3
Semantic representation, I: verbs and arguments

3.0 Introduction
In the previous chapter we presented a theory of morphosyntactic structure which elucidated the structure of simple sentences and noun phrases. At many points in the discussion we made crucial reference to predicates and their arguments and to the semantic representation of sentences. Our task in this chapter and the next is to present a theory of just these things. We begin by presenting a classification of the kinds of events, actions and situations that sentences express and of the roles that the participants in these states of affairs may play. We then turn to the problem of representing the relevant semantic properties of verbs and other predicates that code these states of affairs; these representations will in turn form the basis of the semantic representations of clauses and sentences. From these we will derive the representation of the arguments of the verbs and other predicates, arguments which denote the participants in the states of affairs. In the next chapter we will present the notion of ‘semantic macrorole’ and investigate the semantic representation of adjuncts, operators and noun phrases.

3.1 A typology of states of affairs and their participants
In chapter 1 we pointed out that the general perspective from which this book is written maintains that the communicative functions of language are central to the analysis of its structure, and one (but not the only) function of language is reference and predication, that is, representing things that happen in the world (or a possible, fictional world) and the participants involved in those situations. Hence languages must have the means to depict or denote these participants and states of affairs, and it is usually the case that verbs and other predicing elements describe the situations, while noun phrases and other referring expressions denote the participants in them. In order to help us understand the semantic content of predicing elements and the syntagmatic relationships which hold between a predicate and its arguments, we will begin by setting up a typology of states of affairs and a list of the roles which participants may play in them.

We will use the term ‘state of affairs’ to refer to phenomena in the world, and, following a tradition dating back to Aristotle, we propose that there are four basic types of states of affairs:

3.1 a. *Situation*: static, non-dynamic states of affairs which may involve the location of a participant (a book being on the table), the state or condition of a participant (Maria being tired), or an internal experience of a participant (Fred liking Alice).

b. *Events*: states of affairs which seem to happen instantly, e.g. balloons popping, a glass shattering, a building blowing up.

c. *Processes*: states of affairs which involve change and take place over time, e.g. a change in location (a book falling to the floor), in state or condition (ice melting, water freezing, clothes drying), or in the internal experience of a participant (Tina reading Swahili).

d. *Actions*: dynamic states of affairs in which a participant does something, e.g. Chris singing, the ball rolling, the sun shining, a fire crackling, Yolanda swimming, the ground shaking, Tyrone drinking beer.

These states of affairs can vary along a number of dimensions; among them are: (1) how many participants there are; (2) whether there is a terminal point; and (3) whether the state of affairs happens spontaneously or is induced. In all of the examples above there are states of affairs with one or more participants, and it is possible to have a large number of participants in complex states of affairs, e.g. Kim buying a book from Pat for Sandy with a ten-dollar bill. The question of a terminal point is whether a state of affairs *inherently* comes to a conclusion, for example, the state of affairs of drying necessarily involves a conclusion in which the entity in question is no longer wet and has become dry, whereas the state of affairs of rotating does not necessarily involve a conclusion in which the entity ceases to rotate (as, for example, the earth's rotating on its axis). Drying has an inherent terminal point, while rotating does not. Events, for example, have an inherent terminal point. However, it is often the case that a given event can happen over and over again, i.e. iteratively, and consequently the 'macroevent' will appear to lack a terminal point, e.g. balloons popping, firecrackers exploding. Situations, on the other hand, lack an inherent terminal point; there is nothing in the nature of, say, being on a table or knowing that 2 + 2 = 4 that implies that these situations should or could terminate. They can, of course, but they need not; this is the crucial point. Actions, too, are inherently unbounded; there is nothing in the nature of singing, crackling or swimming that implies that it must terminate in some way, unlike exploding or shattering. Like situations, actions may cease, but they need not, as in actions like the earth spinning on its axis or orbiting the sun. Processes, by contrast, do have inherent terminal points. After a certain amount of time, ice will have completed melting and turned into water, or clothes will have finished drying and be dry. Note that the result of the process may be a situation of some kind, e.g. clothes being dry.
change of condition (uncut \(\rightarrow\) cut), and affected participants which undergo such a change of state or condition are often called patients. We may break down this complex state of affairs into its component states of affairs as in (3.3).

(3.3) a. *Initial situation*: rope (patient) being whole, uncut
b. *Action*: Juan (agent) cutting the rope (patient) using a knife (instrument)
c. *Final situation*: rope (patient) being in two or more pieces

The participant role an entity has depends crucially on the state of affairs that the entity is involved in. In an action in which Felix sharpens a knife, the knife is undergoing a change of state or condition (dull \(\rightarrow\) sharp) and hence is a patient in this state of affairs. Felix would be an agent in this state of affairs, akin to Juan in (3.5b), but if the state of affairs involved Felix seeing the knife only, then he could not be called an agent, since he is doing nothing. Rather, he would be experiencing something, in this case a perceptual experience, and therefore he would be an experiencer rather than an agent. A list of common participant roles is given below, where the participant with the role in question is in italics in the example state of affairs.

*Commonly used participant roles in states of affairs*

agent: a willful, purposeful instigator of an action or event, such as in Leslie breaking the glass on purpose.
effector: the doer of an action, which may or may not be willful or purposeful, as in Max breaking the clock accidentally, a puppy chewing up Maria’s new shoes.

experiencer: sentient beings that experience internal states, such as perceivers, cognizers and emoters as in Felipe thinking about/remem-
bering/disliking the question.

instrument: normally inanimate entities manipulated by an agent in the carrying out of an action, as in Juan breaking a window with a rock.

force: somewhat like instruments, but they cannot be manipulated.

They can include things like tornadoes, storms and acts of God, as in a flood washing away a village.

patient: things that are in a state or condition, or undergo a change of state or condition, e.g. Sue being tall, sick or dying, or a window breaking.

theme: things which are located or are undergoing a change of location (motion), as in a book being on the table or Carl putting a book on the table.

benefactive: the participant for whose benefit some action is performed, e.g. Ned baking a cake for Yvonne, or picking up some dry cleaning for Tanisha.
Verbs and arguments

**recipient:** someone who gets something (recipients are always animate or some kind of quasi-animate entity, e.g., an organization), as in Vidhu sending a card to Hari.

**goal:** destination, which is similar to recipient, except that it is often inanimate, as in Larry sending a package to Baltimore.

**source:** the point of origin of a state of affairs. It is used in a variety of cases, which can conflate the ambiguity between recipient and goal:

![Diagram]

\[ x \rightarrow y \rightarrow z \]

\[ \text{transfer recipient} \]

\[ \text{source} \quad \text{motion} \quad \text{goal} \]

\[ x = \text{initial position}, \ y = \text{object}, \ z = \text{final position} \]

If there is a transfer of \( y \) then \( z \) is a recipient. If \( y \) is in motion, then \( z \) is a goal. In either case, \( x \) is the source, and \( y \) is the theme. In the case of David giving a book to Kristen, David is both an agent and a source. Agent and recipient can also be the same participant, as in Yolanda buying the dog from Bill.

**location:** a place or a spatial locus of a state of affairs, as in the book being on the table or Bob eating a sandwich in the kitchen.

**path:** a route, as in Quentin jogging along the creek to the park.

This is not an exhaustive list, but it introduces the notions most relevant to our discussion. Again, it must be emphasized that the role an entity plays is crucially a function of the type of state of affairs in which it is involved. Put simply, it is possible to derive participant roles by analyzing states of affairs, but the converse is not possible, since participant roles cannot be defined without reference to states of affairs.

In communication, speakers construct sentences which depict the state(s) of affairs which they wish to make known to their interlocutor(s). As mentioned at the beginning of this section, verbs and other predicating elements typically code the type of state of affairs, and noun phrases and other referring expressions denote the participants therein. It is not the case, however, that language is a perfect mirror of reality, be it the real world or a fictional one. It is very important to distinguish what is in the state of affairs from what lexical items encode. Lexical items differ in the meanings they express, sometimes very subtly, and speakers always have a number of options with regard to which lexical items they choose to express a state of affairs. Consider the two states of affairs represented pictorially in figure 3.1. In both pictures there is a person (let's call him 'Fred'), an object (let's say it's a rock) and a window. In the first picture, Fred is holding the rock and hitting the window with it, thereby breaking it, whereas in the second, he has thrown the rock through the window, thereby causing it to break. There are a number of ways that the state of affairs in figure 3.1a could be expressed in English; a partial list is given in (3.6).

![Figure 3.1 Two states of affairs](image)

1. Fred Someone/A boy broke the window (with a rock).
2. Fred shattered the window (with a rock).
3. Fred smashed the window (with a rock).
4. Fred hit the window with a rock, breaking/shattering it.
5. A rock broke the window.
6. A rock shattered the window.
7. The window broke.
8. The window shattered.

All of the sentences in (3.6) are literally true, in that they all accurately characterize some aspect of the state of affairs depicted in figure 3.1a. However, they all have different meanings, both in terms of the meanings of the lexical items chosen (break vs. smash vs. shatter) and in terms of which participants are mentioned. The first four sentences explicitly refer to all three participants, while the fifth and sixth refer only to the instrument and the patient; the last two refer only to a single participant, the patient (the window). Example (3.6d) explicitly mentions the manner in which the breaking was done. There are similar options with respect to figure 3.1b.

(3.7)

1. Fred Someone/A boy broke the window (with a rock).
2. Fred shattered the window (with a rock).
3. Fred smashed the window (with a rock).
4. Fred threw a rock through the window, breaking/shattering it.
5. A rock broke the window.
6. A rock shattered the window.
7. The window broke.
8. The window shattered.

The primary difference between the sentences in (3.7) and those in (3.6) is the specification of the manner of the action, in this case throwing instead of hitting. English allows speakers a variety of options for expressing a particular state of affairs, and no two mean exactly the same thing. Moreover, the language allows speakers to be as specific as they wish about the details; in particular, it allows them to leave out major participants and to gloss over differences in the nature of the action.
Verbs and arguments

When we look at how other languages code states of affairs, we see even more clearly how important it is to distinguish between what is in the state of affairs and what lexical items encode. If a speaker of Lakhota were asked to describe figures 3.1a, b, a partial list of possible responses would include the sentences in (3.8) for figure 3.1a and those in (3.9) for 3.1b.

(3.8) a. Fred/Tuwa/Hokšša wą (ix̺é wą q) ožáŋgalepi ki
/someone/boy a rock a with window the
ká-bléče/*wo-bléče.
by.striking-break/action.from.distance-break
Fred/Someone/A boy broke the window (with a rock).'
b. *Ix̺é wą ožáŋgalepi ki ká-bléče.
rock a window the by.striking-break
'A rock broke the window.'
c. (Ix̺é wą q) ožáŋgalepi ki ká-bléčha-pi.
rock a with window the by.striking-break-3pl
'They [unspecified] broke the window (with a rock).'

(3.9) a. Fred/Tuwa/Hokšša wą (ix̺é wą q) ožáŋgalepi ki
/someone/boy a rock a with window the
wo-bléče/*ká-bléče.
action.from.distance-break/by.striking-break
Fred/Someone/A boy broke the window (with a rock).'
b. *Ix̺é wą ožáŋgalepi ki wo-bléče.
rock a window the action.from.distance-break
'A rock broke the window.'
c. (Ix̺é wą q) ožáŋgalepi ki wo-bléčha-pi.
rock a with window the action.from.distance-break-3pl
'They [unspecified] broke the window (with a rock).'

The first thing to notice about these sets of sentences is that the verb is not the same in each set and that they cannot be substituted for each other. Lakhota does not have a single verb corresponding to English break; rather, it has dozens of verbs for expressing states of affairs involving breaking. There are two primary considerations determining which verb will be chosen, because each verb consists of a verb stem plus an instrumental prefix. The first is the nature of the affected object, or patient. If it is a flat, brittle object, then the verb stem -bléčha would be chosen. If, on the other hand, it was a long, thin object, like a pencil, then either -kša or -wegá would be chosen, depending upon the nature of the damage: if the pencil is broken completely in two, then -kša would be chosen, whereas if it were cracked but not broken into two distinct pieces, then -wegá would be used. Since we are dealing with a window in the two states of affairs in figure 3.1, -bléčha would be selected. The contrast between ká- and wo- in the two verbs involves what are called instrumental prefixes; they specify the nature or manner of the action. Ka-signals that the action was done by striking, whereas wo- indicates action from a distance, as in shooting or throwing. Thus in Lakhota it is obligatory to express two aspects of the state of affairs that are only optionally and indirectly expressed in English: properties of the affected object, and the manner of the action.

The two languages also differ in terms of which participants must be expressed and how they can be expressed. In both languages it is not necessary to overtly code the instrument, a rock. However, in English it is possible to present the instrument participant as the subject of the sentence, as in (3.6, f) and (3.7c, f), whereas this is impossible in Lakhota, as (3.8b) and (3.9b) show. Moreover, it is not possible in Lakhota to express just the window's breaking without referring to any external cause in the states of affairs in figure 3.1. The expression ožáŋgalepi ki nabiléče 'the window broke' (with instrumental prefix na- 'by internal force') can only be used when there is no external force acting on the window when it breaks, and this is not the case in these states of affairs. Accordingly, the closest that one can come to this is the (c) sentences, in which the verb is put in the third person plural form, which can be interpreted as meaning an unspecified breaker; but it clearly codes a force acting on the window in a specific way, causing it to break. Thus Lakhota offers its speakers a different set of options for expressing the states of affairs in figure 3.1 than English offers its speakers. Crucially, however, in both languages there is more than one option for each state of affairs, even if the set of possible options varies across the two languages.

