Chapter 1

In sum, it is unlikely that children can use properties of strictly syntactic representations as criteria to determine the syntactic privileges of verbs. The reasons are twofold:

- If the syntactic criteria are completely abstract, then we are begging the question of how the child can predict which verbs possess them. This is a special case of the “bootstrapping problem”: how children recognize tokens of abstract grammatical representations in the input (see Pinker, 1982, 1984, 1987).
- If the syntactic criteria have detectable consequences such as the ability of the verb to appear with some distinct set of arguments, those consequences would have to be perfectly correlated with the alterability of the verbs in question. Unfortunately, those cases do not exist; many so-called adjuncts, and many so-called optionally deleted arguments, are selective in the verbs they apply to in ways that cross-classify the selectivity with respect to the argument structures of interest (see, e.g., Atkins, Kegl, and Levin, 1986).6

The point of this section is not to criticize these proposals generally; many of them help capture other interesting linguistic generalizations and might be accepted in some version on those grounds. The point is that they do not provide the crucial first step in resolving Baker’s paradox: differentiating a priori the verbs that take different sets of argument structures. Once that step is taken, some of the theories I discussed could take over and explain a variety of consequences of the choice of representation, but how that choice is first made is the problem at hand.

Note also that by taking Baker’s paradox seriously, a variety of traditional concepts concerning lexical representation must be called into question. One can easily see now why it is illegitimate to try to explain a phenomenon by calling a rule “partially productive” or “less than fully applicable” or having “idiosyncratic exceptions,” or describing the lexicon as being “partially structured” or having “accidental gaps.” In fact, this was the larger point of Baker’s (1979) article: many devices commonly used in grammatical explanation raise major learnability problems.

Given the failure of subtle negative evidence, surrogates for negative evidence, and strict lexical conservatism to solve Baker’s paradox, criteria distinguishing the alternators from the nonalternators is the only option standing. And since criteria pertaining to verbs’ syntactic representations do not solve the problem either, the child is left with two possible kinds of cues for verbs’ syntactic behavior: their sounds and their meanings. The next chapter explores this path.

Chapter 2

Constraints on Lexical Rules

For many years linguists have noted systematic semantic and morphological differences between the verbs that enter into a construction and those that are syntactically similar but fail to enter into it. Some of these differences are commonly noted in descriptive grammars of English; others have emerged in the literature of generative grammar as linguists have attempted to make grammars descriptively adequate. Let us consider whether any of these differences could serve as criteria governing a speaker’s willingness to generalize.

2.1 Morphological and Phonological Constraints

It has often been pointed out that dativizable verbs tend to have native (Ger-

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2.1 Morphological and Phonological Constraints

It has often been pointed out that dativizable verbs tend to have native (Germanic), not Latin stems (e.g., Green, 1974; Oehrle, 1976; Mazurkewich and White, 1984); examples are given in (2.1).

(2.1) John gave / donated / presented a painting to the museum.
John gave / *donated / *presented the museum a painting.
Bill told / reported / explained the story to them.
Bill told / *reported / *explained them the story.
Sue built / constructed / designed the house for us.
Sue built / *constructed / *designed us the house.

This correlation is the residue of one of the many peculiar developments in the history of English. In its earlier stages, English had case markers for accusative and dative cases (the latter corresponding to the goal) and had more word-order freedom than contemporary English. According to Visser (1963), in Old English the order “V NP-dat NP-acc” was more common than the order “V NP-acc NP-dat.” In Middle English the case markers eroded, resulting in a “V NP goal NP theme” verb phrase similar to the double-object construction of contemporary English. Very few verbs appeared in the prepositional form “V to NP NP” in early Middle
English. But in the fourteenth and fifteenth centuries many new verbs entered
the language as borrowings from French, which marked the goal phrase with the
preposition à. When these verbs were assimilated into English, the French
argument structure was translated, and thus the preposition to (the translation of
à) was used to mark the goal argument. Native verbs were then allowed to take
this argument structure as well, presumably via the application of a dative rule
operating in what we now think of as the “backward” order, from the double-
object form to the prepositional form. Thus the verbs that take the double-object
form are the ones that were already in the language when that form came into
being, and the verbs that fail to take that form came into the language more
recently from French (and Latin as well), accompanied by a French-like argument
structure.

Presumably children lack a collective racial memory for the history of the
language, so the native/Latinate distinction would have to involve some audible
synchrony property of verbs, not their etymology. It turns out that most often
native stems are monosyllabic or, if polysyllabic, have stress only on the first
syllable. And in fact Latinate verbs that have been assimilated to the native stress
pattern do generally dativize, as (2.2) shows. Similarly, some speakers use oth-
erwise undativizable verbs in the double-object form but shift the stress so as to
conform to the native pattern when they do, as shown in (2.3).

(2.2) Promise/Offer/Recommend/Describe anything to her, but give her
Arp’ege.
Promise/Offer/*Recommend/*Describe her anything, but give her
Arp’ege.

(2.3) IBM doNATED / DoNated some computers to them.
*IBM doNATED them some computers.
?IBM DoNated them some computers.

Grimshaw (1985) and Grimshaw and Prince (1986) note that this definition of
the native class corresponds to a phonological natural kind. The theory of
metrical phonology picks out monosyllables, and polysyllables with stress only
on the first syllable, as constituting a single metrical foot. At first it might appear
that there are counterexamples in the form of dativizable verbs that do not match
this definition, such as assign him a seat, allot him a space, award him a prize,
or allow him one phone call. However, they begin with an unstressed schwa,
which Grimshaw and Prince suggest is not a complete foot but an invisible or
negligible residue of the metrical analysis of the word. When the verb begins
with an unstressed syllable containing more than a schwa, such as return,
explain, or obtain, dativization is blocked, as predicted. The constraint would
then seem to be that dativization is restricted to verbs that have no more than one
metrical foot (more precisely, “no more feet than one”).

Constraints on Lexical Rules

There is an alternative formulation of the native/Latinate distinction:
Latinate verbs could be those that are formed from any combination of a fixed
set of largely meaningless stems and prefixes (“cranberry morphemes”), such as
re-, de-, pre-, in-, con-, trans-, sub-, ad-, ex-, per-, fer-, mit-, sume-, -ceive,-duce,
-nounce, -pel, -plain, and so on (Aronoff, 1976). This would be a morpho-
logical rather than a phonological definition of the class. Though I know of no
proposals that it is the right definition for the dativizable class, it is consistent
with the ungrammaticality of *I transferred him some money and *I purchased
him a jacket, both of which have initial stress and hence would be “native” by
strictly prosodic criteria. (Promise, on the other hand, is probably not analyzed
as pro + mise by modern speakers.) There has been a proposal for a strictly
morphological constraint on dativizability: Storm (1977) has suggested that
dativizable verbs must be monomorphemic. This largely coincides with the pro-
posal that dativizable verbs must be (morphologically) non-Latinate, since the
morphological definition of Latinate is that it consist of combinations of Latinate
prefixes and stems. However, it differs in cases where a verb is composed of two
or more native morphemes. Unfortunately for any account based strictly on
morphology, there seem to be multimorphemic verbs (both Latinate and native)
that do dativize: He bequeathed them his fortune; I telegraphed them the news;
I reserved him a seat; She referred me a patient; and others.

An experiment by Randall (1980) suggests that both morphological and
phonological factors may be psychologically active, at least in other areas of the
lexicon. She asked subjects to rate how good a nonsense word suffixed with -ity
sounded. The suffix appears only with Latinate words in English. Subjects gave
higher ratings to nouns formed from Latinate stems that were familiar in English
than to nouns whose stems had Latinate stress patterns but were not familiar. This
suggests that subjects were sensitive to a morphological distinction (whether or
not a word is composed of a set of known morphemes) rather than a phonologi-
cal one. However, subjects also gave higher ratings to nouns formed from
unfamiliar Latinate stems than to nouns formed from familiar native stems. This
suggests that the phonological properties of the native/Latinate distinction are
attended to as well. Therefore, the distinction is probably “morphophonological,”
in that there is a morphological class whose members can be recognized partially
by their phonological properties. I will return to this issue in section 4.4.1.

2.2 Semantic Constraints

Virtually all argument structure alternations interact with semantics in one way
or another. In Pinker (1984), I reviewed some of the more prominent interactions
that had been reported in the linguistics literature, and I suggested that a child who knew the morphological and semantic properties of words and the morphological and semantic constraints on the alternations could use the constraints as criteria in deciding how far to extend productive rules.

2.2.1 Dative

Dativeverbs have a semantic property in common: they must be capable of denoting prospective possession of the referent of the second object by the referent of the first object (Green, 1974; Mazurkewich and White, 1984; Oehrle, 1976). In the case of verbs that appear in the prepositional form with for, the first object must be not only the goal to which the transferred thing goes as the result of its movement or transfer, but its possessor. In the case of verbs that appear in the prepositional form with for, the first object not only must be the beneficiary of an act but must come to possess a thing as the result of it. The “possessor effect,” as I will call it, is illustrated in (2.4).

(2.4) John sent a package to the border / boarder.
    John sent the boarder / *border a package.
    Rebecca drove her car to Chicago.
    *Rebecca drove Chicago her car.
    Bob made / got / stirred / tasted the cake for Phil.
    Bob made / got / *stirred / *tasted Phil the cake.

Possession need not be literal; in accordance with the Thematic Relations Hypothesis, verbs of communication are treated as denoting the transfer of messages or stimuli, which the recipient metaphorically possesses. This can be seen in sentences such as He told her the story, He asked her a question, and She showed him the answer.

2.2.2 Causative

A lexical causative is a transitive verb signifying causation that is identical in form to an intransitive verb signifying the caused event. It has often been noted that lexical causatives apply to cases of causation via direct or physical contact but not to extended chains of causation. Indirect causal chains can, by contrast, be expressed in a periphrastic causative, in which the intransitive verb is embedded as a complement of make or some other causal verb like cause or let (Fodor, 1970; McCawley, 1971; Shibatani, 1976; Gergely and Bever, 1986). The sentences in (2.5) show that lexical causatives are prohibited for causation mediated by the voluntary actions or psychological processes of the causee. We can call this the “directness effect.”

(2.5) Sally made the ball bounce / the puck slide / the baby burp / the children laugh / the Red Sox triumph (by her enthusiastic cheers).
    Sally bounced the ball / slid the puck / burped the baby / *laughed the children / *triumphed the Red Sox.
    John made the glass break by startling the carpenter, who was installing it.
    *John broke the glass by startling the carpenter, who was installing it.

In addition, Gergely and Bever, discussing examples from Fodor, Garrett, Walker, and Parkes (1980), suggest that stereotypy or conventionality of manner constrains the causative. Although to paint means something like “to cause to be covered with paint,” one does not paint a brush when one dips it in the can, and it is hard to say with a straight face that Michelangelo painted the ceiling when he caused the ceiling of the Sistine Chapel to be covered with paint. This might be called the “stereotypy effect.”

2.2.3 Locative

The locative, also known as the “spray/load” or “figure/ground” alternation, denotes a transfer of a substance or set of objects (the theme, content, or locatum) into or onto a container or surface (the goal, container, or location). It is often assumed that the standard member of this pair of constructions is the one taking the prepositions into or onto, which can be called the content-oriented or theme-object form, and that the locative rule converts it into a construction taking with, often called the container-oriented or goal-object form. The two forms are not synonymous. In the goal-object form, the goal must be completely filled or covered by the theme (see S. Anderson, 1971; Talmy, 1976; Bowerman, 1982b; Rappaport and Levin, 1985); if this is not a possible effect of the event denoted by the verb, the verb does not undergo the alternation, as (2.6) shows.

(2.6) (a) Irv loaded hay into the wagon.
    Irv sprayed water onto the flowers.
    Irv threw the cat into the room.
    Irv pushed the car onto the road.

(b) Irv loaded the wagon with hay.
    Irv sprayed the flowers with water.
    *Irv threw the room with the cat.
    *Irv pushed the road with the car.

There is a similar pair of constructions, shown in (2.7), involving an alternation of from with of, where the verb denotes that the surface or container (the source) contains some substance or objects that are then removed from it. In the of form (container-oriented or source-object), the source must be completely empty or stripped following the movement of the object or substance.
Constraints on Lexical Rules

This Thematic Hierarchy Condition (THC) rules out the passives of “measure” verbs like those listed in (2.8), where a quality or quantity of one entity is compared with a standard, because in such verbs the entity acts as a theme and the standard acts as a metaphorical location. How do we know this? Because expressions for measurements use locative or goal prepositions in other constructions, such as *Grapes are selling AT a dollar a dozen; Bird weighed in AT 260 pounds; Jerry’s resemblance TO Roger is uncanny; One and one is equal TO two.* In the passives in (2.8), we get a location or goal mapped onto the subject and a theme mapped onto the object of by, in violation of the constraint.

In addition, Jackendoff notes that verbs that are ambiguous between an agent-location reading and a theme-location reading in the active voice express only the agent-location reading when passivized, as (2.10) shows.

(2.10) John touched the wall (after he reached for it strenuously).

[agent-location]
John touched the wall (for two days, since his murderer had propped his lifeless body against it). [theme-location]
The wall was touched by John (after he reached for it strenuously).

*The wall was touched by John (for two days, since his murderer had propped his lifeless body against it).*

The THC also rules out other examples of nonpassivizable verbs. In *John was resembled by Bill, John is a goal, if we use prepositions in related constructions as our guide, because one can talk about Bill’s resemblance TO John.* Therefore the passive of resemble violates the THC. By similar arguments, one would treat *Bill in Bill’s arguments escape me* as a source, because one also says *Mary escaped FROM Sue.* If so, the THC would correctly rule out *I am escaped by Bill’s arguments.* See Jackendoff (1972), Pinker (1984), Pinker et al. (1987), and Grimshaw (in press) for other passives ruled out by this constraint.

2.3 How Semantic and Morphological Constraints Might Resolve Baker’s Paradox

Mazurkwich and White (1984) and Pinker (1984) argued that the semantic and morphological constraints discussed in sections 2.1 and 2.2 might form the basis of how children solve Baker’s learnability problem. If children could come to know the criteria distinguishing, say, dativizable from nondativizable verbs, they could append a condition onto a productive dative rule constraining it to apply only to verbs that meet the condition. Thereafter they would apply the rule productively only to the sets of verbs for which the alternation applies. If there

(2.7) (a) Irv emptied water from the bucket.
Irv drained mud from the pipes.
Irv read a story from the book.
Irv threw the ball from the porch.

(b) Irv emptied the bucket of water.
Irv drained the pipes of mud.
*Irv read the book of a story.*
*Irv threw the porch of a ball.*

This “holism effect” not only rules out the goal-object and source-object constructions for verbs like push and read where the action cannot result in complete filling or depletion, but alters the interpretation of sentences with verbs that do alternate: the grammatical sentences in (2.6b) and (2.7b), but not those in (2.6a) and (2.7a), entail that the wagon is completely full, the flowers totally wet, the bucket and pipes completely empty.

2.2.4 Passive

Passivization has long been noted to work best with verbs that are actional, with an agent subject and a patient object. None of these verbs (e.g., cut) fails to passivize; all the verbs that do fail to passivize are stative (Quirk, Greenbaum, Leech, and Svartvik, 1971). Examples are given in (2.8).

(2.8) Two hundred pounds is weighed by John.

*Five dollars is cost by this pen.*
*Amy is resembled by Sue.*

Four is equaled by two plus two.

However, no simple distinction such as actional/nonactional or stative/non-stative completely distinguishes passivizable from nonpassivizable verbs. First, there are stative and abstract passives such as This book is owned by the library; These drastic measures are justified by the situation; and The team was liked by the fans. More dramatically, there are cases where the underlying object is an idiom chunk, pleonastic element, or nonargument, such as The hatchet was buried; It was thought to be raining; The morning star was believed to be different from the evening star. Thus, Jackendoff (1972) offers a more subtle constraint. He proposed that thematic relations are ordered in the hierarchy shown in (2.9).

(2.9) theme source/goal/location agent

In a passive, the surface subject must have a thematic role that is higher on the list in (2.9) than the object of by (or the argument that remains unexpressed in short passives like John was hit).
are scattered positive exceptions (i.e., double-object verbs that violate the constraints), they could be learned on a conservative, verb-by-verb basis from positive evidence. The learning sequence proposed in Pinker (1984) was roughly as follows:

1. Record the argument structures of verbs heard in the input.
2. Note whether there are a large number of verbs that all occur in the same two argument structures. If so, create a productive lexical rule that would take as input the verb form with one argument structure and yield as output the corresponding form with the other argument structure.
3. Note whether there are also a large number of verbs that all fail to occur in one of the argument structure forms. If the verbs that occur in both forms have some property—either a morphological/phonological property of their stems, a semantic property of their predicates, or a thematic property of their arguments—in common, a property that is missing in the verbs that occur in only one form, bifurcate the verbs into two classes distinguished by that property and constrain the rule to apply productively only to the class defined by possession of that property. Apply the constraint retroactively so as to expunge nonwitnessed verb forms generated by the earlier unconstrained version of the rule if they violate the newly learned constraint.
4. If a hypothesized constraint becomes falsified because a large number of verbs violating it appear in the input, search for a new property that distinguishes the alternating from nonalternating verbs and replace the old criterial property with the new one.

This procedure might appear to be using a kind of indirect negative evidence: it is sensitive to the nonoccurrence of certain kinds of forms. It does so, though, only in the uninteresting sense of acting differently depending on whether it hears X or doesn’t hear X, which is true of virtually any learning algorithm (see section 1.4.3.2). It is not sensitive to the nonoccurrence of particular sentences or even verb-argument structure combinations in parental speech; rather, it is several layers removed from the input, looking at broad statistical patterns across the lexicon.

This kind of solution to Baker’s paradox I will call “criteria-governed productivity.”

2.4 Evidence for Criteria-Governed Productivity

The set of procedures just described can, at least in principle, account for how the child can be a productive generalizer while speaking a language that maintains exceptions to the generalization. To support the theory of criteria-governed pro-
ductivity, my students and I have attempted to show two things: that adults respect the criteria, even the seemingly obscure ones, and that children are in the process of coming to respect them. Of the criteria, the morphophonological constraint on the dative, being the result of an accident in the history of the English language, seems the least likely to be operative in the minds of present-day adult speakers. Jess Gropen and I (Gropen et al., 1989) invented eight new verbs whose meanings were exemplified in prepositional-dative sentences in terse written stories, one of which is presented in (2.11).

(2.11) Sue, who had wanted the deed to the house for twenty years, was very excited when her lawyer called with the good news. Her lawyer told her that Bob, the current owner, was ready to begin tonkation, the formal (and only legal) process by which she could obtain the house from him. After Bob had finally tonked the house to Sue, she tonked her duplex to Francis.

Half the verbs were monosyllabic (*norp, moop, pell, tonk*), and half were polysyllabic (*calimod, orgulate, repertine, dorfinize*), counterbalanced across stories and subjects. After reading each story, subjects were shown eleven new sentences containing the verb and asked to rate how good each one sounded. One of the sentences was a double-object dative. In addition, we orthogonally varied whether the sentences involved a transfer of possession—(2.12) involves such a transfer; (2.12) and (2.13) do not—and whether the verb involved the preposition to, signifying an act of transfer, as in (2.12), or for, signifying an act done for someone’s benefit, as in (2.13).

(2.12) Ron, who had promised Dave that he would try to help him make the flight, entered the garage with some regret. It had been a full month since he fired up the orgulator, and he was unsure how it would handle the rough atmosphere. Later, after having orgulated Dave to the hotel, Ron was quite relieved.

(2.13) Ned, a young but upcoming inventor, was eager to spring his latest idea on the unsuspecting world. He thought he’d begin with his neighbor, Cindy, by offering to do her ceiling with his new mooper. It is a profound understatement to say that Cindy was displeased after Ned had mooped the ceiling for her.

We found that subjects rated the double-object sentences in the questionnaire, such as *Fred tonked Mary the house*, as sounding much better if the verb signified a transfer of possession than if it did not. In addition, among the possession-transfer verbs involving the preposition to, those that were monosyllabic were rated as significantly better sounding than those that were polysyllabic. As expected, no such differences were found for ratings of the prepositional-dative forms. Thus the phonological and semantic constraints on dativization are not
more historical residues but are active in the minds of adult speakers, affecting whether or not they judge novel verbs to be acceptable in the double-object construction. Similar effects occur when subjects judge the acceptability of nonce words suffixed with -ity (Randall, 1980) or prefixed with various negative affixes (Baldi, Broderick, and Palermo, 1985). Though we have not yet run analogous experiments for the other criteria and alternations I have discussed, the fact that adults are sensitive to the most puzzling of the criteria, the morphophonological constraint on the double-object dative, leads us to predict that other criteria are psychologically real as well.

Children, too, are sensitive to constraints on the dative, though they do not apply them consistently, as examples such as Brush me my hair and Mattia demonstrated me that yesterday from (1.16) attest. In the first experiment of Gropen et al. (1989), where children were taught new verbs of transfer, we used two monosyllabic and two polysyllabic nonsense words and found that children produced significantly more double-object datives with the monosyllabic than with the polysyllabic verbs (55% versus 39%) but showed no such preference with prepositional-object datives (36% versus 39%). Thus the effect is not an artifact of polysyllabic verbs' being generally harder to learn or pronounce. This difference was replicated, though at a nonsignificant level, in a second study (43% versus 38%). In that study we also varied whether the event referred to by the verb denoted a transfer of a thing to a toy animal, who could plausibly possess the thing, or simply to a location indicated by an inanimate object, which could not. Children produced double-object forms significantly less often when the goal was inanimate than when it was a toy animal (32% versus 38%). When the child himself or herself was the recipient of the thing, making the possibility of possession even more salient, even more double-object sentences (52%) were elicited.

Children occasionally disobey the adult constraint on the causative. Bowerman (1982a) gives examples such as Those are nice beds ... Enough to wish me that I had one of those beds and I want to watch you this book, which sound odd to adult ears because the causation involved is circuitous or nonphysical. However, though children do make such errors, our experiment on productive causativization in children (Gropen, Pinker, and Roepen, in preparation) showed that children are at least probabilistically sensitive to the directness constraint. In the conditions I described earlier, we had one toy animal directly manipulate a second into a posture or action. But in addition, we had a condition in which the causation was mediated by an intervening act: one animal threw a marble at the second, resulting in its assuming the posture or engaging in the motion expressed by the intransitive verb. Children used lexical causatives more often for direct causation than for mediated causation: 55% versus 0% for the 4-year-olds; 66% versus 22% for the 6-year-olds. However, they showed the opposite preference when producing periphrastic causatives with the verb make, seldom using them in trials with direct causation but using them fairly often in trials with mediated causation (10% versus 50% for the 4-year-olds, 0% versus 31% for the 6-year-olds). Likewise, when they simply used the intransitive form, omitting mention of the causal agent altogether, it was never in trials with direct causation (0% versus 20% for the 4-year-olds; 0% versus 25% for the 6-year-olds).

Finally, Pinker, Lebeaux, and Frost (1987) tested various possible constraints on passivization in children. Many experimenters have shown that children have difficulty comprehending the passives of perceptual and psychological verbs such as see and know, though they have no trouble with their corresponding actives or with the passives of actional verbs such as kick (Maratsos, Kuczman, Fox and Chalkley, 1979; de Villiers, Pinney, and Avery, 1982; Maratsos, Fox, Becker, and Chalkley, 1985; Gordon and Chafetz, 1986; Borer and Waxler, 1987). Perhaps children are adhering to an actional-versus-stative criterion that approximates the distinction noted by descriptive grammarians to hold for adult English. Unfortunately, it turns out that adults show roughly the same pattern in their speech: passives of perception and psychological verbs are quite rare. Thus children may have simply recorded certain active and passive versions of actional and nonactional verbs conservatively from their parents' speech. Since input frequency was controlled exactly in our experiments, we could distinguish these possibilities. In one experiment we contrasted novel actional verbs with novel perceptual verbs meaning "to see through binoculars" and "to hear through an ear trumpet." In two others we contrasted actional verbs with verbs of spatial relationships, roughly, "to suspend" and "to contain." By using a variety of teaching and testing conditions we were able to determine whether any reluctance on the part of children to passivize these nonactional verbs was due to nonpassivizability per se, not just to their being more difficult to learn across the board. We discovered in four separate groups of children a selective reluctance to passivize nonactional verbs involving spatial or perceptual relations productively (these differences, though consistent, did not result in statistical significance).

In two other experiments we tested Jackendoff's Thematic Hierarchy Condition directly. In one, actional verbs were taught, but for half the verbs the agent was expressed as the object and the patient was expressed as the subject. Thus for these verbs The bear was piling the cow would mean that the cow was knocking over the bear. Such verbs can be learned by young school-age children, not without difficulty (Marantz, 1982), but they are as strong a violation of the THC as one could imagine. So if children are criterion-governed passivizers,
they should fail to passivize these "anticanonical" verbs even if they can learn them in the active voice. And indeed, we found a strong and statistically significant reluctance to passivize these verbs when they had been taught in the active voice, above and beyond the inherent difficulty of using these anticanonical verbs and the overall difficulty of passivizing any verb. In the other experiment we taught verbs of spatial relationships (meaning "to hang from," "to be centered on," "to be at the end of," and "to be wrapped around") and varied whether the larger reference object, presumably perceived as a location, was subject or object. Thus the verbs could be either of the form The penny is pilking the record (theme subject, location object) or of the form The record is pilking the penny (location subject, theme object). The THC predicts that when the location is the subject of the active, and hence the theme is the surface subject of the passive, the passive form should be possible, but it should not be possible when the theme is the subject of the active and the location is the surface subject of the passive. Again, we found a selective reluctance to passivize the verbs that the THC deems unpassivizable, though this effect was not as consistently observed as the corresponding effect for actional verbs.

Thus we concluded that children were constraining their productive rule of passivization, at least according to some gradient of passivizability, with agent-subject/patient-object actional verbs most passivizable, patient-subject/agent-object actional verbs least passivizable, and spatial relation and perception verbs in between, with spatial relation verbs being further subdivided into more and less passivizable versions depending on which argument was mapped onto the subject role. And more generally, we can conclude that criteria that distinguish which verbs do and which verbs don't participate in argument structure alternations are active in the minds of children and adults and not just historical residues, though children do not apply them as consistently or as precisely as do adults. (In section 7.3 I discuss constraints on children's lexical rules in greater depth.)

2.5 Problems for the Criteria-Governed Productivity Theory

The criteria-governed productivity hypothesis outlined at length in Pinker (1984) has in its favor three things. First, it is consistent with the linguistic fact that the argument structure alternations studied to date do not apply across the board to all the verbs matching the syntactic conditions of the respective rules, and they do not apply to arbitrary lists of verbs either. Rather, they are all governed by systematic criteria. Second, we have experimental evidence for the psychological potency of the criteria as constraints on productive generalizations. And third, of course, it shows us a way out of Baker's paradox. Unfortunately, it is also faced with three problems.

1. Do the criteria really work? What happens when they don't? There are two possible kinds of exceptions to a criterion. Positive exceptions are verbs that should not passivize, dativize, and so on, according to the constraints, but do. Examples are listed in (2.14), (2.15), and (2.16); some of them are taken from Bowerman (1987a, personal communication), Fodor (1985), Gee (1974), Green (1974), Maratsos et al. (1987), and Randall (1987).

   (2.14) Some positive exceptions to the phonological constraint on the dative:
   Dr. Bear referred me a patient.
   I radioed / telegraphed / netmailed her the news.
   Kathy xeroxed me a copy.
   He bequeathed his fortune.
   They forwarded me some mail.
   She guaranteed / allocated / reserved him a seat.

   (2.15) Some positive exceptions to the Thematic Hierarchy Condition on the passive:
   The audience was bored by the movie [audience = goal; cf. The movie was boring TO the audience].
   Russia was invaded by a horde of locusts [Russia = goal].
   The bed was covered by a down comforter [bed = location].
   John was hit by a car [John = goal].
   The mountain was capped by snow [mountain = location].
   The street was lined by trees [street = location].
   The house was surrounded by a moat [house = location].

   (2.16) Some positive exceptions to the directness and stereotypy constraints on the causative:
   Directness:
   John's company grows oranges in the Imperial Valley.
   Oil Can Boyd walked the batter.
   Bond killed Drax by throwing him into the shark-filled pool.

   Stereotypy of manner:
   John broke the bicycle by riding it over a log / because he was too heavy for its racing wheels / by smashing it with a sledgehammer.
   I melted the butter by taping it to the exhaust manifold of my Saab.

   The criterion hypothesis is not necessarily refuted by positive exceptions, because they are learnable from positive evidence. Specifically, the theory can tolerate them if (a) they are learned conservatively, that is, on a verb-by-verb basis from positive evidence; and (b) they are few enough in number, compared to the obedient alternating verbs, that the child will not be tempted to discard the
criteria altogether as ineffective. It is hard to assess the truth of either of these escape hatches. But where the theory fails more clearly is in the case of negative exceptions: verbs that should alternate but do not. Here, conservative learning through positive evidence is not an option; negative evidence is required. In fact, negative exceptions to criteria bring Baker’s paradox back in full force. Though fewer exceptional verbs are involved, as the hypothesis stands even a single negative exception requires some novel mechanism to explain its existence, and one would worry about whether such a mechanism could suffice to account for the acquisition of the entire pattern of verb behavior, supplanting the use of criteria altogether.

Some negative exceptions are presented in (2.17)–(2.20). Some are blatantly permitted under the proposed criteria. For others, the situation referred to by the verb could be construed post hoc as failing a given criterion (for example, perhaps pulling isn’t “really” a way of transferring possession but only a way of changing something’s location). But that would defeat the purpose of invoking the criterion, which is to allow the child to know on the basis of the verb form or meaning alone whether the verb can enter into that argument structure.

(2.17) **Negative exceptions to the possessor constraint on the dative:**
*John pulled Bill the box [cf. John brought Bill the box].
*Sam shouted John the story [cf. Sam told John the story].
*Becky credited Bill the money [cf. Becky promised Bill the money].
*Mary chose Linda a dress [cf. Mary picked Linda out a dress].

(2.18) **Negative exceptions to the directness constraint on the causative:**
*John went his dog into the room [cf. John slid his dog into the room].
*The ball fell because Martha fell it [cf. The ball dropped because Martha dropped it].
*Stephen laughed the baby by tickling it [cf. Stephen burped the baby by patting it].

(2.19) **Negative exceptions to the Thematic Hierarchy Condition on the passive:**
*The house is had by John [cf. The house is owned by John; John = possessor = location, house = theme].
*A disk is lacked by that computer [computer = location].
*Water is contained by the bottle [cf. Water is held by the bottle; bottle = location, water = theme].
*Water was draped by the ceiling [cf. Water was emitted by the ceiling; ceiling = source, water = theme].
*Sap was gushed by the tree [cf. Sap was exuded by the tree; tree = source, sap = theme].

