Chapter 1
A Learnability Paradox

Some of the most rewarding scientific pursuits begin with the discovery of a paradox. Nature does not go out of its way to befuddle us, and if some phenomenon seems to make no sense no matter how we look at it, we are probably in ignorance of deep and far-ranging principles. For anyone interested in the human mind, language offers many such opportunities for discovery. Language is created anew each generation, so details of grammar, even subtle and intricate ones, are products of the minds of children and bear the stamp of their learning abilities.

This book is about a paradox in language acquisition. The paradox begins with a small linguistic puzzle: Why does He gave them a book sound natural, but He donated them a book sound odd? It is complicated by a fact about children’s environment—that they are not corrected for speaking ungrammatically—and a fact about their behavior—that they do not confine themselves to the verb phrase structures they have heard other people use. In trying to resolve this paradox, we must face fundamental questions about language and cognition: When do children generalize and when do they stick with what they hear? What is the rationale behind linguistic constraints? How is the syntax of predicates and arguments related to their semantics? What is a possible word meaning? Do languages force their speakers to construe the world in certain ways? Is there a difference between a word meaning and a concept? Why does children’s language seem different from that of adults? The goal of this work is to resolve the learning paradox and to show how the solution leads to insight into these deep questions.

The strategy I will follow comes out of what is sometimes called the learnability approach to language acquisition (Hamburger and Waxler, 1973; Pinker, 1979; Waxler and Culicover, 1980; Baker and McCarthy, 1981). This approach focuses on the logical nature of the task facing the child as he or she tries to learn a language and on the mental representations and processes that make
Chapter 1

such learning is successful. I will pursue the solution to the learning paradox relentlessly, trying to create a trail that leads from the prelinguistic child to the adult’s command of subtle discriminations of linguistic structure. Though parts of the trail may be rough going, what is most important is that each segment link up with the next to form an unbroken path of explanation from children’s experience to adults’ knowledge.

In this chapter I outline the problem: first, the specific domain of language and why it is important, then the logic of language learning in general, then the juxtaposition of the two that creates the learning puzzle. Then I consider some half-dozen simple ways in which the problem might be eliminated. All can be shown to be incorrect or unsatisfactory. In my mind this is what elevates the problem from a puzzle to a paradox, which the rest of the book attempts to solve.

Chapter 2 discusses phenomena that point to a way out of the paradox and presents evidence that that path is the right one. The next three chapters outline a theory of adult linguistic knowledge that is logically capable of resolving the paradox while providing an explanation for the form of that knowledge. Chapter 3 tries to make sense of the phenomena, making them fall out of more general principles. Chapter 4 extends those principles so that the original linguistic problems can be solved in detail. Chapter 5 deals with representation; it presents and justifies an explicit description of the representational structures for verb meanings and rules that the theory needs.

The next two chapters take up the psychological processes for acquiring the linguistic knowledge underlying the solution to the paradox. Chapter 6 is about learning; it discusses the computational problem of how the linguistic structures are acquired through interaction with the environment, and it outlines a proposal for how the child does this. Chapter 7 is about children’s development; in it I compare the facts of child language with the acquisition problems and mechanisms discussed previously. In the concluding chapter I spell out some interesting implications that the solution of the paradox holds for language and cognition.

Much of this book is about words, and this calls for a special apology. People know tens of thousands of words, so two alike, making the mental lexicon a domain of immeasurable richness. Any theory that tries to find common organizing principles among this richness can be confronted with a huge number of empirical tests. While this makes for lively linguistic argumentation, at times it can be overwhelming. In the middle chapters (3, 4, and 5) I describe a theory of the mental representation of words and rules whose machinery is outlined explicitly and which is buttressed with many linguistic data. I have tried, however, to organize the material so that it can be absorbed by readers with varying degrees of expertise and interest, including those with little background in linguistics.

A Learnability Paradox

The key ideas of these middle chapters are presented in overview sections at the beginning and in summary sections at the end. The first section of chapter 3, section 3.1, is a capsule description of the theory discussed in that chapter, and similarly section 4.1 motivates and previews the claims of chapter 4. The final section of chapter 4 spells out the relationship between the two key parts of the theory, the one presented in chapter 3 and the one presented in chapter 4. The general justification for the theory of representation in chapter 5 is presented in sections 5.1 through 5.4, and the accomplishments of the theory are summarized at the end of the chapter. Finally, chapter 8 begins with a brief recapitulation of everything that went before.

The detailed linguistic discussions in the middle of chapters 3–5 are also modularly organized. In each one I begin with linguistic evidence that is independent of the problems I try to solve. These can be found in sections 3.2, 4.2, and 5.3–5.4. I present the theoretical claims explicitly in sections 3.3, 4.3, and 5.5. In the remaining sections 1 apply the theory to each of four linguistic phenomena, the dative, causative, locative, and passive alternations. Because the topic of this book is the psychology of language acquisition, I have chosen to organize the book around issues of representation and learning rather than around the linguistic phenomena, and this means that I discuss each of the four alternations a number of times. The sections in which the individual alternations are discussed are self-contained, labeled, and cross-referenced, and specialists with an interest in one alternation can skip or skim the others. Readers who want to see the theory applied in detail to one illustrative alternation are encouraged to track the discussions of the dative.

But let me get on with the paradox.

1.1 Argument Structure and the Lexicon

Human languages do not define straightforward mappings between thoughts and words. To get a sentence, it is not enough to select the appropriate words and string them together in an order that conveys the meaning relationships among them. Verbs are choosy; not all verbs can appear in all sentences, even when the combinations make perfect sense, as shown in (1.1).

(1.1) John fell.
   *John fell the floor.
John dined.
   *John dined the pizza.
John devoured the pizza.
   *John devoured.
A Learnability Paradox

particular verbs are paired with particular argument structures—that is, with the question “What do verbs want?” What we need is a theory that answers those two questions simultaneously.

1.2 The Logical Problem of Language Acquisition

Language acquisition in general, and the acquisition of verb-argument structures in particular, can be thought of in the following terms. The child hears a finite number of sentences from his or her parents during the language-learning years, which are symbolized by the X’s in (1.2). But a language is an open-ended set, not a fixed list, so the child must generalize from these inputs to an infinite set of sentences that includes the input sample but goes beyond it. This is shown in (1.2) as the circle with the arrow pointing to it. As in all induction problems, the hard part is that an infinite number of hypotheses are consistent with the input sample but differ from each other and from the correct hypothesis (the actual target language) in ways that are not detectable given the input sample alone. Some of the incorrect hypotheses are depicted by the other circles in (1.2).

The solution to this (or any other) learning problem works as follows. Constraints on the learner force him to entertain a restricted set of hypotheses that includes the correct hypothesis but excludes many others. The learner can then compare the predictions of a hypothesis (which sentences it generates) with the input data so that incorrect hypotheses can be rejected. There are four ways in which one of the the child’s hypotheses can be incorrect before learning is successful. The child’s language can be disjoint from the target language, as in (1.3a). In this case any sentence in the input is sufficient to inform the child that the hypothesis is wrong. Such sentences, called positive evidence,
are depicted in the figure with a “+” symbol. Likewise, if the language generated by the child’s hypothesis grammar intersects the target language, as in (1.3b), or is a subset of it, as in (1.3c), positive evidence consisting of input sentences in the nonoverlapping region of the target language suffices to impel the child to reject the hypothesis. However, if the child entertains a grammar generating a superset of the target language, as in (1.3d), no amount of positive evidence can strictly falsify the guess. What he or she needs is negative evidence: evidence about which word strings are ungrammatical (that is, not in the target language). This is shown as the “−” symbols in (1.3d). Explaining successful learning basically consists of showing that the learner can entertain and stick with a correct hypothesis and can falsify any incorrect ones (see, e.g., Osherson, Stob, and Weinstein, 1985; Pinker, 1979; Wexler and Culicover, 1980).

(1.3) H T H T T H T

(a) (b) (c) (d)

The first important question about child language acquisition is whether negative evidence is available. Obviously no one gives children a list of ungrammatical sentences tagged with asterisks. The most psychologically plausible kind of negative evidence would be some sort of parental feedback that children might receive related to whether their own utterances are grammatical or not, such as corrections or expressions of approval. The available evidence suggests that children are not provided with such information. Brown and Hanlon (1970) found that parents do not differentially express approval or disapproval contingent on whether the child’s prior utterance was well-formed; nor do they understand well-formed questions better than ill-formed ones. As a result it is commonly assumed that children do not depend on negative evidence to acquire a language. This means that they cannot engage in the sort of hypothesis falsification illustrated in figure (2d); either they never entertain any hypothesis that is a superset of the target language, or, if they do, some endogenous force must impel them to abandon it, because the world will never force them to. On the other hand, children cannot simply stick with the exact sentences they hear, because they must generalize to the infinite language of their community. This tension, between the need to generalize and the need not to generate supersets, characterizes many of the toughest problems in explaining human language acquisition. Some of these are discussed by Baker (1979), Berwick (1986), Bowerman (1987a, 1987b), Braine (1971), Chomsky and Lasnik (1977), Pinker (1982, 1984), and Wexler and Culicover (1980).

