The SPECIALIST LEXICON

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<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Introduction</td>
<td>5</td>
</tr>
<tr>
<td>1.1</td>
<td>General Description</td>
<td>5</td>
</tr>
<tr>
<td>1.2</td>
<td>The Development of the Lexicon</td>
<td>7</td>
</tr>
<tr>
<td>1.3</td>
<td>Verbs</td>
<td>8</td>
</tr>
<tr>
<td>1.4</td>
<td>Nouns</td>
<td>9</td>
</tr>
<tr>
<td>1.5</td>
<td>Adjectives</td>
<td>9</td>
</tr>
<tr>
<td>1.6</td>
<td>Adverbs</td>
<td>10</td>
</tr>
<tr>
<td>2.</td>
<td>Spelling Variation</td>
<td>10</td>
</tr>
<tr>
<td>3.</td>
<td>Syntactic Category (Part Of Speech)</td>
<td>11</td>
</tr>
<tr>
<td>4.</td>
<td>Variants: Agreement And Inflection</td>
<td>11</td>
</tr>
<tr>
<td>4.1</td>
<td>Verb Inflection</td>
<td>11</td>
</tr>
<tr>
<td>4.1.1</td>
<td>Regular Verb Inflection</td>
<td>12</td>
</tr>
<tr>
<td>4.1.2</td>
<td>Regular Doubling Inflection</td>
<td>13</td>
</tr>
<tr>
<td>4.1.3</td>
<td>Irregular Verb Inflection</td>
<td>14</td>
</tr>
<tr>
<td>4.2</td>
<td>Variants of Modals and Auxiliaries</td>
<td>15</td>
</tr>
<tr>
<td>4.2.1</td>
<td>Tense in Modals and Auxiliaries</td>
<td>15</td>
</tr>
<tr>
<td>4.2.2</td>
<td>The Paradigm of be</td>
<td>16</td>
</tr>
<tr>
<td>4.2.3</td>
<td>The Paradigms of do and have</td>
<td>17</td>
</tr>
<tr>
<td>4.2.4</td>
<td>Clitic Forms</td>
<td>18</td>
</tr>
<tr>
<td>4.2.5</td>
<td>Negative Contracted Forms</td>
<td>18</td>
</tr>
<tr>
<td>4.3</td>
<td>Adjective Inflection (Comparison)</td>
<td>19</td>
</tr>
<tr>
<td>4.3.1</td>
<td>Regular Variants</td>
<td>19</td>
</tr>
<tr>
<td>4.3.2</td>
<td>Regular Doubling</td>
<td>19</td>
</tr>
<tr>
<td>4.3.3</td>
<td>Irregular Adjectives</td>
<td>19</td>
</tr>
<tr>
<td>4.3.4</td>
<td>Invariant Adjectives</td>
<td>19</td>
</tr>
<tr>
<td>4.3.5</td>
<td>Periphrastic Adjectives</td>
<td>20</td>
</tr>
<tr>
<td>4.4</td>
<td>Adverb Inflection (Comparison)</td>
<td>20</td>
</tr>
<tr>
<td>4.4.1</td>
<td>Regular Adverbs</td>
<td>20</td>
</tr>
<tr>
<td>4.4.2</td>
<td>Irregular Adverbs</td>
<td>21</td>
</tr>
<tr>
<td>4.4.3</td>
<td>Invariant Adverbs</td>
<td>21</td>
</tr>
<tr>
<td>4.4.4</td>
<td>Periphrastic Adverbs</td>
<td>21</td>
</tr>
<tr>
<td>4.5</td>
<td>Noun Inflection</td>
<td>21</td>
</tr>
<tr>
<td>4.5.1</td>
<td>Countability</td>
<td>22</td>
</tr>
<tr>
<td>4.5.2</td>
<td>Regular Nouns</td>
<td>22</td>
</tr>
<tr>
<td>4.5.3</td>
<td>Greco-Latin regular plurals</td>
<td>23</td>
</tr>
<tr>
<td>4.5.4</td>
<td>Meta-linguistic regular nouns</td>
<td>24</td>
</tr>
<tr>
<td>4.5.5</td>
<td>Irregular Nouns</td>
<td>24</td>
</tr>
<tr>
<td>4.5.6</td>
<td>Fixed Singular Nouns</td>
<td>24</td>
</tr>
<tr>
<td>4.5.7</td>
<td>Fixed Plural Nouns</td>
<td>25</td>
</tr>
<tr>
<td>4.5.8</td>
<td>Invariant Nouns</td>
<td>25</td>
</tr>
<tr>
<td>4.5.9</td>
<td>Group Nouns</td>
<td>27</td>
</tr>
<tr>
<td>4.5.10</td>
<td>Uncount Nouns</td>
<td>27</td>
</tr>
<tr>
<td>4.5.11</td>
<td>Group Uncount Nouns</td>
<td>28</td>
</tr>
<tr>
<td>4.6</td>
<td>Agreement for Pronouns</td>
<td>28</td>
</tr>
</tbody>
</table>
4.7 Agreement for Determiners 29
  4.7.1 Determiners of Singular Nouns 30
  4.7.2 Determiners of Plural Nouns 30
  4.7.3 Determiners of Uncount Nouns 31
  4.7.4 Determiners of Singular and Uncount Nouns 31
  4.7.5 Determiners of Plural and Uncount Nouns 31
  4.7.6 Free Determiners 32

