



English Verb Classes and Alternations

A Preliminary Investigation

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Contents

Preface	xvii
Introduction: The Theoretical Perspective	1
The Layout of the Book	21
Part One: Alternations	
1 Transitivity Alternations	25
1.1 Object of Transitive = Subject of Intransitive Alternations	25
1.1.1 Middle Alternation	25
1.1.2 Causative Alternations	26
1.1.2.1 Causative/Inchoative Alternation	27
1.1.2.2 Induced Action Alternation	31
1.1.2.3 Other Instances of Causative Alternations	31
1.1.3 Substance/Source Alternation	32
1.2 Unexpressed Object Alternations	33
1.2.1 Unspecified Object Alternation	33
1.2.2 Understood Body-Part Object Alternation	34
1.2.3 Understood Reflexive Object Alternation	35
1.2.4 Understood Reciprocal Object Alternation	36
1.2.5 PRO- <i>arb</i> Object Alternation	37
1.2.6 Characteristic Property Alternations	39
1.2.6.1 Characteristic Property of Agent Alternation	39
1.2.6.2 Characteristic Property of Instrument Alternation	39
1.2.7 <i>Way</i> Object Alternation	40
1.2.8 Instructional Imperative	40
1.3 Conative Alternation	41
1.4 Preposition Drop Alternations	43
1.4.1 Locative Preposition Drop Alternation	43
1.4.2 <i>With</i> Preposition Drop Alternation	44

2	Alternations Involving Arguments Within the VP	45
2.1	Dative Alternation	45
2.2	Benefactive Alternation	48
2.3	Locative Alternation	49
2.3.1	<i>Spray/Load</i> Alternation	50
2.3.2	<i>Clear</i> Alternation (transitive)	51
2.3.3	<i>Wipe</i> Alternation	53
2.3.4	<i>Swarm</i> Alternation	53
2.3.5	<i>Clear</i> Alternation (intransitive)	55
2.4	Creation and Transformation Alternations	55
2.4.1	Material/Product Alternation (transitive)	56
2.4.2	Material/Product Alternation (intransitive)	57
2.4.3	Total Transformation Alternation (transitive)	57
2.4.4	Total Transformation Alternation (intransitive)	58
2.5	Reciprocal Alternations	58
2.5.1	Simple Reciprocal Alternation (transitive)	59
2.5.2	<i>Together</i> Reciprocal Alternation (transitive)	61
2.5.3	<i>Apart</i> Reciprocal Alternation (transitive)	62
2.5.4	Simple Reciprocal Alternation (intransitive)	62
2.5.5	<i>Together</i> Reciprocal Alternation (intransitive)	64
2.5.6	<i>Apart</i> Reciprocal Alternation (intransitive)	64
2.6	Fulfilling Alternation	65
2.7	Image Impression Alternation	66
2.8	<i>With/Against</i> Alternation	67
2.9	<i>Through/With</i> Alternation	68
2.10	<i>Blame</i> Alternation	69
2.11	<i>Search</i> Alternations	70
2.12	Body-Part Possessor Ascension Alternation	71
2.13	Possessor-Attribute Factoring Alternations	72
2.13.1	Possessor Object	73
2.13.2	Attribute Object	74
2.13.3	Possessor and Attribute Alternation	75
2.13.4	Possessor Subject (transitive)	76
2.13.5	Possessor Subject (intransitive)	77
2.14	<i>As</i> Alternation	78
3	“Oblique” Subject Alternations	79
3.1	Time Subject Alternation	79
3.2	Natural Force Subject Alternation	79
3.3	Instrument Subject Alternation	80
3.4	Abstract Cause Subject Alternation	81
3.5	Locatum Subject Alternation	81
3.6	Location Subject Alternation	82

3.7	Container Subject Alternation	82
3.8	Raw Material Subject Alternation	82
3.9	Sum of Money Subject Alternation	83
3.10	Source Subject Alternation	83
4	Reflexive Diathesis Alternations	84
4.1	Virtual Reflexive Alternation	84
4.2	Reflexive of Appearance Alternation	84
5	Passive	85
5.1	Verbal Passive	86
5.2	Prepositional Passive	86
5.3	Adjectival Passive (transitive verbs)	86
5.4	Adjectival Perfect Participles (intransitive verbs)	87
6	Alternations Involving Postverbal “Subjects”	88
6.1	<i>There</i> -Insertion	88
6.2	Locative Inversion	92
7	Other Constructions	95
7.1	Cognate Object Construction	95
7.2	Cognate Prepositional Phrase Construction	96
7.3	Reaction Object Construction	97
7.4	<i>X’s Way</i> Construction	99
7.5	Resultative Construction	99
7.6	Unintentional Interpretation of Object	101
7.6.1	Unintentional Interpretation with Reflexive Object	101
7.6.2	Unintentional Interpretation with Body-Part Object	102
7.7	Bound Nonreflexive Anaphor as Prepositional Object	104
7.8	Directional Phrases with Nondirected Motion Verbs	105
8	Verbs Requiring Special Diatheses	107
8.1	Obligatory Passive	107
8.2	Obligatorily Reflexive Object	107
8.3	Inalienably Possessed Body-Part Object	107
8.4	Expletive <i>It</i> Object	109
8.5	Obligatory Adverb	109
8.6	Obligatory Negative Polarity Element	109
	Part Two: Verb Classes	
9	Verbs of Putting	111
9.1	<i>Put</i> Verbs	111
9.2	Verbs of Putting in a Spatial Configuration	112
9.3	<i>Funnel</i> Verbs	113
9.4	Verbs of Putting with a Specified Direction	114
9.5	<i>Pour</i> Verbs	115
9.6	<i>Coil</i> Verbs	116

9.7	<i>Spray/Load</i> Verbs	117
9.8	<i>Fill</i> Verbs	119
9.9	<i>Butter</i> Verbs	120
9.10	<i>Pocket</i> Verbs	121
10	Verbs of Removing	122
10.1	<i>Remove</i> Verbs	122
10.2	<i>Banish</i> Verbs	123
10.3	<i>Clear</i> Verbs	124
10.4	<i>Wipe</i> Verbs	125
10.4.1	Manner Subclass	125
10.4.2	Instrument Subclass	127
10.5	Verbs of Possessional Deprivation: <i>Steal</i> Verbs	128
10.6	Verbs of Possessional Deprivation: <i>Cheat</i> Verbs	129
10.7	<i>Pit</i> Verbs	130
10.8	<i>Debone</i> Verbs	130
10.9	<i>Mine</i> Verbs	131
11	Verbs of Sending and Carrying	132
11.1	<i>Send</i> Verbs	132
11.2	<i>Slide</i> Verbs	133
11.3	<i>Bring</i> and <i>Take</i>	134
11.4	<i>Carry</i> Verbs	135
11.5	<i>Drive</i> Verbs	136
12	Verbs of Exerting Force: <i>Push/Pull</i> Verbs	137
13	Verbs of Change of Possession	138
13.1	<i>Give</i> Verbs	138
13.2	<i>Contribute</i> Verbs	138
13.3	Verbs of Future Having	139
13.4	Verbs of Providing	140
13.4.1	Verbs of Fulfilling	140
13.4.2	<i>Equip</i> Verbs	141
13.5	Verbs of Obtaining	141
13.5.1	<i>Get</i> Verbs	141
13.5.2	<i>Obtain</i> Verbs	142
13.6	Verbs of Exchange	143
13.7	<i>Berry</i> Verbs	144
14	<i>Learn</i> Verbs	144
15	<i>Hold</i> and <i>Keep</i> Verbs	145
15.1	<i>Hold</i> Verbs	145
15.2	<i>Keep</i> Verbs	145
16	Verbs of Concealment	146
17	Verbs of Throwing	146
17.1	<i>Throw</i> Verbs	146
17.2	<i>Pelt</i> Verbs	147

