

- 6 More accurately, activity and semelfactive verbs take the auxiliary *avere* ‘have.’ Semelfactives and activities are often confused due to their similar behavior; see B. Levin (1999), Olsen (1994, 1997), and Smith (1991) for discussion.
- 7 Since we are focusing on larger questions about argument alternations, we do not return to the question of why some verbs, including *splash*, *smear*, and *load*, show the locative alternation, while some apparently similar ones, such as *fill* and *pour*, do not. Pinker (1989) offers a solution, but there is still more work to be done since, as Kim (1999) documents, in some languages, including Korean, verbs like *fill* show the locative alternation, though those like *pour* still do not; see also S. T. Rosen (1996).
- 8 The frequency with which the verb pairs *fear/frighten* and *like/please* are cited might suggest there are numerous comparable pairs of morphologically simple English psych-verbs; actually, there are not, despite the fair number of psych-verbs patterning like *fear* and the very large number patterning like *frighten*. Assuming that each psych-verb type instantiates a distinct kind of event, an explanation for this observation might lie in the inherent connection between the particular psychological state associated with a verb and the event type it is most naturally associated with. For instance, Pylkkänen (2000) notes that the *frighten* verbs, unlike the *fear* verbs, are necessarily stage-level; therefore, a psychological state which can only be construed as being individual-level must be lexicalized by a *fear* verb. We leave this important question for further research.
- 9 The fact that not all diagnostics for subjecthood and objecthood pick out the same NPs both in and across languages has prompted researchers in some theoretical frameworks to question the validity of the notions “subject” and “object” altogether. For example, in Role and Reference Grammar (Van Valin and LaPolla 1997), there is no unified notion of subject, and the same holds for Head-Driven Phrase Structure Grammar (Pollard and Sag 1987). We do not enter into these issues and simply point out that however this question is resolved, in laying out a theory of argument realization it is necessary to distinguish behavioral and coding properties.
- 10 Sometimes tense, mood, and aspect considerations affect the morphosyntactic realization of arguments; we will not be concerned with these phenomena.

2

Semantic role lists

represented by SEM ROLE LIST

One of the most widely adopted forms of lexical semantic representation is what we term a **SEMANTIC ROLE LIST**, also known as a “case frame” (Fillmore 1968) or a “theta-grid” (Stowell 1981). The best-known instantiations of this approach are Fillmore’s Case Grammar (1968) and Gruber and Jackendoff’s thematic relations (Gruber 1965; Jackendoff 1972, 1976), but such representations have a long history, going back to the Sanskrit grammarian Pāṇini. The modern interest in semantic role lists originated in Fillmore’s work, especially as presented in “The Case for Case” (1968).¹ In a semantic role list, grammatically relevant facets of a verb’s meaning are represented by a list of labels identifying the role that each of the verb’s arguments plays in the event it denotes. For example, the verbs *break* and *put* might be associated with the semantic role lists “Agent, Patient” and “Agent, Theme, Location,” respectively.

Rather than comparing and contrasting the myriad proposals for semantic role list representations, this chapter provides a critical discussion of these approaches. First, in section 2.1 we present the essential properties of semantic role lists. Then, in section 2.2 we discuss their most fundamental limitations. In section 2.3 we review some attempts aimed at overcoming these shortcomings, while maintaining many basic assumptions underlying such approaches.

2.1 The properties common to semantic role list approaches

The components of a semantic role list are a predetermined set of labels that identify arguments according to the semantic relation they bear to their verb; each verb is associated with the relevant list of semantic roles. As noted by Croft (1991: 156), several fundamental assumptions are implicit in at least the earliest semantic role list approaches: (i) the semantic roles are taken to be semantically unanalyzable, (ii) the semantic roles are defined independently of the meaning of the verb, and (iii) the set of semantic roles is small in size.

Assumptions: (i) *roles unanalyzable,*

The composition and size of the set of semantic roles is a matter of debate, but the set in (1), from one of Fillmore's papers, is typical. (This set includes two roles that are not often encountered, counter-agent and result; the latter is often subsumed under a broader interpretation of the object role – i.e., what is known more commonly as a “patient.”)

- (1) a. Agent (A), the instigator of the event
 - b. Counter-Agent (C), the force or resistance against which the action is carried out
 - c. Object (O), the entity that moves or changes or whose position or existence is in consideration
 - d. Result (R), the entity that comes into existence as a result of the action
 - e. Instrument (I), the stimulus or immediate physical cause of an event
 - f. Source (S), the place from which something moves
 - g. Goal (G), the place to which something moves
 - h. Experiencer (E), the entity which receives or accepts or experiences or undergoes the effect of an action ...
- (Fillmore 1971b: 376)

typical
set
types

Semantic role assignments are meant to bring out similarities and differences in verb meaning that are reflected in argument expression. Each semantic role defines a natural class of arguments, with members of this natural class usually having a common semantic relation to their verbs and shared options for their morphosyntactic expression. Semantic roles, then, can be viewed as labels for equivalence classes of arguments, and the goal of a theory of semantic roles is the identification of a set of semantic roles that is applicable to any argument of any verb.

In a sense, the use of semantic roles is analogous to the use of features in phonology. Phonological features distill from the wide range of phonetic detail those aspects of sounds which are phonologically relevant. Semantic roles distill from the perhaps even wider range of semantic detail those facets of meaning which are grammatically relevant. The choice of features or roles is justified to the extent that they define equivalence classes which recur in rules of phonology or morphosyntax. Phonological features, however, generally appear in clusters defining particular phonemes, and, in addition, define natural classes of phonemes, while semantic roles, as they were initially used, are taken to be atomic elements. As we discuss in section 2.3.1, there have been moves to define semantic roles in terms of more basic semantic elements, which could be viewed as the real analogues to phonological features.

To illustrate how semantic role lists can fulfill the requirements of a lexical semantic representation, we return to Fillmore's (1970) study of the verbs *break* and *hit*, first presented in the introduction. Fillmore points out that both can appear in two different transitive syntactic contexts, as in (2) and (3), although when a wider range of contexts is examined, it becomes apparent that the behavior of these verbs diverges, as in (4)–(7).

role has
"common"
relation
to verb.

like
then
features?

- (2) a. John broke the window with a rock.
b. A rock broke the window.
 - (3) a. John hit the fence with a stick.
b. A stick hit the fence.
 - (4) a. The window broke.
b. *The fence hit.
 - (5) a. The window was broken. (eventive and stative readings available)
b. The fence was hit. (only eventive reading available)
 - (6) a. I broke his leg./*I broke him on the leg.
b. I hit his leg./I hit him on the leg.
 - (7) a. John broke the rock against the window.
(does not paraphrase (2a))
b. John hit the stick against the fence. (paraphrases (3a))
- (Fillmore 1970: 126, (23)–(26))

And as already noted, these two patterns of behavior are even more deserving of explanation since the behavior of *break* is representative of a whole class of verbs, as is that of *hit*. Other verbs patterning like each of these verbs are listed in (8).

- (8) a. *Break* Verbs: bend, fold, shatter, crack
b. *Hit* Verbs: slap, strike, bump, stroke
- (Fillmore 1970: 125, (15))
(Fillmore 1970: 125, (16))

In order to explain the differences between the two types of verbs, Fillmore (1970) proposes distinct semantic role lists for the *break* verbs and the *hit* verbs. (We have simplified Fillmore's representations by omitting information concerning the optional or obligatory status of each element in the list.)

- (9) a. *break*: Agent, Instrument, Object
b. *hit*: Agent, Instrument, Place

? Fillmore locates
? difference in semantic
role list.

Each class of verbs, then, is characterized by the number of participants associated with its members, as well as their semantic roles. Fillmore also proposes rules of subject selection and object selection that take as their starting point semantic role labels. For a given verb, the choice of subject and object depends on its associated semantic role list. If this list contains an agent, then the participant with the agent role is chosen as subject. If there is an instrument in the list, then it too can be chosen as subject, but only in the absence of an agent.² The similarities between the *hit* verbs and the *break* verbs follow because verbs of both types select arguments bearing the roles agent and instrument, while the differences follow because verbs in one class select an object (i.e., patient) as their second argument, while those in the other class select a place (i.e., location). Of course, the identification of semantic roles which distinguish between the classes does not in itself constitute an explanation of the divergent behavior of *hit* and *break* verbs. Mapping rules such as Fillmore's rule of

↑ preferred
rule

hierarchy

↓ short form

subject selection are a first step in this direction; however, a full explanation of the divergent behavior of the *hit* and *break* verbs requires a full-fledged theory of mapping from lexical semantic representation to syntax; this is the topic of chapter 5.

2.2 Problems for semantic role list approaches

Semantic role list approaches have received abundant and typically well-merited criticism. In this section we review some of the most serious criticisms, and then consider some attempts to overcome them in the next section. For other recent discussions of the problems with semantic role-based approaches see Croft (1991: 155–58, 1998: 27–34), Davis (2001: 20–25), Dowty (1991: 553–59), and Parsons (1995: 637–47).

2.2.1 Problems of definition and grain-size

The use of semantic roles has been criticized because it is difficult to find reliable diagnostics for isolating precisely those arguments bearing a particular role. There do not seem to be diagnostic tests which can be consistently applied to an argument with relatively uncontroversial results to determine whether that argument bears a particular role in the way that there are tests for, say, lexical and syntactic categories. Fillmore's use of the term "Case" for what we term "semantic role" reflects the existence of correlations between certain morphological cases, prepositions, or grammatical relations and certain semantic roles, but such grammatical markers do not prove to be adequate indicators of the semantic roles of the NPs. If they did, there would be no reason to distinguish between semantic roles and their morphosyntactic encoding. For example, the preposition *with* can signal instruments (*cut with a knife*), comitatives (*work with Pat*), themes (*spray a wall with paint*), causes (*shiver with cold*), and manners (*agree with enthusiasm*). A variety of heuristics intended to identify instances of particular roles have been proposed in the literature, but they invariably break down under closer scrutiny; see McKercher (2001), Nilsen (1973), Schlesinger (1979, 1989, 1995), and Schütze (1995) for comprehensive discussions of proposed tests for instruments.

Some of the problems that plague attempts to provide precise definitions for individual semantic roles can be avoided. The key is recognizing that semantic roles are actually defined relative to the verbs which select them. The current dominant approach to semantic roles takes them to be defined by recurring sets of lexical entailments or, perhaps, presuppositions imposed by verbs on their arguments (Dowty 1989, 1991: 552–53), what Dowty (1989: 77) calls L-thematic roles. Every verb specifies certain entailments that hold of its arguments (e.g., *murder* entails that its subject acts volitionally). A verb might also presuppose certain properties of its arguments (Dowty 1991: 552; Primus,

1999: 34) though, as Dowty (1991: 552) suggests, presuppositions can be hard to distinguish from entailments. Since in most instances, this distinction is unimportant, we follow Dowty and refer to these lexical properties of arguments as entailments. Natural classes of arguments result when arguments of a number of verbs share certain lexical entailments. The commonly cited semantic roles can be viewed as labels for certain good-sized natural classes of entailments that are relevant to linguistic generalizations.³

Establishing what semantic role an argument of a verb bears, then, requires a careful examination of the meaning of the verb and, in particular, the identification of the lexical entailments which the verb specifies for that argument. This approach, however, also faces serious problems. Clearly, a set of shared entailments on arguments deserves to fall under the rubric of a recognized semantic role only if such a semantic role enters into significant generalizations in argument realization. However, it is difficult to decide on a fixed set of roles with just this property. One of the best-known problems in the identification and definition of semantic roles is what Dowty calls "role fragmentation" (1991: 553–55): the subdivision of a single role into multiple roles as a result of additional semantic and syntactic investigations. Dowty cites studies of the agent role to exemplify this. Cruse (1973), for instance, after a careful study of the syntactic properties of agentive verbs in English, concludes that there are four distinct agent-like roles – volitive, effective, initiative, and agentive – with each displaying distinctive behavior. Nilsen (1972), in an extended study of the instrument role, also ends up subdividing this role into four roles. Several studies of instruments, drawing on the observation that some instruments can be expressed as subjects as well as in *with* phrases, while others cannot, make a distinction between "intermediary" instruments and "facilitating" or "enabling" instruments (Marantz 1984: 247; McKercher 2001: 52–54; Ono 1992; Wojcik 1976: 165); the former, unlike the latter, are able to perform the action independently, as reflected in their occurrence as subjects.

- (10) a. The cook opened the jar with the new gadget.
- b. The new gadget opened the jar.
- (11) a. Shelly ate the sliced banana with a fork.
- b. *The fork ate the sliced banana.