(2.20) **Negative exceptions to the holism constraint on the locative:**
*I poured the glass with water [even if the glass is full; cf. I filled the glass with water].
*I dribbled the floor with paint [even if the floor is completely splattered; cf. I splattered the floor with paint].
*I vacuumed the rug of lint [even if the floor is completely clean; cf. I stripped the rug of lint].
*I stole John of his money [even if John is penniless; cf. I robbed John of his money].

2. **Why does the language have criteria? Why does the child bother to learn them?** These are two sides of the same coin. Compare two rules for productive dativation, one that licenses a pure alternation of argument structures, as in (2.21a), and one that is constrained by a criterion, as in (2.21b); both are taken from Pinker (1984).

(2.21) (a) verb (SUBJ, OBJ, OBL<sub>loc</sub>) ——> verb (SUBJ, OBJ2, OBJ)
(b) verb (SUBJ, OBJ, OBL<sub>loc</sub>) ——> verb (SUBJ, OBJ2, OBJ)
ONLY IF: [verb is native]
[object of OBL<sub>loc</sub> is prospective possessor of OBJ]

Fodor (1985) points out that rule (2.21a) is simpler and that it requires less information to learn. We can add the observation that it confers more expressive power on the speaker. To take an example used earlier, when asked the question “What did John do with the museum that inspired its directors to make him a trustee?” a person possessing the first rule could answer “He donated it that priceless Vermeer he had inherited from his great-grandfather.” If the speaker had been saddled with (2.21b) he would be forced to say instead “He donated that priceless Vermeer he had inherited from his great-grandfather to it.” The latter is clumsier and less felicitous because its “heavy” noun phrase is in the middle rather than at the end and its “new,” focused material, the painting, comes earlier in the sentence than its “old,” topic material, the museum (see Erteschik-Shir, 1979).

Given all these disadvantages to learning a constrained rule, and the fact that the simple, unconstrained rule is compatible with all the child’s linguistic input, why, Fodor asks, does the child do it? Perhaps children are simply built to learn the language of their parents, even if that involves complicating a simple rule in the absence of evidence forcing them to. But why, then, did the parents maintain the constraint in their language (other than the fact that their parents had it?). One could answer that there are many arbitrary and difficult patterns that generation after generation learns (e.g., irregular morphology), but most such cases involve the resolution of conflicts between competing subsystems (e.g., rule application
and memorization; see Pinker and Prince, 1988), not the adding of arbitrary conditions to simple rules.

3. Why are certain rules constrained by certain criteria and not by others? How does the child figure out which rule is constrained by which criterion? Again, these two questions are really one question, to the extent that the structure of the language is caused by the structure of the learner. The criteria listed above involve a motley collection of concepts: number of metrical feet; prospective possession; directness of causation; holism of filling or covering; mapping onto a hierarchy of thematic roles. And these are only for four rules in a single language. The heterogeneity of the list suggests that the universe of criteria from which the child would have to sample might be quite large. In Pinker (1984) I noted that the learning procedures for the criteria-based account require that the list not be open-ended and not be too large: if the list is open-ended, the child might never find the relevant criterion; if it is finite but large, he or she might not find it in a reasonable period of time. Furthermore, as new verbs are learned, hypothesized constraints might have to be given up, so the child might have to search several times for the right constraint before he or she succeeded in acquiring the adult rule. Though I was able to show that many of the components of the criteria, such as choice of thematic roles and gross metrical pattern, did seem to recur across a variety of rules, it is difficult to come up with an explicit list of the possible criteria.

In addition, we still need an explanation as to why certain criteria are paired with certain rules. Could a language have a passive that applied to monosyllabic verbs? A dative rule that required holistic and direct transfer of a substance to a possessor? A causative rule that required the affected entity also to be a source (e.g., “cause-to-send”)? It seems unlikely. Some of these possibilities may be ruled out because they would apply to small unnatural classes of verbs or would be too constricting. But as we have seen, the constrained English dative rule is hardly a model of optimal design, so general utility considerations are probably not a big factor.

So how can one resolve, on the one hand, the existence of criteria, their use by adults and children, and the failure of other attempted resolutions of Baker’s paradox; and on the other, the problems with the criteria-based account? In the rest of this book I will show that criteria are not units that the child explicitly searches for and appends to rules, but are epiphenomena of more general principles of argument structure assignment. In particular, the criteria are consequences of structures and principles of grammar that provide answers to the following questions:

- What is a possible verb in a language?
- How are verbs associated with their syntactic argument structures?
- When may two verbs share the same root?
- When may a possible verb actually be added to a language?

By deriving the criteria from principles addressed to these questions, we can adopt a new perspective that eliminates the theoretical problems associated with the criteria-based account while preserving its advantages. In addition, we will attain refined criteria that are more likely to be exceptionless.
In this chapter I pursue the resolution of Baker’s paradox that hinges on the child’s using semantic criteria to constrain the application of an alternation rule to only those verbs that undergo the alternation in the adult language. What I will try to show is that such constraints are inherently predictable from the nature of lexical rules, if those rules are seen in a different light. After presenting the basic idea, I will examine a range of linguistic phenomena supporting it.

3.1 Overview: Why Lexical Rules Carry Semantic Constraints

Semantic criteria on lexical rules are puzzling because ordinarily one doesn’t think of syntactic rules as being constrained by arbitrary semantic conditions. But what if lexical rules were, at least in part, semantic operations? Then their sensitivity to semantic conditions would be natural. In this chapter I will argue that part of what lexical rules do is change the semantic structures of verbs’ lexical entries. Syntactic argument structures of verbs are predictable from their semantic structures, via the application of linking rules. So when a semantic structure is altered, it is automatically assigned a new argument structure. I will then show that the phenomena I have been characterizing as semantic “criteria” on rule application arise because of the semantic nature of the rules’ operations. Because a rule takes a semantic structure as input and alters it in particular ways (adding, suppressing, or redescribing arguments), the changes it tries to effect can interact with the semantic structure that the verb has to begin with. Some semantic changes, when applied to some verb meanings, may produce a new verb meaning that just doesn’t hang together. For such verbs the rule is avoided; that is the equivalent of the rule being constrained by a semantic criterion.

The difference between the view offered in the preceding chapter (see also Pinker, 1984) and the refinement of it I will outline in this chapter can be summarized in (3.1) and (3.2). In the old theory (3.1), a lexical rule takes the syntactic argument structure of a verb and transforms it into a different argument structure. The semantic representation itself is basically unchanged; the new and old verb forms are synonymous. Verb-by-verb choosiness arises because the rule is stipulated to apply only if the verb’s semantic representation meets certain criteria. In the second view, the lexical rule acts directly on the verb’s semantic representation, transforming it into a new one. In other words, the new verb has a different meaning from the old one. Semantic structures are mapped onto syntactic argument structures, thanks to linking rules, so when the verb’s meaning changes, its argument structure changes, too, as an automatic consequence. Verb-by-verb semantic choosiness arises because the semantic changes effected by a rule just don’t make sense when applied to verbs with certain meanings.

What kind of semantic changes would the rules perform? Consider the dative alternation. Dativization, on this view, converts a predicate meaning “to cause X to go to Y” into a second predicate, meaning “to cause Y to have X.” There is a linking rule that always maps the argument signifying the causally affected entity onto the grammatical function of object (direct internal argument), so when the predicate is reconstructed as involving an effect on a possessor rather than on a theme, it is the possessor that becomes the syntactic object in argument structure: we have give John... rather than give a book... And because the rule as stated changes a goal (“cause to go to J”) into a possessor (“cause Y to have”), it cannot apply to a verb whose meaning is incompatible with “cause to have.” Thus drive the car to Chicago cannot be converted into *drive Chicago the car...
because driving can’t cause anyone to possess anything and Chicago isn’t the sort of thing that can possess something else to begin with. Conceiving of the dative rule as a semantic operation converting “cause X to go to Y” into “cause Y to have X” thus unites two phenomena that were formerly arbitrarily glued together: the syntactic change, where the goal argument is promoted to surface object position, and the semantic choosiness, whereby only verbs involving prospective possessors could undergo the change. As we shall see, other aspects of the behavior of the dative fall neatly out of this conception as well.

Moreover, the same kind of analysis works for the other rules. To continue the preview: I will propose that causativization involves converting a predicate meaning “X changes” into a predicate meaning “to cause Y to change.” The causer is mapped onto the subject (external argument) role, the affected thing to the object role (direct internal argument). Verbs with no directly causable change are inherently incompatible with the rule; there is nothing for it to apply to. Locativization involves taking a verb meaning “to cause X to go into or onto Y” and converting it to a verb meaning “to cause Y to change state by means of putting X into or onto it.” As in the case of the dative, the entity that is stated to be causally affected (the moving stuff, in the first version; the container or surface, in the second) is mapped onto the surface object position. If a verb has no means of specifying exactly how a container or surface changes state because of the addition of something into or onto it, the semantic change is undefined and cannot apply. Finally, passivization converts a predicate meaning “X acts on Y” to a new predicate meaning “Y is in the circumstance of X acting on it.” If there is no “acting on,” there is no passivization.

This portrayal of lexical rules leads immediately to a series of questions. Which verbs can be construed as meaning “causing to have”? “causing to change”? “acting upon an entity”? “causing to change state by means of adding stuff”? Without answers, there is no way of explaining which verbs a rule can or cannot apply to. The general answer, it turns out, is complex enough to merit its own chapter, chapter 4. To preview what I will say there: Decisions about which verbs can be construed as capable of undergoing a given semantic change are not made by each speaker for each verb. Rather, the lexicon of a language defines subclasses consisting of verbs whose meanings are variations of a single semantic plan, and it is these subclasses that precisely delineate which verbs a speaker may construe in the two different ways corresponding to the input and output of the lexical rule (e.g., “cause to go” versus “cause to have”). For example, English distinguishes two kinds of verbs of caused motion, those involving the continuous application of force to cause motion, like pull, and those involving the instantaneous application of force causing a ballistic motion, like throw. Ballistic verbs can be construed as meaning either “cause to go” or “cause to have,” and therefore they undergo dativization (throw the ball to John / throw John the ball); whereas continuous-force verbs can be construed only as meaning “cause to go,” and thus they resist dativization (pull the box to John / *pull John the box). The reasons for the difference are partially motivated and partially arbitrary, as we shall see. The principles governing this construability phenomenon define, for a speaker, the difference between rules that predict the form of a verb and rules that predict the existence of a verb.

This is a description, in a nutshell, of the conclusions that I will end up with in these two chapters. They preserve the idea that Baker’s paradox is resolved by systematic criteria applied to the choice of verbs that may undergo an alternation, while motivating the criteria as manifestations of more general principles. Let me now trace the steps that lead to these conclusions.

3.2 Constraints on Lexical Rules as Manifestations of More General Phenomena

3.2.1 Constraints on Argument Structures That Are Independent of Lexical Rules

A first hint that the semantic criteria discussed in the previous chapter are special cases of more general principles comes from examining verbs that do not alternate between two argument structures but occur only in a single form, specifically, the form usually seen as the derived version or output of the lexical rule. It turns out that such verbs, even though they could not have been produced by the rule, must conform to the same kinds of criteria as those proposed for the rule.

For example, the double-object datives in (3.3 and 3.4) could not have been derived from prepositional-object forms; the prepositional forms are themselves ungrammatical. But nonetheless they conform to the requirement that the first object be the possessor of the second object (Green, 1974). In the case of (3.3), the first object is a current or possible possessor of the second object who might lose possession of it as a result of the event denoted by the predicate; in (3.4), the first object is a metaphorical possessor of the second object.

(3.3) Alex bet Leon $600 that the Red Sox would lose.

*Alex bet $600 to Leon that the Red Sox would lose.

That remark might cost you your job.

*That remark might cost your job to you.

Please spare me your sarcasm.

*Please spare your sarcasm to/from/of me.
Constraints and the Nature of Argument Structure

What are the constraints on argument structure alternation rules?—into two, possibly more tractable problems:

1. What are the constraints on particular kinds of argument structures? That is, what has to be true of a verb for it to be assigned to a transitive argument structure or a double-object argument structure or a with-locative argument structure?
2. When may two verbs involving different argument structures share the same root? That is, why is it that in English we can use the same sound to convey breaking and causing to break but we must use different sounds to convey dying and causing to die?

3.2.2 Constraints on Grammatical Functions That Are Independent of Particular Argument Structures

Some of the constraints apply to units even smaller than argument structures: the individual grammatical functions composing them. For example, consider the holistic requirement on the container version of the locative, whereby the grammatical object must be completely affected (covered, filled, etc.) by the action of the verb (see S. Anderson, 1971). This turns out to be a characteristic of grammatical objects in general, not just of grammatical objects in the container-locative construction (Hopper and Thompson, 1980; Rappaport and Levin, 1985), as shown in (3.7).

(3.7) John drank from the glass of beer.

John drank the glass of beer.
Beth climbed up the mountain.
Beth climbed the mountain.
Bill painted on the door.
Bill painted the door.
Betty put butter on the bread.
Betty buttered the bread.
Jim removed peel from the apple.
Jim peeled the apple.
Gary wrote for many TV shows.
Gary wrote many TV shows.

In each pair, only the second member, in which the second argument is the object, implies that the action involved the complete extent or amount of the referent of the argument (i.e., all the beer was drunk, the entire height of the mountain scaled, the door completely painted, the bread completely covered, the apple completely skinned, the entirety of the show written by the author). Thus in the locative alternation the fact that the wagon is necessarily full when you load a
wagon with hay but not when you load hay onto the wagon is a consequence of the fact that the wagon is the grammatical object in the former sentence but not in the latter one.

Similarly, the directness constraint on lexical causatives has something to do with grammatical objects in general, not just the objects of lexical causatives. In (3.8a), only the second member of the pair, in which Mary is the direct object, entails that Sally landed a direct blow as intended (see B. Levin, 1985). Similarly, in (3.8b), the transitive version implies that the action that Squeaky performed succeeded in affecting Ford, whereas the prepositional form is compatible with an absence of any effect at all.

(3.8) (a) Sally slapped / hit / kicked at Mary.
Sally slapped / hit / kicked Mary.
(b) Squeaky Fromme shot at Ford.
Squeaky Fromme shot Ford.

Thus the direct object role is associated with the reading that what the agent did had an immediate impact on the entity that the action was directed at. Perhaps this is what makes lexical causatives, but not periphrastic causatives, entail some notion of direct causation.

Clearly there is something about the difference between being an object and not being an object of a verb that invokes a reading whereby the state signified by the verb is effected directly on the object and effected on all of it. Note that this difference is not contingent on the argument’s merely being a surface object. Not only are the direct and holistic readings preserved under passivization (The wagon was loaded with hay; The window was broken by John), but the locative alternation itself has a closely related variant with no surface object at all but with the same holistic/nonholistic difference in interpretation (see Salkoff, 1983; Rappaport and Levin, 1985), as shown in (3.9).

(3.9) (a) Bees are swarming in the garden.
Water dripped from the sponge.
Vermin were crawling over the cheese.
(a) The garden swarmed with bees.
The sponge dripped with water.
The cheese was crawling with vermin.

In (3.9b) there is an implication that bees were all over the garden, not just in one part, that the water dripped from the entire sponge, not just a corner, and that vermin crawled over the entire cheese. Yet these arguments are surface subjects in all cases, not objects. Whatever generalization forces arguments to support a holistic interpretation when they are not oblique must apply to something more abstract than the surface direct object: an object in some underlying structure (perhaps marked by a trace in surface structure), or else some thematic role that gets mapped either onto surface objects or onto surface subjects if the verb is intransitive (these options will be discussed in more detail later).

### 3.2.3 Constraints on Verb Choice Are Also Constraints on Interpretation

I have been discussing criteria as if they acted as filters on classes of verbs potentially serving as the input to a rule. In fact the filtering function seems to be a by-product of a more general function of the constraints, namely forcing a certain kind of interpretation on a new argument structure assigned to a verb. Two of the criteria I have discussed, while ruling out the application of lexical rules to certain stems altogether, also alter the meaning of the stems that they do apply to. The directness constraint on the causative, for example, rules out *He laughed the audience. In (3.10), it allows causativization to apply, resulting in a syntactically well-formed sentence (b), but in doing so it makes the sentence imply that direct contact was involved in the action. Since the adjunct in sentence (b) explicitly contradicts the contact reading, the sentence as a whole is anomalous. Similarly, the holism constraint on the locative rules out *He threw the air with the confetti. But when it does apply in (3.11) it also affects its interpretation; the the (b) sentence implies that the wall is completely covered.

(3.10) (a) John caused the window to break by startling Bill, who was installing it.
(b) *John broke the window by startling Bill, who was installing it.

(3.11) (a) Irv slathered paint on the wall.
(b) Irv slathered the wall with paint.

The possessor constraint on the dative displays the same dual roles. If a verb is incompatible with a meaning of causing to change possession, it cannot dativize, as in *I drove her the car. But if the verb does dativize, a successful change of possession is implied in the resulting double-object form. For example, Green (1974) notes that in (3.12a) there is no commitment as to what the students took away, but in (b) there is an implication that the teaching was successful. It is as if the prepositional dative carries no implication about successful possession (in this case, possession of knowledge), but the double-object dative enforces that reading.

(3.12) (a) Mary taught Spanish to the students.
(b) Mary taught the students Spanish.

A related phenomenon can be seen in (3.13), an example from Joan Bresnan:

(3.13) (a) I sent a package to the border.
(b) I sent a package to the boarder.
(c) I sent the border a package.
(d) I sent the boarder a package.

It seems that *send in its prepositional form is ambiguous as to whether a goal of location or a goal of possession and location is involved; (a) and (b) involve different senses of *send, one spatial, one jointly spatial and possessional. Sentence (c) is ungrammatical, presumably because the meaning of the double-object version of *send, unlike its prepositional counterpart, specifies that the transfer must involve possession.

Finally, it has long since been noted that passivization is not semantically neutral. *Beavers build dams implies something about all beavers and is true; *Dams are built by beavers implies something about all dams and is false. Roughly, the surface subject of the passive is interpreted as a theme, an entity of which a location or state is predicated (see Anderson, 1977). We can call this the “predication effect”; when a verb is passivized, its surface subject must be interpreted as a theme of a predication if the verb has a theme. If the verb’s meaning is such that its theme ends up as the by-object instead, it cannot be passivized at all (cost, weigh, stative touch).

What we are seeing here is that verbs must be interpreted in a certain way when they are assigned an argument structure composed of a particular set of grammatical functions. These principles of interpretation act as “criteria” or filters because of an interaction between the mandated interpretation and the inherent meanings of verbs that are extended to that argument structure. If the combination of the inherent meaning of the verb and the meaning components forced by the new argument structure is inadmissible (in a sense to be discussed later), the verb cannot undergo the alteration.

3.3 A Theory of Argument Structure

In the preceding section I tried to show that constraints on the application of lexical rules to verbs are epiphenomena of more general principles: those that enforce an interpretation on particular argument structures (regardless of where they come from), those that link grammatical functions with particular kinds of semantic arguments, and those that effect changes on verbs’ meanings. In this section I spell out these principles in more detail.

3.3.1 Background Assumptions

Given that no current theory of linguistic representation has provided a solution to Baker’s paradox, I will make a number of conservative assumptions about argument structure at the outset so as to block off avenues in which the solution may be found. I will refer to grammatical roles using GB and LFG terminology fairly interchangeably when possible, avoiding special theory-internal devices and tricks. All I absolutely need is the four-way distinction between subjects, objects, second objects, and prepositional objects, and a way of coindexing them with a verb’s arguments. (This has the additional advantage of allowing the current work to touch base both with the LFG-related acquisition theory I developed in Pinker, 1984, out of which this book grew, and with the currently flourishing GB-based work on argument structure.) Furthermore, since notions like “optional argument” and “adjunct” may beg the questions they are designed to solve (see section 1.4.5.2), I will assume that every distinct set of grammatical functions that a verb can appear with is licensed by a different, fully formed argument structure associated with that verb. (Thus there will be two argument structures for eat, corresponding to John ate and John ate the apple, and two for run, corresponding to John ran and John ran to the store.) Third, so as not to saddle myself with unnecessary, possibly harmful assumptions that are implicit in a notation, I will not assume that a verb’s arguments are differentiated in terms of thematic role labels such as “agent” and “theme” but will simply differentiate them by variables such as X and Y, following Rappaport and Levin (1988) and others. Therefore I will use the term “argument structure” to refer to a strictly syntactic entity, namely the information that specifies how a verb’s arguments are encoded in the syntax. With Rappaport and Levin (1988), Burzio (1986), L. Levin (1985), and others, I will assume that this is the only lexical structure pertaining to the thematic properties of arguments that the syntax can look at. Thematic information goes into determining a verb’s argument structure, but that is the extent of its influence; the rest of the syntax cannot “see” it directly.

To review the basic terminology: A lexical entry of a verb specifies an association among (a) morphological information (the morphemes it is composed of, if it is morphemic); (b) phonological information (the sound of the morphemes); syntactic information, including (c) its part-of-speech category and (d) its argument structure, the specification of the syntactic properties of those of its arguments that are expressed in the sentence; and (e) its meaning, or semantic structure. What I will call semantic structure or lexicosemantic structure is similar to the representation called Lexical Conceptual Structure by Hale and Keyser (1983), Hale and Keyser (1986, 1987), and Rappaport and Levin (1988). I avoid their term because, as we shall see, lexical semantic structures cannot be the same thing as mental representations of concepts for typical actions, events, scripts, or scenarios in which the verb is used. Rather, we will see, they are essentially constraints on particular aspects of an event.

As mentioned earlier, I will also assume that the same verb used with two different argument structures actually consists of two distinct lexical entries.
sharing a morphological root and components of their semantic structures. A
lexical rule, then, associates one kind of lexical entry with another; it can be seen
as taking one lexical entry as input and producing a second as output. There are
a number of ways in which sets of words can share a root, involving different
kinds of rules and principles. I will be focusing on a certain kind of alternation
involving changes of argument structure among verbs. The most straightforward
case is the one where the verb stem remains unchanged but the argument
structure differs. The causative, the dative, and several variants of the locative
alternation in English are the examples I treat in detail, but we will also come
across the “conative” alternation (Bill slapped him / slapped at him), the
“middle” alternation (John cut the bread / The bread cut easily), an alternation
involving possessors of parts (John punched Bill’s arm / John punched Bill on
the arm), an alternation that has something in common both with both datives and
locatives (I supplied sheets to him / supplied him with sheets), one that involves
the addition of a path argument (He hit the ball / hit the ball into center field), and
one that deletes an object (John ate the apple / John ate). I predict that the very
same principles will apply to other alternations that change argument structure,
such as “raising-to-object” (I expect that John will leave / I expect John to leave)
and “resultative complement addition” (She hammered the box / She hammered
the box flat).

I also lavish attention on the passive, which differs from these alternations in
adding an affix to the verb and changing its morphosyntactic category, from a
finite verb to a participle. According to Marantz (1984), rules of this sort are
formally different from those that leave the stem intact, and should not be subject
to semantic constraints. This is a bit too strong: I will present evidence from
English and from cross-linguistic surveys showing that similar kinds of semantic
principles apply to alternations that are accompanied by affixation and to those
that are not. However, there certainly are significant differences between the
passive and the nonaffixing alternations, and in sections 4.4.4 and 5.6.4 I
modify Marantz’s suggestion in an effort to pinpoint the grammatical source of
these differences.

One step further we find rules that change a word’s syntactic category, such
as the rule that derives adjectives from participles or the one that derives nouns
from verbs. These alternations appear to be more closely tied to pure syntactic
properties of argument structure (such as the number of arguments, which
arguments are obligatory, and the external/internal argument distinction) than to
the lexicosemantic properties that govern the alternations I focus on, and I will
not be concerned with them. See Rappaport and Levin (1988 and in press),

3.3.2 Semantic Conflation Classes as Thematic Cores of Argument
Structures
In section 3.2.1 I showed that argument structures are associated with character-
istic semantic properties. Let’s say that each argument structure has associated
with it one or more thematic cores. Informally, a thematic core is a schematiza-
tion of a type of event or relationship that lies at the core of the meanings of a class
of possible verbs. For example, the argument structure types discussed so far
could have the thematic cores listed in (3.14).

(3.14) Double-object:
X causes Y to have Z.

Transitive:
X acts on Y.

Unergative Intransitive:
X acts.

Unaccusative intransitive:
X is in a location or state or goes to a location or state.

Transitive with oblique containing to:
X causes Y to go to Z.

Transitive with oblique containing with:
X causes Y to go into a state by causing Z to go to Y.

Intransitive with oblique containing to:
X goes to Y.

The thematic core of an argument structure is an example of what Talmy
(1985) calls a conflation of semantic elements, defined in a semantic field in
which the elements are given a specific interpretation. Each conflation defines
a set of possible predicates in a language, or a conflation class. For now, imagine
that the possible semantic elements consist of variables standing for the partici-
pants in the event (the X, Y, and Z) and the elementary semantic functions “act,”
“cause,” “go,” “have,” “be,” and “to.” Instead of labeling the participants with
thematic roles, one can simply distinguish them by the argument slots they fill
in these elementary functions (Rappaport and Levin, 1986; Jackendoff, 1987a).
Thus (for now) the thematic role agent can be treated as a mnemonic for the first
argument of “cause,” and patient would be the second argument of “cause.”
Similarly, theme is a mnemonic for the first argument of “go” or “be”; path
corresponds to the second argument of “go,” location to the second argument of
“be,” and goal to the second argument of “to.”
3.3.3 Linking Rules

A thematic core of an argument structure is a specification of a conflation class defining a kind of possible verb meaning in a language, including a specification of which arguments are "open arguments" or variables. Open arguments are those whose referents can be expressed syntactically by a phrase within the same clause as the predicate. Linking rules are regular ways of mapping open arguments onto grammatical functions or underlying syntactic configurations by virtue of their thematic roles; they are the mechanisms that create the syntactic argument structure associated with a given thematic core. Linking rules are discussed at length in Carter (1976b), Ostler (1980), and Dowty (1987) and play a prominent role in many theories of grammar, such as the Universal Alignment Hypothesis in Relational Grammar (Perlmutter and Postal, 1984), the Uniformity of Theta Assignment Hypothesis in GB (Baker, 1985), and the Canonical Mapping Hypothesis in LFG (Pinker, 1984; L. Levin, 1985).

Let us consider the following linking rules as a first approximation. They would apply, in unordered fashion, to the open arguments of the semantic structure of a verb under the constraints that every open argument be linked to a grammatical function (LFG) or underlying argument position (GB) and that no grammatical function or argument position be linked to more than one open argument. These constraints, which rule out such strings as *John put and *We drank the beer the bottles of Heineken, correspond to Function-Argument Binuniqueness in Bresnan (1982c) and, roughly, to the Theta-Criterion in Chomsky (1981). (See also Rappaport and Levin, 1988, and Jackendoff, 1987a.)

1. Link the first argument of "cause" (the agent) to: the SUBJ function (LFG) / external argument (GB).
2. Link the second argument of "cause" (the patient) to: the OBJ function (LFG) / direct internal argument (GB).
3. Link the first argument of "be" or "go" (the theme) to: the SUBJ function if it is not already linked or to the OBJ function otherwise (LFG) / direct internal argument (GB).
4. Link the argument of "to" (the goal) to: the OBL function (LFG) / indirect internal argument (GB).
5. Link the third argument of "cause to have" (Z in "X causes Y to have Z") to: the OBJ function (LFG) / second direct internal argument (GB).

Oblique/indirect arguments are also linked to kinds of locations and paths other than those expressed by the preposition to; accordingly, the proper formulation of the linking rule for oblique arguments, to be discussed in chapter 5, is more general. The choice of a specific preposition is actually determined by compatibility between the preposition's own semantic representation and that of the verb (see Jackendoff, 1983, 1987a). The mechanics of this selection will be made more precise in chapter 5; the linking rule listed above can be seen as a fusion of a general linking rule for oblique objects and the semantic structure of one version of the preposition to. As we shall see, the linking rule for second objects is also more general than the tentative version stated here.

Note that the theme requires a special treatment because it commonly appears in both subject (The spot disappeared) and object (I killed the bug) positions. In the version of LFG I elaborated in Pinker (1984), the two-part linking rule for themes can be derived from a canonical mapping of thematic roles onto a hierarchy of grammatical functions, so that the theme is assigned to the highest function in the list "SUBJ-OBJ-OBBL" that is not already linked to an argument. A slightly more complex possibility within the LFG framework was suggested by L. Levin (1985), namely that the theme first be "classified" as taking a "general (semantically) unrestricted function." Then one of three function assignment rules can apply to this class: one that maps it onto SUBJ, one that maps it onto OBJ, or one that maps it onto OBJ2. When the verb lacks an agent, only the first of these three rules can yield a well-formed argument structure containing a SUBJ, and it is the one that applies. Within Relational Grammar, a theme is assigned as an object in an underlying level of representation, but can be promoted to subject in the surface level by a general rule if the subject role is not already assigned. Within GB, the theme would be assigned as the direct internal argument, but if there is no external argument, the rule "Move α" would apply, moving it into the surface subject position and leaving a trace behind to which it would be associated in an "argument chain." (See the discussion of "Burlio's Generalization" in section 1.4.5.1.) In other words, every theory has some means of accounting for unaccusativity: basically, the existence of intransitive verbs whose subjects are themes.

It is important to note that the account of thematic roles and linking I am using represents a significant departure from the conceptions originally proposed by Gruber (1965) and Fillmore (1968) and adopted more or less intact by LFG (Bresnan, 1982a; Pinker, 1984) and the Extended Standard Theory of transformational grammar (Jackendoff, 1972) including the GB framework (Chomsky, 1981). The Fillmore account and its descendants are based on the following assumptions: (a) Thematic roles are atomic labels drawn from a fixed list. (b) The labels are ordered in a hierarchy (usually agent-theme-location/source/goal) and are linked to the syntactic positions Subject, Object, and Oblique in such a way as to preserve the relative rankings of the two hierarchies (so that an agent is a subject; a theme is an object if there is an agent, a subject otherwise; a location is oblique if there is an agent and theme, an object otherwise). (c) Every argument has exactly one thematic role. (d) Linking rules apply to arguments in terms of the roles they play in motion events (thus Object is linked to the moving or located entity).
Dowty (1987), Jackendoff (1987a), B. Levin (1985), and Rappaport and Levin (1985, 1988) present several arguments against the Fillmore-style theory of thematic roles. First, there are many concepts of the same formal type as "source" and "goal" that do not have traditional labels, such as the role of the house in John passed the house. Second, arguments often have multiple thematic roles; for instance, the ball in I batted the ball into center field is the goal of the motion of the bat and the theme of the motion that terminates in center field. Similarly, the subject of give is an agent and a source; the subject of John intentionally rolled down the hill is an agent and a theme. Third, the change in interpretation that accompanies lexical rules is baffling to a theory of unanalyzed thematic role labels: if the wagon has identical role labels in load hay onto the wagon and load the wagon with hay, why is it interpreted holistically in one but not the other? But if it has different role labels in the two structures, why is it interpreted in both phrases as the destination of the hay?

