a particular utterance. Languages vary in terms of how the PFD is restricted, both in simple sentences and in complex sentences, and this variation underlies important grammatical differences across languages (Van Valin & LaPolla 1997, §5.3, 7.6). The focus structure of an utterance is represented in a distinct projection of the clause from the operator and constituent projections; this is exemplified in Figure 16 for a predicate focus construction in English. 'Predicate focus' is Lambrecht's (1994) term for the traditional 'topic-comment' structure with a topical subject and a focal predicate; 'IU' stands for 'basic information unit'.

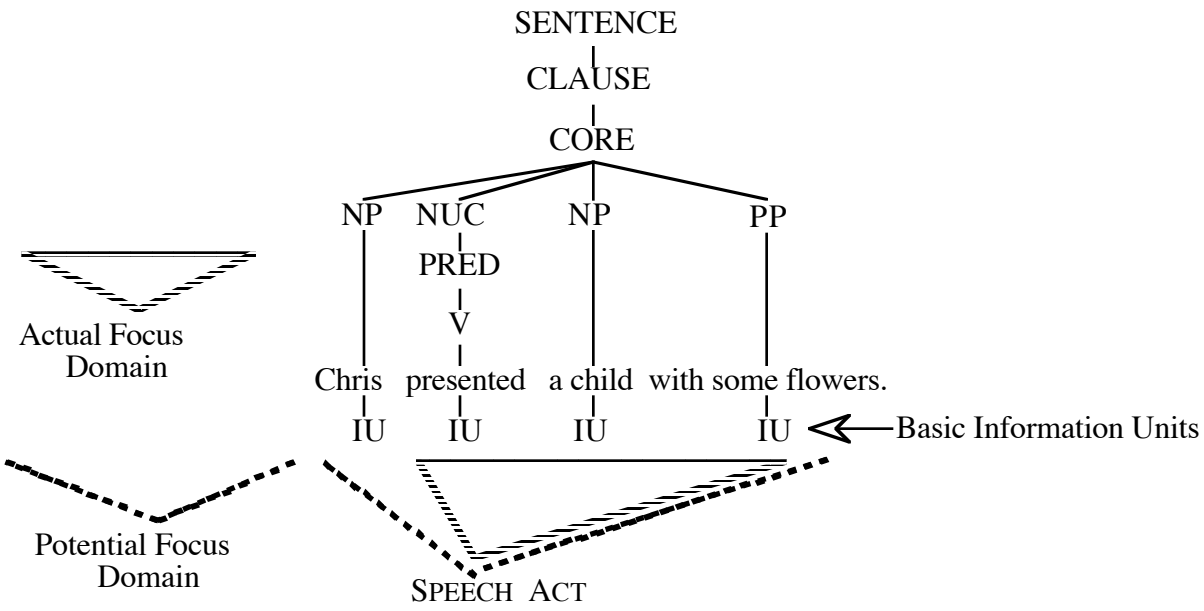

Figure 16: Predicate Focus Construction in English

It is possible to represent all three projections in a single representation, as in Figure 17.