The source of the problem appears to be determining the right "grain-size" to use in the definition of semantic roles. For certain argument expression generalizations coarse-grained lexical semantic analyses are suitable; however, others call for finer-grained analyses. For example, B. Levin and Rappaport Hovav (1995: 135) formulate a rule which realizes the "immediate cause" of an event as the subject in English. They argue at length for this statement of the rule, positing a notion of immediate cause, which is broader than the notion of agent, since it also subsumes many nonagentive animate arguments, for example, the emitter arguments of verbs of sound and light emission such as

basis for natural classes

what conditions role-hood

subclasses

*(on empirically,
to where it affects
the grammar?)*

*how fine-grained do
the distinctions need
to be?*

*L+RH →
"immed-
iate
cause"*

rumble or *sparkle*; see Van Valin and D. Wilkins (1996) for discussion of the related notion “effector.” This argument realization generalization, then, refers to a large class of arguments; however, there are other generalizations that pick out various subclasses of immediate causes. As discussed in section 1.6, although both agents and other causes can be expressed as subjects, natural causes can also be expressed in *from* phrases, while agents cannot, as shown in (12)–(13), repeated from this earlier discussion.

- (12) a. His uncle died from/of pneumonia.
b. Pneumonia killed his uncle.
- (13) a. Brutus killed Caesar.
b. *Caesar died from/of Brutus.

As these examples suggest, in some languages the different kinds of immediate causes receive different morphosyntactic realizations; see DeLancey (1984) and van Voorst (1996) for further discussion and exemplification. Canonical agents – causes that are animate and have volition and control over their actions – are always expressed as subjects, while other types of immediate causes may show several realizations (see section 1.6) or in some languages may be precluded from being realized like canonical agents (e.g., see Guilfoyle [1995] on Irish). And, as noted above, certain grammatical generalizations make distinctions among different kinds of agents as well. Thus, the grain-size appropriate for the sweeping generalization concerning subject selection is not appropriate for other generalizations.

what about verbs with special qualities?

There are some verbs which require analyses that are fine-grained in the extreme, since they have one or more arguments that cannot be characterized in terms of typically posited semantic roles. For instance, what roles do the objects of *contemplate*, *facilitate*, *require*, or *confirm* bear? Such verbs appear to have arguments requiring an individually tailored semantic role. Positing such individualized roles could result in a staggering number of roles; furthermore, little is gained by introducing them since many would not enter into any significant linguistic generalizations. However, generalizing the semantic characterization of some roles to include such arguments is no less problematic since overly general semantic roles tend to have little predictive power. Yet many researchers apply the label theme or patient to almost any NP expressible as an object, perhaps in an attempt to formulate a single object selection rule. This strategy may reflect a desire to avoid role fragmentation and even a hope that there is a unified semantic basis for objecthood. It is possible that researchers are resistant to positing role fragmentation where objects are concerned because the potential fragmentation associated with objects is much more severe than with subjects; with subjects it can be constrained to a handful of roles, such as agent, experiencer, instrument, and natural force. Even if there are reasons that the broad application of certain semantic roles might be desirable in the abstract, the question is whether such uses are empirically supported. For instance,

assignment of the theme or patient role to just about all objects reflects a failure to appreciate differences in the behavior of the objects of various verbs. There is no empirical basis for such a wide application of one of these terms, as demonstrated in section 1.1 via an examination of the objects of *break*, *hit*, *eat*, and *see*.

2.2.2 Problems reflecting cross-role generalizations

Having discussed complications that arise because some generalizations refer to a grain-size smaller than the “average” semantic role, we now examine difficulties posed by generalizations that cut across “average”-size semantic roles. The first type of problem leads to role fragmentation, while the second suggests that “average”-size semantic roles fall into natural classes. Both suggest that semantic roles themselves cannot be unanalyzable notions if certain generalizations are to be perspicuously expressed.

The problems we discuss arise because the typical semantic role inventory lacks internal structure. If each semantic role is taken to be discrete and unanalyzable, generalizations holding over more than one semantic role are not expected. For example, there is no reason to expect that a patient might have more in common with a goal than with an agent, or that an instrument might have more in common with an agent than with an experiencer. Yet, there is evidence that this is so: patients and recipients, for example, have the same morphological expression in languages with double object constructions, and agents and instruments have the same morphological case in many ergative languages of Australia (Blake 1977: 44). There are also languages where goals and benefactives (Blake 1977: 35; Croft 1991) or instruments and comitatives (Croft 1991; Stoltz 1996) are assigned the same morphological case or are signaled by the same preposition. In English, for example, *with* indicates both instruments and comitatives.

- (14) a. Tracy washed the car with an enormous sponge.
b. Tracy washed the car with Stacy.

Similarly, as discussed in section 1.6, the first object in the double object construction can indicate either a goal or a benefactive. Thus, there are both partial similarities and partial divergences in the expression of arguments of verbs bearing particular roles, giving rise to complex patterns of crossclassification, such as those reflected in these syncretisms in morphosyntactic expression. These suggest that there is organization imposed over the semantic roles in the typical inventory.

Further evidence suggesting that the semantic role inventory has internal organization comes from Jackendoff's (1983) discussion of verbs of motion. As the examples in (15) illustrate, a simple motion verb such as *come* can appear with a variety of complements.

*clashes
roles?*

*but
doesn't
this
also
have to
do w/
case?*

→ i.e. not analyzable

- (15) a. Pat came to the library.
 b. Pat came from the cafeteria.
 c. Pat came from the cafeteria to the library.
 d. Pat came towards us.
 e. Pat came through the woods.

On a semantic role list approach, these different uses of *come* have the verb appearing with a goal, as in (a), a source, as in (b), both a source and a goal, as in (c), what Jackendoff (1983: 165) calls a direction, as in (d), and what he calls a route, as in (e). Source and goal figure in most semantic role inventories. Direction and route are not typically included in such inventories, but that in itself is not a problem. There is nothing in the various semantic role lists which unifies these different uses of *come*, though, as Jackendoff points out, there is a simple underlying generalization: the verb *come* can appear with a path, but there are a number of different types of paths.

The root of these problems is the assumption that semantic roles are taken to be discrete and unanalyzable; see Croft (1991: 156–58) for additional discussion. Given this, it is not possible to impose any structure over the set of semantic roles that can account for similarities in patterning or dependencies in cooccurrence. The small set of unanalyzed roles that characterizes an ideal semantic role approach, then, is incompatible with linguistic reality.

2.2.3 Problems of one-to-one correspondence

is this related to WAT?

Fillmore's Case Grammar (1968) and its descendants make the assumptions that there may be at most one instance of each semantic role per clause and that each argument bears one and only one role; see also Starosta (1978). However, potential deviations from these assumptions are frequently cited. Gruber (1965, 1976) and Jackendoff (1972, 1976, 1983) present sentences with verbs of motion and verbs of transfer of possession where a single NP apparently bears two semantic roles. For instance, they claim that the subject of *run* in *Kelly ran across the field* is both an agent and a theme – in the sense of an entity that moves or is located. The potential for dual role assignment is identified as the source of the ambiguity in *Kelly rolled down the hill*. Here *Kelly* is necessarily understood as the theme, but there is also a reading available where *Kelly* is understood to be the agent, as well. On the reading where *Kelly* is only theme, the rolling down the hill is unintentional, and on the other where *Kelly* receives two semantic roles, the rolling is intentional.

mult. roles explain why not volitional vs. volitional ambiguity

Dual semantic role assignment is especially useful in distinguishing between certain verbs of transfer of possession. For instance, it can be used to differentiate the sentences in (16). *Phil* is source, *Mira* goal, and *the yacht* theme, in both sentences; in addition, *Phil* is also agent in the (a) sentence and *Mira* is also agent in the (b) sentence.

- (16) a. Phil sold the yacht to Mira.
 b. Mira bought the yacht from Phil.

Gruber and Jackendoff take examples such as those just discussed as support for dispensing with the assumption that an NP can bear only one semantic role. If this assumption is dropped, new questions arise: which pairs of semantic roles be assigned to an NP, and if only some of the possible pairings are attested, what prevents the others?⁴ → *what combos are allowed?*

Equally problematic for attempts to constrain the associations of semantic roles with arguments are verbs which appear to have two arguments bearing the same role; see Dowty (1991: 556), Huddleston (1970: 510), Starosta (1978: 468–70), among others for discussion. Various examples are cited, with *resemble* being representative. This verb's two arguments are said to bear the same role because sentences such as *Pat resembles Lee* and *Lee resembles Pat* are paraphrases. In fact, purported instances of two-NPs-with-the-same-role may be less problematic than purported instances of one-NP-with-two-roles. Closer examination reveals that the two arguments of *resemble* do not have precisely the same role. Rather, one is the standard of comparison and the other is the object being compared with this standard, as shown by the contrast between the unexceptionable *Dorothy resembles the Mona Lisa* and the somewhat odd *The Mona Lisa resembles Dorothy* (Fillmore 1971a: 39; Gleitman et al. 1996; Parsons 1995: 645–46; Starosta 1978; among others). Nevertheless, verbs such as *resemble* remain problematic as their analysis involves introducing a role, "standard of comparison," that is not otherwise typically posited – a label introduced specifically for this particular class of verbs. Furthermore, this role is what Dowty (1991: 562–66) calls "perspective dependent": it is assigned based on a speaker's notion of what is discourse prominent rather than based on properties of the event itself, like typical semantic roles.

2.2.4 Overall explanatory effectiveness

doesn't really explain

Finally, an unstructured list of semantic roles, whatever its effectiveness, remains fundamentally unexplanatory in a number of ways.

First, as discussed by Rappaport and B. Levin (1988), a lexical semantic representation which consists solely of an unstructured list of semantic roles has no way of distinguishing a possible set of roles that can be associated with a single verb from an impossible one. Although many verbs are associated with the semantic role lists "Agent, Patient, Instrument" (e.g., *break, cut, mix*) or "Theme, Source, Goal" (e.g., *run, swim, walk*), a list of the form "Location, Experiencer, Patient" seems decidedly unnatural. Yet, there is no way of allowing the natural groups of semantic roles and disallowing the unnatural ones. Second, there are no constraints on the number of roles which may be associated with a given verb, yet crosslinguistically, verbs are at most triadic. (The exception, perhaps, are verbs of commercial transfer such as *buy*

what's legal + not?

no explicit relationship to case.

(S)

and *sell*, which involve a buyer, a seller, the merchandise, and the payment; see Carter [1976, 1977]; Croft, Taoka, and Wood [2001].) A similar point is made in Davis and Koenig (2000: 59).

Third, an unstructured list of semantic roles does not give any insight into why semantic roles figure in argument expression in just the way they do. For example, as already mentioned, agents in all languages – possibly putting aside some ergative languages – are always expressed as subjects. This observation can be captured with a stipulation that agents are always subjects, but surely there is a reason for this generalization. Many other broad generalizations concerning the morphosyntactic expression of arguments bearing particular semantic roles can be formulated, but a simple list of semantic roles gives no insight into why just these generalizations are valid.

2.3 Attempted solutions

There have been various attempts to circumvent the problems most often attributed to semantic role list approaches, while still maintaining the basic nature of semantic role lists as a lexical semantic representation. One solution is to define each semantic role in terms of a small set of binary features; a second is to allow a structured form of dual role assignment, known as a TIER MODEL, using roles drawn from two different sets. These two solutions, however, meet with mixed success.

2.3.1 Feature decomposition

Some researchers have suggested that the problems of crossclassification and grain-size can be solved once the assumption that semantic roles are unanalyzable is rejected, and semantic roles are provided with definitions in terms of a small set of semantic features. This approach is adopted by J. M. Anderson (1971, 1977), Ostler (1979), Reinhart (1996, 2000, 2001, 2002), and Rozwadowska (1988, 1989), among others. This approach strengthens the parallel between semantic roles and phonemes, with both being characterized in terms of distinctive features.

Feature decomposition approaches can deal with the problems of crossclassification by making reference to a feature shared across a set of semantic roles. Rozwadowska (1988: 157, 1989: 117–18) provides an analysis of restrictions on the syntactic expression of arguments in derived nominals based on the decomposition of semantic roles into bundles of features. She points out that a single generalization covers experiencers and patients in the nominalization of English transitive verbs. She considers derived nominals based on transitive verbs which express only one of their arguments, with this argument being expressed in prenominal position (e.g., *the building's demolition*). If one of the two arguments of the transitive base verb is either an experiencer or a patient,

this argument is necessarily the one expressed. This generalization is intended to account for the examples in (17). In (17a), *John* must be understood as the experiencer, as in *John loves Mary*, and not as the stimulus. In (17b) *the movie* cannot be understood as the stimulus, as in *The movie shocked the censors*, and (17c) cannot have a reading where *the barbarians* are understood as the agent, as in *The barbarians destroyed Rome*, but only the reading where *the barbarians* is understood as the patient, as in *The Romans destroyed the barbarians*.

- (17) a. John's love
 b. *the movie's shock
 c. the barbarians' destruction

(Rozwadowska 1989: 117, (11a))
 (Rozwadowska 1989: 117, (10d))

According to Rozwadowska (1988: 158, 1989: 119) experiencers and patients share the feature [+change], which is associated with arguments that “are affected physically or psychologically in the course of action, process, or state” and the appropriate generalization, whatever its origin or explanation, can be formulated in terms of this feature. However, Rozwadowska (1988: 159, 1989: 127) points out that experiencers have more in common with agents with respect to certain other grammatical generalizations, and she accounts for this commonality by assigning experiencers the additional feature [+sentient], which is shared by agents. This analysis captures the dual character of experiencers.

