Chapter 2: Lexical Representation and Semantic Roles

2.0 General Considerations

The next step in the exploration of the syntax, semantics and pragmatics interface is the characterization of the semantic representation of sentences (cf. Figure 1 in the Introduction). It is based on the semantic representation of the verb or predication element. Hence much of the discussion in this chapter will be focussed on the lexical representation of verbs. An equally important facet of the semantic representation of sentences is the semantic relationships which hold between a verb or other predicator and its arguments.

The lexicon has become a major component of most contemporary syntactic theories; it is no longer ‘an appendix of the grammar, a list of basic irregularities.’ (Bloomfield 1933:274) Grammatical generalizations may be stated both in the syntax and in the lexicon, and therefore the system of lexical representation that a theory uses has a profound effect on the type and nature of the generalizations that may be stated in terms of it.

2.1 Verb Classes and Logical Structures

Underlying any system of lexical representation for verbs and other predicators, implicitly or explicitly, is a theory of verb classes. RRG starts from the Vendler (1967) classification of verbs into states, achievements, accomplishments and activities, and utilizes a modified version of the representational scheme proposed in Dowty (1979) to capture these distinctions. Examples of English verbs from each of the Aktionsart classes are given in (2.1).

(2.1) a. States: be sick, be tall, be dead, love, know, believe, have  
    b. Achievements: pop, explode, collapse, shatter (the intransitive versions)  
    c. Accomplishments: melt, freeze, dry (the intransitive versions); learn  
    d. Activities: march, walk, roll (the intransitive versions); swim, think, snow, write, drink  

States depict static situations which are inherently temporally unbounded (atelic), and both achievements and accomplishments express changes of state, which are inherently temporally bounded (telic): achievements are punctual, while accomplishments are not. Activities are dynamic, inherently temporally unbounded (atelic), states of affairs. Vendler proposed this taxonomy based solely on the analysis of English verbs, and yet it has proved to be of great cross-linguistic validity. Investigations of the following languages have shown that these contrasts are central to the organization of their verbal systems: Lakhota (Foley & Van Valin 1984), Tagalog (Foley & Van Valin 1984), Hausa (Abdoulaye 1992), Sama (Philippines; Walton 1986), Yatye (Kwa, Nigeria; Foley & Van Valin 1984, Stahlke 1970), Tepehua (Totonacan, Mexico; Watters 1988), Italian (Centineo 1996), Georgian (Holisky 1979, 1981a,b), Icelandic (Van Valin 1991a), Croatian (Dahm-Draksic 1998), Korean (Yang 1994), Japanese (Hasegawa 1996, Toratani 1999), Mparntwe

1The classification of verbs and the system of lexical representation presented in this section, despite similar terminology, differ in crucial ways from the ones used in Foley & Van Valin (1984), Van Valin (1990, 1991a, 1993b) and other work in RRG prior to the publication of Van Valin & LaPolla (1997). See fn. 8. Readers should keep this in mind when looking at those earlier works.
Arrernte (Australia; Wilkins 1989), and Bribri (Chibchan, Costa Rica; Tomcsányi 1988). These distinctions are also highly relevant to language acquisition (Weist 2002). It would be reasonable to hypothesize that these distinctions are the universal basis of the organization of verbal systems in human language.

Each of these four basic classes has a causative counterpart, as exemplified in (2.2).

(2.2) a. State: The boy is afraid.
   a’ Causative state: The dog frightens/scares the boy.
   b. Achievement: The balloon popped.
   b’ Causative achievement: The cat popped the balloon.
   c. Accomplishment: The ice melted.
   c’ Causative accomplishment: The hot water melted the ice.
   d. Activity: The ball bounced around the room.
   d’ Causative activity: The girl bounced the ball around the room.

There is another derivational relation between two classes which is very important cross-linguistically, namely that between activities and what are called ACTIVE ACCOMPLISHMENTS, the telic use of activity verbs. This general pattern relates activity verbs of motion (e.g. run), consumption (e.g. eat), and creation (e.g. paint) to the corresponding active accomplishment verbs. This is illustrated in (2.3) for English.

(2.3) a. The soldiers marched in the park. Activity
   a´ The soldiers marched to the park. Active Accomplishment
   b. Dana ate fish. Activity
   b´ Dana ate the fish. Active Accomplishment²
   c. Leslie painted (for several hours). Activity
   c´ Leslie painted Mary's portrait. Active Accomplishment

There are also causative active accomplishments, e.g. The sergeant marched the soldiers to the park.

There is one important non-Vendlerian Aktionsart class, namely semelfactives (Smith 1997). Semelfactives are punctual events which have no result state. Examples are given in (2.4).

(2.4) a. The light flashed.
   b. Chris coughed.
   c. The tree branch tapped on the window.
   d. Dana glimpsed Kim.
   e. Pat tapped the cane on the door.

Semelfactives differ from achievements in lacking a result state, and this can be seen in their inability to be used as adjectival modifiers expressing a result state, e.g. the shattered window vs. *the flashed light, a burst blood vessel vs. *a glimpsed person. As (2.4e) shows, there are

²It should be noted that this contrast cannot be reduced to the presence or absence of articles, as claimed in e.g. Verkuyl (1973), because it occurs in languages which do not have articles, e.g. Georgian, Japanese, Pirahã (Everett 1986) (see Van Valin & LaPolla 1997, §3.2.1). This contrast revolves around whether the direct object is a specified entity or quantity, in which case it delimits the action and supplies a temporal boundary for it, or whether it is unspecified and therefore does not serve to delimit the action. See Dowty (1979:60 ff.) and Jackendoff (1996) for a detailed explication of the semantic basis of these contrasts.
causative semelfactives. Like achievements, when semelfactives are iterated, they behave like activity verbs, but unlike achievements they do not require a plural subject for an iterative interpretation. Indeed, the default interpretation with many semelfactive verbs is that they are iterative.

There are a number of syntactic and semantic tests for determining the class of a verb. A list of possible tests for the verb class are given in Table 2.1; the causative classes will be discussed below. The ‘*’ means that certain complications arise with this test, which will be discussed below.

<table>
<thead>
<tr>
<th>Criterion</th>
<th>State</th>
<th>Achieve</th>
<th>Accomp</th>
<th>Activity</th>
<th>Active Accomp</th>
<th>Seml</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Occurs with progressive</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No*</td>
</tr>
<tr>
<td>2. Occurs with adverbs like vigorously, actively, etc.</td>
<td>No</td>
<td>No*</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No*</td>
</tr>
<tr>
<td>3. Occurs with adverbs like quickly, slowly, etc.</td>
<td>No</td>
<td>No*</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No*</td>
</tr>
<tr>
<td>4. Occurs with X for an hour, spend an hour Xing</td>
<td>Yes*</td>
<td>No*</td>
<td>Irrelevant*</td>
<td>Yes</td>
<td>Irrelevant*</td>
<td>No*</td>
</tr>
<tr>
<td>5. Occurs with X in an hour</td>
<td>No</td>
<td>No*</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No*</td>
</tr>
<tr>
<td>6. Can be used as stative modifier</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>7. Has causative paraphrase</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Table 2.1: Tests for Aktionsart classes

It should be noted that it is necessary to adapt the tests to the features of the language under investigation. For example, one of the tests Dowty (1979) gives to differentiate states from the other classes is ‘has habitual interpretation in simple present tense’, which is clearly an English-specific test.

Test 1 is useful only in languages like English, Spanish and Icelandic which have a progressive aspect; it can occur with activities (2.5d), accomplishments (2.5b), active accomplishments (2.5e), but not with states (2.5a) or achievements with a singular subject (2.5c). When it occurs with semelfactives, it necessarily yields an iterative reading (2.5e); this is also the case when the progressive is added to an achievement with a plural subject.

(2.5) a. *Dana is being tall/fat/a doctor.
    a’. *Pat is knowing the answer/believing that today is Wednesday.
    b. The ice is melting.
    c. *The firecracker is popping (cf. The firecrackers are popping.)
    d. Kim is dancing/singing/running/talking/crying/sleeping.
    e. The light is flashing (*once).

This test is marked ‘No’ for semelfactives, because if an adverb like once or one time is added to

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There is an additional complexity with the progressive test. Some stative predicates, such as sit, stand, and lie, may occur with the progressive under certain circumstances, as in (i).

(i) a. The book is lying on the table.
    b. The city lies/*is lying at the base of the mountains.

Carlson (1977) calls the statives in (ia) stage-level predicates, because they depict a situation which is not necessarily permanent. When the situation is necessarily permanent, as in (ib), the progressive is impossible. Carlson refers to statives representing permanent states or attributes as individual-level predicates.
make an iterative reading impossible, the progressive is unacceptable. As noted earlier, the progressive with a semelfactive verb (or an achievement verb with a plural subject) yields a verb which patterns like an activity verb.

Test 2 involves the ability to cooccur with adverbs that code dynamic action, e.g. *vigorously, actively, dynamically*, etc.

(2.6) a. *Max is vigorously tall/fat/a linguist.*
   a’. *Max vigorously knows the answer/believes that today is Wednesday.*
   b. *The snow is melting/melted vigorously.*
   b’. *The window shattered vigorously.*
   c. *Mary is dancing/singing/running/talking/crying vigorously/actively.*
   d. *The light flashed dynamically (*once).*

There is an important caution relevant to this test. It is crucial to avoid adverbs which require a controlling subject, e.g. *deliberately, carefully*. While they are incompatible with states and achievements, they are also incompatible with activity verbs which have subjects which refer to non-agentive participants in the action, e.g. *shiver* as in *the dog shivered violently/*deliberately in the cold, or *shake* as in *the house shook violently/*carefully during the earthquake*. Hence in selecting adverbs for this test, it is necessary to test their compatibility with involuntary verbs like *shiver* and with verbs like *shake* which can have an inanimate subject.