In this section we have presented a classification of states of affairs (situations, events, processes and actions) and a (non-exhaustive) list of the roles which participants may have in them. The linguistic means for describing states of affairs typically consists of verbs and other predicating elements, which express the situation, event, process or action, and noun phrases and other referring expressions, which denote the participants. Hence what verbs mean must be in some way related to the state of affairs they express. Even though a speaker has considerable freedom with respect to the linguistic possibilities available for coding a state of affairs, these choices are nevertheless constrained by properties of the state of affairs. We have seen that languages lexicalize different aspects of a state of affairs and vary in what they require a speaker to code about it, e.g. Lakhota requires that the manner of the action of breaking be specified, while English does not. The role that an entity plays in a state of affairs is always a function of the nature of the state of affairs, and it is nonsensical to separate participant roles from the states of affairs in which they occur. Thus it is states of affairs which are fundamental (i.e. basic), not participant roles (which are derived). In the next section we will present a theory of lexical representation for verbs and their arguments which will allow us to capture how linguistic expressions can code states of affairs.


3.2 The lexical representation of verbs and their arguments

Since verbs and other predicating elements express (aspects of) states of affairs, an adequate theory of lexical representation ought to represent explicitly the crucial distinctions which differentiate the different types of states of affairs, e.g., taking place over time, being dynamic or having a terminal point. Moreover, since the role of a participant is a function of the state of affairs it is involved in, the semantic function of an argument referring to a participant should follow from the representation of the verb or any other predicating coding the state of affairs. Hence our goal in this section is to develop a system of lexical representation for predicates and their arguments which will satisfy these conditions. Throughout this section we will use the term 'argument' to refer to the semantic arguments of predicates, unless otherwise noted.

The approach to the depiction of the lexical meaning of verbs which we will adopt is lexical decomposition, which involves paraphrasing verbs in terms of primitive elements in a well-defined semantic metallanguage. As a simple example of the mechanism of lexical decomposition, kill can be paraphrased into something like 'cause to die', and then die can be broken down into 'become dead'. Thus the lexical representation of kill would be something like 'x causes [y become dead]'. In Lakhota, for example, verbs of killing can be formed from the verb ra 'die, be dead' by adding instrumental prefixes; the result is verbs like kaiya 'cause to die by striking' (kaya-by striking), yu-ia 'strangle' (yu-‘with the hands’), yu-ia 'bite to death' (yu-‘with the teeth’) and wu-ia 'shout to death' (wu-‘by action from a distance’). The addition of the instrumental prefix causativizes the verb and codes a type of causing action; all of these verbs of killing are derived from a bare verb meaning 'die' or 'be dead' via causativization. Another piece of evidence for this kind of analysis comes from intriguing morphological suppletion patterns found in some languages. In Georgian (Harris 1982), certain transitive verb stems supplet for the number of their objects. This means that if there is a singular object of the verb kill, for example, the verb stem has one form, e.g. mov’alil ‘I killed it’, and when the object is plural, the verb stem has a different form, e.g. dav’oc ‘I killed them’ (w-‘1sg’). Interestingly, the same thing happens in some intransitive verbs, as they supplet for the number of their subject, e.g. mok’oda ‘he died’ vs. dai’oca ‘they died’. Thus ‘die’ suppletes for the number of its subject, and ‘kill’ for the number of its object. This seems like an odd relationship, until it is recognized that the subject of ‘die’ is semantically the same argument as the object of ‘kill’. This can be seen explicitly in the decompositions of the two verbs: in both Georgian and English, die is ‘y becomes dead’, and kill is ‘x causes [y become dead]’. The two verbs in Georgian supplet for the number of the y argument. This supports the semantic analysis of kill as something like ‘cause to die’; the exact representation will be given below, and this provisional characterization should not be confused with the English expression cause to die.

A system of lexical representation should include a way of expressing the fact that the subject of die and the object of kill are the same argument semantically. There are many verbs like this pair, and in many cases the relationship between them is overt. Examples include sink, as in The boat sank and The torpedo sank the boat, where boat is the subject of intransitive sink and the object of transitive sink. Another example is the predicate cool, which can take three forms, one adjectival and two verbal: The soup is cool, The soup is cooling and The wind cooled the soup. Thus, there seems to be a pattern of intransitive verbs whose subjects are identical to the objects of their transitive counterparts. There are cases, however, when the intransitive-transitive alternants do not have the same lexical form, as in die and kill, or receive and give. An adequate theory of lexical representation should be able to capture these relationships, and lexical decomposition provides a promising method for doing it. There are many theories of lexical decomposition, which differ in terms of how fine-grained they are. It is necessary to find the right level of detail, one which allows the expression of certain important generalizations but which also has representations whose differences have morphosyntactic consequences. Thus, arriving at a compositional system is a compromise between the demands of semantics (make all necessary distinctions relevant to meaning) and those of syntax (make syntactically relevant distinctions that permit the expression of significant generalizations). There is something akin to the law of diminishing returns at work here; at a certain point, the semantic distinctions being made cease to have significant syntactic consequences, and so from the point of view of syntactic theory the most desirable system of decomposition is one which is just fine-grained enough (and no more) to make the distinctions necessary for capturing linguistically significant generalizations about syntax, semantics and their interaction.

The semantic representation of the predicate in the nucleus is the heart of the semantic representation of the clause as a whole, and as such the two representations are obviously related. However, it is always necessary to distinguish the lexical meaning of the verb (which would be found in its lexical entry in the lexicon) from the meaning it has in a particular clause in which it occurs. In the next section, we will talk about both aspects of the meaning of verbs. We will first look at the classification of verbs themselves and then look at the issue of how they are interpreted in the context of a particular clause. The first determines how a verb will be represented in the lexicon, and the second determines the semantic representation of the core of a clause.

3.2.1 Verb classes

The system of lexical decomposition to be employed is based on the distinctions in Aktionssat (German for 'form of action') proposed originally in Vendler (1957 [1967]). He argued that verbs and other predicating elements could be classified in terms of their inherent temporal properties, and proposed four basic classes: states,
achancements, accomplishments and activities. Aktionsart, then, is the term we use for the inherent temporal properties of verbs. States are non-dynamic and temporally unbounded. Activities are dynamic and temporally unbounded. Achievements code instantaneous changes, usually changes of state but also changes in activities as well; they have an inherent terminal point. Accomplishments are temporally extended (not instantaneous) changes of state leading to a terminal point. These classes are exemplified in (3.10).

(3.10) a. States: be sick, be tall, be dead, love, know, believe, have
b. Achievements: pop, explode, collapse, shatter (all intransitive)
c. Accomplishments: melt, freeze, dry (the intransitive versions); recover from illness, learn
d. Activities: march, walk, roll (the intransitive versions); swim, think, rain, read, eat

Each of these Aktionsart types corresponds to one of our basic state-of-affairs types.

(3.11) State-of-affairs type | Aktionsart type
--- | ---
Situation | State
Event | Achievement
Process | Accomplishment
Action | Activity

This correspondence reveals the reason for the importance of the typology of states of affairs developed in the previous section: the distinctions among states of affairs are reflected to a striking degree in distinctions among Aktionsart types. That is, situations are expressed by state verbs or predicates, events by achievement verbs or predicates, processes by accomplishment verbs or predicates, and actions by activity verbs or predicates. It is important to distinguish properties of states of affairs from properties of verbs and other predicates; Aktionsart refers only to properties of linguistic predicates, not to properties of states of affairs.

In the previous section we pointed out that it is always necessary to distinguish the lexical meaning of the verb (which would be found in its entry in the lexicon) from the meaning it has in the particular clause in which it occurs. In Aktionsart terms, this means that verbs have a basic Aktionsart type, which is how they are represented in the lexicon. However, the addition of PPs or adverbials often results in a different Aktionsart interpretation for the verb in the context of the entire clause. Hence it is often the case that a given verb can be used with more than one Aktionsart interpretation. In this chapter we will first discuss verbs in terms of their basic Aktionsart classification, and then later in this chapter and in the next we will investigate how new interpretations arise in the context of whole sentences.

These four classes can be defined in terms of three features, [+static], [+punctual] and [+telic], which refers to whether the verb has an inherent terminal point or not. This is summarized in (3.12).

(3.12) a. State [+static], [-telic], [-punctual]
b. Activity [-static], [+telic], [-punctual]
c. Accomplishment [-static], [+telic], [-punctual]
d. Achievement [-static], [+telic], [+punctual]

Most fundamental is the distinction between static and non-static verbs, which distinguishes verbs which code a 'happening' from those which code a 'non-happening'. In other words, with reference to some state of affairs, one could ask 'what happened?' or 'what is happening?' If, for example, a sentence like A deer ran through the room could be the answer to this question, then the verb run is [-static]. On the other hand, a sentence like John believes the world is round could not be the answer to this question, because nothing is taking place. Hence believe is a [+static] verb. By this criterion activities, achievements and accomplishments are [-static]. States, however, are [+static]. The non-static nature of achievements can be seen in the fact that a sentence like The window broke could felicitously be the answer to the question 'what happened?'

The feature 'telic' has to do with whether a verb depicts a state of affairs with an inherent terminal point or not. States and activities lack inherent terminal points. For example, a sentence like John is tall makes no reference to a temporal boundary, and is therefore non-telic (atelic). In John is running in the park, for example, there is a reference to an activity, but running, like rotating, need not terminate. This is not a function of the progressive aspect; in The clothes are drying on the line, the verb dry entails that there is a terminal point at which the clothes will be dry. Therefore, run is [-telic], while the intransitive verb dry is [+telic]. Achievements also have terminal points; if a bomb explodes or a window shatters, the terminal point is the moment of the explosion or the shattering. Hence these verbs are [+telic] as well. Therefore, states and activities are unbounded (atelic), while achievements and accomplishments are bounded (telic). Tests to unambiguously determine whether a verb is [+telic] will be given below.

The final feature, [+punctual], distinguishes telic events with internal duration from those which lack it. The verbs melt and pop can both involve changes of state, as in The ice melted and The balloon popped, but they differ in that the former takes place over a time span, while the latter is instantaneous, for all practical purposes. Since states and activities are atelic, they must by definition involve temporal duration, and therefore they are always [-punctual].

How do we know which Aktionsart type a verb or other predicate is? The tests in table 3.1 will allow us to decide which class a verb belongs to. The point of the tests is to uncover co-occurrence patterns which will reveal the Aktionsart class of a verb. Each of them is intended to isolate one or more semantic features of the class(es). The asterisks will be explained below. The tests are intended to have cross-linguistic validity, with some qualifications. It is possible to find valid tests which work only in the language being investigated. For example, one of the best tests for identifying a
Verbs and arguments

Table 3.1 Tests for determining Aktionsart type

<table>
<thead>
<tr>
<th>Criterion</th>
<th>States</th>
<th>Achievements</th>
<th>Accomplishments</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Occurs with progressive</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>2 Occurs with adverbs like</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>vigorously, actively, etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Occurs with adverbs like</td>
<td>No</td>
<td>No*</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>quickly, slowly, etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Occurs with X for an hour,</td>
<td>Yes*</td>
<td>No</td>
<td>Irrelevant</td>
<td>Yes</td>
</tr>
<tr>
<td>spend an hour Xing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Occurs with X in an hour</td>
<td>No</td>
<td>No*</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

state verb in English is the simple present test (Dowty 1979): if a verb can be used in the simple present form and has a present tense interpretation, then it is a state verb. For example, Chris knows the answer (right now) has a present tense interpretation, whereas Dana sings the song (*right now) does not; it has only a habitual interpretation, hence the ungrammaticality of right now with it. This test would not work in other languages in which the morphological present tense has a present tense interpretation with all verbs.

Test 1 is useful only in languages like English, Spanish and Icelandic which have a progressive aspect; it may be interpreted as an indicator of [-static, -punctual], since it can occur with activity (3.13d) and accomplishment verbs (3.13b), but not with states (3.13a) or achievements (3.13c).³

(3.13) a. *Miriam is being tall/fat/a linguist.
     a'. *Aisha is knowing the answer/believing that today is Wednesday.
     b. The snow is melting.
     c. *The balloon is popping.
     d. Stan is dancing/singing/running/talking/crying/sleeping.

Verbs have their own inherent meaning, upon which are then added further temporal meanings through inflection. If one says The balloon popped, then one is merely stating the fact that it happened, but if one says The balloons are popping, there is a sequence of different balloons popping, i.e. there is an iterative interpretation. This is the result of adding the progressive to a [+punctual] verb. One could take an inherently bounded verb and add the progressive to it, which tends to mean that an action was working toward completion, but was as yet incomplete, as in (b); this can only be done with a [-punctual] verb. On the other hand, if one added the progressive to an inherently unbounded verb, it would refer to the middle of this unbounded action or process, as in (3.13d).¹⁰

3.2 Lexical representation

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

(3.14) 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.