18	Verbs of Contact by Impact	148
18.1	<i>Hit</i> Verbs	148
18.2	<i>Swat</i> Verbs	150
18.3	<i>Spank</i> Verbs	151
18.4	Non-Agentive Verbs of Contact by Impact	153
19	<i>Poke</i> Verbs	154
20	Verbs of Contact: <i>Touch</i> Verbs	155
21	Verbs of Cutting	156
21.1	<i>Cut</i> Verbs	156
21.2	<i>Carve</i> Verbs	157
22	Verbs of Combining and Attaching	159
22.1	<i>Mix</i> Verbs	159
22.2	<i>Amalgamate</i> Verbs	160
22.3	<i>Shake</i> Verbs	161
22.4	<i>Tape</i> Verbs	162
22.5	<i>Cling</i> Verbs	164
23	Verbs of Separating and Disassembling	164
23.1	<i>Separate</i> Verbs	165
23.2	<i>Split</i> Verbs	166
23.3	<i>Disassemble</i> Verbs	167
23.4	<i>Differ</i> Verbs	167
24	Verbs of Coloring	168
25	Image Creation Verbs	169
25.1	Verbs of Image Impression	169
25.2	<i>Scribble</i> Verbs	170
25.3	<i>Illustrate</i> Verbs	171
25.4	<i>Transcribe</i> Verbs	171
26	Verbs of Creation and Transformation	172
26.1	<i>Build</i> Verbs	173
26.2	<i>Grow</i> Verbs	174
26.3	Verbs of Preparing	175
26.4	<i>Create</i> Verbs	175
26.5	<i>Knead</i> Verbs	176
26.6	<i>Turn</i> Verbs	177
26.7	Performance Verbs	178
27	<i>Engender</i> Verbs	179
28	<i>Calve</i> Verbs	180
29	Verbs with Predicative Complements	180
29.1	<i>Appoint</i> Verbs	181
29.2	<i>Characterize</i> Verbs	181
29.3	<i>Dub</i> Verbs	182
29.4	<i>Declare</i> Verbs	182
29.5	<i>Conjecture</i> Verbs	183

29.6	<i>Masquerade</i> Verbs	183
29.7	<i>Orphan</i> Verbs	184
29.8	<i>Captain</i> Verbs	184
30	Verbs of Perception	185
30.1	<i>See</i> Verbs	185
30.2	<i>Sight</i> Verbs	186
30.3	<i>Peer</i> Verbs	187
30.4	Stimulus Subject Perception Verbs	187
31	Psych-Verbs (Verbs of Psychological State)	188
31.1	<i>Amuse</i> Verbs	189
31.2	<i>Admire</i> Verbs	191
31.3	<i>Marvel</i> Verbs	192
31.4	<i>Appeal</i> Verbs	193
32	Verbs of Desire	194
32.1	<i>Want</i> Verbs	194
32.2	<i>Long</i> Verbs	194
33	Judgment Verbs	195
34	Verbs of Assessment	196
35	Verbs of Searching	197
35.1	<i>Hunt</i> Verbs	197
35.2	<i>Search</i> Verbs	198
35.3	<i>Stalk</i> Verbs	198
35.4	<i>Investigate</i> Verbs	198
35.5	<i>Rummage</i> Verbs	199
35.6	<i>Ferret</i> Verbs	199
36	Verbs of Social Interaction	200
36.1	<i>Correspond</i> Verbs	200
36.2	<i>Marry</i> Verbs	201
36.3	<i>Meet</i> Verbs	201
37	Verbs of Communication	202
37.1	Verbs of Transfer of a Message	202
37.2	<i>Tell</i>	203
37.3	Verbs of Manner of Speaking	204
37.4	Verbs of Instrument of Communication	206
37.5	<i>Talk</i> Verbs	207
37.6	<i>Chitchat</i> Verbs	208
37.7	<i>Say</i> Verbs	209
37.8	<i>Complain</i> Verbs	210
37.9	<i>Advise</i> Verbs	211
38	Verbs of Sounds Made by Animals	212
39	Verbs of Ingesting	213
39.1	<i>Eat</i> Verbs	213

39.2	<i>Chew</i> Verbs	214
39.3	<i>Gobble</i> Verbs	214
39.4	<i>Devour</i> Verbs	215
39.5	<i>Dine</i> Verbs	215
39.6	<i>Gorge</i> Verbs	216
39.7	Verbs of Feeding	216
40	Verbs Involving the Body	217
40.1	Verbs of Bodily Processes	217
40.1.1	<i>Hiccup</i> Verbs	217
40.1.2	<i>Breathe</i> Verbs	218
40.1.3	<i>Exhale</i> Verbs	218
40.2	Verbs of Nonverbal Expression	219
40.3	Verbs of Gestures/Signs Involving Body Parts	220
40.3.1	<i>Wink</i> Verbs	220
40.3.2	<i>Crane</i> Verbs	221
40.3.3	<i>Curtsey</i> Verbs	222
40.4	<i>Snooze</i> Verbs	222
40.5	<i>Flinch</i> Verbs	223
40.6	Verbs of Body-Internal States of Existence	223
40.7	<i>Suffocate</i> Verbs	224
40.8	Verbs of Bodily State and Damage to the Body	224
40.8.1	<i>Pain</i> Verbs	224
40.8.2	<i>Tingle</i> Verbs	225
40.8.3	<i>Hurt</i> Verbs	225
40.8.4	Verbs of Change of Bodily State	226
41	Verbs of Grooming and Bodily Care	227
41.1	Verbs of Caring for the Whole Body	227
41.1.1	<i>Dress</i> Verbs	227
41.1.2	<i>Groom</i> Verbs	228
41.2	Verbs of Caring for a Specific Body Part	228
41.2.1	<i>Floss</i> Verbs	228
41.2.2	<i>Braid</i> Verbs	229
41.3	Verbs of Dressing	229
41.3.1	Simple Verbs of Dressing	229
41.3.2	Verbs of Dressing Well	229
41.3.3	Verbs of Being Dressed	230
42	Verbs of Killing	230
42.1	<i>Murder</i> Verbs	230
42.2	<i>Poison</i> Verbs	232
43	Verbs of Emission	233
43.1	Verbs of Light Emission	233
43.2	Verbs of Sound Emission	234

	43.3	Verbs of Smell Emission	236
	43.4	Verbs of Substance Emission	237
44		<i>Destroy</i> Verbs	239
45		Verbs of Change of State	240
	45.1	<i>Break</i> Verbs	241
	45.2	<i>Bend</i> Verbs	242
	45.3	Cooking Verbs	243
	45.4	Other Alternating Verbs of Change of State	244
	45.5	Verbs of Entity-Specific Change of State	246
	45.6	Verbs of Calibratable Changes of State	247
46		<i>Lodge</i> Verbs	248
47		Verbs of Existence	249
	47.1	<i>Exist</i> Verbs	249
	47.2	Verbs of Entity-Specific Modes of Being	250
	47.3	Verbs of Modes of Being Involving Motion	251
	47.4	Verbs of Sound Existence	252
	47.5	Verbs of Group Existence	253
	47.5.1	<i>Swarm</i> Verbs	253
	47.5.2	<i>Herd</i> Verbs	254
	47.5.3	<i>Bulge</i> Verbs	254
	47.6	Verbs of Spatial Configuration	255
	47.7	<i>Meander</i> Verbs	256
	47.8	Verbs of Contiguous Location	257
48		Verbs of Appearance, Disappearance, and Occurrence	258
	48.1	Verbs of Appearance	258
	48.1.1	<i>Appear</i> Verbs	258
	48.1.2	Reflexive Verbs of Appearance	259
	48.2	Verbs of Disappearance	260
	48.3	Verbs of Occurrence	260
49		Verbs of Body-Internal Motion	261
50		Verbs of Assuming a Position	262
51		Verbs of Motion	263
	51.1	Verbs of Inherently Directed Motion	263
	51.2	<i>Leave</i> Verbs	264
	51.3	Manner of Motion Verbs	264
	51.3.1	<i>Roll</i> Verbs	264
	51.3.2	<i>Run</i> Verbs	265
	51.4	Verbs of Motion Using a Vehicle	267
	51.4.1	Verbs That Are Vehicle Names	267
	51.4.2	Verbs That Are Not Vehicle Names	268
	51.5	<i>Waltz</i> Verbs	268
	51.6	<i>Chase</i> Verbs	269

	51.7	<i>Accompany</i> Verbs	270
52		<i>Avoid</i> Verbs	270
53		Verbs of Lingering and Rushing	271
	53.1	Verbs of Lingering	271
	53.2	Verbs of Rushing	271
54		Measure Verbs	272
	54.1	<i>Register</i> Verbs	272
	54.2	<i>Cost</i> Verbs	272
	54.3	<i>Fit</i> Verbs	273
	54.4	<i>Price</i> Verbs	273
	54.5	<i>Bill</i> Verbs	274
55		Aspectual Verbs	274
	55.1	<i>Begin</i> Verbs	274
	55.2	<i>Complete</i> Verbs	275
56		<i>Weekend</i> Verbs	275
57		Weather Verbs	276
		References	277
		Verb Index	313
		References	277
		Verb Index	313

Preface

The set of resource materials on the English verb lexicon which make up this book grew out of work begun as part of the cross-linguistic study of lexical organization and lexical representation undertaken by the Lexicon Project of the MIT Center for Cognitive Science, which I was affiliated with during the years 1983–1987. I thank Ken Hale and Jay Keyser, the co-directors of the project, for giving me the opportunity to participate in the stimulating research atmosphere of the project. This book would never have happened without the Lexicon Project: it started life as a handout on lexical organization prepared for the project's seminar series. The book contains expanded and revised versions of earlier lists of verb classes and diathesis alternations (dated 1984, 1985, 1986, and 1989), which have been previously circulated.