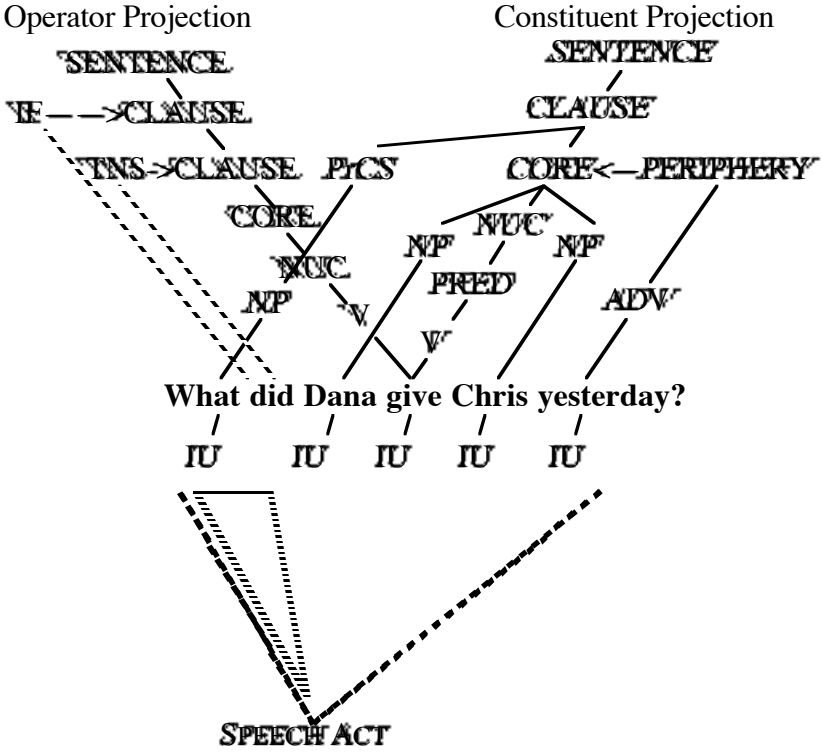

Figure 17: Clause Structure with Constituent, Operator and Focus Structure Projections

Grammatical relations and linking In the earliest work on RRG it was argued that grammatical relations like subject and direct object are not universal and cannot be taken as the basis for ade-

quate grammatical theories. In place of these notions, RRG employs the notion of 'privileged syntactic argument' [PSA], which is a construction-specific relation and is defined as a restricted neutralization of semantic roles and pragmatic functions for syntactic purposes. The other arguments in a clause are characterized as direct or oblique core arguments; there is nothing in RRG corresponding to direct or indirect object.

PSAs may be characterized functionally as controllers or pivots. These two functions are exemplified in (5) and (6).

(19) a. The tall man$_i$ hit William$_j$ and then ____$_{i/*j}$ ran away.
CONTROLLER PIVOT
b. William$_j$ was hit by the tall man$_i$ and then ___$_{*i/j}$ ran away.
CONTROLLER PIVOT

(20) a. Bill$_i$ persuaded the tall man$_j$ [__$_{*i/j}$ to visit Sam].
CONTROLLER PIVOT
b. The tall man$_j$ was persuaded by Bill$_i$ [__$_{*i/j}$ to visit Leslie].
CONTROLLER PIVOT

Pivots are canonically the missing argument in a construction, as in (19) and (20), while controllers prototypically supply the interpretation for a pivot. It should be noted that there can be pivots without controllers, e.g. the extracted element in an extraction construction, and controllers without pivots, e.g. agreement controllers. A further contrast is highlighted in (19) and (20), the contrast between syntactic and semantic pivots and controllers. In the construction in (19), the controller is the first NP in the core, the traditional 'subject', regardless of its semantic function, whereas in the construction in (20), the controller is the undergoer argument, regardless of its syntactic status. Hence the controller in (19) is a syntactic controller, while the controller in (20) is a semantic controller. The types of pivots and controllers that the constructions of a language have are typologically very significant.

The linking system relating semantic and syntactic representations is summarized in Figure 18. Syntactic functions like PSA and direct core argument represent the syntactic pole of the system, while logical structures represent the semantic pole. In every language with grammatical relations, there is an accessibility to PSA hierarchy for multiple-argument verbs; it is the actor-undergoer hierarchy interpreted from the actor end, i.e. arg of DO > 1st arg of **do´** > 1st arg of **pred´** (x, y) > 2nd arg of **pred´** (x, y) > arg of **pred´** (x). In syntactically accusative constructions in languages like English and German, the highest ranking argument is the default choice for PSA, whereas in syntactically ergative constructions in languages like Dyirbal, it is lowest ranking argument which is the default choice. That is, in a syntactically accusative construction the unmarked choice for the PSA of a transitive verb is the actor, with the undergoer being a marked choice possible only in a passive construction. On the other hand, in a syntactically ergative construction, the unmarked choice for the PSA of a transitive verb is the undergoer, with the actor being a marked choice possible only in an antipassive construction. With an intransitive verb, the hierarchy is irrelevant, as the single macrorole functions as PSA regardless of whether it is actor or undergoer. It should be noted that in most languages the highest ranking

argument is not the default choice for PSA but the only choice; such languages lack voice systems. (See Van Valin & LaPolla 1997, §6.5)

An important consideration in PSA selection is whether it is restricted to macrorole arguments or not. In some languages, e.g. German and Dyirbal, only actor and undergoer arguments can function as the PSA of a construction; non-macrorole direct core arguments can never so function. In others, e.g. Icelandic and Georgian, non-macrorole direct core arguments can be selected to serve as the PSA of a construction. This contrast is seen most clearly in the status of dative NPs: in German they can never be true 'subjects', while in Icelandic they can.