Despite being [-static], achievement and accomplishment verbs are odd with these adverbs, since verbs like vigorously and dynamically modify actions. This suggests that a further distinction is required among [-static] verbs, namely [-dynamic]. This test shows that activities are [+dynamic], while achievements and accomplishments are [-dynamic]. This feature does not apply to states, since they are [+static]. 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-agent 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 [-static] verbs and distinguishes [-punctual] from [+punctual] verbs. Adverbs like quickly, rapidly and slowly, which we will call 'pace' adverbs, can occur with events involving temporal duration, regardless of whether they involve dynamic action, e.g. The snow is melting slowly/rapidly/vigorously, John slowly/vigorously realized his mistake. The *on the 'No' in the achievement column of table 3.1 indicates that pace adverbs indicating very short temporal intervals are marginally acceptable with these verbs, e.g. The bomb exploded instantly. Hence with these verbs it is necessary to use pace adverbs which indicate a relatively slow process, e.g. The bomb exploded slowly/gradually.

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 and activities all have temporal duration, but achievements do not, and this supports the claim in (3.12) that achievements are [+punctual], the others all being [-punctual]. 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 ten 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
Verbs and arguments

indicates 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 one 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 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*, and accordingly they are marked ‘No’* in table 3.1. Hence this test should also be used with temporal expressions of substantial duration.

(3.15) a. Max was tired/hungry 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/died for in ten minutes.

State predicates which code inherent properties do not normally take for-phrases, e.g. *Sandy was tall/short/fat for an hour.* Hence there is an asterisk on the ‘Yes’ indicating that this test is problematic for some state predicates. Some accomplishments can take for-phrases, e.g. *The clothes dried for ten minutes* or *The ice melted 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. So it is marked as ‘irrelevant’ in table 3.1. Finally, there is an additional cooccurrence which must be noted. Achievements 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.

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 we apply test 3 to the English verb *rush*, 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 an 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 the previous section we discussed how states of affairs may be either spontaneous or induced and how for each spontaneous type there is a corresponding induced type (see (3.2)-(3.4)). Thus far we have only talked about the *Aktionsart classes corresponding to spontaneous states of affairs*, and we now turn to the properties of verbs referring to induced states of affairs. For each of the basic *Aktionsart classes there is a corresponding causative class*, which corresponds to the induced state of affairs. This is exemplified in (3.16).

(3.16) a. **State**
   a’. **Causative state**
   b. **Achievement**
   b’. **Causative achievement**
   c. **Accomplishment**
   c’. **Causative accomplishment**
   d. **Activity**
   d’. **Causative activity**

The causative classes all respond to the tests in table 3.1 in the same way as the non-causative ones, and the causative classes can be distinguished from the non-causative ones by the existence of a causative paraphrase, as in (3.17).

(3.17) a. The dog caused the boy to fear/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, ‘Robin causes Kim to come to have

96
Verbs and arguments

the book' is an appropriate paraphrase of Robin gives the book to Kim, but 'Sandy causes Sandy/herself to run' is not a possible paraphrase of Sandy runs. This rules out using passive versions of the verbs in the paraphrases, since they do not have the same number of core arguments as the active verbs being tested. On the other hand, 'Mary caused the dog to run (around the block)' is a possible paraphrase of Mary ran the dog (around the block). 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.

Some languages mark these verb classes overtly with some type of morphological marker, as exemplified in the following examples from Tepehua, a Totonac language of Mexico (Watters 1988).

(3.18) a. taknoc-y 'A is underground' \rightarrow ta:knu:-y 'A goes underground' \rightarrow mazkow-y 'B buries A'

b. lakjahu-y 'A is closed' \rightarrow talakjahu:-y 'A closes' \rightarrow ma:la:kjavu:-y 'B closes A'

c. pa:a-y 'A is changed, different' \rightarrow tapa:-y 'A changes' \rightarrow ma:pa:-y 'B changes A'

d. laqta:ja-y 'A is open' \rightarrow talaqta:ja:-y 'A opens' \rightarrow ma:laqta:ja:-y 'B opens A'

In Tepehua, many achievement and accomplishment verbs carry the inchoative prefix to-, while many causative achievement and accomplishment verbs carry the causative prefix ma:--; states are unmarked. In Qiang, a Tibeto-Burman language, the relationship is even clearer: ba 'big' (state), to-ba 'become big' (accomplishment), and to-za 'cause to become big' (causative accomplishment). It is not always the case that state verbs are unmarked and the other classes are morphologically marked. In Russian, French and Yagua (Peru), for example, there are related forms in which the causative accomplishment verb is unmarked and the others are marked, e.g. French briser 'break' (causative accomplishment), se briser 'break' (accomplishment), [être] brisé 'broken' (state); Russian razbit 'break' (causative accomplishment), razbit'sja 'break' (accomplishment), razbitij 'broken' (state); Yagua -mi:ta- 'open' (causative accomplishment), -mi:-y- 'open' (accomplishment) (Payne and Payne 1989). The accomplishments in French and Russian are indicated by the same morpheme which is used in reflexive constructions, ze in French and -sja in Russian, while the states are an adjectival past participle (French) or a deverbal adjective (Russian); in Yagua the states are indicated by adding the perfect ditic -man to the accomplishment form. In English, on the other hand, there is no consistent morphology marking these classes; in some cases they are all the same form, e.g. cool, cool and cool, and in others there is a indicator, albeit an inconsistent one, e.g. [be] black (state) vs. blacken (causative accomplishment), [be] red (state) vs. reddn (accomplishment), [be] sick (state) vs. sicken (accomplishment) vs. sicken (causative accomplishment). In Tepehua, causative activities may also be derived with ma:-, e.g. pu:pju:-y 'boils' vs. ma:pu:pju:-y 'boils x', so:qja:-y 'hurries' vs. ma:so:qja:-y 'hurries x'. In Lakshma, causative activities may be derived either with the instrumental prefix ya-, which is treated as a general causative prefix with activity verbs, or by the causative verb -ya, e.g. chéya 'cry' vs. yu:chexe 'make cry' vs. chëy:ya 'make cry'. Causative states corresponding to (3.16a) also involve the causative verb -ya, e.g. inúq 'be scared, frightened, amazed, awed' vs. inúq:ya 'scar, frighten, amaze, awe'. In Japanese, the same type of contrast holds between achievement and causative psychoverbs, with the latter marked by the causative morpheme -(s)e-, e.g. kowagaru 'become terrified' vs. kowagar:se-ru 'terrify', okaru 'become angry' vs. okar:se-ru 'anger'. Barai, a language of Papua New Guinea (Olson 1981), makes a systematic contrast between state verbs of psychological and physical state, e.g. dodue 'be thirsty', gare 'be cool', ma: 'be happy' and visi 'be sick', and causative verbs of induced psychological and physical state, e.g. dodua-d: 'make thirsty', garo-d: 'make cool', ma:di: 'please' and visi-nam: 'sticken'. No matter how these distinctions are indicated morphologically in a particular language, they are fundamental distinctions made in the verbal systems in all languages.

It was mentioned at the beginning of this section that verbs may have a different Aktionsart interpretation in the context of a particular sentence from what we may determine to be its basic or lexical Aktionsart interpretation. A very important alternation between classes is that between activities and accomplishments. He walked in the park for ten minutes is an activity, whereas He walked in the park in ten minutes is an accomplishment. If motion verbs have a definite goal, which provides a terminal point, then they behave like accomplishments; if they do not have a definite goal, then they behave like activities. This is a phenomenon which we find reflected in the grammar of different languages.11 This contrast is significant cross-linguistically, as we will see.

Another important variation is that verbs which are normally thought of as accomplishments behave like activities if they have an object which is a mass noun or bare plural. So a sentence like He ate a plate of spaghetti in ten minutes is an accomplishment, but He ate spaghetti for ten minutes is an activity. Similarly, He drank beer for an hour is an activity, but He drank a beer in an hour is an accomplishment because there is a specified amount, which provides a delimitation of the event; that is, the terminal point is reached when all of the beer has been consumed. Therefore some verbs, basically those of consumption or creation (e.g. write, paint, carve), behave like activities if they have a non-specific, indefinite, generic or mass noun object, but they behave like accomplishments if they have a specific, quantified object which serves to delineate the action. The terminal point is reached when the entity is created or consumed. Cognate objects may also serve
this function, e.g. She sang a song, He drank a drink. It must be emphasized that this
alternation is not simply a function of whether the direct object has an article or
not, as it appears from looking at English data only. In other languages, this contrast
is coded on the verb itself, with no change in the coding of the direct object. For
example, in Russian the activity and accomplishment forms of the verb eat are distin-
tinct: est' (kasha) 'eat (kasha)' vs. s'est' kasha 'eat the/kasha'. The verb est' does
not require a direct object, whereas s'est' does require one. There is no change in
the form of the direct object, although its interpretation changes from unspecified
mass noun to a specific quantity with the change in the form of the verb. Similarly
in Georgian, c'er 'write' is the activity form which contrasts with dac'er 'write', the
accomplishment form. Here again the contrast is coded on the verb itself. A final
example comes from Pirahã, a language spoken in the Amazon basin in Brazil,
which has suffixes which Everett (1986) glosses as 'telic' and 'nontelic', and with verbs
like 'eat' they have the same effect seen in English, Georgian and Russian, e.g.
xápis xaho-al- (bark eat-TELIC) 'eat bark' vs. xápis xaho-do- (bark eat-NONTELIC)
'eat (the) bark'. Like Georgian and Russian, Pirahã lacks articles, and the contrast
is coded on the verb and affects the interpretation of the NP. This alternation is
found across languages, and it has interesting syntactic consequences, which will be
discussed in sections 4.2 and 4.6. We will refer to the accomplishment uses of
activity verbs as active accomplishments. There are causative active accomplishments,
like transitive march, as in The sergeant marched the troops to the barracks.

We started out talking about four Aktionsart classes, and we have ended up with
ten classes overall: the basic four classes (states, activities, achievements, accom-
plishments), active accomplishments, and a causative version of each of them. The
tests in table 3.1 were meant to distinguish only the four basic classes, and accord-
ingly we must repeat the table with all ten classes; this is given in table 3.2. The tests
in table 3.1 are referred to by number; the causative paraphrase test is 'test 6'. The *
for achievement and causative achievements with respect 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 causative state of affairs is, the better the progressive and dynamic
adverbs are with causative state predicates. Consider the following contrasts.

(3.19)
a. Your attitude upsets/is upsetting me.
b. Your clothes nauseate/are nauseating me.

b'. The smell of your clothes nauseates/is nauseating me.
c. The clown's funny hair amuses/is amusing the children.
c'. The clown's nasty antics amuse/are amusing 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 (3.19c), not (3.19c).

The basic Aktionsart classes are non-causative, and their causative counterparts
are obviously causative. What about active accomplishments? In Foley and Van
Valin (1984), for example, it was argued that active accomplishments are causative,
with a sentence like Carl ran to the store being analyzed as 'Carl's running caused
him to arrive at the store.' This is problematic, for two reasons. First, it is not a valid
causative paraphrase, because there are more NPs (three) in the phrase than in the
sentence being paraphrased (two). A valid paraphrase would be 'Carl ran and
arrived at the store'. Second, if these verbs were causative, one would reasonably
expect that at least some languages would use causative morphology to signal the
active accomplishment use of activity verbs, but to our knowledge, none do. Indeed,
if one adds causative morphology to an activity verb, the inevitable result is a caus-
ative activity, not an active accomplishment. Hence it must be concluded that active
accomplishments are not causative. As noted earlier, there are causative versions of
active accomplishment verbs, e.g. intransitive march, as in The soldiers marched to
the barracks (plain active accomplishment), vs. transitive march, as in The sergeant
marched the soldiers to the barracks (causative active accomplishment).

The 'Yes' for test 2 for causative achievements 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 accept-
able, 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 derived from a state predicate, whereas causative active accomplishments are derived from an activity predicate. Hence, if the pattern of morphological derivation relates a telic, non-punctual causative verb to a state, then it must be a causative accomplishment, whereas if the pattern relates it to an activity, then it must be a causative active accomplishment. 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.

3.2.2 Lexical representations for verbs
These distinctions among the four basic Aktionsart types may be represented formally as in Table 3.3. These representations are called logical structures. 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 typeface. 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’á and English die (intr.) would be BECOME dead’ (x). The elements in all capitals, ING or BECOME, are modifiers of the predicate in the logical structure; their function will be explained below. 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 Síka t’á ‘The dog died’ would have the logical structure BECOME dead’ (síka).