5. Complementation 32
  5.1 Verb Complementation Patterns 32
     5.1.1 Intransitive 33
     5.1.2 Transitive 34
     5.1.3 Ditransitive 35
     5.1.4 Linking 36
     5.1.5 Complex-transitive 37
  5.2 Verb Complements 38
     5.2.1 Noun Phrase Complements (Objects) 38
     5.2.2 Prepositional Phrase Complements 39
     5.2.3 Adjective Complements 40
     5.2.4 Adverbial Complements 40
     5.2.5 Non-Finite Clause Complements 41
     5.2.6 Finite Clause Complements 47
     5.2.7 WH Complement Clauses 49
  5.3 Verb Particle Constructions 50
     5.3.1 The Passive Construction 51
  5.4 Noun Complementation 51
     5.4.1 Infinitive Clause Complements 52
     5.4.2 Non Subject Raising 52
     5.4.3 Finite Clause Complements 53
     5.4.4 WH Finite Clause Complements 53
     5.4.5 Prepositional Phrase Complements 53
     5.4.6 WH Infinitive Complements 54
  5.5 Adjective Complementation 54
     5.5.1 Infinitive Clause Complements 55
     5.5.2 Non Subject Raising 56
     5.5.3 Non-Subject Control 57
     5.5.4 Finite Clause Complements 57
     5.5.5 WH Infinitive Clause Complements 58
5.5.6 WH Finite Clause Complements  58
5.5.7 Adverbial Complements  59
5.5.8 Prepositional Phrase Complements  59

6. Nominalizations of Verbs and Adjectives  59

7. Acronyms and Abbreviations  60

8. Proper Nouns  60

9. Adjective Positions  61
   9.1 Attributive Adjectives  61
      9.1.1 Position Classes for Attributive Adjectives  62
          Qualitative Adjectives 63
          Color Adjectives 63
          Classifying Adjectives 64
   9.2 Attributive Adjectives with Complements  64
   9.3 Predicative Adjectives  65
   9.4 Post-Nominal Adjectives  65

10. Stative Adjectives  66

11. Adverb Modification types  67
   11.1 Adverbial Particles  68
   11.2 Intensifiers  68
   11.3 Sentence Modifiers  68
   11.4 Verb Modifiers  68
   11.5 Locative, Temporal and Manner Adverbs  69
      11.5.1 Locative  69
      11.5.2 Temporal  69
      11.5.3 Manner  69

12. Interrogative  70
   12.1 Interrogative Pronouns  70
   12.2 Interrogative Adverbs  70
   12.3 Interrogative Determiners  70

13. Negation  71
   13.1 True Negative Adverbs  71
   13.2 Broadly Negative Adverbs  71

14. Pronouns  73
   14.1 Person and Number  73
   14.2 Gender for Personal Pronouns  73
   14.3 Type  75
      14.3.1 Government  75
      14.3.2 Possession  76
      14.3.3 Reflexive  78
14.3.4 Quantification  78
14.3.5 Deixis  79
14.3.6 Deictic Determiners  80
1. Introduction

1.1 General Description

A lexicon, recording information specific to individual lexical items, is necessarily a core component of any natural language processing system. The SPECIALIST lexicon has been developed to provide the lexical information needed for the SPECIALIST Natural Language Processing System. It is intended to be a general English lexicon that includes many biomedical terms. Coverage includes both general English words as well as more specialized biomedical vocabulary discovered in the NLM Test Collection and the UMLS Metathesaurus. The lexicon entry for each word or term records the syntactic, morphological, and graphemic information. Syntactic information includes syntactic category (part of speech), and complementation patterns for verbs, adjectives and nouns, as well as positional and modification types for adjectives and adverbs. Inflectional morphology is indicated for those syntactic categories which inflect, and spelling variation is recorded for each lexical item known to exhibit such variation.