Logical structures, macroroles and the hierarchy linking them are universal, in that there is very little cross-linguistic variation; this is the domain of lexical processes, as mentioned above. Where languages differ substantially is how macroroles and other arguments link into the syntax.

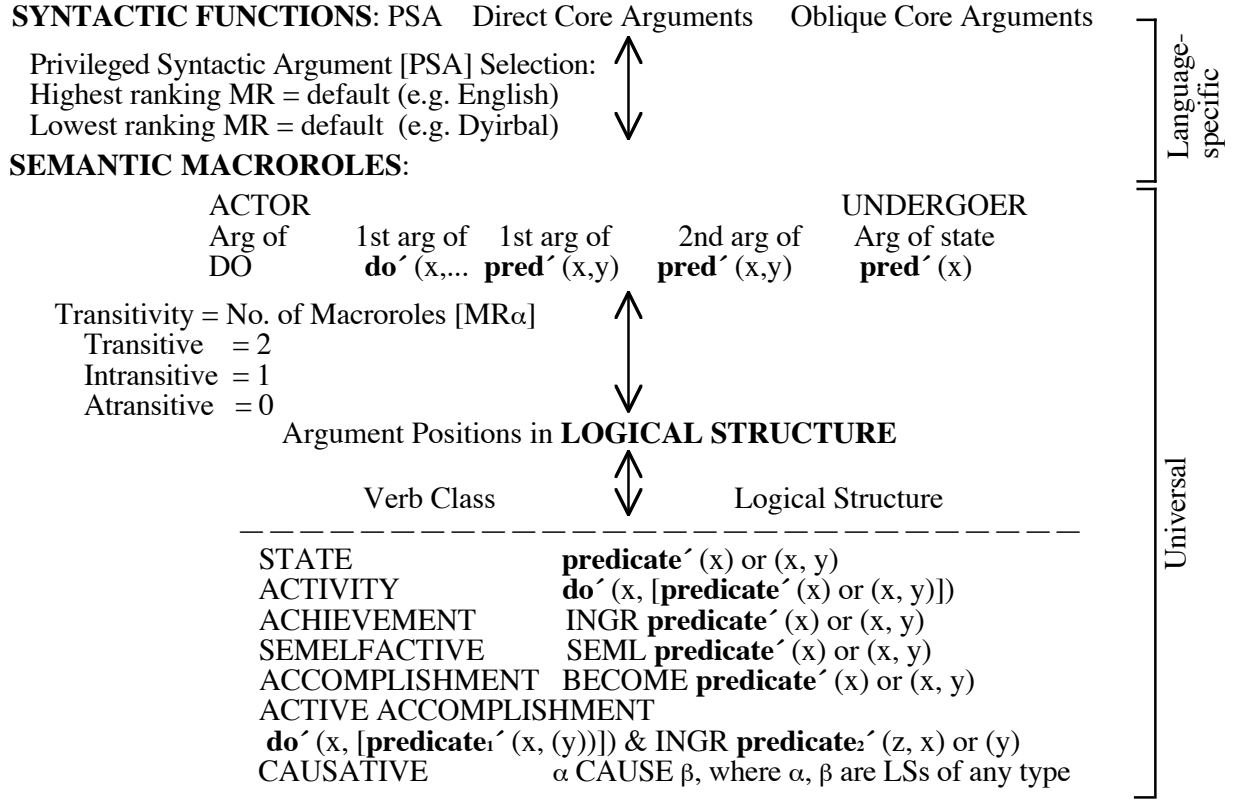

Figure 18: RRG Linking System

The reason the arrows in Figure 18 are double-headed is that the linking system works both from semantics to syntax and from syntax to semantics. A theory which could describe the linking from semantics to syntax only could be part of a language production system, but it would not be adequate for a comprehension system. In such a system, the parser, as an idealization, would take the input and produce a structured syntactic representation of it, identifying the elements of the layered structure of the clause and the cases, adpositions and other grammatically relevant elements in the sentence. It is then the grammar's job to map this structure into a semantic representation, as the first step in interpreting it, and this is where the syntax to semantics

linking algorithm is required. The details of the linking algorithms are given in Van Valin (2005).