More people than I can hope to acknowledge have contributed to this work. The late Bill Martin first encouraged me to think deeply about these issues. Boris Katz, Judy Kegl, Betsy Ritter, Jane Simpson, and especially Sue Atkins deserve my special thanks for their continuing encouragement to get the material in this book into a form that could be published. I would like to thank Sue Atkins, Ken Hale, Mary Laughren, Malka Rappaport Hovav, and Betsy Ritter for many valuable discussions. Roz Fergusson and Jim McCawley offered extensive and detailed comments on an earlier draft. Michael Brent, Annette Herskovitz, Geoff Huck, Talke Macfarland, and Tova Rapoport also commented on portions of the draft. I am grateful to Olivia Chang, Li Ya Fei, Tina Nielsen, Tova Rapoport, and Betsy Ritter for help in compiling this book and its precursors; to Olivia Chang, Jazmine Loiselle, Alice Rusnock, and Kirsten Winge for help with the bibliography; to David Weir for help with \LaTeX ; to Ken Church for generating the verb index; and to Christine Bartels for her excellent job copyediting the manuscript. I am also indebted to the many linguists and lexicographers whose work I have drawn on in preparing this book.

The compilation of this book was aided by a series of discussions among

members of the Lexicon Project during 1985–6 and by two meetings of the Lexicon Seminar in the fall of 1985 that were devoted to discussions of verb properties. The contents have also benefited from meetings of the Working Group on the Polytheoretical Lexicon in 1987, as well as from the Workshops on the Lexicon held at both the 1986 Linguistic Institute at CUNY and the 1987 Linguistic Institute at Stanford University.

The *Oxford Advanced Learner's Dictionary* in electronic form has been an invaluable tool for filling out specific sets of verbs. A variety of dictionaries in printed form have also aided this work. They include: *The Collins-Robert English-French Dictionary*, *The Collins COBUILD English Language Dictionary*, *The Longman Dictionary of Contemporary English*, and *The Longman Lexicon of Contemporary English*.

During the years 1983–1987, this work was supported by a grant from the System Development Foundation to the Lexicon Project of the MIT Center for Cognitive Science. Since 1989, this work has been supported in part by NSF Grant BNS-8919884.

I hope that this book serves to stimulate further research into the lexical organization and lexical representation of English verbs.

Introduction: The Theoretical Perspective

The resource materials on the English verb lexicon presented in this book represent some initial results of an ongoing investigation of the syntactic and semantic properties of English verbs. This introduction gives an overview of the conception of lexical knowledge that forms the foundation for this investigation and shows how a research program devoted to compiling the kinds of materials included here can assist in increasing such knowledge.

This work is guided by the assumption that the behavior of a verb, particularly with respect to the expression and interpretation of its arguments, is to a large extent determined by its meaning. Thus verb behavior can be used effectively to probe for linguistically relevant pertinent aspects of verb meaning. This book offers an attempt at delimiting and systematizing the facets of verb behavior. Its contents should help pave the way toward the development of a theory of lexical knowledge. Ideally, such a theory must provide linguistically motivated lexical entries for verbs which incorporate a representation of verb meaning and which allow the meanings of verbs to be properly associated with the syntactic expressions of their arguments.

The Nature of Lexical Knowledge

One of the most widely known views of the lexicon is that articulated by Bloomfield (1933), who wrote, "The lexicon is really an appendix of the grammar, a list of basic irregularities" (p. 274). Bloomfield's view conforms to a frequently articulated desideratum for an ideal lexicon—a lexicon that contains the minimum information necessary and that, therefore, as Bloomfield proposes, has to provide a record of precisely the idiosyncratic information associated with each lexical item. However, this view of the lexicon offers an incomplete picture of lexical knowledge as a whole. The knowledge that a speaker demonstrates with respect to lexical items suggests that there is more to lexical knowledge than knowledge of idiosyncratic word-specific properties.

This characteristic of lexical knowledge is easily illustrated with respect to verbs. Verbs, as argument-taking elements, show especially complex sets of properties. As shown in B. Levin (1985b, in prep.) and other works, native speakers can make extremely subtle judgments concerning the occurrence of verbs with a range of possible combinations of arguments and adjuncts in various syntactic expressions. For instance, speakers of English know which *diathesis alternations*—alternations in the expressions of arguments, sometimes accompanied by changes of meaning—verbs may participate in. They know that verbs such as *spray* and *load* may express their arguments in two different ways, displaying the so-called *locative alternation*.

- (1) a. Sharon sprayed water on the plants.
b. Sharon sprayed the plants with water.
- (2) a. The farmer loaded apples into the cart.
b. The farmer loaded the cart with apples.

But the same speakers know that some verbs which are apparently closely related to *spray* and *load* do not allow both options: *fill* and *cover* show one possibility, while *dump* and *pour* show the other.

- (3) a. *Monica covered a blanket over the baby.
b. Monica covered the baby with a blanket.
- (4) a. *Gina filled lemonade into the pitcher.
b. Gina filled the pitcher with lemonade.
- (5) a. Carla poured lemonade into the pitcher.
b. *Carla poured the pitcher with lemonade.
- (6) a. The farmer dumped apples into the cart.
b. *The farmer dumped the cart with apples.

Furthermore, speakers agree in their judgments concerning subtle differences in meaning associated with alternate expressions of a verb's arguments. For instance, they know that sentence (2b) suggests that the cart is full, but that sentence (2a) need not suggest this. Thus (2a), but not (2b), could be used to describe a cart that is half-full of apples. (This is the much-discussed "holistic/partitive" effect; see references cited in Part I under Locative Alternation.)

A speaker of English also knows whether a verb may participate in one of various *transitivity alternations* found in English—diathesis alternations that involve a change in a verb's transitivity. So for example, although the verb *break* shows transitive and intransitive uses, where the transitive use of the verb means roughly "cause to *break*-intransitive," this possibility—known as the *causative/inchoative alternation*—is not available for the verb

appear. That is, the verb *appear* cannot be used transitively to mean "cause to *appear*-intransitive."

- (7) a. The window broke. (inchoative variant)
b. The little boy broke the window. (causative variant)
- (8) a. A rabbit appeared out of the magician's hat.
b. *The magician appeared a rabbit out of his hat.

The ability to make such judgments extends to novel combinations of arguments and adjuncts. For instance, speakers of English know that benefactive phrases, though typically expressed as *for* prepositional phrases, can sometimes be expressed as the first object in the double object construction.

- (9) a. Martha carved a toy out of wood for the baby.
b. Martha carved the baby a toy out of wood.

Yet a speaker also knows when this option is not available. Though (10a) is a near-paraphrase of (9a), speakers of English know that there is no sentence (10b) comparable to (9b) where the benefactive is expressed as an object.

- (10) a. Martha carved some wood into a toy for the baby.
b. *Martha carved the baby some wood into a toy.

English has productive morphological processes for deriving new verbs that are zero-related to nouns,¹ and speakers of English have no difficulty in using or understanding these verbs. The advent of electronic communication has been accompanied not only by the widespread use of the noun *modem*, but also by its use as a verb meaning 'communicate via modem'.