A Learnability Paradox

1.3 Baker’s Paradox

Now we can juxtapose the facts of argument structure with the logic of the learning problem. The acquisition of the syntactic properties of verbs is one of the clearest cases in which the non-negative-evidence problem arises. Though Georgia Green (1974; pp. 3, 199) first pointed out a learning paradox based on it, C. Lee Baker (1979) discussed it in a larger context that drew more attention. Consider a child hearing sentence pairs such as those in (1.4) and forming the associated argument structures.

(1.4) John gave a dish to Sam.
     give: NP₁ __ NP₂ to–NP₃
     John gave Sam a dish.
     give: NP₁ __ NP₃, NP₂
     John passed the salami to Fred.
     pass: NP₁ __ NP₂ to–NP₃
     John passed Fred the Salami.
     pass: NP₁ __ NP₃, NP₂
     John told a joke to Mary.
     tell: NP₁ __ NP₂ to–NP₃
     John told Mary a joke.
     tell: NP₁ __ NP₃, NP₂

It would seem to be a reasonable generalization that any verb with the NP₁ __ NP₂ to–NP₃ argument structure (prepositional dative) could also have a NP₁ __ NP₃ NP₂ argument structure (double-object dative). This generalization could be captured in, say, a lexical rule such as that in (1.5), which would allow the child to create a double-object dative corresponding to any prepositional one for some new verb (e.g., send), even if he or she had never heard the verb in the double-object form.

(1.5) NP₁ __ NP₂ to–NP₃, → NP₁ __ NP₃ NP₂

The problem is that not all the verbs with the prepositional argument structure dativize (that is, appear in both versions of the alternation), as (1.6) shows.

(1.6) John donated a painting to the museum.
    *John donated the museum a painting.
    John reported the accident to the police.
    *John reported the police the accident.

But the child has no way of knowing this, given the nonavailability of negative evidence. The fact that he or she hasn’t heard the ungrammatical sentences in (1.6) could simply reflect adults’ never having had an opportunity to utter them
in the child’s presence (after all, there are an infinite number of grammatical sentences that the child will never hear). Therefore, the child should speak ungrammatically all his life—or more accurately, the language should change in a single generation so that exceptional verbs such as those in (1.6) would become regular.

I will call this learning problem “Baker’s paradox.” It has attracted a great deal of attention among language acquisition researchers, for example, Berwick and Weinberg (1984), Bowernan (1983a, 1987a, 1987b), Clark (1987), Fodor (1985), Fodor and Crain (1987), Maratsos, Gudeman, Gerard-Ngo, and De Hart (1987), MacWhinney (1987), Mazurkewich and White (1984), Pinker (1981a, 1982, 1984, 1986, 1988), Pinker, Lebeaux and Frost (1987), Randall (1987), and Rooper (1981). In Pinker (1984) I considered several other lexico-syntactic alternations where the combination of widespread generalization and lexical exceptions creates the same learnability problem. Among them are the passive, shown in (1.7), the lexical causative alternation, in (1.8), and the locative alternation, in (1.9). I will return to these four alternations repeatedly in this book in discussing the resolution of Baker’s paradox.

(1.7) John touched Fred.
Fred was touched by John. (also hit, see, like, kick, etc.)
John resembled Fred.
*Fred was resembled by John.

(1.8) The ball rolled.
John rolled the ball. (also slide, melt, bounce, open, close, etc.)
The baby cried.
*John cried the baby.

(1.9) Irv loaded eggs into the basket.
Irv loaded the basket with eggs. (also spray, cram, splash, stuff, etc.)
Irv poured water into the glass.
*Irv poured the glass with water.

1.4 Attempted Solutions to Baker’s Paradox

1.4.1 Components of the Paradox

Three aspects of the problem give it its sense of paradox. First is the lack of negative evidence: if children could count on being corrected or on being given some other signal for every ungrammatical utterance they made, then simply saying something like I am resembled by Seth and attending to the resulting feedback would suffice to expunge the passive lexical entry for resemble.

Second, productivity: if children simply stuck with the argument structures that were exemplified in parental speech, never forming a productive rule such as that in (1.5), then they would never make errors to begin with and hence would have no need to figure out how to avoid or expunge them. Third, arbitrariness: the fact that near-synonyms have different kinds of argument structures, such as give and donate, or load and pour, or own (which passivizes) and have (which does not), or move (which occurs in a lexical causative) and go (which does not) means that the child cannot use some simple semantic guideline indicating where productive rules can be applied and where they are blocked. But in combination these three factors make acquisition of argument structure alternations in the verb lexicon impossible to explain. Accordingly, the various solutions to the paradox that have been proposed have denied one or more of these three assumptions.

1.4.2 Solution #1: Nonsolutions

Language acquisition research has no shortage of vague general proposals about what language acquisition is like, and often it has been suggested to me that the problem disappears or is easily solved by one of these proposals. For example, Bowernan (1987b) suggests that Brain’s (1971) “Discovery Procedures Model” might lead to a solution of Baker’s paradox, and MacWhinney (1987) claims that his “Competition Model” solves it outright. It has also been suggested to me that processes that go by such names as “abduction algorithms” and “syntactic distributional analysis” would do the job. These suggestions are not necessarily wrong, but they are about as useful as saying that you can get rich by buying low and selling high. Since none of them provides any details as to how Baker’s paradox might be solved in any concrete instance—the models cannot even represent the distinctions made in the adult state, let alone show how they are acquired—there is no need to discuss them further.

1.4.3 Solution #1: Variants of Negative Evidence

1.4.3.1 Subtle Negative Evidence: The idea that children have no access to negative evidence does not sit well with many people. As Michael Maratsos (1986) has put it, psychologists seem to want to take the difficult problem of language acquisition away from the helpless child and return it to the hands of responsible authorities. Thus several investigators have recently taken a closer look at the negative evidence question. These reexaminations have replicated Brown and Hanlon’s finding that parental expressions of approval are independent of the grammaticality of the child’s prior utterance. However, there have been found to be slight differences in the frequency with which some mothers repeat, alter, question, and follow up in various ways on their child’s well-formed
versus ill-formed utterances (Hirsch-Pasek, Treiman, and Schneiderman, 1984; Demetras, Post, and Snow, 1986; Penner, 1987; Bohannon and Stanowicz, 1988). Nonetheless, this feedback is unlikely to solve the learnability problem we are faced with in this case, or probably any other one (see also Bowerman, 1987a, 1987b, Gordon, in press, Cunnigham and Pinker, in press, and Morgan and Travis, in press, for similar arguments). For Baker’s problem to go away, the following things would have to be true:

1. Negative evidence would have to exist. One thing is certain: children do not receive negative evidence in the technical sense of the term. Negative evidence (see Gold, 1967; Pinker, 1979) is information about the ungrammaticality of every ungrammatical string composed of the language’s vocabulary items. None of the new studies has shown that all the ungrammatical sentences of all children elicit reliable differences in parental behavior, only that some do sometimes.

In these studies, all forms of ill-formedness are lumped together in the analyses. Thus we do not know whether it is ungrammaticality in general that elicits differences in parental behavior, or a particular salient kind of ungrammaticality such as missing major constituents. In the Hirsch-Pasek et al. study, only children in the youngest age-group (2-year-olds) were found to receive partly diagnostic input in the form of more frequent repetitions of ungrammatical utterances (the analysis combined verbatim repetitions with those in which the error was corrected); for the 3-year-olds, 4-year-olds, and 5-year-olds, there was no difference. Penner (1987) also found that feedback rates declined precipitously after the age of two. But there is surely a lot of language left to be acquired at that age, including the structure relevant to Baker’s paradox. In fact Groppen, Pinker, Holland, Goldberg, and Wilson (1989) documented a number of examples of children uttering double-object sentences that were ungrammatical because of their verbs; in no case did the parents react with disapproval, correction, repetition, or recasting.

An equally serious problem is that it is unlikely that all children receive diagnostic parental feedback—but all children learn their native language. Except for the Demetras et al. paper, the new studies report aggregate data, rather than data from individual children. Nonetheless even the aggregate data from the Hirsch-Pasek study make it clear that not every mother of a 2-year-old in their middle-class sample (let alone mothers from other classes or cultures) differentially repeated ungrammatical utterances, and this is likely to be true of the Bohannon and Stanowicz and Penner studies as well. Note in this regard that the use of inferential statistics in an attempt to generalize to a population of mothers is highly misleading. It is not the psychology of the average mother that is in question here but the availability of certain kinds of information to any child who learns to speak. 1

A Learnability Paradox

A third reason to doubt that children receive negative evidence is that much of the parental feedback that has been documented may not even be feedback about grammaticality. In the Demetras et al. study, the three kinds of feedback measures that had a probabilistic relationship to the utterances of all the children in the sample (clarification questions, signals to “move on” in the conversation, and verbatim repetitions) were not consistently related to whether the utterance was deviant for syntactic, phonological, semantic, or pragmatic reasons. Thus there was no information indicating to the children whether it was their grammar and lexicon that needed fixing or their pronunciation or conversational skills; a child who paid heed to parental feedback could needlessly mess up his rules of syntax or morphology when all he had done was pronounce ballOn as bawoon. The same problem infects the Bohannon and Stanowicz (1988) study.