Since natural classes of semantic roles can be defined through the use of shared features, the range of attested morphological case syncretisms, mentioned in section 2.2, might be accounted for in terms of these shared features. For example, to account for the fact that agents and instruments share certain grammatical properties, they can both be assigned a common feature, say Rozwadowska's feature [+cause] (1988: 159), and an additional feature [+control], indicating control over the execution of an action, could be assigned to agents, but not to instruments (cf. the discussion of agents and instruments in DeLancey 1984).⁵ Patients and recipients (i.e., the goals found with transfer of possession verbs such as *give* or *sell*) might be said to share a feature [+affected] – a relative of Rozwadowska's feature [+change]. The basis for this proposal is that both can be objects, and Jackendoff (1990b: 135–37), for example, attributes this to their being affected by the action. Rozwadowska's feature [+sentient] – sometimes presented as [+animate], though see section 4.4 – might then distinguish possessional goals from patients.

Furthermore, generalizations which are apparently stated with respect to semantic roles of different grain-sizes can be accommodated by referring to feature specifications of greater or lesser generality. For example, the broad generalization concerning mapping to subject discussed in section 1.6 may be sensitive to a feature [+immediate cause], while other language-specific generalizations may make reference to features that distinguish among immediate causes, such as [+volitional], [+animate], or [+sentient].

Another attempt to cover a wide range of argument realization phenomena along similar lines is pursued by Reinhart (1996, 2000, 2001, 2002), who also defines semantic roles in terms of binary features. She introduces two features, [c], for “cause/change” and [m] for “mental state,” for this purpose. Coarse-grained roles are those left unspecified for one feature. For example, the role cause is represented simply as [+c], being unspecified for the feature [m]. Roles defined by a single feature may have varying contextual interpretations, so that a cause – i.e., [+c] – argument may be realized as an agent – a [+c, +m] argument – or an instrument – a [+c, -m] argument – since both their definitions are compatible with the single feature [+c]. As in other semantic role list approaches, classes of verbs can then be defined in terms of the semantic roles of their arguments, though for Reinhart, these roles are defined in terms of feature clusters.

The use of underspecified feature clusters solves the problem of grain-size. It is natural for some verbs to allow agent, cause, or instrument subjects – these are precisely the verbs that select for a [+c] subject – and for others to require an agent subject – these are the verbs that select for a [+c, +m] subject. Furthermore, the fact that agents, causes, and instruments can all be subjects follows if [+c] arguments can be subjects; there is no need to have a subject selection rule that explicitly lists the possibilities.

Rozwadowska and Reinhart’s feature decompositions have somewhat different motivations: Rozwadowska is concerned with the interaction of argument structure and derivational morphology, while Reinhart is interested in explaining the argument expression options of verbs, particularly psych-verbs, as well as patterns of lexical causativization. Nevertheless, the features that the two posit largely overlap. This overlap reflects an emerging consensus regarding the semantic determinants of argument realization that need to be incorporated into any lexical semantic representation, the topic of chapter 4.

However, as discussed by Rappaport and B. Levin (1988), approaches based on feature decomposition are not unproblematic. They still do not provide any insight into what constitutes a natural set of semantic roles which can be associated with an individual verb. Furthermore, unless the number of features is small, as in Reinhart’s and Rozwadowska’s work, the number of attested feature combinations is usually less than the number of possible combinations, so that these approaches give rise to uninstantiated roles. This problem can be quite severe, as Kisala (1985) demonstrates. She points out that Ostler (1979) makes use of 48 roles, which he defines in terms of eight features, yet eight features are sufficient to distinguish 256 roles – over 200 more roles than Ostler uses. To account for these discrepancies between predicted and existing roles, a theory of the features that define semantic roles must be supplemented with a theory that predicts the possible combinations of these features. However, as Rappaport and B. Levin write, “Considering the care that Ostler takes in motivating this set of features and the wide range of phenomena he attempts to deal with, it is doubtful that other attempts at defining comprehensive feature systems will meet with much more success” (1988: 33).

Feature analyses are appealing because they provide a way of defining and making reference to natural classes of semantic roles. It is important to recognize, however, that there are two ways in which semantic roles fall into natural classes and that feature analyses are only relevant to one of the two. First, semantic roles can fall into natural classes in that they pattern together with respect to argument realization options. These classes are typically the ones that are implicated in issues of crossclassification and grain-size. Second, semantic roles can form natural classes in that they may cooccur as the arguments of particular types of verbs. Although feature approaches provide a way of dealing with the first type of natural class, they do not offer insight into natural classes of cooccurring semantic roles. Understanding these natural classes requires a theory of possible events, since the nature of an event determines its participants; chapter 4 introduces theories of event conceptualization intended to address this problem.

2.3.2 Dual semantic role assignments and tier models

Some researchers relax the assumption that each argument bears one and only one semantic role. Certain arguments, then, may be assigned more than one role, and this dual role assignment allows for some degree of crossclassification. The best-known instantiation of this approach is the system of thematic relations introduced by Gruber (1965) and Jackendoff (1972); it was exemplified with the verbs *roll*, *buy*, and *sell* in section 2.2.3 and is discussed further in section 4.1. Jackendoff explicitly reviews the advantages of allowing dual role assignments. A challenge for such approaches, however, is that only certain combinations of roles seem to be viable. The allowable combinations are easy to describe, but an explanation is necessary for why only particular combinations are possible.

To deal with this problem, some instantiations of this approach impose additional organization on the set of roles. Culicover and W. Wilkins (1984) propose there are two sets of roles, with dual role assignments always involving one role from each set. These two sets of roles are referred to as the extensional or perceptual roles and the intensional or action roles. The perceptual or extensional roles are so-named because they can be assigned to arguments of a verb by looking at the event in the world that is being described; these roles are source, goal, location, and theme in the Gruber/Jackendoff sense (see also section 4.1). The action or intensional roles are agent, patient, instrument, and benefactive; these roles “categorize objects according to their status as actors in an action” (Culicover and W. Wilkins 1984: 212). They are referred to as intensional roles because, unlike the perceptual roles, they must be assigned “based on our natural theories of human action” (Culicover and W. Wilkins 1984: 212). As discussed in section 4.1, Jackendoff (1990b) takes this idea further, proposing that the lexical semantic representation involves two distinct dimensions, his “thematic” and “action” tiers (1987, 1990b), corresponding roughly to Culicover and Wilkins’ perceptual and action roles, respectively.

Although Jackendoff's tiers are cast in predicate decomposition terms, they incorporate a notion of dual role assignment since a single argument may play a part in both tiers. Grimshaw (1990) also adopts the idea that there are two representations, proposing an aspectual dimension, which is a projection of the event structure of predicates, as well as a thematic dimension, which is inspired by Jackendoff's thematic tier. In fact, these are perhaps the most recent instantiations of an idea that keeps recurring in the semantic role literature, having made one of its earliest appearances in Grimes (1975: 133–38). Most noteworthy is that the two dimensions identified in these approaches foreshadow two distinct perspectives on event conceptualization, each relevant to argument expression; these are discussed in chapter 4.

2.4 Conclusion

In this chapter we presented lexical semantic representations that take the form of semantic role lists, surveying the severe problems that such representations face. We reviewed attempts to overcome these problems by rejecting the assumption that semantic roles are unanalyzable, while still maintaining the assumptions that semantic roles are indeed an appropriate basis for a lexical semantic representation and that, even if analyzable, they are definable by a set of necessary and sufficient properties. These revised approaches, however, are only partially successful. The next chapter considers further developments in the theory of lexical semantic representation designed to overcome the fundamental limitations of semantic role lists. These developments are incorporated into most current theories of lexical semantic representation.

We end this chapter on a methodological note. Due to the many problems facing theories of semantic roles, existing semantic role labels are often “reappropriated” by researchers: some semantic role labels are used in various, possibly incommensurable, ways. Nowhere is this more evident than with two of the most often cited semantic roles, “theme” and “patient.” These two roles, which are most often associated with arguments realized as direct objects, are neither defined, nor used consistently. For instance, many researchers have assigned theme or patient to almost any NP expressible as an object, perhaps in an attempt to formulate a unified object selection rule (see section 2.2.1). Other researchers use these notions as if they were interchangeable, while still others refer to a “patient/theme” role, without making any commitment as to whether there is one role or two. Such uses most likely stem from statements by Gruber (1965) and Jackendoff (1972) that every sentence must have a theme (see section 4.1), which has led to a tendency to treat this role as a “wastebasket,” assigning it to all objects. However, there are researchers who recognize a well-defined difference between the patient and theme roles. The notion “patient” goes back to traditional literature on transitivity, and in its narrowest sense is applied to the entity that is affected in an event, though “affectedness” itself is not so easily defined. On a narrow interpretation it

means an entity that changes state, but often it is used in a looser sense, so that the objects of *hit* and *wipe* qualify as affected, and, hence, patients (Jackendoff 1987, 1990b; see section 4.2.4). The notion “theme” is introduced by Gruber (1965, 1976; Jackendoff 1972, 1976, 1983, 1987) to refer to the moving entity in a motion event or a located entity in a location event and then extended to the entity that changes state in a change-of-state event; this notion is then adopted and elaborated by Jackendoff (1972, 1976, 1983; see section 4.1). In later work, Jackendoff (1987: 394; 1990b: 125–30) recognizes a notion of patient as affected entity, in addition to a notion of theme, seeing each notion as relevant to distinct facets of a lexical semantic representation (see section 4.1). Finally, some researchers give precedence to the notion “theme”: they define it as the role of an entity that changes state, and then apply the label patient to entities that might qualify as “affected” in a broad sense, but that do not fall under their notion “theme” (Marantz 2003). For these researchers, the objects of *hit* and *wipe* are patients, while the objects of *break* and *open* are themes. This use of “patient,” then, diverges considerably from the more traditional use.

These different understandings of “theme” and “patient” reflect both the difficulties in defining semantic roles and the efforts to give them more effective definitions. In the following chapters we address the various semantic notions that figure in the many definitions of these terms. Here we simply address the terminological consequences of this plethora of uses for this book. Since our goal is to review and synthesize work in lexical semantics and argument realization, we usually use the term patient/theme as it is typically used, that is, to refer to the semantic range of arguments that are expressed as direct object. Where reference to a narrower notion is critical, as in discussions of semantic generalizations stated in terms of theme or patient, we will make clear precisely what is meant through a fuller specification, such as “the entity which undergoes a change of state.”

Notes

¹ The “Case for Case Reopened” (1977a) presents Fillmore’s views on semantic roles close to ten years after his seminal paper “The Case for Case” and includes his responses to some common criticisms of semantic role approaches. For an extensive survey of major semantic role list approaches, which also reviews the various stages in Fillmore’s work, see Cook (1989). For a shorter survey with somewhat different coverage, see chapter 3 of Blake (2001).

² English sentences with instrument subjects describe a more circumscribed set of events than the corresponding sentences with an overt agent and the instrument expressed in a *with* phrase. As DeLancey (1984: 203) points out, *The axe broke the window* can describe an axe falling off a shelf onto a window, but without considerable context it is unlikely to describe a window breaking because someone deliberately strikes it with an axe. These limitations on the use of instrument subject sentences were not appreciated when Fillmore wrote his Case Grammar papers.

- 3 Not all researchers take semantic roles to be defined in terms of lexical entailments. Jackendoff (1972, 1976) and Talmy (1975, 1985), among others, allow NPs to be assigned different semantic roles, even if they do not differ in their entailments, but rather differ in their pragmatic or information-structure status.
- 4 Examples such as (16) are sometimes considered to be problems for Chomsky's (1981) Theta-Criterion; however, as noted by Chomsky (1981: 139, n. 14), and stressed in Rappaport and B. Levin (1988), the uses to which the Theta-Criterion is put in the Principles and Parameters framework, are not affected if the Theta-Criterion needs to be modified to allow for the kinds of examples which Gruber and Jackendoff cite.
- 5 This use of the feature [control], which we introduce solely for illustrative purposes, diverges from Rozwadowska's use of a feature with the same name. She assigns her feature [control] to instruments as well as agents because of other considerations raised by the particular phenomena she is exploring.

3

Current approaches to lexical semantic representation

As we discussed in the last chapter, a general consensus has emerged that semantic roles, to the extent that they do figure in argument realization, cannot be considered unanalyzable notions. We reviewed two approaches to overcoming this problem: unpackaging the content of semantic roles in terms of bundles of binary features and allowing arguments to be assigned more than one semantic role. In this chapter, we survey two other widely adopted solutions. The first involves introducing what Van Valin (1999) calls "generalized semantic roles." On this approach the content of traditional semantic roles is unpackaged into more basic components, as in the feature decomposition approach, but these components do not constitute a set of jointly necessary and sufficient conditions on any given role. The second involves introducing a more structured lexical semantic representation known as a predicate decomposition. The most sophisticated of the current theories of argument realization build on generalized semantic roles, predicate decompositions, or both. Section 3.1 introduces generalized semantic roles, while section 3.2 introduces predicate decompositions.