Test 3 applies only to non-stative verbs and distinguishes non-punctual from punctual verbs. Adverbs like *quickly, rapidly* and *slowly*, which will be called ‘pace’ adverbs, can occur with events involving temporal duration, regardless of whether they involve dynamic action, e.g. *the snow is melting slowly/??vigorously, John slowly/vigorously realized his mistake*. The ‘*$*$’ on the ‘No’ in the achievement and semelfactive columns indicates that pace adverbs indicating very short temporal intervals are marginally acceptable with these verbs, e.g. *the bomb exploded instantly, the light flashed instantly*. Hence with achievement verbs it is necessary to use pace adverbs which indicate a relatively slow process, e.g. *the bomb exploded *slowly/gradually*. Again, with semelfactive verbs these adverbs are possible only on the iterative reading, and therefore adding *once* should render them unacceptable, e.g. *?? The tree branch tapped slowly on the window once.*

Tests 4 and 5 distinguish telic from non-telic verbs. When applied to other languages, they require one to determine which adposition indicates duration (the *for* test) and which indicates completion (the *in* test). Test 4 isolates the property of having duration in time; it shows that states, accomplishments, activities and active accomplishments all have temporal duration, but achievements and semelfactives do no. Test 5 focuses on terminal points. If something is done in ten minutes, then explicit reference is being made to the termination point of the event. In other words, the event started at a certain time and ended 10 minutes later. But if something is done *for* ten minutes, the same event could still be going on at a later time. All the *for*-phrase indicates is that an event went on for a certain amount of time, without any information about when it began or when it ended. So in *he read the book in an hour*, the event began and ended in the space of an hour, with the subject having finished reading the book, whereas in *he read the book for an hour*, there is no indication of when the action began or ended, and the same event could still be going on at a later time. In general, states and activities readily take *for*-phrases, while achievements and accomplishments take *in*-phrases. Because achievements and semelfactives are punctual, they are only compatible with *in*-phrases referring to an exceedingly short period of time, e.g. *in the blink of an eye, in an instant, in a fraction of a second*. They are incompatible with *in*-phrases referring to temporal periods longer than this, e.g. *in ten seconds, in a minute, and in an hour*, unless they
have an iterative reading, and accordingly they are marked ‘No*’ in Table 2.1. Hence this test should also be used with temporal expressions of substantial duration.

(2.7) a. Max was tired/ill/happy for/*in an hour.
   a'. Max liked Susan for/*in an hour.
   b. The snow melted in/for an hour.
   c. The window shattered in/*for a fraction of a second.(*The window shattered in an hour.)
   d. Mary danced/sang/cried/talked/slept for/*in ten minutes.
   e. The light flashed in an instant/*in an hour/*for an hour once.

State predicates which code inherent properties do not normally take for phrases, e.g. *Sandy was tall/thin/short/fat for an hour. Hence there is an asterisk on the ‘Yes’ indicating that this test is problematic for some state predicates (cf. fn. 3). Some accomplishments and active accomplishments can take for-phrases, e.g. the clothes dried for ten minutes or Chris ran to the park for five minutes, which follows from their being non-punctual, which is the main point of test 3. Hence the occurrence of for-phrases with accomplishments is really redundant and tells us nothing new about accomplishments or active accomplishments. Hence it is marked as ‘irrelevant’ in Table 3.2 for them. Finally, there is an additional cooccurrence which must be noted. Achievements, semelfactives and activities do cooccur with in-phrases, e.g. The bomb will explode in one hour, Mary will sing in ten minutes; these phrases refer to the time until the onset of the action or event, not to the temporal duration of the event itself and are therefore irrelevant to these tests. Thus, it is not sufficient simply to ascertain the type of temporal phrase that a verb can occur with; it is, rather, necessary to pay attention to the meaning of the sentence as well.

Test 6 serves primarily to distinguish the two punctual types from each other. As noted earlier, because semelfactives have no result state, they cannot be used as stative modifiers, e.g. *the tapped window, *the flashed light. Achievements, on the other hand, do have a result state and therefore can be used as stative modifiers, e.g. the shattered window, the burst blood vessel. This is related to the fact noted earlier that semelfactives can have an iterative interpretation with a singular subject, while achievements can only have such a reading with a plural subject. Because the subject of an achievement undergoes a change of state, it cannot undergo it again, and therefore a different referent is required for the action to repeat, whereas, because the subject of a semelfactive verb does not undergo a change of state, it can repeat the action, hence the possibility of an iterative reading with a singular subject. This contrast could be used as an additional test for differentiating achievements from semelfactives.

There is no simple syntactic test to determine whether a verb is inherently causative or not, but paraphrases can be useful, as illustrated in (2.8). This is test 7.

(2.8) a. The dog caused the boy to be afraid.
   b. The cat caused the balloon to pop.
   c. The hot water caused the ice to melt.
   d. The girl caused the ball to bounce around the room.

It is important to make sure that the paraphrases have the same number of NPs as the original sentence being paraphrased; that is, ‘Pat causes Chris to come to have the book’ is an appropriate paraphrase of Pat gives the book to Chris, but ‘Leslie causes Leslie/herself to run’ is not a possible paraphrase of Leslie runs (it is at best a paraphrase of Leslie made herself run). This means that this test cannot apply to single argument verbs, i.e. verbs that have one argument in their basic form, because it would be impossible to make a causative paraphrase with a single participant.
When the causative versions of the classes listed in Table 2.1 are included, the result is given in Table 2.2.

<table>
<thead>
<tr>
<th>Class</th>
<th>Test 1</th>
<th>Test 2</th>
<th>Test 3</th>
<th>Test 4</th>
<th>Test 5</th>
<th>Test 6</th>
<th>Test 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes*</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Activity</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Achievement</td>
<td>No*</td>
<td>No</td>
<td>No*</td>
<td>No*</td>
<td>No*</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Semelfactive</td>
<td>No*</td>
<td>No*</td>
<td>No*</td>
<td>No*</td>
<td>No*</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Accomplishment</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Irrelev.*</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Active Accomplishment</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Irrelev.*</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Causative state</td>
<td>Yes*</td>
<td>Yes*</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Causative activity</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Causative achievement</td>
<td>No</td>
<td>Yes*</td>
<td>No*</td>
<td>No</td>
<td>No*</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Causative semelfactive</td>
<td>No*</td>
<td>Yes*</td>
<td>No*</td>
<td>No*</td>
<td>No*</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Causative accomplishment</td>
<td>Yes</td>
<td>Yes*</td>
<td>Yes</td>
<td>Irrelev.*</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Causative active accomplishment</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Irrelev.*</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 2.2: Tests for determining predicate classes

The ‘*’ for achievement and causative achievements and semelfactives with respects to tests 3 and 5 is the same as discussed above, as is the ‘*’ for test 4 with state predicates. Causative states present some interesting complexities with respect to tests 1 and 2. Specifically, the more active the causing state of affairs is, the better the progressive and dynamic adverbs are with causative state predicates. Consider the following contrasts.

(2.9) a. Your attitude is upsetting me.
     a’. Your boorish behavior is upsetting me.
     b. Your clothes nauseate me.
     b’. The smell of your clothes nauseates me.
     c. The clown’s funny hair amuses the children.
     c’. The clown’s zany antics amuse the children.

The first sentence in each pair presents a rather static situation as the cause of the state of affairs, while the second presents a more dynamic causing state of affairs. While none of the combinations is impossible, the progressive is better with the more dynamic causing state of affairs and worse with the more static one. Dynamic adverbs also force a dynamic reading for the causing state of affairs. For example, the sentence *the clown actively amused the children* could only be a report about the state of affairs described by (2.9c’), not (2.9c).
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The ‘Yes*’ for Test 2 for causative achievements, semelfactives and accomplishments reflects the fact that this type of adverb is not always acceptable with these verbs. It modifies the causing activity in the logical structure. Because they are sometimes acceptable, causative accomplishments differ little from causative active accomplishments in terms of these tests. But there are important differences. First, there should always be at least some dynamic adverbs which they are compatible with, and because there are two activity predicates in the logical structure, there may be ambiguity as to which one is being modified, something which is not the case with causative accomplishments. Second, causative accomplishments are ultimately related to a state predicate, whereas causative active accomplishments are ultimately related to an activity predicate. That is, the non-causative form of a causative accomplishment should be an accomplishment, which should involve a specific result state. The non-causative form of a causative active accomplishment, on the other hand, should be an active accomplishment, which should involve a specific activity. It should also be noted that causative accomplishments are much more common than causative active accomplishments, and therefore in unclear cases it is more likely that the verb would be a causative accomplishment rather than a causative active accomplishment.

These tests are not perfect, but taken together they enable the analyst to distinguish the classes. As noted above, it is necessary to adapt the tests to the language being investigated, and not all of them are equally useful. If a language lacks a progressive aspect, for example, then test 1 is irrelevant. Finally, it is necessary to be sensitive to what we may call ‘local cooccurrence effects’ in interpreting the tests. For example, suppose one applied test 3 to the English verb *rush*, as in She rushed across the room, in order to determine whether this verb has temporal duration or not, yielding She rushed quickly/swiftly/*slowly across the room. Some but not all pace adverbs are possible here; what are we to conclude? The correct conclusion is that *rush* has temporal duration and therefore is either an accomplishment or activity verb. But what about the incompatibility with *slowly*? This is an example of a local cooccurrence effect; because part of the inherent meaning of *rush* is to do something with some degree of rapidity, *slowly* conflicts with this aspect of the meaning of *rush*. This is not due to the verb not having temporal duration, as its cooccurrence with *quickly* and *swiftly* show. Rather, the incompatibility of *rush* and *slowly* is due to an aspect of the meaning of *rush* which is unrelated to what test 3 is testing for. In the same vein, it is possible that only one of the class of adverbs of the type mentioned in test 2 is compatible with a particular verb; that would be sufficient to show that the verb rates a ‘yes’ for the test. Other factors irrelevant to the point of the test may cause the other adverbs to be ruled out. Thus one must be sensitive to these local cooccurrence effects in interpreting the results of the tests.