States are represented as simple predicates, e.g. broken’ (x), be-at’ (x, y), and see’ (x, y). There is no special formal indicator that a predicate is stative. The logical structure, be’ (x, [pred’]) is for identificational constructions, e.g. Sam is a policeman,

and attributive constructions, e.g. Mary is tall. Schwartz (1993) has shown that these constructions behave differently from result state constructions, e.g. The watch is broken, in a variety of languages, and therefore these predicates require a different logical structure. In this logical structure the second argument is the attribute or identificational NP, e.g. be’ (Mary, [tall’]), be’ (Sam, [policeman’]). The primary criteria for distinguishing between attributive constructions and result state constructions is whether the attribute is inherent, e.g. Coal is black (be’ (coal, [black’])), or whether it is the result of some kind of process, e.g. The fire blackened the wood (...BECOME black’ (wood)). While English uses the same copular construction for both meanings, some languages systematically distinguish them. In Tagalog (Foley and Van Valin 1984), for example, the contrast is indicated by the prefixation of the state verb, e.g. Ma-puti ang bulaklak (ma-white DET flower) ‘The flower is white (it faded)’ vs. Puti ang bulaklak ‘The flower is (naturally) white.’ The bare stem is used for the attributive construction, and ma- is prefixed to it when the property is the result of some kind of process. Accordingly the logical structure for the first example would be white’ (bulaklak) and for the second it would be be’ (bulaklak, [white’]). Hence if the state predicate is not conceived of as being the result of a process, then the be’ (x, [pred’]) logical structure should be used. Be’ should not be confused with English be or copular verbs in other languages. It is used for logical structures with specific meanings, and its occurrence in a logical structure does not entail that the sentence realizing the logical structure should have a copula or the like. (See the Lakhota and Russian examples at the beginning of section 2.2.1.) The pred’ element in the second argument position will constitute the nucleus in the clause (see section 2.2.1). The logical structure feel’ (x, [pred’]) is used for internal sensations and transient emotional states, e.g. I feel sad (feel’ (I, [sad’])). She feels sick (feel’ (she, [sick’])). This is different from e.g. she has gotten sick (BECOME sick’ (she)), which describes a physical state or condition, and not the internal sensations of the subject. It is, of course, possible to feel sick but not be sick, and vice versa. Some other languages also make this distinction explicitly. In Bonggi, a Western Austronesian language spoken in Malaysia (Boutin 1994), stative stems are affixed differently depending upon whether they are condition statives or experiential statives, e.g. the stem ramiq ‘cold’ can appear as me-ramiq if it is a condition stative with a meaning like ‘cold to the touch’ (e.g. Sia me-ramiq [3sgnom cold] ‘it is cold’) or as rimig-adn if it is an experiential stative with the meaning ‘feel cold’ (e.g. Ou rimig-adn [1sgnom cold] ‘I am/feel cold’). In the syntactic realization of such sentences in English, the nucleus will contain both feel and the pred’ element, e.g. [3sgnom feel sad], [1sgnom feel sick].

All activity logical structures contain the generalized activity predicate do’, which serves as the marker of membership in this class, e.g. sing do’ (x, [sing’ (x)]), run do’ (x, [run’ (x)]), eat do’ (x, [eat’ (x)]). It should be noted that sing’, run’ and eat’ are not state predicates; they are activity predicates which always cooccur with do’.

<table>
<thead>
<tr>
<th>Verb class</th>
<th>Logical structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>predicate’ (x) or (x, y)</td>
</tr>
<tr>
<td>Activity</td>
<td>do’ (x, [predicate’ (x) or (x, y)])</td>
</tr>
<tr>
<td>Achievement</td>
<td>ING predicate’ (x) or (x, y)</td>
</tr>
<tr>
<td>Accomplishment</td>
<td>BECOME predicate’ (x) or (x, y)</td>
</tr>
</tbody>
</table>

Table 3.3 Lexical representations for the basic Aktionsart classes
which is a two-argument predicate, i.e. do' (x, y), filling the second argument position. If the second argument position is left unspecified, i.e. do' (x, 0), then this is the logical structure for an unspecified activity, as in English Silly doesidid. It might seem odd to posit such a complex structure for simple verbs like run and sing, but in fact there are numerous languages which construct activity predications in just this way. Basque is a particularly good example of this. Almost all verbal expressions corresponding to intransitive activity verbs in languages like English are created by combining a noun with the verb egin 'do, make', as illustrated in (3.20) from Levin (1989).

(3.20) a. Nk lan-θ egin d-u-t.
1sg-ERO work-ABS do 3sgABS-AUX-1sgERO
'I worked.' (lit. 'I did work')

b. Other combinations:

amets egin 'to dream' amets 'dream'
barre egin 'to laugh' barre 'laugh'
hitz egin 'to speak' hitz 'word'
igeri egin 'to swim' igeri 'swim'
lo egin 'to sleep' lo 'sleep'
negar egin 'to cry' negar 'tear'

Nouns like lan 'work' and hitz 'word' fill the second argument position in the logical structure of egin, which would be do' (x, y), to create activity predications. Even English provides some evidence for this second argument position: first, it can be filled by a pronoun referring to a known state of affairs in the context, e.g. Dana might do it; and second, it can be filled by an interrogative WH-word in questions about actions, e.g. What did they do? States and activities are the most basic classes, semantically; they are the building blocks for all other classes.

Achievement and accomplishment verbs are composed of a state or activity predicate plus a symbol for change. 'INGR' is derived from 'ingressive' and encodes instantaneous changes; these may be changes of state or activity. Accomplishments are coded by BECOME, which codes change over some temporal span, plus a state predicate, e.g., melt (intr.) BECOME melted' (x), sink (intr.) BECOME sunk' (x). Examples of punctual changes of state include explode (intr.) INGR exploded' (x) and shatter (intr.) INGR shattered' (x). We have to look to other languages for good examples of inchoative or inceptive activities. Georgian (Holisky 1981a, b) has verbs of this type, e.g. at'irda 'he will begin to cut' (INGR do' (x, [cry (x)])) vs. t'irs 'he is crying' (do' (x, [cry (x)])), ok'ark'aidbeba 'he will begin to tremble' (INGR do' (x, [tremble (x)])) vs. k'ark'aidbeba 'he is trembling' (do' (x, [tremble (x)])). Russian also has verbs of this kind: govorit' 'speak' (do' (x, [speak (x)])) vs. zagovorit' 'start to speak' (BECOME do' (x, [speak (x)])), plakat' 'cry' vs. zaplakat 'burst out crying' (INGR do' (x, [cry (x)])). In Georgian and Russian an important clue as to whether the derived inceptives are punctual or not comes from their range of inflectional forms. According to Holisky, most derived inceptives in Georgian do not have imperfective forms, but a few do (all are derived from states rather than activities), e.g. civa 'it is cold' vs. acivadeba 'it will become cold'.

In Russian, zagovorit' 'start to talk' has an imperfective form, zagovorivat' 'be starting to talk', whereas zaplakat 'burst out crying' and zasmejat'sja 'burst out laughing' do not; hence zaplakat and zasmejat'sja are punctual (accomplishments), while zagovorivat' is non-punctual (accomplishment). Hausa (Abdoulaye 1992) also has inceptive activity verbs, e.g. riigud 'start running'. Japanese has a suffix -dasu which derives inceptive activity verbs, e.g. tabe-dasu 'start to eat', hanai-dasu 'start to talk', hasiri-dasu 'start to run'. Pirahã (Everett 1986), has distinct inceptive markers for states and activities: -hot for initiation of an action and -hoag for the beginning of a state, e.g. xa'id-hoi (sleep-hoi) 'go to sleep, fall asleep', bihoah-hôhôg (tired-hoag) 'got tired'.

Examples of some English verbs with their logical structures are given in (3.21).

(3.21) a. States

Leon is a fool.
be' (Leon, [fool])
The window is shattered.
shattered' (window)
Fred is at the house.
be-at' (house, Fred)
John saw the picture.
see' (John, picture)

b. Activities

The children cried.
do' (children, [cry (child)])
The wheel squeaks.
do' (wheel, [squeak (wheel)])
John ate fish.
do' (John, [eat (John, fish)])

c. Achievements

The window shattered.
INGR shattered' (window)
The balloon popped.
INGR popped' (balloon)
John glimpsed the picture.
INGR see' (John, picture)

d. Accomplishments

The snow melted.
BECOME melted' (snow)
The sky reddened.
BECOME red' (sky)
Mary learned French.
BECOME know' (Mary, French)

An important issue arises with respect to achievement and accomplishment verbs. Some verbs are necessarily punctual, e.g. pop or shatter, while others are necessarily temporally durative, e.g. dry or grow. In between these two groups there are many verbs which code states of affairs which may be virtually instantaneous but need not be, e.g. break (intr.). In the same way there are verbs coding states of affairs which are normally not instantaneous but could be under certain circumstances, e.g. freezing normally takes place over a period of time, but if one dipped something into a vat of liquid nitrogen, the freezing would be virtually instantaneous. Should, therefore, verbs like freeze be represented as both INGR frozen'
Verbs and arguments

(x) and *BECOME frozen* (x)? The answer is ‘no’, for the following reason. With respect to the feature [-punctual], achievements are the marked member of the opposition, i.e. they are [+punctual], while accomplishments are unmarked, i.e. they are [-punctual]. It is well established that the unmarked member of a privative opposition covers a much greater range than the marked member, which has a very specific property. Hence, a [+punctual] verb must code states of affairs which are always instantaneous (or very close to it), whereas a [-punctual] verb may code a state of affairs with a temporal duration ranging from very short (nearly instantaneous) to very long. Since the states of affairs expressed by freeze can cover this range of temporal possibilities, it should be considered an accomplishment with the logical structure *BECOME frozen* (x). Among the non-punctual verbs, it is necessary to recognize that the default interpretation of a verb can fail in different places along the temporal range. For example, *arrive* is normally construed punctually, but it can, in the appropriate context, be construed non-punctually. *Freeze*, on the other hand, has a default interpretation at the other end of the range, as we noted above. *Break* seems to be neutral, and its interpretation is a function of the properties of the object broken; if it is brittle or hard, e.g. a window, then it is likely to have a punctual interpretation, whereas if it is non-brittle and somewhat soft, e.g. a green stick or tree branch, it is likely to have a more durative interpretation.

A change of state verb may be punctual in one language and non-punctual in another. A good example of this cross-linguistic variation is English *die* vs. Mandarin *st*. Both have the result that the subject is dead, but they differ in that the Mandarin verb is punctual, while the English verb need not be. Accordingly, it is possible to say in English *He died quickly/slowly* and *He died suddenly*, while in Mandarin *Tá sǐ de kuài* ‘He died quickly’ is impossible. Hence the logical structure for English *die* would be *BECOME dead* (x), an accomplishment, while the logical structure for Mandarin *st* would be *INGR dead* (x), an achievement. Another example of this is the contrast between the Japanese verbs *ik- ‘go’* and *k- ‘come’* and their English counterparts. Applying tests like those in table 3.1, Hasegawa (1992, 1996) shows that the Japanese verbs are punctual and therefore achievements. English *go and come*, on the other hand, are not punctual, are telic and cooccur with adverbs like *quickly* or *slowly* but not with ones like *vigorously* or *actively*, hence they are accomplishments. The same contrast holds between the verb *likna* in Belhare, a Tibeto-Burman language, and its English counterpart *enter*: the Belhare verb is punctual, while the English one is not (Bickel 1995). Here again it is clear that determining the *Aktionssatz* of a verb is not a matter of looking at the state of affairs it depicts; rather, it is a *linguistic* property which can be determined only by means of *linguistic* tests like those in table 3.1.

It was mentioned in the previous section that each of these *Aktionssatz* types has a corresponding causative type; the examples from (3.16) are repeated below.

3.2 Lexical representation

(3.16) a. State

b. Achievement

c. Accomplishment

d. Activity

e. Causative activity

(3.17) a. State

b. Achievement

c. Accomplishment

d. Activity

e. Causative activity

In order to represent the causative verbs, we will assume that their logical structure contains *CAUSE*, the second argument of which is the logical structure of the basic verb or predicate. This is illustrated in (3.22).

(3.22) a. [...] *CAUSE* [feel (boy, [afraid])] = (3.16a*)

b. [...] *CAUSE* [INGR popped (balloon)] = (3.16b*)

c. [...] *CAUSE* [BECOME melted (ice)] = (3.16c*)

d. [...] *CAUSE* [do (ball, bounce (ball))] = (3.16d*)

What is ‘[...]’; the first argument of *CAUSE*? Is it an individual or some kind of state of affairs? This is a point about which there is much disagreement among semanticists, both in philosophy and linguistics. If we look back briefly to the complex induced states of affairs in (3.3) and (3.4), we see that there are many instances in which one state of affairs brings about another, and therefore we will assume that what filled ‘[... ]’ in the causative logical structures may be the logical structure of a state, activity, achievement or accomplishment verb. This is illustrated in (3.23).

(3.23) a. Bill’s owning a gun frightened Martha.

b. The balloon’s popping startled the baby.

c. The warming of the earth’s atmosphere melted the arctic snowpack.

d. The dog’s barking scared the boy.

e. [*CAUSE* [feel (boy, [afraid])] = (3.16a*)]

In all of these cases the nature of the cause is specified in the sentence, but in many instances it is not, e.g. *Max broke the window*. This sentence tells us that Max did the breaking and the window broke, but it does not specify exactly what Max did to break the window, as discussed in section 3.1. Such an unspecified action is represented in logical structure as ‘do’ (x, 0)', and accordingly the logical structure for *Max broke the window* would be as in (3.24).

(3.24) a. Max broke the window.

b. [do (Max, 0)] *CAUSE* [BECOME broken (window)].
Verbs and arguments

Further examples of causative constructions from English, French, Italian (Centineo 1993) and Mandarin (Hansell 1993) are given in (3.25). We will discuss the syntax of these examples in detail in chapter 8.