Most of what counts as 'syntax' in many theories, e.g. case assignment, agreement, and WH-movement, is handled in RRG in terms of the syntactic phase of the linking. The analysis of reflexivization in RRG follows the approach in Jackendoff (1992) and states the constraints for core-internal ('clause-bound' in other theories) reflexivization at the LS level, not with respect to the syntactic representation. RRG treats constructions as an important part of syntax, and they are represented in terms of constructional schemas. Cross-constructional and cross-linguistic generalizations are captured in terms of the general principles and constraints that constitute the linking algorithms, e.g. the actor-undergoer hierarchy, the layered structure of the clause, the PSA selection hierarchy. Only the idiosyncratic, language-specific features of constructions are represented in constructional schemas, which may include syntactic, morphological, semantic and pragmatic (focus structure) information.

A simple example from English illustrating the operation of the semantics-to-syntax linking algorithm is given in Figure 19. The numbers refer to the general steps of the algorithm: (1) constructing the semantic representation of the sentence; (2) assigning actor and undergoer; (3) determining PSA selection, case and adposition assignment, and agreement; (4) selecting the appropriate syntactic template from the syntactic inventory; and (5) linking the elements from the semantic representation into the appropriate positions in the syntactic representation.

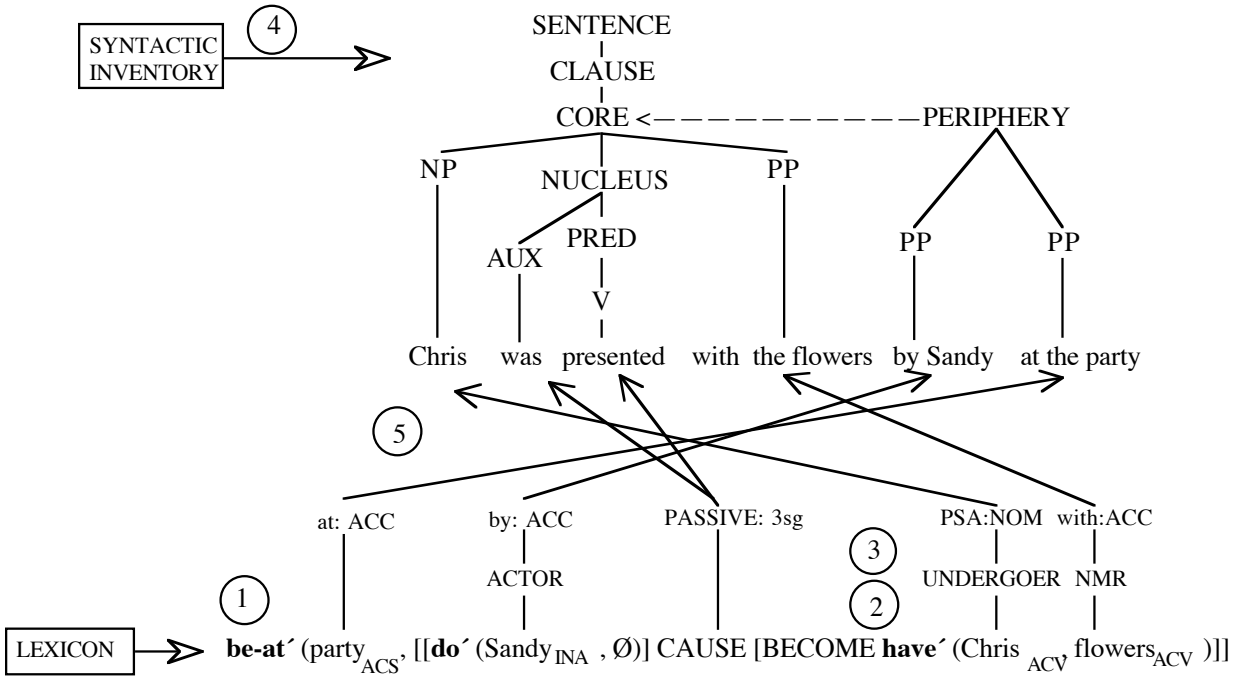