In many languages, verbs in these different classes may be overtly morphologically related to each other. Consider the following examples from Huallaga Quechua (Weber 1989).

\[
\begin{align*}
(2.10) & \quad \text{State} & \quad \text{Accomplishment} & \quad \text{Causative Accomplishment} \\
\text{a. } & \text{qarwash-} & \text{qarwash-ta:-} & \text{qarwash-ta:-chi-} \\
& \text{yellow} & \text{yellow-become} & \text{yellow-become-cause} \\
& \text{‘be yellow’} & \text{‘become yellow’} & \text{‘make something yellow’} \\
\text{b. } & \text{hāmpa-} & \text{hāmpa-ya:-} & \text{hāmpa-ya:-chi-} \\
& \text{above.on.slope} & \text{above.on.slope-become} & \text{above.on.slope-become-cause} \\
& \text{‘above with respect to slope’} & \text{‘become higher’} & \text{‘make something higher’} \\
\text{c. } & \text{hatun-} & \text{hatun-ya:-} & \text{hatun-ya:-chi-} \\
& \text{big} & \text{big-become} & \text{big-become-cause} \\
& \text{‘be big’} & \text{‘become bigger’} & \text{‘make something bigger’} \\
\text{d. } & \text{umasapa-} & \text{umasapa-ya:-} & \text{umasapa-ya:-chi-} \\
& \text{big.headed} & \text{big.headed-become} & \text{big.headed-become-cause}
\end{align*}
\]
In (2.10a-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 (2.10e-f) show, -chi- can be added to underived accomplishment verbs as well.

A rather different pattern expressing the same relationships obtains in Yagua (Peru; Payne & Payne 1989), Russian and French.

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

In these three languages, the base form of the verb is a causative accomplishment, and the accomplishment and state forms are derived morphologically from it. It is also the case that some languages overtly mark the contrast between activity verbs and active accomplishment verbs, e.g. Russian est‘eat [activity]’ vs. s’est ‘eat [active accomplishment]’, Georgian c’er ‘write’ [activity] vs. dac’er ‘write’ [active accomplishment]. In all of these languages there are overt morphological relationships among some of the different classes.

An explanation for these patterns can be found in the lexical representations used in RRG: verbs are analyzed in terms of a lexical decomposition system in which state and activity predicates are taken as basic and the other classes are derived from them. States are represented as bare predicates, e.g. know´(x, y), dead´(x). Activity verbs representations all contain the element do´, e.g. do´(x, [cry´(x)]) ‘cry’, do´(x, [eat´(x, y)]) ‘eat’. Achievements, which are punctual changes of state or onsets of activity, are represented as a state or activity predicate plus an INGRResessive operator, e.g. INGR shattered´(x) ‘shatter [INTR]’. English does not have any lexical verbs indicating a punctual onset of an activity, but other languages do. In Russian, plakat´ ‘cry’ is an activity verb, and zaplakat ‘burst out crying’ is an achievement, i.e. INGR do´(x, [cry´(x)]); note the translation using the punctual expression burst out. Semelfactives likewise can be based on states or activities, e.g. glimpse would have the representation SEML see´(x, y), while cough would have the representation SEML do´(x, [cough´(x)]). This captures the fact that only semelfactives based on activities have an activity reading when iterative, e.g. Pat is coughing vs. *Chris is glimpsing Kim. Accomplishments, which are non-punctual changes of state or onsets of activity, are represented as a state or activity predicate plus a BECOME operator, e.g. BECOME melted´(x) ‘melt [INTR]’. Russian also provides an example of a non-punctual onset of activity verb: gorovorit´ ‘talk, speak’ is an activity verb, and zagovorit´ ‘start talking’ is an accomplishment, i.e. BECOME do´(x, [speak´(x)]). Causative verbs have a complex structure consisting of a predicate indicating the causing action or event, usually an activity predicate, linked to a predicate indicating the resulting state of affairs by an operator-connective CAUSE, e.g. [do´... CAUSE [BECOME pred´...]].
Accomplishment verbs like *melt* involve both a process that takes place over time, and an inherent endpoint of the process leading to a result state. Achievement verbs like *pop*, on the other hand, have no process, only a punctual event leading to a result state. Thus, an accomplishment can be analyzed as a process plus an achievement, if the final moment of the process is equated with the punctual event of the achievement. There is no direct representation of such a process in this decomposition system. It is not the same as an activity, since it is not dynamic, i.e. such processes do not cooccur with the adverbs of test 2 in Table 2.1. This can be seen in English when verbs like *melt* occur in the progressive, which isolates the process from the endpoint, as in (2.12).

(2.12)a. The ice is melting.
   b. The ice is melting slowly/*vigorously.

There are languages in which verbs directly express processes with no necessary implication of an endpoint and result state, unlike English verbs like *melt* and *dry*. The following examples are from Mparntwe Arrernte (Wilkins 1989).

(2.13)a. Ayenge    irrernte ne-ke.
       1sgNOM cold      COP-PAST
       ‘I was cold.’

b. Ayenge    irrernt-irre-ke.
       1sgNOM cold-PROC-PAST
       ‘I got colder/cooler/*cold.’

b’. Ayenge    iparrpele/*tyepetyepele irrernt-irre-ke.
       1sgNOM quickly/energetically      cold-PROC-PAST
       ‘I got colder quickly/*energetically.’

c. Ayenge    irrernte-arle-irre-ke.
       1sgNOM  cold-RES-PROC-PAST
       ‘I got cold.’

The crucial contrast is between (2.13b) and (c): the suffix *-irre* added to the stative stem *irrernte* ‘cold’ means ‘become colder’ or ‘become cooler’ but not ‘become cold’, i.e. it signals a change from less cold to more cold without entailing that the process has reached the endpoint of being cold. Like (2.12b) in English, a dynamic adverb like *tyepetyepele* ‘energetically’ is impossible with a process. In order to signal the reaching of the endpoint, the suffix *-arle* ‘result’ must be added, as in (c), to indicate that the process reached its termination yielding a result state. Hence in Mparntwe Arrernte it is necessary to represent processes independent of a possible endpoint and result state. In order to do this, it is necessary to introduce an operator PROC for ‘process’. The decompositional representation for the examples in (2.13) would be as in (2.14).

---

4Treating causatives as all having the same ‘CAUSE’ element is a gross oversimplification for many reasons, only two of which will be mentioned here. First, there is a contrast among three basic types of causality: (i) *Pam made Sally go* [Direct (Coercive)]; (ii) *Pam had Sally go* [Indirect (Non-coercive)]; and (iii) *Pam let Sally go* [Permissive]. Both direct and indirect causality will be represented by ‘CAUSE’, and permissive causality will be represented by ‘LET’ in logical structure. English verbs like *let*, *drop* and *release* would have LET instead of CAUSE in their logical structure. Virtually all the examples to be discussed involve direct or indirect causality. Second, there is an important contrast between implicative and non-implicative causality; that is, the difference revolves around whether the resulting state of affairs is necessarily entailed or not. In English, lexical causatives and direct causality are implicative, whereas permissive is not: *Pam made the dish, but it didn’t break; *Pam made Sally go, but she did not go; Pam let Sally go, but she did not go. For discussion of these issues, see e.g. Jackendoff (1990), Talmy (2000), especially with respect to his theory of force dynamics.
Thus, BECOME with a state predicate is decomposable into PROC & INGR. However, it will continue to be used with verbs like English *melt* and *dry*, because they normally entail both a process and a result state. Unlike INGR, SEML and BECOME, PROC does not occur with activity verbs. The other three entail an event or transition which is the onset of the activity, and because PROC has no event or transition entailment, it could not be used to characterize some kind of pre-onset process.

As shown in (2.3), active accomplishments are composed of an activity predicate plus a change of state which renders them telic. There are two kinds of active accomplishments: those involving verbs of motion, as in (2.3a)` and those involving verbs of consumption and creation in (2.3b`c`). With the first kind, the change is a change of location, namely the motion is completed when the subject arrives at a particular location. Hence the decompositional representation of (2.3a`) would be as in (2.15a). With respect to verbs of consumption and creation, on the other hand, the result state is either the consumption or creation of an object, which involves a change of state rather than location. The representations for the examples in (2.3b`,c`) are given in (2.15b,c).

Because active accomplishments are composed of an activity + termination with result state, they are more accurately characterized as ‘active achievements’. However, they will still be referred to as ‘[active] accomplishments’, since this is the standard term for them in the literature.

These decompositional representations of verbs are termed LOGICAL STRUCTURES [LS], and the schemata for the classes are given in Table 2.3.

---

5 The INGR operator here is not directly signalled by the verbal morphology, which indicates a process plus a result state. But the existence of a result state necessarily entails a change of state leading to the result, hence the INGR.

6 ‘&’ is a connective meaning ‘and then’; see Dowty (1979: 74-5).