(3.25) a. Hakem pushed open the door.
   a'. [do (Hakem,[push] (Hakem, door))] CAUSE [BECOME open
   (door)]

   make-3sg Fut TIR-INF
   'Pierre will make Marie run.'

b'. [do (Pierre,0)] CAUSE [do (Marie, [run] (Marie))]

c. Tonino fece affonda-re la barca.
   make.past.3sg sink-INF the.3sg boat
   'Tonino made the boat sink.'

c'. [do (Tonino,0)] CAUSE [BECOME sink (barca)]

d. Ti qiao po le yi ge fangwain.
   3sg hit break孵 one clue bowl
   'She broke (by hitting) a rice bowl.'

d'. [do (3sg,[hit] (3sg,fangwain))] CAUSE [BECOME broken
   (fangwain)]

These constructions are illuminating, in that they show that what in some instances is coded by a single lexical item, e.g. sink, break (trans.), can be expressed by a complex expression involving more than one verb. The Mandarin example is particularly interesting, since it involves a casting activity and an accomplishment (po ‘break’ is always intransitive). It recalls the Lakhota forms discussed at the beginning of the chapter; they too were composed of a prefix signaling the nature of the causing activity and then a state predicate indicating the result state. These constructions, both morphological (Lakhota) and syntactic (Mandarin), show how the logical structure of causatives may be reflected more directly in the overt form of the sentence than in a language like English.

We may now restate the basic set of lexical representations, including causatives and active accomplishments (see table 3.4). Active accomplishments are included here, because some verbs have this as their basic Aktionsart type, e.g. Italian andare ‘go’, which always involves motion to a goal (Contineo 1986). There are two additional logical structure elements that must be introduced. The first is NOT, which occurs in the logical structure of verbs like remove, drain and take (as in x took y from z). This is illustrated in (3.26).

(3.26) a. Sally removed the book from the table.
   a'. [do (Sally,0)] CAUSE [BECOME NOT be-on (table, book)]

b. Tom took the knife from the prisoner.
   b'. [do (Tom,0)] CAUSE [BECOME NOT have (prisoner, knife)]

The second element is ‘&’, meaning ‘and then’. The logical structure in (3.26b) does not tell the whole story of the state of affairs depicted by the sentence, since it entails that Tom ended up having the knife in his possession. In order to represent this, we need ‘&’, as in (3.27).

(3.27) [do (Tom,0)] CAUSE [BECOME NOT have (prisoner, knife) & BECOME have (Tom, knife)]

This should be read as meaning that Tom does something that causes (i) the prisoner to lose possession of the knife and (ii) Tom to come into possession of it. In general, ‘&’ may be used to express the successive states of affairs involved in motion and transfers of possession, i.e. initial situation (location, possession) → subsequent situation (location, possession). ‘&’ may be used in the logical structure of verbs of transformation like carve in which there are simultaneous changes of state, as illustrated in (3.28).

(3.28) a. The man carved the log into a canoe.
   b. The man carved the canoe out of a log.
   c. [do (man,[carve] (man, log))] CAUSE [BECOME NOT exist (log) & BECOME exist (canoe)]

In this complex process, a log is acted upon by a man and, as it ceases to be a log, it becomes a canoe. Hence there are two simultaneous changes taking place, and this is expressed in the logical structure by ‘BECOME NOT exist’ (log) ^ BECOME exist’ (canoe).

This theory of lexical representation is extremely powerful yet highly constrained, and it is well supported by much cross-linguistic study. We have already seen examples from Lakhota, Qiang, Georgian, French, Russian, Tepchun and other languages of how languages may derive at least some of the verbs in one class.
Verbs and arguments

from those in another class. The patterns found in these languages are summarized in (3.29).

(3.29) a. State → accomplishment
   Qiang, Tepehna, Pirah\text{\textdagger}
   Georgian, Japanese, Russian, Pirah\text{\textdagger}
   Georgian, Russian, Pirah\text{\textdagger}

b. Activity → accomplishment (i.e., 'start to V')
   Qiang, Lakhota
   Tepehna, Lakhota
   Yagura
   French, Russian
   French, Russian
   Tepehna, Lakhota
   Japanese, Lakhota, Barai

c. Activity → active accomplishment

d. Accomplishment → causative accomplishment

e. State → causative accomplishment

f. Causative accomplishment → accomplishment

g. Causative accomplishment → state

h. Activity → causative activity

i. State → causative state

From a lexical semantic point of view, one of the advantages of this system of lexical decomposition is that it makes the task of representation more manageable, because detailed definitions need be formulated only for the primitive predicates. If there is an adequate semantic representation, for example, of cool as a state, one need not say anything more about the interpretation of cool as an accomplishment verb. It is necessary only to take the representation of the state predicate and add BECOME, which has a well-defined meaning attached to it, in order to derive the accomplishment form of the verb. In addition, its argument structure does not change in the transition from state to accomplishment. Hence nothing needs to be stated about the argument structure of the derived form. In other words, if there is an adequate definition of be cool, the meanings of both cool intransitive and cool transitive fall out from this because they are additions of a well-defined semantic modifier (BECOME) and a well-defined predicate-connector (CAUSE) to the basic lexical predicate. In a similar way, the lexical semantic theory does not need to have a representation for kill; it only needs a representation for dead, and then kill will fall out from this scheme because there are well-defined meanings for CAUSE and BECOME. It will be necessary to have an interpretation of do’ (x, 0), since there is no specification of the nature of the causing activity, but that is relatively straightforward. Because of this, there is no need to worry about the meaning of kill or the meaning of die. An investigation of possible compositional schemes for the representation of the basic state and activity predicates in logical structures will not be undertaken here; the discussion will proceed with the representations in table 3.3, (3.21) and (3.23). Van Valin and Wilkins (1993) present a sketch of what a decompositional system for the state predicates would look like.

3.2 Lexical representation

How should the accomplishment uses of activity verbs be represented in logical structure? To begin with, we note that these accomplishments are like plain accomplishments (e.g., melt, freeze) in that they are telic and take place over time; they differ from them in that they are more active and can cooccur with the dynamic adverbs like actively, intensely, etc. As we saw earlier, they are not causative. They fall generally into two types: verbs of motion and verbs of creation/consumption. For motion verbs, we need to represent the motion plus the change of location over time. This can be done as in (3.30).

(3.30) a. do’ (x, [run’ (x)])
   b. do’ (x, [run’ (x)]) & BECOME be-at’ (y, x)
   c. Paul ran to the store.
   d. do’ (Paul, [run’ (Paul)]) & BECOME be-at’
      (store, Paul)

This logical structure represents both the activity and accomplishment facets of the sentence. For verbs of creation, e.g., write, paint, build, etc., the result of the activity is the coming into being of some specific entity, e.g., write a poem/letter/novel, paint a picture/portrait, build a house/model, etc. This may be represented by adding an accomplishment logical structure expressing the coming into being of the entity.

(3.31) a. John wrote poetry.
   a’. do’ (John, [write’ (John, poetry)])
   b. John wrote a poem.
   b’. do’ (John, [write’ (John, poem)]) & BECOME exist’ (poem)

For verbs of consumption, e.g., eat, drink, read, the situation is similar, except that the result is that a preexisting entity has been consumed rather than created.

(3.32) a. Carl drank beer.
   a’. do’ (Carl, [drink’ (Carl, beer)])
   b. Carl drank a beer.
   b’. do’ (Carl, [drink’ (Carl, beer)]) & BECOME consumed’ (beer)

In these logical structures two related predicates appear, an activity predicate, e.g., write’, and a state predicate, e.g., exist’. This is because active accomplishments involve both an activity and a result state, and since the result state is a function of the activity, it seems reasonable to represent them in this way. These alternations may be summarized as in (3.33).

(3.33) a. Motion verbs
   do’ (x, [pred’ (x)]) → do’ (x, [pred’ (x)]) & BECOME be-oc’ (y, x)
   a’. do’ (x, [pred’ (x, y)]) → do’ (x, [pred’ (x, y)]) & BECOME pred’ (y)

b. Creation/consumption verbs
   do’ (x, [pred’ (x, y)]) → do’ (x, [pred’ (x, y)]) & BECOME pred’ (y)
Verbs and arguments

One of the questions that comes up here is whether an alternating verb like *eat* is really an activity or an active accomplishment; in other words, should it be represented in its lexical entry as an activity or an active accomplishment? Or should it be represented twice, once as an activity and once as an active accomplishment? With verbs like *run*, *eat* and *write*, the activity verb gives its name to the main semantic substance in the logical structure, and the accomplishment part is very general; in the case of consumption and creation verbs, the interpretation of the logical structure is dependent upon the semantic content of the activity part, as in the logical structures of *write* in (3.31b) and *drink* in (3.32b). In other words, the semantically general part in the active accomplishment structure which is not specific to particular verbs is in the accomplishment part, while the primary verb-specific lexical content is in the activity part. This suggests that these verbs are basically activities which may be used as accomplishments. Additional evidence for this analysis comes from their interpretation when used with bare plural or mass noun objects. When causative accomplishment verbs like *kill* or *break* are used with bare plural or mass noun objects, they pattern like activity verbs with respect to the *Aktionssatz* tests, but they always have an iterative interpretation, e.g. *kill* bears or *break* windows always refers to multiple instances of killing or breaking, due to the fact that these verbs are necessarily telic. When verbs like *eat* and *drink* are used the same way, e.g. *eat* *peanuts*, they do not have to have an iterative interpretation; that is, it is possible to interpret *eat* *peanuts* as a single act of eating (non-iterative) or as a series of single acts of eating (iterative). This option is available because *eat* is not inherently telic, unlike *kill* and *break*; hence it must be analyzed as an activity verb, with an active accomplishment use. If we look at the Russian and Germanic verbs mentioned above, we see that the underived, base form of each verb is the activity form, not the active accomplishment form, and therefore we may conclude that Russian *'eat'* (*'eat'*) and Germanic *'write'* (*'c'ere'*) are basically activity verbs, with derived active accomplishment forms. Given how general the relationship between the two types of verbs is, as captured in (3.33), simply listing two forms of each verb in the lexicon would entail the loss of a linguistically significant generalization.

The crucial point to be emphasized again is that it is necessary to distinguish the basic lexical meaning of a verb, e.g. *eat* as an activity verb, from its meaning in a particular context, e.g. *eat a slice of pizza* as an active accomplishment predication. The former would be its representation in its lexical entry in the lexicon, whereas the latter would be the representation of the core of the clause in which *eat* appears. Moreover, 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 uses of a particular verbal lexical item. For a polymorphous verb each meaning would be associated with a different logical structure; for example, *take* in the sense of 'obtain' or 'get' (as in (3.27)) would have a different logical structure from *take* in the sense of 'carry'. There are other cases in which a verb is ambiguous between two related meanings, as with Lakhota *'a*, which can mean either 'be dead' (state) or 'die' (accomplishment). This is a systematic ambiguity throughout the verbal system of Lakhota: many non-activity intransitive verbs can have either state or change-of-state readings. The simplest solution would be to posit *'(BECOME) dead' (x)' as the logical structure for *'a*, the parentheses indicating that BECOME is optional. This is different from the situation with *run*, *eat* or *write*, because a sentence like *Igwá kí t'éd* (*eat the *'a'*') is simply ambiguous between 'The cat *is/was* dead' and 'The cat *died/died.*' Logical structures are associated fundamentally with the meanings which verbs express, not with the verbs themselves. We will discuss this issue further in section 4.6. We will discuss the composition of the semantic representation of whole clauses in section 4.8.

Having presented the system of lexical representation for verbs and other predicking elements, we now turn to the semantic interpretation of the arguments in the logical structures.

3.2.3 The semantics of predicate–argument relations

It was stated at the end of section 3.1 that the role that an entity plays in a state of affairs is a function of the nature of the state of affairs, and accordingly, it is also the case that the semantic interpretation of an argument is a function of the logical structure in which it is found. This is a fundamental point of great importance, and it cannot be emphasized strongly enough. The interpretation of an argument depends, first and foremost, on the verb or predicking element it occurs with. What is this interpretation? It is the semantic counterpart to the participant roles discussed in section 3.1. If Jack is the agent in an action, then the NP referring to him should be interpreted as the controlling and instigating argument of the verb. The semantic relations between a predicate and its arguments which express the participant roles in the state of affairs denoted by the verb are called thematic relations. The labels usually used for thematic relations are basically the same as those used for participant roles on pages 85–6, and in order to avoid confusing the two types of roles, we will give participant roles in normal typeface and thematic relations in small capitals. Thus, *patient* will refer to a participant role, while *patient* will refer to a thematic relation; the first refers to the role a participant plays in a state of affairs, whereas the second refers to the semantic interpretation of an argument in a logical structure and in a sentence. Thematic relations are linguistic entities, i.e., they are part of natural-language semantics, while participant roles are not; they are properties of states of affairs in the world. As we saw at the end of section 3.1, it is crucial to make this distinction and to motivate linguistic entities on linguistic grounds. It is not legitimate to argue that a verb needs to have a particular kind of argument solely because the state of affairs it denotes may have a specific kind of participant; as the discussion of (3.6)–(3.9) showed, verbs in different languages which may be used to refer to the same state of affairs may have quite different
properties. The thematic relations associated with a verb must be justified on linguistic grounds first and foremost.