- (11) "I'll modem him tomorrow," said one of them, urged by Mr. Krens to get in touch with an out-of-town colleague. (Arts and Leisure Section, *New York Times*, May 29, 1988, p. 1)

Modem, then, is taking its place among a set of verbs that take their names from instruments of communication (*cable*, *wire*, *radio*, etc.). Once again, speakers are aware of the limitations on the process of creating denominal verbs. Even though new verbs of this type are being coined daily, certain imaginable uses of nouns as verbs are not possible. As Hale and Keyser (1992)

¹ Here and throughout this work, I use the term *zero-related* rather than *zero-derived* when referring to the relation between the uses of a particular word in two lexical categories, such as the use of *tile* as a noun and as a verb. This choice reflects a desire to remain neutral about the direction of the relation, since although in some instances the direction is clear, in others it is not. Also, in using the term "zero-related" I do not intend to take any position with respect to the debate as to whether the derivational process involves the addition of a category-changing zero-morpheme or not.

point out, a speaker of English would never use the noun *church* as a verb meaning “give to a church,” as in **They churched the money*.

Speakers of English also know that certain English verbs manifest what B. Levin and Rapoport (1988) have called *extended meanings* (or senses) and what Apresjan (1973) calls *regular polysemy*. This phenomenon is best introduced with an example. Verbs like *whistle* and *roar*, which basically describe the emission of a sound, can regularly take on certain additional senses (see Atkins and B. Levin (1991), B. Levin (1991)). For instance, they can be used as verbs of directed motion, describing an object moving and simultaneously emitting a sound, as in *The bullet whistled through the window* or *The car roared up the driveway*. Yet speakers know that they cannot use the apparently comparable **The dog barked down the street behind the jogger* to say that a dog ran down the street barking behind a jogger.

The examples described in this section are representative of a wide range of phenomena that suggest that a speaker’s knowledge of the properties of a verb goes well beyond an awareness of the simple expression of its arguments—the type of lexical knowledge traditionally represented in subcategorization frames. Furthermore, the speaker’s ability to make subtle judgments about possible and actual verbs and their properties makes it unlikely that all that a speaker knows about a verb is indicated in its lexical entry.

Verb Meaning: A Key to Verb Behavior

What underlies the ability to make such judgments? Hale and Keyser (1987) present a telling example that suggests the following answer: what enables a speaker to determine the behavior of a verb is its meaning.

Hale and Keyser consider the archaic English verb *gally*, a whaling term, used as in *The sailors gallied the whales*. A speaker of English who is unfamiliar with this verb might assume that *gally* means “see” (*The sailors saw the whales*), while a second speaker might take *gally* to mean “frighten” (*The sailors frightened the whales*). What is striking is that, on the basis of these assumptions about the meaning of *gally*, the two speakers are able to make judgments about its syntactic behavior. To illustrate this point, Hale and Keyser look at the *middle* transitivity alternation. The subject of the intransitive middle use of a verb corresponds to the object of the transitive use; compare the transitive use of *slice* in *The baker sliced the bread* with the middle use of the same verb, *Stale bread slices easily*.² The speaker who believes that *gally*

means “see” would not allow the middle construction *Whales gally easily* (cf. **Whales see easily*), although the speaker who interprets *gally* as “frighten” will find this construction perfectly acceptable (cf. *Whales frighten easily*).

Thus the two speakers’ different treatment of *gally* may be explained by their different assumptions concerning its meaning. Hale and Keyser propose that the middle construction is available only to a certain semantically defined class of verbs: verbs whose meaning involves a notion of causing a change of state. They point out that change of state verbs such as *frighten*, *cut*, *split*, *open*, and *crush* have middles, but that other types of verbs such as *see*, *consider*, and *believe* do not. Only the speaker who attributes the change of state meaning “frighten” to *gally* will allow the verb to be used in the middle construction. The speaker who—contrary to fact as it turns out—believes that *gally* means “see” correctly does not allow this option.

The *gally* example shows vividly that for speakers of English, knowing the meaning of a verb can be a key to knowing its behavior. Presumably, predictions about verb behavior are feasible because particular syntactic properties are associated with verbs of a certain semantic type. The *gally* example and others like it suggest that general principles of grammar are at work, allowing the syntactic behavior of a verb to be predicted from its meaning. Their existence should explain a speaker’s ability to make the judgments discussed in the previous section.³

A More Complex Example

Further examination of the nature of lexical knowledge confirms that various aspects of the syntactic behavior of verbs are tied to their meaning. Moreover, verbs that fall into classes according to shared behavior would be expected to show shared meaning components. This point about the nature of lexical knowledge can be demonstrated with a more extensive example: an investigation of the verbs *break*, *cut*, *hit*, and *touch*, which draws on several studies of these verbs, including Fillmore (1967), Guerssel, Hale, Laughren, B. Levin, and White Eagle (1985), Hale and Keyser (1986, 1987), and Laughren (1988).

nation, in not denoting an event; that is, it need not have a specific time reference. Second, the middle construction always implies an agent (*Crystal vases shatter easily*), while the inchoative construction need not (*The crystal vase shattered*). See the discussion of these two alternations in Part I and the references cited there.

³ Providing an explanation for each of these judgments goes beyond the scope of this introduction. See Rappaport and B. Levin (1988) and Pinker (1989) for a discussion of the *sprayload* facts. See Hale and Keyser (1991) for a discussion of the *church* example and E.V. Clark and H.H. Clark (1979) for more general discussion of productive strategies for coining verbs from nouns. The extended meaning example is discussed in B. Levin (1991) and B. Levin and Rappaport Hovav (1991). The causative/inchoative alternation is discussed at greater length in the following section.

² The middle alternation should not be confused with the causative/inchoative alternation illustrated in (7) with the verb *break*. Although both are transitivity alternations where the subject of the intransitive use of the verb bears the same semantic relation to the verb as the object of the transitive use, there are differences between the two constructions. First, the middle construction differs from the inchoative construction, the intransitive variant of the causative/inchoative alter-

The verbs *break*, *cut*, *hit*, and *touch* are transitive, taking two arguments expressed as subject and object, but we will see that they have little else in common.

- (12) a. Margaret cut the bread.
b. Janet broke the vase.
c. Terry touched the cat.
d. Carla hit the door.

In particular, these verbs differ with respect to their participation in diathesis alternations. First, the middle alternation differentiates among these four verbs. Only *cut* and *break*, but not *hit* and *touch*, are found in the middle construction.⁴

- (13) a. The bread cuts easily.
b. Crystal vases break easily.
c. *Cats touch easily.
d. *Door frames hit easily.

On the other hand, *cut* and *hit* appear in the *conative construction*, as shown in (14), but *break* and *touch* do not.

- (14) a. Margaret cut at the bread.
b. *Janet broke at the vase.
c. *Terry touched at the cat.
d. Carla hit at the door.

The conative alternation is also a transitivity alternation, but unlike the middle and causative/inchoative alternations, the subject of the transitive variant (12) and intransitive variant (14) bears the same semantic relation to the verb. The variants differ in the expression of the other argument: in the conative construction, the argument corresponding to the object of the transitive variant is expressed in a prepositional phrase headed by *at*. The conative construction is set apart by its meaning: there is no entailment that the action denoted by the verb was completed. Thus (14a) means something like "Margaret tried to cut the bread."

Yet another diathesis alternation—the *body-part possessor ascension alternation*—distinguishes *cut*, *hit*, and *touch* from *break*. Only *break* does not display this alternation.

⁴ The uses of *hit* in this section involve the simple "contact through the motion of an instrument" sense of this verb. The verb *hit* is not found in the middle construction on this sense, which does not necessarily involve any subsequent motion of the entity that is hit. However, the verb *hit* has a second sense that might be described as "contact using an instrument and set in motion," as in *The batter hit the ball over the fence*. This second sense of *hit* allows the middle for some speakers. To ensure that the examples in this section unambiguously involve the simple sense of *hit*, the examples have an immovable entity as the object of the verb.

- (15) a. Margaret cut Bill's arm.
b. Margaret cut Bill on the arm.
- (16) a. Janet broke Bill's finger.
b. *Janet broke Bill on the finger.
- (17) a. Terry touched Bill's shoulder.
b. Terry touched Bill on the shoulder.
- (18) a. Carla hit Bill's back.
b. Carla hit Bill on the back.