Finally, in no study was any of the forms of feedback uniformly contingent on properties of the child’s utterance. For example, Hirsch-Pasek et al. found that 20% of the child’s ungrammatical utterances were repeated; but so were 12% of their grammatical utterances. So any child who changed his or her grammar so as to rule out a repeated utterance would be making his grammar better a fifth of the time but making it worse an eighth of the time. The other studies of parental feedback also found that its relation to the well-formedness of children’s speech was highly noisy at best; usually the mean difference between the frequency of a form of feedback following a well-formed utterance and following an ill-formed utterance was a few percentage points. Again, we must not be misled by the habit of trying to detect weak effects by looking at average tendencies in large samples. Although this might be appropriate for a study of the psychology of mothers, it is not appropriate for a study of the information available to every child.

The noisiness of parental feedback suggests that the child might be better off ignoring it altogether and changing his or her grammar only in response to positive evidence. According to some estimates (Newport, Gleitman, and Gleitman, 1977), parental speech is 99.93% free from speech errors (putting aside irrelevancies such as ellipses and casual speech forms that are “errors” only in a prescriptive sense). Relying on positive evidence alone, in contrast to relying on negative evidence as well, would thus make the child’s grammar worse virtually never. Note also that the extremely high reliability of positive evidence shows that skepticism about the value of noisy and inconsistent negative evidence is not based on a naive faith in a pristine, noise-free world.

2. Negative evidence, even if it exists, would have to be useful. Although negative evidence in the technical sense surely does not exist, perhaps, it could be argued, the children that do receive probabilistic feedback could make use of it in some way. For example, children might be able to aggregate information
from the statistical tendencies of parental reactions, rejecting a sentence if it had been followed by a given type of feedback so often that the hypothesis that it was ungrammatical was very much more probable than the hypothesis that it was grammatical.

But how this would work is quite unclear. Children certainly cannot aggregate information about feedback to a tens of particular sentences; no sentence is used by a child often enough. So if they use feedback at all, they must lump “equivalent” kinds of sentences together for the tallies. How they hypothesize the right equivalence classes and assign sentences correctly to them simply re-raises all the questions about generalization that have to be answered under the assumptions that positive evidence alone is used.

The usefulness of the information that a kind of sentence is ungrammatical is highly questionable too. Sentences are generated by large numbers of rules and principles that vary crosslinguistically, not just one. So even a child who is able to make a binary good/bad decision faces a formidable example of what artificial intelligence researchers call the “blame-assignment” problem: figuring out which rule to single out for change or abandonment. (As mentioned in the preceding discussion, in practice the problem is even worse because the child may have no way of distinguishing “errors” that are due to syntax from those due to defective word meanings, bad pronunciation, or conversational maladroit-

e.

3. Negative evidence, even if present and useful, would have to be used. Hirsh-Pasek et al. are careful to point out that their study does not establish that children were at all sensitive to the contingencies they tried to document. We have very little good evidence on this matter. But we do have a set of consistent observations of parent-child interaction suggesting that parental feedback, even in the form of maximally clear and informative overt corrections, may be fruitless in changing the grammar of the child. For example, McNeill (1966) reports the following dialogue:

(1.10) Child: Nobody don’t like me.
    Mother: No, say “Nobody likes me.”
    Child: Nobody don’t like me.
    [dialogue repeated eight times]
    Mother: Now listen carefully, say “NOBODY LIKES ME.”
    Child: Oh! Nobody don’t like me.

Braine (1971) reports that he made several extensive efforts to change the syntax of his two children through feedback. Over a span of several weeks, for example, he repeatedly but unsuccessfully tried to persuade his daughter to substitute other N for other one N, in interchanges such as the following:

A Learnability Paradox

(1.11) Child: Want other one spoon, Daddy.
    Father: You mean, you want THE OTHER SPOON.
    Child: Yes, I want other one spoon, please, Daddy.
    Father: Can you say “the other spoon”?
    Child: Other ... one ... spoon.
    Father: Say ... “other.”
    Child: Other.
    Father: “Spoon.”
    Child: Spoon.
    Father: “Other ... spoon.”
    Child: Other ... spoon. Now give me other one spoon?

Braine reports that “further tuition is ruled out by her protest, vigorously supported by my wife.” Maratsos (1986) has reported similar exchanges from the speech of Stan Kuczaj’s son, and I glanced upon the following dialogue from transcripts of the speech of Brian MacWhinney’s son (MacWhinney and Snow, 1985):

(1.12) Child: I turned the raining off.
    Parent: You mean you turned the sprinkler off?
    Child: I turned the raining off of the sprinkler.

Though isolated, the reports are consistent, and I know of no demonstrations in which overt correction or other immediate parental feedback has led to persistent changes in children’s language.

Although it is possible that corrections or other forms of enriched interaction with children might in the future be shown to lead to measurable changes in the children’s speech, such evidence would have to be interpreted cautiously. Any correction by its very nature also offers positive evidence, and positive evidence of a peculiarly relevant kind. So any study which purports to show that corrections are actually used by children can be given the more parsimonious explanation that this is just another case where relevant positive evidence is used. To make any kind of case for the role of corrections as negative evidence, it is necessary to distinguish the statistical correlation between partial corrections and ungrammatical utterances from the content of the corrections themselves, which is a form of positive evidence.

4. Negative evidence, even if used, would have to be necessary to avoid or recover from overgeneralization. Even if the child were shown to learn faster by virtue of using negative evidence, it would have to be demonstrated that negative evidence was necessary to cause the change. If it simply sped up some change that was bound to happen because of other learning mechanisms, we would still have to explain how those other mechanisms worked. An analogy: It is
conceivable that explicit language drills, such as in high school "language laboratories," could affect the child's acquisition of some aspect of grammar. Unless that drill was the only way in which that learning accomplishment could take place, a theorist could not rely on it to explain that facet of language acquisition.

In fact, it seems quite unlikely that negative evidence is necessary for the child to learn which verbs take which argument structures. Virtually every adult speaker of standard American English would judge the sentences such as *I ladeled the floor with paint*, *Ten pounds was weighed by the boy*, *I murmured John the answer and He rejoiced the audience to be ungrammatical. Is that because everyone has at some point uttered these verbs in these contexts and benefited from negative feedback? If someone's personal history had not included such events, would he or she find such sentences acceptable? The low frequency of these verbs, and of children's and adults errors with them, combined with the uniformity of adult judgments that these sentences sound bad, makes that extremely unlikely. We must look elsewhere to explain how children turn into adults.

Two other ideas are often discussed in connection with negative evidence, each aimed at showing that some kind of information in the environment is sufficient to tell the child which strings are ungrammatical in the language, not directly via some physical cue or signal, but indirectly via a short inference.

### 1.4.3.2 Nonoccurrence: A Surrogate for Negative Evidence?

Occasionally it is suggested that if the child noted that certain forms did not occur in the input, that could serve as a kind of evidence that such forms were ungrammatical (e.g., Chomsky, 1981). This is called indirect negative evidence. But on closer examination it turns out to be far from clear what indirect negative evidence could be. It can't be true that the child literally rules out any sentence he or she hasn't heard, because there is always an infinity of sentences that he or she hasn't heard that are grammatical (and the discussion of conservatism below will show that at no point in development does a speaker rule out all the verb-argument structure combinations that have not yet appeared in the input). And it is trivially true both that the child picks hypothesis grammars that rule out some of the sentences he or she hasn't heard, and that if a child hears a sentence he or she will often entertain a different hypothesis grammar than if he or she hasn't heard it. So the question is, under exactly what circumstances does a child conclude that a nonwitnessed sentence is ungrammatical? This is virtually a restatement of the original learning problem. Answering it requires specifying some detailed learning strategy. It takes the burden of explaining learning out of the environ-

mental input and puts it back in the child. Use of indirect negative evidence, even if true in some sense, is thus not, strictly speaking, a feature of the child's learning environment (as subtle direct negative evidence would be) but rather a feature of his learning strategy, and hence it must be fleshed out according to a particular theory of these learning strategies. (Osherson, Stob, and Weinstein, 1985, discuss one theoretical possibility, though it is not plausible for the present problem.)

### 1.4.3.3 Uniqueness: Another Surrogate for Negative Evidence?

It is also occasionally suggested that the child hears sentences in perceptual contexts containing information about the meaning of the sentences rather than disembodied strings of words, and that this gives him or her a substitute for negative evidence (see Pinker, 1979, 1982; Waxler and Culicover, 1980; Osherson et al., 1985). There are two versions of this suggestion, and neither one of them can solve Baker's problem directly. On the one hand, a language can be construed as a set of pairs each consisting of a string and a semantic representation. The child's task is to learn the infinite set of legitimate pairs, and his or her input consists of a sample of such pairs (sentences, plus a representation of their meanings, inferred from their contexts). Negative evidence in this case would consist of information that certain meaning-sentence pairings were impossible. But it is clear that the child does not receive this kind of negative evidence either. For example, the child would have to know that *John donated the museum a painting* is not among the legitimate ways of expressing the proposition that *John donated a painting to the museum*, leading us back to the Brown and Hanlon findings that such information is probably not available.