7 The effect of the progressive on verbs like this can now be easily expressed: progressive + BECOME *pred* (x) yields PROC *pred*. In other words, the progressive cancels the INGR component of BECOME, leaving only PROC. This follows from the incompatibility of the progressive and achievements, as expressed in test 1.
<table>
<thead>
<tr>
<th>Verb Class</th>
<th>Logical Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>STATE</td>
<td>( \text{predicate}´(x) \text{ or } (x,y) )</td>
</tr>
<tr>
<td>ACTIVITY</td>
<td>( \text{do}´(x, [\text{predicate}´(x) \text{ or } (x, y)]) )</td>
</tr>
<tr>
<td>ACHIEVEMENT</td>
<td>INGR ( \text{predicate}´(x) \text{ or } (x,y) ), or ( \text{do}´(x, [\text{predicate}´(x) \text{ or } (x, y)]) )</td>
</tr>
<tr>
<td>SEMELFACTIVE</td>
<td>SEML ( \text{predicate}´(x) \text{ or } (x,y) ), or ( \text{do}´(x, [\text{predicate}´(x) \text{ or } (x, y)]) )</td>
</tr>
<tr>
<td>ACCOMPLISHMENT</td>
<td>BECOME ( \text{predicate}´(x) \text{ or } (x,y) ), or ( \text{do}´(x, [\text{predicate}´(x) \text{ or } (x, y)]) )</td>
</tr>
<tr>
<td>ACTIVE ACCOMPLISHMENT</td>
<td>( \text{do}´(x, [\text{predicate}´(x) \text{ or } (x, y)]) ) &amp; INGR ( \text{predicate}2´(z, x) \text{ or } (y) )</td>
</tr>
<tr>
<td>CAUSATIVE</td>
<td>( \alpha \text{ CAUSE } \beta ), where ( \alpha, \beta ) are LSs of any type</td>
</tr>
</tbody>
</table>

Table 2.3: Lexical representations for Aktionsart classes

Following the conventions of formal semantics, constants (which are normally predicates) are presented in boldface followed by a prime, whereas variable elements are presented in normal face. The elements in boldface + prime are part of the vocabulary of the semantic metalanguage used in the decomposition; they are not words from any particular human language. Hence the same representations are used for all languages (where appropriate), e.g. the logical structure for Lakhota 't'à and English die (intr.) would be BECOME dead´(x). The variables are filled by lexical items from the language being analyzed; for example, the English sentence ‘the dog died’ would have the logical structure BECOME dead´(dog), while the corresponding Lakhota sentence \( \text{ki t'é} \) ‘the dog died’ would have the logical structure BECOME dead´(ki t'é). Thus, the constants should be from the semantic metalanguage, while the variable should be filled by lexical items from the language in question.

The derivational relationships illustrated in (2.10) and (2.11) can be readily accounted for in terms of this system of lexical decomposition. The state \( \rightarrow \) accomplishment \( \rightarrow \) causative accomplishment pattern found in Huallaga Quechua follows directly from the lexical representations, e.g. in (2.10c), hatun- (big´(x)) \( \rightarrow \) hatun-ya: (BECOME big´(x)) \( \rightarrow \) 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 logical structure rather than to add components to it, e.g. in (2.11a), -muta- (...CAUSE [BECOME open´(x)]), -muta-y- (BECOME open´(x)), in which -y- cancels the ‘...CAUSE’ part of the logical structure, and -muta-y-maa (open´(x)), in which -maa cancels...
the BECOME part of the logical structure.

This system of lexical representation, while much richer than that employed by some other theories, is nevertheless only a first approximation to the kind of decompositional system which is required for deeper lexical semantic analysis. Van Valin & Wilkins (1993) explore the features of such a system, focussing on the decomposition of cognition verbs in English and Mparntwe Arrente, and Van Valin & LaPolla (1997) explore the extended decomposition of English verbs of saying. Faber & Mairal (2002) investigate the extended decomposition of verbs of cutting in English.

Examples of some English verbs with their logical structure are presented in (2.16).

(2.16) a. STATES
Pat is a fool. be´ (Pat, [fool´])
The cup is shattered. shattered´ (cup)
Kim is in the library. be-in´ (library, Kim)10
Dana saw the picture. see´ (Dana, picture)

b. ACTIVITIES
The children cried. do´ (children, [cry´ (children)])
Carl ate pizza. do´ (Carl, [eat´ (Carl, pizza)])

c. ACHIEVEMENTS
The window shattered. INGR shattered´ (window)
The balloon popped. INGR popped´ (balloon)

d. SEMELFACTIVES
Dana glimpsed the picture. SEML see´ (Dana, picture)
Mary coughed. SEML do´ (Mary, [cough´ (Mary)])

e. ACCOMPLISHMENTS
The snow melted. BECOME melted´ (snow)
Mary learned French. BECOME know´ (Mary, French)

f. ACTIVE ACCOMPLISHMENTS
Chris ran to the park. do´ (Chris, [run´ (Chris)]) & INGR be-at´ (park, Chris)
Carl ate the pizza. do´ (Carl, [eat´ (Carl, pizza)]) & INGR consumed´ (pizza)

g. CAUSATIVES
The dog scared the boy. [do´ (dog, Ø)] CAUSE [feel´ (boy, [afraid´]])
Max melted the ice. [do´ (Max, Ø)] CAUSE [BECOME melted´ (ice)]
The cat popped the balloon. [do´ (cat, Ø)] CAUSE [INGR popped´ (balloon)]
Felix bounced the ball. [do´ (Felix, Ø)] CAUSE [do´ (ball, [bounce´ (ball)])]

In (2.16g), ‘do´ (x, Ø)’ represents an unspecified activity.

A crucial point to be emphasized is that it is necessary to distinguish the basic lexical meaning of a verb, e.g. drink as an activity verb, from its meaning in a particular context, e.g. drink a glass of beer as an active accomplishment predication. The former would have ‘do´ (x, [drink´ (x, y)])’ as its representation in its lexical entry in the lexicon, whereas the latter would have ‘do´ (x, [drink´ (x, y)]) & INGR consumed´ (y)’ as the representation of the core of the clause in which drink appears. A given logical structure is intended to represent a particular meaning or interpretation of a lexical item; it is not necessarily the case that there is a single logical structure underlying all of the

9 The system of lexical decomposition proposed in Rappaport Hovav & Levin (1998) is quite similar to the RRG system, especially to the earlier system referred to in fn. 8, with reference to which the differences are largely notational. Their lexical templates correspond to the logical structure types in Table 2.3.

10 The order of arguments in the logical structure will be discussed in §2.2.1 below.
uses of a particular verbal lexical item. It is not necessary to list each of these verbs separately in the lexicon; rather, the activity forms would be listed and the active accomplishment use would be derived by the following lexical rules.

(2.17)a. Motion verbs:

\[
\text{do}^\prime (x, \text{[pred}^\prime (x))] \leftrightarrow \text{do}^\prime (x, \text{[pred}^\prime (x))] \& \text{INGR be-LOC}^\prime (y, x)
\]

b. Creation/consumption verbs:

\[
\text{do}^\prime (x, \text{[pred}_1^\prime (x, y))] \leftrightarrow \text{do}^\prime (x, \text{[pred}_1^\prime (x, y))] \& \text{INGR pred}_2^\prime (y)
\]

Similarly, verbs which are related morphologically could also be derived by lexical rules. For example, the Huallaga Quechua accomplishment forms in the second column in (2.10) would be derived from the state forms in the first column by an inchoativization rule in the lexicon, and the causative accomplishment forms in the third column would be derived from the accomplishment forms in the second column by a causativization rule in the lexicon. For a polysemous verb each meaning would be associated with a different logical structure; for example, take in the sense of ‘obtain’ or ‘get’ would have a different logical structure from take in the sense of ‘carry’. Logical structures are associated fundamentally with the meanings which verbs express.

Adjectives are treated as state predicates in logical structure when they function predicatively, and following Schwartz (1993) attributive, identificational, and equational predications are given the logical structures in (2.18).

(2.18)a. Pat is tall.

\[
\text{a'} .\text{be}^\prime (\text{Pat}, \text{[tall}^\prime])
\]

b. Kim is a lawyer.

\[
\text{b'} .\text{be}^\prime (\text{Kim}, \text{[lawyer}^\prime])
\]

c. Kim is the lawyer.

\[
\text{c'} .\text{be}^\prime (\text{Kim}, \text{lawyer})
\]

\text{Be}^\prime in these logical structures does not correspond to English \textit{be}, which, as noted in §1.3, is not part of the predicate in a copular construction; rather \text{be}^\prime serves only to indicate attributive, identificational and equational predictions in logical structures. Result state predications do not contain it, e.g. \text{dead}^\prime (dog) for \textit{The dog is dead}. In attributive and identificational predications, the second argument position of \text{be}^\prime is filled by an adjectival or nominal predicate. In equational predications, on the other hand, it is filled by a referring expression.

English uses \textit{be} for a wide range of stative predications, while other languages make important semantic distinctions within this range. In Tagalog, for example, inherent attributes and result states are distinguished, as illustrated in (2.19) (from Foley & Van Valin 1984).

(2.19)a. Puti \text{ ang } bulaklak.

\[
\text{white NOM flower}
\]

‘The flower is (naturally) white.’

b. Ma-puti \text{ ang } bulaklak.

\[
\text{-white NOM flower}
\]

‘The flower is white (it faded).’

The logical structure for (2.19a) is \text{be}^\prime (bulaklak, [white\prime]), an individual-level predicate (see fn. 3),

\begin{itemize}
  \item[11] See Van Valin & LaPolla (1997), §4.6, for a discussion of lexical rules in RRG.
\end{itemize}
while the logical structure for (b) is whiteˈ (bulaklak), a stage-level predicate, which is the result state of BECOME whiteˈ (x). Spanish uses four different verbs in constructions whose English equivalents all use be.