This alternation is characterized by a change in the expression of a possessed body part: either the possessed body part may be expressed as the direct object of the verb, as in the (a) sentences, or the possessor may be expressed as the object of the verb, with the possessed body part expressed in a prepositional phrase, as in the (b) sentences.

Each verb shows a distinct pattern of behavior with respect to these three alternations, as summarized in the table.

	<i>touch</i>	<i>hit</i>	<i>cut</i>	<i>break</i>
Conative:	No	Yes	Yes	No
Body-Part Possessor Ascension:	Yes	Yes	Yes	No
Middle:	No	No	Yes	Yes

The four patterns of behavior observed here cannot simply be dismissed because they are linked to four different verbs. Corresponding to each one of these four verbs are other verbs that show the same pattern of behavior.

- (19) a. *Break* Verbs: break, crack, rip, shatter, snap, ...
b. *Cut* Verbs: cut, hack, saw, scratch, slash, ...
c. *Touch* Verbs: pat, stroke, tickle, touch, ...
d. *Hit* Verbs: bash, hit, kick, pound, tap, whack, ...

Not only can four verb classes be recognized that are defined by the shared behavior of their members with respect to the above diathesis alternations, but several studies (Fillmore (1967), Guerssel et al. (1985), Hale and Keyser (1986, 1987)) have examined each set of verbs in (19) closely and found that their members share certain aspects of meaning. Thus their members have common syntactic as well as semantic properties. These studies propose that the differences in verb behavior can be explained if the diathesis alternations are sensitive to particular components of verb meaning.

As a first step in identifying the relevant meaning components, let us look more closely at the body-part possessor ascension alternation. What distinguishes *cut*, *hit*, and *touch*, which enter into this alternation, from *break*, which

does not, is that the actions the first three verbs denote necessarily involve contact. Although the real-world event denoted by the verb *break* often involves contact, it need not. Evidence drawn from an examination of a variety of diathesis alternations indicates that, linguistically speaking, *break* is a pure change of state verb and a notion of contact is not inherent to its meaning (see below). It appears that a verb shows the body-part possessor ascension alternation only if its meaning involves the notion of contact.

But even if the meaning component 'contact' is common to *cut*, *hit*, and *touch*, there must be further meaning components that distinguish between them. After all, *touch*, unlike the other two, does not show the conative alternation. Guerssel et al. (1985) suggest that verbs which enter into the conative alternation have meanings that involve both motion and contact components. Only the meanings of *hit* and *cut* involve both. The motion component is missing from the meaning of *touch*, which is a pure verb of contact, while the meaning of *break* lacks both these components. If both contact and motion are necessary for the conative alternation, then pure verbs of motion would also be predicted not to show this alternation, and in fact, they do not.⁵

- (20) a. Jean moved the table.
b. * Jean moved at the table.

As we have also seen, *cut* and *break* both show the middle alternation, while *hit* and *touch* do not. As discussed above, this alternation is manifested by verbs of causing a change of state. The behavior of the verbs *hit* and *touch* suggests that they are not change of state verbs. And indeed, hitting and touching need not entail a change of state, unlike cutting and breaking. Although they behave differently in some respects from one another, *cut* and *break* nevertheless show similarities that go beyond the middle construction. For instance, both have associated zero-related nominals with a similar interpretation: they refer to the result of the action. In contrast, the nominals zero-related to *hit* and *touch* do not allow this interpretation, but refer instead to the action itself.

⁵ The interpretation that would be expected to be associated with the conative use of *move* in (20b), if this construction were possible, would be roughly "Jean attempted to move the table." However, this particular conjunction of meaning and syntactic frame is not observed. The verb *move* can be found with an *at* phrase, as in *The two opponents moved at each other*, but the interpretation associated with this use of *move* is not that expected in the conative construction. Rather, the use of *at* here parallels that found in *run at* or *charge at*. Furthermore, this use of *at* is not paired with a transitive use of the verb that is derived by "dropping" the preposition *at*; *The opponents moved each other* is not at all related to *The opponents moved at each other*. The existence of this use of *at*, as well as many other uses of *at* with verbs that do not show the conative alternation, raises another question: Are there some meaning components that are common to all these uses of the preposition? If there are, they may not be precisely the ones that determine participation in the conative alternation. The investigation of a unified characterization of *at* falls outside the scope of this book.

- (21) a. a break
b. a cut
c. a hit
d. a touch

This additional difference supports the proposal that *cut* and *break* are both verbs of causing a change of state; presumably, the actions they denote have a result that can be referred to by a nominal.

Finally, a few words concerning the difference between *cut* and *break*. Although the meaning of both verbs involves a change of state, *cut*'s meaning also involves notions of contact and motion. The verb *cut* describes bringing about a change of state by means of contact through motion; cutting involves bringing a sharp object into contact with a surface and causing a "separation in its material integrity" in the words of Hale and Keyser (1986). The verb *break* is a pure change of state verb: in both its transitive and intransitive uses it simply expresses a change of state (plus a notion of cause when transitive), without specifying how this change of state comes about. For example, throwing a rock at a window, bending a twig sharply, and dropping a cup are only a few of the many imaginable ways of breaking things. Not only does *break* differ from *cut* in not showing the conative or body-part possessor ascension alternations, but *break*, unlike *cut*, participates in the causative/inchoative alternation, as illustrated above in (7), which is repeated here as (22).

- (22) a. The window broke.
b. The little boy broke the window.
(23) a. Margaret cut the string.
b. * The string cut. (on the interpretation "became cut")

This fact has been attributed to this alternation's sensitivity to pure change of state verbs. And as expected, since they are not change of state verbs, the verbs *hit* or *touch* are not found in the causative/inchoative alternation.⁶

- (24) a. Terry touched the cat.
b. * The cat touched.
(25) a. Carla hit the door.
b. * The door hit.

Studies such as Guerssel et al. (1985) offer an explanation for the contrasting behavior of *break* and *cut*. A pure change of state verb like *break* is basically a single-argument verb, denoting an entity undergoing a change of state, as in the inchoative variant. The two-argument form of the verb found in the causative

⁶ The absence of a causative form for *appear* illustrated in (8) would be attributed to its not being a verb of change of state; it belongs to the class of verbs of appearance.

variant is derived by the addition of a notion of cause. Because the meaning of a verb like *cut* inherently involves an instrument, this verb requires the existence of an agent that uses this instrument to bring about a change of state in the patient; hence, *cut* is basically a two-argument verb and would never be found in the inchoative construction. Both *cut* and *break* are found in the middle construction because this construction is open to verbs of causing a change of state, whether or not their meaning also specifies how this change of state comes about.

The four verbs examined in this section then differ as follows: *touch* is a pure verb of contact, *hit* is a verb of contact by motion, *cut* is a verb of causing a change of state by moving something into contact with the entity that changes state, and *break* is a pure verb of change of state. These characterizations are not intended to exhaust the meaning of these verbs; rather, they simply capture those aspects of meaning that serve minimally to distinguish the verbs participating in the alternations discussed here. The notions of motion, contact, change of state, and causation that figure in these characterizations must be taken into account in selecting a lexical representation of verb meaning. These same notions are correlated with participation in diathesis alternations, including those discussed here. The body-part possessor ascension alternation is sensitive to the notion of contact, while the conative alternation is sensitive to both contact and motion. The causative/inchoative alternation is found only with verbs of pure change of state, while the middle alternation is found with verbs whose meaning involves causing a change of state.

The existence of ties between verb behavior and verb meaning is not particular to English. Alternations—including analogues of many of those found in English—are manifested across languages by verbs of the same semantic types. To take one example, the Australian language Warlpiri also shows the conative alternation. As in English, this alternation is not found with *break*-type verbs and *touch*-type verbs, though it is found with *hit*-type and *cut*-type verbs.⁷ Such examples reinforce the evidence from English that certain components of verb meaning determine verb behavior. This is not to say that all languages have the same inventory of verbs or diathesis alternations.⁸ But to the extent that languages are similar—and the similarities between them are often great—the same meaning components, and hence the same classes of verbs, figure in the statement of regularities concerning the expression of arguments. Even when alternations are specific to only some languages, they are often

7 For more discussion of Warlpiri, see Guerssel et al. (1985) and Laughren (1988).

8 Talmy (1985, 1991) and others, including Choi and Bowerman (1991), Pouradier Duteil and François (1981), Green (1973), Iordanskaja and Mel'chuk (1981), and B. Levin and Rapoport (1988), have described interesting differences between languages involving both the possible words of a language and the possible senses that can be associated with a given word.

sensitive to aspects of verb meaning that have been shown to be significant to the characterization of verb behavior in other languages as well.