3.1 Generalized semantic roles

The difficulties that arise in identifying a semantic role inventory and in assigning semantic roles to certain NPs have led some researchers to reject the traditional assumption that the semantic roles relevant for argument realization are characterized by a set of jointly necessary and sufficient conditions. In so doing, they are able to posit semantic roles that lump together arguments that pattern in the same way with respect to morphosyntax, without requiring that they have a single common semantic ingredient. Consequently, they can make use of semantic roles that encompass a wider range of arguments than traditional semantic roles, yet are not simply more coarsely defined roles, but rather are defined in terms of relatively specific semantic criteria. Van Valin

(1999) refers to such semantic roles as “generalized semantic roles,” while Croft (1998: 22) characterizes them as “super-roles.”

As discussed in section 1.6, the notions of subject and object are different from other morphosyntactic expressions available to arguments, in that both can be associated with a particularly wide range of semantic roles, and there are morphosyntactic processes which alter the assignment of arguments to these expressions. As a result, it has proven difficult to associate semantic roles with these grammatical relations, and a key motivation for the use of generalized semantic roles is their potential to overcome this difficulty. For this reason, generalized semantic role approaches usually posit only two such roles: one associated with subject and a second with object. Primus (1999), however, posits a third generalized semantic role, which is associated with the first object in a double object construction. Her proposal is based on parallels between the first object and the grammatical relations, subject and direct object (see section 1.6).

The seeds for generalized semantic roles were most likely sown in Dixon’s (1972: 59, 1979: 60, 102–07, 1994: 6–8) work on ergativity, which introduces the labels “A” and “O” to refer to the semantic classes of arguments of transitive verbs that are realized as subject and direct object, respectively, in a language like English with a nominative–accusative case system. Dixon himself sees these labels as “syntactic-semantic primitives” (1979: 60; 1994: 6) in the sense that they have a semantic basis, but are used in the definition of grammatical relations such as “subject” and “object.” These labels have been widely adopted for use in statements about the morphosyntactic realization of arguments in work on a broad range of languages, particularly work with a typological cast. The core exemplars of A and O are prototypical agents and patients, respectively, but the labels are intended to encompass other arguments that share the morphosyntactic realization of agents and patients. Thus, not only is the agent of prototypical agent–patient verbs an A, but so is the perceiver for verbs of perception (Dixon 1994: 8, 1991). This last idea underlies generalized semantic role approaches: classes of arguments with a range of semantic properties pattern together in terms of morphosyntactic realization, and there may be no semantic property common to the whole set of arguments. Members of these classes are said to share a generalized semantic role label, allowing rules of argument realization to make direct reference to just these classes of arguments. This general approach obviates the need to propose that the patient has a vague definition that covers the entire semantic spectrum of possible direct objects – the type of definition that prompts some researchers to characterize this as a “wastebasket” role.

In this section we review two approaches to generalized semantic roles. The first is Dowty’s (1991) proto-role approach, which we briefly compare with a similar approach developed by Schlesinger (1995). We then review another perspective on generalized semantic roles developed within Role and Reference Grammar (RRG) by Van Valin (1990, 1993b; Foley and Van Valin 1984;

Van Valin and LaPolla 1997). Both approaches take generalized semantic roles not to be defined by a set of jointly necessary and sufficient conditions, and both appeal to many of the same semantic ingredients in defining these roles, but, as the comparison in section 3.1.2 shows, the actual part generalized semantic roles play in the overall theory of grammar is quite different.

3.1.1 Dowty’s proto-roles

Dowty (1991) suggests that many of the problems inherent in developing a viable system of semantic roles can be overcome if semantic roles are viewed as cluster concepts or prototypes, which bring together related notions without imposing jointly necessary and sufficient conditions for membership in a category.¹ In presenting the prototype approach to semantic roles we focus primarily on Dowty’s (1991) theory since it has been widely discussed and adopted. We also briefly discuss the work of Schlesinger (1995) in order to emphasize the potential benefits of a prototype approach, while highlighting points of contrast in implementation.

3.1.1.1 An overview of the proto-role approach

Dowty (1991) introduces two prototype-based generalized semantic roles, which he calls the AGENT PROTO-ROLE and the PATIENT PROTO-ROLE. His starting point is the assumption, developed in earlier work (Dowty 1989; Ladusaw and Dowty 1988), that arguments are associated with lexical entailments (or presuppositions) imposed on them by their verbs, and that semantic roles are best understood as names for recurring clusters of lexical entailments imposed by groups of predicates on one of their arguments. Semantic roles, then, are second-order properties – properties of predicates. Such clusters of entailments deserve a semantic role label only to the extent that they enter into significant linguistic generalizations – they are what he calls “L-thematic roles” (1989: 77).² Dowty argues that with respect to argument selection, only two such roles need be recognized, an Agent Proto-role and a Patient Proto-role. He associates these two proto-roles with the properties given below.

(1) Contributing properties for the Agent Proto-Role:

- volitional involvement in the event or state
- sentience (and/or perception)
- causing an event or change of state in another participant
- movement (relative to the position of another participant)
- (exists independently of the event named by the verb)

(Dowty 1991: 572, (27))

(2) Contributing properties for the Patient Proto-Role:

- undergoes change of state
- incremental theme

- causally affected by another participant
- stationary relative to movement of another participant
- (does not exist independently of the event, or not at all)

(Dowty 1991: 572, (28))

Dowty (1991: 572) writes that the last, parenthesized entailment in each set – the entailment involving independent existence or the lack thereof – has its origins in the lists of subject properties in Keenan (1976, 1984). Dowty parenthesizes these entailments since he is unsure whether they belong to the discourse dimension of subjecthood rather than the semantic dimension. Polinsky (1996) further discusses the presupposition of existence with respect to the recipient and theme arguments of dative verbs. She associates it with the semantic characterization of certain arguments, while proposing that it is important to establishing a link between the semantic and discourse characterizations of the arguments of dative verbs.

Not unexpectedly, the components of meaning that enter into the proto-roles overlap significantly with those proposed in previous discussions of the agent and patient roles; these same notions also figure in the more structured lexical semantic representations that are introduced in the next section. The only notion that does not figure in work on semantic roles is “incremental theme,” an aspectually based notion, which is discussed in section 4.2.1. The main innovation, then, is not in the content of the semantic components which enter into the definition of the proto-roles, but rather in the fact that these components contribute to the degree to which an argument can be taken to be an agent or a patient without being jointly necessary and sufficient in defining either of these notions. Concomitantly, there is no longer any reason to provide an exhaustive analysis of all arguments in a given sentence in terms of recognized semantic roles. This, too, is a major departure from earlier semantic role approaches.

The basic idea is that there is no invariant entailment or set of entailments which determines access to subjecthood or objecthood. Dowty illustrates this by presenting examples satisfying only one of the relevant entailments of each proto-role to the exclusion of the others. For example, the subject of *John sees/fears Mary* only possesses the Agent Proto-role entailment of sentience (Dowty 1991: 572, (29b)), while the object of *John erased the error* only possesses the change-of-state Patient Proto-role entailment (Dowty 1991: 572, (30a)). Thus, any given argument does not have to meet all of the criteria associated with a particular proto-role. Moreover, there are pairs of subject NPs or object NPs with no shared proto-role entailments at all. Obviously, an NP that meets all the criteria for either the Agent or the Patient Proto-role corresponds to what would be considered a good – or prototypical – example of the relevant role, as in *Brutus assassinated Caesar*. In fact, the most uncontroversial examples of the agent role in the literature tend to be those that have most, if not all, of the Agent Proto-role entailments, and the same holds

for the most uncontroversial – or best – patients. The result is that arguments may be agent-like or patient-like to greater or lesser degrees, according to the number of Agent or Patient Proto-role entailments they are associated with. In this sense, the subject of *assassinate* is a more prototypical agent than the subject of *see*. The existence of more and less central exemplars of a category is a defining characteristic of a prototype category (Rosch 1973).

A single NP may even have some Agent Proto-role and some Patient Proto-role entailments. For example, when *frighten* psych-verbs have a change-of-state interpretation, their objects possess the Agent Proto-role entailment of sentience and the Patient Proto-role entailment of undergoing a change of state (Dowty 1991: 579–80). We return to these examples below. Finally, an argument of a verb need not be associated with any of these entailments. Although presumably every argument of a verb is associated with some entailment or presupposition imposed by its verb, Dowty stresses that there is no evidence that each such semantic restriction be associated with a recognized semantic role – or “L-thematic role” in his terms – which enters into generalizations concerning argument realization.

The proto-role approach to semantic roles is consistent with the observation that most recognized roles have what Dowty has perspicuously termed “unclear boundaries.” This approach also solves the problem of generalizations that need to be stated over semantic roles of different grain-size (see section 2.2.1). Natural classes of arguments can be picked out by making reference to shared entailments; depending on the number of shared entailments, broader or narrower sets of arguments are picked out. Although for the purposes of subject and object selection, Dowty argues that only the broad categories he labels the Agent and Patient Proto-roles need be recognized, languages have other generalizations involving argument realization which refer to narrower semantic categories.

Dowty’s basic motivation for introducing proto-roles is providing subject and object selection rules that have wide coverage and that overcome some of the problems facing rules formulated in terms of regular semantic roles. Dowty (1991: 576, (31)) proposes that for a given verb, the argument with the largest number of Agent Proto-role entailments is realized as the subject, and the one with the largest number of Patient Proto-role entailments is realized as object (his Argument Selection Principle). Thus, in *Chris built a house*, the builder is the subject since it has the volition, sentience, causation, and movement Agent Proto-role entailments, but no Patient Proto-role entailments, while the building is the object as it has several Patient Proto-role entailments: change, causally affected, incremental theme, stationary, and dependent existence (1991: 577). This approach explains why arguments which meet all the criteria for agenthood are always, in all languages, expressed as subjects in nonpassive sentences. This solid and overarching generalization must be expressed by any theory of argument realization. With three-place predicates, the nonsubject argument with the greater number of Patient Proto-role entailments is the direct object and the

one with fewer Patient Proto-role entailments is an oblique or a prepositional object (Dowty 1991: 576, (33)).

Although we have referred to subject and object selection rules, it is important to stress that for Dowty, these rules represent not a step in a derivation, but rather constraints “on what kind of lexical predicates may exist in natural language, out of many imaginable ones” (1991: 576). A particular verb may “lexicalize”, or determine, a particular pairing of semantic argument types and grammatical relations, but these pairings must conform to the “constraints” defined by the subject and object selection rules. In some sense, then, these rules define a set of possible verbs.

Dowty argues that his subject and object selection rules have broad applicability by showing that they can handle many widely discussed examples, such as *fear/frighten* verb pairs, the locative alternation, and several other less familiar instances of variable argument realization, including those characteristic of verbs of surface contact and motion such as *hit* and *kick* and so-called “partially symmetric interactive” predicates such as *hug* and *kiss* (e.g., Gleitman 1965; Gleitman et al. 1996; Lakoff and Peters 1969). To illustrate how Dowty’s approach confronts some of the challenges of subject and object selection, we review its application to psych-verbs and partially symmetric interactive predicates.

As discussed in section 1.2, psych-verbs fall into two classes: the experiencer-subject *fear* verbs and the experiencer-object *frighten* verbs. Dowty (1991: 579–80, 586–87) points out that verbs of both types have an Agent Proto-role entailment associated with both their stimulus and their experiencer arguments: the sentience entailment for the experiencer and the causation entailment for the stimulus. Since no other proto-role entailments distinguish between the arguments of these verbs (on their stative use), the subject and object selection rules do not unambiguously determine which argument is subject and which object. Either a pairing of the experiencer with subject and stimulus with object or a pairing of stimulus with subject and experiencer with object is compatible with these rules, so that the appropriate pairing is determined verb-by-verb or, possibly, language-by-language. Dowty’s approach explains why just this class of verbs allows different choices as to how particular verbs lexicalize the projection of their arguments. A further property of psych-verbs is at least compatible with, if not explained by, Dowty’s approach: most *frighten* verbs systematically show an additional, nonstative change-of-state reading (e.g., *The loud noise frightened me*), as well as the previously discussed stative meaning (e.g., *Ghosts frighten me*); this reading is found with the comparable class of psych-verbs in other languages, an observation Dowty attributes to Croft (1986) (see also Croft [1993]). But when the experiencer is entailed to undergo a change of state, it is associated with a Patient Proto-role entailment, creating an asymmetry between the experiencer and stimulus, which forces the experiencer to be selected as object. (The *fear* verbs are consistently stative and never show this ambiguity.) As Dowty himself points out, the *frighten* verbs

(on their stative use) also show a well-known range of peculiar syntactic properties (e.g., Giorgi 1983–84; Pesetsky 1987, 1995; Postal 1971). These properties are often given a syntactic explanation which builds on the assumption that the subject of these verbs is syntactically derived. Since Dowty assumes a monostratal syntactic analysis, he suggests that perhaps these unusual semantic properties can be attributed to another unusual property of these verbs: their object has the Agent Proto-role entailment of sentience (1991: 580–81, n. 23).