The lexicon consists of a set of lexical entries, with one entry for each spelling or set of spelling variants in a particular part of speech. Lexical items may be “multi-word” terms made up of other words if the multi-word term is determined to be a lexical item by its presence as a term in general English or medical dictionaries, or in medical thesauri such as MeSH. Expansions of generally used acronyms and abbreviations are also allowed as multi-word terms.

The lexical entry is a frame structure consisting of slots and fillers. Each entry is enclosed in braces ( {...} ) and identified by a unique entry number (EUI) recorded as the filler of the entry= slot. The EUI is a seven digit number preceded by the letter “E”. The cat= slot indicates the part of speech of the entry and the base= slot indicates the base form of the entry. The base form is the uninflected citation form of the lexical item; the infinitive in the case of a verb; the singular in the case of a noun; and the positive in the case of an inflecting adjective or adverb. Optionally a spelling_variants= slot records spelling variants of the base form, including variants used in other English dialects like UK English, Australian English, and Canadian English. Spelling variants are listed in the following order: pure ASCII terms first, then terms without punctuation, then shortest length terms, and alphabetized after that. The spelling variant listed first by this metric (the filler of "base=") is called the citation form, while the other forms are not. That means each entry in the lexicon may have multiple base forms, or spelling variants, but each has just one citation form. The lexical entries for the citation form anesthetic given below illustrate some of the features of a SPECIALIST lexical entry:
There are two entries for the base form *anesthetic*, a noun entry and an adjective entry. The variants= slot contains a code indicating the inflectional morphology of each entry; the filler reg in the noun entry indicates that the noun *anesthetic* is a count noun which undergoes regular English plural formation (*aesthetics*); inv in the variants= slot of the adjective entry indicates that the adjective *anesthetic* does not form a comparative or superlative. The position= slot indicates that the adjective *anesthetic* is attributive and appears after color adjectives in the normal adjective order.

Lexical entries are not currently divided into senses. So, an entry represents a spelling-category pairing regardless of semantics. The noun *act* has two senses, both of which show a capitalized and lowercase spelling; an act of a play and an act of law. Since both senses share the same spellings and syntactic category, they are represented by a single lexical entry in the current lexicon.

When different senses have different syntactic behavior, codes for each behavior are recorded in a single entry. For example, *beer* has two senses: the alcoholic beverage and the amount of a standard container of that beverage.

3a. Patients who drank beer recovered more slowly than patients who drank wine.

3b. 56 patients reported drinking more than five beers a day.

The first sense illustrated in 3a. is a mass (uncount) noun. The second sense illustrated in 3b. is a regular (count) noun. In cases like this the appropriate codes for both senses are included in the entry.
Two codes will also appear in cases where the lexical item is both count and uncount without a sense distinction. *Abdominal delivery* denotes the same procedure whether it appears as an uncount noun as in 5a. or a count noun as in 5b.

5a. Abdominal delivery is the procedure of choice in this situation.
5b. Abdominal deliveries are more common these days.

So the lexical record for *abdominal delivery* includes both codes.

6. {base=abdominal delivery
   entry=E0006453
   cat=noun
   variants=uncount
   variants=reg
   }

Other syntactic codes such as complement codes for verbs, adjectives and nouns are similarly grouped without regard to sense.

1.2 The Development of the Lexicon

Words and terms are selected for lexical coding from a variety of sources. Approximately 20,000 words from the UMLS Test Collection of MEDLINE abstracts together with words which appear both in the UMLS Metathesaurus and *Dorland's Illustrated Medical Dictionary* form the core of the words entered. In addition, an effort has been made to include words from the general English vocabulary. The 10,000 most frequent words listed in The American Heritage Word Frequency Book and the list of 2,000 words used in definitions in Longman's Dictionary of Contemporary English have also been coded. Since the majority of the words selected for coding are nouns, an effort has been made to include verbs and adjectives by identifying verbs in current MEDLINE citation records, by using the *Computer Usable Oxford Advanced Learner's Dictionary*, and by identifying potential adjectives from *Dorland's Illustrated Medical Dictionary* using heuristics developed by McCray and Srinivasan (1990). A systematic model was developed to retrieve words and terms from MEDLINE in 2014. We plan to apply this model to consumer health related data and other resources to enrich the coverage of the Lexicon.