The discussion of *break*, *cut*, *hit*, and *touch* underscores the conclusions drawn in the earlier sections. Studies of diathesis alternations show that verbs in English and other languages fall into classes on the basis of shared components of meaning. The class members have in common a range of properties, including the possible expression and interpretation of their arguments, as well as the existence of certain morphologically related forms. Furthermore, the existence of regular relationships between verb meaning and verb behavior suggests that not all aspects of a verb's behavior need to be listed in its lexical entry, a conclusion also suggested by a speaker's ability to make judgments about possible and actual verbs and their properties. The picture that emerges is that a verb's behavior arises from the interaction of its meaning and general principles of grammar. Thus the lexical knowledge of a speaker of a language must include knowledge of the meaning of individual verbs, the meaning components that determine the syntactic behavior of verbs, and the general principles that determine behavior from verb meaning.

The Larger Context

These observations about the nature of lexical knowledge fit well with proposals that the ideal lexical entry for a word should minimize the information provided for that word. This goal can be achieved by factoring predictable information out of lexical entries, leaving only idiosyncratic information. If the syntactic properties of a verb indeed follow in large part from its meaning, then it should be possible to identify general principles that derive the behavior of a verb from its meaning. Given such principles, the meaning of a verb will clearly have a place in its lexical entry, but it is possible that the entry will need to contain little more. And since a word's meaning is necessarily idiosyncratic, the inclusion of a word's meaning in its lexical entry conforms to Bloomfield's characterization of the lexicon as a locus of idiosyncrasy. In fact, Bloomfield (1933) follows his famous statement to this effect by writing that this view of the lexicon "... is all the more evident if meanings are taken into consideration, since the meaning of each morpheme belongs to it by an arbitrary tradition" (p. 274). Certainly this statement is just as true of words—at least monomorphemic words and multi-morpheme words whose meanings are not compositional. (It is not clear that this statement should apply to multi-morpheme words whose meanings are compositionally determined. The properties of such words are determined from their component parts, as discussed in recent work on argument structure and morphology; see, for example, Lieber (1983), Rappaport Hovav and B. Levin (1992), Sproat (1985), Williams (1981).)

Taking this approach seriously requires a re-evaluation of previous assumptions concerning the contents of lexical entries, since it suggests that they may contain less information than has sometimes been proposed. Specifically, if there are indeed correlations between verb meaning and verb behavior, some properties that might have been included in lexical entries because they were thought to be idiosyncratic could turn out on further examination to be predictable from verb meaning and could be eliminated from a verb's lexical entry.

Subcategorization frames are a case in point. Recently, there has been much investigation of the proposal that the subcategorization requirements of a lexical item might be predictable from its meaning, a position that is consistent with the view of lexical knowledge proposed here, though the motivation has come from efforts to constrain the power of syntactic rules. Those facets of syntactic constructions that cannot be made to follow from general principles of grammar are considered to be projections of the lexical properties of the words in these constructions. Concomitantly, the lexicon has assumed an increasingly central place in several syntactic frameworks (e.g., Government-Binding, Lexical Functional Grammar, Head-driven Phrase Structure Grammar), and much effort has been devoted to investigating the nature of lexical representation. This move has led to an increased interest in *argument structure*—the representation and characterization of argument-taking properties of verbs and other predicates. As discussed here, studies of these properties suggest that argument structures might in turn be derivable to a large extent from the meaning of words. Chomsky (1986), for example, speculates that only the meaning of a verb needs to be learned, and “semantic bootstrapping” models of child language acquisition (Pinker (1989)) are built on the assumption that a word's syntactic properties are predictable from its meaning. Within this context then, the ability to build representations of linguistically relevant aspects of word meaning and to formulate the principles that determine syntactic properties from word meaning becomes essential.

Challenges

Although no one is likely to deny that words with similar meaning show at least some tendency toward displaying the same syntactic behavior, the hypothesis that the syntactic behavior of a word is fully semantically determined is not uncontroversial. Many researchers have argued that this hypothesis must be rejected, citing numerous purported counterexamples to it. Nevertheless, the meaning of a verb does have considerable predictive ability, as the examples above and examples cited in other work illustrate, suggesting that the ties between a verb's meaning and its syntactic behavior cannot simply be ignored. And there are studies that show that this hypothesis receives substantial support,

particularly in restricted domains (Laughren (1988), B. Levin and Rappaport Hovav (1991), Zwicky (1971a), among others). This work pursues the hypothesis of semantic determination seriously to see just how far it can be taken, even if it does ultimately turn out to meet with limited success (see Jackendoff (1990b) for some discussion).

The key to maintaining this hypothesis is the identification of the appropriate representation of verb meaning. Determining the appropriate meaning components is not easy, since a priori it is possible to classify verbs in many ways according to their meaning. So it would not be surprising if some proposed semantic/syntactic correlations did not make reference to the proper choice of meaning components. Such correlations will be found to have limited applicability, suggesting that the relation between verb meaning and verb behavior is more idiosyncratic than it actually is and that the search for generalizations is doomed to fail. However, these conclusions may not be warranted. Apparent deviations from semantic/syntactic correlations might reflect the use of the wrong meaning components in the statement of the correlations, rather than the absence of such correlations. It is possible that many examples intended to demonstrate the limitations of the hypothesis that syntactic properties are semantically determined might, if reanalyzed, turn out to support it. An illustration, discussed in B. Levin and Rappaport Hovav (1991, 1992) and repeated here, underscores the importance of carefully evaluating purported counterexamples to the hypothesis.

This illustration involves the Unaccusative Hypothesis, a hypothesis concerning the syntactic configurations associated with intransitive verbs first proposed by Perlmutter (1978) and further elaborated by Burzio (1986). The proposal is that the single argument of some intransitive verbs, the unaccusative verbs, is an underlying object, while the single argument of the others, the unergative verbs, is an underlying subject. The Unaccusative Hypothesis has provided a rich context for debating whether syntactic behavior is semantically determined. Some researchers, including Perlmutter himself, have argued that the membership of an intransitive verb in the unaccusative or unergative class can be determined from its meaning. However, other researchers, including Rosen (1984), have concluded that meaning alone is not predictive of class membership. To support this view, Rosen points out that bodily process verbs in Italian do not show uniform behavior: *russare* ‘snore’ patterns like an unergative verb, while *arrossire* ‘blush’ patterns like an unaccusative verb.

But in fact, this particular example only emphasizes the importance of identifying the appropriate meaning components and does not necessarily argue against the semantic determination of syntactic properties. The verbs *russare* ‘snore’ and *arrossire* ‘blush’ would be expected to show similar behavior only if the semantic notion “bodily process” plays a part in determining a verb's status with respect to the Unaccusative Hypothesis. If it does not, then these

verbs need not necessarily pattern in the same way. The fact that they do not suggests that the semantic notion "bodily process" is probably not relevant to verb classification. There are other possible characterizations of bodily process verbs. The concept denoted by English *snore* can be classified as an activity in the sense of Vendler (1957), while that denoted by English *blush* is open either to an activity or to a change of state interpretation. Interestingly, Italian *arrossire* 'blush' literally means "become red," suggesting that *arrossire* is a change of state verb. There is evidence, in fact, that the semantic notions of activity and change of state are facets of meaning that figure in the determination of a verb's status with respect to the Unaccusative Hypothesis (B. Levin and Rappaport Hovav (1992), McClure (1990), Tenny (1987), Van Valin (1990), Zaenen (in press)).

If the hypothesis that syntactic properties are semantically determined is taken seriously, then the task is to determine, first, to what extent the meaning of a verb determines its syntactic behavior, and second, to the extent that syntactic behavior is predictable, what components of verb meaning figure in the relevant generalizations. The identification of the relevant components of meaning is essential if this approach is to be successful. And once these questions are answered, others remain. What kind of lexical representation of verb meaning is necessary? How are the mapping rules formulated that determine the syntactic properties? And more important, why are certain phenomena sensitive to certain meaning components? The attested patterns of behavior exhibited by verbs in English and other languages must be accounted for in a principled and systematic way. The present study is intended to lay the groundwork that will facilitate the future investigation of these questions, even though it does not offer explicit answers.