Dowty also uses his subject selection rule to explain certain complex facts involving partially symmetric interactive predicates (1991: 583–86). Such predicates show two patterns of argument realization in English and many other languages: they may have a subject in the form of a conjoined or a collective NP or they may have both a subject and an object (or sometimes a prepositional complement typically headed by *with*). For certain predicates, like *debate* and *play chess*, the alternate argument realizations are truth-conditionally equivalent (e.g., *Smith and Jones debated*; *Smith debated Jones*). For others, this need not be so: *Kim hugged Sandy* is not truth-conditionally equivalent to *Kim and Sandy hugged*, since in the second, but not the first, Sandy must be “agentively” involved in the action of hugging. For the same reason, *The drunk embraced the lamppost* is acceptable, but **The drunk and the lamppost embraced*, an example Dowty (1991: 583) attributes to Chomsky, is not. However, the difference between the two argument realization options cannot always be characterized in terms of the traditional notion of agency. An asymmetry in truth conditions also surfaces with the verb *collide*: *Pat and Terry collided* entails that both Pat and Terry were in motion, but *Pat collided with Terry* entails only that Pat was in motion (though it is compatible with Terry also being in motion). Here the difference involves motion with respect to another participant – another of Dowty’s Agent Proto-role entailments. Presumably, the same entailment explains why *The truck and the lamppost collided* is odd, except as a description of a scene where a lamppost came loose and rolled down a hill, crossing the path of a moving truck.

A single generalization covers the *hug* and *collide* examples: when the alternate argument realizations differ in entailments, there is always an Agent Proto-role entailment which the denotation of the object (or the prepositional object) can lack, but which must hold for all subject denotations in the conjoined NP version. Whether or not there can be a difference in entailments seems to depend on the kind of activity denoted by the verb itself, but if the meaning of the verb does not force both arguments in the two-argument option to have exactly the same set of entailments, then the argument with more Agent Proto-role entailments is the subject and the other is a nonsubject. What is important is that the generalization which covers both options does not make reference to agency per se, but to the entailments constituting the Agent Proto-role, which, when distributed differentially over the arguments of a predicate, determine the realization of one argument as subject. It is precisely this kind of generalization which Dowty’s theory is designed to handle.

Although Dowty is primarily interested in transitive verbs, he briefly addresses how his approach could be applied to intransitive verbs as part of a discussion of unaccusativity (1991: 605–13). He suggests that subject selection for one-argument intransitive verbs is trivial: every one-argument verb would simply have a subject. Unaccusative verbs would then be distinguished from unergative verbs without recourse to distinct syntactic analyses: unergative verbs have an argument with predominantly Agent Proto-role entailments, while unaccusative verbs have an argument with predominantly Patient Proto-role entailments. The morphosyntactic repercussions associated with the unaccusative/unergative distinction would be a result of some of the Agent and Patient Proto-role entailments being grammaticalized in some languages.³

Baker (1997) takes advantage of the basic properties of proto-roles in order to handle variation in subject choice with a given verb. As we discuss more extensively in section 6.2, often an argument bearing a particular semantic role may be chosen as a subject only in the absence of an argument bearing some other role; for instance, an instrument is never the subject in the presence of an agent, as Fillmore (1968: 33) notes, nor is a recipient ever the subject in the presence of an agent. Baker (1997: 11) suggests that such patterns arise due to variability in the proto-role associated with a given argument. In the presence of an agent, a recipient will not be analyzed as having the Agent Proto-role, but in the absence of an agent it can be. According to Baker, “the prototype theory says that certain participants in an event are less prone to being seen as agents than others are, but the one seen as an agent is always the subject” (1997: 110); such an approach would be impossible with traditional semantic roles.

Schlesinger (1995) presents another approach to using prototype notions in the definition of semantic roles, building on his previous work (1979, 1989, 1992). He deals with a wider range of semantic relations of arguments to verbs than Dowty does, and only gives prototype characterizations to some of them; again, one of his motivations is the ability to express argument realization generalizations concisely. Specifically, he introduces what he calls the A-CASE, which subsumes agents, as well as certain instruments, and, in contradistinction to Dowty’s Agent Proto-role, certain patients.⁴ The subsumption of patients under the A-case reflects its association with subject position, and Schlesinger’s desire to subsume under it the subjects of the following examples, which would be characterized variously as agents, as in (3), patients, as in (4), and instruments, as in (5). (Since Dowty’s concern is subject selection for transitive verbs this issue does not arise, and his discussion of unaccusativity suggests that he still characterizes the subjects of verbs such as those in (4) as having Patient Proto-role entailments.)

- (3) a. The little boy threw the ball.
- b. They pushed the chair to the table.
- c. The girl drank her coffee.

(Schlesinger 1995: 31, (5))

3.1 Generalized semantic roles

- (4) a. The butter melted in the sun.
- b. My little dog remained indoors all day long.
- c. The guard is standing near the entrance. (Schlesinger 1995: 31, (6))
- (5) The knife cut the cake. (Schlesinger 1995: 92, (1))

Arguments bearing the A-case are associated with one or more of the following three features: CAUSE, CONTROL, and CHANGE. These features are reminiscent of entailments in Dowty’s Agent Proto-role list. As Schlesinger (1995: 32) writes, “Dowty’s properties ‘causing,’ ‘volitional,’ and ‘movement’ seem to correspond roughly to CAUSE, CONTROL, and CHANGE, respectively.” However, the relationship between Dowty’s notion of movement and Schlesinger’s CHANGE needs some clarification. For Dowty, movement with respect to another participant is an Agent Proto-role property only in the absence of a cause (1991: 574); otherwise, undergoing a change of state is a Patient Proto-role entailment. Schlesinger, in contrast, does not impose such a restriction since CHANGE is included as an A-case feature in order to allow for patients bearing the A-case. Interestingly, Schlesinger does not propose a counterpart to Dowty’s Patient Proto-role; he feels no single semantic characterization of object selection is possible, and though he does not mention this, most likely the statement of a unified object selection rule is rendered even more difficult because some patients need to come under his subject selection rule, rather than an object selection rule.

For 11/18, week 9

3.1.1.2 Extensions and limitations

Dowty’s proto-role approach has proven widely attractive and has been adopted by many researchers (e.g., Aissen 1999; Alsina 1996; Aranovich 2000; Asudeh 2001; Filip 1996; Joshi 1993; Singh 1992; Zaenen 1993), including some who have refined and extended it (Ackerman and Moore 1999, 2001; Blume 1998; Davis 2001; Davis and Koenig 2000; Primus 1999). In joint work, Dowty even extends the proto-role approach to nominals (Barker and Dowty 1993). However, Dowty’s (1991) paper itself is rather modest in scope. It does not integrate the proto-role approach into a larger theory of grammar, and so hardly deals with any issues relating to syntax. It provides an analysis of basic verbs, but not those that are the output of morphosyntactic rules which change valence, voice, or grammatical relations. Moreover, it is mainly motivated by English data and so does not deal with argument realization in languages with richer morphosyntax, which raise additional questions about argument realization (see section 1.6). It does not even present a specific theory of lexical semantic representation, and Dowty stresses that his approach is compatible with many other approaches (1991: 553); he merely shows how certain aspects of meaning – which can be represented in a variety of ways – are input to argument selection. We now present ways in which Dowty’s theory has been extended to widen its scope and discuss some of its most serious limitations – limitations which often reflect its very nature. For further discussion see Croft

(1998: 36–38), Davis (2001: 61–73), Davis and Koenig (2000: 74–76), Koenig and Davis (2001: 80–84), Newmeyer (2002: 67–71), Primus (1999: 33–47), Tenny (1992: 21–22, 1994: 101–05), and Van Valin (1999: 386–88).

A major limitation is that Dowty's formulation of the proto-role approach presupposes a partial solution to the argument realization problem. The subject and object selection rules apply to verbs that are known to be transitive; they simply determine which argument is the subject and which the object, as also noted by Davis (2001: 64), Davis and Koenig (2000: 74), and Primus (1999: 47). Yet, this assumption is significant. As reviewed in section 1.5, crosslinguistically, verbs that fit the agent-act-on-patient mold – verbs whose arguments meet most, if not all, of the Agent Proto-role and Patient Proto-role entailments – are necessarily transitive, while there is substantial crosslinguistic variation in the transitivity of verbs that do not fit this mold. Furthermore, Dowty does not extend his system beyond transitives to two-argument intransitives. Yet, as Davis (2001: 65–66) and Davis and Koenig (2000: 74–75) point out, among two-argument intransitive verbs, the argument with the most Agent Proto-role entailments is realized as the subject and the other argument is realized as an oblique (e.g., *The magician relies on sleight of hand*) and not vice versa (e.g., **Sleight of hand relies on/by/of/with the magician*; Davis 2001: 66, (54a); Davis and Koenig 2000: 74, (23a)). If Dowty's approach is intended to include constraints on possible lexicalizations, it should be able to account for these generalizations. In fact, as Davis and Koenig (2000: 75) have pointed out, the very same semantic notions which figure in Dowty's theory of argument selection for transitive verbs are implicated with two-argument intransitive verbs. Dowty also does not provide an account of object selection for verbs showing the dative alternation, although, as discussed below, Primus (1999) introduces a Recipient Proto-role to deal with such verbs.⁵

A different sort of problem arises because all the entailments entering into each proto-role carry equal weight, yet, as Dowty himself acknowledges, this assumption is not uncontroversial. As he points out, "causation has priority over movement for distinguishing agents from patients" since movement is an Agent Proto-role entailment only when it is not caused by another participant, as in *The cloud passed the tree* as opposed to *John threw the ball* (1991: 574). Schlesinger makes a similar point, noting that "CAUSE has more weight than CHANGE when these two features compete" (1995: 47). Regarding the more general issue, Schlesinger explicitly proposes that "assignment to the A-case is determined by three factors: (i) the relative strength of the features; (ii) their number; and (iii) their differential weights" (1995: 45), while Dowty writes "I also would not rule out the desirability of 'weighting' some entailments more than others for purposes of argument selection" (1991: 574), though he does not pursue this issue. Ackerman and Moore (2001: 51), Davis (2001: 66–72), and Davis and Koenig (2000: 75–76) point out the primacy of the cause entailment. When an agentive verb is causativized in languages which allow productive morphological causativization, the new cause argument invariably becomes

3.1 Generalized semantic roles

→ causative word causes obj.
the subject of the derived causative predicate, regardless of the number of Agent Proto-role entailments carried by the subject argument of the base verb. For example, the introduced cause is the subject, even if the base verb requires that its subject – the causee – be sentient, as in *The frosty weather made her cough* or, even sentient and volitional, as in *The cold weather made her run faster*. Generalizing, Koenig and Davis (2001: 82–83) suggest a ranking of certain Proto-Agent entailments with respect to subject selection:

for all verbs that denote causal events, the only proto-agent entailment that we need to consider is whether the participant causally affects another participant in the event ... Similarly, among non-causative verbs, sentience is sufficient to ensure mapping to subject ... Volitional involvement in the event is also sufficient to ensure mapping to subject position in non-causative verbs. Finally, for all verbs for which being in motion counts as a proto-agent entailment, the NP denoting the moving object is mapped onto subject position.

Researchers have also reexamined the relative importance of the Patient Proto-role entailments to argument realization. For example, Jackendoff (1996b: 314–15) argues that the incremental theme Patient Proto-role entailment – an entailment intended to pick out arguments with a special role in determining the time course of an event – does not have a part to play. We defer a full discussion of the success of this notion until the larger discussion of aspectual determinants of argument realization in section 4.2.

The question of the relative priority of various semantic features in subject and object selection has been raised previously by Tsunoda (1985) in a critique of Hopper and Thompson's (1980) prototype approach to transitivity. He points out that the semantic components of transitivity they propose do not all count equally, with "affectedness" of the object being crucial, while "volitionality" of the subject apparently being irrelevant. Tsunoda's discussion, taken together with the discussion of Dowty's proto-role entailments, suggests that the factors contributing to argument realization in transitive verbs may well be ranked. This possibility is perhaps not surprising since the components of prototype concepts have been shown to be differentially ranked; see Murphy (2002) for recent discussion and references. If the semantic ingredients entering into subject and object selection are indeed ranked, then another question arises: what is the source of the ranking? The most obvious answer is that there may be more organization to a lexical semantic representation than the prototype approach allows for. This additional organization is assumed by most researchers to be grounded at least partially in a theory of event types.

Finally, Dowty's approach suggests that all the semantic determinants of argument realization derive from the lexical entailments which verbs impose on their arguments and that only these entailments enter into assignment of grammatical relations to argument. However, the picture is more complicated. First, there are semantic properties relevant to argument realization which derive

from sources other than the lexical entailments of verbs. Second, some semantic properties may affect the morphosyntactic realization of a grammatical relation, rather than the choice of grammatical relation. We discuss these complications in turn.