On the second constraint, the language would be treated as a set of strings and the child's input as a finite sample of those strings, but the child would assume that meanings and strings pair up in one-to-one fashion. Thus if a given string was heard paired with a particular meaning, the child could reject any hypothesis that paired a different string with that meaning. In this way any ungrammatical sentence (as long as it was given a determinate semantic interpretation) could be ruled out. The one-to-one or Uniqueness postulate (see Waxler and Culicover, 1980; Pinker, 1984; Clark, 1987) would be necessary because if a language allowed synonymous sentences, hearing one sentence paired with a meaning would not license the child to conclude that some other sentence with that meaning was ungrammatical. Once again, there is no straightforward way in which this solves Baker's problem. On the face of it, languages do contain synonymous sentences, such as *Give the book to me* and *Give me the book*. Thus if a child hears *Donate the book to me* he cannot justifiably infer that *Donate me
Chapter 1

...the book is ungrammatical. (If the child did erroneously assume that Uniqueness was the unmarked case, relaxing it for give and the scores of verbs like it under the pressure of witnessing both versions in the input, he would simply be adopting the conservatism strategy that I discuss in the next section.) Thus an appeal to Uniqueness will not resolve Baker’s paradox. It’s not that the logic of Uniqueness is faulty. For example, it works in principle in the case of recovering from overgeneralization of past-tense morphology, because virtually every verb has a unique past-tense form: hearing broke in a past tense context is evidence that broke is ungrammatical. The problem for the case of argument structures is that there is unlikely to be a perceptually recoverable semantic representation that can be paired up uniquely with each alternative argument structure.

Before I reject this option too quickly, it is worth noting that Clark (1987) does review evidence suggesting that perfect synonymy is rare or nonexistent in natural languages. She points out that seemingly synonymous constructions can differ in discourse properties, entailments, speech register (e.g., formal versus casual), and other subtle factors. For example, Erratics-Shir (1979) points out that the two forms of the dative differ in discourse focus. Give the X to the Y is most felicitous when X (the transferred object) is known background information and Y (the recipient) is the new information that attention is being called to; Give the Y the X is appropriate when Y is background and X is foreground. But how could the learner use this information to rule out *He donated the museum a painting?* Basically, each combination of a verb and a set of discourse roles for its arguments would have to be paired uniquely with an argument structure.

In Pinker (1981a) I sketch the necessary kind of scenario. There would have to be a situation in which the recipient is background information and the transferred object is new information but the speaker insists on using the nonfelicitous prepositional-object form instead. For example, if a person were to ask, “What did John do with the museum that inspired its directors to make him a trustee?” and heard as an answer, “He donated a Vermeer to the museum,” the listener could conclude that the double-object form of donate is ungrammatical. This scenario, of course, is highly implausible. Though children are demonstrably sensitive to discourse properties of the dative forms (Groen et al., 1989), their sensitivity is statistical, not absolute. Furthermore, in ordinary discourse a host of focusing devices, such as prenominalization, pronoun stress, and cliffting, can override the default differences in discourse focus between alternative argument structures. Thus, in my example, *He donated a VERMEER to it* is a perfectly felicitous reply to the hypothetical question. Unique discourse correlates of alternative argument structures would therefore be a tenous basis for rejecting one of them.
the denominal verbs in the (a) lines of (1.13) sound unfamiliar, once they are accepted by themselves the new, related argument structures created by the lexical rules and shown in (b) possess no increment of oddness or ungrammaticality over the original ones. This suggests that verbs are added to the mental lexicon in sets related by lexical rules; not every verb must be heard in every argument structure.

(1.13) Dative: verbs derived from means of communication
(a) I arpanetted / kemitted / E-mailed / binetted / the message to him.
(b) I arpanetted / kemitted / E-mailed / binetted / him the message.

Casuative: verbs derived from means of transportation
(a) She Ckery'd / Harley'd / Winnebag'o'd / Cessna'd to New York.
(b) Harry Ckery'd / Harley'd / Winnebag'o'd / Cessna'd her to New York.

Passive: Verbs derived from names
(a) Artis Gilmore out-Kareemed Kareem / out-Ma{onrod Malone / out-Parished Parish last night.
(b) Kareem was out-Kareemed / Malone was out-Ma{onrod / Parish was out-Parished last night by Artis Gilmore.

Locative: verbs derived from instrument of removal
(a) She Hoovered / Electroluxed / Hoky'd / Eureka'd ashes from the carpet.
(b) She Hoovered / Electroluxed / Hoky'd / Eureka'd the carpet.

There is good evidence that children are not conservative either. This evidence, which I will review in the next two sections, comes in two forms: errors in spontaneous speech, and generalizations made in experiments involving the teaching of new forms.

1.4.4.1 Evidence Against Strict Lexical Conservation in Children: Spontaneous Speech
In chapter 7 I will examine in detail children's errors with argument structures; here it will suffice to show that children make the errors in spontaneous speech.

Passives can be extracted from on-line transcripts of spontaneous speech by searching for instances of -ed, -en, and a few irregular endings; once such a list has been extracted, one can check to see if any of them are unacceptable as adult forms and hence could not have been learned from adult speech models. We searched the corpora of speech of the children named Adam, Eve, and Sarah studied by Brown (1973), using the Child Language Data Exchange System (CHILDES) database (MacWhinney and Snow, 1985). In addition, one can examine published accounts of children's creative invention of transitive verbs, such as verbs created from nouns (e.g., Can you nut these? from Clark, 1982), or transitive causatives created from intransitives (e.g., Don't giggle me, Bowerman, 1982a, b). If children are productive passivizers, some of these novel verbs should have been produced in the passive, again without benefit of an adult model.

Each of these searches yielded passives that for a variety of reasons could not have been based directly on parental speech. Some, such as I don't want to be shoted, gave evidence of a productive morphological process yielding passive participles, similar to classic morphological overregularizations such as singed of feet (Pinker, Lebeaux, and Frost, 1987, lists about twenty examples). A defender of strict lexical conservatism could reply that in these cases children could have noted the existence of passives in parental speech and simply forgotten their surface form, invoking a morphological rule to generate it. Therefore, the more relevant cases are those where not even the existence of the participle could have been inferred from adult speech because the verb was invented by the child to begin with. These are reproduced in (1.14), taken from Pinker, Lebeaux, and Frost (1987):
CB, 5:6: I don’t want to be dogerated today [asking for her hair not to be arranged in “dogears”].

DL, 5:6: Hier ist Gold angestrich. [This is gold-striped.]

EG, 6:8: ... pain enceinté ... [egg on it]

CG, 7:6: ... pain encontre ... [jammed bread; talking about bread with jam on it]

CG, 7:4: Mon assiette est entarîte. [My plate is covered with tart.]

MA, 9:3: ... une procession_eautile ... [a watered procession; describing a procession on the water]

From Bowerman (1983a):

CB, 3:6: If you don’t put them in for a very long time they won’t get stale.

CB, 3:6: Until I’m four I don’t have to be gone [= taken to the dentist].

CB, 4:3: Why is the laundry place stayed open all night? [= kept].

CB, 5:1: I need to round this circle very much. I need to have this rounded very much [as she rotates knife tip in lump of clay to make a cut-out circle].

H, 4:1: He’s gonna die you, David. [Turns to mother] The tiger will come and eat David and then he will be died and I won’t have a little brother any more.

From Tom Reper (personal communication):

I don’t want to get wet.

I don’t want to get wore over.

(Note: The children referred to as “EB” and “CB” by Clark are Eva and Christy Bowerman, whose speech is also reproduced in several examples from Bowerman.)

Example (1.15) presents other passives that children could not have learned directly from their parents, either because a verb takes a preposition that cannot be stranded or because the phrase that the child promoted to subject position is not the direct object of the verb in its transitive form.

(1.15) Adam, 4:2: (Playing with a cord of a toy telephone) Oh, look it’s roped through here. [Past participle of “rope”]

Adam, 4:2: Another child has put a bowl on Adam’s mother’s head. [You look like a crashed lady. [Mother: A crashed lady?] Yeah, like a crashed lady.

Sarah, 3:5: It was get burned on my there finger.

Sarah, 4:2: We got all stucked on each other.

A Learnability Paradox

Sarah, 4:7: She’s scribbled.

Sarah, 4:7: I’m making her picture scribbled.

From Wason (1981):

44: I don’t like being falled down on!

From Bowerman (1983a and personal communication):

EB, 3:8: [Watching one child sit on a potty, another on a toilet] Both are going to be go-ened in!

CB, 3:8: [After putting small items into a jewelry box and a coin purse] Both of these things can be put things in.

Double-object dative cannot be found as easily, both because there are fewer potentially dativizable verbs than passivizable ones, and because they contain no distinctive affix that can be searched for in on-line transcripts. Nonetheless, there are recurring reports of them in the literature, and Jess Groops, Michelle Hollander, Richard Goldberg, Ronald Wilson, and I (Groop et al., 1989) turned up several more in searches of transcripts of the spontaneous speech of Adam, Eve, and Sarah and of Brian MacWhinney’s two sons, Ross and Mark (MacWhinney and Snow, 1985). These are reproduced in (1.16).

(1.16) Adam, 4:1: I gon’ put me all dese rubber bands on.

Adam, 4:11: You finished me lots of rings.

Adam, 5:2: Mommy, fix me my tiger.

Ursia, fix me a tiger.

Ursia, fix me a tiger.

Eve, 2:3: But I go write you a lady now.

I go write you something.

I go write you train.

I writing you something.

You please write me lady. You please write me lady.

You can write me a lady on that page.