Following the proposal in Jackendoff (1976), thematic relations will be defined in terms of argument positions in logical structures. In the system we are developing here, only two types of predicate define thematic relations, states and activities; all of the other types are composed of these two basic types (see table 3.4). There are many subtypes of state and activity verbs, and only a small list of each will be discussed here. Levin (1993) presents a rich taxonomy of verb classes in English. Since all thematic relations are defined in terms of argument positions in state and activity predicates, it is necessary to look at the subclasses of these two types. There are at least ten subclasses of state predicates. 'State or condition' includes predicates like being sick, being shattered and being broken. State or condition verbs take one argument, as do predicates of existence, whereas all the others take two arguments (see section 3.2.3.4 below). There are no tests like those in table 3.2 to distinguish the various subtypes of state predicates, and accordingly it must be ascertained from the meaning alone whether a verb is a perception verb, as opposed to a cognition or possession verb. If the verb denotes a perceptual event of some kind, then we assume it is a perception verb; if it denotes a cognitive event, then it is a cognition verb, and so on. There are at least as many subtypes of activity predicates as there are of state predicates, and representing the distinctions among the state and activity predicates requires a more detailed decomposition than this scheme provides. Based on these subtypes of activity and state predicates, a (non-exhaustive) list of possible thematic relations is given in table 3.5.

Each of the argument positions in the logical structures defines a thematic relation, and it is necessary to refer to the arguments as 'first argument' or 'second argument' when there is more than one. In table 3.5, 'first argument' refers to the $x$ arguments in the logical structures, and 'second argument' refers to the $y$ arguments. Role labels like 'effector', 'cognizer', 'theme' and 'performer' are merely mnemonics for argument positions in logical structure. Because there is as yet no adequate decompositional representation for the primitive state and activity predicates which are the building blocks of the system and carry the substantive semantic load, these labels are useful in that they designate the subclass of the predicate; hence 'experimenter' means 'first argument of a two-place state predicate of internal experience', 'possessor' means 'second argument of a two-place state predicate of possession' and 'observer' means 'first argument of an activity predicate of directed perception', for example. Thus, the interpretation of an argument is a function of (1) the class or subclass of the predicate and (2) its position in the logical structure. For instance, if a verb is an accomplishment, it takes the appropriate state logical structure, and there is no change in the argument structure. In both $x$ is dry and $x$ dried, $x$ is a patient, and the logical structures are, respectively, dry' ($x$) and become dry' ($x$). The thematic relation of $x$ is not affected by the addition of

### Table 3.5 Definitions of thematic relations in terms of LS argument positions

<table>
<thead>
<tr>
<th>I</th>
<th>State verbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Single argument</td>
</tr>
<tr>
<td>1</td>
<td>State or condition</td>
</tr>
<tr>
<td>B</td>
<td>Two arguments</td>
</tr>
<tr>
<td>1</td>
<td>Pure location</td>
</tr>
<tr>
<td>2</td>
<td>Perception</td>
</tr>
<tr>
<td>3</td>
<td>Cognition</td>
</tr>
<tr>
<td>4</td>
<td>Desire</td>
</tr>
<tr>
<td>5</td>
<td>Propositional attitude</td>
</tr>
<tr>
<td>6</td>
<td>Possession</td>
</tr>
<tr>
<td>7</td>
<td>Internal experience</td>
</tr>
<tr>
<td>8</td>
<td>Emotion</td>
</tr>
<tr>
<td>9</td>
<td>Attrib/Identifier</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>II</th>
<th>Activity verbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Single argument</td>
</tr>
<tr>
<td>1</td>
<td>Unspecifed action</td>
</tr>
<tr>
<td>2</td>
<td>Motion</td>
</tr>
<tr>
<td>3</td>
<td>Static motion</td>
</tr>
<tr>
<td>4</td>
<td>Light emission</td>
</tr>
<tr>
<td>5</td>
<td>Sound emission</td>
</tr>
<tr>
<td>B</td>
<td>Two or more arguments</td>
</tr>
<tr>
<td>1</td>
<td>Performance</td>
</tr>
<tr>
<td>2</td>
<td>Consumption</td>
</tr>
<tr>
<td>3</td>
<td>Creation</td>
</tr>
<tr>
<td>4</td>
<td>Repetitive action</td>
</tr>
<tr>
<td>5</td>
<td>Directed perception</td>
</tr>
<tr>
<td>6</td>
<td>Use</td>
</tr>
</tbody>
</table>

BECOME. In the case of causative verbs, the argument structure is the sum of the arguments of the composite predicates.

The implications of this scheme for deriving thematic relations from logical structures are very important. If it is the case that the thematic relations which a verb takes are a function of the argument positions in its logical structure, and there
is a system of lexical representation in which there are independent criteria for assigning logical structures to verbs, then there are independent criteria for assigning thematic relations to verbs. This is the case because the thematic relations are a function of the logical structure of a verb, and there are independent criteria for attributing a logical structure to a verb. Thematic relations cannot be assigned on an arbitrary basis, because logical structures cannot be assigned arbitrarily; rather, logical structures are determined on the basis of the tests in table 3.2. Thus the great advantage of this system of lexical representation is that there are tests which provide independent criteria for assigning a particular logical structure and hence a particular argument structure to a given verb.

This scheme also has important implications for how one actually goes about analyzing a language. In order to determine the argument structure of a verb, it is first necessary to ascertain its Aktionsart in the construction in which it occurs, using the tests in table 3.2. Having established that, its logical structure can be created, following table 3.4, and its argument structure follows from table 3.5. What is not appropriate in this system is to decide arbitrarily what thematic relations a verb should have and then to construct a logical structure which would yield those roles.

It is important to remember that in the system being developed, thematic relations play no direct role in lexical representation; the relevant semantic properties of the verbs are expressed by the decompositional logical structure representations, not by the thematic relations. We will continue to use these labels as mnemonics for argument positions in logical structure for the sake of convenience, but it should be kept clearly in mind that these do not refer to independently meaningful thematic relations but rather to argument positions in the logical structure of predicates of certain type.

In the next five sections, we will examine how certain groups of participant roles are expressed semantically through different logical structure combinations.

### 3.2.3.1 Verbs of saying and their arguments

Verbs of saying constitute an important subclass of activity verbs, but their complexity precludes a simple listing in table 3.5; Wierzbicka (1987), for example, lists thirty-eight subclasses of verbs of saying in English. We will be concerned here with speak, say, talk, discuss, and tell, and it will be necessary to posit a more complex decomposition than we have done to this point, in order to capture important similarities among them; we will follow the general approach of Van Valin and Wilkins (1993). The problem verbs of saying raise for the decomposition we have been using is this: the second argument varies rather dramatically in its interpretation. With talk, for example, it is the addressee, whereas with discuss it is the topic of the conversation. Some verbs of saying take a metalinguistic noun, e.g. word, syllable, as in say a few words, while others take what we will call an 'utterance noun', e.g. story, joke, rumor, statement, as in tell a story/joke about Frank. Some can take indirect discourse complements (that-clauses), as in say that it will rain, tell Sandy that it will rain.

We propose to unite all of these different verbs of saying in a single, general logical structure, and the differences among them will fall out from the way the variables in the representation are interpreted. The general logical structure is given in (3.34).

\[\text{do} (x, [\text{express}(\alpha), \text{to}(\beta), \text{in}\text{-language}(\gamma)), (x, y)]\]

The interpretation of the \(x\) argument is unproblematic; it defines the speaker thematic role for all verbs of saying. The new elements in the decomposition are the internal variables \(\alpha, \beta, \gamma\) which refer to the content of the utterance (\(\alpha\)), which may be a metalinguistic noun, an utterance noun, a noun referring to a topic of the conversation, or an indirect discourse complement, the addressee (\(\beta\)), and the language used (\(\gamma\)). They are called internal variables because they are within the semantic representation of the verb, and they are variables because they represent a range of possibilities for that facet of the semantic content of the verb, e.g. the three possibilities for \(\alpha\) mentioned above. One dimension along which speech act verbs may vary is which of these must or may be expressed and how they are expressed. The most minimal possible expression involves expression of \(x\) alone and none of the internal variables: Sandy spoke. Speak allows each of the three internal variables to be expressed as the \(y\) argument along with the speaker, as in (3.35).

\[\text{a. Sandy spoke but a few words. } y = \alpha \]
\[\text{b. Sandy spoke to Kim. } y = \beta \]
\[\text{c. Sandy spoke Telugu. } y = \gamma \]

We may summarize the selectional properties of these five verbs of saying as in (3.36).

\[\text{a. speak } y = \alpha \quad \alpha = \text{metalinguistic noun} \quad \text{e.g. (3.35a)}\]
\[y = \beta \quad \text{e.g. (3.35b)}\]
\[y = \gamma \quad \text{e.g. (3.35c)}\]

\[\text{b. say } y = \alpha \quad \alpha = \text{metalinguistic noun, indirect discourse complement} \quad \text{see above}\]

\[\text{c. talk } y = \beta \quad \text{e.g. talk to Kim}\]
\[y = \gamma \quad \text{e.g. talk Cajun}\]

\[\text{d. discuss } y = \alpha \quad \alpha = \text{topic noun} \quad \text{e.g. discuss the situation}\]

\[\text{e. tell } y = \alpha \quad \alpha = \text{utterance noun} \quad \text{e.g. tell a joke}\]
\[y = \beta \quad \text{e.g. tell Kim}\]

With some verbs it is also possible to realize the internal variables as oblique core arguments (PPs), as illustrated in (3.37).
Verbs and arguments

(3.37)  
a. speak a few words to Sandy  
to PP = β
b. speak to Sandy about Kim  
to PP = β, about PP = α
c. say to Robin that . . .  
to PP = β
d. talk to Pat about Sandy  
about PP = α
e. tell a joke to Pat  
to PP = β

The verb tell differs from the other four by virtue of its telicity; it is the only verb that can take an in PP (test 5) with the relevant meaning. The others are all activity verbs. It seems to be inherently causative, as the following paraphrase reveals: Sandy told Kim that Robin would arrive soon = 'Sandy's speaking made Kim become aware that Robin would arrive soon'. Accordingly, the logical structure for tell is that given in (3.38).

(3.38)  
[dо (x, [express (c).to (β).in_language (γ)]) (x, γ)] CAUSE [BECOME aware of (y, z)], where γ = β, z = α

Thus, the advantage of positing internal variables is that it allows us to see how the different verbs of saying realize different aspects of the basic representation in (3.34); otherwise, we would be forced to posit numerous homophonous verbs of saying, three just for speak, as (3.35) shows.

3.2.3.2 Agents, effectors, instruments and forces

Activity verbs raise a number of interesting issues. While the first argument of activity verbs receives a different thematic relation label with each subclass, the first arguments are all alike in that they are all doing something. As we saw in the Aktsionsart tests in table 3.2, these verbs cooccur with adverbs like vigorously and actively, and these adverbs modify the action that the first argument is doing. There is a generalized activity verb in many languages, e.g. English do, Korean ha, Basque egin and Thai thaan, and the first argument of this verb is an effector. This labels the participant that brings something about, but there is no implication of its being volitional or the original instigator. It is simply the effecting participant. It need not be animate. It would be appropriate to say that all of the other x arguments in part II of table 3.5 are subtypes of effector. Thus, movers are also effectors, but they occur with verbs of motion. Similarly, performers are effectors that occur with performance verbs, just as speakers are effectors that occur with verbs of saying, and so on. The 'effectorhood' of these arguments is represented in the logical structures by the fact that all activity verb logical structures contain 'dо (x, . . . )' and the formal definition of effector is the x argument in this logical structure configuration.

What about agents? Agents are always a type of effector semantically, and this means that agent is in effect an overlay on other, more basic thematic relations. Agent is always associated with an activity logical structure, and therefore only verbs which have an activity predicate in their logical structure can have an agent argument. But how is agent to be represented in logical structure? It is not listed in table 3.5. For verbs which lexicalize agency, such as murder, we will represent them as 'D O (x, [dо (x, . . . )], following Ross (1972) and Dowty (1979), and the formal definition of agent is the x argument in this logical structure. Thus the minimal logical structure for murder would be D O (x, [dо (x, 0)] CAUSE [BECOME dead (y)]). This explicitly represents agent as an overlay over the more basic effector, mover, consumer, etc. roles.

What about the verb kill? Many analyses claim that it too takes an agent argument, but this is in fact questionable. For instance, it is perfectly correct to say both 'John accidentally killed his neighbor's dog' and 'John intentionally killed his neighbor's dog. Moreover, kill, unlike murder, can take an inanimate subject, as in 'Malaria killed Fred', and inanimate entities cannot intend anything. In Tsowa-Tush (Bats; Holisky 1987), a language spoken in the Caucasus, some intransitive verbs take ergative (agent) marking while others take absolutive (patient) marking, but most intransitive verbs can take either one depending upon the way it is used. For instance, if one takes the verb meaning 'to lose one's footing and fall' and uses the ergative suffix, it means 'slide'. If, however, one uses the absolutive suffix, it means 'slip'. Sliding is controlled slipping; in other words, sliding is a controlled event, whereas slipping is not. Most intransitive verbs can use either suffix. The following example illustrates this for the verb for 'fall'.

(3.39)  
a. (As) -wiiž-aš
   (1sger) fall-tns-1sg
   'I fell down (on purpose).'
b. (So) -wiiž-eš
   (1sgas) fall-tns-1sg
   'I fell down (accidentally).'

Examples like this, along with the variable interpretation of verbs like kill, show that most of the time agency is an implication of the way a particular verb is used in a sentence, and not an inherent lexical property of the verb. Consequently, putting D O (x, [dо . . . ] in every logical structure which can have an agentive interpretation is highly problematic, for it would mean that one would have to posit two verbs kill in English, one with it and one without, and the same analysis for 'fall' in Tsowa-Tush.