A variety of reference sources was used in coding lexical records. Coding was based on actual usage in the NLM Test Collection, dictionaries of general English, primarily learner’s dictionaries which record the kind of syntactic information needed for NLP, and medical dictionaries. *Longman’s Dictionary of Contemporary English, Dorland’s Illustrated Medical Dictionary, Collins COBUILD Dictionary, The Oxford Advanced Learner’s Dictionary, and Webster’s Medical Desk Dictionary* were make available to the coders. The early development of the lexicon coding scheme relied heavily on the coding scheme used in the first edition of the *Longman Dictionary of Contemporary English*, with only minor deviation from that scheme. But changes in the current lexicon scheme such as the addition of *modification_type* codes for
adverbs and position codes for adjectives have moved the SPECIALIST lexicon coding system farther away from Longman’s and have required increased use of other lexicographic sources such as Collins COBUILD Dictionary.

The SPECIALIST LEXICON (unit lexical record formatted file) along with relational files have been released annually as one of the UMLS Knowledge Sources since 1994. Number words, including cardinal, ordinal and fractions, were added to the Lexicon release in 2003. XML format of unit lexical records, XML schemas and JAXB (Java Architecture XML Binding) APIs were available in the LexCheck package released in 2005. The Lexicon migrated to Unicode and has been released in UTF-8 format since 2006. Derivations with negation information (DM.DB) and synonyms (SM.DB) are generated to synchronize with the Lexicon annual release since 2013 and 2017, respectively.

1.3 Verbs

The basic sentence patterns of a language are determined by the number and nature of the complements taken by verbs, since the complementation of the main verb largely determines the structural skeleton of a sentence. SPECIALIST recognizes five broad complementation patterns: intransitive, transitive, ditransitive, linking and complex-transitive. These complementation classes are manifested in the lexicon as slots filled by codes further specifying the verbs' complementation pattern. Table 1 indicates the slot name associated with each complementation class and the page on which that class and its elaborations are discussed.

<table>
<thead>
<tr>
<th>Complementation Class</th>
<th>Slot Name</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>intransitive</td>
<td>tran</td>
<td>page 33</td>
</tr>
<tr>
<td>transitive</td>
<td>tran=</td>
<td>page 34</td>
</tr>
<tr>
<td>ditransitive</td>
<td>ditran=</td>
<td>page 35</td>
</tr>
<tr>
<td>linking</td>
<td>link=</td>
<td>page 36</td>
</tr>
<tr>
<td>complex-transitive</td>
<td>cplxtran=</td>
<td>page 37</td>
</tr>
</tbody>
</table>

Table 1. Verb Complementation patterns in SPECIALIST

Intransitive verbs are those which can appear with no complements at all. The verb eat has no complements in example 7.

7. He ate.

Transitive verbs take a single object complement. This complement may be a noun (direct object), a prepositional phrase, a finite complement, etc. Eat and find are transitive in 8a. and 8b. respectively. Ditransitive verbs have more than one object complement. Give and lower are ditransitive in 9a. and 9b. respectively. The verb-phrase complement of linking verbs is one that reidentifies the subject of the verb. Become is linking in 10. In complex-transitive verbs there are two verb-phrase complements, which may be in a predication relationship, shown in 11a. and 11b., or an identity relationship, found in 11c.
8a. He ate the cake.
8b. He found that I had eaten.
9a. John gave Mary the book.
9b. John lowered the price to $5.00
10. John became king.
11a. We painted the house purple.
11b. I wanted him to leave.
11c. They elected him president.

Verbs can, and often do, fall into more than one complementation class. For example, consider the verb *treat*.

12. {base=treat
   entry=E0061964
   cat=verb
   variants=reg
   intran
   tran=np
   tran=pphr(with,np)
   tran=pphr(of,np)
   ditran=np,pphr(to,np)
   ditran=np,pphr(with,np)
   ditran=np,pphr(for,np)
   cplxtran=np,advbl
   nominalization=treatment|noun|E0061968
}

See Section 5.1 on page 34 for details of verb complement coding.

Verb entries also encode each of the inflected forms, (principal parts of the verb) in a *variants* slot. Verbs are inflectionally classified as regular, Greco-Latin regular or irregular. See “Verb Inflection” on page 11, for more detail.