Writing you soaping.

Write me another one right here.

You please write me snowman.

When Fraser come back he gon’ to write me another snowman.

Eva, 2:9: [Driving in the country. Mother: Oh, look at the horses.] Where’d those horses go? [Mother: We passed them.] Pass me some more horses. [Repeated with “silin’”, “structures”, and “hoose”]

Ross, 2:8: Jay said me no.

Ross, 3:3: Don’t say me that [asking adult not to tell him to put on his socks].
Ross, 3:3: You ate me your cracker.
Mark, 3:8: So don’t please ... keep me a favor [asking brother not to throw up on a ride].
Mark, 4:0: Ross is gonna break into the TV and is gonna spend us money.
[Father: What is he gonna do, Mark?] Spend us money [i.e. to fix it will cost us money, cause us to spend money].

From MacArthur and White (1984):
2:3: I’ll brush him his hair.
5:2: Pick me up all these things.
6:0: Mummy, open Hadwen the door.

From Bowerman (1978; 1983a; 1987a):
C, 3:1: I said her no.
C, 3:3: You put me just bread and butter.
C, 3:4: Put Eva the yakky one first.
C, 3:6: Don’t say me that or you’ll make me cry.
C, 3:4: Button me the rest.
C, 3:9: I do what my horsey says me to do.
E, 2:4: Then put her some more.
E, 2:4: How come you’re putting me that kind of juice?

From E. Clark, personal communication:
Damon, 8:0: Mattia demonstrated me that yesterday.

Although some of these errors might have been caused by the direct substitution of one verb stem for a semantically similar one (e.g., write for draw, keep a favor for do a favor) rather than by the application of a dative rule, most of them (e.g., Fixe me a tiger) must have involved the use of a rule. Even Eva’s use of write in the double-object form was probably created by the application of a dative-identification operation; she uttered prepositional-dative sentences with for (e.g., Write a lady for me four times in that session, but never used draw in the double-object form in any of her transcripts. This issue will be discussed in detail in chapter 7.

Causatives. Melissa Bowerman (1982a) lists over 150 examples of spontaneous causatives. Many of them are from her two daughters, Christy and Eva, but examples can be found in virtually any reasonably large sample of children’s speech. They have also been found in other languages, including Hebrew (Berman, 1982), Hungarian (MacWhinney, 1985), Portuguese (Figueira, 1984), French, Polish, and Turkish (Slobin, 1985). Because I will be discussing these examples in detail in chapter 7, I reproduce in (1.17) all of the novel causatives involving intransitive verbs from Bowerman’s paper.
C, 4:6: Would you like me to ... have ... you some?
C, 3:8: You feed me. Take me little bites. Give me little bites.
Robert, 11+: We took him a bath yesterday and we took him one this morning.
Julie, 5+: When we go horse I'm gonna take you a bath with cold water.
Hilary, 4+: C'mon, Mama, take me a bath. C'mon, David, Mama's gonna take us a bath.
C, 3:9: You better not make me a quiet time, you better make me a quiet time [= give].
C, 3:9: A nice nurse lady took me a ride.
Hilary, 4+: David, let's take Mama a ride. [M: Oh, you're gonna give me a ride?] Yes, we're gonna take you a ride, Mama.
Rachel, 4:6: I want you to take me a camel ride over your shoulders into my room.
Jaime, 5:10: I'm taking my babies a walk.
E, 5:0: Be a hand up your nose. [M: What?] Put a hand up your nose.
C, 3:1: I wanna be it off. I wanna put it off [= take].
C, 5:0: Why do you wanna be it smooth before you put it in a pony tail? [M: What?] Why do you have to put it smooth before you put it in a pony tail?
C, 3:5: Be a picture of Emily and me [= take a picture].
C, 5:5: I meant to be it like this [= make it, have it be].
C, 2:1: [M: Close your eyes.] No! I want be my eyes open.
C, 3:1: I'm singing him. [Pulling string on cow-shaped music box]
E, 2:1:11: Do you want to come watch the mass sing their guitars?
E, 2:1:11: [M: How do you use a piano?] You sing it.
E, 2:2: I'm talking my birdie. [Pulling string on bird-shaped music box]
E, 4:0: Polly and Vicky aren't real. We just hold them up and talk them by themselves. We talk for them. [Re: her and C's dolls]
E, 3:0: Don't giggle me, [as D tickles E]
E, 5:3: You cried her! [After M drops E's doll and it squeals]
E, 4:6: Spell this "buy." Spell it "buy." [Wants M to rotate blocks on toy spelling device until word "buy" is formed]
C, 4:3: Andrea. I want you to watch this book. Andrea. I want to watch you this book. [Shortly] I just want you to watch this book. [C trying to get A's attention]
E, 2:11: Watch your faces! [Trying to get parents' attention so their faces will "watch" something]
E, 2:1: I want swim that. [Holding an object in the air and wiggling it as if it were swimming]
Adam, 4:2: Oh, look it’s rosted through here. [Playing with cord of toy telephone]
Adam, 4:11: See, it fills the grain in.
Adam, 4:11: I filled the grain up.
Sarah, 4:7: She’s scribbled.
Sarah, 4:7: I’m making her picture scribbled.
Mark, 4:7: And fill the little sugar up in the bowl how much you should
[= fill the bowl with as much cereal as you should].
From Bowerman (1981, 1982b):
E, 3:0: My other hand’s not yucky. See? ’Cause I’m going to touch it
on your pants [= touch your pants with it].
C, 4:3: [M. Simon says, “Touch your toes.”] To what? [Interprets toes as
theme, is looking now for goal. A moment later] M. Simon says,
“Touch your knees.”] To what?
C, 6:10: Feel your hand to that [= feel that with your hand].
E, 5:0: Can I fill some salt into the bear? [fill a bear-shaped salt shaker
with some salt].
E, 4:5: I’m going to cover a screen over me.
C, 4:8: She’s gonna pinch it on my foot.
E, 4:1: I didn’t fill water up to drink it; I filled it up for the flowers to drink
it [= filled the watering can up with water].
E, 4:11: And I’ll give you these eggs you can fill up. [Giving M beads to
put into cloth chicken-shaped container]
E, 5:3: Terri said if this were a diamond then people would be trying to
rob the shirt [= rob me of a shirt with rhinestones].
C, 3:11: Eva is just touching gently on the plant.
C, 4:2: Pinch on the balloon [= pinch the balloon].

(1.19) E, 2:11: Pour, pour, pour. Mommy, I poured you. [Waving empty con-
tainer near M. M: You poured me?] Yeah, with water.
E, 7:2: My belly holds water! Look, Mom, I’m gonna pour it with water,
my belly.
E, 4:11: I don’t want it because I spilled it of orange juice [spilled orange
dye on her toast].
C, 6:5: Once the Partridge Family got stolen. [M, puzzled: The whole
family?] No, all their stuff.
In all the experiments, several actions, words, and sets of toys were used, all
counterbalanced within an experiment.
Of course we could not guarantee that children would use the argument
structure we were interested in even if it was available to them and even when
we used questions that focused one or another participant, making the targeted
form the most felicitous in the discourse context. To establish a baseline as to how successful the elicitation technique was, we also elicited passives, double-objectatives, and causative versions of made-up verbs that we had actually taught to the children in the passive, double-object, or lexical causative. In some experiments we also tried to elicit passives and datives of real English verbs such as kick or give. Our success rate with these verbs established an upper limit on how successful we could hope to be with the made-up verbs taught only in the active, prepositional-object, or intransitive form, which should have been somewhat harder because of the verbs' unfamiliarity and the requirement that a productive rule be applied. The table in (1.29) summarizes some of the results. Each line represents an experiment with a different group of subjects (there were several replications and a number of manipulations we can ignore for now). The first column of data displays the results of interest: how often the children produced passives, double-objectatives, lexical causatives, or "container-object" locatives (like Load the wagon with hay) of verbs they had never heard in those forms. The second column of data shows, by comparison, how often the elicitation technique was successful at drawing out such forms when productivity was not at issue because the verbs had been taught in the targeted forms. The third column of data gives the other estimate of the limits of the technique by showing children's frequency of uttering the targeted form with existing English high-frequency verbs.

Clearly, children were not strictly conservative: they uttered productive passives anywhere from 19% to 81% of the available opportunities (depending on age, stimulus materials, and so on), which is consistently less frequent, but not by much, than their production of verbs that they actually heard in the passive or of existing English verbs. Similarly, children uttered double-objectatives on 40%–53% of the opportunities (not much less than the 56% production rate when they had actually heard those forms); they uttered lexical causatives on 55%–66% of the available opportunities; and they uttered locative verbs with the container as direct object 78%–100% of the time.