(2.19)a. Pat is tall.
   a’. Pat es alto.
   b. Pat is in the library.
   b’. Pat está in la biblioteca.
   c. Pat is cold (i.e. feels cold)
   c’. Pat tiene frio.
   d. The weather is cold.
   d’. Hace frío.

Thus, simply because a number of stative predications in a language all contain the same copula, it cannot be assumed that they have the same logical structure.

Predicative prepositions are also state predicates, as exemplified in (2.16a). When predicative PPs function as adjunct modifiers, they take the logical structure of the main verb as one of their arguments. This is exemplified in (2.20).

(2.20)a. Chris ran in the park.
   b. be-inˈ (park, [doˈ (Chris, [runˈ (Chris)])])

In (2.20a), Chris’ running takes place in the park, and therefore the logical structure of the predicative preposition in is the highest predicate in the logical structure; it takes the park and the logical structure for run as its two arguments. This contrasts with the logical structure of the active accomplishment Chris ran to the park in (2.16f); there the PP expresses the location of the referent of Chris, not the location of the event of running.

Adverbs are represented in logical structure as one-place predicates, which modify different parts of a logical structure.12 Peripheral temporal adverbs take the whole logical structure as their argument, as in (2.21).

(2.21)a. Yesterday Chris ran to the park.
   b. yesterdayˈ (doˈ (Chris, [runˈ (Chris)]) & INGR be-atˈ (park, Chris))

Manner adverbs modify activity predicates primarily, while pace adverbs can modify any kind of durational predicate.

(2.22)a. Pat elegantly closed the door slowly.
   b. [elegantˈ (doˈ (x, Ø)) CAUSE [slowˈ (BECOME closedˈ (y, x))]]

Adverbs are not operators, but they interact with the operator projection. When there are multiple adverbs in a sentence, they are constrained by the layers of the operator projection, in that adverbs related to more outer operators occur outside of adverbs related to more inner operators. In the simplest case, ‘outside of’ means ‘farther from the verb’. This is illustrated below; ordering constraints of this kind were first noticed by Jackendoff (1972).

(2.23)a. Evidently, Leslie has slowly been completely immersing herself in the new language.

12 See Van Valin & LaPolla (1997), §4.4.1.2, for a detailed discussion of adverbs and their semantic representation.
a’. Leslie has evidently been slowly immersing herself in the new language completely.
c. *Evidently, Leslie has completely been slowly immersing herself in the new language.
d. *Slowly, Leslie has evidently been completely immersing herself in the new language.
e. *Completely, Leslie has evidently been slowly immersing herself in the new language.
f. *Completely, Leslie has evidently been slowly immersing herself in the new language.
g. *Completely, Leslie has slowly been evidently immersing herself in the new language.

(2.24)a. Leslie has been immersing herself completely in the new language slowly, evidently.
 a’. Leslie has been completely immersing herself slowly in the new language, evidently.
c. *Leslie has been immersing herself slowly in the new language completely, evidently.
d. *Leslie has been immersing herself completely in the new language evidently, slowly.
e. *Leslie has been immersing herself evidently in the new language completely, slowly.
f. *Leslie has been immersing herself slowly in the new language evidently, completely.
g. *Leslie has been immersing herself evidently in the new language slowly, completely.

Note that unlike operators, which have fixed positions, adverbs may occur either before or after the verb, but in both cases the scope constraints require that the nuclear adverb be closer to the verb than the core adverb, and likewise for the core adverb with respect to the clausal adverb. The structure of (2.24a) is given in Figure 2.1. Adverbs are connected to both projections; they are constituents of the constituent projection but interact with the operators of the operator projection.
Leslie has been immersing herself completely in the new language slowly, evidently

2.2 Operators

Operators like tense, aspect, modality and illocutionary force are very complex semantically, and no attempt will be made to develop a substantive semantic representation for them here. Rather, a place for them in the semantic representations will be provided, so that their interaction with other elements of the representations can be represented. The RRG semantic representation would ultimately have to be given a full interpretation in a formal semantic theory.

In order to distinguish operators from the other elements in semantic representations, they will be represented in italicized caps inside of angled brackets indicating their scope in logical structure. The general schema is summarized in (2.25), with values arbitrarily chosen solely for illustration purposes. There is a range of values for each operator, which depends on the operator system in the language in question; for example, in a language with a past/non-past tense system, there are two values for the tense operator, whereas in a language with a past/present/future system, there are three values.

(2.25)
\[
\langle \text{IF}\langle \text{TNS}\langle \text{PAST} \rangle \langle \text{STA}\langle \text{IRR} \rangle \langle \text{NEG}\langle \text{Ø} \rangle \langle \text{MOD}\langle \text{OBLG}\langle \text{EVQ}\langle \text{SG}\langle \text{DIR}\langle \text{Ø} \rangle \langle \text{ASP}\langle \text{PERF}\langle \text{LS}\rangle \rangle \rangle \rangle \rangle \rangle \rangle \rangle \rangle \rangle \rangle \rangle
\]

The full logical structure for *Has Kim been crying?* would be as in (2.26). (Operators with no
specification will be omitted for ease of presentation.)

\[(2.26) \langle \text{IF INT} \langle \text{TNS PRES} \langle \text{ASP PERF PROG} \langle \text{do´} (\text{Kim}, [\text{cry´} (\text{Kim})]) \rangle \rangle \rangle \]

### 2.3 Nouns and noun phrases

Nouns have a semantic representation based on the qualia analysis developed in Pustejovsky (1995) in his Generative Lexicon theory. A non-derived noun like *cat* or *table* does not have a logical structure like a verb or predicative preposition, but it does have semantic properties which contribute in an important way to the meaning of a sentence. Consider the following example.

\[(2.27) \text{Dana began a new novel.} \]

This sentence can normally be construed to mean that Dana either began to *read* a novel or to *write* a novel. Where does this meaning come from? Why can’t one interpret this to mean that Dana began to *eat* a novel, the way one can construe *Chris started in on a souvlaki*? The answer obviously is that the interpretation derives from the different object NPs in the two sentences, *novel*, on the one hand, and *souvlaki*, on the other. In order to capture these facts, Pustejovsky (1991, 1995) proposes the qualia theory of the semantics of nominals. It is summarized in (2.28).

\[(2.28) \text{Qualia Theory (Pustejovsky 1991:426-7)} \]

- **a. Constitutive Role:** the relation between an object and its constituents, or proper parts
  - 1. Material
  - 2. Weight
  - 3. Parts and component elements

- **b. Formal Role:** that which distinguishes the object within a larger domain
  - 1. Orientation
  - 2. Magnitude
  - 3. Shape
  - 4. Dimensionality
  - 5. Color
  - 6. Position

- **c. Telic Role:** purpose and function of the object
  - 1. Purpose that an agent has in performing an act
  - 2. Built-in function or aim that specifies certain activities

- **d. Agentive Role:** factors involved in the origin or “bringing about” of an object
  - 1. Creator
  - 2. Artifact
  - 3. Natural kind
  - 4. Causal chain

Pustejovsky gives the following representation for *novel*.\(^{13}\)

\[(2.29) \text{novel} (x) \]

- **a. Const:** *narrative´* (x)
- **b. Form:** *book´* (x), *disk´* (x)

\(^{13}\)The logical structure notation developed in this chapter has been used in place of the verb notation used in the original.
c. Telic: \(\text{do}´ (y, [\text{read}´(y, x)])\)
d. Agentive: \(\text{artifact}´(x), \text{do}´(y, [\text{write}´(y, x)])\) & INGR \(\text{exist}´(x)\)

The source of the two interpretations for (2.27) is now clear: one reading is based on the telic role of \textit{novel}, while the other is derived from the agentive role. In the case of (2.27), \textit{Dana began a new novel}, we would have the following logical structure.\(^{14}\)

\[(2.30) \text{BECOME do}´ ([\text{Dana} (x), {...}]), [\text{verb}´ ([\text{Dana} (x), {...}]), \text{novel} (y), {..., Q_r [\text{do}´ (x, [\text{read}´(x, y)]), Q_A [\text{do}´ (x, [\text{write}´(x, y)])])])\]

\(\text{Begin}\) is treated semantically like a complement-taking predicate with an unspecified complement verb (the ‘\text{verb}´ in the logical structure), and the semantic content of the unspecified verb is supplied by the logical structure in the telic role in the qualia for the ‘\textit{Dana began to read a novel}’ interpretation and in the agentive role in the qualia for the ‘\textit{Dana began to write a novel}’ reading. Since qualia express important semantic properties of nominals, qualia may be used to represent the selectional restrictions of verbs. That is, if a verb requires a particular type of argument, that argument position can be annotated with the appropriate qualia type, and then only NPs whose head noun has qualia compatible with it may function in the logical structure.