The alternative view that Jackendoff, Levin, and Rappaport argue for, and that I expand here, substitutes the following assumptions: (a) Thematic roles are positions in a structured semantic representation. (b) Therefore, they do not form a fixed list that can be ordered in a hierarchy; rather, each thematic role triggers a specific linking rule. (c) Arguments can bear several thematic roles simultaneously by virtue of their simultaneous appearance in several semantic substructures (e.g., second argument of "cause" and first argument of "go"). (d) Linking rules can apply to the roles that entities play in any semantic field, not just physical location. For example, a verb can have two arguments playing the role of theme, one corresponding to what moves, the other corresponding to what changes state. The main advantage of this newer formulation of thematic roles in dealing with Baker's paradox, we shall see, is that it removes the arbitrariness of semantic constraints and their pairings with particular lexical rules.

3.3.4 Lexical Rules

Conflation classes built around thematic cores are inherently incapable of allowing new forms to be derived productively. A word is more than a meaning; it needs a sound, too, or people won't know how to pronounce it. Conflation class definitions inherently don't tell you where the sound for a new word is supposed to come from. That function is reserved for lexical rules, which allow a speaker to take the sound paired with a verb in one conflation class and use it with a new, related meaning belonging to another conflation class.

The clearest analysis of lexical rules along the lines I am proposing here comes from Rappaport and Levin's (1985) account of the locative alternation. By discussing it in some detail, I will demonstrate the empirical benefits of the theory, and my application of it to the other three alternations will be straightforward.

3.3.4.1 The Locative Alternation

Consider the into/onto argument structure by itself, independent of any alternation. It has the thematic core "X moves Y into/onto Z." X, the agent, is the subject, following the linking rule mentioned earlier. Y is the thing that changes location or theme and is an affected entity or patient, and thus is the object. Z defines both the end of the path that Y moves along and the location with respect to which Y is situated following the motion (i.e., in the interior of, on the top of, or against the surface of). Since to Z means "along a path ending at Z," in Z means "at the interior of Z," and into Z means "to in Z," the choice of preposition must be into, or, by similar logic, onto (Jackendoff, 1983).

Generally when a verb specifies motion or change, it can also specify the manner of such motion or change and some of the properties of the entity that undergoes the motion or change (Talmy, 1985), so many of the verbs that are built around this thematic core specify the manner of causation of motion of a substance to a medium or container, or the manner of motion of a substance to a medium or container. That is, the verb constrains either how the agent initiates the motion (e.g., by spilling versus injecting versus ladling) or in what manner the object moves (e.g., in a continuous stream, as in pouring, or as a mist, as in spraying). Note that the verbs do not have to specify how the container or surface changes as the result of putting something into or onto it. For example, if I pour water into the glass, the glass can be full, partially full, or even empty (if the glass leaks), but I have to cause the water to move as a cohesive stream; I cannot spray the water into the glass, use the glass to bail water out of a bathtub, let water condense into the glass, or leave the glass on a windowsill during a rainstorm.

In contrast, the argument structure containing an object and a with-object has the thematic core "X causes Y to change its state by means of moving Z to Y." As before, when a verb specifies a change, it can specify the manner or nature of the change or the properties of what changes. In this case, the entity corresponding to the goal of the physical motion is treated as an entity undergoing a change of state. Specifically, verbs in the conflation class corresponding to the thematic core of this argument structure specify that a surface, container, or medium undergoes a particular change resulting from the addition of material to it. The mere addition of material is not enough, and the manner in which the material moved or was caused to move is irrelevant; all that is captured in the thematic core schematization is that the state of the object is seen to be different as a result of the addition. For example, if I fill a glass with water, the glass must have its entire interior occupied by water, but the water could have gotten there because I poured it in, because I used the glass to bail some water out of a bathtub, because I left the glass on a windowsill during a rainstorm, and so on. Likewise, other verbs that have this argument structure, such as adorn, blanket, impregnate, encrust, infect, riddle, and saturate, specify a particular state of an object
subsequent to the addition of something to it.

Once one specifies the semantics of verbs in this conflation class, their common argument structure follows from the linking rules. The causal agent is the subject. The entity that changes state as an effect of what the agent does is a theme—in the field of circumstances or states, not physical locations—so its link with the object function or direct internal argument position preserves the generalization that affected themes or patients are objects, even if it is not the theme of a change of physical location. The mapping between the \textit{with}-object and the thing whose movement to \textit{Y} changes \textit{Y}'s state is also nonarbitrary: \textit{with} often signifies an instrument, as in \textit{She cracked the egg with a hammer}. Though Rappaport and Levin argue that the \textit{with} function is not strictly speaking an instrument in locative constructions such as \textit{I loaded the wagon with hay}, it is easy to see that the English preposition \textit{with} can embrace either true instruments or more generally the entity that by being moved is the means by which a state change is effected. Rappaport and Levin call it the “displaced theme”; I will formally call it the “state-changer.” The label is irrelevant; we can simply assume that there is a linking rule that maps the Z in “\textit{X} causes \textit{Y} to move into/onto \textit{Z},” and converts it into a new verb whose semantic structure contains the core “\textit{X} causes \textit{Z} to change state by means of moving \textit{Y} into/onto it.”

As mentioned, the holism requirement generally applies to these verbs, whether or not they are related to \textit{intolonto} locatives: the entire object, and not just a part of it, must be completely covered, filled, or saturated with the material. Rappaport and Levin suggest that the holism effect is actually an epiphenomenon of the fact that the verb specifies a change of state. They point out that, taken literally, the effect does not invariably hold: one can say \textit{The vandal sprayed the statue with paint} even if there is only a dab of paint on the statue. The reason is that the status of the statue as an object of beauty changes even with a single blemish on it. Similarly, they point out that you can load a wagon with a single box if a single box is normally considered to be the standard load for the wagon (an observation they attribute to Richard J. Carter). Thus the holism requirement is really just a state-change requirement as it applies to ordinary surfaces or containers: unless they are entirely covered or filled, there is no pragmatic sense in which they can be said to have changed state.

There may be an even deeper reason that affecting something and affecting all of it are so closely tied. Recall that in \textit{throw the paint onto the wall, paint = theme, wall = location; whereas in coat the wall with paint, wall = theme, paint = instrument/state-changer}. Talmy (1983) offers an interesting generalization about the intuitive geometric systems in which languages specify the spatial relations that are encoded in their grammars. Most typically, a theme is conceived as a pointlike or dimensionless entity and is located with respect to a place defined by a reference object. The reference object, unlike the theme, is spatially differentiated, and places on it are defined with respect to its dimensionality, orientation, shape, aspect ratio, or endpoints. For example, the English phrases \textit{on the cup, under the cup, and in the cup} pick out certain aspects of the geometry of the cup as relevant, such as the top or bottom of its vertical dimension or its interior region (and hence a preposition like \textit{in} is incompatible with objects whose geometry lacks the crucial geometric property, e.g., \textit{in the sheet of wood}). However the prepositions are completely nonspecific about the geometric properties of the theme object that is in, on, or under the cup. If the schematization of space and objects underlying spatial relations is carried over to abstract themes and locations, as the Theme Relations Hypothesis would predict, then the promotion of \textit{wall} to theme of a state change entails that it will be interpreted as a pointlike entity, without differentiation of its internal parts or geometry. The expression \textit{paint the wall} is saying something about the surface conceived of as an undifferentiated whole; if paint is adhering to it, then the unmarked interpretation is that it is adhering to all of it.

Given all these proposals, the locative alternation can now be stated simply: it is a rule that takes a verb containing in its semantic structure the core “\textit{X causes \textit{Y} to move into/onto \textit{Z}},” and converts it into a new verb whose semantic structure contains the core “\textit{X} causes \textit{Z} to change state by means of moving \textit{Y} into/onto it.” Basically, it is a gestalt shift: one can interpret \textit{loading} as moving a theme (e.g., \textit{hay}) to a location (e.g., a wagon), but one can also interpret the same act in terms of changing the state of a theme (the wagon), in this case from empty to full, by means of moving something (the hay) into it. The difference in argument structure follows from the linking rules: in the old verb, the moving thing was the theme and hence was linked to direct object; in the new verb, the location is the theme (of a state change) and hence is linked to object. The argument not linked to object gets linked to an oblique function or position by virtue of other linking rules in combination with lexical entries for specific prepositions. The holism requirement follows from the cognitive content of the notion of “theme” or located entity, which is generally construed as an undifferentiated point. Thus, the two different construals of the same event in this gestalt shift, and the two different argument structures, are closely linked: loading hay into a wagon is something that happens to hay; loading a wagon with hay is something that happens to a wagon. A similar account can be provided for the intransitive variants, such as \textit{Bees swarmed in the garden} versus \textit{The garden swarmed with bees}, where the garden is a theme and hence liable to a holistic interpretation only in the second sentence.

The constraints or criteria governing the locative alternation stem, to a first approximation, from the ability of a predicate to support this gestalt shift. What is special about an alternating verb is that it specifies the motion of an object or
substance (and generally its manner of motion), making it eligible for the into/onto construction, and that this kind of motion predictably causes an effect on the surface that receives the substance. For example, when a liquid is sprayed, it is sent in a mist or fine droplets. However, as a result of causing such movement, a surface to which it moves predictably has an even coat of deposited liquid adhering to it. This predictability is what is crucial: the with form requires a specific change of state, and the meaning of a verb like spray allows the speaker to predict exactly what that state change is. More generally, caused motion of a substance in the direction of a particular object and in a particular spatial configuration will result in the substance being deposited in or on the object in a characteristic way, changing its state. This provides part of the explanation for why the alternation does not extend to verbs of pure manner of motion such as pour, or to verbs of force exertion (push, drag, pull, tug, yank) or verbs of positioning (lay, place, position, put): there is no way to predict on the basis of the verb meaning alone what the effect on the goal argument will be. Conversely, this account helps to explain why verbs of pure effect, such as fill, which do not specify any specific kind of motion of a theme, cannot take the into/onto form.

Rappaport and Levin provide a strong piece of independent evidence for this kind of account. For some speakers it is possible to add the particle full to pour which introduces a specification how the container is affected: I poured the glass full. Interestingly, the addition immediately qualifies pour to participate in the locative alternation: I poured the glass full with water.

The general idea is summarized in (3.15).

(3.15)

Argument structures: V NP into/onto NP

<table>
<thead>
<tr>
<th>Thematic cores:</th>
<th>Move substance in a particular manner to an object</th>
<th>Affect object in a particular way by adding substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbs:</td>
<td>&quot;pour&quot;: substance moves in a stream</td>
<td>&quot;spray&quot;: surface is covered with drops by moving mist</td>
</tr>
<tr>
<td></td>
<td>&quot;spray&quot;: substance moves in a mist</td>
<td>&quot;fill&quot;: interior is occupied</td>
</tr>
</tbody>
</table>

I am not claiming that this view predicts the constraints on the alternation exactly: it would take some semantic gymnastics, for example, to show that spray inevitably yields a predictable effect on a surface whereas dribble never does. But I do claim that this is the principle behind the fact that criteria exist and take the kinds of forms that they do; the remaining piece of the puzzle, which delineates the alternating and nonalternating verbs more precisely, will be presented in section 4.4.2 and more formally in section 5.6.3.

A closely parallel account can be given of the alternation that involves removing something from something else, as in I emptied garbage from the bag / I emptied the bag of garbage. The argument structure that includes an object and a from-object has the thematic core "X causes Y to go away from Z," as in John grabbed the salt shaker from the table, involving familiar linking rules plus a lexical entry for from that specifies a source role (cf. The boy ran from the dog).

The argument structure incorporating an object and an of-object has the thematic core "X causes Y to change state by means of taking Z away from Y," as in John cleared the table of dishes. The preposition of might be used for various kinds of themes by default, serving as the "empty" preposition in English which jumps into action when a preposition is syntactically necessary but when no specialized role is involved. (A familiar example can be seen with argument-taking nouns and adjectives, which are forbidden to have syntactic objects: *Their destruction the city / Their destruction of the city.) Alternatively, of may have a more specialized entry complementary to with, indicating state change by subtraction; sometimes this is called the abstrument role (Dowty, 1987).

Verbs that appear in the from variant can specify an instrument of removal such as brush, comb, hose, or mop, a manner of causation of removal such as rub, rinse, scrub, or wipe, or the effect of physical removal, such as clean, cleanse, empty, strip, clear, or drain. However, only verbs in the latter class, which specify the effect of removal, can appear in the of-object form: I emptied // I wiped the can of water. (Unlike the in/of with version of the alternation, however, the verbs are not restricted from appearing in container-oriented forms altogether; the restriction is only against the container-oriented form that includes the oblique argument. Thus one can still say I wiped // I rubbed the can.)

Again, if a particle adds an effect component of meaning to one of the verbs in the nonalternating classes, the verb-particle combination can take the of form: I shoveled the walk clear of snow; They wiped the table clean of dirt.

In sum, the behavior of locative verbs supports a conception of argument structure alternations as operations that take a verb in one conflation class, serving as the thematic core of one kind of argument structure, and create a new verb, sharing the same root but having an altered semantic representation that places it in a different conflation class serving as the thematic core of a different argument structure. The argument structures themselves are predictable from general linking rules. Rappaport and Levin (1985) summarize the advantages of this kind of theory applied to the locative alternation by pointing out that it
provides answers to four questions that at first glance seem independent of one another. First, why does the meaning of a verb change when it assumes a new argument structure in the locative alternation? Because the rule altering the verb directly changes its semantic structure; specifically, it changes which argument serves as the theme. Second, why is the meaning of the verb in one argument structure so closely related to the new meaning of the verb in the other argument structure? Because the first meaning—move Z to Y—is incorporated as part of the second meaning—change Y’s state by moving Z to Y. Third, why do the two argument structures contain a grammatical object, linked to different entities in the two forms, and either an intonational or a with oblique object, rather than any of the numerous other ways that arguments could link with grammatical roles? Because there is a general linking rule that makes the theme the object, whether it is a theme of a location change or a theme of a state change, and there are other linking rules and lexical entries that assign the other argument to its appropriate preposition. Fourth, why are lexical rules choosy? Because the semantic change effected by the rule requires the specification of information—a specific kind of state change—that can be predicted from the the intrinsic meaning of some verbs but not others.

Now let us see if we can gain these same advantages by applying the theory to the other alternations under consideration.

3.3.4.2 The Dative Alternation The dative alternation embraces two alternations, one involving the preposition to, one involving for. The alternation with to can be seen as an operation that takes a verb with a semantic structure containing “X causes Y to go to Z” and converts it to a verb containing a structure “X causes Z to have Y.” Linking rules, primarily the one that links the theme or patient to the object position, affect the difference in syntactic argument structures. In one case, the entity being caused to move becomes the object; in the other, the entity caused to gain possession becomes the object. In both cases, more specific linking rules take care of the unlinked argument. As mentioned, evidence for the two thematic cores comes from nonalternating verbs: She carried the letter to the mailbox shows that “X causes Y to go to Z” is a possible substructure of an English verb and that such a verb is linked to a transitive argument structure incorporating a to-object; They charged him five dollars shows that “X causes Z to have Y” is a possible substructure of an English verb definition (in this case, causing someone not to have something), which is mapped onto the double-object form.

As in the locative alternation, there is often a change of interpretation accompanying the change of argument structure; if both alternations are a result of changes in semantic structure, such changes are to be predicted. Because the possessor in the double-object form is the patient or theme (I distinguish these later) rather than the goal, it should be interpreted as being affected by the transaction rather than simply being its target. This accounts for the contrast between teaching French to the students, possibly with no effect, and teaching the students French, with success, at least on the most salient reading (Green, 1974). I threw the ball to John can mean that John is merely the spatial target (possibly asleep or dead), analogous to I threw the ball to the target, but I threw John the ball entails that he was meant to receive it and invites the inference that he did. Similarly, it would be odd to say I told John the news if he were deaf or dead, whereas I told the news to John may be a bit less anomalous in those circumstances. A related effect noted by Green is that the recipient, when it is the object of the double-object form, is entailed to exist. For example, Juanita told her sorrows to God would come more easily out of the mouth of an atheist than Juanita told God her sorrows.

Richard Oehrle (1977), in a review of Green’s book, expresses doubt about some of these judgments. He suggests that the following sentences do not seem to be contradictory: I read him the figures, but when I looked up, he was gone, or When I took him his mail, I found that he had disappeared. However, most people find these sentences somewhat odd, and in an unpublished paper coauthored with Haj Ross (Oehrle and Ross, n.d.), Oehrle himself marks the sentence Jim threw the catcher the ball, but a bird got in the way as being ungrammatical, just as Green predicted. Nonetheless, Oehrle may be right that the intuition of a semantic change can be somewhat weak, especially in sentences like I gave a book to John / I gave John a book or I told a story to my children / I told my children a story. I suspect that it is because the meanings of those verbs inherently specify change of possession: give cannot be used to mean the physical motion of an object (He *gave I threw a book onto the table); tell can be used only if there is a comprehending listener who can extract the content of the speech (He *?told mumbled the lesson to the blackboard; in this example told is natural only on an intentionally ironic reading). In such cases, the dative shift does not add the notion of cause-to-change-possession to a verb meaning; it rearranges the verb meaning to make the cause-to-change-possession component apply to the possessor as affected entity. Thus for these verbs the meaning change accompanying dativization is logically vacuous: causing Y to go into the possession of Z is barely different from causing Z to possess Y. It is not psychologically vacuous, however, as it does have discourse consequences, allowing the speaker to focus either on what is done to the possessor or on what is done to the possession (Erteschik-Shir, 1979).

By the way, it should not be surprising that whether or not an argument is playing the role of theme affects its discourse properties. After all, a theme is
usually defined as an entity in a location or state or changing its location or state. But all objects are in some location or state; when an object plays the role of theme, it must be because the speaker is asserting or predicating a particular location or state of the object. Such highlighting or focusing, of course, is closely tied to discourse considerations. (See Hopper and Thompson, 1980, for discussion.)

Another piece of evidence showing that the possessor in the double-object construction is represented as a patient or theme is the existence of double-object idioms whose first objects have an identical semantic role to the sole object of nonidiomatic transitive verbs. The role of John in give John a kiss is the same as his role in kiss John; likewise for give John a punch / punch John, give John a bath / bathe John, and so on (Green, 1974).

Now that we have characterized the differences between the prepositional and double-object forms, we can see how those differences interact with the verbs in either class that the dative rule might try to reassign to the other. Generally, verbs can alternate only if they signify a transfer of an object that can result in its being possessed. The inadmissibility of *She carried the mailbox a letter stems from the inability of the action to result in the mailbox possessing anything. Conversely, the inadmissibility of *They spared that punishment to the policeman stems from the fact that the verb is asserting that the punishment does not go to the policeman, contrary to what the IO-structure would require.

The for-dative alternation can be treated similarly. Say that transitive argument structures containing for-objects are projected from verbs containing the conflation “X acts on Y for the benefit of Z.” Beneficiaries would be linked to oblique objects (indirect internal arguments); the preposition for is the only preposition whose semantic structure specifies a benefactive relation. Verbs taking the for-dative structure will alternate only if the agent, as a result of affecting the patient in the manner specified by the verb, can cause the beneficiary to possess the patient. Verbs specifying acts of creation (bake, sew, cook, make, etc.) dativize because creating something is a means of causing someone to possess it; likewise, verbs of obtaining (get, buy, find, etc.) can dativize because one person’s obtaining a thing is a means of causing someone else to get it. However, verbs that simply convey acts done for the benefit of a third party, without allowing one to predict the way in which the act can result in that party’s coming to possess the affected object, can appear in the for prepositional form but not the double-object form (e.g., I drove his car for him / I drove him his car).

As in the discussion of the locative alternation, these considerations do not give precise sufficient conditions for a verb to dativize. They do give necessary conditions, however, and provide an explanation for the sufficient conditions that I will discuss in section 4.4.1 (also in section 5.6.1).

3.3.4.3 The Causative Alternation The causative (or “anticausative”) alternation involves two argument structures: an intransitive and a transitive. Let us assume that the principal thematic core giving rise to the transitive argument structure is “X acts on Y.” Many action verbs, for example, contain this core, such as hit in I hit the wall. Y, the second argument of “act-on,” is traditionally referred to as the patient, and I would like to distinguish that role from the role of theme, the first argument of “go” or “be” (see also Jackendoff, 1987a, and Rappaport and Levin, 1988, for arguments that they should be distinguished). A patient is acted upon or impinged upon or inherently involved in an action performed by an agent but does not necessarily undergo a specified change. Of course, in real life a patient may undergo a change of state or location, but if it does, the verb does not care what that change is (e.g., the wall could shatter, fall over, or tumble down a hill, and the verb hit would be equally appropriate). However, the patient must be inherently involved in or affected by the action, playing a role in defining what the action consists of. For example, moving one’s hand to within a fraction of an inch of the wall, even if the accompanying wind or static electricity causes the wall to fall over, would not count as hitting the wall, because the kind of motion or act denoted by hitting is inherently defined as terminating in contact with some patient. Similarly, the patient has a role in temporally delineating the event referred to by the verb; the hitting is over when the patient is contacted (see Dowty, 1987; Tenny, 1988). A theme, on the other hand, is predicatively to be in a location or state or to undergo a change of location or state, whether or not it was caused by an agent. For example, if a bug dies (bug = theme), it is definitely dead, but it could become so at the hands of an exterminator or because of old age. Some verbs specify arguments that are both patients and themes: when I cut an apple, the apple must have a cut in it, and the cut must have been effected by my cutting it in a certain way (viz., by my moving an object into contact with it; see B. Levin, 1985: Hale and Keyser, 1986, 1987). As we shall see in section 4.2, this purely semantic distinction, involving different entailments, has grammatical consequences.

A verb that specifies an argument that is both a patient and a theme, such as cut, chip, shatter, or kill, is a causative verb. The agent, by acting on a patient, causes it to change state or location. An elegant way of dealing with the directness condition on causatives is to derive it from the thematic roles assumed by the causee. Assume that the notion of “acting on” that defines the role of patient inherently means “directly act on” (this is independently motivated by the phenomena in example 3.7 in section 3.2.2 and by the larger set of phenomena discussed by Hopper and Thompson, 1980). Then the directness constraint on lexical causatives derives from the fact that in transitive verbs in English, the causee is a patient of the action denoted by the verb as well as a theme; in the
periphrastic locution involving an intransitive verb (cause to die; cause to
shatter), the causee is only a theme. Thus the directness constraint on inter-
perturbation would fall out of the inherent definition of the thematic role of patient in
the same way as the holistic constraint on the interpretation of locatives falls out
of the definition of the thematic role of theme—and the premise that English has
a conflation class “X acts on Y (= patient)” but no conflation class “X acts, causing
Y (= theme) to move or change” which could serve as a thematic core for
transitive verbs lacking patients. In other languages, such semantic confluations
seem to be possible, as there are rules yielding indirect lexical causatives as well
as rules yielding direct lexical causatives, often differentiated by alternative
suffixes on the verb (e.g., in Hebrew, Berman, 1982; and in Hindi, Saksena,
1982). However, when languages have both a lexical and a periphrastic or
“analytic” causative, the lexical causative is generally the one signifying direct
causation (Shibatani, 1976; Comrie, 1985). This suggests that the conflation of
an agent and a patient/theme is more natural as a thematic core than the confla-
tion of an agent and a pure theme.

The cognitive content of thematic roles, such as the directness interpretation
accompanying the role of patient, must be treated with some subtlety. Viewed
with a sufficiently sharp microscope, there is no such thing as direct causation:
when I cut an apple, I first decide to do it, then send neural impulses to my arm
and hand, which cause the muscles to contract, causing the hand to move, causing
the knife to move, causing the knife to contact the surface of the apple, causing
the surface to rupture, and so on. Nonetheless, there is a clear sense in which this
causation differs from paying a servant to cut an apple. When describing an
event, one always chooses a grain size below which events are treated as invisible
or irrelevant. For physical actions initiated by a person, muscular events and
most intervening physical events are below the grain size, so that you can break
a window with your fist or by hitting a long fly ball, but the intervention of another
agent, such as a jittery window-installer, is seen as interpolating an intermediary
of the same grain as the original agent. That is why you can cause the window
to break by shouting “boo,” but you ordinarily wouldn’t call that breaking a
window. However, many verbs can be extended to yield a much more macro-
scopic perspective, such as in Man reaches the moon or Napoleon invades
Russia. When a verb with a causative component is used at that scale, such as in
Nixon bombed Cambodia or John, the president of United Fruit, grows bananas
in Guatemala, the directness condition applies at that scale. These sentences are
permissible despite the very long chain of intervening causal links because the
links are not comparable in grain size to the decision-making or responsibility-
assuming that is predicated of the subject. For that reason it would still be unusual
to say that The National Security Council bombed Cambodia just because it
persuaded Nixon to do so (likewise, The voters of every state but Massachusetts
bombed Cambodia) or that Harvard grows bananas just because the university
holds stock in United Fruit.

Let us turn to intransitives. The intransitive argument structure has at least two
distinct thematic cores paired with it: one underlying unergative verbs, where
X performs some action or activity (e.g., run, walk, sleep, eat, breathe, cry,
dance), and one underlying unaccusative verbs, where X exists in or undergoes
some change of location or state (e.g., bounce, slide, melt, open). The definitions
of the unergative verbs usually imply that the proximal instigation or causation
of the act is due to some internal mechanism, force, or quality; thus, as agentlike
entities, they qualify to be subjects. The subjects of unaccusative verbs are
generally themes. They are not specified to be in a state or location as the
necessary result of any cause; something can open or break or slide all of a sudden
and for no apparent reason.

As discussed in sections 1.4.5.1 and 3.3.1, theories of grammar differ as to why
both the theme argument of unaccusative verbs and the agent or actor argument
of unergative verbs are mapped onto the surface subject position. For unaccu-
sative verbs, GB posits movement from the underlying object position to an empty
subject position. L. Levin’s version of LFG posits that the theme is first mapped
onto a class of functions that is uncommitted to either subject or object, which
is then mapped onto subject if that role has not already been assigned. Relational
Grammar posits that the theme is mapped onto the object relations in an
underlying stratum of grammatical relations and promoted to the subject relation
in a superficial one. The attention to unaccusativity within all the major
frameworks stems from a recognition that there are widespread grammatical
consequences of the unaccusative/unergative distinction, requiring that the
distinction be captured in some grammatical representation. One example is the
 possibility of “impersonal” passivization in Dutch: you can say Er wordt hier
doorgeleed “It is danced here a lot by the young people,” but not *Er werd
doorgelede in Amsterdam gebleven, “It was remained in Amsterdam by the young people.” Another is auxiliary selection in Italian: unac-
cussatives take essere, “to be,” as in Giovanni è arrivato, “Giovanni is arrived,”
whereas unergatives take avere, “to have,” as in Giovanni ha telefonato,
“Giovanni has telephoned.” A third example is from English: intransitives can
be converted into adjectival passives in English only if they are unaccusative:
wilted lettuce, a fallen leaf, *a run man, *a coughed patient. If all of these phe-
nomena can be derived as automatic general consequences of an argument’s
being in direct object position, the GB-style accounts whereby they are initially
in direct object position is mandated. If they can be derived directly from an
argument’s thematic status as theme in a structure lacking an agent, versus agent
in a structure lacking a patient, no difference in a purely syntactic representation is needed. Grimshaw (1987) points out that not all of the reflexes of the unaccusative/unergative distinction coincide in every language; she suggests that each of the syntactic differences may be caused by different properties of the various verbs (see also Grimshaw, in press; Kiparsky, 1987). This would be consistent with the spirit of the current theory, whereby the criteria that delineate argument structure alternations are stated in lexicosemantic structure, not in argument structure itself.

Among the four alternations I discuss in detail, the causative alternation is the one that is most clearly semantic, as it adds an argument with a specific semantic role, namely that of causal agent. Specifically, the theme argument of an intransitive predicate is assigned the additional role of being the patient of an act, and a new argument, the agent of that act, is added: “X goes to a location or state” is converted to “Y acts on X, causing X to go to a location or state.” The theme is reconstrued as undergoing a change as the result of being a patient, that is, as the result of being acted on by some agent. The argument structure follows directly from the linking rules that map agent to subject or external argument and patient to object or direct internal argument. The directness interpretation falls out of the additional role assigned to the theme, namely patient. Arguments that were not themes to begin with because they act voluntarily or as a result of causes internal to themselves, rather than passively changing, such as agents of unergative intransitives like talk, do not submit to the rule. The presence of an internal cause implies that any external causal entity cannot effect the causation directly; the causation is always mediated by the internal mechanism or force. Arguments that are both themes of motion and agents of unergative intransitives, such as jog (where a change of location takes place as well as an action), also do not submit to the rule; again there is no way to act on an agentic potential jogger causing him to jog in the same sense that one can directly act on a window causing it to break.

As I emphasized when discussing the other alternations, this is not meant to be a sufficient condition for the possibility of a verb’s alternating, only a necessary one, and one that supplies part of the explanation for the sufficient conditions I will supply in in section 4.4.3 (see also section 5.6.2). There are also some subsidiary alternations that appear to violate the “theme → patient and theme” rule I have been proposing, including John drove / I drove John and Bill cheered up / I cheered up Bill; I will also defer discussing these till later.

There are cases that do not conform at all to my depiction of the causative alternation, but one can show that this is because they simply have nothing to do with productive causativization. Clemens walked the batter, for example, is surely an isolated verb that is learned by positive evidence; no fan or announcer says *Clemens singled / doubled / tripled / homered / flied out / grounded out / popped out the batter. Similarly, He burped the baby and Dr. Smith bled the patient are freestanding items: *He vomited / ate / slept / cried / cooed the baby; *Dr. Smith coughed / vomited / urinated / spat the patient. These are the kinds of examples that have motivated a putative constraint of stereotypy of causation: one walks a batter only by throwing four balls, one burps a baby by putting it on the back; bleeding a patient was a common locution mainly when causing to bleed was a standard medical procedure (Gergely and Bever, 1986). Therefore it is probably not accurate to say that a stereotypy condition applies to the causative alternation; rather, it applies quite generally to the coining of isolated words. Surely words cannot be created whose meanings are based on knowledge possessed only by a single speaker; no one would understand him (Clark and Clark, 1978). And as we have seen from (2.16), productive causativization does not conform to any obvious stereotypy-of-manner requirement.

3.3.4.4 The Active-Passive Relation As I mentioned in section 3.3.1, the passive is different in two ways from the other alternations I discuss in detail: it involves a morphological change, and its range of application is far greater. I will discuss the significance of these differences in detail in section 4.4.4, but here I want to show that the theory that argument structures are projections of thematic cores can be applied fruitfully to the passive as well. The basic motivation is the same as for the other cases. Not all transitive verbs passivize (there is “passive resistance,” as Robin Lakoff, 1971, put it). Since the verbs that submit to passivization are delineated by semantic criteria, at least one part of the process producing passives must be an operation on semantic structure (see also L. Levin, 1985, who makes a similar point). That is, the verbwise sensitivity of the passive can be explained by an interaction between the inherent lexical semantics of verbs and a particular semantic change required by the passive rule.