One possible objection to this experiment is that the children could have been responding to experimental demand characteristics, stringing together ad hoc word sequences in order to please the experimenter or "play the game." This counterexplanation is quite unlikely. First of all, we have shown that the productive forms elicited in the experiment also show up in spontaneous speech in natural settings. Second, contrary to the suspicions of some, it is not possible to induce children to apply just any linguistic generalization in an experimental setting. Major (1974), for example, had children participate in a game in which they turned declaratives into questions. Children did not indiscriminately play along; for example, they would not reply to You better go by asking Better you

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<th>Age</th>
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go. This is exactly the kind of error that children never make in their spontaneous speech either (Kuczaj and Maratos, 1979; Pinker, 1984). Thus spontaneous speech and elicitation experiments can yield consistent evidence both for the occurrence and for the nonoccurrence of productive generalizations by children. Third, in the Gropen et al. experiments, we used a control condition in which children were exposed to a pseudoargument structure, I horsep the mouse of a ball, in contexts identical to those we had used for the double-object form. When we elicited such forms with novel verbs, we were successful only 4% of the time, as compared to our 50% success rate for the double-object form. We concluded that our technique could not be used to teach arbitrary verb-syntax combinations to children; it simply provided a context in which children's prior knowledge of grammar could be brought to bear on newly learned verbs.

In sum, this series of studies forces us to reject strict lexical conservatism— the hypothesis that children record which verbs appear in which argument structures and stick to those combinations—as a solution to Baker's paradox. We have now rejected the most obvious kinds of resolutions of the paradox: those that seek to find some kind of negative evidence to guide children, and those that deny that children are productive.
This leaves us with one option: rejecting arbitrariness. Perhaps the verbs that do or don’t participate in these alternations do not belong to arbitrary lists after all. Lexical entries specify associations among semantic, syntactic, phonological, morphological, and pragmatic bits of information. These associations may not be completely arbitrary. Perhaps a verb’s set of possible argument structures can be predicted from one of the other kinds of information in its entry. If so, the apparent arbitrariness of argument structure subcategorization is just an illusion stemming from naïve first impressions or from a faulty theory of lexical entries. If learners could acquire and enforce criteria delineating the alternating and nonalternating classes of verbs, they could productively generalize an alternation to verbs that meet the criteria without overgeneralizing it to those that do not. In principle, any of the tiers of information associated with a verb could be used to determine whether a rule applies to it. I will first examine whether verbs’ syntactic properties can delineate the range of rule application; in the next chapter I will examine morphological and semantic properties.

1.4.5 Solution #3: Syntactic Representations as Criteria for the Application of Lexical Rules

It might seem that the most elegant theory of how children solve Baker’s paradox would be to discover some syntactic property of verbs that perfectly predicts whether they enter into a given alternation, where the predictive contingency would be a consequence of some theory of the nature of the alternation. After all, argument structures are syntactic entities, and the rules manipulating them should be subject to properties of the verbs’ syntactic representations. There have been several proposals of this kind in the linguistic literature. We shall see, however, that all such proposals either cannot resolve Baker’s paradox or do not resolve it. But before we examine such proposals, it is necessary to review very briefly the current theories about how the syntactic properties of verbs’ argument structures are represented.

1.4.5.1 Representations for Argument Structures

Argument structures for a verb can be represented in a variety of ways, so long as there is a precise association between symbols that refer to grammatical entities and symbols that refer to the verb’s semantic or logical arguments. The classical notation, shown in (1.21), is simply one of more ordered lists of the phrasal categories that may simultaneously appear with the verb in a verb phrase, perhaps annotated to indicate which argument they correspond to.

(1.21) (SUBJ)

dine: NP, _ NP,

devour: NP, _ NP, PP,

pot: NP, _ NP, PP,

Since this notation duplicates information that is ordinarily stated in rules and principles governing phrase structure and otherwise hides a variety of generalizations, it is used mainly as a transparent mnemonic rather than as a hypothesis about the mental representation of argument structure information. A more theoretically motivated notation, based on Bresnan and Kaplan’s Lexical Functional Grammar (LFG; Bresnan, 1982a, b; Kaplan and Bresnan, 1982) is shown in (1.22).

(1.22) fall (SUBJ)

theme
dine (SUBJ)

agent
devour (SUBJ, OBJ)

agent theme
et (SUBJ, OBJ)

agent theme
et (SUBJ)

agent theme location

Each argument structure in (1.22) indicates how many syntactically expressed arguments the verb takes: one for dine and the intransitive version of eat, two for devour and the transitive version of eat, three for pot. It also indicates what thematic role, or “theta-role,” each argument is an example of: an agent is the instigator of an action; a theme is the object asserted to have a particular location or to be changing location; a location, source, or goal corresponds to where the theme is, what it is moving from, and what it is moving to, respectively.

According to the Thematic Relations Hypothesis (TRH; Greber, 1969; Lackendorf, 1972, 1978, 1983), thematic roles can apply not only to literal physical motion but also in a quasi-metaphorical way to changes of state or possession, including abstract “possession” of ideas, as if states, possessors, and minds were “places” in an abstract space (referred to as a semantic field) and objects, possessions, and ideas were movable things. Thus in John beheaded his house to Mary, John told a story to Mary, and John made the house red, one can identify abstract themes and goals: the house and a story are themes, Mary and red are goals. The Thematic Relations Hypothesis is motivated by a host of parallelisms between expressions for physical location and expressions for abstract states, and between expressions for physical motion and expressions for abstract changes. Examples include John went from Chicago to Boston, John went from
A Learnability Paradox

complements. An external argument is outside the phrase containing the head verb, and in single-clause sentences it will end up as the subject. The external argument is related to the combination of the verb and its other arguments by the relation of "predication." Internal arguments are further differentiated by Muramatsu (1984) and Levin and Rappaport (1986) as being either direct, that is, receiving a thematic role directly from the verb, or indirect, that is, receiving a thematic role from an intervening preposition.

There are various typographical conventions for distinguishing external, direct internal, and indirect internal arguments in a verb's argument structure. The one used by Levin and Rappaport and by Muramatsu lists the external argument outside of the bracketed argument list and italicizes the direct internal argument, as in (1.23).

(1.23) PUT: agent < theme, location >

An alternative notation eschews thematic role labels as a means of identifying a verb's arguments and simply uses arbitrary variables (x, y, z) for the arguments.

An example of this kind of notation, used in Zubizarreta (1987), is shown in (1.24a), where the byphen links the theta-role-assigning element to the argument that receives the role, and "loc P" stands for a locative preposition. A hybrid representation used by Rappaport and Levin (1986) is shown in (1.24b).

(1.24) a. PUT y x; loc P z
b. PUT: x y P

In all these formulations, any phrase that is associated with a verb but is not one of its arguments (for example, "adjunct" phrases like at three o'clock or in order to please his mother) is simply not listed in the verb’s argument structure. When a verb has an argument that can be expressed optionally, such as John ate the meat / John ate the steak, the optional argument can be symbolized in any of these formulations using parentheses in the argument structure, as in eat: (SUBJ, OBI) or EAT: x (y).

In the OBI theory, some verbs can have direct objects in underlying d-structure but not in the surface structure, or "a-structure," which corresponds more closely to the spoken sentence. Passive participles and certain kinds of intransitive verbs called "unaccusatives" (like arrive) are the main examples. (I will discuss the difference between standard intransitives, or "unergatives," and intransitives that are said to be transitive in underlying structure, or "unaccusatives," in more detail later.) These forms are represented as having a direct internal argument that receives a theta-role from the predicate but does not receive "abstract case" either from the predicate or from a preposition. Since Chomsky's Case Filter would generally disallow sentences with non-case-marked lexical NPs, the only way that such a sentence can become grammatical is if a
transformation ("Move α") moves the argument into subject position, where it can be case-marked by an abstract tense element in the INFL (inflection) node. (Another mechanism that forces unaccusative intransitives and passives to get subjects is the Extended Projection Principle, which requires all verbs to have subjects.) For these verbs, the surface subject will correspond to the internal argument, not the external argument. The fact that the internal argument is caseless is predictable from the fact the verb does not assign a theta-role to an external argument; this is sometimes known as Burzio’s Generalization (Burzio, 1986). A GB representation of the intransitive verb fall would be something like (1.25).

(1.25) fall <t>.

The GB and LFG representations are fairly intertranslatable (see, e.g., B. Levin, 1985; L. Levin, 1985, and Jackendoff, 1987a, for discussion), and in most of the book I will use the LFG and GB terminology for grammatical roles interchangeably, except in those few cases where one makes a distinction ignored by the other. The main substantive difference between them is the GB differentiation between subjects that are external arguments and subjects that are moved internal arguments, though even here L. Levin has shown that the distinction can easily be captured in LFG. The table in (1.26) shows how the translation works for argument structures and grammatical functions. (There is no consensus among GB linguists as to how to represent the second object in double-object or ditransitive structures such as Give me the book; I will simply call them "second direct internal arguments.")

Another theory, Relational Grammar (RG; Perlis, 1980; Perlis and Rosen, 1984), combines features of both. As in LFG, the syntactic roles of arguments are specified in terms of grammatical relations such as "subject" rather than configurations in phrase structure. As in GB, the grammatical roles are assigned at an underlying level of representation that is mapped onto a surface representation by transformational rules during the derivation of a sentence. A fourth theory, Generalized Phrase Structure Grammar (GPSG; Gazdar, Klein, Pullum, and Sag, 1985), resembles LFG and GB in the opposite pair of respects: as in LFG, the representation in which the verb’s subcategorization is stated is not transformed in the derivation of a sentence; as in GB, the representation is in terms of phrase configurations (specifically, in terms of a modified classical notation listing the categories of the phrase mates of the verb).