Instead, it is preferable to have a theory in which an activity verb only takes D O (x, [dо . . . ] when its argument must be interpreted as an agent and has no such logical structure component when the agentive reading is merely possible. Thus, for verbs like murder, there is a D O (x, [dо . . . ] in logical structure, as we have seen, whereas with a verb like kill there is only [dо . . . ]. Holisky argues that speakers tend to interpret a human effector as an agent, unless there is information to the contrary in the sentence, e.g. the occurrence of an adverb like unintentionally or inadvertently. Hence D O (x, [dо . . . ] is part of the logical structure only if the
Verbs and arguments

argument must be interpreted as an agent; otherwise, the argument is simply an effector ([do:]... ) which can under certain circumstances be construed as an agent. What are the criteria for determining whether an argument is lexicalized with a verb or not? A simple test involves putting an adverb like unintentionally or inadvertently in the sentence and seeing if it yields a contradiction. If it is contradictory, then the verb lexicalizes an agent, and if it is not a contradiction, the verb does not.

John unintentionally killed his neighbor's dog is not a contradiction, while John unintentionally murdered his neighbor is; hence kill does not lexicalize agency, whereas murder does. Hence DO (x, [do:]... appears only in the logical structures of those verbs which lexicalize agency.

Languages seem to vary strikingly with respect to how extensively an argument is lexicalized in verbs. English and Tsowa-Tush appear to have few verbs which have obligatory agentive arguments, whereas many Japanese verbs whose English counterparts are marked for agency do indeed require an agent argument, according to Kuno (1973) and Hasegawa (1992, 1995, 1996). The following examples from Hasegawa are all semantically anomalous.

(3.40a) a. *Senso o ookuno heesi o korosi-ta.
   "The war killed many soldiers."

b. *Zyoon ga guzen ni tegami o sute-ta.
   "Joan accidentally threw the letter away."

c. *Zyoon wa ukkari-to megane o wat-ta.
   "Joan unintentionally broke the eye-glasses."

Example (3.40b) is odd because of the inanimate abstract subject 'war', which is incapable of acting volitionally. In the (b) and (c) sentences the agency-canceling adverbs are incompatible with the requirements of these verbs for an agentive subject. Note that none of the English translations are semantically anomalous. In order to use these verbs with a non-agentive effector, a special construction involving a nuclear juncture with the verb simaw- 'put' must be used. It is illustrated in (3.41), also from Hasegawa.

(3.41a) a. Zyoon ga guzen ni ino o korosi-te simat-ta.
   "Joan accidentally killed the dog."

b. Zyoon ga guzen ni tegami ni sute-te simat-ta.
   "Joan accidentally threw the letter away."

c. Zyoon wa ukkari-to megane ni wat-te simat-ta.
   "Joan unintentionally broke the eye-glasses."

Thus, languages differ with respect to whether verbs like 'kill' and 'break' require an agentive effector argument or not.

Force and Instrument thematic relations are not listed in table 3.5, because they can best be viewed as derivative of the more basic role of effector, as argued in Van Valin and Wilkins (1996). Forces are inanimate effectors that have two essential features in common with human and animate effectors: they can act and move independently, and they are not under the control of another effector, animate or inanimate; in other words, they can serve as the instigators of an action, event or process. Instruments, in contrast, are not capable of independent motion and action and are under the control of another effector (see p. 85); they are not instigators. They are closely related semantically to the arguments of two-argument activity verbs like use. In the prototypical case of an instrument, e.g. Tom is cutting the bread with a knife, an effector, typically human, manipulates a knife and brings it into contact with the bread, whereupon the interaction of the knife with the bread brings about the result that the bread becomes cut. This may be represented as in (3.42). (The main CAUSE in the logical structure is italicized.)

(3.42) [do (Tom, use (Tom, knife))] CAUSE [[do (knife, cut (knife, bread))] CAUSE [BECOME cut (bread)]]

The causing event in (3.42) is complex, and the instrument argument appears three times in the logical structure: as the implement of use and as the effector of do (x, cut (x, y)). It is possible, if the first argument of the highest do were left unspecified, to say The knife cut the bread, with the instrument knife as agent. This contrasts with the occurrence of Implements with activity verbs like eat and look at; the corresponding examples with the human effector unspecified are quite ungrammatical.

(3.43a) a. Abdul ate the cereal with a spoon.
   a'. The spoon ate the cereal.

b. Tanisha looked at the comet with a telescope.

b'. The telescope looked at the comet.

How is the difference between them to be captured? The crucial difference lies in the fact that the knife in the cut example is part of a causal chain, whereas in the examples with eat and look at there is no causal chain. The logical structures for (3.43a, b) are given in (3.44).

(3.44a) a. do (Abdul, eat (Abdul, cereal)) use (Abdul, spoon)

b. do (Tanisha, see (Tanisha, comet)) use (Tanisha, telescope)

These logical structures reflect the fact that (3.43a, b) can be paraphrased as Abdul ate the cereal, using a spoon and Tanisha looked at the comet, using a telescope,
respectively. The reason why knife can potentially function as actor whereas spoon and telescope cannot is now clear: knife is part of a causal chain and is the effector of cut in it, while spoon and telescope are not part of a causal chain and are not even directly arguments of eat or look at. Hence instruments are implements in a causal chain which are also effectors. It should be noted that it is possible to leave most of the logical structure in (3.42) unspecified, yielding [do’ (Tom, 0)] CAUSE [BECOME cut [bread]] and Tom cut the bread.

The formal definitions of force and instrument are given in (3.45).

(3.45) a. force: Inanimate ‘x’ argument in LS configuration
b. instrument: implement ‘y’ argument in LS configuration

[do’ (x, [....])] CAUSE [[.... do’ (y, [....])]] CAUSE
[BECOME/INGR prof’ (....)]

If x were animate, it would be a candidate for the agent implicature. By saying that the y argument is an implement, we are in effect requiring that one of the higher activity predicates be use’.

3.2.3.3 The second argument of activity predicates

The second argument of some of the multiple argument activity predicates in table 3.5 has unique properties among all of the argument types given there. These verbs behave in two ways, depending upon whether the second argument is referential or not. In the discussion of the alternation between activity and active accomplishment Aktionart with verbs like eat in the previous section, it was pointed out that when eat has an activity interpretation, its second argument is necessarily non-referential; that is, it cannot be interpreted as having any specific reference. This can be seen most clearly when eat is used in the simple present with a generic or habitual interpretation: Mario eats pizza vs. Mario eats a piece of pizza. This suggests that the second argument of this type of activity verb is qualitatively different from all of the other arguments in table 3.5, which are normally referential, unless they occur within the scope of a reference-cancelling operator like negation. In Mario ate pizza for an hour, no specific piece of pizza is referred to, as opposed to Mario ate a slice of pizza in thirty seconds, where reference to a specific piece of pizza is made. Given that the second argument of these verbs is non-referential, it is not surprising that it need not appear overtly, as in sentences like Mary is eating/drinking, and moreover the unrealized argument cannot be interpreted as having a discourse referent. That is, if someone asks, ‘Where is my sandwich?’ ‘Bill is eating’ is not an appropriate response if one means that Bill is eating the questioner’s sandwich (see Fillmore 1986). In a sentence like Mary is eating, it is understood that Mary is eating what one conventionally eats, namely food; it cannot be construed to mean she is eating poison, dirt, paper or the like. Many verbs in Mandarin Chinese normally take a non-referential argument when used as an activity, e.g. chǐ fàn ‘eat rice’, chǔn gē

'sing song' (Li and Thompson 1981). Thus the second argument with an activity verb like eat will be called an inherent argument, an argument which expresses an intrinsic facet of the meaning of the verb and does not refer specifically to any participants in an event denoted by the verb; it serves to characterize the nature of the action rather than to refer to any of the participants. It is not fixed, in that it can be used to characterize a number of different types of actions expressible by a particular verb, e.g. drinking beer, drinking coffee, drinking tea, drinking milk, etc. Inherent arguments are treated quite differently from normal, referential arguments. First, they can be freely omitted in English and many other languages, as noted above. Second, they are often incorporated into the verb. English is not usually thought of as a language with noun incorporation, but it is possible to have expressions like beer drinking as in She's gone beer drinking, where beer is the non-referential inherent argument. Other languages have more productive incorporation, and in many the inherent argument may or even must be realized as an incorporated noun. Examples from Lakhota and Tongan (Chung 1978) are given below.

(3.46) a. Wî háška ki čâ ki kakast-he.
man the wood the chop-cont
'The man is chopping the wood.'

b. Wî háška ki čâ-kâsas-he.
man the wood-chop-cont
'The man is chopping wood,' or 'The man is wood-chopping.'

(3.47) a. Na'e haka 'e he sînâ 'a e ika.
past cook Dro definit fish
'The man cooked the fish.'

b. Na'e haka 'i kâ 'a e sînâ.
past cook fish ABS definit
'The man cooked fish.'

The structure of Lakhota noun incorporation was discussed in chapter 2; see figure 2.32. Evidence that čâ 'wood' is incorporated in Lakhota comes from the fact that it lacks stress and that the stress has shifted to the first syllable in kakast 'chop'; most multisyllabic words in Lakhota have second syllable stress, as can be seen in kakast and wî háška 'man' in (3.46). Hence in languages like Lakhota the inherent argument appears as part of the verb and not as an independent constituent at all. The evidence for incorporation is even clearer in Tongan: ika 'fish' occurs compounded with the verb, and the subject appears in the absolutive case, the case of intransitive subjects, rather than in the ergative case, as in the canonical transitive construction in (3.47a). Thus, the non-referential second argument with two-argument activity verbs, the inherent argument, is qualitatively different from the other argument types listed in table 3.5.
Verbs and arguments

Not all two-argument activity verbs treat their second argument in this way. If it is a fully referential NP as with the verbs below, then it is realized as an oblique core argument, as in (3.48)–(3.51).

(3.48)  
a. The farmer plowed the field.  
   Active accomplishment  
   a'. The farmer plowed in the field.  
   Activity  
   b. The seamstress sewed the dress.  
   Active accomplishment  
   b'. The seamstress sewed on the dress.  
   Activity

(3.49)  
Kabardian (Cafford 1975)  
a. he-m  qıphsẽ-r je-dзаçę.  
dog-ERG bone-ABS-TRANS-bite  
"The dog bites the bone (through to the marrow)."  
b. he-r  qıphsẽ-m je-w-dзаçę.  
dog-ABS bone-ERG TRANS-bite  
"The dog is gnawing on the bone."

(3.50)  
West Circassian (Comrie 1978)  
a. Pišaša-m chay-ør  yada.  
girl-ERG cherkassha-ABS sew,sew,sew,TRANS  
"The girl is sewing the cherkassha."  
b. Pišaša-r chay-am  yada.  
girl-ABS cherkassha-LOC sew,sew,INTR  
"The girl is sewing away at the cherkassha."

(3.51)  
Tongan (Clark 1973)  
a. Nu’e kai-i  ‘a e ika 'e he tangata.  
active accomplishment  
past-TRANS-abs-def man  
fish  
"The man ate the fish."  
b. Nu’o kai-a e tangata'i he ika.  
Activity  
past-abs-def man  loc-def fish  
"The man ate (some other) the fish."

In all of these pairs, there is a transitive form with an active accomplishment reading and the second argument treated as a 'direct object' and an intransitive form with an activity reading in which the second argument is treated as an oblique core argument. The shift from transitive to intransitive is particularly striking in the three ergative languages, as the case marking on the subject shifts from ergative to absolutive. What is striking about activity verbs is that their second argument is not treated like the second argument of predicates of the other Aktionsart classes or the derived classes. We will discuss this further in section 4.2.

The second argument of two-argument activity verbs like listen to (directed perception) and use (use) behave like the second arguments of other classes. This is not surprising in the case of look at, since it is the activity version of a perception verb; this is clearly reflected in its logical structure (do' (x, [see' (x, y))]). Like the other activity verbs discussed, the second argument is optional, as in I'm listening/watching. Use seems to be somewhat unusual for this class, as it does not readily occur without a second argument. It is also unusual in that it normally occurs in a core juncture with purposive semantics, e.g. She used the knife to cut the rope, rather than in simple sentences (see chapter 8). The sentence She used the knife seems rather incomplete on its own out of context.

3.2.3.4 Two-place state predicates

Most of the state predicates in table 3.5 have two arguments, and they seem to define many thematic relations. Examples of verbs from these classes are given in (3.52).

(3.52)  
a. Location  
   The book is on the table.  
   be-on' (table, book), table = LOCATION, book = THEME  
b. Perception  
   Mabel saw the accident.  
   see' (Mabel, accident), Mabel = PERCEIVER, 
   accident = STIMULUS  
c. Cognition  
   Dana knows the answer.  
   know' (Dana, answer), Dana = COGNIZER, 
   answer = CONTENT  
d. Desire  
   Sam wants a new car.  
   want' (Sam, car), Sam = WANTS, car = DESIRE  
e. Propositional attitude  
   Max believes the rumor.  
   believe' (Max, rumor), Max = JUDGER, 
   rumor = JUDGMENT  
f. Possession  
   Tammy has a new car.  
   have' (Tammy, car), Tammy = POSSESSOR, 
   car = POSSESSED  
g. Internal experience  
   Diana feels sick.  
   feel' (Diana, [sick]), Diana = EXPERIENCER, 
   sick = SENSATION  
h. Emotion  
   Charles hates his wife.  
   hate' (Charles, wife), Charles = EMOTER, 
   wife = TARGET  
i. Attributiveness/identification  
   The building is tall.  
   be' (building, [tall]), building = ATTRIBUTE

The logical structures in (g) and (i) are somewhat unusual, in that the second argument position is filled by a predicate, rather than a referring expression, which is normally realized as the predicate or as part of the predicate in the nucleus. In
Verbs and arguments

In traditional grammar, they are termed 'predicate adjectives'. The second position in an identification of logical structure can be filled by a nominal as in (3.21a) 'Leon is a fool'; this is the traditional notion of a 'predicate nominal'.