Passivization changes the structure of transitive verbs. This means that there are two ways that one could try to capture the semantic choosiness of the passive. First, one could say that passivization is a purely syntactic operation that applies to any transitive verb, but not all verbs that appear to be transitive really are transitive. Thus the postverbal arguments of unpassivizable verbs like cost and have would not really be direct objects, appearances to the contrary notwithstanding; they might, for example, be the second object of an underlying double-object structure from which the first object has been moved into surface subject position. In that case, the semantic constraints on passivization would really be semantic constraints on what kinds of arguments can be linked to object position. Unpassivizable verbs would be those with an argument that is linked to a bare postverbal NP that is not a genuine direct object or direct internal argument; the
passive rule, which requires a genuine direct object, would be blocked. The second possibility is that verbs that look transitive really are transitive, and that passivization is sensitive to verb semantics. It is difficult to tell these hypotheses apart because the traditional test of objecthood in English is passivizability itself. Because there are no generally accepted tests that distinguish “fake” transitive verbs from “real” ones, and to maintain consistency with the other alternations, I treat constraints on passivizable verbs as constraints on the passive rule itself. This is not an iron-clad tenet of the theory, however; if it can be shown on independent grounds that all unpassivizable verbs are not genuinely transitive and vice-versa, the semantic filter I will argue for can be removed from the passive rule and placed in the linking rule that creates the verbs that look transitive but aren’t. The nature of the solution to Baker’s paradox as it applies to passivization would remain unchanged.

What are the properties of the passive surface structure, independent of the alternation that produces the verb in it? Few or no verbs exist only in the passive. Some putative examples, such as rumor in John is rumored to be a Communist; They rumored John to be a Communist, are probably adjectives, and it is not clear what to make of contrasts where the passive sounds more natural than the active, such as My mother was twenty when I was born versus My mother was twenty when she bore me (Bolinger, 1977a). In any case we can consider the thematic concomitants of the surface expression of the passive construction’s two arguments, the subject of be and the object of by. Jackendoff (1983) argues that be is not a meaningless tense-carrier but a predicate expressing the “location” of a theme, either in physical space (John is in the room) or in one of the abstract “spaces” that borrow the vocabulary of physical space, such as identification (Clark Kent is Superman), possession (This is mine), or circumstance (John is sick). This suggests that the subject of the passive participle may be a kind of theme, presumably a theme of circumstance. That is, John was hit means John was in the circumstance of someone’s having hit him. This would be consistent with the “predication effect” of passivization noted in section 3.2.3. Although I have stated this hypothesis in terms of the underlying object’s being directly assigned to the surface subject, it can also be stated in GB terms: the circumstantial theme role can be linked to an internal argument of a predicate that does not have an external argument; the internal argument will generally end up as the surface subject of simple clauses.

The second argument of the passive is prototypically the object of by, which signifies an agentlike role in English fairly generally, not just in passives: This painting is by Monet; No tomfoolery by students will be tolerated; Bribe-taking by politicians will be severely punished; Get your child “Tony the Pony” by Marx! It is not literally an agent role because it doesn’t make much sense to talk about the “agent of a pony” or the “agent of a painting”; the more general notion is of a “responsible entity” or “author.” The centrality of this argument role in the verbal passive is underlined by the interpretation of short passives like John was hit. Despite the absence of a by-phrase, the agent role in short passives is a well-defined “implicit argument” (Keyser and Roep, 1984). For example, the sentence The ship was sunk entails that there was some agent or force that sunk the ship; in the unaccusative counterpart The ship sank, no such implication exists. There could have been no apparent reason, or it could have been a long-term consequence of a lack of preventive maintenance. Moreover, purposive adjuncts, which require agentive events to control them, can occur with short passives: The ship was sunk to collect the insurance (cf. *The ship sank to collect the insurance; see also Lasnik, 1984). Thus a crucial difference between the passive and other intransitive argument structures with theme subjects is that the passive forces an interpretation whereby the existence of an agent-like argument or party responsible for the circumstance predicated of the theme is asserted. We can call this the “agency effect.” It is now necessary to find a thematic core for passive argument structures out of which should fall the agency effect and the predication effect, just as the directness effect, the holistic effect, and the possessor effect fell out of the thematic cores for the transitive causative, the withlocative, and the double-object dative.

Imagine that the following thematic core is created by a passive rule: X is in the circumstance characterized by Y’s acting on it (more generally, the circumstance for which Y is responsible; for now let me use the term “agent” to refer to this general sense of causal efficacy and “patient” to refer to the entity that it affects or defines the state of). That is, X is a theme in a semantic field corresponding to being in various states or circumstances; the position in that field that X occupies (in other words, the circumstance that John is now in) corresponds to X’s being a patient and Y’s being an agent. The rule creating this thematic core would have as its primary operation the suppression or demotion of the agent argument (see Zubizaretta, 1987), from the topmost level of the semantic structure of the verb to an embedded position in the definition of the circumstance predicated of the other argument. With no agent role defined, linking rules would map the theme onto the subject function (LFG), or onto the internal argument position, from which it would be moved to subject position (GB). Assume also that semantic structures can specify arguments that are “implicit,” that is, not “open” or linkable to grammatical functions. An implicit argument has no overt syntactic realization but is still defined, ensuring that it is entailed to exist when the sentence is interpreted semantically and that it can play various grammatical roles such as defining the controller of certain adjuncts. Full passives would be the same as short passives except that the agent argument
in semantic structure would be marked as being "open"; a phrase containing by would be linked to it because the dictionary entry of by and of no other preposition defines a quasi-agentive role for it.

As mentioned, if the subject of a passive is being redefined as a kind of theme, then the predication effect or difference in interpretation between Beavers build dams and Dams are built by beavers would follow. As a consequence, verbs whose objects cannot be interpreted as themes should not passivize. This is compatible with a number of types of nonpassivizability (see, Anderson, 1977, and Bolinger, 1977a, for similar analyses of constraints on the passive). For example, idioms are often cited as an example of the insensitivity of the passive to semantic factors, because the chunks of idioms are taken to be meaningless. But as Gazdar et al. (1985) point out, it is not that the chunks of all idioms are utterly meaningless; it’s just that the meaning of a chunk cannot be predicted from the meaning of the words in isolation or in other phrases. It has been widely noted that the easier it is to conceive of a possible or metaphorical meaning for an idiom chunk, the more passivizable that chunk is (Fiengo, 1977; Gazdar, et al. 1985; Wasow, Sag, and Nunberg, 1983). Thus in Tabs were kept on subversives and The hatchet was finally buried, tabs can be interpreted as "surveillance measures" and the hatchet as "a dispute," of which one can predicate various properties or changes. However, in *The bucket was kicked or *The bullet was bitten, the idiom chunks lack such themes. Similarly, cognate or "fake" objects are unpassivizable, as in *A hearty laugh was laughed; *A horrible death was died.

The requirement that the state predicated of the theme be defined in terms of the theme’s being a quasi-patient of some agent or agent-like responsible party would, naturally, allow all actional verbs to passivize. This would include the alternating forms of verbs in which the patient can be alternatively construed as the entity caused to undergo a location change (The book was handed to John; The hay was loaded into the wagon) and as the entity caused to undergo a possessional or physical state change (John was handed a book; The wagon was loaded with hay). With a suitably abstract characterization of agents and patients motivated by an extension of the Thematic Relations Hypothesis (to be discussed in the next chapter), passivization would be compatible with many abstract predicates in which ideas or situations are asserted to cause or be responsible for one another, such as The horror of the last war justified the new treaty / The new treaty was justified by the horror of the last war, which is analogous to the obviously agentive counterparts John justified the new treaty / The new treaty was justified by John.

Another manifestation of the agency effect can be seen in a phenomenon noted by Perlmuter and Postal (1984): that prepositional passives (e.g., This bed has been slept in) are acceptable with unergative verbs, as in (3.16a), but not with unaccusative verbs, as in (3.16b).

(3.16) (a) The bed was slept in by the Shah.
    The package was stepped on by a camel.
    (b) *The package was accumulated on by dust.
    *The oven was melted in by an ice cube.

If unergatives involve an agent whereas unaccusatives involve only a theme, the agency effect would be compatible with the former but not the latter. An additional pragmatic factor governing prepositional passives has been noted by Bolinger (1977a) and Davison (1980): they are most acceptable when the prepositional object is seen as being affected in some way by virtue of an agent’s having acted upon it, either physically, as in This bed has been slept in (it’s a mess); This bridge has been driven on (its roadway is damaged), or in terms of status or interest value, as in This bed has been slept in by George Washington (it’s special) and This bridge has been flown under (proving how high it is). When the theme/patient analysis is unavailable, as in the examples in (3.17), passivization is impossible.

(3.17) John ran out during the symphony. / *The symphony was run out during by Bob.

We talked in the park. / ?*The park was talked in by us.

They drank after the rugby game. / *The rugby game was drunk after.

We walked to the store. / *The store was walked to by us.

Because the passive argument structure expresses an asymmetrical relation in which the passive subject is in the circumstance characterized by being acted upon by an agent, any verb for which there is no way of construing one entity as an agent and another as a patient should fail to undergo passivization. This would account for the unpassivizability of "symmetrical predicates" like resemble (e.g., *Gene is resembled by Tom; *Di was married by Charles; *Four is equaled by two plus two). Likewise, transitive verbs of pure spatial relations (contain, lack, fit, and the static spatial sense of touch) and the transitive verb of pure possession have, with no possible sense of patienthood that could be predicated of a theme, would be incompatible with the thematic core that the passive argument structure is a projection of. Similarly, for measure verbs, such as in *Five hours were lasted by the party, there is no way to think of five hours as being in any sort of circumstance or of the party as doing anything to it. Though I will have to give alternative analyses to many of the phenomena that Jackendoff (1972) tried to explain with the Thematic Hierarchy Condition, the general spirit of the THC is that in the passive, the by-object should be more agentive (or at least, not less agentive) than the surface subject. This is a powerful constraint on
children's passivization of newly learned verbs, and it is closely related to the current proposal, in which the passive is constrained to have its surface subject be a theme in a circumstance characterized by the action of an agent, expressed as a by-object (Pinker, Lebeaux, and Frost, 1987).

There is, then, a relationship between the syntactic form of the passive, the change of interpretation that accompanies passivization, and the patterns of verbwise selectivity of the passive. Three questions are still open—what is the exact change effected by the passive rule, why are there semantically similar pairs of verbs that differ in passivizability, and why does the passive appear to apply with fewer restrictions than the other alternations?—and they will be discussed in sections 4.4.4, 4.5, and 5.6.4.

### 3.4 On Universality

I have tried to show that semantic criteria on argument structure alternations are not odd little conditions tacked onto syntactic rules, but manifestations of general principles of how predicates may be composed out of thematic elements and how arguments are mapped onto thematic roles. If so, we might expect to see the same kinds of constraints operating on the same kinds of rules in other languages. This was not predicted by the earlier view (e.g., Mazurkewitch and White, 1984; Pinker, 1984), in which the criteria were simply abstracted from a database of alternating verbs in the language, learned individually. Nor is it an inevitable consequence of the current theory; each language could have its own special linking rules, learned anew by each child, and the lexical rules in the language could display patterns of itemwise selectivity that were systematic and predictable within that language but not replicated in others. However, the theory would obviously be more interesting if it made stronger predictions about other languages and about the innate proclivities of the child.

In many theories, linking rules of some sort are assumed to be universal (see, e.g., Perlmutter and Rosen, 1984), and there is considerable evidence for this position. Keenan (1976) reviews cross-linguistic research showing that agents and causal forces are universally encoded as subjects, at least in each language's "basic sentences." He also shows that an entity of which something is predicated is encoded as subject when there is no agent. Hopper and Thompson (1980) review evidence for a close association across languages between grammatical objects and the argument that is acted upon and caused to undergo a change. Dryer (1986) reviews a diverse sample of languages with ditransitive constructions and notes that the second object is notionally a "patient/theme," generally nonhuman, in the context of a first object that is a "goal/beneficiary," generally human. Thus rules that link agent to subject, theme in a noncausative verb to subject, patient to object, theme of a causative verb to object, and theme of a semantically ditransitive verb with a goal/beneficiary argument to second object seem to be widely applicable across the world's languages. I am not aware of analogous surveys for oblique or indirect arguments, but most of the language-particular properties of prepositions and oblique case markers can be factored out of any linking rule for oblique arguments and localized in the lexical entries for those individual morphemes. Thus it is probably possible to define linking rules for obliqueness itself that are likely to be universal; in chapter 5 I suggest two.

To the extent that the linking rules I have proposed are found in other languages, the argument structures they use should be paired with verbs having similar kinds of thematic cores to those we find in English. Furthermore, lexical rules that map between the same pairs of argument structures should be subject to the same kinds of constraints as those discussed in this chapter. Thus the new theory (augmented by assumptions about the universality of linking rules) makes a very strong prediction that the kinds of constraints I have discussed in this chapter should show tendencies toward universality. Either the criteria should be universal accompaniments of homologous rules (to the extent that they can be identified across languages) or there should at least be a tendency for the particular kinds of criteria we see on English lexical rules to be associated with the same kinds of rules in other, historically unrelated languages. Though an original review of cross-linguistic constraints on lexical rules is obviously beyond the scope of this book, we can examine the relatively theory-neutral cross-linguistic surveys done by others, such as those in Shopen (1985a, b).

**Causative.** Many languages have regular morphological alternations between a predicate X and a predicate cause-to-X. According to Comrie's (1985) review, "The cause, apparently universally, appears as subject of the causative verb" (p. 335). Periphrastic causatives are also widespread; Comrie calls these "analytical" and contrasts them with lexical causatives, which he calls "morphological." He notes: "In general, formation of analytical causatives is completely productive. ... The degrees of productivity of morphological causatives varies immensely from language to language" (p. 332). This variability will be discussed in detail in the next chapter, but the variation is within the limits we would expect: "One often finds that when a language has both analytic and morphological or lexical causatives, the former implies less direct causation than the latter" (p. 333). Nedystalov and Silnitsky (1973), in their survey of causative constructions in over one hundred languages, state that "If a causative morpheme forms [a causative verb] only from [an intransitive verb], it usually expresses contact causation. In these cases distant causation is usually expressed by combinations with empty causative verbs" (p. 14). Shibatani (1976) offers similar conclusions. Thus the association between adding a subject to a predicate and getting a predi-
cate with a causative reading where the subject plays the role of agent is a widespread phenomenon, as is the association between lexical causatives and the directness constraint.

**Passive.** Keenan (1985) offers the following generalizations about passive in the world’s languages: “If a language has any passives it has ones characterized as basic ... moreover, it may have only basic passives,” where “basic passives” are characterized as follows: “(i) no agent phrase (e.g., by Mary) is present, (ii) the main verb (in its non-passive form) is transitive, and (iii) the main verb expresses an activity, taking agent subjects and patient objects” (p. 247). Among the corollaries and related generalizations Keenan offers are the following: “If a language has passives of stative verbs (e.g. lack, have, etc.) then it has passives of activity verbs. ... Passives are often not formed freely on transitive verbs whose objects are not patients, that is, not portrayed as being affected” (p. 249).

Recall that the criteria surrounding passivization in English seem to stem from a predication effect (some state is predicated of the patient) and an agency effect (the state is attributed to the force of some agent). Keenan notes the cross-linguistic prevalence of both: “The subject of a passive VP is never understood to be less affected by the action than when it is presented as the object of a transitive verb” (p. 268); “The distinction between passives and middle or reflexives is made on semantic grounds: the implication or presence of an agent” (p. 254).

**Dative.** Dryer (1986) presents a “small but diverse” sample of languages that have ditransitive constructions, including Ojibwa and Cree (Algonkian), Huichol, Palaun (Micronesia), Chi-Mwini (Bantu), Khasi (Mon-Khmer, Assam), Lahu (Burmes-Lolo), Kokborok (Bodo-Garo, Assam), Kham (West Tibetan), Nez Perce (Oregon Penutian), and Tzotzil (Mayan). He notes that the semantic roles of the first and second objects are “goal/beneficiary” and “patient/theme,” respectively, and all the examples he cites except one (a pure benefactive) contain verbs whose English translations dativize. In other surveys we find other languages unrelated to English that have an alternation similar to the dative pertaining to “recipient” arguments. Foley and Van Valin (1985) mention Nengone (an Austronesian language spoken in New Caledonia) and Acooli and Lango (Nilotic languages spoken in Uganda) as examples; Shona, a Bantu language, and Bahasa, an Indonesian language, both discussed briefly in Dowty (1979a), appear to be similar. Foley and Van Valin also note that in several languages it is only verbs of giving that undergo this alternation, and they imply that this might be true in general when the input form involves the equivalent of the preposition to. In addition, many languages add a verb-adjacent object argument, and when they do it generally has the role of recipient, possessor of the theme, or benefit/malefactive (Foley and Van Valin, 1985), as in the English for-dative (see sections 3.3.4.2, 4.4.1, and 5.6.1). Alternations of this general sort are found in several Mayan languages (Foley and Van Valin, 1985) and in Swahili (Comrie, 1985).

**Locative.** I am not aware of any cross-linguistic surveys of locative constructions, but it is not hard to find evidence for patterns of association in a variety of languages. Alternations similar to the English locative, often marked with an affix on the verb, are found in Hungarian and Indonesian (Foley and Van Valin, 1985), Russian and German (Comrie, 1985), Berber (Guerssel, 1986), Igbo (a Nigerian language; Nwachukwu, 1987), and Japanese (Fukui, Miyagawa, and Tenn, 1985). Rappaport and Levin (1985) note that “when a language manifests the alternation the verbs that participate in the alternation fall into the same broad semantic class as the English locative alternation verbs” (p. 36). Furthermore, the holistic effect and phenomena related to it are not restricted to English: Foley and Van Valin remark on it in discussing Hungarian, Comrie does so for Russian, and Nwachukwu notes that in Igbo the version of the locative that allows an equivalent of the preposition with requires a verb that is compounded with a predicate meaning full, for example, “pack-full” = fill by packing. This is obviously reminiscent of the contrast in English between *I poured the glass with water* and *I filled the glass with water* or *I poured the glass full with water*.

Thus the theory of argument structure alternations presented in this chapter, which was intended to explain constraints on alternations as manifestations of the nature of the alternation, has an unanticipated benefit: it is consistent with the fact that the same alternations in other languages are prone to applying to the same kinds of verbs and being constrained by the same kinds of criteria and shifts in interpretation as one finds in English. Of course, languages do differ in the exact sets of verbs that are allowed to undergo each alternation; in the next chapter I try to explain where this variation comes from and how it is defined precisely within a language.
Chapter 4
Possible and Actual Forms

4.1 The Problem of Negative Exceptions

Constraints on lexical rules that furnish criteria for selecting verbs can solve Baker's paradox in principle, but raise two problems in practice. First, why are they there? Second, are there any that work? In chapter 3, I tried to answer the first question. I proposed a theory in which semantic constraints on lexical rules are motivated by the very nature of those rules, and I used it to show why various verbs do not participate in argument structure alternations. Such verbs are clearly ruled out because they are cognitively incompatible with a thematic core associated with the argument structure. You can sell but not *drive Mary the car, because the double-object form expresses causation of a possession change and selling but not driving results in a possession change. You can spray but not *put the plant with water, because the with-locative requires a specific state change and putting does not specify what it would be. You can slide but not *decide the boy, because the lexical causative requires unmediated causation, which is possible for sliding but not deciding. And a hatchet can be buried but a bucket can't *be kicked, because the passive predicates something of a theme and the hatchet but not the bucket corresponds to a possible theme.

However, the second problem, ruling out negative exceptions exactly, has not yet been solved. Clearly there are many differences between alternating and nonalternating verbs that cannot be ruled out by such coarse differences in meaning. One cannot simply live with these as unexplained counterexamples. Because they are negative exceptions, Baker's paradox would remain unsolved. Consider how the theory as stated so far would try to explain the differences in (4.1), (4.2), and (4.3).

(4.1) John took Mary the ball.
John threw Mary the ball.

*John carried Mary the ball.
John asked Mary a question.
*John shouted Mary a question.
John gave Mary sheets.
*John supplied Mary sheets.
John found Mary a dress.
*John chose Mary a dress.

(4.2) Betty splashed the floor with suds.
*Betty spilled the floor with suds.
Betty wrapped the pole with ribbons.
*Betty coiled the pole with ribbons.
Betty smeared the wall with paint.
*Betty attached the wall with posters.

(4.3) Sam bounced the ball.
*Sam fell the ball.
Sam melted the butter.
*Sam disappeared the butter.
Sam walked Annette home.
*Sam went Annette home.

Amy slid her daughter across the floor.
*Amy sweated her daughter.

One might try to appeal to subtle meaning differences among the verbs. For example, one could say that taking and throwing can inherently mean "cause X to possess Y by taking/throwing Y to X" but that carrying does not mean "cause X to possess Y by carrying Y to X." Similarly, one could say that asking inherently implies communication with another party and hence is a way of causing someone to possess a message, whereas shouting is merely a kind of behavior, with no necessary causal effect on a listener. Finally, finding can mean "finding X as a means of causing Y to have X," whereas choosing cannot have the meaning of being a means to such an end.

Similar accounts could be applied to the locative. Splashing could be said to effect a predictable state change on the floor (it is covered with liquid over a large part of its surface), whereas spilling could be said to constrain only the manner in which the liquid is caused to move, with no necessary effect on the surface where the liquid ends up. Similarly, the argument would go, being wrapped or
pure semantic compatibility as a way out of Baker’s paradox predicts that anyone who knows the meaning of a verb will use it predictably in the argument structures we have been dealing with. This would seem to rule out dialect differences in the syntax of common concrete verbs. But such differences appear to exist: Georgia Green (1974), for example, finds *shout him the answer* and *carry him the box* to be grammatical in her dialect, unlike the one spoken by me. Yet surely Green and I do not differ in our knowledge of what *shout* and *carry* mean—unless the meaning difference is so abstract that it is virtually the same as the difference in syntax that we are trying to explain.

In sum, the criteria that emerge from the nature of the semantic change effected by the lexical rules seem to function as necessary conditions for an alternation, specifying a meaning component that a verb must be capable of including if it is to alternate. But these criteria do not function as sufficient conditions: some verbs seem to be capable of containing the required meaning but still do not alternate. As we shall see, this difference is a consequence of an important dissociation between semantics and cognition.

### 4.1.1 Why the Negative Exceptions Exist

Consider one of the design problems that language is faced with: providing the means of expressing the arguments of an essentially unbounded set of possible verbs. Predictable linkages between argument structures and verbs’ semantic structures help solve the problem: if you know what a verb means, you can guess what syntax it can use without your having to learn its argument structure from the input. But obviously the predictable linkages can’t consist of an innate list of all possible verb meanings and their corresponding argument structures; new verbs that natural selection could not have anticipated are constantly being invented (*debug, slam-dunk, out-Reagan*, etc.). Instead, we have been given a much smaller set of semantic elements that recur through thousands of verbs—such thematic subpredicates as “cause,” “go,” “be,” “path,” and their arguments “agent,” “patient,” “theme,” “goal,” and so on—and linkages to syntactic devices. By looking for such elements in the semantic decompositions of verbs, a speaker can predict the verbs’ syntactic privileges, even for brand-new verbs, as long as they contain some of those elements.

But how does a speaker know which semantic elements are in which verbs? Perception and cognition are flexible, and this causes a problem. Most situations can be construed in many different ways involving the crucial thematic elements, especially since thematic relations can apply either literally to spatial location or metaphorically to states and circumstances. When I hit a wall with a stick, is the wall an “affected entity” and the stick the “instrument” with which I affect it, or is the stick the affected entity, because it moves, and the wall the goal of the
movement? When I pour water into a glass, am I affecting the water by causing it to move, or am I affecting the glass by causing it to go from not being full to being full? When Sue likes John, is she causing herself to think well of him, or is John causing her to approve of him? If Jim does an impression of Richard Nixon for Bill, is he causing Bill's laughter in the same way that he can cause a spoon to fall, or does Bill have enough free will that "causation" is an inappropriate concept? When Mary shouts across a noisy room to Bob, what is she doing; affecting Bob, creating a message, moving the message across the room, or just moving her muscles in a certain way? Even the choice of the agent and patient of an action event is not irreversibly burned into our minds. "French-kiss my elbow!" shouts the hockey player. In general, these choices can't just be left up to an individual speaker at the moment of the speech act, because they could lead to conflicting applications of thematic-syntactic linking rules—either John or Sue, either Mary or Bob, could be construed as the agent, hence subject, bringing back the ambiguity that the design of language should be trying to minimize.

I suggest that language has chosen a particular solution to the problem it took on when it tried to map flexible cognition onto rigid syntax. Language guards its verbs' grammatically relevant semantic structures vigilantly. In ordinary natural speech, speakers cannot construe the meaning of a verb however they see fit before mapping it onto syntax, even if such a construal is consistent with the referent event. Rather, in cases of potential thematic ambiguity, new meanings can be assigned to old verbs only in fairly precise circumstances. Only certain relatively narrow classes of verb meanings are given the privilege of being reconstruable as having new, related verb meanings.

Here is an example. In the case of the dative, what good is it to know that "verbs can take the double-object argument structure only if they involve causation of a change of possession" if one cannot tell a priori whether a given verb can be construed as meaning "cause a change of possession"? Certain verbs like give have that meaning by definition, and other verbs like sleep do not mean that under any reasonable construal, but what about verbs in the gray area, such as throw or carry or bake, where changes of possession are possible but not necessary results? I will show that English makes the decision for us. It uses independent, semi-arbitrary configurations of semantic features as criteria about what kinds verbs have meanings that can be construed as ways of causing a change of possession. For example, it turns out that verbs that denote instantaneous imparting of force to an object causing ballistic physical motion—the class that includes throw, toss, kick, slide, roll, and bounce—can be given a new meaning, roughly to cause someone to possess an object by means of instantaneously imparting force to it. Thus an argument that is ordinarily a goal of a location change can now also be assigned the role of patient of a possession change. When linking rules apply to the new verb form, the rules generating double-object structures from patients of possession change apply, and thus one can say She threw / tossed / kicked / slid him the puck. However, this lexical rule, essentially a rule of reconstrual, is so narrowly stated that it does not apply to seemingly similar verbs, such as those whose definitions involve continuous exertion of force resulting in the guided motion of a theme, such as carry, pull, push, schlepp. Though they are cognitively construable as resulting in a change of possession (if the object is pushed over to a person with the intent of giving it to him), they are not linguistically construable as such because the licensing linguistic rule is not stated broadly enough to apply to them. As a result, the semantic structure necessary to trigger the double-object linking rules is never paired with these verbs, and they do not dativize as a class: *She pulled / lifted / lowered / dragged me the box.

In other words, in cases where a verb is cognitively ambiguous, that is, consistent with several possible thematic analyses, the grammar looks at some independent component of the verb's meaning and dictates which analysis or analyses the speaker is permitted to use when linking the verb to an argument structure. The productive use of a lexical rule is thus restricted to a narrow range of verb meanings. This implies that subtle semantic distinctions among subclasses of verbs can result in differences in their syntactic behavior, often giving the appearance of there being arbitrary lexical exceptions to alternations. I will refer to the simple operations on semantic structure introduced in the preceding chapter as broad-range lexical rules, and the classes of verbs they apply to as broad conflation classes. The more selective versions of these rules that pick out narrow conflation classes of verbs (or "conflation subclasses") will be called narrow-range rules. Membership in a broad conflation class is only a necessary condition for a verb to alternate; it is membership in one of the narrow conflation classes that is a sufficient condition.

How are these narrow lexical subclasses defined? We will see that they are defined by a distinctive, grammatically relevant subset of the semantic structures that constitute the meaning of a verb (this is the subject of chapter 5) and perhaps by salient morphological divisions in the lexicon of the language. In the rest of this chapter I will do three things. First, I will motivate the addition of narrow conflation classes to the theory by examining a seemingly simple and homogeneous class of verbs—transitive action verbs—whose syntactic behavior illuminates the need to distinguish broad and narrow verb classes. This will serve as an independent motivation for the claim that there are broad- and narrow-range versions of the four rules we have been concentrating on. Then I will apply the claim in detail to the dative, passive, locative, and causative alternations, aiming for a delineation of the relevant classes that will leave no negative exceptions.
Finally, I will clarify the relation between the narrow-range rules that I describe here and the broad-range rules discussed in the chapter 3.

### 4.2 Transitive Action Verbs as Evidence for Narrow Subclasses

The most prototypical class of verbs is surely transitive action verbs: they are among the first verbs that infants acquire, the first verbs one would come up with if asked to give examples of verbs, and the verbs that appear to be syntactically simplest. However, Beth Levin (1985) shows that this simplicity is an illusion. Action verbs break down into a variety of narrow conflation classes (she calls them “semantically cohesive subclasses”) that have predictable differences in their syntactic properties.

Consider the conative alternation, shown in (4.4), in which a transitive verb is allowed to take an oblique object introduced by the preposition at, indicating that the subject is trying to affect the oblique object but may or may not be succeeding.

(4.4) Mary cut the bread. / Mary cut at the bread.
    Sam chipped the rock. / Sam chipped at the rock.
    Bill hit the dog. / Bill hit at the dog.
    Irv kicked the wall. / Irv kicked at the wall.

In the present framework, we might say that there is a lexical rule (of broad range) that applies to thematic cores of the form “X acts-on Y,” producing “X goes toward X acting-on Y,” where “goes” and “toward” are interpreted in a semantic field where locations are treated as intended states or events. A linking rule for paths and a lexical entry for at map the argument of the path-function ‘toward’ (corresponding to a path that is oriented toward, but does not necessarily extend all the way to, a location) onto an oblique or indirect internal argument containing at. This can be seen in a similar use of at in John threw the ball at the tree, which indicates that the ball traveled in the direction of the tree but did not necessarily get there.

However, (4.5) shows that not all verbs can enter into the construction, even if the combination would make sense on cognitive grounds.

(4.5) *Nancy touched at the cat.
    *Jane kissed at the child.
    *Jerry broke at the bread.
    *Bob split at the wood.

It turns out that the conative alternation, though it always conveys “attempting,” applies to much narrower classes of verb than those whose actions can be attempted. Verbs of cutting (cut, slash, chop, hack, chip, etc.) and verbs of hitting

(hit, beat, elbow, kick, punch, poke, rap, slap, strike, etc.) all enter into the alternation. Verbs that fail to enter into it include verbs of touching (touch, kiss, hug, stroke, contact, etc.) and verbs of breaking (break, shatter, crack, split, crumble, etc.). More precisely, the subclasses of verbs that are eligible to enter into the conative alternation must signify a type of motion resulting in a type of contact.