An integral part of a noun phrase is the set of nominal operators, which were introduced in §1.6. They may be given a representation in the semantic representation of the NP analogous to the representation of operators in the semantic representation of the clause. The NP operators are summarized in (2.31).

\[(2.31) \langle \text{DEIC PROX} \langle \text{DEF} + \langle \text{NEG} \langle \text{QNT} \exists \langle \text{NUM} \langle \text{SG} \langle \text{NASP COUNT} \langle \text{QUAL} \langle \text{O} \langle \text{N} \rangle \rangle \rangle \rangle \rangle \rangle \rangle \rangle \rangle \]

Quality modifiers are represented as predicates taking the head as an argument; the head noun is indicated by the dashed underlining. The logical structure for \textit{the red scarf} would be as in (2.32).

\[(2.32) \langle \text{DEF} + \langle \text{NEG} \langle \text{QNT} \exists \langle \text{NUM} \langle \text{SG} \langle \text{NASP COUNT} \langle \text{QLT} [\text{be}´(\text{scarf}, [\text{red}])]) \rangle \rangle \rangle \rangle \rangle \]

Possessive NP constructions involve a possessive predication within the NP. Possessive predications are based on \textit{have}´(x, y), e.g. \textit{have}´(woman, book) for \textit{The woman has a book}, and the corresponding alienable possessive NP \textit{the woman’s book} would be represented as \textit{have}´(woman, book), with the head underlined as in (2.32). In a possessive predication, the first argument of \textit{have}´ is the possessor and the second argument the possessed (see Table 2.4 below), and therefore within the NP the possessed is normally selected as the head of the NP. It is possible, however, to choose the possessor as the head, i.e. \textit{have}´(woman, book), yielding \textit{the woman with the book}. Certain types of NP adjuncts receive a similar representation, e.g. the NP \textit{the table in the library} would have the representation \textit{be-in}´ (library, \textit{tablē}). Inalienable possession is represented by \textit{have.as.part}´(x, y), e.g. \textit{have.as.part}´(woman, arm) for \textit{the woman’s arm}. Kin possession is expressed by \textit{have.as.kin}´(x, y), as in \textit{have.as.kin}´(woman, \textit{sister}) for \textit{the woman’s sister}.

Pronouns and reflexive pronouns are represented directly in the logical structure in which they occur, as illustrated in (2.33).

\(^{14}\)‘...’ represents qualia which are not specified for the example. The logical structure for \textit{begin} would be \textit{BECOME do}´(x, y), where the logical structure of the complement verb fills the y variable slot.
(2.33) a. He saw Pat.
   a´. see´(3sgM, Pat)
   b. Mary saw herself.
   b´. see´(Mary, herself)

The conditions on possible intersentential coreference involving pronouns are related to information structure; see Van Valin & LaPolla (1997), §5.6. The conditions on the binding of reflexive pronouns like herself will be discussed in §5.2 below.

Since every argument in a logical structure would receive a representation like the one in (2.32) in a full semantic representation, such representations would be extremely complex and cumbersome. An example of the representation of a simple intransitive clause, Has the tall man been crying?, is given in Figure 2.2.

\[
\langle \text{IF INT } \langle \text{TNS PAST } \langle \text{ASP PERF PROG } \langle \text{do´(x, [cry´(x)])} \rangle \rangle \rangle \rangle \langle \text{DEF + } \langle \text{QNT } \exists \langle \text{NUM SG } \langle \text{NASP COUNT } \langle \text{QLT be´(man (x), [tall´])} \rangle \rangle \rangle \rangle \rangle
\]

Figure 2.2: Semantic representation of Has the tall man been crying?

2.4 Semantic Roles

The next step in the development of the semantic representation is the specification of the semantic relations that obtain between a verb or other predicator and its arguments. RRG posits two types of semantic roles: specific semantic roles which correspond to the much discussed thematic relations of other approaches, and generalized semantic roles which play a crucial role in the linking system.

2.4.1 Thematic Relations

The logical structures introduced in section 2.1 form the heart of the lexical entry for a verb, and they correspond to the thematic relations/role lists that other theories associate with a verb in its lexical entry. There is, however, no listing of thematic relations in a verb’s lexical entry in RRG; rather, thematic relations are defined in terms of the argument positions in the decomposed logical structure representations, following Jackendoff (1976). The definitions are given in Table 2.4.

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. Attrib/Identificational  be´(x, y)  x = ATTRIBUTANT, y = ATTRIBUTE
II. ACTIVITY VERBS

A. Single argument

1. Unspecified action
   \[ \text{do}^\prime (x, \emptyset) \]  
   \( x = \text{EFFECTOR} \)

2. Motion
   \[ \text{do}^\prime (x, [\text{walk}^\prime (x)]) \]  
   \( x = \text{MOVER} \)

3. Static motion
   \[ \text{do}^\prime (x, [\text{spin}^\prime (x)]) \]  
   \( x = \text{ST-MOVER} \)

4. Light emission
   \[ \text{do}^\prime (x, [\text{shine}^\prime (x)]) \]  
   \( x = \text{L-EMITTER} \)

5. Sound emission
   \[ \text{do}^\prime (x, [\text{gurgle}^\prime (x)]) \]  
   \( x = \text{S-EMITTER} \)

B. One or two arguments

1. Performance
   \[ \text{do}^\prime (x, [\text{sing}^\prime (x, (y))]) \]  
   \( x = \text{PERFORMER}, y = \text{PERFORMANCE} \)

2. Consumption
   \[ \text{do}^\prime (x, [\text{eat}^\prime (x, (y))]) \]  
   \( x = \text{CONSUMER}, y = \text{CONSUMED} \)

3. Creation
   \[ \text{do}^\prime (x, [\text{write}^\prime (x, (y))]) \]  
   \( x = \text{CREATOR}, y = \text{CREATION} \)

4. Directed perception
   \[ \text{do}^\prime (x, [\text{see}^\prime (x, (y))]) \]  
   \( x = \text{OBSERVER}, y = \text{STIMULUS} \)

5. Use
   \[ \text{do}^\prime (x, [\text{use}^\prime (x, y)]) \]  
   \( x = \text{USER}, y = \text{IMPLEMENT} \)

Table 2.4: Definitions of thematic relations in terms of LS argument positions

In terms of these definitions, in (2.16a) Pat is an attributant, the first argument of an identificational predication, while the cup is a patient, the single argument of a one-place stative predicate of state or condition. In the locational example, the library is a location and Kim is a theme. In the last example with see, a two-place stative perception verb, Dana is the first argument and therefore a perceiver, while the picture is the second argument and a stimulus. The thematic relations assignments of achievement, accomplishment and semelfactive verbs are the same as the corresponding state or activity, as the addition of the operator BECOME, SEML or INGR does not affect the argument structure of the logical structure.

Activity verbs are the other class of primitive predicates, and there are at least ten subclasses. The first argument of a non-motion activity verb is an effector, the participant which does some action and which is unmarked for volition and control. The other thematic relations associated with the first argument of activity verbs are really subtypes of effector. Activity verbs tend strongly to be single-argument, but there are some which have two arguments, e.g. eat, drink, play.

A prominent thematic relation that is missing from Table 2.4 is that of agent. While many approaches take agent to be one of the basic thematic relations, in RRG it is analyzed very differently. To begin with, if agent is taken to be the intentional, volitional and controlling participant in an event, then there are many verbs which appear to take agents in some sentences but not others.

(2.34)a. The man killed his neighbor.
   b. The man intentionally killed his neighbor.
   c. The man accidentally killed his neighbor.

(2.35)a. The man murdered his neighbor.
   b.?The man intentionally murdered his neighbor.
   c.*The man accidentally murdered his neighbor.

\(^{15}\)The order of arguments in the semantics reflects their thematic relation and is not correlated with the word order of English or any other language. All locational predicates in every language have this logical structure, with the first argument a location and the second one a theme, and this is true regardless of the word order of the language. The relationship between the order of arguments in logical structures and the overt order of XPs in a sentence is mediated by the linking algorithm to be introduced in chapter 5.
(2.36)a. A branch falling from Pat’s tree killed his neighbor.
   b.*A branch falling from Pat’s tree murdered his neighbor.

Murder, unlike kill, requires a perpetrator which is acting intentionally and volitionally and is in control of his or her actions. This precludes sentences like (2.35c), in which there is no intention on the part of the perpetrator to carry out the action, and like (2.36b) in which the perpetrator is an inanimate entity incapable of volition, intention and control by definition. Thus, murder requires an agent argument. Kill, on the other hand, is quite compatible with a non-intentional perpetrator, as (2.34c) shows, or with an inanimate perpetrator, as (2.36a) shows. Facts like these led Holisky (1987) and Van Valin & Wilkins (1996) to argue that the basic notion that applies to both of these verbs is effector, and agents are a special type of effector. With verbs like murder, the agency is lexicalized in the meaning of the verb and therefore would have to be represented in its logical structure. Following Ross (1972), DO signals agency in logical structures, e.g. DO (x, [do´ (x, Ø)] CAUSE [BECOME dead´ (y)]) for the logical structure for murder. With verbs like kill, on the other hand, the effector argument is interpreted as an agent if its referent is human (or sentient) and if there is no information in the clause to the contrary, e.g. an adverb like accidentally. Hence the logical structure for kill would be [do´ (x, Ø)] CAUSE [BECOME dead´ (y)]. Languages differ with respect to the extent to which agency is lexicalized in verbs: English appears to have only relatively few verbs which absolutely require an agentive interpretation of their effector, whereas Japanese seems to lexicalize agency with many more verbs than English (Hasegawa 1996).

Causative verbs have a logical structure composed of (typically) an activity logical structure plus a second logical structure of any of the five Aktionsart types linked by the connective CAUSE. Accordingly, the role assignments of the causative logical structure are those of the constituent activity and other logical structures; no new roles are added. Hence in (2.16g) the thematic relations of the arguments are a function of the assignments in (2.16a)-(2.16e).

The representation of arguments in the logical structure of a verb or predicator provides a strict definition of ‘core argument’. In §1.1 it was stated simply that the core contains the arguments of the predicate in the nucleus, and it is now possible to state this more precisely. All arguments which appear in the core of a simple clause must be linked to argument positions in the logical structure of the predicate in the nucleus, and in the default situation, all arguments in the logical structure of the predicate must appear in the core of the clause. However, it is not always the case that an argument in the logical structure occurs in the core; in a passive construction, for example, the effector, if overt, will be realized as an oblique constituent in the periphery. Among core arguments a further distinction is made between direct and oblique core arguments. This contrast is based on the morphological coding of the arguments: direct core arguments are those that are morphologically unmarked or coded with a direct case, as in dependent-marking languages like English and German, or are cross-referenced on the verb, as in head-marking languages like Lakhota and Tzotzil. Oblique core arguments are those marked by an adposition or by an oblique case. Thus English give has three core arguments; in Dana gave Pat the key there are three direct core arguments, while in Dana gave the key to Pat there are two direct core arguments and one oblique core argument. This will be discussed in more detail in §§4.4-4.5.