### 1.4.5.2 Using Properties of Syntactic Representations to Solve the Learning Problem

There have been a number of suggestions that certain general principles of grammar are sensitive to details of the syntactic representation of verbs, allowing some verbs to undergo a lexical rule while superficially similar ones with different representations are left untouched. For example, Randall (1987) suggests that dativizable verbs are represented as having two obligatory internal arguments, whereas for nondativizable verbs the goal argument is optional. A related suggestion is that the theme and goal phrases associated with dativizable verbs are both arguments of the verb, whereas nondativizable verbs have only one theme argument, the goal being an adjunct. Borger and Wexler (1987) suggest that the causativizability of an intransitive verb is predictable by whether it is unaccusative or unergative, that is, whether its role argument is its object in d-structure or its subject. Often it is suggested that passivizability hinges on whether a verb and its object are adjacent in d-structure; it is also suggested that passivizability of NPs that are not objects of the verb depends on the verb and object being represented as parts of a single complex verb.

There is a problem with proposed solutions of this ilk: as usually stated, they are logically incapable of explaining Baker’s paradox. Abstract syntactic representations are colorless, odorless, and tasteless. Saying that one verb alternates and a superficially similar one does not because the first has syntactic representation A whereas the second has syntactic representation B only pushes the question back a step: how does the child know which verbs have representation
A and which have representation B? Without an answer, the representational theory offers no advantage over saying that one kind of verb is represented with the abstract feature [+ditivizable] and the other has the feature [-ditivizable].

Two kinds of answers are possible. One is that there is some morphological, phonological, or semantic property of the verb that allows the child to predict which syntactic representation it has. This makes the learnability-theoretic aspect of the syntactic representation accounts reduce to the accounts I will discuss in the rest of this book, as far as solving Baker's paradox is concerned, and the configurations themselves have no direct role to play in the solution. That is not to say that proposals about the abstract syntactic representations are false or useless—they could enter into the explanation of a variety of linguistic regularities that ensure once the correct representation is identified by the child— it's just that they do not explain the learning problem at hand. I will say little about them, simply because it is the learning problem that I am confronting here.

The second possible answer is that each of the representations has other detectable syntactic effects in the behavior of the verbs. For example, all the verbs that alternate between argument structures X and Y could invariably appear in structure Z, while all the verbs that fail to alternate never appear in Z, or vice versa. This kind of solution is logically capable of resolving the paradox: the child could note which of the verbs appearing in Z also appear in Z and could successfully predict that those verbs do (or don't) alternate between X and Y. It is actually the vice versa case, where Z predicts not Y, that is most interesting, because the Z-predicts-Y case would be similar to conservatism: the child would simply wait to hear Z before generalizing to Y, rather than waiting to hear Y before generalizing to Y. Note, though, that there is a kernel of implausibility lying at the center of this kind of account. The reason we have a learning paradox is that some verbs appear in X and Y and some appear only in X. Presumably there is some set of factors yet to be discovered that prevents some of the verbs that appear in X from appearing in Y. But this account requires that whatever those choosy factors are, they are completely nullified when it comes to the alternation of X and Z—all verbs (or no verbs) that appear in X appear in Z, without exception. That is possible, of course, but if the X-Z alternation is even vaguely in the domain of phenomena encompassing the X-Y alternation, it is unlikely. In fact, I will show that none of the proposals hinging on abstract syntactic representations makes the right kind of predictions about the child's discovering those representations on the basis of independent inputs.

### 1.4.5.3 Obligatory Versus Optional Arguments

Janet Randall (1987) suggests that ditivizable verbs specify both their objects as obligatory arguments, whereas nonditivizable verbs specify only the theme as an obligatory argument. Since predicates and their obligatory arguments are adjacent within a phrase but optional arguments are generally outside the phrase (Jackendoff, 1977), two obligatory arguments can switch places in linear order whereas an optional argument cannot intrude between a verb and its obligatory argument without destroying the connectivity of the tree or violating other principles. The general principle is illustrated in (1.27), where the verb get has an obligatory argument for the received object and an optional argument for the sender.

(1.27) John got an invitation from Mary. John got an invitation from Mary.
*John got from Mary.
*John got from Mary an invitation.

In the case of ditivization, Randall provides the lexical entries shown in (1.28) for the ditivizable give and the unditivizable deliver.

(1.28) give: _NP PP deliver: _&NP (PP)

Randall therefore predicts that only ditivizable verbs can appear in simple transitive structures with theme objects. Hearing such structures would then be sufficient for the child to deduce that the verb is nonditivizable. For example, the child, upon hearing Connie reported the news, would know that the goal argument of report is optional, hence that report cannot have a goal argument between itself and its (obligatory) theme argument, hence that report cannot be ditivized. Positive evidence would suffice to avoid or learn double-object phrases with report: children should avoid ditivizing report when and only when they hear report used without a goal argument. Randall supports her predictions with the data reproduced in (1.29).

(1.29) (a) Agamemnon reported the news.

Pablo explained his painting.
Gertrude recited the recipe.
Romeo delivered the posies.
Cressida dictated the letter.
Joan contributed six warriors.

(b) *Agamemnon told the news.
*Pablo gave his painting.
*Gertrude showed the recipe.
*Romeo bought the posies.
*Cressida sent the book.
*Joan lent six warriors.
Randall notes that these judgments are somewhat shaky and tries to show that the sentences in (1.29b) are acceptable only when the verb is elliptical, idiomatic, or ambiguous. However, the account does not work in general. Bill told a story is fully grammatical, unambiguous, and pragmatically neutral, as are Sam asked a question (cf. Sam asked me a question), Irv wrote a letter (cf. Irv wrote her a letter), and John threw / kicked / rolled the ball (cf. John threw / kicked / rolled me the ball). Conversely, the sentences containing explain, contribute, and deliver in (1.29a) seem fairly elliptical—no less so, in any case, than the sentences with deliver, brought, sent or lent in (1.29b). There are also nondistributive verbs with obligatory to-phrases; they should be ungrammatical on Randall’s hypothesis: She entrusted her child to the daycare center / She entrusted her child to my account / She entrusted the daycare center her child, and He credited the money to my account / He credited the money / He credited my account the money. See Dowty (1979a) for a related set of phenomena.

The noncorrelation between the obligatoryness of an oblique argument and its ability to be promoted to direct object can be seen in other constructions, such as the locative alternation. Rappaport and Levin (1985) and Levin and Rappaport (1986) point out that among the verbs that alternate between into/on to and with, all logical possibilities for combinations of optional and obligatory arguments can be found (thus speaking against Randall’s generalization regardless of which of the variants is thought to be derived from the other). Furthermore, verbs that do not alternate can also have their oblique phrases either obligatory or optional. Examples are given in (1.30).

(1.30) Alternating, Theme obligatory, Goal optional:
John piled books on the table / John piled the table with books.
John piled the books.
*John piled the table.

Alternating, Theme optional, Goal obligatory:
John stuffed feathers into the pillow / John stuffed the pillow with feathers.
*John stuffed the feathers.
John stuffed the pillow.

Alternating, Theme obligatory, Goal obligatory:
John heaped books on the shelf / John heaped the shelf with books.
**John heaped the books.
*John heaped the shelf.

Alternating, Theme optional, Goal optional:
John packed books into the box / John packed the box with books.

1.4.5.4 Arguments Versus Nonarguments Randall’s specific hypothesis can be generalized to make davizibility hinge on a more fundamental distinction, that between arguments and nonarguments. Intuitively, there is a big distinction between the uses of the prepositional phrase near the store in John re-

A Learnability Paradox

John packed the books.
John packed the box.

(1.31) Nonalternating, Theme object, Goal optional:
John spilled soup onto the table / *John spilled the table with soup.
John spilled soup.

Nonalternating, Theme object, Goal obligatory:
John spilled water onto the table / *John spilled the table with water.
*John spilled water.

Nonalternating, Goal object, Theme optional:
John filled the glass with water / *John filled water into the glass.
John filled the glass.

Nonalternating, Goal object, Theme obligatory:
John encrusted the cake with walnuts / *John encrusted walnuts onto the cake.
*John encrusted the cake.

Quite possibly Randall’s generalization could be salvaged by differentiating the verbs in (1.30) by various criteria, so that some of the examples would involve not a single verb extended to a new surface argument structure but two quasi-independent verbs. Of course, this just moves the resolution of Baker’s paradox to a discussion of what those criteria are, thereby collapsing Randall’s solution with those considered later in the book.

1.4.5.4 Arguments Versus Nonarguments Randall’s specific hypothesis can be generalized to make davizibility hinge on a more fundamental distinction, that between arguments and nonarguments. Intuitively, there is a big distinction between the uses of the prepositional phrase near the store in John remained near the store and John sang near the store. In the first case, the phrase in some sense completes the meaning of the verb or combines with it to define a single predicate; in the second, it is tacked on as a mere comment and the verb would denote pretty much the same event without it. In the first sentence, the PP is said to be an argument of the verb; in the second, it is an adjunct. Generally arguments are thought to be represented syntactically as sisters of the verb within the VP, whereas adjuncts are attached outside the VP in VP or S. A phrase could fail to be an argument of the verb for another reason: it could be an embedded modifier of one of the verb’s arguments rather than an argument of the verb itself. For example, there is a clear difference between the n-phrase of Bob put the hat in the box and John patched the hole in the rug. Some nonargument phrases can have the prepositions to and for. This can lead to sentences that resemble derivizible ones in terms of literal word-by-word composition but that quite
obviously do not meet the conditions for dativizability. For example, *John told the joke to death (adjunct) does not yield *John told death the joke; John found the top to the jar (embedded modifier) does not yield *John found the jar the top. Similarly, Sarah raced motorcycles for a thrill (adjunct) does not license *Sarah raced a thrill motorcycles; and Sarah found the case for her flute (embedded modifier) does not license *Sarah found her flute the case.