### 1.4 Nouns

As described above, noun entries describe the inflection of the nouns (pluralization) in a *variants* slot, and spelling variation in a *spelling_variant* slot. The *compl* slot indicates complementation for nouns. A *nominalization* slot indicates that the noun is the nominalization of a verb or adjective. Nouns also have a *trademark* slot to list tradenames, as well as a *trademark* code (with no argument) to indicate that a term is a trademark without an identifiable name.

### 1.5 Adjectives

In addition to inflection (*variants*) codes and complement codes, adjectives in SPECIALIST have
position codes, in a position= slot, to indicate the syntactic positions in which they occur. Adjectives that occur pre-nominally in noun phrases are marked attrib(), in the position= slot. The numerical argument of the attrib() slot indicates where in the normal sequence of noun premodifiers this adjective occurs. Qualitative adjectives (attrib(1)) normally precede color (attrib(2)) and classifying (attrib(3)) adjectives. 13a. is more natural than either 13b. or 13c.

13a. a big red wooden box.
13b. a red big wooden box.

Adjectives that can occur in predicate adjective constructions have the code pred in their position= slot, and adjectives which can occur post nominally have the code post. See “Adjective Positions” on page 61.

1.6 Adverbs
Adverbs in SPECIALIST are coded to indicate their modification properties in a modification_type= slot. SPECIALIST recognizes sentence, verb-phrase and intensifier type adverbs, as well as classifying verb-phrase and sentence adverbs into manner, temporal and locative types. Adverbial particles like up in 14. are also listed as adverbs in SPECIALIST, with a modification_type indicating that it is a particle.

14. I called them up.

2. Spelling Variation
While spelling is highly standardized in Modern English, spelling variation remains fairly common. Some spelling variation is due to dialect differences, such as the well-known differences between British and American spelling conventions, especially in technical vocabulary. Table 2 describes some American and British English spelling differences.

<table>
<thead>
<tr>
<th>American Spelling</th>
<th>British Spelling</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>e</td>
<td>ae</td>
<td>hemo/haemo</td>
</tr>
<tr>
<td>e</td>
<td>oe</td>
<td>fetus/foetus</td>
</tr>
<tr>
<td>er</td>
<td>re</td>
<td>center/centre</td>
</tr>
<tr>
<td>ection</td>
<td>exion</td>
<td>inflection/inflexion</td>
</tr>
<tr>
<td>z</td>
<td>s</td>
<td>analyze/analyse</td>
</tr>
</tbody>
</table>

Table 2. American and British Spelling Differences

Many words show spelling variation in American English. For example, artifact has the spelling variant artefact listed in several modern American dictionaries (See Emery (1973)). Spelling variants when known are collected as the fillers of the spelling_variant= slots in lexical records.
3. Syntactic Category (Part Of Speech)

Each entry includes a cat= slot, showing the syntactic category of the entry. Table 3 shows the allowable fillers of the cat= slot, the syntactic categories they represent and some examples of each category.

<table>
<thead>
<tr>
<th>Code</th>
<th>Category</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>cat=verb</td>
<td>Verbs</td>
<td>see, run, anaesthetize</td>
</tr>
<tr>
<td>cat=aux</td>
<td>Auxiliary Verbs</td>
<td>do, have, be</td>
</tr>
<tr>
<td>cat=modal</td>
<td>Modal Auxiliaries</td>
<td>may, can, shall, could</td>
</tr>
<tr>
<td>cat=noun</td>
<td>Nouns</td>
<td>boy, milk, surgery</td>
</tr>
<tr>
<td>cat=pron</td>
<td>Pronouns</td>
<td>he, she, it, they</td>
</tr>
<tr>
<td>cat=adj</td>
<td>Adjectives</td>
<td>red, optical</td>
</tr>
<tr>
<td>cat=adv</td>
<td>Adverbs</td>
<td>quickly, fast, probably, up</td>
</tr>
<tr>
<td>cat=prep</td>
<td>Prepositions</td>
<td>in, of, on, in regard to</td>
</tr>
<tr>
<td>cat=conj</td>
<td>Conjunctions</td>
<td>and, or, but</td>
</tr>
<tr>
<td>cat=compl</td>
<td>Complementizers</td>
<td>that</td>
</tr>
<tr>
<td>cat=det</td>
<td>Determiners</td>
<td>this, that, these, those</td>
</tr>
</tbody>
</table>

Table 3. SPECIALIST Syntactic Categories

4. Variants: Agreement and Inflection

The variants= slot records inflectional and agreement information. Each entry has at least one variants= slot indicating inflectional morphology and/or agreement facts about the entry.