Some of Dowty's proto-role entailments may have their source not in the lexical entailments that a verb imposes on a particular argument, but in the choice of "filler" for that argument. Consider, for example, the dative verb *send*. This verb selects three arguments: the sender, the thing sent, and the goal of transfer. The goal need not be animate, as illustrated in *The factory sent the goods to the warehouse*. However, the goal can be realized as the first object in a double object construction only if animate, as in *The factory sent the contractor the goods*, or, at least, interpretable as a potential possessor, as in *The factory sent London the goods*, where *London* is understood metonymically as 'the people in the London office.' Thus, even though *send* does not lexically entail an animate goal, it appears that the animacy of the goal, which is determined by the filler of this semantic role, influences its morphosyntactic realization. It is, of course, possible to argue that there are two verbs *send*, each associated with a distinct realization of arguments and each imposing a distinct set of entailments on the goal. This polysemy view of the dative alternation is widespread (see chapter 7), and, indeed, Ackerman and Moore (2001) develop a theory of argument realization in which all such alternations are taken to reflect differences in lexical entailments. However, the question of whether dative verbs are monosemous or polysemous is far from settled (see B. Levin and Rappaport Hovav [2002] for arguments against the polysemy approach). It is at least worth investigating whether some semantic determinants of argument realization are derived from the properties of the fillers of argument positions and not only from lexical entailments of predicates. This position, argued for in Evans (1997), connects to the second issue raised above. Ackerman and Moore (2001) argue that the proto-role entailments associated with a particular argument can influence not only its grammatical relation, but also the morphosyntactic expression of this grammatical relation. They support this claim by pointing to languages in which proto-role entailments determine the assignment of an oblique case to an argument which is clearly a syntactic object. Evans (1997), in turn, points out that the properties of an NP bearing a particular semantic role – particularly, its animacy – influence the morphosyntactic encoding of the associated grammatical relation, rather than the choice of this grammatical relation.

Just as the inventory of semantic roles and the definitions of particular roles have been a matter of debate, so have the characterizations of Dowty's Agent and Patient Proto-roles. There have been attempts both to refine and to enlarge the sets of Agent and Patient Proto-role entailments. The most controversial of the Patient Proto-role entailments is the previously mentioned incremental theme entailment. Due to its limitations as a predictor of argument realization, Ackerman and Moore (2001: 97) propose an additional "bounding entity"

Patient Proto-role entailment (called "telic entity" in Ackerman and Moore [1999]), which is also aspectually based, but which identifies a somewhat different set of arguments. Turning now to the Agent Proto-role entailments, Primus (1999: 36–37) sees many of them as being entailments of what she calls a "control" relation, which is a reformulation of Dowty's volitionality entailment; see also Davis and Koenig (2000: 73). Davis and Koenig (2000: 72) propose an entailment "has a notion or perception of other participant(s) in event"; this entailment, which is inspired by the work of Wechsler (1995: 35–40), apparently replaces Dowty's sentience entailment. They also propose an additional Agent Proto-role entailment "possesses an entity" (2000: 72). The notion of possession plays a part in Primus' (1999: 54–55) suggestion that an additional, Recipient Proto-role is necessary to deal with object selection with dative verbs. This proto-role, which would be associated with recipient, addressee, and benefactive arguments, shares certain entailments with the Agent Proto-role and others with the Patient Proto-role. Attempts to reformulate, refine, and expand the list of proto-roles are not unexpected given that Dowty leaves open the source of the particular lexical entailments which are relevant for the assignment of the proto-roles and does not explain why just these entailments matter for argument realization. Dowty (1991: 601–04) does propose that these notions might have cognitive roots, figuring in a theory of the ontology of events, and has begun to explore this idea in subsequent research (Dowty 1998). In the absence of such a theory there is room for debate, just as there is in semantic role approaches in general.

As pointed out by Tenny (1994: 103), as Dowty's theory stands, it is an accident that the sets of Agent and Patient Proto-role entailments are what they are. For instance, why couldn't the incremental theme entailment have been associated with the Agent Proto-role and the volitional involvement entailment with the Patient Proto-role? Furthermore, as many, including Koenig and Davis (2001: 83), Croft (1998: 37), Primus (1999: 52–53), and even Dowty himself (1991: 574), note, some Agent Proto-role and Patient Proto-role properties are paired, such as the Agent Proto-role entailment "causing an event or change of state in another participant" and the Patient Proto-role entailment "undergoes change of state." These paired entailments identify participants in a semantic relation, so that one participant in the relation cannot exist without the second. Yet, there is nothing that would predict such cooccurrences, let alone enforce their consequences. That is, there could, in principle, be an argument that causes a change of state without there being one that undergoes a change of state, contrary to fact. As Primus (1999: 52) notes, these pairings shed light on the convergence of certain sets of entailments as Agent or Patient Proto-role entailments. She writes, "Proto-Agents and Proto-Patients are ... distinguished ... only by their dependency relative to each other" (1999: 52) and argues that in each instance of paired entailments the Patient Proto-role entailment is dependent on the Agent Proto-role entailment it is paired with. The clustering of entailments as

why?

*relative
entity*

Agent or Patient Proto-role entailments, then, to a large extent reflects a larger generalization.

Many of the proto-role entailments pick up on notions that figure in two major perspectives on event conceptualization reviewed in the next chapter. Some approaches to lexical semantic representations are based on “causal chain” representations of events, an approach reflected in the entailments involving causation, volition, and affectedness (see section 4.3). Others are based on temporal representations, as reflected in the incremental theme entailment. Tenny (1992: 21–22), for instance, proposes that the clusters of proto-role entailments follow from her Aspectual Interface Hypothesis, which builds on an aspectual model of event conceptualization. She argues that the Patient Proto-role entailments can be reduced to her aspectual notion of measure (see section 4.2.1). The fact that the Agent and Patient Proto-roles include entailments relevant to both causal and aspectual approaches may explain why the proto-role approach has the wide coverage that makes it so attractive.

In closing this section, we point out an important property of Dowty’s proto-roles which distinguishes them both from traditional semantic roles and from other types of generalized semantic roles. As Davis (2001: 66), Davis and Koenig (2000: 74), and Van Valin (1999: 386–87) point out, Dowty’s proto-roles are not “reified”; that is, they are not present in the grammatical representation of a sentence, nor does any grammatical process refer to them. As in most current theories of semantic roles, proto-roles figure only in the mapping from lexical semantics to syntax, and, furthermore, are considered to be composite notions, derived from more primitive properties or entailments. However, Dowty breaks with tradition in assuming that the entailments a verb imposes on an argument enter directly into a counting algorithm used to determine whether that argument may be realized as subject or object; he does not assign semantic roles to arguments as an intermediate stage in the mapping. In contrast, on the traditional view the entailments a verb imposes on an argument are used to determine that argument’s semantic role, and then mapping rules determine its realization on the basis of this role.

As mentioned, Dowty (1991: 601–04) takes the proto-roles to instantiate important conceptual categories, prominent in cognitive development, but lacking an explicit role in the grammar. Therefore, the components of proto-roles differ in nature from the components of grammatical categories. Although the prototype approach shares with the feature decomposition approach the idea that semantic roles are not atomic, but can be decomposed into more basic components, it differs crucially from the feature decomposition approach both in assuming that the components are not jointly necessary and sufficient and in not taking these components themselves to be binary and discrete, dividing the world into classes with clear boundaries. An argument is either a subject or not a subject, but it is an agent to a greater or lesser degree. As Dowty (1991: 575) points out, binary features defining discrete classes have their place in the coding systems of phonology, morphology, and syntax, but not in the system

not reified

no explicit gr. role

relevant to our capacity to categorize happenings in the world as events. In this respect, Dowty’s approach to generalized semantic roles differs from a second one, which we now turn to.

3.1.2 Role and Reference Grammar’s macroroles

A second conception of generalized semantic roles is used in Role and Reference Grammar (RRG; Van Valin 1990, 1993b; Foley and Van Valin 1984; Van Valin and LaPolla 1997), where they are referred to as MACRO-ROLES. Van Valin and LaPolla describe macroroles as groupings of arguments which are treated alike in the grammar: “generalizations across argument-types found with particular verbs which have significant grammatical consequences” (1997: 140). Macroroles figure prominently in subject and object selection, and, therefore, it is not surprising that, just as Dowty posits two proto-roles for this purpose, RRG posits two macroroles, known as ACTOR and UNDERGOER. Though RRG’s macroroles share many of the properties of proto-roles, nonetheless, they have a somewhat different place in the grammar, as Van Valin (1990, 1999, *in press*) points out.

RRG takes macroroles to be semantic neutralizations of finer-grained semantic roles. If individual verbs are associated with verb-specific semantic roles, such as giver, runner, shiner, breaker, and singer, then most of the familiar semantic roles such as agent, experiencer, recipient, patient, and theme, can be seen as medium-grained roles that generalize across some of these verb-specific semantic roles. For instance, agent generalizes across roles such as runner, giver, and singer. The macroroles Actor and Undergoer are generalizations across sets of medium-grained semantic roles whose prototypes are agent and patient, respectively. Roles such as agent, experiencer, instrument, recipient, source, and force are subsumed under the Actor macrorole, while patient, theme, stimulus, recipient, and location are subsumed under the Undergoer macrorole. This lumping is evident in the range of semantic roles that can be associated with the subject – the typical expression of the Actor – and the direct object – the typical expression of the Undergoer. Thus, instead of choosing the subject and direct object of a sentence by applying an algorithm directly to semantic roles such as agent, experiencer, or patient, RRG postulates an intermediate level of semantic role assignment – the assignment of macroroles.

RRG’s macroroles differ from Dowty’s proto-roles not so much with respect to their semantic conception, but rather with respect to the part they play in the grammar. Although RRG takes macroroles to be semantic rather than syntactic notions, many rules of grammar refer to them. In many ways, Actor and Undergoer, respectively, correspond to the traditional notions of underlying subject and object used in multistratal syntactic theories, such as the Principles and Parameters framework and Relational Grammar. In fact, Van Valin (1993b: 43–44) justifies the use of macroroles in the same way that traditional transformational grammar justifies positing underlying grammatical relations.

Thus, since the same range of argument types can be the object of a transitive verb and the subject of the corresponding passive verb, they ought to be associated with a single category in order to avoid reference to the same disjunction of semantic roles in more than one place in the grammar. Transformational grammar avoids this by assigning the semantic role types to the category of underlying direct object; however, since RRG is monostratal, it must achieve this in another way, making crucial use of the notion “macrorole.” RRG associates the relevant set of argument types with the generalized semantic role Undergoer, which is then mapped onto the relevant morphosyntactic expression: in English, the direct object of an active verb and the subject of a passive verb. However, while in the Principles and Parameters framework and Relational Grammar the notion of underlying direct object is syntactic, the RRG notion of Undergoer is considered semantic.

In contrast to Dowty’s proto-roles which are not “reified” (Davis and Koenig 2000: 74), RRG’s macroroles are actually assigned to a verb’s arguments, allowing rules of grammar to refer to them. For the purposes of assigning macroroles to the arguments of a verb, the semantic roles available to arguments are arranged along a hierarchy, with the most agentive roles at one end of the hierarchy and the most patient-like roles at the other. In early work in RRG, this hierarchy consisted of explicit semantic roles, taking the form in (6).

- (6) Agent > Effector > Experiencer > Location > Theme > Patient
 (Van Valin 1990: 226)

In more recent work (Van Valin in press; Van Valin and LaPolla 1997: 126–27) the semantic roles themselves are redefined as positions in predicate decomposition substructures (see section 3.2) and the hierarchy itself is redefined in terms of such substructures.

- (7) Revised hierarchy:
 Arg of > 1st arg of > 1st arg of > 2nd arg of > Arg of state
 DO **do'(x,...)** **pred'(x, y)** **pred'(x, y)** **pred'(x)**

In general, a two-argument verb in the active voice has two macroroles, with the Actor macrorole being assigned to the argument with the semantic role highest on the hierarchy, and the Undergoer macrorole being assigned to the argument with the semantic role lowest on the hierarchy. The placement of agent and patient at opposite ends of the hierarchy in (6) captures the fact that an agent is the unmarked choice for Actor, while a patient is the unmarked choice for Undergoer. Van Valin and LaPolla (1997: 150–54) discuss in some detail how the number of macroroles associated with a given verb is determined. Typically, a two-argument verb will have two macroroles, as mentioned above, and a one-argument verb will have one, though some systematic deviations from this assumption are recognized. RRG, then, has an explicit algorithm

for determining transitivity, and does not presuppose that certain argument realization rules apply to verbs that are known to be transitive, as Dowty’s approach does (see section 3.1.1), though it still lacks explanations for the systematic exceptions to macrorole assignment.⁶

Unlike Dowty (1991), Van Valin and LaPolla (1997) do not characterize the arguments filling positions in their lexical semantic representations and, hence, bearing specific semantic roles, in terms of lexical entailments. However, their algorithm for assigning Actor and Undergoer to a verb’s arguments can be rather straightforwardly shown to pick out the arguments bearing the most Agent and Patient Proto-role entailments, respectively. As Dowty (1991: 578) notes in discussing a traditional thematic hierarchy, such as (6), the most highly ranked semantic roles have the most Agent Proto-role entailments, while the lowest-ranked roles have the most Patient Proto-role entailments. Specifically, all arguments in the hierarchy from experiencer up have some Agent Proto-role entailments, with the two most salient entailments being causation and sentience. The arguments below experiencer lack both these entailments. The patient has the most Patient Proto-role entailments, the most salient being causally affected and undergoing a change. (It also often has the incremental theme entailment.) In fact, Dowty (1991: 578) views the thematic hierarchy as an artifact of his proto-role approach precisely because of this distribution of entailments. Although Van Valin and LaPolla (1997) formulate the macrorole assignment algorithm in terms of positions in predicate decompositions, the positions in the decompositions reduce to the very same properties encoded in Dowty’s proto-role entailments. The generalizations governing subject choice formulated by Koenig and Davis (2001: 82–83), which were mentioned in the previous section, can be recast in terms of positions in the revised RRG thematic hierarchy in (7). For example, the argument of *do* and the first argument of *do'* tend to be volitionally involved in the event or to be causes, while the first argument of *pred'(x,y)* tends to be sentient. Since the arguments of *do* and *do'* are the highest on the hierarchy, this captures the generalization that causation is the ultimate determinant of subject choice, with something akin to sentience determining choice of subject when causation does not enter into the picture.