Laughren, Levin, and Rappaport (1986) discuss another alternation involving action verbs, first studied by Fillmore (1967), which can be called “part-possessor ascension.” Examples are shown in (4.6).

(4.6) Sam cut Brian’s arm. / Sam cut Brian on the arm.
    Miriam hit the dog’s leg. / Miriam hit the dog on the leg.
    Terry touched Mavis’s ear. / Terry touched Mavis on the ear.

Again, the alternation is puzzlingly selective, as (4.7) indicates.

(4.7) *Jim broke Tom on the leg.
    *Hagler split Leonard on the lip.

There are three narrow semantic subclasses whose verbs behave similarly with respect to the alternation: the verbs of hitting and the verbs of cutting participate, but the verbs of breaking do not. More precisely, the subclasses of verbs that signify physical contact may alternate.

Laughren, Levin, and Rappaport also discuss an alternation resembling the locative, involving physical contact. Examples are presented in (4.8).

(4.8) I hit the bat against the wall [cf. I hit the wall with the bat].
    She bumped the glass against the table.
    Bill slapped the towel against the sink.
    *I cut the knife against the bread [cf. I cut the bread with the knife].
    *He split the ax against the log.
    *Phil shattered the hammer against the glass.
    *I broke a spoon against the egg.
    *I touched my hand against the cat.
    *I kissed my lips against hers.

(The starred examples are grammatical only on a different reading, where the knife itself gets cut, the ax gets split, and so on.) Here, the verbs of hitting can enter into the alternation, but not the verbs of breaking. More generally, the subclass of verbs of motion followed by contact can enter into it, but the subclass of verbs of motion followed by contact followed by a specific effect (a cut, a break, a split) and the subclass of verbs of contact without a prior change of location (touch, kiss) do not.³
Keyser and Roeper (1984) and Hale and Keyser (1987) discuss the middle alternation, which, roughly, specifies the ease with which an action can be performed on a patient. It too is selective above and beyond differences in the degree to which the “ease of performing an action” cognitively coheres with various verb meanings. Specifically, it applies only to verbs that signify an effect, regardless of whether it is the result of motion or contact; no effect, no alternation. Examples are provided in (4.9).

(4.9) I broke the glass. / This glass breaks easily.
    I cut the bread. / This bread cuts easily.
    She kissed Bill. / **Bill kisses easily.
    He slapped the wall. / *That wall slaps easily.
    They touched the wire. / *This wire touches easily.

Finally, consider the causative alternation applying in reverse direction, converting a transitive verb to an intransitive. This transformation, sometimes called the anticausative, is distinct from the middle in that it pertains to an actual event that the theme undergoes, rather than the generic property of the theme corresponding to how easily it undergoes that kind of event. The anticausative alternation, shown in (4.10), applies to verbs specifying a particular effect, either a change of state or a change of position, but only if they signify nothing but an effect, that is, if they are mute as to what kind of event caused the effect.

(4.10) At exactly 3 o’clock, the glass broke.
    *At exactly 3 o’clock, the bread cut.
    *At exactly 3 o’clock, Mary hit [ungrammatical if taken to mean “Mary was hit”].
    *At exactly 3 o’clock, John touched [ungrammatical if taken to mean “John was touched”].

The table in (4.11) summarizes the selective application of the alternations to various subclasses of transitive action verbs.

### Possible and Actual Forms

<table>
<thead>
<tr>
<th>Alternation</th>
<th>Subclass</th>
<th>Examples of verbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conative</td>
<td>+motion, +contact</td>
<td>hit, cut, *break, *touch</td>
</tr>
<tr>
<td>Part-possessor ascension</td>
<td>+contact</td>
<td>hit, cut, *break, touch</td>
</tr>
<tr>
<td>Contact Locative</td>
<td>+motion, +contact, −effect</td>
<td>hit, *cut, *break, *touch</td>
</tr>
<tr>
<td>Middle</td>
<td>+effect</td>
<td>*hit, cut, break, *touch</td>
</tr>
<tr>
<td>Anticausative</td>
<td>+effect, −contact, −motion</td>
<td>*hit, *cut, break, *touch</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Verb</th>
<th>Elements in semantic structure defining subclass membership</th>
</tr>
</thead>
<tbody>
<tr>
<td>hit</td>
<td>motion, contact</td>
</tr>
<tr>
<td>cut</td>
<td>motion, contact, effect</td>
</tr>
<tr>
<td>break</td>
<td>effect</td>
</tr>
<tr>
<td>touch</td>
<td>contact</td>
</tr>
</tbody>
</table>

- Whether a verb belongs to a class depends not on the characteristic features of the event in the world that the verb can refer to, but on the aspects of the event that its semantic structure constrains.

The last point, which Levin, Laughrn, and Rappaport do not mention explicitly, is crucial to the theory I am presenting. Verb meanings do not correspond to speakers’ conceptual categories for kinds of events or states, or to notions like “scripts” or “frames” or “stereotypes,” which are popular constructs in cognitive psychology and artificial intelligence. And semantically cohesive subclasses of verbs are not clusters of verbs related by general cognitive similarity (say, according to some continuous metric calculated over the number of shared and distinct features; Tversky, 1977). The problem with these representations is that they capture probable or characteristic features of a kind of event, those that often or typically occur. In contrast, the semantic structure associated with a verb constrains certain aspects of the events or states the verb can refer to and is mute about others, no matter how characteristic, often making surprisingly fine discriminations. Syntactically relevant semantic subclasses depend on exactly which aspects of the event or state the verb’s semantic structure imposes conditions on. These conditions are manifested as “semantic intuitions” of what kinds of circumstances a speaker could imagine using a verb in. Other aspects of an event might be well specified in that they are known to the speaker and hearer, inferable from the discourse context, or predictable from conceptual categories or stereotypes of what typically happens in an event, but they are forbidden to enter into the determination of whether a verb can can feed a lexical rule that alters its thematic structure.

**4.3 The Nature of Narrow Conflation Classes**

The analysis of these alternations in B Levin (1985) and Laughrn, Levin, and Rappaport (1986) illustrates some crucial properties of argument structure alternations in general:

- The verbs that enter into a construction fall into semantically cohesive subclasses involving a narrower range of meanings than that which is directly associated with the argument structure.
- A common set of elements of meaning, such as contact, motion, and effect, enter into the definitions of the semantically cohesive classes.
In the present examples we see that the conative construction involves verbs of motion-then-contact, such as *hit* and *cut*. Motion is obligatorily involved: if one were to cause a bruise on someone’s arm by pressing increasingly firmly against it, that would not be *hitting*, just as causing an incision to appear by hard tugging or by rapid heating followed by freezing is not *cutting*. Furthermore, the role of the motion in causing the effect is specified by the verb: if one were to wave a knife in the air as part of a magic spell, causing the bread to split, that would also not be a clear example of *cutting the bread*. (It’s not that magical scenarios alter intuitions about verb use in general; it sounds perfectly natural, given the right supernatural circumstances, to “cut a brick” with a feather, a strand of thread, a shadow, or a breath of air). Contrast this now with *kissing* or *breaking*. Clearly, the typical scenario for kissing someone is to move toward the kissee, then contact him or her, and then initiate the kiss. A typical chain of events in breaking something is to do so by moving one’s hand to contact it. But crucially, the typicality of an entire event of a given kind is irrelevant. The semantics of *kiss* do not require that the event include prior change of location resulting in contact; two teenagers can start *kissing* hours after their orthodontists have become accidentally entangled. And the definition of *break* does not require that the break be caused by motion followed by contact; John can *break* a bicycle by riding it if he’s too heavy for it.

In sum, it’s not what possibly or typically goes on in an event that matters; it’s what the verb’s semantic representation is choosy about in that event that matters. I am stressing this point—let me call it the “autonomy of lexical semantics”—because the criteria that delineate the domain of application of lexical rules do not depend on general cognitive similarity or typicality but on features that are precise enough to guide finely differentiated intuitions of a verb’s ability to refer to kinds of situations, and equally fine intuitions about choice of argument structures.

One final point. I suggest that in instances of cognitive ambiguity or vagueness, lexical rules apply productively only to narrow-range, semantically cohesive subclasses. It would be unfortunate if the boundaries of these subclasses were arbitrarily related to the nature of the lexical rule that respected them. That is not the case. Consider why the preposition *at* is used in the conative construction. It is not literally being used in the same way as the spatial preposition *at*, which refers to a path oriented toward a goal but not necessarily arriving there (e.g., *John threw the rock at the tree*). If John *cuts at the bread*, it’s not that the knife never arrives at the bread; rather, the bread was not properly cut. (The effect is magnified in *John was cutting away at the bread*: here John could have succeeded in putting one or more cuts in it; the implication is that he is not finished, that he has not yet cut the bread to the extent that he wants to). Even in *Mary slapped at John*, with no effect component, the implication is not that her hand never arrived at John’s person, only that the type of contact ordinarily implied by *slap* was not accomplished. But there is a clear parallelism between the “toward” relation in space and an analogous relation in the domain of intensions. This parallelism would seem to play a role in explaining why it is the class of motion-contact verbs, rather than, say, any action verb or only effect verbs, that can undergo the conative alternation. The rationale might be roughly that in motion-contact events such as John hitting Bill, there is a parallel between the physical motion of John’s hand, which is spatially aimed at Bill, and the temporal unfolding of the act of hitting, which is “aimed” at the goal of contact. A single notion of “direction toward a destination” embraces both dimensions of the act of hitting. The conative alternation “notices” the temporally coterminal trajectories of spatial motion and of realization of the event in motion-contact events, and it supplies a form that zooms in on the pre-terminal portion of the latter.

I am not claiming that all speakers grasp this rationale—they needn’t do so to apply the alternation properly—or that there is a linguistic constraint that preestablishes that conative alternations must apply to motion-contact verbs. For example, it would not be surprising if there were languages or even dialects of English in which one could say *John was breaking at the bread*. Rather, the historical processes that cause lexical rules to be defined over some subclasses but not others seem to favor the addition and retention of verbs whose own meanings exemplify or echo the semantic structure created by the rule. I think that the conditions that characterize the set of narrow classes licensing a lexical rule are an example of what George Lakoff (1987) calls the “motivation” for a category. A motivated class is a family of items whose membership conditions are too varied and unusual to be deduced a priori from universal principles or constraints, but whose members hang together according to a rationale that can be discovered post hoc—so the family is not an unstructured list, either. The full motivation for a subclass may come from the psychology of the first speakers creative enough or liberal enough to extend a linguistic process to a new item, as such speakers are unlikely to make such extensions at random. Therefore the subclass might be learned by simply memorizing its definition, by grasping its motivation all at once with the aid of a stroke of insight recapitulating that of the original coiners, or by depending on some intermediate degree of appreciation of the rationale to learn its components efficiently, depending on the speaker and the subclass involved."
4.4 Defining and Motivating Subclasses of Verbs Licensing the Four Alternations

If the theory I have outlined—involving thematic cores to motivate constraints on rules, and narrow conflation classes to implement them precisely—is on the right track, then we should be rewarded with criteria that actually work in distinguishing alternating and nonalternating verbs in each alternation; negative exceptions should vanish. These criteria should not be arbitrary but should be motivatable in part in terms of an interaction between the meaning of a verb and the thematic core associated with the argument structure that the alternation yields. I will present hypotheses about the subclasses that do and don’t submit to the four alternations we have considered. In the rest of the chapter I will describe the narrow classes and their motivations informally and then draw conclusions about the nature of narrow and broad classes in general. In chapter 5 I will return to each of the alternations one more time and propose explicit representations for the broad- and narrow-range classes in an attempt to characterize them precisely.

4.4.1 Dativizable Verbs

The dative rule obviously applies to verbs of giving, where the verb cannot be used in its literal sense unless it denotes a giver having some object and then causing it to enter into the possession of a recipient. Examples are shown in (4.12).

(4.12) give, pass, hand, sell, pay, trade, lend, loan, serve, feed

This is the prototypical subclass of dativizable verbs; its definitions are compatible—by definition, as they say—with the notion of X causing Y to have Z. A related subclass includes verbs where a transfer of possession is mediated by a separation in time and space, sometimes bridged by a particular means of transfer: send, ship, mail.

But among the verbs that can result in a change of possession but do not necessarily do so, some subclasses can be reinterpreted by a narrow lexical rule to denote changes of possession, by means of which they inherit the double-object argument structure, and other cannot. I have already mentioned the subclasses of verbs of instantaneous imparting of force in some manner causing ballistic motion, as shown in (4.13), which allow dativization, and the verbs of continuous imparting of force in some manner causing accompanied motion, as in (4.14), which do not.

(4.13) Lafleur throws / tosses / flips / slaps / kicks / pokes / flings / blasts him the puck; he shoots, he scores!

(4.14) *I carried / pulled / pushed / schlepped / lifted / lowered / hauled John the box.

It is striking that the verbs bring and take, which also signify continuous causation of accompanied motion but specify the direction of the motion (“to here” versus “away from “here,” respectively) and not its manner, do seem to take the double-object form: I brought / took him his lunch. Like the elements “motion,” “contact,” and “effect” that Levin and her collaborators focus on, the elements “manner” and “direction” turn up again and again in defining conflation subclasses. Lexical rules mind their manners.

Another dativizable class, shown in (4.15), contains verbs where X makes some commitment that Y will have or can have Z in the future, what Green (1974) calls “verbs of future having.” The actual acts referred to by the verbs are not changes of possession but proactive commitments of some sort guaranteeing them.

(4.15) offer, promise, bequeath, leave, refer, forward, allocate, guarantee, allot, assign, advance, award, reserve, grant

We have already seen another subclass of verbs, shown in (4.16), for which X has the potential or desire of causing Y no longer to have Z, the “verbs of future not having” (Green, 1974). (Another possible characterization would be in terms of the first object being a “malefactive” or “adversative” argument of the action or state of the subject, similar to the traditional benefactive case but of opposite affective valence. The object of on in My cat died on me is sometimes described as having this role.) As mentioned in chapter 2, none of them (except possibly deny) can appear in the usual prepositional-dative form (*It cost five dollars to me / me of me / from me). Ask is included in its sense of She asked him the time / the way (cf. *She asked the time / way to him), where the information referred to by the second object is given by the addressee, not to him. Save is included in the sense of That saved me the trouble of making a separate trip.

(4.16) cost, spare, envy, begrudge, bet, refuse, ask, save, charge, fine, forgive, deny

Another nondativizable class of possession-change verbs consists of what B. Levin (1985) calls “verbs of presentation” but which might better be called “verbs of fulfilling.” Examples are given in (4.17). These verbs, which do appear in a construction with the prospective possessor as the first object—She presented the students with certificates; They rewarded him with a promotion—mark the transferred object with the preposition with, not as a second object in a double-object form. The verbs have the following properties: X transfers Z to Y, where (a) Z is not necessarily possessed by X beforehand (X just enables its transfer); (b) Z is something that Y deserves, needs, or is worthy of; (c) Y’s relation to Z has certain properties, usually specified by the nominal counterpart of the verb. In (4.17), the nominal counterpart is listed alongside each sentence.5
transitive verb to leak in the sense of "to divulge sensitive information" came into common use in the 1950s (though sporadic examples, usually with scare quotes, appeared in the second half of the nineteenth century and early in the twentieth century). It clearly refers to the nature of the message relative to the intended recipient (i.e., the message is something the recipient is not supposed to know) and imposes no general constraints on the manner. As predicted, it dativizes: I have heard He's been leaking me bits of information for several months, and in my judgment it is perfectly natural.

One of the most common verbs of communication (especially among children), say, falls into neither of these classes: She told* told a story; She shouted* said. The object of say seems to be individuated by its content rather than either its physical or illocutionary properties. Unlike tell, it takes a clausal object (She said* told that Elvish died), a quotation (She said* told "Hello!"), or a quantified NP (She said* told nothing / something / a lot / very little; told is acceptable only elliptically). Though it can take a to-object, it cannot dativize: She said nothing to me / *She said me nothing. Perhaps it belongs to a class of verbs of "transparent" content of communication, where one of the arguments is the actual content of what the communicator means, and the communicator's attitude with respect to the truth of that content may be specified by the verb. Assert, question, claim, think (aloud about), and doubt, and others, may fall into this class. For present purposes, it is sufficient to show that say clearly belongs to a different class from tell.

Finally, for many speakers, a relatively new class of verbs of communication can alternate (see Randall, 1987; Wasow, 1981). These are verbs specifying an instrument of communication, as shown in (4.20); intuitions vary among verbs and speakers. Beth Levin has provided me with an additional example from an article in the New York Times—I'll modem him tomorrow—and as mentioned, double-object constructions with the new verb to fax (to transmit using a facsimile machine) have mushroomed in the late 1980s.

(4.20) John radioed / satellited / E-mailed / telegraphed / wired / telephoned her the news.

Let me turn now to verbs that take the preposition for. The prepositional form has the thematic core "X acts-on Y for the benefit of Z." For the moment I will put aside the question of whether the thematic core for the double-object version of these verbs is the same as that for the double-object form of verbs taking to, and will first examine the narrow classes of verbs participating in the for-dative alternation. One subclass—shown in (4.21)—includes verbs of creation, which in the double-object form express the notion of X causing Y to come into existence for the benefit of Z and then causing Z to have Y. These verbs can
specify means (including specific instruments such as xerox, which like all instruments in English are patients in the secondary event that serves as the means of accomplishing the main event), properties of the created object, or, most typically, both.8

(4.21) bake, make, build, cook, sew, knit, toss (when a salad results), fix (when dinner results), pour (when a drink results)

Another is the class of verbs of obtaining, where X does not initially possess Y, then comes to possess it for Y’s benefit so that X can give it over to Y; examples are given in (4.22)

(4.22) get, buy, find, steal, order, win, earn, grab

In contrast, for most speakers verbs of choosing—see (4.23)—do not accept the double object form, though like other nondativizable subclasses they are conceptually compatible with the possibility of change of possession. Melissa Bow-er- man (1987a) points out, however, that I picked her out a dress is grammatical. This is probably because the particle out when combined with pick supplies the crucial missing element of meaning, involving obtaining (or, more precisely, obtaining by removal from a location: I dug / scooped / scraped / pulled out the gold; I got / brought / took out my guitar). The particle has a similar effect on other nondativizable verbs: *I dried / pulled / yanked her a gemstone versus ?I dried / pulled / yanked her out a gemstone. (The particle can have a similar effect when it produces verbs of creation: compare *Juan tapped / banged her a tune on the xylophone with Juan tapped / banged her out a tune on the xylophone.) Thus the effect of the particle is analogous to that of the particles in examples like I poured the glass full with water or I wiped the table clean of crumbs, discussed in the preceding chapter.9

(4.23) *I chose / picked / selected / favored / indicated / preferred / designated her a dress.

Most often, verbs that simply convey acts done for the benefit of a third party, without that party’s coming to possess the affected object, can appear in the for prepositional form but not the double-object form (e.g., I drove his car for him / *drove him his car). At first this would seem to be a consequence of the fact that the thematic core associated with the double-object form calls specifically for a change of possession. However, we shall see that this is not quite right. The double-object form is not absolutely barred from appearing with benefactive verbs, neither in fact nor in principle. Let me discuss each in turn.

A first suspicion that pure benefactive double-object forms are not invariably and absolutely ungrammatical came from the study of Groden et al. (1989), in which adult subjects rated the acceptability of novel verbs. Though we found that double-object forms were always rated as sounding better with possession-

change scenarios, this effect was significantly weaker for for-dative verbs, where the contrast was with benefactive scenarios, than for to-dative verbs, where the contrast was with transportation scenarios. This result leads us to ask whether English speakers are capable of showing some degree of tolerance toward double-object benefactives. In certain circumstances this appears to be so.

In standard American English, there are some highly circumscribed subclasses of double-object verbs that seem only to express the benefactive relation, with no actual change of possession (Green, 1974). Examples are shown in (4.24).

(4.24) Idioms with give and do:
She gave him a hand.
She gave him a kick.
She gave him a kiss.
She did him a favor.
She did him a good deed.
Artistic performances:
She danced us a waltz.
She played us her trombone.
Symbolic acts of dedication:
Sam promised to move his lover a mountain.
Cry me a river!
God said to Abraham, “Kill me a son.”10

In addition, there is an American colloquial construction in which a pronoun is used reflexively as the postverbal object to indicate an act or state that benefits the subject. I have heard the examples listed in (4.25), none of them grammatical in my (Canadian) dialect.

(4.25) (a) From color commentary on basketball games:
Vincent had himself ten points in the first half.
Hinson has himself a good ball game going.
Robert played himself one heck of a ball game.
I'll tell you, we've really had ourselves a good ball game.

(b) Why don't you take yourself a cab and go jump in the lake?

(c) From a bluegrass song:
I'll pawn you my diamond ring. [The singer, appealing to a sheriff to release her jailed lover, is offering to pawn her ring and give him the proceeds. Note that the referent of the first object would benefit from the pawning of the ring but would not come to possess it.]

(d) Five more minutes, he'd have got out and chewed himself a hole through the fence. [A truck driver is referring to an angry businessman whose car was blocked by his truck.]
(e) Barbara Walters: Tell me, Dolly, are they real?
   Dolly Parton: Well, Barbara, I'm the kind of gal that, if they weren't,
         I'd go out and get me some.

In earlier periods of the language, from Old English until fairly recently, the
double-object construction was used more freely with relations such as benefac-
tive, malefactive, or mere "sympathetic interest," as in They broke him his shoul-
der. Visser (1963) cites, for example, Then cometh the devil and him shorten his
days (word-by-word translation from Old English); He ate me up half a ham of
bacon (1711); With great exactitude of purpose he enters me his name in the book
(1820); and He can knock you off forty Latin verses in an hour (1835). Aronoff
(1980) finds Who will surgeone me this gash? in the OED, dated 1849.

Furthermore, even when the dative alternation applied to for verbs does
involve a change of possession, there is an overlay of benefaction conflated with
the possession change. Thus, Green (1974) suggests that She burned John a steak
is well formed if John likes his steaks burned but not if he doesn't. Similarly, She
baked him an arsenic-laced pie seems to have an ironic tone.

Yet another class of double-object constructions combining possession and
benefaction recently came to my attention. Bob Ryan, a sportswriter for the
Boston Globe, justified a selection on his personal All-Star list by writing,
"Meanwhile, Jeff Malone no Jeff Malones." The Malone in question was a
well-reputed basketball player whom Ryan did not care for. I also recall the title of
an editorial in Life magazine a few years back protesting the standard two-
letter abbreviations for American states introduced by the postal service: "UT me
no UTs." This semiproducive, self-conscious construction translates as "Don't
you're doing me a favor by offering / saying X to me." It is quite stereotyped
(cf. *Don't Jeff Malone me any Jeff Malones) and is probably inspired by a few
well-known literary sources. Harrison (1968) notes that it was "a common kind of
idiom" in Shakespeare's time. In (4.26), I quote passages cited by Jespersen
(1938/1982).

(4.26) "My gracious uncle. —"
  "Tut tut, Grace me no Grace, nor Uncle me no Uncle:
    I am no traitor's uncle, and that word 'grace'
    In an ungracious mouth is but profane."
    (Shakespeare, Richard II, act II, scene 3)
  "What is this?
    'Proud' and 'I thank you not,'
    And yet 'not proud,' Mistress minion, you,
    Thank me no thankings, nor proud me no prouds."
    (Shakespeare, Romeo and Juliet, act II, scene 5)

"I heartily wish I could, but —"
"Nay, but me no buts—I have set my heart upon it."
(Sir Walter Scott, The Antiquary)

"Advance and take thy prize, the diamond; but he answered,
Diamond me no diamonds! For God's love, a little air!
Prize me no prizes, for my prize is death!"
(Tennyson, Lancelot and Elaine)

Does this mean we should give up the general claim that the double-object
form is inherently tied to change of possession? Probably not. The cognitive
content of the notions of "benefactive" and "gaining possession" may be similar.
We talk of having good fortune, having it made, having a good time (a ball, a
blast, etc.), having it all, having someone (sexually), and having someone where
you want him. Green (1974) suggests that in expressions like Cry me a river, the
beneficiary could be said to "possess" the river of tears as a token or "offering"
of his or her lover's dedication. And if someone does you a favor, might there be
some sense in which you now possess (enjoy, take advantage of) the favor? There
is even a form of the verb have itself that has a causative-benefactive reading and
a distinct malefactive reading (Chomsky, 1965). I had my leg broken can mean
either "I paid an orthopedist to break my partially-healed leg and re-set it in a
cast" (causative-benefactive), or "Some thugs came and broke my leg on me"
relations can be expressed using the verbs give and receive, in expressions
resembling "St. George gave killed a dragon for Mary" and "Mary received
killed by St. George a dragon." These sentences correspond to the English St.
George killed Mary a dragon, where the dragon is never literally handed over to
Mary. Finally, as noted in chapter 3, in other languages constructions similar to
the double-object dative can refer to recipients, benefactives, or both.

This pattern of similarity suggests that benefactive relations can be subsumed
as cases of metaphorical possession, extending the Thematic Relations Hypo-
thesis. A thematic core embracing possession and a possible extension of it to ben-
efaction/malefaction would underlie all verbs taking the double-object form.
Thus nondativizable for-datives such as *drive her the car would be ruled out not
by an inherent incompatibility with the thematic core of the double-object form
but by the absence from the speaker's dialect of a narrow class including those
verbs. (Many ungrammatical to-datives, on the other hand, are still ruled out by
incompatibility with the thematic core, such as *drive Chicago the car.)

This account has several advantages over any alternative. If there were only
a very general thematic core for all double-object forms meaning "cause to
change to a beneficial state," we would be left with no explanation for why all
of the to-dative narrow classes and most of the standard for-dative sublocations do involve change of possession. Even the more general benefactive relations involving for-datives (Vincent has himself ten points; Cry me a river; But me no buts) are often conflated with states of possession or support metaphoric extensions of possession, and many actually contain the verbs have and get. Furthermore, if the thematic core were restricted to literal possession, we could not account for the narrow classes involving symbolic acts, reflexive benefactives, "sympathetic interest" in earlier stages of English, and so on. As we shall see, there are also developmental data, discussed in chapter 7, that support a thematic core for the double-object that embraces possession and a metaphorical extension of it to benefactive/malefactive relations.

Motivation for the dativizable classes. Is there a motivation or rationale for which of the conflation subclasses are dativizable? For verbs where change of possession is inherent to the meaning of the verb, such as give, the answer is obvious. More generally, if the thematic core of the double-object dative involves an actor acting on a recipient in such a way that causes him to possess something (as opposed to acting on an object in such a way as to cause it to go to someone), then verb subclasses that suggest that the action inherently involves the beneficiary as patient in some direct fashion would be more likely to undergo dativization. Since throw to X verbs involve aiming in the direction of the receiver concurrently with causing the motion, whereas the action in pull to X verbs can be initiated without having the receiver in mind and can have an ever-changing goal throughout its duration, there is a sense in which the receiver is more involved in defining the action for throw and can be more naturally analyzed as a patient. So if we only knew that one of the two classes was dativizable, we could predict it would be the throw class. Similarly, when asking a question, what makes it asking is how a hypothetical listener is supposed to react to it, but when shouting a question, what makes it shouting has nothing to do with a listener and can be defined in terms of the behavior of the speaker alone. Therefore we are not surprised that illocutionary verbs, but not manner-of-speaking verbs, dativize. As I have emphasized, the learnability story does not absolutely hinge on such differences, and I do not insist that the difference be exploited by all speakers or be perfectly predictive across languages and dialects. It does appear, however, that where in the semantic landscape the productive lines are drawn is not completely arbitrary from a cognitive vantage point.

4.4.1.1 The Morphological Constraint on the Dative In explaining constraints on lexical rules in terms of the theory of thematic cores and conflation subclasses, I have not touched on the morphological constraint on the dative, introduced in chapter 2. How would it enter into the subdivision of verbs into narrow classes? Interestingly, the constraint does not completely cross-classify the semantic subclasses; it conjoins with some of them but not others. For example, the subclass of illocutionary communication verbs demands native stems (tell/*explain him the story), but the subclass of verbs of future having (promise/bequeath her my fortune; offer/refer him a patient) does not. The fact that morphology and semantics interact, as summarized in (4.27), explains why the morphological constraint is demonstrably psychologically real (Gropen et al., 1989) but apparently so vulnerable to counterexamples that most investigators are skeptical that it could be (e.g., Green, 1974; Randall, 1987; Fodor, 1985). What is going on is that the constraint is real but does not apply to certain subclasses; that’s where the apparent counterexamples come from.

(4.27)

Dativizable subclasses sensitive to the morphological constraint:
1. Giving: give, pass, hand versus *donate, *contribute

Dativizable subclasses insensitive to the morphological constraint:
7. Future having: bequeath, refer, recommend, guarantee, permit
8. Malefactive / future not having: envy, begrudge, deny, refuse
9. Instrument of communication: radio, telegraph, telephone, satellite, netmail

Some nondativizable subclasses that are cognitively compatible with change of possession:
10. Manner of speaking: *shout, *scream
11. Continuous causation of motion in some manner: *pull, *push, *lower
12. Transferring something needed/deserved: *entrust, *credit, *supply

This summary given in (4.27) leaves open the question of why any of the subclasses should care about morphology in the first place. Though I cannot answer this question definitively, I will try to render it a bit less mysterious.

First, the morphological or phonological constraint is not ad hoc to the English dative. The native/Latinate distinction or some of its phonological correlates are relevant to a variety of linguistic processes in English:
The 180 or so English verbs with irregular past-tense forms (go/went, hit/kid, sing/sang, spend/spent) are all either monosyllabic or monosyllabic with a recognizable native prefix (e.g., understood, forgot, beset, mistook, withstood, upset) (Pinker and Prince, 1988).

The negative prefix in- (with phonologically conditioned variants il-, in-, ir-) can attach only to Latinate stems: insatiable, illiterate, irreducible, improbable, *inborn, *illucky, *inhappy, *irroky. Adult speakers, when asked to produce or judge negative versions of novel adjectives, are sensitive to this regularity (Baldi, Broderick, and Palermo, 1985).

The comparative suffixes -er and -est attach to monosyllabic adjectives (nicer/nicest, intelligent/intelligentest) or to polysyllabic that are clearly native, with stress on the first syllable (prettier/prettiest; simplest/simplest).

The suffixes -ion and -ation attach only to Latinate verbs: inversion; chart/chartion/chartation. The semantically similar suffix -ment is not choosy (Aronoff, 1976).

The suffix -ity attaches only to the stems of certain Latinate adjectives: ferocious/ferocity, probable/probability, purple/purplicity, heavy/heavity. Adults are sensitive to this regularity in judging nonce words ending in the suffix (Randall, 1980). The semantically similar suffix -hood attaches only to native forms: mother/motherhood; professor/professorhood. The suffix -ness is indifferent (Aronoff, 1976).

The phonological rule of velar softening, which, for example, changes k to s in some environments, applies only to Latinate forms: electricity; mistake/mistaken (Chomsky and Halle, 1968).