4.1 Verb Inflection

The variants= slot records the verb’s inflectional pattern. English main verbs have five forms (principal parts): the base form (infinitive), third person singular form, past tense form, present participle form and past participle form. When a verb adheres to the regular English inflection pattern, it is marked reg or regd. The code reg indicates regular inflection as defined in “Regular Verb Inflection” on page 12; regd indicates that the final consonant is doubled. (See “Regular Doubling Inflection” on page 13.) If the verb is irregular it receives the code irreg| | | | | |. The actual inflections are recorded in the irreg code, See Section 4.1.3 on page 14.

SPECIALIST inflection codes refer to the spellings of lexical items, not to their phonology. A lexical item which is phonologically regular may be orthographically irregular. Although it is extremely rare for an English verb to have a phonologically irregular present participle form, there are verbs whose present participle is orthographically irregular. For instance, the present participle of glue can be spelled regularly (gluing) or irregularly (glueing) with the same regular phonology.
4.1.1 Regular Verb Inflection

The filler `reg` is added to the `variants` slot of regular verbs. Verbs are considered regular if they meet the following description:

1. The third person present tense singular suffix is *s*.
   - *y* becomes *ie* following a consonant before the suffix *s*.
   - *e* is inserted between a base ending in *z*, *x*, *ch*, or *sh* and the suffix *s*.

2. The past tense and the past participle suffix is *ed*.
   - *y* becomes *ie* following a consonant before the suffix *ed*.
   - Final *e* is deleted before the suffix *ed*.

3. The present participle suffix is *ing*.
   - *ie* becomes *y* before the suffix *ing*.
   - Final *e* is deleted before the suffix *ing*, unless preceded by *e*, *y*, or *o*.

The alternation of *y* with *ie* and the dropping of the silent *e* interact in forming the past tense/past participle of regular verbs. The `{y ~ ie}` alternation precedes *e*-dropping. For example, in the past tense/past participle of the verb *fry*, *y* becomes *ie* and the final *e* is dropped to produce *fried*, rather than *frieed*. (The asterisk preceding *frieed* indicates an ungrammatical or ill-formed utterance.) And *ie* becomes *y* before the final *e* is deleted in the present participle of *tie*, producing *tying* rather than *tiing*. Notice, too, that the final *e*-dropping rule applies differently to the past tense/past participle and the present participle. The final *e* of *hoe*, for example, is dropped before *ed* and retained before *ing*, i.e. *hoeing* and *hoed*. Table 4 illustrates the regular pattern of verb inflection.

<table>
<thead>
<tr>
<th>Base</th>
<th>3rd Singul</th>
<th>Past / Past</th>
<th>Present</th>
<th>Example paradigms:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ends with:</td>
<td>Ends with:</td>
<td>Participle</td>
<td>Participle</td>
<td></td>
</tr>
<tr>
<td>-s</td>
<td>-ses</td>
<td>-sed</td>
<td>-sing</td>
<td>dismiss: dismisses, dismissed, dismissing</td>
</tr>
<tr>
<td>-z</td>
<td>-zes</td>
<td>-zed</td>
<td>-zing</td>
<td>waltz: waltzes, Waltzed, Waltzing</td>
</tr>
<tr>
<td>-x</td>
<td>-xes</td>
<td>-xed</td>
<td>-xing</td>
<td>index: indexes, indexed, indexing</td>
</tr>
<tr>
<td>-ch</td>
<td>-ches</td>
<td>-ched</td>
<td>-ching</td>
<td>detach: detaches, detached, detaching</td>
</tr>
<tr>
<td>-sh</td>
<td>-shes</td>
<td>-shed</td>
<td>-shing</td>
<td>distinguish: distinguishes, distinguished, distinguishing</td>
</tr>
<tr>
<td>-ie</td>
<td>-ies</td>
<td>-ied</td>
<td>-ying</td>
<td>tie: ties, tied, tying</td>
</tr>
<tr>
<td>-ee</td>
<td>-ees</td>
<td>-eed</td>
<td>-eening</td>
<td>agree: agrees, agreed, agreeing</td>
</tr>
<tr>
<td>-oe</td>
<td>-oes</td>
<td>-oed</td>
<td>-oeing</td>
<td>canoe: canoes, canoed, canoeing</td>
</tr>
<tr>
<td>-ye</td>
<td>-yes</td>
<td>-yed</td>
<td>-yeing</td>
<td>dye: dyes, dyed, dyeing</td>
</tr>
<tr>
<td>-Cy*</td>
<td>-Cies</td>
<td>-Cied</td>
<td>-Cying</td>
<td>dry: dries, dried, drying</td>
</tr>
</tbody>
</table>