RRG’s macroroles, being reified, have a different status than Dowty’s proto-roles. Van Valin and LaPolla integrate their theory of macroroles into a fully articulated theory of sentence structure and, concomitantly, show how the macroroles figure in a wide range of linguistic phenomena. They argue, for example, that in some languages, the relation between an anaphor and its antecedent should be formulated with reference to macroroles (1997: 279), that applicative constructions involve an alternate choice of Undergoer (1997: 337), and that many rules of case assignment make reference to the notions of Actor and Undergoer (1997: 352–76). Van Valin criticizes Dowty’s proto-role approach for the status it assigns proto-roles: they are “simply generalizations about subject- and object-selection properties of verbs” (1999: 386) and are not

notions that grammatical rules can make reference to. Therefore, the association of such a category with a given syntactic constituent can be indeterminate, following from the fuzzy nature of the category. In RRG, in contrast, this is not possible, as a macrorole must either be or not be associated with a constituent. As Van Valin himself points out, RRG differs from most other theories in this respect, since most other theories restrict the use of semantic roles to the mapping between lexical semantics and syntax, as an expression of autonomy of syntax, a notion which RRG explicitly rejects.

Macroroles are used to provide an interface between semantic notions and grammatical notions, though their status as syntactic or semantic entities needs further clarification. Van Valin and LaPolla (1997; Van Valin 2002) take the locative alternation and certain other well-known argument alternations to be semantic in nature. In RRG, most alternations are taken to arise from alternate choices of arguments as Undergoer, rather than, say, alternate assignments of grammatical relations to arguments. This position receives support from Dowty's recent work (2000, 2001), which draws attention to the semantic motivation behind the alternate argument realization options available to a single verb. Ironically, although RRG stresses the semantic nature of argument alternations, the same predicate decomposition underlies the alternate argument realization options of individual verbs (1997: 141). So locative alternation verbs have a single lexical semantic representation, and the different argument realizations reflect alternate choices of arguments in this representation as Undergoer (1997: 145). That is, the semantic content of each argument of an alternating verb remains constant since it is actually determined by its place in the predicate decomposition that constitutes the lexical semantic representation of the alternating verb (1997: 141).

In sum, RRG's macroroles are similar to Dowty's proto-roles in that both are derived notions with no invariant semantic entailments associated with them. What emerges as a consensus is that the individual semantic components associated with arguments are the ultimate determinants of argument realization. Dowty and Van Valin disagree as to whether or not there are composite categories such as Actor or Agent Proto-role and Undergoer or Patient Proto-role which, as categories, play a role either in the mapping to syntax or in other grammatical phenomena. The choice between these options depends on many assumptions in the larger approach to grammar.

3.2 Predicate decompositions and event structures

Some lexical semanticists have explored yet another way to surmount the problems and limitations of semantic roles. As in generalized semantic role approaches, they take the semantic determinants of argument realization to derive from verb meanings, but instead of decomposing semantic roles, the meanings of verbs themselves are decomposed into more basic elements, as assumed, for instance, in RRG. Such representations usually take the form of a

PREDICATE DECOMPOSITION – a representation of meaning formulated in terms of one or more primitive predicates chosen to represent components of meaning that recur across significant sets of verbs. For example, a primitive predicate CAUSE is often posited as the element common to the predicate decompositions of all lexically causative verbs, including transitive *break*, *open*, and *dry*.

The predicate decomposition approach is most extensively elaborated in the work of Jackendoff (1976, 1983, 1990b) and more recently in Role and Reference Grammar (Van Valin and LaPolla 1997) and in the work of Croft (1990, 1991, 1993, 1994, 1998); it is also discussed in Foley and Van Valin (1984), Rappaport and B. Levin (1988), Rappaport, B. Levin, and Laughren (1988), Rappaport Hovav and B. Levin (1998a), and Wunderlich (1997a, 1997b, 2000), among others. The idea that verb meanings can be decomposed into basic components is pursued by researchers working in various contexts. Generative semanticists (Lakoff 1968, 1970; McCawley 1968, 1971; Ross 1972) explicitly introduce primitive predicates into semantico-syntactic structures in order to capture various entailment relations, including relations between sets of sentences containing morphologically – and, thus, semantically – related words. For example, the facts that transitive/intransitive pairs such as *Marshall cooled the soup* and *The soup cooled* share the entailment ‘The soup was cool’ and that the same selectional restrictions hold for the object of the transitive verb and the subject of the intransitive verb are accounted for by positing a shared component of meaning, something like ‘BE COOL.’ This goal is adopted by others who propose predicate decompositions, among them Dowty (1979) and Jackendoff (1976). Another line of research, represented again by Dowty (1979) and also by Parsons (1990) and von Stechow (1995, 1996), exploits the primitive predicates of the generative semanticists, introducing them into the logical structure of sentences to account for interactions between event types and various tense operators and temporal adverbials. As we discuss in sections 4.2.2 and 5.1, more recently the elements of predicate decompositions have made their way back into syntactic structures, through the use of multiple so-called “VP-shells” (Larson 1988) – VPs whose heads correspond to the primitive predicates of lexical decompositions (Arad 1998, 1999, 2002; Hale and Keyser 1992, 1993, 1997a, 1997b, 1998, 2002; Erteschik-Shir and Rapoport 1996, 2004; Harley and Noyer 2000; Marantz 1997).

In most predicate decompositions, the primitive predicates are argument-taking functions, so that a verb's arguments are represented by the open argument positions associated with the predicates. This move allows semantic roles to be defined with respect to the argument positions of particular primitive predicates, making them explicitly derived notions, following a suggestion by Jackendoff (1972: 39). For example, assuming that the predicate CAUSE takes two arguments, an entity and an event brought about by that entity, the agent role is commonly defined as the first argument of this predicate (Jackendoff 1972: 39). Furthermore, rules of argument realization can be formulated in terms of the geometry of the predicate decomposition; that is, they might refer

to the notion “first argument position of the predicate CAUSE” or even “first argument position of the predicate” rather than the semantic role “agent.” As we discuss in chapters 5 and 6, there may be real advantages to formulating these rules in this way.

The number of commonly posited semantic roles is typically greater than the number of argument positions available in the most often postulated predicate decompositions. This discrepancy has two sources. First, certain semantic roles are actually associated with “adjuncts” and, thus, cannot be defined with respect to predicate decompositions, which are designed to be representations of verb meanings. Second, the argument positions in a predicate decomposition may actually correspond to semantic notions that are coarser in grain-size than the average semantic role. Although, as just mentioned, the notion “agent” is often defined in terms of the first argument position of CAUSE, this characterization may be too narrow. Only some verbs taking agent arguments are causative, and, conversely, the first argument of verbs whose decomposition is taken to include CAUSE need not be an agent in the narrow sense, but corresponds to a broader notion that encompasses not only agent, but also various types of causes and even certain instruments. Thus, this argument position of CAUSE is more like the “immediate cause” mentioned in section 2.2.1 or Van Valin and D. Wilkins’ “effector”, which they define as “the dynamic participant doing something in an event” (1996: 289). Certain more familiar, finer-grained roles can still be defined by referring to this position in combination with properties of its filler; for example, the agent role would be associated with this position when its filler is animate, sentient, and volitional. Assuming, then, that transitive *burn* is associated with a decomposition containing the predicate CAUSE, the agency of the subject in *Martha deliberately burned the chicken* would arise not from the decomposition representing the verb’s own meaning, but from the nature of the NP which fills the first argument position of the predicate CAUSE. For other appropriately defined choices of filler, the same position would be the source of a cause or instrument role, as in *The intense heat burned the chicken* or *The malfunctioning oven burned the chicken*, respectively (Baker 1997: 109–10; Van Valin and D. Wilkins 1996). Other familiar semantic roles, such as experiencer or perceiver (Van Valin and LaPolla 1997), are labels for certain positions in predicate decompositions that share some other property – perhaps derived from some more narrowly defined facet of the meaning of verbs.

Since verbs individuate and name events (see section 1.4), theories of predicate decomposition are often taken to be theories of the basic event types. That is, such theories posit a limited inventory of linguistically relevant event types, which are available to speakers for describing happenings in the world. Two basic questions arise. First, what are the possible internal structures of EVENT STRUCTURES, as the representations developed in these theories are commonly called? Second, what semantic properties of events organize event types into grammatically relevant subclasses? These two questions are, in principle,

independent. Two theories could agree on the structure of the lexical semantic representation, but disagree on the semantic properties defining the grammatically relevant event types, or, alternatively, they could agree on the event types, but not on the structure of the representation. Therefore, we consider these questions independently. We devote the remainder of this chapter to the first question. We provide an overview of those lexical semantic representations collectively called event structures, identifying the properties common to the various instantiations of these representations. The next chapter is devoted to the second question, which we address under the rubric of event conceptualization, because, as we discuss there, the most successful attempts to identify and delimit the grammatically relevant event types organize them around certain modes of conceptualizing happenings in the world as linguistic event types.

Early discussions of event structures focused on the primitive predicates that define the space of possible event structures, but event structure representations typically involve a second type of basic building block which represents the “idiosyncratic” element of a verb’s meaning. Its function is best demonstrated with an example. Verbs of change of state in their causative use have predicate decompositions consisting of predicates representing the notions of cause and change; however, these verbs differ with respect to the specified state. One way to express this is to allow the predicate representing the change to take an argument representing the state, which can then be associated with distinct individual states. Representations for three causative change-of-state verbs are given in (8); the state relevant to each verb is given in capital italics and placed within angle brackets.

- (8) a. *dry*: [[x ACT] CAUSE [y BECOME <*DRY*>]]
- b. *open*: [[x ACT] CAUSE [y BECOME <*OPEN*>]]
- c. *shorten*: [[x ACT] CAUSE [y BECOME <*SHORT*>]]

Individual verb meanings, then, are represented by primitive predicates together with an idiosyncratic element of meaning.

The idea that idiosyncratic information should be distinguished from the primitive predicates is now widely accepted, although it has been instantiated in somewhat different ways and the two components of meaning have been given various names. In earlier work we called the idiosyncratic element the “constant” since it is represented by a constant in a predicate decomposition (B. Levin and Rappaport Hovav 1995; Rappaport Hovav and B. Levin 1998a, 1998b; see also Hale and Keyser 1997b: 35); however, the accepted term is now “root,” following Pesetsky (1995). Therefore, we use this term in the remainder of the book.

A root’s most important property is its ontological type. There is a small set of these types, which include state, stuff, thing, place, manner, and instrument. Most roots have a single ontological type, though some may have more than one. As Rappaport Hovav and B. Levin (1998a) point out, a root’s ontological type largely determines its basic association with an event structure type. These

associations can be expressed using “canonical realization rules” (Rappaport Hovav and B. Levin 1998a), such as those in (9), which give rise to the event structures for *dry* in (10a) and *bottle* in (10b). In the event structure templates given to the right of the arrows in the canonical realization rules in (9), the ontological type of the associated root is indicated in angle brackets; it is filled by the actual root when these templates are instantiated for particular verbs, as in (10). (The representations in these examples are inspired by those in Rappaport Hovav and B. Levin [1998a], but other notations are possible.)

- (9) a. externally caused state →

$$[[x \text{ ACT}] \text{ CAUSE} [y \text{ BECOME } <\text{STATE}>]]$$
 - b. place →

$$[[x \text{ ACT}] \text{ CAUSE} [y \text{ BECOME IN } <\text{PLACE}>]]$$
- (10) a. *dry*: [[x ACT] CAUSE [y BECOME <DRY>]]
 b. *bottle*: [[x ACT] CAUSE [y BECOME IN <BOTTLE>]]

Roots may be integrated into event structures in two ways. A root may fill an argument position associated with a primitive predicate; such roots appear in the appropriate position in the event structure, as in (10a) or (10b). Alternatively, a root may serve as a modifier of a predicate (Rappaport Hovav and B. Levin 1998a, 1998b); a modifier root is noted as a subscript to this predicate in the event structure, as in (11).