Figure 19: Linking from semantics to syntax in a simple sentence in English

The subscripts 'ACV' and 'ACS' stand for 'activated' and 'accessible', and they refer to different cognitive statuses that a referent of the element may have; cf. Lambrecht (1994). Because this sentence is a passive, the undergoer appears as the 'subject', with the actor appearing in a pe-

ripheral PP. These language-specific details would be represented in the constructional schema for the English passive. See Van Valin (2005) for detailed discussion and explication of all of these points.

A simple example of the linking from syntax to semantics is given in Figure 20. Here again the numbers refer to the general steps in the algorithm: (1) extract all of the information possible from the overt morphosyntactic form of the sentence, including the voice of the verb (if the language has voice), case marking, word order, and adpositions; (2) retrieve the LS of the predicate in the nucleus from the lexicon and assign macroroles to the extent possible; and (3) link of the information derived from steps (1) and (2). The syntactic representation is produced by the parser, which turns the acoustic input into a labeled syntactic representation.

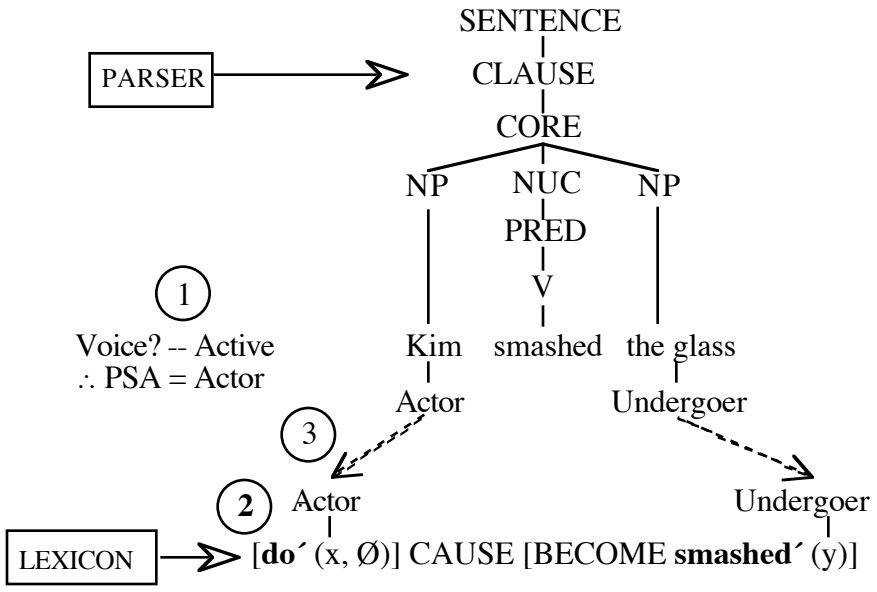

Figure 20: Linking from syntax to semantics in a simple sentence in English

The linking in a WH-question in English, in both directions, is illustrated in Figure 21; this figure summarizes the linking procedures from both of the previous two figures . Note the direct linking of the WH-word between the PrCS and its LS position.