It appears that there is a plethora of different thematic relations represented here, but upon closer inspection it turns out that there are fewer than meet the eye. There are two groups of thematic relations here, the first arguments and the second arguments of the state predicates, and a crucial fact about these two groups is that the members of each group do not contrast with each other. That is, no single predicate takes more than one argument from the group (locative, perceiver, cognizer, judge, possessor, experiencer, emoter, attributant), more than one from the group (effector, mover, st-mover, l-emitter, s-emitter, performer, consumer, creator, speaker, observer, user), or more than one from the group (theme, entity, stimulus, content, desire, judgment, possessed, sensation, target, attribute, performance, consumed, creation, locus, implement). Consequently, perceiver never coincides with cognizer or experiencer, nor does theme with content, stimulus or target. Since these thematic relations never contrast with each other, only with roles from the other group, there are really only two basic thematic relations in (3.52), and what these role labels distinguish is the subclass of the state or activity predicate that the argument occurs with. This can be seen clearly if we set up a thematic relations continuum in terms of argument positions in logical structure. This yields the thematic relations continuum in figure 3.2. The continuum has agent and patient as its anchor points, and the remaining groups of roles are ranked in terms of how agent-like and patient-like they are. Since human effectors can be interpreted as agents, 'first argument of do'...would be the closest argument type to agent. With respect to the two arguments of state 'predicate' (x, y), the first arguments of some of the classes clearly have things in common with the arguments in the first two columns. This is most obvious with observer and perceiver, and there is a similar parallel between the cognizer of stative cognition predicates like know and activity cognition predicates like think (about/over). Similarly, a component of do is wanting something to happen, and this is related to wanter with desire verbs. Likewise, there seem to be connections between the second argument of these verbs and patient. They denote entities which for the most part are not active and which are affected by the action of the verb in various ways. Hence it seems reasonable to place them closer to patient than to effector. There are really only three points, hence three distinct, contrasting thematic relations between agent and patient.

3.2.3.5 Recipients, goals and sources

These participant roles were discussed on page 86, but they do not appear as thematic relations in the logical structures in table 3.5. The distinction between

<table>
<thead>
<tr>
<th>Arg. of</th>
<th>1st arg. of</th>
<th>2nd arg. of</th>
<th>Arg. of state</th>
</tr>
</thead>
<tbody>
<tr>
<td>DO</td>
<td>do' (x, y)</td>
<td>predf (x, y)</td>
<td>predf (x, y)</td>
</tr>
<tr>
<td>AGENT</td>
<td>effector</td>
<td>location</td>
<td>theme</td>
</tr>
<tr>
<td></td>
<td>mover</td>
<td>perceiver</td>
<td>stimulus</td>
</tr>
<tr>
<td></td>
<td>st-mover</td>
<td>cognizer</td>
<td>content</td>
</tr>
<tr>
<td></td>
<td>l-emitter</td>
<td>wanter</td>
<td>desire</td>
</tr>
<tr>
<td></td>
<td>s-emitter</td>
<td>judgee</td>
<td>judgment</td>
</tr>
<tr>
<td></td>
<td>performer</td>
<td>possessor</td>
<td>possessed</td>
</tr>
<tr>
<td></td>
<td>consumer</td>
<td>experiencer</td>
<td>sensation</td>
</tr>
<tr>
<td></td>
<td>creator</td>
<td>emoter</td>
<td>target</td>
</tr>
<tr>
<td></td>
<td>speaker</td>
<td>attribute</td>
<td>attribute</td>
</tr>
<tr>
<td></td>
<td>observer</td>
<td>performan</td>
<td>performance</td>
</tr>
<tr>
<td></td>
<td>user</td>
<td>consumed</td>
<td>consumption</td>
</tr>
<tr>
<td></td>
<td></td>
<td>creation</td>
<td>creation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>locus</td>
<td>locus</td>
</tr>
<tr>
<td></td>
<td></td>
<td>implement</td>
<td>implement</td>
</tr>
</tbody>
</table>

Figure 3.2 Thematic relations continuum in terms of LS argument positions

GOAL and RECIPIENT is important because RECIPIENT arguments behave differently from GOAL arguments. For instance, one can say Send Mary the present and send the present to Mary, which shows that theme and recipient can both be the direct object with send. On the other hand, it is possible to say Send the package to Philadelphia but not *Send Philadelphia the package. This alternation is not possible between themes and goals. This is one of the reasons why it is desirable to have a goal role for motion separate from a recipient role for change of possession. The contrast between goal and recipient can be seen clearly in the logical structures for put, which takes a goal, and give, which takes a recipient; they are given in (3.53).

(3.53) a. put: [do' (x, y)] CAUSE [BECOME be-loc' (y, z)]
b. give: [do' (x, y)] CAUSE [BECOME have' (y, z)]

In (3.53a) x is an effector, y is a location and z is a thème, while in (b) x is an effector, y is a possessor and z is a possessed. In a sentence like The book is lying on the table (lie' (y, z)), y is the location and z is the thème. What, then, is the difference between location and goal? Similarly, in Mary has a new car (have' (y, z)), y is a possessor and z is a possessed. Here again, what is the difference between possessor and recipient? These contrasts are represented by the logical structure as a whole. The logical structures for lie and have are plain stative, while put uses BECOME be-loc' and give BECOME have'. Therefore, it is BECOME which distinguishes pure possessor and location from recipient.
Verbs and arguments

and **goal**. Simply because there is a semantic distinction, in this instance between **possessor** and **recipient** or between **location** and **goal**, it does not follow that it is necessary to create a new thematic relation in order to signal it. Hence it is the overall structure of the logical structure that gives the meaning of the argument. Thus the definitions of **recipient** and **goal** are as shown in (3.54).

(3.54) a. **recipient**: first argument in LS configuration '... BECOME/INGR have*(y,z)'  
b. **goal**: first argument in LS configuration '... BECOME/INGR be-loc*(y,z)'

**source** seems to have the same range of basic meanings as **recipient** and **goal**; that is, it is used in transfers of possession, i.e. *Mary took the book from Sam*, *Louise bought the watch from the jeweler*, and in changes of location, i.e. *Kim ran from the house to the barn*. The contrast with **goal** and **recipient** can be represented by adding **not** to the semantic representation, as suggested by Gruber (1965). Hence **source** can be defined as in (3.55).

(3.55) **source**: first argument in LS configuration '... BECOME/INGR NOT have/be-loc*(y,z)'

It is not really a distinct thematic relation from **possessor or location**; it is, rather, a **possessor of location** embedded under 'BECOME/INGR NOT' in logical structure.

In terms of the thematic relations continuum in figure 3.2, **recipient**, **goal**, and **source** would fall in the third column under 'first argument of **pred** (x, y)', along with **location**, **possessor**, etc.

3.3 Summary

It is important to emphasize again that in the system presented here, thematic relations play no direct role in lexical representation; the relevant semantic properties of the verbs are expressed by the decompositional-logical structure representations, not by thematic relations. Thus even though we have used a large number of role labels like **agent**, **cognizer**, **theme** and **patient**, they are merely mnemonics for argument positions in logical structure. They have no independent status. Since there is as yet no adequate decompositional representation for the primitive state and activity predicates which are the argument-bearing components of the system and which carry the substantive semantic load, these labels are useful in that they indicate the subclass of the predicate; hence **cognizer** means 'first argument of a two-place state predicate of cognition', **judgment** means 'second argument of a two-place state predicate of propositional attitude' and **theme** means 'second argument of a two-place state predicate of location', for example. We will continue to use these labels in this way (see n. 20), and it must be kept clearly in mind that these labels do not refer to independently meaningful relations but rather to argument positions in the logical structure of predicates of a certain type.

It is also worthwhile reiterating the consequences that follow from this approach for linguistic theory and practice. The theoretical implications of this system for deriving thematic relations from logical structures are very important. If it is the case that the thematic relations which a verb takes are a function of the argument positions in its logical structure, and there is a system of lexical representation in which there are independent criteria for assigning logical structures to verbs, then there are independent criteria for assigning thematic relations to verbs. This is the case because the thematic relations are a function of the logical structure of a verb, and there are independent criteria for attributing a logical structure to a verb. Thematic relations cannot be assigned on an arbitrary basis, because logical structures cannot be assigned arbitrarily; rather, logical structures are determined on the basis of the tests in table 3.2. Thus the great advantage of this system of lexical representation is that there are tests which provide independent criteria for assigning a particular logical structure and hence a particular argument structure to a given verb.

This system also has important implications for how one actually goes about analyzing a language. In order to determine the argument structure of a verb, it is first necessary to ascertain its **Aktionssatz** in the construction in which it occurs, using the tests in table 3.2. Having established that, its logical structure can be created, following table 3.4, and its argument structure follows from table 3.5. Thus, it is necessary to ascertain the **Aktionssatz** of the verb in the sentence, and from this its argument structure follows. What is not appropriate in this system is to decide arbitrarily what thematic relations a verb should have and then to construct a logical structure which would yield those roles.

Further reading

Verbs and arguments

Exercises

(Note: All exercises can be done after section 3.2.2.)

1. Determine the class of each of the following English verbs, using the tests in table 3.2. If a verb can be used in more than one way, classify each of its uses.

   collapse
devour
dissolve
draw (in the sense of 'sketch', not 'pull')
doubt
irritate
perish

2. Determine the class of each of the following Mparntwe Arremte verbs (Wilkins 1989). Use the tests in table 3.2; apply test 6 to the English translation, on the assumption that it accurately reflects whether a verb is causative or not. Discuss the evidence provided by each example sentence that led you to assign a given verb to a particular class. Give the logical structure for each verb. Comment on any patterns in the verbal morphology which correlate with the class of the verb. Note: the asterisk means that the sentence is impossible with the meaning specified; some of the sentences are fine with a different meaning, but that is irrelevant to this problem.

   (1) a. The kwelwele areme.
   b. *The kwelwele arekereleme.
   c. *The kwelwele yetepetyepelo areme.
   d. The kwelwele areke tine minitele.
   e. *The kwelwele areke tine minitekekekete.

   (2) a. Ayenge irennte neme.
   b. *Ayenge irennte nereneme.
   c. *Ayenge irennte yetepetyepelo neme.
   d. Ayenge irennte neke arlte therrele.
   e. *Ayenge irennte neke arlte therrekekekete.

   (3) a. Kwarte atele.
   b. *Kwarte areleneke.
   c. *Kwarte irpapele atele.
   d. Kwarte atele minite nyante-lekekekete.

   (4) a. Ayenge aleyheleme.
   b. Ayenge aleyherleneme.

   'I see a dog.'
   'I am seeing a dog.'
   'I see a dog energetically.'
   'I saw a dog for ten minutes.'
   'I saw a dog in ten minutes.'
   'I am cold.'
   'I am being cold.'
   'I am cold energetically.'
   'I was cold for three days.'
   'I was cold in three days.'
   'An egg exploded.'
   'An egg was exploding.'
   'An egg exploded quickly.'
   'An egg exploded for/in one minute.'
   'I sing.'
   'I am singing.'

   (5) a. The kwemntayye untlhilekileke.
   b. The kwemntayye untlhilereneke.
   c. The kwemntayye yetepetyepelo untlhilekileke.
   d. The kwemntayye untlhilekileke arlte therrele.
   e. *The kwemntayye untlhilekileke arlte therrekekekete.

   a. *Madte kwemntayye wander around.
   b. *I was making K wander around.
   c. *I made K wander around energetically.
   d. *I energetically made K wander around.
   e. *I made K wander around for three days.
   f. *I made K wander around in three days.

   (6) a. Arntape urperle neme.
   b. *Arntape urperele nereneme.
   c. *Arntape urperle arntrelele neme.
   d. Arntape urperele neke arlte therrele.
   e. *Arntape urperele neke arlte therrekekekete.

   a. Some (tree) bark is black.
   b. Some bark is being black.
   c. Some bark is black intensely.
   d. Some bark was black for three days.
   e. Some bark was black in three days.

   (7) a. Ayenge irenteraarleirreke.
   (cf. Ayenge irenterirreke).

   'I got cold.'
   'I got cooler [but not to the point of being cold].'
   'I was getting cold.'
   'I got cold energetically.'
   'I got cold in ten minutes.'
   'I got cold for ten minutes.'

   (8) a. Ayenge untlhoke.
   b. Ayenge untlherleneme.
   c. Ayenge yetepetyepelo untlhoke.
   d. Ayenge untlhoke arlte therrele.
   e. *Ayenge untlhoke arlte therrekekekete.

   'I wandered around.'
   'I am wandering around.'
   'I wandered around energetically.'
   'I wandered around for three days.'
   'I wandered around in three days.'

   (9) a. Arntape urperlarleirreke.
   (cf. Arntape urperlirreke).

   'Some bark became black.'
   'Some bark became blacker, darker.'