The Underlying Research Methodology

The assumption that the syntactic behavior of verbs is semantically determined gives rise to a powerful technique for investigating verb meaning that can be exploited in the development of a theory of lexical knowledge. If the distinctive behavior of verb classes with respect to diathesis alternations arises from their meaning, any class of verbs whose members pattern together with respect to diathesis alternations should be a semantically coherent class: its members should share at least some aspect of meaning. Once such a class is identified, its members can be examined to isolate the meaning components they have in common. Thus diathesis alternations can be used to provide a probe into the elements entering into the lexical representation of word meaning.⁹

⁹ A similar approach is proposed and illustrated by Deane and Wheeler (1984), who call it "correlation analysis." See also Green (1974, 66–69) and Wierzbicka (1987, 24–26).

The availability of this technique for investigating word meaning is important since it can be quite difficult to pin down the meanings of words using introspection alone. For instance, dictionaries provide rather different definitions of the sense of the verb *whistle* found in the context *The bullet whistled through the air*. They seem unsure whether to treat this sense as involving a verb of sound or a verb of motion. Thus *Webster's Ninth* (Mish (1986)) sees this sense as involving sound emission, giving the definition "to make a shrill clear sound, esp. by rapid movement;" in contrast, the *Collins English Dictionary* (Hanks (1986)) gives the definition "to move with a whistling sound caused by rapid passage through the air." By itself, intuition provides little guidance as to which one of these definitions is correct.

Distinctions induced by diathesis alternations help to provide insights into verb meaning, and more generally into the organization of the English verb lexicon, that might not otherwise be apparent, bringing out unexpected similarities and differences between verbs. A striking example is provided by verbs of motion. Verbs of motion are frequently cited as a large and important class within the English verb inventory. Yet a study of the syntactic behavior of these verbs (B. Levin and Rappaport Hovav (1992)) shows that this class is not homogeneous. It includes at least a subclass of verbs of inherently directed motion (e.g., *arrive*, *come*, *go*) and a subclass of verbs of manner of motion (e.g., *jump*, *run*, *trot*, *skip*). In the absence of a directional prepositional phrase, verbs of directed motion describe the direction of motion but not the manner of motion, while verbs of manner of motion describe the manner of motion but not the direction. In fact, some verbs of manner of motion do not necessarily entail any displacement, as in *run in place*. However, the verbs *run* and *whistle*—one a verb of motion and the other a verb of sound emission—are in some respects more similar to each other than the verbs *run* and *come*—although both are verbs of motion. The verbs *run* and *whistle* manifest a similar extended meaning: both can be used as verbs of directed motion in the presence of a directional prepositional phrase (*The bullet whistled through the window*, *The man ran into the room*), though neither is basically a verb of this type. Returning to the question of the best definition for one of the senses of *whistle*, it is likely that the *Collins English Dictionary* is on the right track in treating the relevant sense as a motion sense, since the verb shows the complement-taking properties of verbs of motion in this sense, which is only available in the presence of a directional phrase.

As these examples show, by providing independent criteria for isolating narrow classes of verbs known to share certain aspects of meaning, the study of diathesis alternations can lead to the identification of the linguistically relevant meaning components which determine a verb's behavior. In order to identify the full set of meaning components that figure in the lexical representation of verb meaning, the investigation of semantically relevant syntactic properties

and the ensuing clustering of verbs into classes need to be carried out over a larger and larger number of verbs occurring in a wide range of constructions. A growing number of studies of the syntactic behavior of English verbs are being conducted with the goal of identifying such meaning components; see, for example, Guerssel (1986), Guerssel et al. (1985), Hale and Keyser (1986, 1987), B. Levin and Rappaport Hovav (1991, 1992), Rappaport and B. Levin (1988). Furthermore, as discussed above, work on other languages can provide additional support both for this technique of studying lexical representation and for the results that it achieves. Interestingly, as noted in B. Levin and Pinker (1991), certain meaning components identified via the study of semantic/syntactic correlations show considerable overlap with the set of elements posited as being central to the meanings of English verbs in studies that approach the problem of verb meaning from the perspectives of language acquisition and cognition (Jackendoff (1983, 1990b), G.A. Miller and Johnson-Laird (1976), Pinker (1989)).

The nature of these meaning components, in turn, would be expected to influence the selection of a lexical representation of verb meaning that allows for the observed behavior. In fact, some of the studies listed above move beyond an examination of verb behavior to a consideration of its implications for the choice of a lexical representation of verb meaning and for the principles mapping from such a representation to the syntax. One of the conclusions that emerges from such studies is that the complex pattern of behavior manifested by verbs with respect to diathesis alternations cannot be explained with a lexical semantic representation that takes the form of a list of semantic roles (see Grimshaw (1990), Rappaport and B. Levin (1988), among others). These studies, as well as other recent work, propose lexical semantic representations that take the form of predicate decompositions, though there are significant differences in detail.

Although the hypothesis that meaning determines syntax has been used before in lexical semantic studies, its success within limited, well-defined domains shown in current work such as the studies cited above depends in part on the investigation of intricate and extensive patterns of syntactic behavior. Research of this kind looks not only at the subcategorization frame of a verb, but also examines a wider constellation of properties, particularly a verb's participation in diathesis alternations, and also to a more limited extent its morphological properties and extended meanings. Such wide-ranging studies are necessary because it is unlikely that a single property can be isolated that will prove sufficient to characterize a particular class of verbs (see also Mufwene (1978)). Each class of verbs displays a set of properties which together reflect the meaning components of its members. Since many of these meaning components are common to more than one class of verbs, properties that are

attributable to a single meaning component will be manifested by verbs from various classes. Although any single property of a class of verbs will in itself not be very informative, the conjunction of properties shown by a class of verbs may well be more revealing, since it will reflect the entire set of meaning components shared by the class members. For this reason, continued progress in the development of a theory of lexical knowledge of verbs will depend on an extensive exploration of verb behavior.

The Scope of this Book

This book offers the results of a preliminary large-scale investigation of the behavior of English verbs. It is divided into two major parts that reflect the nature of lexical knowledge as it has been described in this introduction. Part I of the book sets out a range of diathesis alternations that are relevant to a speaker's lexical knowledge of English. Part II presents a large number of semantically coherent classes of verbs whose members pattern in the same way with respect to diathesis alternations and other properties. The classes that are identified in Part II of the book have emerged from the study of the diathesis alternations set out in Part I.

This book tries to strike a balance between breadth and depth of coverage. Many of the diathesis alternations and verb classes included are familiar and well studied. Others have received relatively little attention, and I hope that their inclusion may stimulate further study. This introduction is intended to justify the general approach toward the exploration of the English verb inventory, though it cannot hope to argue for the inclusion of any given diathesis alternation or verb class. The classificatory distinctions in this book have been drawn using criteria of the type discussed throughout this introduction. They involve the expression of arguments of verbs, including alternate expressions of arguments and special interpretations associated with particular expressions of arguments of the type that are characteristic of diathesis alternations. Certain morphological properties of verbs, such as the existence of various types of related nominals and adjectives, have been used as well, since they are also tied to the argument-taking properties of verbs.

The verb classes that are identified in this book should be "handled with care," since there is a sense in which the notion of "verb class" is an artificial construct. Verb classes arise because a set of verbs with one or more shared meaning components show similar behavior. Some meaning components cut across the classes identified here, as attested by the existence of properties common to several verb classes. For instance, the meaning components contact and motion are common to the *hit* verbs and the *cut* verbs, as manifested by their participation in the conative alternation. However, the meaning component

contact alone would also have picked out the *touch* verbs, as well as the *hit* and *cut* verbs. Thus, since most verbs are characterized by several meaning components, there is potential for cross-classification, which in turn means that other, equally valid classification schemes might have been identified instead of the scheme presented in Part II of the book.