The derivation of thematic relations from argument positions in logical structures has a significant consequence: because there are syntactic and semantic criteria determining the class of a verb which make no reference at all to thematic relations (Table 2.1) and because the thematic relations which a verb assigns to its arguments are to a great extent attributable to its class and hence to its logical structure, THE ASSIGNMENT OF THEMATIC RELATIONS TO VERBS IN RRG IS INDEPENDENTLY MOTIVATED.
It might appear from Table 2.4 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 logical structures. This may be represented as in Figure 2.3.

<table>
<thead>
<tr>
<th>Arg of DO</th>
<th>1st arg of do (x, ...)</th>
<th>1st arg of pred (x,y)</th>
<th>2nd arg of pred (x,y)</th>
<th>Arg of state pred (x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGENT</td>
<td>EFFECTOR</td>
<td>LOCATION</td>
<td>THEME</td>
<td>PATIENT</td>
</tr>
<tr>
<td></td>
<td>MOVER</td>
<td>PERCEIVER</td>
<td>STIMULUS</td>
<td>ENTITY</td>
</tr>
<tr>
<td></td>
<td>ST-MOVER</td>
<td>COGNIZER</td>
<td>CONTENT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L-EMITTER</td>
<td>JUDGER</td>
<td>DESIRE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S-EMITTER</td>
<td>POSSESSOR</td>
<td>JUDGMENT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PERFORMER</td>
<td>EXPERIENCER</td>
<td>POSSESSED</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CONSUMER</td>
<td>EMOTER</td>
<td>SENSATION</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CREATOR</td>
<td>ATTRIBUTANT</td>
<td>TARGET</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPEAKER</td>
<td></td>
<td>ATTRIBUTE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OBSERVER</td>
<td></td>
<td>PERFORMANCE</td>
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<td></td>
<td>USER</td>
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<td>CREATION</td>
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<td></td>
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<td></td>
<td>LOCUS</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>IMPLEMENT</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2.3: 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. Taking these as endpoints on the continuum makes it possible to place the other role-types with respect to them. The DO of lexicalized agency always cooccurs with the do (x, ...) which defines effector and its subtypes, and accordingly the first two columns are closely related to each other; all of them express participants which do something. At the other end of the continuum fall 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 denoted 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 positioning of the different argument positions in the continuum in Figure 2.3 reflects the semantic contrasts among them.

In addition to static locations, e.g. be-at (x, y) and possession, e.g. have (x, y), there are also change of location and possession arguments. ‘Goal’ may be defined as the location argument in the following logical structure configuration: ...INGR/BECOME be-at/in/on (x, y). ‘Recipient’
may be defined as the possessor argument in the following configuration: ...INGR/BECOME haveˊ (x, y). ‘Source’ may be defined as the location or possessor argument in either of the configurations: ...INGR/BECOME NOT be-atˊ (x, y) or ...INGR/BECOME NOT haveˊ (x, y).

The thematic relation of instrument is also missing from Table 2.4, because it is analyzed as a type of effector, specifically as a manipulated inanimate effector in a causal chain. This is illustrated in (2.37).

(2.37)a. Leslie shattered the window with a rock.
   b. [doˊ (Leslie, [useˊ (Leslie, rock)])] CAUSE [ [doˊ (rock, Ø)] CAUSE [INGR shatteredˊ (window)]]

Note that the second part of the logical structure can be a complete clause, The rock shattered the window.16 It is of course also possible to leave out the intermediate effector, yielding Leslie shattered the window. Logical structures may be expanded primarily in two ways: (1) to specify a full causal chain, as in (2.37), and (2) with motion active accomplishment predications and transfer predications to specify the source, path (or means) and goal (or recipient).

With respect to the issue of the number of thematic relations to be posited in universal grammar, it is necessary to recognize that thematic relations have traditionally played two distinct roles in syntactic theories: first, they have been part of the semantic representation of the verb, and second, they have played a role in the formulation of grammatical constructions and processes. In Fillmore's original proposal (1968), the ‘case frame’ of a verb, e.g. [Agent (Instrument) Objective] for break, was intended to be a partial representation of the meaning of the verb, and it also fed into the operation of grammatical rules, e.g. the subjectivization, objectivization and raising rules. In RRG, thematic relations have only the second function; the logical structure of the verb is its semantic representation, and the role labels like ‘effector’ and ‘theme’ are simply mnemonics for the argument positions in logical structure. They are not independently meaningful, as in a Fillmorean theory; rather, they derive their semantic value from the logical structure.

### 2.4.2 Macroroles

The second type of semantic roles is generalized semantic roles, the two macroroles ACTOR and UNDERGOER.17 These are the two primary arguments of a transitive predication, either one of which may be the single argument of an intransitive verb. They correspond to what is pretheoretically commonly called ‘logical subject’ and ‘logical object’, but these labels are not utilized in RRG because ‘subject’ and ‘object’ are normally used to refer to syntactic, not semantic relations. Generally speaking, the actor is the most agent-like argument, while the undergoer is the most patient-like. They are called ‘macroroles’ because each subsumes a number of specific thematic relations. Macroroles are motivated by the fact that in grammatical constructions groups of thematic relations are treated alike. For example, themes and patients function alike for certain purposes in the grammar. It is necessary to distinguish them on semantic and other grounds. But nevertheless, the grammar, for certain purposes, treats these roles as essentially the same, e.g. they can be both the direct object in an active and the subject in a passive. In fact, active and passive in English can be described in terms of lists of thematic relations. Agent, effector, experiencer,

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16 For detailed discussion of effectors and instruments, see Van Valin & Wilkins (1996) and Van Valin & LaPolla (1997), §3.2.3.2.

17 See Van Valin (1999b) for a comparison of different theories of generalized semantic roles and Van Valin (2002a) for arguments as to why there are only two macroroles.
perceiver, possessor, judger, etc. can be the subject of an active verb, while patient, theme, stimulus, possessed, location, etc. can be direct object. In the English passive, patient, theme, stimulus, possessed, location, etc. can be subject, while agent, effector, experiencer, perceiver, possessor, judger, etc. can be the object of the preposition by. It appears that a significant generalization is being missed here, since there are long disjunctive lists of roles in these statements. But in fact, it is not an accident that they seem to group together the way they do, and the obvious generalization can be captured in terms of semantic macroroles: in an active clause, the actor is subject and the undergoer direct object, while in a passive the undergoer is subject and the actor is in a peripheral PP.

The relation between macroroles and logical structure argument positions is captured in the Actor-Undergoer Hierarchy in Figure 2.4.

![Actor-Undergoer Hierarchy](image)

This double hierarchy says simply that given the logical structure of a transitive verb, the leftmost argument will be the actor and that the rightmost argument will be the undergoer. This is the default situation. Marked assignments to undergoer are possible, as in the ‘dative shift’ alternation in which the first argument of the two-place state predicate, not the second, is undergoer, as in (2.38c).

(2.38)a. \([do^\prime] (Pat, \emptyset)\) \text{CAUSE} [BECOME \text{have}^\prime (Chris, book)]


There are languages which have only the first possibility, some which have only the second, and some which have both. The issues raised by three-place predicates and their implications for the hierarchy will be discussed further in §4.4.

The ranking of argument positions (thematic relations) in Figure 2.4 with respect to actor and undergoer selection is supported by considerable cross-linguistic evidence. The maximal unmarkedness of agent as actor and patient as undergoer follows from the fact that if a verb has an agent argument, it will always be actor, and likewise if one has a patient argument, it will always be undergoer. With respect to the actor end of the hierarchy, if a verb has both a potential agent and an inanimate effector (i.e. instrument), as in (2.37), the potential agent must be the actor, never the effector, an observation that goes back at least to Fillmore's original work on case grammar. Transitive verbs which take perceiver and stimulus arguments, e.g. see (\text{see}^\prime (x, y)), or possessor and possessed arguments, e.g. have (\text{have}^\prime (x, y)), always have the perceiver- or possessor-type as actor, never the stimulus- or possessed-type argument. With regard to the undergoer end of the hierarchy, the markedness relations are reversed from the actor end. If a verb takes perceiver- or possessor-type arguments and stimulus- or possessed-type arguments, e.g. y and z with show (\([do^\prime] (x, \emptyset)\) \text{CAUSE} [BECOME \text{see}^\prime (y, z)]) and give (\([do^\prime] (x, \emptyset)\) \text{CAUSE} [BECOME \text{have}^\prime (y, z)]), the z argument is the unmarked choice for undergoer, even though these verbs allow both possibilities in English. Evidence for this comes from a variety of sources. First, there are well-known arguments for the markedness of the y-argument-as-undergoer form of the dative-shift
construction in English, e.g. the restrictions on pronominal arguments in this form. Second, nominalizations provide evidence for the priority of the \( z \) argument over \( y \): a *bookshower* would have to be someone who shows books to people and a *studentshower* could not be someone who shows things to students but rather who shows students to people; the same interpretations are found with *flowergiver* and *girlgiver*, which cannot mean someone who habitually gives things to girls. Third, in the survey of dative-shift constructions in a wide range of languages presented in Foley & Van Valin (1985), the \( z \)-as-undergoer form is clearly the unmarked form in virtually all of the languages; in most languages other than English, the base form of a verb of the appropriate class can take only the \( z \) argument as undergoer, and a derivational morpheme of some kind must be added in those languages which allow the \( y \) argument as undergoer. It is very significant that most languages do not have dative-shift constructions at all; in them, the choice of undergoer is lexically governed, and the vast majority of the relevant verbs in these languages are like English *put* and *donate* in having \( z \) not \( y \) as undergoer. Thus with respect to the undergoer end of the hierarchy, the second argument of a two-place predicate outranks the first argument of a two-place predicate for undergoer.