The particle up, signifying "to completion," combines with verbs that are monosyllabic or polysyllabic with stress only on the first syllable: shake it up, jiggle it up, break it up, *vibrate it up, *destroy it up (Whorf, 1956). In fact the verbs in verb-particle combinations in general are overwhelmingly native (di Sciullo and Williams, 1987); give up / out / away / in versus *donate up / out / away / in; make up / out / over versus *create up / out / over; and so on.

Derived nominals from causative verbs can inherit their transitive argument structure only if the verb takes a Latinate nominalizing suffix like -tion, not if it takes a native suffix: corn’s growth / *the farmer’s growth of corn versus the girl’s conversion / the priest’s conversion of the girl (Smith, 1972).

Thus a variety of morphological and morphophonological rules in English are sensitive to the native/Latinate distinction. This leads to two questions: why do verbs group themselves into these two classes, and why do the classes govern the application of the dative rule?

As for the first question, we know in general that many languages subdivide their open-class vocabulary and let different kinds of morphological rules apply to these subclasses (e.g., gender classes, Hebrew binyanim; see also Aronoff, 1976). More specifically, McCarthy and Prince (in preparation) propose that every language has a phonological definition of its "basic" or "minimal" words, and many morphological processes are restricted to applying only to these basic words. In English (though not, say, Italian), the minimal word is one metrical foot long. This notion of basicness may also correlate with speakers’ intuitions of which words in their language are felt to be natural, neutral, or native, and which are felt to be foreign or learned (see Selkirk and Dell, 1978, for a proposal that [learned] is a morphological feature in French). The native/Latinate distinction has some of this connotation for English speakers. It has often been noted that native verbs tend to be high in frequency and to include the common simpler vocabulary of the language. Latinate words are of lower frequency and belong to the learned vocabulary, often suggesting a more formal speech register. I remember a cover story on Aretha Franklin in Time magazine in the mid-1960s, which described her in performance, “perspiration streaming down her face.” An irate reader wrote in: “Aretha does not perspire. Aretha sweats.”

There is evidence that English speakers have abstracted the morphological and phonological signatures of the native/Latinate distinction as correlating with the basic versus nonbasic vocabulary distinction. Baldi, Broderick, and Palermo (1985) showed that untutored speakers can judge fairly accurately whether real and nonsense native and Latinate stems were “native” versus “borrowed or foreign.” Randall (1980) showed that speakers judged the suffix -ity as sounding good not only with Latinate stems but with those whose etymology was Greek. She suggests that a sense of “classicality” was involved.

So the native/Latinate distinction in English is a manifestation of an important cleavage of the vocabulary into two morphological classes, one containing basic, native, natural words and the other containing marked, foreign-sounding, special words. Why does the dative rule care about this distinction? One possibility is the following. In general, lexical rules can effect simultaneous changes in semantics, argument structure, syntax, and morphology. The morphological change is seen in English only in the passive (and to a certain extent in the causative in earlier stages of the language, leaving pairs like rise/raise, fall/fell, stit/seat, lie/lay as a residue). But in several other languages, these alternations involve specific morphological changes. For example, the dative alternation is marked with an affix on the verb in Indonesian (Foley and Van Valin, 1985) and Shona, a Bantu language (Dowty, 1979a). The locative alternation can be marked with a verbal affix in Indonesian, Russian, German, and Hungarian (Foley and Van Valin, 1985). The causative and anticausative are marked by
morphological changes in many languages (Comrie, 1985); causative rules that change a verb’s membership in inflectional paradigms are subject to similar semantic constraints as causative rules (like that of English) that have no morphological effect (Nedyalkov and Siulitsky, 1973). The sensitivity of the English dative rule to morphological class could then be a consequence of two assumptions:

1. Morphological rules can be selective in their application to different morphological classes.
2. Rules that alter argument structures count as morphological rules, even if they do not effect an overt morphological change.

Thus the English dative rule, though its has no overt morphological operation, is formally a kind of rule that can have morphological operations, and therefore it can be sensitive to salient morphological subclasses in the vocabulary of the language. The dative is the only rule without a morphological change that we have seen be sensitive to the distinction, but in principle others could be.

Interestingly, any child who was prepared for the possibility that a dative rule is conditioned by morphological class would find “evidence” to confirm that suspicion. In Gropen et al. (1989), we combed through the transcripts of Adam, Eve, Sarah, Ross, and Mark in the ChiLDDES database (MacWhinney and Snow, 1985), looking at all the prepositional-dative sentences (both to and for, including benefactives) in the speech of the adults who interacted with the children. Of course, there is no constraint forcing the verbs in these sentences to be native. Nonetheless, the only verb with Latinate phonology from these thousands of examples was explain, used once each by the adults playing with Adam and Sarah. (Three other verbs were Latinate but had the native stress-initial prosodic pattern: measure, package, and finish, used once apiece in benefactive prepositional fo-r-datives.) So it seems that native verbs just happen to be the ones parents use when talking to their children, presumably because they are more basic and of higher frequency. But this statistical phenomenon has an intriguing consequence: even if English didn’t have a morphological constraint on the dative, children would think that it did. This also may have something to do with the fact that the subclasses that don’t obey the constraint (the bequeath class, the arpanet class) are learned later in life when long non-native words are common.

Let me touch briefly on two more aspects of the morphological constraint. First, it is possible that verbs that are transparently derived from nouns, especially nouns perceived to be namelike, lie outside the binary native/Latinate distinction. In many areas of morphology, tacit knowledge that a word’s stem is from another category gives it a special status regarding the rules that apply to it. Irregular inflection is a notable case: The defense man of the Toronto Maple Leafs, high-sticker, high-stuck the goalie; Mary out-Sally-Rided Sally Ride, out-Sally-Rode Sally Ride (see Pinker and Prince, 1988). Many of the salient examples of productive datizivation involve names for instruments (sereox, satellite, microwave, radio, arpanet, E-mail, modem, fax, etc.), usually with a clear origin as a familiar brand name, neologism, or jargon term. These examples exist even though some are verbs of creation, a subclass that ordinarily respects the native/Latinate distinction. (Such violations cannot be placed in a separate semantic subclass of verbs specifying “instruments of creation,” because many of the familiar creation verbs do specify instruments, and none, to my knowledge, is Latinate, e.g., She hammered me out a disc; he sawed me a piece of wood.) Thus it seems that verbs derived from common “special” nouns (names, neologisms, etc.) are perceived to be neither native nor Latinate/learned, and as a result they escape any restriction of a datizivable subclass to native stems. This would account for the findings of the Gropen et al. (1989) questionnaire study, where we found that people rated double-object sentences with novel monosyllabic possession-change verbs as sounding more natural than novel polysyllabic possession-change verbs only for one of the four verb meanings used. The verb meaning that induced a sensitivity to phonology was the one in which the verb denoted a kind of transfer of possession (a legal means of property transfer). The other three verbs were all denominals involving some instrument whose name contributed the verb stem: causation of motion in a sport by the use of a special piece of equipment, creation by the use of a specific machine, and obtaining by the use of a kind of currency.

A final question that might be raised is whether there is a semantic motivation for the distinction between native and Latinate verbs. I think it’s possible, though I would not be prepared to push the point. The argument might go like this. The Latinate verbs appear to be less basic on semantic as well as phonological grounds. Perhaps, because of their abstractness and semantic complexity, they convey less of a sense of directly acting on or affecting the recipient than native words do. For example, in order to donate something to someone, as opposed to merely giving it, one must have publicly charitable motives, the recipient must be an institution or an individual representing an institution or cause, and the donor need not know the recipient personally. Explaining, as opposed to telling, involves attention to unpacking the content of the message, not just transferring it to a listener directly; announcing is directed to a broad nonspecific audience. If the datizizability of verbs is motivated by the general notion “X causes Y to have Z,” a morphological distinction that is correlated with the directness of the interaction between X and Y might be motivated as a condition on datizizability as well.
4.4.2 Locativizable Verbs

In chapter 3, I pointed out that a necessary criterion for a verb to participate in the locative alternation is that it specify or allow one to predict both a type of motion and an end state. This is what prevents the alternation of fill (end state only; thus it appears only in the *with* form) and pour (motion only; thus it appears only in the *into/onto* form). Conversely, the verbs that do alternate constrain aspects of both: *smear* involves contacting and moving a substance against a surface and adherence of the substance to it in a streaky layer; *load* involves a unit or type of substance appropriate for the containing object that is put in a designated location within the containing object, enabling it to perform some function (e.g., a gun, a camera). However, these constraints are not sufficient conditions for the alternation to occur, at least not without begging the question of why some words specify a motion or end state and others do not. For example, it is not convincing to say that the reason that *I dripped water onto the floor* is bad is that no end state is specified—why has the verb *drip* not accumulated a component of meaning specifying that the surface is covered with drops, like *sprinkle*?

Instead, there are finer-grained criteria, independent of end states or motions per se, that antecedently determine whether the verb can retain components of meaning for end states or motions. Rappaport and Levin (1985) have amassed a list of 142 locative verbs that is probably not far from being an exhaustive list for English. According to Levin (personal communication), these include all the locative verbs listed in previous papers on the topic, plus any that either of the authors heard or read over a span of several years while working on the paper. They point out that most verbs taking either of these constructions do not alternate: only 34 of the 142 appear in both forms. They did not mention any precise criteria specific to these alternating verbs. A crucial test for the narrow-class theory is whether such criteria can be found given that the alternation is productive for children but has exceptions for adults. Here I present the results of my own examination of their list. As the theory requires, there are narrow criteria governing the alternation; they are somewhat surprising but, once stated, fairly straightforward. Furthermore, I have found that a handful of verbs that Rappaport and Levin failed to include fall neatly into the subclasses that I derived from their list, and display the syntactic behavior that one would expect from such classification. I take this as support for the current proposals.

I began with the idea that since there are many verbs that take only the *with* form, and many that take only the *into/onto* form, there may be two rules operating in different directions, both of them defined over sets of subclasses. I tentatively subdivided the alternating verbs into those for which the rule seems to take an *into/onto* base form and derives a *with* form, and those where the derivation goes in the opposite direction. Directionality was determined as follows. If the locational theme (the content) is obligatory, it was assumed that the derivation is from *into* to *with*. For example, you can say *He piled the books* but not *He piled the shelf,* this suggests that the verb naturally takes the locational theme as object and that the derivation is from "pile NP-theme" to "pile NP-theme onto NP-goal," which in turn leads to "pile NP-goal with NP-theme." Conversely, if the simple two-argument form of the verb can appear with the locational goal (the container) but not the locational theme, it is assumed that the verb "naturally" takes the goal as direct object and that the form with the theme as object is derived from it; for example, *He stuffed the turkey!* *He stuffed the breadcrumbs.* When both arguments are optional, the derivation could have gone in either direction (followed by deletion of an oblique argument), but often one of the simple transitive forms sounds elliptical and causes the listener to fill in or presuppose the existence of the other argument when hearing it. Thus *He loaded the gun* sounds like a complete thought; *He loaded the bullets* is grammatical but feels like a truncated version of *He loaded the bullets into the gun.* This is somewhat subjective, but I would guess that the direction of the asymmetry is fairly reliable across speakers. Finally, there are only six verbs where both arguments are obligatory, two of them dubiously classified as such, and these are ignored for the purpose of finding the subclasses for each rule and only placed in the relevant subclasses later. I then tried to divide the 142 verbs into semantically cohesive subclasses such that for some of the subclasses, all the member verbs alternate; for others, none of the member verbs do.

The results of my analysis are that verbs for which the *into/onto* form is basic fall into about seven subclasses, of which four allow derivation of the *with* form, and verbs for which the *with* form is basic fall into about seven subclasses, of which two allow derivation of the *into/onto* form. The criteria for the class definitions include the thematic predicates and features used in the previous discussions and also a set of features pertaining to force (see Talmy, 1988), aspects of the dimensional geometry of solids (see Talmy, 1983; Jackendoff, 1987), and a classification similar to the count/mass distinction in which matter is construed either as a discrete bounded entity or as a boundaryless continuum; typically this will result in single objects being designated as countlike, and in liquids, powders, semisolid substances, and aggregates of small indistinguishable objects being designated as masslike.

The exact differentiation of the nonalternating classes from one another is not crucial as long as the criteria distinguishing them from the alternating classes are clear. Similarly, there are several nonalternating classes not listed here at all because their meaning is even more removed from the notion of putting an object
into or onto a surface or container, for example, verbs of applying force (push, shove, force, etc.).

The content-oriented or intolonto verbs fall into the following classes:

1. Alternating. Simultaneous forceful contact and motion of a mass against a surface: He smeared grease on the axle / He smeared the axle with grease. Includes brush, dab, daub, plaster, rub, slather, smear, smudge, spread, streak. For many of the verbs a resulting state is specified, usually corresponding to the deverbal noun: a smear, a smudge, and so on (Rappaport and Levin, 1985).

2. Alternating. Vertical arrangement on a horizontal surface: He heaped bricks on the stool / He heaped the stool with bricks. Includes heap, pile, stack.

3. Alternating. Force is imparted to a mass, causing ballistic motion in a specified spatial distribution along a trajectory: She splashed water on the dog / She splashed the dog with water. Includes inject, spatter, splash, splatter, spray, sprinkle, squirt.

4. Alternating. Mass is caused to move in a widespread or nondirected distribution: The farmer scattered seeds onto the field / The farmer scattered the field with seeds (the latter is marginal for some speakers). Includes bestrew, scatter, sow, stew.

5. Nonalternating. A mass is enabled to move via the force of gravity: She dribbled paint onto the floor / *She dribbled the floor with paint. Includes dribble, drip, drizzle, dump, ladle, pour, shake, slop, slosh, spill.

6. Nonalternating. Flexible object extended in one dimension is put around another object (preposition is around): He coiled the chain around the pole / *He coiled the pole with the chain. Includes coil, spin, twirl, twist, whirl, wind.

7. Nonalternating. Mass is expelled from inside an entity: He spat tobacco juice onto the table / *He spat the table with tobacco juice. Includes emit, excrete, expel, expel, exude, secrete, sputum, vomit. (In the next section we will see that these verbs also behave as a class with respect to causativization.)

We could also add an eighth, nonalternating class, not included in Rappaport and Levin’s list: verbs of attachment, such as attach, fasten, glue, nail, paste, pin, staple, stick, and tape. They all imply the existence of an intermediate instrument object or substance holding objects together, and usually specify the geometry of the attachment region (e.g., at a point versus sharing a surface).

The container-oriented or with verbs fall into the following classes:

1. Alternating. A mass is forced into a container against the limits of its capacity: They packed oakum into the crack / They packed the crack with oakum. Includes the wadding sense of pack, as well as cram, crowd, jam, stuff, wad.

2. Alternating. A mass of a size, shape, or type defined by the intended use of a container (and not purely by its geometry) is put into the container, enabling it to accomplish its function: Max loaded the gun with bullets / Max loaded the gun with ammunition.

3. Nonalternating. A layer completely covers a surface: They inundated the field with water / *They inundated water onto the field. The layer may be liquid, as in deluge, douse, flood, and inundate, or solid, as in enfold, enwrap, coat, cover, encrust, face, inlay, pad, pave, plate, shroud, smother, tile. Line and edge are similar, except with one less dimension; fill and perhaps occupy are also similar, with one more dimension.

4. Nonalternating. Addition of an object or mass to a location causes an aesthetic or qualitative, often evaluative, change in the location: They adorned the gift with ribbons / *They adorned ribbons onto the gift. Includes adorn, burden, clutter, deck, dirty, embellish, emblose, endow, enrich, festoon, garnish, imbue, infect, litter, ornament, pollute, replenish, season, soil, stain, taint, trim.

5. Nonalternating. A mass is caused to be coextensive with a solid or layerlike medium: She soaked the sponge with water / *She soaked water into the sponge. The mass may be composed of layers or strings, as in interface, interlard, interleave, intertwine, interweave, lard, ripple, vein, or of liquids, as in drench, impregnate, infuse, saturate, soak, stain (what one does to wood), suffuse.

6. Nonalternating. An object or mass impedes the free movement of, from, or through the object in which it is put: I clogged the sink with a cloth / *I clogged a cloth into the sink; She bound him with rope / *She bound rope onto/around him. Includes verbs pertaining to liquids in containers, as in block, choke, clog, dam, plug, stop up, and bound movable objects, as in bind, chain, entangle, lash, lasso, rope.

7. Nonalternating. A set of objects is distributed over a surface: They studded the coat with metal stars / *They studded metal stars onto the coat. Includes bombard, blot, dapple, riddle, speckle, splotch, spot, stud. The type of object is specified by the verb (a splotch, a hole, a stud, etc.).

Finally, there are two alternating verbs that have a unique geometry and hence could be seen as belonging to one-word classes. String (as in They strung lights on the roof / They strung the roof with lights) involves a static arrangement of a linear object along a surface. Wrap at first glance seems similar in some ways to cover (with form only) and in other ways to wind or coil (around form only). Its absolute minimum requirement is that a flexible object conform to part of the shape of an object along two or more orthogonal dimensions. Thus it is not wrapping when one installs shelf paper cut to the exact size of the shelf, but it can be called wrapping if the paper extends beyond the edges of the shelf and is bent around them.

Motivation for the classes. All the classes are clearly compatible with their respective thematic cores. The intolonto classes all specify the kind of force or
direction of motion according to which the theme moves or is caused to move: it is forced against something (smeared), around something (wrap), all over the place (scatter), thanks to gravity (drizzle), against gravity (pile), or with some imparted force. The verbs in the with class all specify a change of state resulting from the addition of material, usually pertaining to the entire object: a qualitative change, usually with esthetic or evaluative connotations (adorn, pollute); a decrease in freedom to move (block, bind); a definitionally holistic coextensive spatial arrangement either in a solid (saturate) or surface (cover).14

The motivation for which classes alternate comes from two sources. First, as in the case of the dative, the conversion of an into/onto-locative into a with-locative causes a goal argument to become a patient. Therefore, types of action that can more easily be construed as something that can happen to the goal are more likely to support the reconstrual of the goal as a patient and more likely, as a class, to undergo locativization. Second, container-oriented (with-locative) verbs cannot merely specify that a change of state has occurred by covering or filling but must specify what that state is; otherwise they would all be synonymous with fill and cover (and we know that languages avoid true synonymy, this “Principle of Contrast,” Clark, 1987, will be discussed in more detail in chapter 5). Likewise, content-oriented (into/onto-locative) verbs must not merely specify the movement of a substance to a location but must specify some particular manner of causation or motion or some particular kind of substance; otherwise they would all be synonymous with put. Therefore the verbs in the alternating content-oriented classes should contain information that allows the speaker to predict a particular state change of the goal, not just that the goal has changed state, and the alternating container-oriented subclasses should contain information that allows the speaker to predict what kind of thing moves or how it moves, not just that something moves. This kind of interpredictability, in addition to the general ease of cognitively reconstruing a motion as a state change, seems to characterize the choice of which subclasses alternate.

Thus in the smear class the location and moved substance simultaneously feel the force of the action, and in the spray class the force imparted to the object can aim it in a direction. This is in contrast to the pour class, where gravity is a force mediating between the immediate effect on the moving object and the effect on the destination. Furthermore, the kind of pressure, direction, and motion specified in the smear verbs allows one to predict with reasonable specificity the distribution of the substance on the surface (a smear, a dab, etc.) that characterizes how the surface has changed. Similarly, in the spray class there is a necessary imposition of a shape and distribution of the theme, whose cross-section helps to predict the shape of the adhering layer on the surface at which it arrives. For verbs that alternate in the other direction, we would expect that the specified effect on the container or surface also imposes constraints on the act of moving the contents. Thus for stuff verbs, the amount moved is defined as “too much” with respect to the capacity of the container; for load verbs the moved objects are of a shape, size, and kind appropriate to the container. Whether motivation-by-interpredictability is psychological or merely historical is an open question, of course; given the strong functional pressure to avoid synonymy in language acquisition (Clark, 1987), it could be psychological.

If the general analysis described in this section is correct, it is also interesting that the conflation subclasses can contain any number of verbs, perhaps even one. That would suggest that subclass-defined generalizations are not licensed by a statistical averaging process triggered by large numbers of similarly behaving verbs, but that each alternating verb defines a generalizable region in semantic space around it, with any verb falling into that region automatically sharing its privilege to alternate. I will explore this phenomenon in greater depth in chapters 5 and 6.

Rappaport and Levin call attention to a number of closely related alternations. As I would predict, all of them apply freely only within well-defined narrow subclasses, not just to any verb in the relevant cognitive domain. For example, among the verbs of “image impression,” we have alternators (He branded his name onto the fence / He branded the fence with his name) and nonalternators of both kinds (He wrote his name into the book / He wrote the book with his name; He illustrated the page with a picture / He illustrated a picture onto the page). The into/onto nonalternators, roughly, constrain properties of the type of pattern impressed, either by their source (copy, plot, sketch, trace), manner of creation (doodle, scribble, scrivel), or symbolic type (draw, letter, write). The with nonalternators entail a specific kind of esthetic, evaluative, or purposive change of the surface (adorn, decorate, embellish, illustrate). The alternators, which include brand, emboss, embroider, engrave, etc., imply, inscribe, mark, set, stamp, and tattoo, specify a particular manner or means in which the surface was affected and properties of the substance of the image and the medium onto which it was put, all defined in concrete physical terms (e.g., with the use of a brand or thread, made from ink or burned material, underneath skin or on a surface or piercing cloth). What seems to be crucial is that these properties are defined physically and not in terms of either the symbolic properties of image (e.g., drawing versus letters versus numbers) or the esthetic purpose of the inscription (e.g., decoration).

Likewise, the related empty alternation consists of three alternating classes and several nonalternating classes. One class of alternators includes those that specify a specific kind of void end state regardless of manner (He cleared dishes from the table / He cleared the table of dishes, also clean, cleanse, empty, strip).
There are also alternators that are a bit less free in that they allow either the from form or a form with the source as direct object but lacking an of-phrase. These alternators can be neatly characterized as specifying either a particular manner of removal via contact with the source (She wiped crumbs from the table / She wiped the table *(of crumbs); also scrub, wash, wring, skim), or a particular instrument of removal (He vacuumed lint from the carpet / He vacuumed the carpet *(of lint); also comb, filter, hose, mop, sponge).

Interestingly, Talmy (1985) points out that verbs involving the removal of objects or conditions from people’s possession (alienable or inalienable) virtually never alternate: She robbed him of his money / *She robbed his money from him; She stole money from him / *She stole him of his money. Verbs resembling steal include seize, recover, withhold, grab; verbs resembling rob include bilk, cheat, cure, fleece, relieve, unburden. (Rip off is the chief exception; one can rip off Ma Bell or Rip off money from Ma Bell.) This wholesale exclusion of possession-removal verbs is fortunate, because steal and rob in particular are basically synonyms except for their choice of direct object. If the rest of their semantic field could alternate, they would stand as embarrassing negative exceptions.¹⁵

### 4.4.3 Causativizable Verbs

Not all intransitive verbs can be transformed into causative transitives, and not all causative transitives can be transformed in the opposite direction, into “anti-causative” intransitives. There are three main classes of intransitives that can be causativized. First, there are verbs of extrinsic change of physical state; examples are listed in (4.28). In the intransitive form the change is not caused by an identifiable external agent; this distinguishes inchoatives such as The plastic shrunk from passives such as The plastic was shrunk.

(4.28) The box opened / closed / melted / shrunk / shattered.
I opened / closed / melted / shrunk / shattered the box.

A second alternating class—see (4.29)—involves contained motion taking place in a particular manner. By “contained” I mean that it is possible for the center of mass of the moving object to remain roughly in one “place” while its parts move, as in John slid in one spot for an hour.¹⁶ The motion is of a kind that need not be internally caused; that is, skidding can be either voluntary or involuntary, and it belongs to this class; running can only be voluntary, and it is excluded.

(4.29) The log slid / skidded / floated / rolled / bounced.
Brian slid / skidded / floated / rolled / bounced the log.

### Possible and Actual Forms

A third kind of alternating verb undergoes a semantic change that is not the same as that of the previous classes. One subclass, presented in (4.30a), involves manner of locomotion, and in its transitive version the sense is one of coercing or encouraging the locomotion. The other subclass, shown in (4.30b), signifies an instrument of transportation, and in the transitive form it signifies enabling and accompanying the transportation.

(4.30) (a) The horse walked / galloped / trotted / raced / ran / jumped / past the barn.
I walked / galloped / trotted / raced / ran / jumped / jogged the horse past the barn.

(b) She drove / flew / cycled / ferried / boated / sailed / motored to New York.
Captain Mars drove / flew / cycled / ferried / boated / sailed / motored her to New York.

There are several subclasses of verbs that might have been thought to alternate systematically but in fact do not. The most notable is the class of verbs of motion in a lexically specified direction, as shown in (4.31). In contrast to verbs of manner of motion, these verbs treat the theme as a dimensionless point undergoing a translation in space.

(4.31) My son went to school.
*I went my son to school.
His sister came home from the hospital.
*He came his sister home from the hospital.
The flag rose.
*I rose the flag.
The shoe fell.
*He fell the shoe. (also ascend, descend, leave, exit, enter, arrive)

Other noncausativizable subclasses include verbs of volitional or internally caused actions, as in (4.32);¹⁷ verbs of coming into or going out of existence, as in (4.33);¹⁸ most verbs of emotional expression, as in (4.34); and verbs of emission including emission of lights, sounds, and substances, as in (4.35).

(4.32) Sally ate.
*Bert ate [= fed] Sally. (Also jump, hop, run, drink, sing, etc.)

(4.33) Bobby died.
*Catherine died Bobby. (Also expire, decease, perish, croak, pass away, kick off, bite the dust, etc.; see Talmy, 1985)
The bird vanished.

*The pin vanished the bubble. (Also appear, disappear, disintegrate, etc.)

(4.34)  The audience smiled.

*Irv smiled his audience. (Also cry, laugh, frown, blink, etc.)

(4.35)  The light glowed.

*Barbara gloved the light. (Also glitter, glisten, shimmer, blaze, etc.)

The saw howled.

*Billy howled the saw. (Also whine, shriek, buzz, chatter, sing)

The sauce bubbled.

*Hazel bubbled the sauce. (Also erupt, smoke, sweat [e.g., as applied to cheese or wood], ooze, puff, leak, bleed, shed.)

Note that the complementary subclasses that express the same kinds of meanings in transitive verbs all resist the reverse process of anticausativization formation: the transitive verbs of causation of directed motion cannot be used intransitively, as shown in (4.36); nor can verbs of killing, creating, or destroying, as shown in (4.37); nor can verbs of inducing behavior, as shown in (4.38).

(4.36)  I took my son to school.

*My son took to school.

I brought my sister home.

*My sister brought home.

I raised the flag.

*The flag raised.

(4.37)  Catherine killed Bobby.

*Bobby killed (= died). (Also slay, murder, dispatch, liquidate, assassinate, slaughter, exterminate, waste, do in, etc.; see Talmy, 1985)

They created a monster.

*A monster created.

(4.38)  Jack tickled Sally.

*Sally tickled. (Also amuse, nauseate, feed, bribe, convince, etc.)

It is important not to confuse these pure inchoative sentences, which can denote specific events, with middles, which assert a property of the subject. Typically middles appear with adverbials, as in Bureaucrats bribe easily, though the adverbial meaning can also be supplied by other elements such as intonation or negation: This lock won’t pick (it’s jammed); Around here, bureaucrats BRIBE! (see Keyser and Roeser, 1984, and Hale and Keyser, 1986, 1987).

In addition, as we noted with reference to (4.10), verbs of motion-contact-effect do not anticausativize: *The bread cut / sliced / hacked. This is true even though causation is inherent to their meaning and visible to other selective alternations such as the middle, which requires it (The bread cut / broke / hit the knife against the bread (= cut / broke / hit the knife with the knife).)

Motivation for the causativizable classes. As before, one can discern a motivation for the designation of subclasses that do or do not permit alternations in each direction. Interestingly, the rationales are of two kinds. In some cases, the language simply does not supply any transitive verb allowing one to express the notion that X acts on Y, causing Y to change, act, or move as a result. For example, there are no verbs that mean to cause someone to rejoice, cry, shout, drink, talk, or sleep. It is as if such events are inherently noncausable directly by an external agent, since they involve an inherent internal cause that must mediate any effect of an external agent. In English, most verbs of physical emission assimilate to this pattern, as if the ability to emit a light, sound, or substance inheres in the emitter and can be caused from the outside only indirectly. Conversely, there are cases where there is no way to use an intransitive verb to express the notion that a particular event, usually caused, can occur spontaneously or in the absence of a cause or agent such as being cut or amused. It is as if such events were conceived as being inherently unoccurable without some external cause. These are phenomena pertaining to the possible conations of meaning elements within English verbs, motivated by the cognitive content of the notion “direct causation.” (See B. Levin, 1985, and Guerssel, 1986, for discussions of the grammatical consequences of the difference between intrinsic causation, where it is implied that some property inherent to the object itself is responsible for its behaving in a certain way, and extrinsic causation, where the causal antecedent may not be inherent in the object’s essence.)

The other kind of motivation is quite different: For some kinds of events, both inchoative intransitive and causative transitive meanings exist, but they are not allowed to share the same verb root, such as kill and die, bring and come, or take and go (this phenomenon is also seen in the possession-depriving verbs in the locative class, such as steal and rob). This is due not to the existence or nonexistence of possible conations of meaning but to the existence or nonexistence of narrow-range lexical rules that map between them. (Another way of putting it is that such rules determine whether stems can be shared among verbs in different conflation classes.) Intuitively, the rules governing stem-sharing reflect how much the language lets you bend or enrich a verb’s meaning before it has to be treated as a completely different verb. In effect, the lexicon groups some kinds of events together as exemplars of the same kind, to be expressed by a single verb, and differentiates other kinds of events. If John kills Bill, is that just causing him to die, or is there something unique about the act of killing that
makes it different from the sum of its parts of causing and dying? English provides one kind of answer to this question.

In their survey of causative alternations in over a hundred languages, Nedyalkov and Silinisky (1973) offer intriguing partial support for the hypothesis that while the exact verbs that participate in causative alternations differ across languages, there are systematic patterns governing which verbs are most likely to alternate. They found that no language allowed a lexical causative form of laugh, or even a suppletive verb meaning "cause to laugh" (though some could express it with a separate causative affix). Causing to laugh is simply not expressible as a simple lexical item. In contrast, break was quite likely to participate in a lexical causative alternation (as it does in English). Boil and burn were somewhere in between; they were also the only verbs among these four that ever appeared in suppletive causative/noncausative pairs. One can speculate that these phenomena are related to those verbs' being associated with notions of going out of existence and/or of emitting substances, which in general are not causativizable in English, presumably because of the greater connotation of important internal causal influences. This all suggests that there is a universal continuum of lexical causativizability, presumably corresponding to the ease of conceiving of a given kind of event as being directly causable from without, running from verbs for human actions to verbs for simple state changes, perhaps with verbs for changes involving emission and disappearance in between.