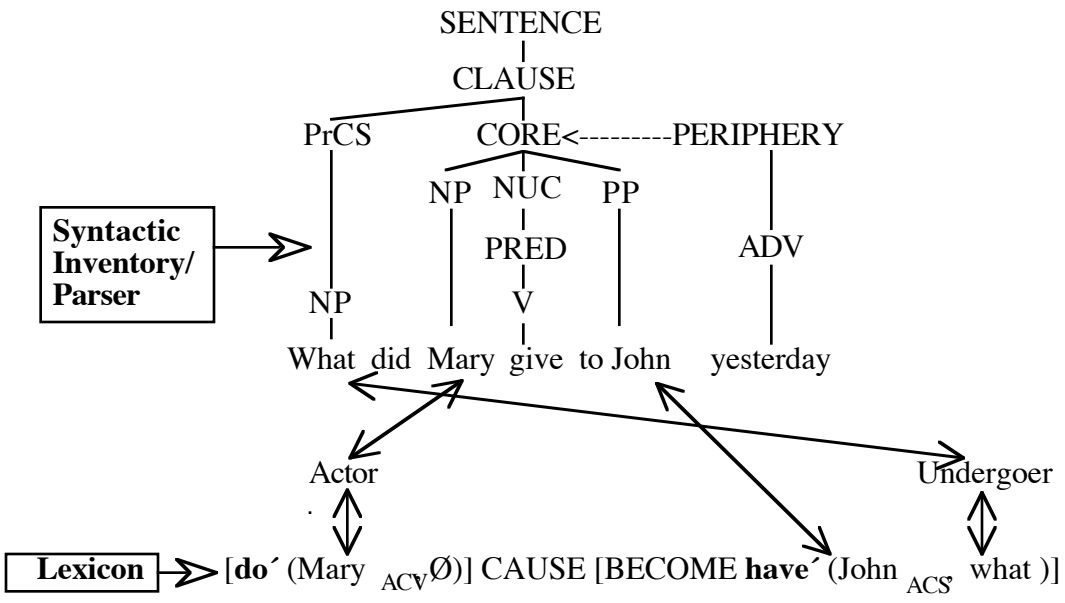

Figure 21: Linking syntax and semantics in a WH-question in English

Constraints on WH-question formation and other 'extraction' constructions are explained in terms of the interaction of focus structure and syntax, in particular in terms of restrictions on the potential focus domain (Van Valin 1995, 1998, 2005).

Some implications of RRG RRG illustrates one possible answer to the questions stated at the beginning, and it shows that it is possible to have a rigorous, typologically-sensitive grammatical theory which takes semantics and pragmatics as central features.

With respect to cognitive issues, RRG adopts the criterion of psychological adequacy formulated in Dik (1991), which states that a theory should be "compatible with the results of psycholinguistic research on the acquisition, processing, production, interpretation and memorization of linguistic expressions"(1991:248). Van Valin (2004) relates RRG to psycholinguistic models of production and comprehension, and Bornkessel, et al (2004) provide an explanation for certain experimental results regarding German language processing using RRG. Guest (2003) presents a parser based on RRG that can parse a range of syntactic structures in both English and Dyirbal. Kailuweit, et al (2003) and Butler (2004) propose implementations of the RRG semantics-to-syntax linking algorithm for French and English, respectively.

The RRG approach to language acquisition, sketched in Van Valin (1991, 1994) and Van Valin & LaPolla (1997), rejects the position that grammar is radically arbitrary and hence unlearnable, and maintains that it is relatively motivated (in Saussure's sense) semantically and pragmatically. Accordingly, there is sufficient information available to the child in the speech to which it is exposed to enable it to construct a grammar. For example, Braine (1992) shows how a conception of clause structure very much like the layered structure of the clause could be constructed developmentally by the child. Rispoli (1991a,b, 1994) shows how the lexical representations in RRG and the conception of grammatical relations could be learned. Bowerman (1990) provides evidence in favor of the view that rules linking syntactic and semantic representations

of the type summarized in Figure 15 are learned, and Weist (1990) shows how the RRG theory of grammatical relations provides an explanation for the pattern of development of grammatical relations in children learning Polish. Weist, et al (2004) shows the importance of *Aktionsart* for the understanding of the acquisition of verbs. Van Valin (1994, 1998) puts forward an account of how some of the constraints on linking between syntactic and semantic representations in complex sentences (i.e. subjacency) could be learned. Certain otherwise problematic facts about the acquisition of WH-questions are explained in terms of RRG in Van Valin (1998, 2002). Van Valin (2001) explores the predictions made by the theory of clause linkage and presents evidence from seven languages in support of them.

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