The hierarchy in Figure 2.4 represents thematic relations along the continuum presented in Figure 2.3. The prototypical actor is an agent, the prototypical undergoer a patient, but effectors and arguments bearing other thematic relations can also function as actor, and arguments bearing thematic relations other than patient can also serve as undergoer; this depends on the logical structure of the particular verb, as shown in Table 2.4. It must be emphasized that the label ‘undergoer’ should not be taken literally, just as ‘actor’ should not. The actor of *see* does not do anything but is nevertheless an actor in the sense intended here, i.e. the logical subject; one could say that the actor is the participant which is responsible for the state of affairs, in the sense that it is impossible to have an action without an entity doing the action, a perceptual situation without a perceiving entity, or a cognitive or emotional situation without a participant experiencing the cognitive or emotional state. Similarly, the undergoer of *see* does not undergo anything, unlike the undergoer of e.g. *kill*, but it is still the undergoer of the verb, i.e. the logical object. In general, the undergoer represents the non-instigating, affected participant in a state of affairs. The specific semantic content of the macrorole with a particular verb is supplied by the position of the argument in the logical structure, not by its macrorole status, although the two are clearly related.

The number of macroroles that a verb takes is generally predictable from its logical structure; there are only three possibilities: 0, 1, 2. If a verb has two or more arguments in its logical structure, e.g. \([\text{do}´(x, \emptyset)] \text{CAUSE} [\text{BECOME be-at}´(y, z)]\) or \([\text{hear}´(x, y)]\), then the unmarked situation is for it to take two macroroles. If a verb has only a single argument in its logical structure, e.g. \([\text{do}´(x, [\text{walk}´(x)])\) or \([\text{BECOME open}´(y)]\), then the unmarked situation is for it to have only one macrorole. Verbs with no arguments, e.g. *rain*´, have no macroroles. The nature of the macroroles is also a function of the verb’s logical structure. If a verb takes two, then they must be actor and undergoer. For verbs which have a single macrorole, the default choice follows directly from the logical structure of the verb: if the verb has an activity predicate in its logical structure, the macrorole will be actor; otherwise, it will be undergoer. The default macrorole assignment principles are summarized in (2.39).

(2.39) Default Macrorole Assignment Principles

a. Number: the number of macroroles a verb takes is less than or equal to the number of arguments in its LS:

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

In English, most verbs follow these defaults; the exceptions are intransitive location verbs with two arguments, e.g. *lie* as in *The book is lying on the table* or motion active accomplishment verbs such as *run* in *Dana ran to the house*, which have only a single macrorole, an undergoer with *lie* and an actor with *run*. This is a systematic exception, and therefore it could be handled by a general principle governing the macrorole number of locative verbs. There are also verbs like *seem* which have a propositional argument and an experiencer in their logical structure but which do not contribute the subject or object to the clause. Since the number of macroroles is not predictable from the number of logical structure arguments with these verbs, it would have to be specified in the lexical entry of the verb, e.g. 0 for *seem*. This could be formalized in terms of a simple feature such as [MR α], with values [MR 0], [MR 1], and [MR 2]. The appearance of this feature in the lexical entry of a verb signals that the default principles are overridden. The identity of the macrorole would not need to be stipulated, however, since it follows from the general principle in (2.39b). One class of verbs appears to be a universal exception to the default generalization regarding macrorole number: activity verbs. Multiple-argument activity verbs with a non-referential second argument, e.g. *beer* in *Kim drank beer*, NEVER have an undergoer macrorole, for the following reason. As noted above, the undergoer NP refers to the non-instigating, affected participant in the state of affairs denoted by the clause, and because *beer* in this example is non-referential, it cannot refer to a specific affected entity; hence it cannot be an undergoer. In many languages this argument appears incorporated into the verb and not as an independent NP. Consequently, two-argument activity verbs with a non-referential second argument take only an actor macrorole. Because this is a general principle of the theory, it is not necessary to put ‘[MR 1]’ in the lexical entry of verbs like *eat, drink, read*, etc.

The macrorole number of a verb corresponds closely to the characterization of a verb in terms of the traditional notion of transitivity: single macrorole verbs are intransitive, two macrorole verbs are transitive. The traditional notion refers to the number of direct NPs that appear in the syntax, and this corresponds to the number of direct core arguments, in RRG terms. It is necessary, then, to distinguish between what Narasimhan (1998) calls ‘macrorole transitivity’ (M-transitivity), which refers to macrorole number, and syntactic transitivity (S-transitivity), which refers to number of direct core arguments. The number of direct core arguments need not be the same as that of macroroles; there are never more than two macroroles, but in a sentence like *Leslie sent Pat a card* there are three direct core arguments. Also, in *Pat drank beer* there are two direct core arguments but only one macrorole. From an RRG perspective, the S-transitivity a verb takes is less indicative of its syntactic behavior in simple sentences than its M-transitivity, and consequently ‘transitivity’ is understood in RRG as M-transitivity and is defined in terms of the number of macroroles a verb takes: 2 = transitive, 1 = intransitive, and 0 = atransitive. This is summarized in Table 2.5.

<table>
<thead>
<tr>
<th>Semantic Valence</th>
<th>Macrorole Number</th>
<th>M-transitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>snow</td>
<td>0</td>
<td>Atransitive</td>
</tr>
<tr>
<td>die</td>
<td>1</td>
<td>Intransitive</td>
</tr>
<tr>
<td>drink [ACT]</td>
<td>1 or 2</td>
<td>Intransitive</td>
</tr>
<tr>
<td>drink [ACTACC]</td>
<td>2</td>
<td>Transitive</td>
</tr>
<tr>
<td>kill</td>
<td>2</td>
<td>Transitive</td>
</tr>
<tr>
<td>set</td>
<td>3</td>
<td>Transitive</td>
</tr>
<tr>
<td>send</td>
<td>3</td>
<td>Transitive</td>
</tr>
</tbody>
</table>

Table 2.5: Macrorole number and transitivity
Examples of partial lexical entries for some English verbs are given in (2.40).

(2.40)a. smash \([\text{do}´(x, \emptyset)] \text{CAUSE} [\text{BECOME smashed}´(y)]\)  
  b. receive \(\text{BECOME have}´(x, y)\)  
  c. own \(\text{have}´(x, y)\) \([\text{MR1}]\)  
  d. belong (to) \(\text{have}´(x, y)\) \([\text{MR1}]\)  
  e. arrive \(\text{BECOME be-at}´(x, y)\)  
  f. go \(\text{do}´(x, [\text{move.away.from.ref.point}´(x)]) \text{& INGR be-at}´(y, x)\)  
  g. appear \(\text{appear}´(x, y)\) \([\text{MR0}]\)  
  h. see \(\text{see}´(x, y)\)  
  i. watch \(\text{do}´(x, [\text{see}´(x, y)])\)  
  j. show \(\text{do}´(w, \emptyset) \text{CAUSE} [\text{BECOME see}´(x, y)]\)  
  k. run \(\text{do}´(x, [\text{run}´(x)])\)  
  l. eat \(\text{do}´(x, [\text{eat}´(x, y)])\)  
  m. freeze \(\text{BECOME frozen}´(x)\)  
  n. afraid \(\text{feel}´(x, [\text{afraid}´(y)])\)

No list or other explicit statement of the thematic relations associated with a verb has to be specified, since they are derived from the logical structure, and because of the principles in (2.39), nothing more is needed for indicating transitivity and macrorole choice. Only with exceptional verbs like seem and belong to must the feature \([\text{MR }\alpha]\), be listed. There is no need for any syntactic subcategorization information in the lexical entries of verbs in RRG. Lexical idiosyncrasies are specified in the lexical entry. For example, show in (2.40j) allows either its \(x\) or \(y\) argument to be undergoer (the well-known ‘dative alternation’), whereas donate does not; hence it is necessary to specify that the \(z\) argument is the only possible choice for undergoer with donate \((U = z)\). It should be noted that the prepositions which mark the oblique core arguments of verbs show are not stated in the lexical entries, as they are in all other theories; this is because they can be predicted by a general rule and therefore need not be listed (Foley & Van Valin 1984, Jolly 1991, 1993); see 4.5..

The macroroles of actor and undergoer function as the interface between thematic and grammatical relations. Just as actor is not equivalent to agent, it is likewise not equivalent to syntactic subject; nor is undergoer equivalent to syntactic direct object. This can be seen clearly in (2.41).

(2.41)a. Chris [SUBJ, ACTOR] drank the beer [DOBJ, UNDERGOER].  
  b. The beer [SUBJ, UNDERGOER] was drunk by Chris [ACTOR].  
  c. Chris [SUBJ, ACTOR] drank beer [DOBJ].  
  d. The fireman [SUBJ, ACTOR] ran into the burning building.  
  e. The lawyer [SUBJ, UNDERGOER] became upset over the decision.

In (2.41a) the actor is subject and the undergoer direct object, while in the passive in (2.41b) the undergoer is subject and the actor is a peripheral oblique. In (2.41c) beer is not undergoer because it is non-referential, drink being an activity verb in this sentence. The subject in (2.41d) is an actor, while the subject in (2.41e) is an undergoer. The status of grammatical relations in RRG and their interaction with semantic roles is the topic of chapter 4.