4.4.4 Passivable Verbs
In section 3.3.4.4 I proposed that the thematic core of passive participles is "X is in the circumstance defined by Y acting on it." That is, X is a theme in the circumstance field; the position in that field that X occupies is defined in terms of X being a patient and Y being an agent. Thus Mary was hit by John means roughly "Mary is in the circumstance characterized by John's hitting her." I tried to show how certain kinds of verbs—symmetrical predicates, prepositional passives and idioms with no possible sense of patienthood associated with the object, and static relations of spatial arrangement, possession, and measurement—are unpassivable because they are incompatible with this thematic core. The logic was the same as that used in explaining the dative, locative, and causative alternations: the syntactic form of the passive, the change in interpretation that it engenders, and its pattern of selectivity across verbs are all manifestations of a single principle, the principle that argument structures are projections of thematic cores.22

The discussions of the dative, causative, and locative alternations in this chapter dealt with the problem that the thematic core theory did not rule out enough verbs: some verbs that were cognitively compatible with the thematic core did not alternate (i.e., they were negative exceptions). This required the additional claim that the thematic cores associated with broad-range rules do not rule out verbs directly but motivate narrow-range rules that license the actual inclusion or exclusion of verbs. For the passive, the story has to be different. The problem isn't that the semantic correlates of passivization fail to exclude some nonpassivable verbs. On the contrary, all verbs that clearly have agents and patients passivize. There are no agent-patient verbs that puzzle us in the way that throw and show did for the dative, die and fall did for the causative, or pour and cool did for the locative. Thus there is no need for narrow conflation classes and narrow-range rules that carve up the verbs with agents and patients; the semantics of the broad-range rule are sufficient to include them all.

The passive faces the opposite problem. Many verbs that passivize do not have arguments that we would easily classify as agents and patients. Thus we must explain how the broad-range rule of passivization is extended to cover verbs that do not appear to meet its semantic conditions, not how it is restricted from applying to verbs that do. The problem is no less hard than those we faced for the other alternations, because the distinctions between verbs lacking patient objects that do and do not passivize appear obscure. First, there are pairs of verbs or verb forms with similar meanings but different thematic roles assigned to their object arguments, and both forms passivize. This would appear to vitiate any principle that would restrict passivization to verbs whose objects have particular thematic roles. Examples are the forms related by the dative and locative alternations, and pairs of psychological verbs one of which has an experiencer subject, like, fear, the other of which has a stimulus subject, like frighten. Second, there are passivable concrete event verbs whose subjects have roles other than agent, such as receive, whose subject is a goal, and open, whose subject can be an instrument (as in The door was opened by a brass key). Third, although certain highly static or abstract verbs fail to passivize (idiom chunks, measure verbs), many others do, such as Drastic measures were justified by the dire situation.

Fourth, verbs defining spatial relations sometimes do (e.g., surround) and sometimes don't (e.g., contain) passivize. Fifth, verbs defining possessional relations sometimes do (e.g. own) and sometimes don't (e.g., have) passivize. It is these borderline cases that have made the semantic boundaries of passivization so difficult to characterize in the past; I know of no theory that demarcates these boundaries fully.

How can we characterize the very broad range of the English passive? It won't work to say that the passive is a purely syntactic rule that applies to any verb with a syntactic object, because that is false. But if passivizability is due only to the thematic concomitants of the broad-range passive rule, we would expect it to be confined to verbs taking obvious agents and patients, which it is not. A third
possibility is that passivization, like the other alternations, is actually licensed by
a set of narrow-range rules with subtle semantic conditions and that these
numerous mini-passive rules happen to exhaust all of the subclasses of agent-
patient verbs in English and embrace some, but not all, of the nonagentive subclasses as well. This is a possibility that I cannot rule out conclusively, but
if true it would be surprising that we do not find at least a few pockets of unpass-
vivable agent-patient verbs, as we do for the other alternations.

The solution that I think is most reasonable takes off from Bolinger (1977a)
and S. Anderson (1977), who suggested that passivization seems to apply when
the object either is a patient or is capable of being construed as one. More
precisely, I will suggest the following. The broad-range rule of passivization
applies productively to all and only the transitive verbs that have agents and
patients. Thus it supplies a sufficient condition for a verb to alternate, and in that
regard it is unlike the dative, causative, and locative alternations, whose broad-
range rules merely define necessary conditions (which then motivate a set of
narrow-range rules that are the actual source of the sufficient conditions).

However, simple action or change verbs are not the only ones that have agents
and patients. English has a number of verbs that are ambiguous between
meanings with agent-patient roles and meanings with other roles, and it has a
number of rules that convert verbs lacking agent subjects and patient objects into
related forms that do have these assignments. It is the versions of these verbs with
agents and patients that passivize; similar versions that lack these roles do not.

To support this analysis, I will rely on two assumptions that have already
pervaded my analyses of other verb subclasses. First, the notion of patient (like
other thematic relations) can be used in nonphysical semantic fields, so it does
not refer only to entities that are physically acted upon. (The abstract notion of
patient that I employ is discussed in more detail in section 5.5.7.) Second, the
required agent-patient relations need constitute only one component of the
verb’s meaning; any number of other sets of semantic relations can also be
defined and the passive rule will not be blocked by them.

In the next five subsections, I will use these assumptions to show why
passivization does or does not apply to various kinds of verbs, and then I will try
to explain why the passive is different from the other alternations.

4.4.4.1 Passivizable Action Verbs  Let me start with the most straightfor-
ward cases, involving verbs denoting actions. All the subclasses of two-
argument verbs discussed so far that have actional patients and themes, including
verbs of effect (i.e., lexical causatives) and motion-contact-effect (e.g., cut)
obviously are compatible with the passive thematic core. There is already a state
that the verb predicates of the passive subject, and a patient relation defined for

it. Likewise, we have already seen how the verbs undergoing the dative and
locative alternations have two related semantic forms, each of which assigns a
patient and a theme role to the argument appearing as direct object. In They
loaded hay into the wagon, the object hay is construed as the patient of the action
that results in its being the theme of a change of location; in They loaded the
wagon with hay, the object the wagon is construed as the patient of the action that
results in its being the theme of a change of state (from empty to full). The to-
dative alternation is similar. The prepositional form with to is construed as
having an agent change the location of its object argument; the object is thus the
patient of the action performed by the agent and the theme of the resulting
location change. Thus it is passivizable, as in The book was given to John. The
double-object counterpart is construed as having an agent act on a person,
causing him to gain possession of something. Thus the person is the patient of
the act performed by the agent and the possessor in the possession-change event.
This specification of a patient makes the double-object form eligible for
passivization: John was given a book. 23

4.4.4.2 The Thematic Relations Hypothesis Extended to Agent-Patient
Relations  Now what about nonactional transitive verbs? Earlier I suggested
that there is a more general sense of agency and patienthood, having to do with
responsibility and abstract causation, that allowed the passive thematic core to
be extended to many subclasses of abstract verbs. Can this be stated more explicitly?
Lakoff (1977) offers one proposal. He lists a set of properties that
characterize a “prototypical” causation event, so that events possessing some but
not all of these properties are still construable as involving causation but less
prototypically so. Prototypical causation involves a single, willful, human agent
who deliberately transfers energy toward a single perceived patient who notice-
ably changes state as a result in a single local event. Hopper and Thompson (1980)
offer a similar definition of the prototypical “transitive” event, and Maratsos et
al. (1985) specifically note its relevance to passivizability.

A somewhat more systematic account comes from Talmy (1988). Talmy
offers a theory according to which the roles of agent and patient can be
generalized in a quasi-metaphorical way to nonactional fields, just as the roles of
theme, goal, source, location, and path have been generalized from literal
spatial location to fields of circumstance, possession, identity, communication,
and so on (Gruber, 1965; Jackendoff, 1972, 1983, 1987a). According to Talmy,
there is an intuitive notion of “force dynamics” that pervades lexical semantics,
just as there is a notion of topology that underlies the classic thematic relations
of themes, locations, and paths (Talmy, 1983). In this force-dynamic model,
objects are conceived as bodies with inherent tendencies toward motion or rest.
An agonist is a body whose state of motion or rest is being focused on in a sentence. An antagonist is a body impinging on an agonist, imposing a counteraacting force toward motion or rest, which sums with the inherent tendency of the agonist to determine what happens to it. When the agonist’s tendency is toward rest and the antagonist’s is toward motion and the latter is stronger, the agonist moves; this is illustrated peripherally in (4.39a). When the agonist’s tendency is toward motion and the antagonist’s tendency toward rest is stronger, the agonist stays put; see (4.39b). These are examples of steady-state causation. If the antagonist is not there from the beginning but comes into place and exerts its effect, we have onset causation, as in (4.39c, d). In all four of these examples the result is in opposition to the agonist’s intrinsic tendency. If an antagonist is removed, allowing the agonist to move or not move according to its inherent tendency, we have onset permissive or “letting” causation, as in (4.39e, f).

(4.39) (a) The ball kept rolling because of the wind blowing on it.
(b) The log kept lying on the incline because of the ridge there.
(c) The ball’s hitting it made the lamp topple from the table.
(d) The water’s dripping on it made the fire die down.
(e) The plug’s coming loose let the water flow from the tank.
(f) The stirring rod’s breaking let the particles settle.

The force-dynamic analysis offers a common set of elements out of which various related notions associated with agency and causation can be defined, including causation by an event, an agent, or an instrument; causation by onset or within a steady state; permissive or “letting” causation; “inductive” causation of activity by an agent; and causation of change versus absence of change. (In chapter 5 I will outline an explicit theory of how this space of possibilities is mentally represented in semantic structure.) Furthermore, the domain of causation need not be physical motion and rest; Talmy gives examples where the analysis extends to intrapsychic forces, as in the contrast between He didn’t close the door and He refrained from closing the door, and social forces, as in the contrast between She told him to leave and She urged him to leave. He also suggests that they can be extended to epistemic domains of inference and reasoning, as when one is “forced” to a conclusion.

Of more immediate interest, Talmy argues that the notion of agent can be defined within this system as an antagonist whose intrinsic force tendency is volitional. Thus simple causal sentences such as John broke the lamp are not fundamentally different from The ball’s hitting it broke the lamp. (In agent causation, as in other types of causation, a number of microscopic intervening generic links in the causal chain are usually omitted.) Talmy also formalizes some of the key semantic elements of a variety of definitions of open- and closed-class lexical items, such as despite, keep, let, because, make, get, stop, try, manage, help, leave, and the modal auxiliaries.

What this analysis buys us is a set of features that can be used to extend the notions of agent and patient in a way that allows for the possibility that abstract verbs have such roles. In transitive verbs in general, patients correspond to agonists, agents to antagonists; hence the agonist is mapped onto object and antagonist mapped onto subject. We can say that the minimal agent-patient relation is one where two entities are involved in a single asymmetrical relationship defined by one entity’s exerting some causal power against the other; the nature of this exertion is specified by the particular verb. Thus many transitive verbs that are not actional can nonetheless be seen as having abstract agent and patient roles, and passivization will apply to them. Let me examine the circumstances in which this can happen.

4.4.4.3 Passivizable Abstract and Stative Verbs Instrumental subjects. Verbs whose subjects play the role of instrument can passivize: The brass key opened the door; The door was opened by the brass key. This is often taken as evidence that the English passive can apply regardless of thematic role. However, this assumes that the subject of these sentences truly plays no semantic role other than instrument. This is false. Not just any instrument can become a subject: *A spoon ate the cereal; *The telescope saw the galaxy; *John’s graphite racket won the tennis match. B. Levin (1985) and Rappaport and Levin (in press) point out that only intermediary instruments can become subjects, not just facilitating instruments. An intermediary instrument is basically a participant in the penultimate event of a causal chain, ordinarily unexpressed or backgrounded. In other words, there is a temporally unfolding chain “John acts on key CAUSES key acts on door CAUSES door opens” but no causal chain “John acts on spoon CAUSES spoon acts on cereal CAUSES cereal is eaten,” because in the latter case the specified grain size for the events forces inclusion of an additional event of John acting on the cereal in order for it to be eaten. Thus instrumental subjects are also, by grammatical necessity, agentlike proximal antagonists or causes. English appears to have a narrow-range rule that we could call “intermediary instrument promotion,” which converts verbs with a multilink causal chain containing an intermediary instrument argument into verbs with a two-link chain in which the instrument argument is the first link, hence a kind of agent, hence subject. That is the version that feeds the passive rule.

Epistemic and deontic verbs. Verbs expressing abstract relations can sometimes be construed as involving generalized agents and patients. Propositions and situations can be seen to possess the analogue of causal or force tendencies that can result in other propositions or situations being true or coming about that
otherwise would not, or that by being eliminated no longer prevent them from being true or coming about. In fact, many English verbs—see (4.40)—take either animate or abstract referents as their subjects, which is consistent with the suggestion that agents are simply volitional causes. English seems to have one or more rules that we could call "epistemic agent disembodiment," converting verbs with an animate argument whose actions can be epistemic or deontic change into verbs with an abstract argument that ensures or engenders such a state by means of the force of its content. If Talmy is correct, these abstract verbs still have a kind of agent argument, and the applicability of passivization to them follows.

(4.40) John justified the new treaty. / The new treaty was justified by John.

The horrors of the last war justified the new treaty. / The new treaty was justified by the horrors of the last war.

The judge nullified the amendment. / The amendment was nullified by the judge.

The principles of the constitution nullify such an amendment. / The amendment is nullified by principles of the constitution.

John proved the theorem. / The theorem was proved by John.

These steps prove the theorem. / The theorem is proved by these steps.

Bob created a golden opportunity for us. / A golden opportunity was created for us by John.

Falling interest rates have created a golden opportunity for us. / A golden opportunity has been created for us by falling interest rates.

"Psych-verbs." Transitive psychological verbs, also lacking agents and patients, are an important topic of current research on argument structure because they come in two complementary forms: those like please and frighten, where the stimulus is the subject, and those like like and fear, where the experiencer is the subject. Furthermore, they differ in how various grammatical processes apply to their subjects, such as the binding of anaphoric elements within them (see, e.g., Belletti and Rizzi, 1986; Grimshaw, in press). It is therefore curious that on the face of it, both kinds of verbs passivize: John was feared/liked by Bill; John was frightened/pleased by Bill. But how could this be so in a theory in which the links between thematic roles and grammatical functions are critical? There are two possibilities.

One possibility is that only one of these subclasses has a mapping of thematic roles onto argument structure that supports passivization; the other subclass in fact lacks a verbal passive and the passive "participles" we see are actually adjectives. This is clearly the case in Italian where the two kinds of passive forms are morphologically distinct (Belletti and Rizzi, 1986). Grimshaw notes that there is some evidence that this might be true in English as well; if so, it would be consistent with a new version of Jackendoff's Thematic Hierarchy Condition that she has developed. She points out that frighten verbs clearly can be adjectival passives, because they have uniquely adjectival properties. They can undergo negative un-prefixation (Betty was unperturbed by the situation / *The situation unperturbed Betty). They appear as complements to certain adjective-selecting verbs like seem (John seems sick / frightened by the situation / *running / *hit by Bill). And they accept a variety of prepositions, not just the verbal passive's by (Berry was frightened by / of / at / about the thought of leaving).

Grimshaw also points out that whereas frighten verbs can appear with the progressive in the active (The situation was depressing Mary), it cannot do so as felicitously in the passive (?Mary was being depressed by the situation). This is exactly what one would expect if the passive was adjectival (cf. ?Mary was being sick).

The other possibility is that frighten verbs in English have both adjectival and verbal passives, because they actually do assign a causal (hence quasi-agentic) role to the stimulus event. Grimshaw notes that the reason that passives of frighten verbs are less than fully acceptable in the progressive is that they require the speaker to construe the by-object as a kind of agent, which is cognitively difficult when it is something as nonagentive as a situation. However, the sentences are not entirely ungrammatical, especially when the aspectual interactions between the psychological state and the effect of the progressive are weakened, as in Mary sat around being depressed by the situation. This suggests that the verbal passive is possible and that it is accompanied by an attribution of responsibility to the stimulus situation, as in Talmy's examples in (4.39). As Dowty (1982) points out, the frighten-verbs can all signify an event of causation of a change of state (hence a patient/theme role for the object) as well as extended states (with only an experiencer role): The thunderclap frightened John could refer either to John's being startled or to his being concerned. The ability of the stimulus-subject verbs to support a causal reading becomes even more apparent when we consider the fact that virtually all of them can also appear with volitional animate subjects (e.g. John deliberately tried to frighten / worry / please / arouse / excite me; see Talmy, 1985, for a list of one hundred of them). Thus it is likely that a rule similar to epistemic agent disembodiment (the one discussed in relation to justify verbs) relates the two versions of these verbs. If such a rule converts the version of these verbs with an event reading and a causal agent role (perhaps subsuming causation by an event like a thunderclap) into a version with a stative reading in the field of epistemic or psychological causation, the stative
version would continue to have an agentlike role, thereby being able to feel passivization.\textsuperscript{25}

Thus the passivizability of both \textit{fear} and \textit{frighten} verbs follows from the thematic core of the passive. This can be seen by considering the cognitive ambiguity inherent in the construal of perceptual events. What is the cause in an act of perception? Is it the perceiver, because he or she must be engaged in mental activity (either phasic, such as moving the eyes, head, or an internal mental “spotlight” of attention, or tonic, such as having the right kind of sensorium and being in a conscious state)? This would be consistent with Talmyn’s (1988) suggestion that the body—and by extension, internal surrogates such as "the mind’s eye"—is naturally considered to be inert unless animated by an intrapsychic willful force. Or is the stimulus the cause, because its salient properties call attention to itself or because it puts itself into the perceiver’s awareness involuntarily? Again, this option is within the realm of cognitive possibility: Talmyn discusses a set of expressions suggesting that the “central” component of mind is generally conceived as having a natural state of repose and requires a stronger force from more peripheral parts of the mind to overcome that tendency. Given that cognition can avail itself of either conceptual gestalt, it should be possible for languages to grammaticize either or both possibilities as conflation classes for transitive perception verbs (see Dowty, 1982, for a similar suggestion). Indeed both stimulus-subject and experiencer-subject verbs are seen in many languages (Talmyn, 1985). English has both, and passivizes both.\textsuperscript{26}

\textit{Verbs of spatial relations}. This takes us to verbs of spatial relationships, some of which passivize, others of which do not. Jackendoff (1972) explicitly predicts that a spatial-relation passive is possible only when its surface subject is a theme and its by-object or implicit argument is a source, location, or goal. This fails in both directions: \textit{*Beer is contained by the bottle} (surface subject = theme; see also the examples in (2.19) in chapter 2) and \textit{The mountain is capped by snow} (surface subject = location). I will propose a simpler solution: verbs of pure spatial events and relations (\textit{contain, gush, drip, lack, fit}) have no patient arguments and thus do not passivize, period. Spatial verbs that do passivize can be shown, by independent tests, to encode more than pure spatial relations. Specifically, they include in their definitions an abstract notion of state-causation or responsibility that motivates the extension of abstract versions of the thematic relations “agent” and “patient” to them.

Passivizable spatial verbs fall into two subclasses. One set, shown in (4.41), was used by Gee (1974) as his primary case of positive exceptions to Jackendoff’s Thematic Hierarchy Condition, which should rule out passives whose surface subjects are sources or goals.

\begin{enumerate}
    \item (a) He was hit by a car.
    The house was struck by lightning.
    The rocks were slapped by the breaking waves.
    \item (b) Russia was invaded by a horde of locusts.
    St. Sebastian’s body was pierced by arrows.
    Her body was infected by a virus.
\end{enumerate}

Examples (4.41a) and (4.41b) are recognizable as belonging to the classes of motion-contact verbs and motion-contact-effect verbs (4.41b), respectively. They do involve goals, to be sure, but they also involve clear-cut patients, entities that are physically involved in defining the action. As long as there is a patient, the thematic core of the passive argument structure doesn’t care whether some other set of thematic roles are defined as well.

The second set of examples, called to my attention by Melissa Bowerman, is presented in (4.42).

\begin{enumerate}
    \item (a) The mountain was capped by snow.
    \item (b) The street was lined by trees.
    \item (c) The house was surrounded by a moat.
    \item (d) The paragraph was headed by a catchy title.
    \item (e) The canyon was spanned by a bridge.
    \item (f) The canyon was bridged by a span.
    \item (g) The side of the house was abutted by a stone fence.
    \item (h) The crater was filled by a lake.
    \item (i) The bed was covered by a blanket.
\end{enumerate}

Ignore for now the fact that many of these sentences sound better in their adjectival versions containing \textit{with} instead of \textit{by}; the point is that for most speakers they are grammatical with \textit{by}.) A curious thing about these verbs, but not the unpassivizable spatial verbs like \textit{contain, lack, or gush}, is that they all also appear in the \textit{with} version of the locative form, shown in (4.43).

\begin{enumerate}
    \item (a) Hurricane Gloria capped the mountain with snow.
    \item (b) The planter lined the street with trees.
    \item (c) The landscapers surrounded the house with a moat.
    \item (d) I headed the paragraph with a catchy title.
    \item (e) The engineers spanned the canyon with a bridge.
    \item (f) The engineers bridged the canyon with a span.
    \item (g) The architect abutted the house with a stone fence.
    \item (h) Centuries of rain filled the crater with a lake.
    \item (i) Sheila covered the bed with a blanket.
    \item (j) *I contained a ship with the bottle.\textsuperscript{27}
    \item (k) *The architects foolishly lacked the building of a bathroom.
\end{enumerate}
We have already analyzed the thematic roles of sentences like (4.43a)–(4.43i); their objects are themes of a change of state, and their with-objects are roughly like instruments; more accurately, they are themes of change of location in a subordinate means event (Rappaport and Levin, 1985), or “state-changers.” Thus (4.43a) can be paraphrased as “Hurricane Gloria changed the state of the mountain by adding snow to it, covering its top.” Means events are basically penultimate events in causal chains; recall that this is also true for some instruments (those that can become subjects). Let’s say that the verbs of (4.42) are derived from those of (4.43) by a rule similar or identical to intermediary instrument promotion. When the beginning of a causal chain is truncated by omitting the first event and promoting the penultimate event (the means) to subject, the theme of the means event now serves as the head of the chain and hence is being construed as the causal agent. Thus passive sentences like those in (4.42) should be analyzed not as having location subjects and theme by-objects but as having patient/theme subjects and state-changer by-objects. That is, the active version of (4.42a) would be paraphrased as “The presence of snow on top of it causes the mountain to be in a certain state” and the passive version as “The mountain is in the state characterized by snow’s being on it.” The active subject is a static proximal cause or antagonist, causing the agonist (patient) to be in a state that its natural tendency would not have brought it into. Thus the passive subject is an abstract patient, and the passivizability of the subclass of verbs of state-change-by-addition follows.

Some peripheral elaborations of these verbs independently support this analysis. The pseudo-cleft construction, which is often said to pick out events, applies to the passivizable but not the unpassivizable spatial verbs: What the fur does is line the coat; What the trees do is line the street, and so on; but What this bottle does is contain the ship and What this building does is lack a bathroom. The pro-verb do can be substituted for the state-change-by-addition verbs because the state-changer is construed as having some function in defining the state of the theme. In addition, explicit expressions of the idea of an object existing in one state and changing to another by the addition of an object to it differentiates the two subclasses: That mountain is much nicer now that snow is capping it; That street is much nicer now that trees are lining it; That paragraph is much nicer now that a catchy title is heading it; but That pint of beer is much nicer now that a glass is containing it.

One other class of spatial verbs is worth mentioning. Many verbs of pure motion can appear with either volitional or nonvolitional subjects; for example, John / The ball rolled down the hill. Though most such verbs specify path arguments and hence take oblique phrases, making passivizability moot, a few, such as enter and approach, take direct-object phrases. In such cases, it is only the volitional-agent version that passivizes: The room was entered by a strange man / *by a balloon; Biff was approached by a spy / *by the train (Bolinger, 1977a).

**Verbs of possession.** Transitive verbs of possession can be analyzed in a similar way, though no rules deriving them from more complex forms are involved. When pure possession is involved, passivization is impossible; when possession is conflated with thematic elements involving extended senses of agency, passivization can be extended to the subclass. As has often been pointed out (see, e.g., Miller and Johnson-Laird, 1976), there are several kinds of possession, including inalienable possession (John’s nose), possession of property (John’s car), relationships (John’s father), custody (John’s library book), and temporary association (John’s lottery number). Many of these distinctions are differentiated in morphology or in multiple translations of have in other languages. English uses have to refer to the pure concept of possession, ignoring all these distinctions, and own and possess to refer mainly to property possession (John owns a car / *father / *nose / *library book / *lottery number 91854); possess seems to admit of custody as well. What do property ownership and custody entail above and beyond generic possession? Perhaps an alienably possessed object is construable as having an inherent tendency to move away from the owner, but the owner exerts a stronger opposing force keeping it with him and allowing him to do with it what he pleases. If so, the owner would have a quasi-ative or antagonist role with respect to the possession/agonist. Thus property possession (own, possess) might be seen as an exemplification of generalized agent-patient relations, whereas pure possession (have, lack) specifies a static spatial/possessional relation and nothing else. This is why only the property possession verbs passivize.28

4.4.4 Other Passivable Verbs Lacking Concrete Agents and Patients

**Verbs of enabling.** One of the toughest cases for any theory of passivization appealing to thematic roles is receive. The verb is puzzling because it seems to violate the linking regularity that when an event involves an agent and a goal (e.g., send), it is the agent that is the subject; for receive, the recipient or goal is the subject. Indeed, receive is exceptional in a number of ways. Dowty (1987) notes that verbs with goal or patient subjects (undergo and succumb are two other examples) are few in number, low in frequency, acquired late, and more common in elevated than in casual speech. Higginbotham (1988) suggests that the semantics of these verbs is fundamentally different from that of most other verbs. Whereas the meanings of most verbs correspond to a kind of event or state, and their arguments encode the thematic roles of various participants in the event or state, the meaning of receive (and verbs like it) directly expresses the thematic
role of one of the participants in an event or state whose nature is otherwise unspecified. Thus receive means “to play the role of recipient/goal.” Higginbotham suggests that “light verbs” such as do, have, be, and go (discussed in chapter 5) have similar kinds of meanings; they directly assert that their subjects play a particular thematic role.

Regardless of how receive receives its subject, we must account for why it passivizes given that the subject is not agent-like. To begin with, one should note that the subject cannot be a mere goal but must be a possessor: one cannot talk of a tree receiving an arrow or a mailbox receiving a package. But in addition, receive appears to be consistent with two slightly different meanings, one where a person merely comes to possess something, another where a person enables something to come into his possession. An enabling cause can be construed as an abstract “agent” by Talmyn’s force-dynamic analysis: the enabler removes or weakens the antagonistic force that opposes the tendency of the theme to arrive into his possession. The voluntary enabling sense can be seen in sentences like John refused to receive any more packages from the Fruit-of-the-Month Club or Bill received the packages to placate the mailman. Although in many cases the two meanings overlap, there are also cases where they do not. When someone receives a snowball in the eye or a blow to the head, clearly no enabling is going on. Conversely, when someone receives a guest (or when a person is “well received” or an institution sets up a “Receiving” department), the receiver is doing something or at least allowing something to happen. The passive clearly distinguishes these extreme cases, applying only in the second, where a sense of enabling is involved: *A blow to the head / A snowball in the eye was received by John, versus The guests were received by the debutante / The package was received by the clerk. I suggest that even in the intermediate cases, the passive forces the enabling sense of receive to dominate. For example, it seems acceptable to say For months after his death, John received packages, but quite odd to say Packages were received by John for months after his death.

Raising-to-object verbs. The most recalcitrant class of verbs for an analysis of passive that invokes operations on semantic structure is the class of “exceptional case-marking” or “raising-to-object” verbs such as expect, consider, regard, view. These verbs passivize (John is considered to be a fool by his friends), but their objects do not even appear to be arguments of the verb, let alone arguments playing a particular thematic role. What allows this class to passivize? Oehrle and Ross (n.d.) and Lakoff and Johnson (1980) note that the raised object is not utterly devoid of a semantic role with respect to the matrix verb: in Ed found the chair to be comfortable, it is implied that Ed directly experienced the chair by sitting in it; in Ed found that the chair was comfortable, no contact is necessary. Thus the phrase may play the role of a stimulus entertained by the referent of the subject, in addition to whatever role it is assigned by the embedded predicate. Interestingly, this test may provide insight into the biggest challenge of all to thematic constraints on the passive: passivizable raised dummy elements, such as Sue found it to be a drag to itemize deductions / It was found by Sue to be a drag to itemize deductions; or Sir Edmund found there to be rampant discontent in the colonies / There was found to be rampant discontent in the colonies by Sir Edmund. (Note, though, that not all speakers accept these sentences with byphrases.) Compare these sentences to Sue found that it was a drag to itemize deductions or Sir Edmund found that there was rampant discontent in the colonies. In the former (raising) sentences, there is an implication that Sue actually filled out her own tax forms and that Sir Edmund visited or directly studied the colonies; in the latter (tensed sentential complement) sentences, Sue could merely be a tax commissioner reading human factors studies and Sir Edmund a reader of historical novels. This suggests that in these examples it and there verge toward being pronouns roughly referring to “the action” or “the situation there,” which are stimulus arguments of find. The fact that most of these verbs also appear as simple transitives with stimulus direct objects (John expected an earthquake; I considered her offer; They viewed the painting, etc.) hints that some aspect of this analysis might be correct. Di Sciullo and Williams (1987) explicitly analyze these constructions as assigning a thematic role to the raised object: they propose that Bill expects John to win involves the complex predicate “expect-to-win” and the arguments “Bill” and “John.” Thus this class of verbs could be treated as having a thematic analysis similar to that of the stimulus-object psychological verbs.

4.4.4.5 What Makes the Passive Different from Other Alternations? As we have seen, the passive is strikingly different from the dative, the locative, and the causative. The passive broad-range rule supplies sufficient conditions for it to be applied productively, and narrow subclasses of verbs play no role (except possibly as conditions for other rules, such as instrument promotion, that feed the passive with forms that meet those conditions). For the other three alternations, the conditions of the broad-range rule are necessary but not sufficient, and narrow-range rules intervene. Why is the passive different, and how do children know the difference?

An obvious difference between the passive and the other alternations is that the passive rule alters a verb’s argument structure, adds an affix to its stem, and changes its morphosyntactic status from finite verb to participle, whereas the other rules only alter argument structure. Marantz (1984) suggests that in general, alternations that involve the addition of an affix are fundamentally different from alternations in which the stem survives intact. Levin and Rappa-
rules acting “in reverse” (and then blocked only if the inherent meaning of the verb made this difficult or impossible). In other words, for affixation rules one can think of the syntactic operation as doing the pulling and the semantic change as being the passenger, whereas for nonaffixation rules the semantic change, with its highly detailed sensitivity to verb semantics, would do the pulling and the syntactic change would follow. Second, it preserves the intuition that when a rule creates a verb with a transparent “stem + affix” structure, the learner attributes the argument structure change and the semantic change to the telltale affix and largely ignores the verb, whereas when the verb appears unchanged in form, the learner perceives the alteration more as a case of polysemy and analyzes the verb’s semantics in detail in order to understand the chemistry between the semantic change and the parts of the verb’s inherent meaning that remain unchanged.