- (11) *jog*: [x ACT_{<JOG>}]

What kind of verbs have modifier roots? As the example suggests, such roots might be appropriate for verbs of manner of motion, such as *walk*, *run*, *skip*, and *jog*, which differ in the manner in which the motion activity takes place. Since manners can be viewed as modifiers of activity predicates, a root of ontological type “manner” is represented as a modifier.⁷ In fact, many modifier roots are of ontological type “manner.”

Predicate decompositions are constructed so that verbs belonging to the same semantic class have decompositions with common substructures, with roots of the same ontological type filling the same position in these substructures. For example, manner of motion verbs all share the basic event structure template illustrated with *jog* in (11), consisting of the predicate ACT and a manner root. Broad semantic classes of verbs, then, are defined as those sharing a predicate decomposition. If the decompositions are chosen appropriately, the members of these classes will share syntactically salient properties, including those relevant for determining argument realization. The class of causative change-of-state verbs discussed above, for example, is a grammatically relevant semantic class since, as shown in numerous studies, these verbs share a range of grammatical properties (Fillmore 1970; Rappaport Hovav and B. Levin 1998a, 2002; see also sections 2.1 and 4.2.4). In this way, the substructures defined

over the primitive predicates and pairings of substructures with roots of particular ontological types are instances of what in previous chapters we have called the “grammatically relevant aspects of meaning.”

In much of the literature on event structure there is at least a tacit assumption that primitive predicates alone determine the grammatical behavior of predicates (Grimshaw 1993; K. P. Mohanan, T. Mohanan, and Wee 1999: 6–7; Pinker 1989: 166–67). However, it appears that this assumption is not correct. Consider, for example, the verbs *smear* and *splash*, mentioned in section 1.3. As reviewed there, Hale and Keyser (1993: 89, 1997b: 53–55, 1999: 60–63) point out that these two verbs presumably belong to the same broad class of verbs of causative change of location and, thus, should have the same predicate decomposition, yet only *splash* shows the causative alternation and *smear* does not.

- (12) a. We splashed mud on the wall.
 b. Mud splashed on the wall. (Hale and Keyser 1997: 53, (40))
- (13) a. We smeared mud on the wall.
 b. *Mud smeared on the wall. (Hale and Keyser 1997: 53, (41))

These verbs describe the placing of stuff on a surface, with individual verbs, differing in the manner in which the stuff is placed and in the resulting configuration of the stuff with respect to the surface (Dowty 1991; Pinker 1989). Hale and Keyser argue that the core meaning of *splash* imposes constraints on the nature of the stuff and the distribution of this stuff with respect to the surface; so its meaning only refers to the result state. In contrast, they argue that *smear* also describes something about the means or manner in which a certain type of stuff comes to be on the surface, and “that aspect of the event as a whole is attributed to the entity which carries out the action” (1997b: 54). Its meaning, then, further specifies the action of the agent leading up to the result state, and they attribute the infelicity of the causative alternation to a requirement that the agent’s activity, and hence the agent, be expressed. This analysis fits into the more general picture which B. Levin and Rappaport Hovav (1995) draw with respect to verbs describing externally caused changes of state or location, such as *break* and *slide* (see section 1.2). Verbs in this class typically show the causative alternation; however, as discussed in B. Levin and Rappaport Hovav (1995), Smith (1970), and van Voorst (1995), some class members do not alternate, including *murder*, *assassinate*, *dent*, and *pasteurize* in the change-of-state class and *remove*, *stow*, and *immerse* in the change-of-location class. Presumably, these nonalternating verbs have largely the same event structure as *dry* or *break*, and it is the nature of their root that prevents “detransitivization,” just as the nature of *smear*’s root prevents its detransitivization. This property may reflect a general requirement on the pairing of roots with event structures that the minimal elements of meaning encoded in the roots be given structural expression in the event structures (Rappaport and B. Levin 1988: 109). These examples represent just one instance of recent research which underscores the importance of studying the contribution of the root to the grammatical properties of verbs.

In what way are predicate decompositions superior to representations of verb meaning based on semantic roles?⁸ There is an implicit assumption that it is easier to delimit a small set of grammatically relevant primitive predicates than it is to delimit a small set of grammatically relevant semantic roles. Indeed, relatively small sets of overlapping primitive predicates recur in various proposed systems of predicate decomposition, and the number of predicates is smaller than the number of semantic roles suggested in the literature. We have already shown how some traditional semantic roles can be defined with respect to argument positions associated with a primitive predicate, together with properties associated with the fillers of these positions. To the extent that argument realization is sensitive to the distinction between roles defined with respect to a primitive predicate alone and those whose definition also depends on properties of the fillers of the role as well, as we suggest it is in sections 4.2.3 and 6.4.2, then lexical semantic representations which make this distinction are preferable.

The primitive predicates which surface again and again include ACT/DO, CAUSE, BECOME, GO, BE, STAY, and LET. However, proposed sets of primitive predicates differ in size much more than is typically acknowledged. Although Jackendoff (1972) suggests that all verb meanings can be represented using just five predicates, later he (1990b) increases the number significantly, recognizing predicates such as ORIENT, EXTEND, EXCHANGE, REACT, MOVE, FORM, and CONFIGURE; furthermore, he augments many of these predicates with diacritics. Jackendoff introduces additional predicates because many classes of verbs which would be given similar decompositions if the set of predicates were limited, in fact, differ with respect to their syntactic properties and their potential extended meanings. Once predicates begin to proliferate, theories of predicate decompositions encounter the same problems as theories of semantic roles: identifying a small, well-motivated set of primitive elements (Carter 1976, 1978; Wilks 1987). Some of the distinctions which Jackendoff (1990b) tries to make by introducing additional predicates and annotating predicates with diacritics might be traced back to differences in the type of associated root, and the diacritics, at least, might be attributed to the roots. If so, differences among verbs in argument realization options could be traced to differences in the ways that their roots pair up with event structure types. In fact, Jackendoff's (1990b) own argument realization rules make reference to fewer distinctions than his decompositions allow. Positing an appropriate set of primitive predicates necessitates grounding the set within a theory of event conceptualization, the topic of the next chapter.

In what way are predicate decompositions superior to lexical semantic representations based on a set of undifferentiated lexical entailments of the sort employed in Dowty's proto-roles (1991)? Both types of representations derive the content of semantic roles from verb meanings, overcoming a major shortcoming of semantic roles. The semantic content of the primitive predicates can most likely be translated into entailments similar to those that Dowty associates

with his proto-roles. However, there are differences. First, an approach that uses lexical entailments does not make a principled distinction between that part of a verb's meaning that falls under the notion "root" and that part that falls under the notion "event structure." To the extent that this distinction facilitates the statement of generalizations, the approach which makes this distinction is preferable. Second, predicate decompositions contain information which cannot be derived from a list of arguments classified in terms of lexical entailments. By their very nature predicate decompositions encode relations between arguments; therefore, they help explain why certain arguments cooccur, while others do not, a problem raised in section 3.1.1.2. Finally, the function–argument form of a predicate decomposition represents the SUBEVENTUAL analysis of an event – it indicates the constituent subevents and their properties – and, in turn, defines relations among the arguments.⁹ Proto-role analyses do not distinguish among the events denoted by verbs in terms of their internal complexity. In section 4.2.5 we review evidence that a subeventual analysis figures in argument realization generalizations, supporting a lexical semantic representation that allows for this added structure. Furthermore, as we discuss in sections 4.2.5, 5.2.2, and 6.4.1, the hierarchical relations among arguments which the subeventual analysis defines are appealed to in some theories of argument realization, yet such relations cannot be defined in a proto-role analysis which simply associates sets of entailments with arguments. If reference to this hierarchical organization is necessary, then a lexical semantic representation which defines the relevant structure is clearly preferable.

3.3 Conclusion

A consensus has emerged from research into grammatically relevant lexical semantic representations: to the extent that semantic roles figure in argument realization generalizations, they are to be considered both nonatomic and derived notions. There is also considerable agreement that grammatical relations cannot be associated in any simple manner with unified semantic notions. This chapter has reviewed two developments in the theory of lexical semantic representation which are meant to capture these insights: generalized semantic roles and predicate decompositions. Although these have been discussed separately, some approaches, such as Role and Reference Grammar and the work of Davis and Koenig (2000) within Head-Driven Phrase Structure Grammar, employ lexical semantic representations which make use of both predicate decompositions and generalized semantic roles.

The survey of types of lexical semantic representations in this chapter and the preceding one has also revealed that the semantic notions which figure in argument realization are derived largely from the properties of the events which verbs describe. Therefore, a theory of the semantic determinants of argument realization needs to be grounded in a theory of event conceptualization – the topic of the next chapter.

Notes

- 1 The pervasiveness and importance of prototype concepts is brought out in the extensive psychological studies on human categorization by Rosch and her associates (1973; Rosch and Mervis 1975). The idea of bringing prototype concepts into this area of linguistic description seems to have originated in Lakoff (1977). Lakoff specifies properties of prototypical sentences with agent–patient verbs, and many of the prototypical entailments of agents and patients adopted by Dowty (1991) derive directly from a Lakoff-style description of such sentences. Another early attempt at casting the semantic notions entering into argument realization in terms of prototypes is found in Hopper and Thompson's (1980) proposal that transitivity should be conceived of as a prototype notion; this proposal is accompanied by a listing of the semantic factors associated with a prototypical transitive sentence. In this spirit, Langacker (1990: 219–26, 1993: 486–97) explicitly recognizes “conceptual archetypes” which underlie the notions of subject and object of a transitive verb. (See Rice [1987a, 1987b] and Taylor [1989: 206–15] for further developments of this idea.) The type of complexity associated with the notions of patient and, particularly, agent that favors a prototype approach to semantic roles is brought out in the work of Cruse (1973), Fillmore (1977b: 102), and Grimes (1975).
- 2 Not all linguists who agree with Dowty that semantic roles are prototype notions agree with him that their source is in the lexical entailments of verbs. In approaches associated with cognitive grammar, a particular construal of a happening can determine the semantic role borne by an argument, even though different construals may not involve different lexical entailments.
- 3 The larger issue of whether unaccusativity should be treated semantically, as Dowty does, or syntactically is complicated; see Dowty (1991: 605–13), as well as B. Levin and Rappaport Hovav (1995), C. Rosen (1984), and Van Valin (1990) for extensive discussion.
- 4 Besides the A-case, Schlesinger (1989, 1995: 70–75) introduces the C-case, a proto-role which has no analogue in Dowty (1991). This role subsumes NPs that would traditionally be said to bear the instrument, comitative, or manner roles; these semantic roles are all expressed as objects of the preposition *with* in English. As far as we know, Schlesinger's C-case is the only generalized semantic role that is not motivated by the special status of subject and object. Nevertheless, the wide range of semantic notions expressed as objects of *with*, as well as the apparent use of this preposition to indicate noncanonically realized or “displaced” themes (Rappaport and B. Levin 1988), as in *spray the wall with paint*, make *with* objects not unlike subjects and objects.
- 5 Dowty (1991: 597, n.36) only briefly mentions the dative alternation, suggesting that the animacy of the recipient may be implicated in the availability of two possible argument realizations for dative verbs. There is no indication that he would handle this alternation by introducing a Recipient Proto-role, as Primus does.
- 6 In RRG, there are no grammatical relations corresponding to the traditional notions of “subject” and “object.” The traditional properties of a subject are split between the argument analyzed as a “syntactic pivot” and a “syntactic controller,” selected on a construction-specific and language-specific basis. In syntactically accusative languages, the Actor is the unmarked choice for the “privileged syntactic argument,” which will be the pivot or controller in most constructions. Voice modulations can

alter the choice of pivot and controller, as when the passive forces the choice of Undergoer as pivot or controller.

- 7 In our event structure for an activity verb, a primitive predicate ACT is modified by a manner root, as in (11), an analysis which contrasts with Hale and Keyser's (1993, 2002) analysis of comparable verbs, which treats the root as the argument of a predicate DO, roughly comparable to ACT, as in [x DO <JOG>]. This other approach receives apparent support from Basque and some other languages, where the counterparts of activity verbs are expressed peripherastically using the verb meaning ‘do’ plus a noun (B. Levin 1989). We do not choose between approaches here, since additional investigation into the representation of such verbs is needed.
- 8 Predicate decompositions allow a solution to a problem raised in section 2.2.2: unifying the various instantiations of path found with motion verbs (e.g., *to the library, from the cafeteria, through the woods*), which are assigned distinct “traditional” semantic roles. In his predicate decompositions, Jackendoff (1983) recognizes a conceptual category of path, which consists of a path function and a reference object; since the path function has internal structure it provides a unified representation of all types of paths. Jackendoff then analyzes verbs of motion as based on a two-place primitive predicate GO, which takes theme and path arguments.
- 9 Much of the work which takes a mereological approach to aspectual classification (Hinrichs 1985; Krifka 1992, 1998) also assumes that verbs can denote events with subeventual structure (see section 4.2.1); however, this work is concerned with the analysis of the aspectual notion of telicity, rather than with argument realization.