Table 4. Regular Verb Inflection
The SPECIALIST Lexicon

<table>
<thead>
<tr>
<th>Base Ends with:</th>
<th>3rd Singular Ends with:</th>
<th>Past / Past Participle ends with:</th>
<th>Present Participle ends with:</th>
<th>Example paradigms:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-De^)</td>
<td>(-Des)</td>
<td>(-Ded)</td>
<td>(-Ding)</td>
<td>love: loves, loved, loving</td>
</tr>
<tr>
<td>(-X^c)</td>
<td>(-Xs)</td>
<td>(-Xed)</td>
<td>(-Xing)</td>
<td>talk: talks, talked, talking</td>
</tr>
</tbody>
</table>

Table 4. Regular Verb Inflection

a. \(C\) denotes any consonant or consonant cluster.
b. \(D\) denotes any letter other than \(i\), \(y\), \(e\), or \(o\).
c. \(X\) denotes any final letter not otherwise covered in the table.

4.1.2 Regular Doubling Inflection

The filler \(\text{regd}\) is added to the \text{variants=} slot of verbs displaying regular doubling inflection. Cummings (1988) gives the following rule for orthographic consonant doubling in English:

The final consonant letter of a stem is twinned only when all of the following conditions are met:

1. The stem must be free.
2. The stem must end in \(VC^\#\) -- that is, with a single vowel letter that is followed by a single consonant letter that spells a single consonant sound.
3. The \(VC^\#\) string in the stem must bear primary or secondary stress both before and after the suffix is added.
4. The suffix being added starts with a vowel.
5. The suffix must not be one of the shortening suffixes, such as \(-ic\) or \(-ity\).

These rules, especially rule three and the “spells a single consonant” clause of rule 2, refer to the phonology of the verb. Since the SPECIALIST system has no access to phonology, a purely orthographic approximation of these rules is used in the SPECIALIST lexicon coding scheme.

Verbs ending in an orthographic CVC pattern, whose final consonant is doubled before the past tense and participle suffix \(-ed\) and the present participle suffix \(-ing\) but are otherwise regular are given the code \(\text{regd}\), e.g. \(bat\): \(bats\), \(batted\), \(batting\).

The requirement that the verb end in a closed syllable with a single (orthographic) vowel means that verbs like \(acquit\), \(dial\), \(duel\), \(equip\), \(fuel\), and \(quit\) are considered irregular.

Since consonant doubling generally occurs following a stressed vowel, many of these verbs are one syllable. But multi-syllable verbs with final consonant doubling do exist, e.g. \(commit\), \(control\), \(overlap\), \(transfer\) and \(debug\), even when the vowel of the final syllable is unstressed.
as in level and bootleg; level: levels, levelled, levelling, and bootleg: bootlegs, bootlegged, bootlegging. These are all considered regular doubling.

We do not consider addition of k following a final c to be an instance of regular doubling, although some scholars identify those processes. So, verb entries for mimic and traffic are irregular: traffic: traffic, traffics, trafficked, trafficking, and mimic: mimic, mimics, mimicked, mimicking.

Regular doubling applies to only the past tenses, past participles, and present participles of verbs; we do not consider the regular doubling rule to apply in the rare cases where a final s or z doubles before the third person singular present tense suffix -es. The verb bias, for example, is both regular and irregular but not regular doubling. Its two paradigms are: bias: biases, biased, biasing and bias: bias, biasses, biassed, biasing which are regular and irregular respectively. The verb bus is both regular doubling and irregular because its third person singular present tense form can be either busses or busses; irregular: bus: bus, busses, bussed, bussing; regular doubling: bus: busses, bussed, bussing.

Consonant doubling is often subject to dialectal or simple spelling variation; travel can be either regular or regular doubling in American English but it is regular in British English. Verbs like those are marked both regular and regular doubling.

Some cases in which the base form shows dialectal or other spelling variation involving doubling do not count as instances of regular doubling. The verb program has a British English spelling variant programme. The result is that this verb has the following paradigm: programs/programmes; programmed/programmed; programming/programing. While programming might appear to be the result of regular doubling applied to program, it is identical to the regular present participle of programme so the lexical record is coded as regular.