It seems reasonable to suggest, then, that the presence of affixation (and possibly also any change in morphological category, such as finite form versus participle) is the cue children use to recognize which argument structure changing rules are productive as broad-range semantic operations that can be applied to any verb within the broad conflation class defined by the rule. The English passive is an example; others include morphological causative affixes, which often apply quite freely and permit indirect causation readings (Nedyalkov and Silnitsky, 1973; Comrie, 1985), and “applicative” affixes, which are similar to the English benefactive for-dative alternation but less restrictive.

Clearly, the notion of “affixation” must be made precise; the child cannot merely look for any verbs that change in form or have stuff added onto them. To take the simplest problem, English irregular verbs like hit and cut have no overt affixes in the passive. In the other direction, some languages have phonologically related verb pairs that are not truly derived by an affixation operation (the English vestigial causative pairs rise/raise and sit/set are examples that are close to home). Somehow the child must analyze the morphological system of the language to distinguish genuine affixation operations from mere similarity of forms. I cannot treat this problem here but instead refer the reader to Pinker and Prince (1988), where it is discussed in detail.

Affixation may distinguish the English passive from alternations like the dative and the causative, but what causes the differences in breadth of the passives of different languages? It is unlikely that there is a single parameter of breadth of application. Some of the differences among passive rules might be traceable to differences in their forms. One possible factor is that any passive that is not marked by a general affixation rule should be productive only for narrow-range subclasses. Another is that some productive passives may have slightly different broad-range conditions because they are not tenseless participles.
appearing with be but rather are finite forms or complements of more specialized verbs (e.g., receive or even eat; see Keenan, 1985). But the main factor I have relied on in the discussion of passivizable verbs in English is the large inventory of mechanisms that English uses to create verb forms with patient objects in nonlocational and nonactional semantic fields. It may be that the English passive itself is not that much broader in range than that of other languages, but that many other rules in the language feed it with eligible semantic forms containing patient objects. This is simply a lexicosemantic version of the more traditional syntactic accounts, in which the passive is fed by rules that reanalyze certain kinds of surface phrases as objects of the verb. (For example, \[\text{take advantage of John}\] is said to be reanalyzed as \[\text{take advantage of John}\], which then allows \text{John was taken advantage of}; see Bresnan, 1982b, for discussion of a variety of such rules.) In the current account, the crucial antecedent of passivization in most cases is not the creation of surface objects (if it were, \text{contain and have} would passivize), but the creation of surface objects that are patients.

Nonetheless, the prevalence of patient-object verbs in English, and the rules creating them, could have arisen in response to the need for a very general passive operation. In English, the passive serves several functions that are accomplished in other languages by other means. First, it serves to focus what is usually the object argument, an important function given that the language lacks constituent order freedom, deletable subjects, and grammatical marking of the sentence topic. Furthermore, the passive can be used to avoid mentioning a specific subject. Crain, Thornton, and Murasugi (1987) present a nice example of this “evasive passive”: Ronald Reagan, describing the Iran-contra scandal besetting his administration, admitted only that “mistakes were made.” Third, the English passive also serves to move the object argument to the front of the sentence, which can reduce the processing load on the listener in constructions like relative clauses by minimizing the duration of the resource-hungry process of remembering the head noun until the gap appears (see Wanner and Maratsos, 1978; compare \text{She tickled the monkey that the giraffe kicked with She tickled the monkey that was kicked by the giraffe}. In contrast, the freer constituent orders in other languages allow speakers to reorder the elements of an embedded clause without having to resort to the passive voice (see, e.g., Hakuta, 1981). Thus it would not be surprising if mechanisms allowing the English passive to be very broad in range evolved under pressure for the passive to fulfill these functions for which no other grammatical device is available. (We know that in even more extreme cases, this pressure seems to have an effect. In some languages—many Bantu languages, for instance—one cannot question the subject position, so passivization is the only means of questioning agent arguments—\text{Who hit me? is ungrammatical; one has to say Who was I hit by?} Such languages have a passive rule that is even less restrictive than the English passive; see Keenan, 1985; Foley and Van Valin, 1985.)

The suggestion that the English passive diachronically increased its range in part for functional reasons is not new. Historians of English such as Curme (1935/1983) and Visser (1963) have speculated that the passive spread in English because of the lack of an indefinite pronoun analogous to the French \text{on} or the German \text{man}. They note that the equivalent pronoun was lost in English by the fourteenth century, at which time an expansion in the range of passivization in English, such as to prepositional objects, began. In fact, historical accounts of the passive commonly note that it is not a unitary phenomenon but appears to be tied to a gradual tendency to reanalyze verbs as taking object arguments (arguments that are objects because they are patients, in my account) following the leveling of the accusative/dative case distinction in the Middle English period. While Old English contained passives of transitive verbs, more extended classes seem to have flourished only later, and probably not all starting at the same time. According to Lieber (1979) and Lightfoot (1981), passives of double-object forms were very rare in Old English and increased in the Middle English period from the thirteenth century on. Prepositional passives began to appear in numbers in the fourteenth and fifteenth centuries; passives of predicative verbs (e.g., consider) increased in the fifteenth century; passives of complex verbs (e.g., advantage was taken of John) first appeared in the fourteenth century but experienced their biggest growth spur in the eighteenth and nineteenth centuries. (Of course, vagaries in sampling make the picture a complicated one.) Closer to home, Dowty (1979a) quotes Marchand (1951) as characterizing passives of double-object for-datives as a mid-twentieth-century development: “In World War II it was so often repeated how necessary it was to ‘find the returning soldiers a job’ that it required [sic] the character of a phrase. This paves the way for ‘the men would be found a job’” (Spectator, May 18, 1945, 441).”

In sum, the passive differs from the other alternations I have discussed in applying to any verb meeting its broad-range conditions (viz., having a patient object) rather than merely motivating a large set of specific narrow-range rules. Presumably this is related to the fact that it adds an affix and changes the verb’s category; the resulting participle is perceived as being composed of a meaning contributed by the original stem and a meaning change localized to the affix, rather than as a new lexical item with its own complex meaning. The reason that the English passive extends not only to all transitive action verbs but to many nonagentive and stative verbs as well is that these passivizable verbs actually do have patients, according to the Thematic Relations Hypothesis.
4.5 The Relation Between Narrow-Range and Broad-Range Rules

Let me summarize the theory. In chapter 3 I characterized argument structure alternation rules as involving very general operations on lexical semantic structure. I showed that this proposal had the right consequences for their concomitant changes in interpretation, for the choice of grammatical functions associated with them, and for necessary conditions defining broad patterns of selectivity in the kinds of verbs that can undergo the alternations. In this chapter I examined in detail the sufficient conditions. For the dative, the locative, and the causative, the fine patterns of selectivity can be explained by the rules' being restricted to very narrow conflation classes, where the choice of the subclasses was motivated by the thematic core of the broad rule but the choice of individual verbs was determined locally by the verb's membership in the narrow subclass. For example, *She
drove Chicago the car* is ruled out because it does not conform to the broad-range dative rule, which makes possession change a necessary condition for dativization. *She
pulled John the suitcase*, though it does meet the necessary condition, is ruled out because it does not conform to any of the narrow-range dative rules, each of which imposes a set of sufficient conditions (such as ballistic motion). For the passive, on the other hand, narrow-range rules play no role; the broad-range rule defines necessary and sufficient conditions for passivization.

This raises the question of the relation between broad-range and narrow-range rules for the alternations that have both. Could the broad-range rule be eliminated entirely from an account of the psychology of language, replaced by the list of narrow-range rules that actually determine how speakers generalize? Recall what the arguments for broad-range rules are. First, the broad-range rules determine what all the narrow-range rules have in common. All the mini-dative rules, for example, involve the double-object construction with the possessor as first object, not a family of different constructions with various combinations of prepositions or various assignments of roles to surface functions. Second, the motivation for why certain subclasses alternate and others don't is provided by the broad-range rule. For example, the dativizability of the tell class as compared to the shout class is probably related to the fact that what makes a speech act an example of "telling" presupposes something about the interaction between the speaker and the target of the transfer of information whereas what makes a speech act an example of "shouting" does not, and the fact that the thematic core of the double-object form specifies acting on the recipient. However, neither of these facts strictly requires that all speakers mentally represent broad-range rules; each of the narrow classes could be acquired individually.

There is evidence, though, for the on-line operation of broad-range rules in people's speech and writing. Bowerman (1982a) noted that adults occasionally use causative forms that are obviously productive (they sound quite unusual), but clearly recognizable as the causative of some intransitive predicate (see also Stemberger, 1982). In other words, such forms are consistent with the broad-range causativization rule, but not licensed by any of the narrow-range rules. The examples derived from verbs are reproduced in (4.44).

(4.44) (a) UL-approved outdoor lighting sets are weatherproofed so that water will not deteriorate the sockets.
(b) He said that the Agnew and Watergate affairs have tended to deteriorate confidence in the American system.
(c) The relatively steep nose-up attitude after take-off climbs the airplane quickly to decrease noise on the ground.
(d) Sparkle your table with Cape Cod classic glassware.
(e) Zia conforms Pakistan law with Islam.
(f) Mr. Castellito simply disappeared permanently in 1961, but the jury apparently believed the testimony of other figures who said Mr. Provenzano had arranged to disappear him.
(g) At the end of the week "Here little doggie, here is your bone, now last it until next week."
(h) We're gonna splash and we're gonna spin ya. We're gonna scream and we're gonna grin ya. [In promotional brochure for an amusement center]
(i) The aspirations have been risen again.
(j) They've grown it to where it's a large company.
(k) The experience grew me up in a hurry.
(l) What's fussing her? [A Grandpa wondering why baby is crying]
(m) He just popped it up out of the clear blue sky. [Wife telling how husband thought of name for their baby]
(n) They break her out. [Mother telling how disposable diapers give her child a rash]

Let me refer to these kinds of utterances as "Haigspoke," after the presidential Chief of Staff who appalled the nation with creative usages such as *Let me caveat that* and *That statement needs to be nuanced.* (A MacNelly cartoon had him announcing his resignation: "I decisioned the necessification of the respiratory action/option due to the dangerousity of the trendflowing of foreign policy away from our originative careful courting towards consistensivity, purposely, steadfastmitude, and above all, clarity.") The phenomenon is intriguing because it illuminates the psychological role of broad-range rules in adults and, as we shall see in chapter 8, children. In the next section I show how pervasive the phenomenon is and discuss some of its salient properties. Then I will discuss its
implications for the respective roles of broad-range and narrow-range lexical rules.

4.5.1 Ungrammatical Uses of Lexical Rules in Adult Language

Productive uses of argument structures in adult speech and writing are not hard to find. Examples I have heard or read in a 6-month period are discussed in this section. (I am afraid they show that my free time is not exactly spent at the open and the ballet.) For some of the examples, I cannot make a crisp judgment as to their naturalness; I have prefixed them with a question mark.

Causatives. The examples in (4.45) replicate Bowerman’s observations.

(4.45) (a) But if my client is a man, and we get Shirley, I know we’re crooked. [A lawyer referring to a judge]
(b) You should hang yourself up. [To a computer user on a dial-up line] Can you hang yourself up??! [Shouted to a person on another phone in the same house]
(c) Well, that decided me.
(d) I don’t know who I’m going to pitch the first ballgame. [A baseball manager speaking]
They haven’t found the time to play him a whole lot of minutes (= let him play for a substantial portion of the basketball game].
(e) Stream on the flavor! [TV ad for melted-butter dispenser]
(f) If she subscribes us up, she’ll get a bonus [= gives our name to a cable TV company, resulting in our subscribing].

(h) It started in 1976 when the Parti Québécois began to deteriorate the health care system.
(i) Small company’s new golf ball flies too far, could obsolete many golf courses. [Headline of a fictitious news item in a magazine ad]
(j) A lot of teams collapsed zones on him [= used a defensive strategy where basketball players distributed in “zones” converge on an opposing offensive player].
(k) In early Modern English, the vowel of the singular was deformed to that of the plural.
(l) He corresponded the stages to the training sets.
(n) Sunbeam whips out the holes where staling air can hide. [Advertisement for bread]
(m) Is the universe including man evolved by atomic force? [Sermon title, found by Beth Levin]

Bowerman said she did not notice examples of productive intransitivization, but as Lord (1979) and Maratsos et al. (1987) point out in regard to children’s speech, such errors are generally not as salient to an observer unless they are specifically attended to. In (4.46), (4.47), and (4.48), respectively, I reproduce examples I have heard of anticausatives, middles, and an unusual example that is neither.

(4.46) (a) The bacteria live off the dissolved minerals that exude from the vent.
[b] [From basketball play-by-play descriptions] The ball slaps around. The rebound tips to the hands of Sichting. [From transitive tip = “touch with the fingertips,” not intransitive “tip over”]
That causes Robert to release downfloor. [From transitive release = “allow a player to break out of a pack,” not “relinquish the ball”] The ball kicks around and ends up near midcourt in the hands of Cavs guard Ron Harper.
It kicks out of bounds off the Bullets.
The ball hits into the right field stands.
(c) Mary presented as an attractive, neatly dressed woman.
(d) Can germs harbor in these things?
(e) When I slow down at a corner and take my foot off the gas the car wants to kill [“die” or stall].
(f) If she whips into shape, then I’ll see her.

(4.47) (a) Its batteries can store up to ten years. [Advertisement for a flashlight]
(b) The soup that eats like a meal. [Advertisement]
It eats like steak but costs like ordinary dry. [Advertisement for dog food]
Steaks that look the same may not eat the same. [Meat industry executive]
(c) This game isn’t playing very well. [A sloppy basketball match]

(4.48) The aftereffects [of the operation] don’t seem to be telling at all right now. (Said by a basketball player; = “can’t tell that the operation had aftereffects; I don’t feel the aftereffects of the operation.”)

Datives. I have also heard a variety of violations of the narrow constraints on the dative alternation. Morphological violations are not uncommon, as shown in (4.49).

(4.49) (a) Sun donated them a bunch of computers.
What does he want me to do—donate them blood?
(b) I returned her the books.
(c) I explained him the problem.
Can you explain me language breakdown?
(d) An intriguing down side to the three-hour ceremonies ... was the snub extended Michael Jackson.
(4.52) (a) I am proud to present you this trophy.
?The president was presented a policy that wasn’t arms for hostages.
?They are presented these cards under three conditions.
(b) We have been served papers by the District Court.
(e) ... the tubing that we would persuade [the company] to provide him.
(d) Can you furnish me an address for George Augusta?
(e) The most precious gift a father could bestow a son. [TV advertisement for a car]
(f) The bank credited my account $100.
(g) If you’ll indulge me just two in-jokes. [Note: only acceptable using preposition with or in]
(h) If you’re not satisfied, return the record with your receipt within 2 weeks and we’ll credit you back the full purchase price toward any merchandise in the store.

The odd double-object forms shown in (4.53) also do not have the usual source but would ordinarily require use of the preposition in. The sentences, which seem to be based on an analogy with the verb teach, are from graduate school application materials written by computer experts.

(4.53) (a) She demonstrated fine teaching abilities in training other students the complex procedures and complex equipment we use in our lab.
(b) The uses of such a program are myriad and include use as a compositional device and as a method for individually tutoring students musical improvisation.

Locatives. Examples of both argument structures participating in the locative alternation containing verbs that make them marginal to ungrammatical in my dialect are listed in (4.54) and (4.55).

(4.54) (a) He’s trying to fob me off with that guy.
Now I’ll just fob her off with some colored pencils.
(b) They filed him with charges.
(c) They and a lot of other public figures were bestowed yesterday with the 1987 Bozo awards.
(d) He was pumped with a liter and a half of glucose solution.
(e) He squeezed them [fish fillets] with lemon juice.
(f) Drizzle them [apple slices] with fresh lemon juice. [From a cookbook]
(g) [from recipes in a magazine article] This version is dribbled with a lively Worcestershire-spiked mayonnaise. ...serve at once with toasted French bread rounds dribbled with olive oil. ...slices of...
uncooked beef drizzled with a Worcestershire mayonnaise. Arrange the meat on a platter and dribble it all over with the mayonnaise... serve at once with crusty Italian bread or toasted bread slices dribbled with olive oil.

(4.55) (a) I said I was sorry to serve a manuscript on him. [A publisher referring to a person he had asked to review a manuscript; cf. “serve him with a subpoena”]
(b) Take a little of the mixture at a time and fill it into the zucchini. [Quoted by Rappaport and Levin, 1985; from a cookbook]
(c) I’m just going to rinse some water now. [A periodontist speaking]
(d) Sometimes before they do brain surgery, they probe in electrodes.
(e) ... by inoculating living R cells into mice ...
(f) She pierced needles under her fingernails.
(g) It’s not just all that water filling up ... [in the basement; describing why someone is upset]
(h) He jumped both knees on it. [A goalie in hockey trapping a puck; cf. “He jumped on it with both knees”]
(i) She said we just dug up some trash someone littered.
(j) I’ll just touch this to your ear.
(k) If they endow $400,000 to MIT ...
(l) Isn’t that just another way to bilk money from the ignorant?
(m) Endurance training at less than 70–80% of a cyclist’s peak performance depletes glycogen from the slow-twitch muscle fibers.

As an actor, it has the odd effect of zapping him—for lack of a better term—of a soul [“it” = the fact that the actor’s mind is a “spinning gyroscope”].
(o) I had to rob the front wheels off some support bikes to have enough for changes.
(p) They’re working on a plan to rob your resources.
(q) We’re going to make this a better community, and we’re going to the negative element.

Just as we saw in the case of the unusual productive datives, some of the locative-like constructions are not the product of what we ordinarily think of as the locative alternation. Although they involve roughly the same kinds of meanings, the closest related form does not take the expected prepositions. In fact, (4.56c) is the inverse of the unusual dative forms listed in (4.52).

(4.56) (a) Norman and Frances Lear were divorced last year after he settled approximately $125 million on her.

(b) She had to pinpoint it onto someone [blame someone for it].
(c) We have charged your Visa account with $300 for the required deposit.

Other argument structures. Aside from the alternations I have focused on, there are other argument structures that are occasionally extended to verbs outside the narrow classes that ordinarily allow them. These include the uses of prepositional phrases and clausal complements listed in (4.57).

(4.57) (a) I looked the ball into my hands [= “I looked at the ball all the way until it reached my hands”; from Landau and Gleitman, 1985].
(b) They are excellent at creating missed shots into fast-break opportunities at the other end.
(c) For purposes of counterbalancing against the possibility that any effects are due to a particular set of stimuli...
(d) ... reinforcing subjects that version is irrelevant ... should remove the need to discriminate between versions of a character [= “In our instructions to the subjects in our experiment, we reinforced the fact that which version of a character they saw on the screen was irrelevant to the discrimination task they were asked to perform”].
K.C. always reinforces him to shoot.
(e) Bounce pass to Bird who touches it back to McHale.
(f) Ainge saves it nicely to Acres.
(g) I’ll include the paper back to him.
(h) I tried to hint this to her.
(i) She tried to convince me out of it.
(j) I expressed that it would be difficult for one person to manage both the Suns and the Microvaxes.
(k) I’m proud of her to get some of that [credit].
(l) The best way to solve many of the problems with taking too much time in both loading the image from memory and storing it to the EGA is to use smaller images.
(m) I don’t think it can be done by a hacker from the outside. It is a potential that could occur by a disaffected employee [computer sabotage].

Passives. According to the proposal in section 4.4.4, passivization is accomplished directly by a broad-range rule, so blatantly ungrammatical passives in spontaneous speech and writing should be quite rare. I have encountered only two possible examples. The one shown in (4.58a) involves a pure spatial verb, though it is possible that we have an ablative passive here. The other, in (4.58b),...
at first glance seems to involve a pure temporal relationship, but there is also an implication of inter-event causation that might allow the passivization. (4.58) (a) Break out your favorite bicycle grease, but keep it contained until you’re finished splashing solvent around.
(b) That was led up to by what happened at the last party.
The only other odd passives I have heard, listed in (4.59), are the result of speakers aiming for a breezy, jocular, or emphatic effect by passivizing idioms or other specialized forms.

(4.59) (a) Well, the soot was blown. [Richard Pryor commenting on his reckless driving in a new sports car, in response to “They say you have to blow the soot out of them once in a while.”]
(b) Sometimes you get a pooch that can’t be screwed [The idiom to screw the pooch = “to commit a grievous error.” From the movie The Right Stuff, comment on the lack of negative publicity following an astronaut’s mistakes during the popular Mercury program.]
(c) The public is having the hell scared out of it.
(d) They were wiped the floor with [= soundly defeated].
(e) [from a television script]
Him: What are you doing?
Her: I’m making out my will.
Him: Make sure you leave me something.
Her: Consider yourself left. [She leaves.]

4.5.2 Property-Predicting Versus Existence-Predicting Rules
What is the psycholinguistic status of HaigSpeak utterances? They are certainly not a reason to abandon constraints on lexical rules, because they are undoubtedly deviant to my ears and to those of most people I have shown them to. Though a few may come from dialects or idiolects in which they are well-formed sentences, most do not: When I was able to confront the speakers of some of the sentences in (4.45)–(4.57) with their utterances (mixed with distractor sentences they had never used), their reactions ranged from mild cringing to outright incredulity at the suggestion that they themselves had uttered them. On the other hand, they are not obviously speech errors of the standard sort (Spoonerrisms, perseverative or anticipatory substitutions, etc.). Many are from written sources: they do not sound like quasi-random distortions, were never self-corrected, and cannot all be systematically derived from some intended target by the effects of internal noise, decay, or interference in some output buffer. Finally, they are not obviously ungrammatical, at least not in the same sense as Furiously sleep ideas green colorless or Walks the boys. Chomsky (1965, 1987) has stressed that linguistic judgments should not be treated as all-or-none placements of asterisks or even as scalar confidence ratings. Rather, grammars assign multidimensional structural descriptions to strings, and some levels of description can be well formed at the same time that others are ill formed. The in-between status of HaigSpeak is due to its violating the narrow-range rules while obeying a broad-range rule or at least being consistent with one of the broad conflation classes related by such rules. This shows that the broad-range rule is indeed part of adults’ competence.

But then, why should both kinds of rules exist, and what are their respective functions? I suggest that the difference coincides with the distinction between what Janet D. Fodor (1985) calls “property-predicting rules” and what she calls “existence-predicting rules.” Property-predicting rules dictate what grammatical properties a form would have to have were it to exist. However, they do not actually license the addition of a new form to the language. Existence-predicting rules allow a speaker who possesses one form to add a related form to his or her grammar automatically. Specifically, I suggest that nonaffixing broad-range rules are psychologically real but are merely property-predicting; only their narrow-range rules are existence-predicting. The utterances in section 4.5.1, then, unlike productive usages licensed by narrow-range rules, are perceived as sentences that could be English but don’t happen to be English. They are possible or likely ways to extend English by a minimal amount and are perceived by most speakers and listeners as innovations.

Making this distinction allows us to understand the role of another kind of structure that I have discussed frequently, conflation classes (both broad and narrow). Recall that a conflation class definition states that a given combination of semantic elements can be the basis of a possible word meaning in a language. Clearly, conflation class definitions by themselves can only be property-predicting, not existence-predicting. A word is more than a meaning; it needs a sound, too, or people won’t know how to pronounce it. Lexical rules map entries from one conflation class into another, and crucially, they provide a sound for the new entry: the stem associated with the old entry. Conflation class definitions by themselves, on the other hand, don’t tell you where the sound for a new word is supposed to come from. At best, one could pick some other word that is roughly associated with one aspect of the event the new verb is expressing. And in fact, that is exactly what speakers seem to be doing when they innovate a new form that cannot be the product of a broad-range lexical rule, as in He settled $125 million on her or She trained other students the complex procedures. Some of the functional limitations of such linguistically- unpredictable stem borrowing can be seen in Clark and Clark’s (1979) study of the way people use noun stems to label new verbs, often resulting in forms that out-Haig Haig (e.g., He enfant
4.5.3 Why Are Only Narrow-Range Rules Existence-Predicting?

The distinction between property-predicting rules and existence-predicting rules lead to an obvious question: Why can’t the broad-range rules (other than the ones that add affixes) be used to predict the existence of forms? If I am right, it appears that languages have a deep-seated conservatism built into their lexicons. Regardless of how pervasive a generalization across existing pairs of lexical entries may be, the default condition is not to allow new entries to be added freely by individual speakers. The default is abandoned only for words that are in some sense minimally different from ones that already exhibit the generalization—new words that are of the same morphological type and whose meanings are “similar” (in a sense to be made precise in the next chapter) to those of existing words. Thus although I rejected itemwise conservatism in chapter 1, I am forced to a classwise conservatism by the discussion in this chapter. The extension of full existence-predicting productivity to narrow-range rules, resulting in classwise rather than itemwise conservatism, may be a minor relaxation of a basically conservative policy: languages tie speakers not to the exact verbs they have heard, but to the small family of verbs that are similar to the ones heard. In fact, in the next two chapters I will consider the radical but simple possibility that in some sense the linguistic faculty has no choice—it simply lacks the means to “see” the differences among the verbs that display full productivity, and blocks the extension of syntactic privileges to any verb that it can see as being different from the ones that have been heard in the input.

Is there a good reason for this minimally relaxed conservatism? Perhaps there is. Consider the analogy of a monetary system. Currency, like language, is a system of social exchange based on conventionalized symbols. Users can treat the symbols as having a fixed value because they are grounded in tacitly shared, arbitrary pairings: the gold standard or its equivalent for currency, and the sound-meaning relation for words. The mechanisms for introducing new tokens into the system must be very sharply circumscribed, not left up to the desires of individual players on individual occasions, or else the system will collapse in inflationary chaos.

Lest this seem too far-fetched in the case of language, consider two of the possible effects of rules affecting argument structures if they were totally unconstrained by semantic considerations. First, there is the possibility of rampant ambiguity. Atkins, Kegl, and Levin (1986) note that English has at least six distinct alternations between transitive and intransitive forms (Beth Levin has suggested to me that there may be a dozen or more in all). Several involve disappearing objects (e.g., unspecified object deletion, as in John eats food / John eats). Several others involve disappearing subjects (e.g., anticausativization, as in John broke the cup / The cup broke). If the rules could be applied productively, bidirectionally, and without regard to semantics, any transitive verb could lead to the derivation of another transitive verb with the opposite meaning: \( X \text{ eats } Y \rightarrow X \text{ eats (after object deletion)} \rightarrow Y \text{ eats } X \) (after causativization). Similarly, intravitives with transitive counterparts would be totally ambiguous: \( X \text{ eats } Y \rightarrow X \text{ eats (after object deletion)} ; X \text{ eats } Y \rightarrow Y \text{ eats (after anticausativization)} \).

It’s not that languages have utterly avoided such ambiguities, as (4.60) shows.

(4.60) Groucho: Call me a taxi.
Chico: You’re a taxi.
Waitress to Dick Gregory, Mississippi, 1960: We don’t serve colored people here.
Dick Gregory: That’s OK, I don’t eat colored people. I’d like a piece of chicken. 31

However, argument structure ambiguities are fairly rare, at least in English, relative to the numerous hypothetical possibilities for creating them with broad-range rules. This functional consideration is consistent with Marantz’s (1984) suggestion that rules that add an affix to the verb are broader in range than rules that leave the stem unchanged. When there is a telltale affix, it can be seen as carrying a specific kind of meaning change, and one can look up the lexical entry of the affix to determine what it is. If there is no affix, the verb itself must have acquired a new meaning, and the listener should be equipped with an alternative route to determining what that meaning change is; given narrow-range rules, the verb’s semantics can allow one to retrace the alternations that could have created it.
The second possibly harmful effect of existence-predicting rules that are too broad is indeterminacy of semantic composition. If the semantic operation of a rule is very general, how it combines with the original meaning of a verb is often very hard to determine. Consider causativization. It's utterly clear that John broke the cup means that John acted on the cup, causing it to break. Similarly, Bill bicycled Susan to Concord must mean that Bill carried or accompanied Susan to Concord by bicycle. It may even be easily deducible that That event decided me means that that event made me come to a decision, or that What's fussing her? means “What’s causing her to fuss?” But what exactly would Sam came Bill out in favor of Nixon or Sheila ran Susan a mile in four minutes or Eric danced Francis mean? The semantic change accomplished by a broad-range lexical rule may be too vague to yield output words with predictable meanings. In the case of the locative alternation, the problem is even more severe: the derived with form defines a specific state or property that is simply absent from the meaning of the intolonto form, and the speaker and listener must have some way of predicting that what state is. One advantage of restricting the existence-predicting powers of lexical rules to semantically cohesive subclasses is that any vagueness in composing an input verb’s inherent meaning with the new meaning contributed by the rule can be eliminated by a single scheme of interpretation that applies across the entire subclass, deriving a meaning for the new form in a determinate way from seeds of information residing in the old one.

Each basic word in a language involves an irreducible, arbitrary pairing between sound and meaning. Thus using words presupposes independent but identical prior episodes of brute-force associative learning on the part of each person who speaks the language. It would not be surprising if the language faculty used the means available to it to restrict the automatic, natural usages of words to highly circumscribed extensions of existing forms.

5.1 The Need for a Theory of Lexicosemantic Representation

The reason that Baker’s paradox can be resolved, at least in principle, by appealing to semantically defined classes of verbs is that children have to learn the meanings of verbs anyway. They have to learn the difference between pouring and splashing or between throwing and pulling to use them in the right situations, regardless of syntax, and it is a nonobvious discovery that certain aspects of those distinctions correlate with certain of their syntactic privileges. This of course raises the important question of how children represent and learn verb meanings. Unlike some of the other hypotheses I considered in chapter 1, the conflation class hypothesis cannot point to any simple and obvious formal feature as the crucial distinction that children must respect. That is, there is no elementary feature like [triglottary] or [prevented-by-dependent] associated with a verb that the learner could look at in deciding how to use it. The learner must instead decide whether a “verb’s meaning” is “compatible” with a “conflation class,” a much more obscure notion.

There are two possibilities as to what that might mean. First, verb meanings could be cognitive categories for certain types of events or relations, and conflation classes could be broader categories of the same type, and the decision about whether a verb belongs to a class could be a case of ordinary cognitive categorization. Deciding whether cutting is a causative relation would be analogous to deciding whether a dog is an animal and would depend on the individual’s real-world knowledge of causation and of what events typically happen in scenarios involving cutting. If so, the constraints on productive alternations would ultimately be a part of the cognitive psychology of the categorization of events and states, and would simply correspond to the ways that a given culture finds it useful to carve up the universe of possible happenings.

“Similarities” among families of verbs could be captured in a variety of ways,