The important theoretical construct is the notion of meaning component, not the notion of verb class. This point is also argued for by Mufwene (1978) in a follow-up to Zwicky's (1971a) exploration of the properties of manner of speaking verbs. Mufwene argues that the identification of this class of verbs is of limited value since each of the twenty properties which Zwicky ascribes to manner of speaking verbs is shared by other types of verbs as well. A more explanatory account would result, Mufwene argues, if rather than tying the properties to a list of verb classes, they were associated with particular meaning components that are common to all verbs showing the property, whether or not they are manner of speaking verbs. Thus Mufwene favors "identifying a specific feature . . . as a component of a lexical entry . . . which triggers a given behavior or is held responsible for a given property" (p. 278).

Mufwene is right, but the identification of the meaning components poses a real challenge. Their identification is an eventual aim of the line of research described here. As discussed in the previous section, an examination of classes of verbs defined by shared behavior can play an important part in zeroing in on these meaning components. In this book, I have chosen a level of classification characterized by interesting clustering of verbs that should further the isolation of meaning components. The classification system does not take into account every property of every verb, since such a system would be liable to consist of classes having only one member, a state of affairs that would not provide much insight into the overall structure of the English verb lexicon.

Having set out what the book attempts to do, I would now like to turn briefly to what it does not attempt to do. This book presents a snapshot of ongoing research. It is by no means a definitive and exhaustive classification of the verb inventory of English. Some of its limitations reflect explicit design decisions. The verb classes were chosen because their members participated in diathesis alternations or showed behavior that was closely related to that of other verbs found in particular alternations. This strategy has led to the omission of certain verbs and verb classes. This book also restricts itself to verbs taking noun phrase and prepositional phrase complements. Verbs taking sentential complements are for the most part ignored, except when they show interesting behavior with noun phrase or prepositional phrase complements.¹⁰ Nor does this book look systematically at verbs derived by productive morphological processes, such as

¹⁰ For some catalogs of verbs that take sentential complements, see Alexander and Kunz (1964), Bridgeman et al. (1965), Ingria (1987), Rudanko (1989), Sager (1981), among others.

so-called zero-derived denominal verbs¹¹ and verbs derived through prefixation (*un-*, *de-*, *dis-*, *re-*, etc.) or suffixation (*-ify*, *-ize*, *-en*, etc.). This study also does not treat the inherent lexical aspect of verbs (aktionsart).¹² The connection between the verb classes and diathesis alternations discussed here and lexical aspect needs to be carefully investigated, since lexical aspect also plays an important part in determining verb behavior.

The material that is within the scope of this book is likely to contain inconsistencies, omissions, and inaccuracies, which reflect the practical difficulties that face attempts to accurately and exhaustively carry out hypothesis checking over a large number of English verbs. The set of verbs listed as belonging to any given class does not necessarily exhaust the membership of that class, though an effort has been made to make the lists as comprehensive as possible. It would not be surprising to find disagreement over the inclusion of a certain verb in a particular class, as well as differences of opinion concerning whether all the members of a certain class do indeed manifest a particular property. What is important is the existence of core sets of verbs with specific sets of properties that can provide the basis for the later identification of meaning components.

The goals of this work have also figured in the decision not to illustrate a consistent set of properties across all the verb classes identified in Part II of this book. Where information about a property is relevant it is included. For instance, given that the verb *fill* expresses its arguments in a frame resembling one of the variants of the locative alternation, and that as a first approximation it seems rather similar in meaning to locative alternation verbs like *spray* and *load*, it makes sense to include among the properties of *fill*'s verb class that its members do not undergo the locative alternation. However, the inclusion of this information in the discussion of another class of verbs might merely obscure the central properties of the members of this class. Similarly, in Part I of the book only some classes of verbs that do not display a particular diathesis alternation are noted.

Finally, this book does not assess the implications of the material it includes for the identification of meaning components, nor does it move beyond their identification to the formulation of a lexical semantic representation. Rather, it is intended to set the stage for these necessary next steps. In the meantime, I hope that it will be a valuable resource for linguists and researchers in related fields.

¹¹ For extensive studies of these verbs, see Bladin (1911), E.V. Clark and H.H. Clark (1979), Karius (1985), Leitner (1974), Marchand (1969), among others.

¹² There is a vast literature devoted to lexical aspect that includes Bach (1981, 1986), Brinton (1988), Declerck (1979), Dowty (1979), Freed (1979), Hinrichs (1985), Kenny (1963), Lys (1988), Mourelatos (1978), Tenny (1987, 1988b, 1989), Vendler (1957), Verkuyl (1972, 1989), among many others.

The Layout of the Book

This book consists of two major parts: a list of diathesis alternations and a list of verb classes. It also contains a bibliography of relevant works and a verb index. There is a certain area of overlap between the two major parts, because they present the same material from different perspectives.

The presentation of material relies primarily on illustrative examples, with written descriptions kept brief; however, comments signaling noteworthy properties of verb classes and alternations have been included. Bibliographic references have also been included where possible; these references should provide a starting point for further investigations. Throughout this work, if the illustrative examples given seem problematic, the reader should try substituting another verb of the same type, in case the judgment simply reflects disagreement about the classification of a particular verb. However, the reader needs to keep in mind that verbs belonging to the same class are syntactic "synonyms." That is, they should be substitutable in the same set of syntactic frames, though not necessarily in exactly the same contexts.

Although different behavior with respect to a diathesis alternation is more often than not a good reason to split a set of verbs into two subclasses, in some instances where members of a set of verbs share all but one or two properties, the class has not been subdivided further to avoid too much fragmentation and the resulting loss of insight. In these circumstances, in Part I of the book, when the relevant diathesis alternation is illustrated with respect to this class of verbs, it is accompanied by an annotation indicating that it applies to only some members of the class and that only the relevant verbs are listed. In Part II of the book, when the relevant verb class is treated, the properties that do not apply to the whole class are flagged.

Part I: Alternations

This part of the book includes a wide variety of diathesis alternations characteristic of English verbs, as well as special diatheses exhibited by certain English verbs. Each diathesis alternation is exemplified upon introduction; often, too, examples are given of verbs which might be expected to undergo the alternation but do not. In an attempt to suggest semantic restrictions which may bear on the alternations, the semantic classes of verbs which do and do not show the alternation are identified, insofar as these are understood. If only some members of one of the semantic classes undergo the alternation, only those members are listed; a full list of members of such classes will be found in Part II. Lists of verbs that do not undergo a particular alternation are preceded by an asterisk; lists of verbs that undergo an alternation are not set off in a special way. References to relevant discussions in the literature are included, as are comments on noteworthy features of the alternations.

Most verbs mentioned in Part I of the book figure in one or more classes in Part II. But a small number of verbs cited in Part I have not been associated with a class in Part II because of limited or ill-understood behavior.

The alternations are subdivided into groups on the basis of the syntactic frames involved. The first group includes transitivity alternations, while the second group covers alternate expressions of arguments (mostly within the verb phrase) that do not affect transitivity. A third group includes alternations that arise when verbs permit "oblique" subjects. These major groups of alternations are followed by a variety of other types.

Part II: Verb Classes

This part of the book contains various syntactically relevant, semantically coherent verb classes of English. These classes are described individually. A list of as many members of each class as possible is given; however, additional class members are likely to exist in many instances. Lists considered to be exhaustive are signaled by the word "only" following the last verb in the list. A representative verb is then used to exemplify the characteristic properties of the class, including argument-taking properties, behavior with respect to diathesis alternations, and occasionally morphological properties (related nominals or adjectives). These properties have been chosen to illustrate what is distinctive to the members of that class. References to other discussions of the verb class in the literature are provided where possible. Special properties of each class are also signaled.

Some verbs have several meanings and therefore will be included in several classes. Often when a verb has more than one meaning, one of its meanings is basic and the others are systematically related to it; that is, they are instances of extended meanings (see Introduction). Usually the ability to show particular

extended meanings is a property of a class of verbs, so where applicable, the existence of related meanings is mentioned in the comments associated with the description of a verb class. This phenomenon is not well understood, so no attempt has been made to include extended meanings systematically.

This part of the book is organized into sections that reflect a limited attempt to group verb classes related by meaning together. However, there is little hierarchical organization compared to the number of classes identified. This lack of structure reflects not only the preliminary nature of the investigation, but also the fact that it is an open research question whether a complete hierarchical organization of English verb classes is possible or even desirable (see Fellbaum (1990) and G.A. Miller and Fellbaum (1991) for some discussion).