Thus, for an alternation to apply, it is clearly a necessary condition that all the affected phrases be arguments of the verb. The question is, is it a sufficient condition as well? Perhaps one could argue that in *John threw the box to Mary, the phrase to Mary is an argument of throw, whereas in John pulled the box to Mary, the phrase to Mary is merely an adjunct. That would account for the difference between John threw Mary the box and *John pulled Mary the box. Grimshaw (1989) and others have made this suggestion.

To evaluate the suggestion, we must make sure that “argument” is not being defined in such a way that it is synonymous with “dativizable,” thus begging the question once again. Fortunately, there are independent criteria in the linguistics literature for when a phrase may count as an argument (Bresnan, 1982; Dowty, 1982; Gazdar et al., 1985). These criteria associate the argument/nonargument distinction with sentences and phrases that do not involve the dative alternation directly, and hence could be used by the child to acquire representations for the verbs that have predictive power with respect to dativizability. Unfortunately, when these independent criteria are invoked, they fail completely:

• Compositionality. In arguments, the preposition can be a meaningless syntactic marker; in adjuncts, the interpretation may not be possible. In the case of French, where of is meaningful and of France is an argument, and the king from France, where from is used as it always is, to denote a source, and from France is an adjunct. The problem is that in John threw the ball to Mary, we want to Mary to be an argument, but the preposition to has a clear independent meaning. Compare John ran to / past / around the store with John threw the ball to / past / around Mary.

• Existential entailment. The use of a verb entails that the referents of its arguments exist, even when the arguments are not expressed overtly. However, there need not be any definite thing that invariably corresponds to the referent of a phrase that can appear as an adjunct. For example, if Susan is a sister, she must be the sister of some specific person, so in Susan is the sister of Steven, the phrase of Steven is an argument of sister. However, a sister need not be near anything in particular, so in Susan is the sister near the wall, the phrase near the wall is not an argument. Similarly, John ate implies that there must be something that John ate, so the apple in John ate the apple must be an argument. The problem is that there is no clear sense in which throwing or sliding entails a definite goal to which the object must be thrown or slid at the same time that pulling or lifting does not entail a definite goal to which the object must be pulled or lifted. But such a difference must exist, according to the account appealing to argumenthood. Similarly, one can ask a question without there being anyone to whom the question is addressed (it can be rhetorical), yet Ask him a question is possible.

• Unique. Adjuncts can be iterated; arguments must appear singly. For example, Paul sang a song in the park near the tree across from the fence at 3 o'clock on a cloudy day to impress the townfolk (iterated adjuncts) is possible, whereas *Paul sang a song a pretty ballad (iterated arguments) is impossible.

Another example: Susan is the sister near the wall with the mistletoe (iterated adjuncts), versus *Susan is the sister of Steven; Robert (iterated arguments). The problem is that this criterion deems certain phrases to be arguments that the dativizable account wants as adjuncts, such as *Sam gave the box to Mary to Sally, which has iterated putative adjuncts. (Sam gave the box past Mary to Sally is fine, but so is Sam threw the ball past Mary to Sally.) By this criterion, even the for argument of prepositional datives must be an argument: *I baked cakes for Susan for Mary, with the meaning “I baked cakes intended both for Susan and for Mary.” (If the action of baking a cake intended for Susan alone is done for Mary’s benefit, the first-for-phrase is uncontroversially an argument, the second an adjunct.)

• Obligatoriness. Arguments are often obligatory; adjuncts never are. For example, the verb devour takes an obligatory argument: John devoured the steak / *John devoured. No verb takes an obligatory adjunct such as those denoting time of day or the actor’s intentions. The problem is that the empirical problems for Randall’s hypothesis apply here exactly. For dativizable verbs, the to-phrase must be an argument, hence it should be obligatory, for some verbs it is not: John threw the ball: John asked a question. Conversely, for nondativizable verbs, the to-phrase must be optional, but for some verbs it is not: Babs credited the money to his account / *Babs credited the money / *Babs credited his account the money.

Examples could be multiplied, especially when the similar locative alternation is examined; see (1.30, 1.31). Thus if we apply independent criteria for what an “argument” is, argumenthood is a necessary condition for dativizability, ruling out some blatant counterexamples, but not a sufficient condition, failing to make the right distinctions for the more subtle cases.

1.4.5.5 Unaccusativity Hagit Borer and Kenneth Wexler (1987) suggest that the difference between causativizable and uncausativizable intransitives corresponds to the difference between unaccusative and unergative verbs
Chapter 1

(Perlmutter, 1978), which in GB theory is captured by differences in whether they specify their arguments in deep subject or deep object position (Burzio, 1986; see also L. Levin, 1985, for an LFG treatment, and Grimshaw, 1987, for a review). "The difference is shown in (1.32).

(1.32) laugh (unergative): x <-> arrive (unaccusative): x

Because arrive does not assign a thematic role to a subject, it does not assign case to its internal argument (Burzio’s Generalization), so the argument would have to be moved into subject position, obscuring the difference between arrive and a verb like laugh in surface structure. Causativization would simply insert a new, agent argument into the empty subject position, obviating the need for movement. But in the unergative entry, no empty slot is available, so causativization is blocked.

According to Borer and Waxler, children are initially incapable of registering the possibility that an intransitive may have an object in underlying structure, because they lack the device that would link surface subjects with the trace of their deep object position. Only after aural maturation installs this device can they differentiate the two kinds of verbs, using the following criteria: “First, only the ergative verbs appear in the object position (in causative constructions). Second, only ergative verbs appear as passive participles, either in adjectival or in verbal constructions.” The first of these possibilities, or course, is simply strict lexical conservatism, because the ability of a verb to take an object in the causative is just what the child is faced with determining. The second possibility is basically the same, since verbal passive participles of causative verbs are simply derived from causative verbs. (The use of adjectival participles to predict the existence of lexical causatives doesn’t work: upwet hair / *Mary upwet her hair; a fallen sign / *Bill fell the sign; an undescended testicle / *The drug undescended the testicle / *The drug undescended the testicle.)

In any case, the original proposal that causativization applies to unaccusative verbs is unsound. In (1.33a) there are verbs that are unaccusative (by the usual criteria; see Perlmutter, 1984) but do not causativize; in (1.33b) there are verbs that are unergative but do causativize. (In section 4.4.3.1, I explore these patterns systematically.)

(1.33) (a) The ball fell, *John fell the ball.

   The boy came, *Sam came the boy.
   The cloud appeared, *The wind appeared the cloud.
   Sam arrived, *Bob arrived Sam.
   A bug entered, *Mary entered a bug.
   The smoke ascended, *Sue ascended the smoke.

   (b) John walked home, I walked John home.
   Cathy drove to Chicago, I drove Cathy to Chicago.
   The soldiers marched across the field, The general marched the soldiers across the field.
   The horse raced past the barn, The jockey raced the horse past the barn.

1.4.5.6 Other Proposals There are many other proposals that are not even as explicit as those of Randall and of Borer and Waxler, in that they attribute some abstract property to alternating or nonalternating verbs alone without any suggestion whatsoever as to how the child could tell the difference. For example, Larson (1988) suggests that give but not donate marks its second object as having the thematic role “goal,” so that the preposition to is semantically redundant when used with give but conveys information when used with donate. Therefore, applying the dative shift allows the role of the now-prepositional argument to be recovered for give but not for donate. Donate is thus unassignable because the deletion of to is unerasable, violating the general principle of recovery of deletion. However, if the notion of recoverability of theta-roles is meant literally—could the speaker figure out which preposition should go with the prepositional counterpart to a double-object sentence containing donate?—the hypothesis is simply false. The meaning of donate is so close to that of give that one could easily infer that its third argument is a goal and so it would have to have been in that was deleted. That is, no one could be in doubt as to what role them were going in donate them a book. If the notion of assigning a theta-role is more abstract, it only begs the question of why donate but not give lacks the abstract property. Another suggestion comes from Larson and from Bellenti and Rizzi (1986), who argue that certain verbs that appear to have direct objects on the surface may not actually be adjacent to these NPs in deep structure but are separated from them by another phrase; this intervening phrase would be moved into surface subject position in active sentences, creating the illusion of a transitive verb. These verbs cannot passivize, because passivization is an operation that moves the argument adjacent to the verb in deep structure. But there is a massive tendency in English to reanalyze postverbal surface NPs as objects and hence to allow them to passivize (both synchronically and diachronically—see BRENNAN, 1982b; Visser, 1963), resulting in such forms as John was thought well of. This raises the question of how the child knows that the postverbal NPs of some verbs, but not others, is an underlying object.
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, 1983, 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, Kegel, and Levin, 1986).

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 "idiomsymantic 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 (Germanic), not Latinate 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 (1965), 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-acc, NP-dat" 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