4.1.3 Irregular Verb Inflection

The variants= slot of irregular verbs is filled with the code irreg| | | | | , with the irregular inflectional forms listed between the pipe “|” symbols in this order: base form, third person present tense, past tense, past participle followed by present participle. The filler of the variants= slot for the irregular verb break is: irreg|break|breaks|broke|broken|breaking|. Many of the verbs listed in the SPECIALIST lexicon as irregular are members of the class of English strong verbs; verbs with inflectional vowel changes and past participles which differ from their past tenses. e.g. eat: eats, ate, eaten, eating. Some verbs are nearly regular but fail to meet the rules given for regular or regular doubling above. e.g. singe: singeing which does not drop e before ing. And stymie does not undergo {ie ~ y}-alternation; stymie ~ stymieing. Such verbs are listed as irregular. Verbs ending in o which take es in the present tense, like veto, are considered irregular.

Verbs whose spelling variants differ in their inflectional paradigms are coded as irregular. The verb fulfil has the variant spelling fulfill. Since all variant codes, except irreg| | | | |, apply to all spelling variants of a lexical record, fulfil/fulfill must be listed with two irregular codes, despite the fact that the two paradigms are, individually, regular and regular doubling; fulfil: fulfil, fulfils, fulfilled, fulfilling and fulfill: fulfill, fulfills, fulfilled, fulfilling.
Verbs with defective paradigms are also coded as irregular. The verb *sight-see* has a base form, and a present participle, but the other principal parts do not exist, *sight-sees, *sight-saw, *sight-seen. Similarly *beware* occurs only in its base form. The missing parts of the paradigm of these verbs are indicated by leaving the position for them in the **irreg** code empty.

### 4.2 Variants of Modals and Auxiliaries

Modal and auxiliary verbs differ from main verbs in the richness of their inflectional paradigm. *Be* has more inflections than most verbs and the modals have fewer. Modals and auxiliaries also have cliticized and negative contracted forms. This variation is captured in the **variant** slot. The **variants** slot found in the entries for most verbs can be thought of as an abbreviation of several **variant** slots.

The fillers of the **variant** are the variants themselves with features attached following a semi-colon. The main part of a variant feature is a tense code, indicating the tense (past or present) of the variant. The tense codes take arguments indicating agreement restrictions on the variant; no argument means that agreement is unrestricted. The agreement features are the same ones used to describe pronoun agreement.

<table>
<thead>
<tr>
<th>Tense Code</th>
<th>List of Agreement Features</th>
<th>Negation Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>past</td>
<td>free</td>
<td>negative</td>
</tr>
<tr>
<td>pres</td>
<td>fst_plur</td>
<td></td>
</tr>
<tr>
<td></td>
<td>second</td>
<td></td>
</tr>
<tr>
<td></td>
<td>sec_sing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>sec_plur</td>
<td></td>
</tr>
<tr>
<td></td>
<td>third</td>
<td></td>
</tr>
<tr>
<td></td>
<td>thr_sing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>thr_plur</td>
<td></td>
</tr>
</tbody>
</table>

### 4.2.1 Tense in Modals and Auxiliaries

The modal verbs *can, may, shall* and *will* have past tense forms *could, might, shall, and would*. While these forms are not semantically identical to past tense in main verbs, they function syntactically as past tense in some cases. For example, 15a. could be a report that the subject of 15a. uttered 15b. as well as 15c. This back-shifting phenomenon in indirect quotations is most
naturally stated in terms of past tense, since the difference between hope and hoped in 16b. and 16c. is uncontroversially a matter of tense.

15a. He said he would go.
15b. I will go.
15c. I would go.
16a. He said he hoped to attend the meeting.
16b. I hope to attend the meeting.
16c. I hoped to attend the meeting.

Past and present tense modals are grouped together in the same entry with the past and present forms appearing in separate variant= slots. The features past and pres indicate the past and present form of the modal respectively. These codes also allow SPECIALIST to capture the special agreement behavior of the modal verbs. May agrees with any noun or pronoun subject regardless of person or number as variant=may;pres indicates. Similarly, might agrees with any noun or pronoun as variant=might;past indicates.

17. {base=may
   entry=E0039142
   cat=modal
   variant=might;past
   variant=mayn’t;pres:negative
   variant=mightn’t;past:negative
}

The single variant of must is considered to be present tense.

18. {base=must
   entry=E0041474
   cat=modal
   variant=mustn’t;pres:negative
}

4.2.2 The Paradigm of be

The auxiliary verb be has a richer inflectional paradigm than other verbs. Unlike have and do, these forms could not be fitted into an irreg| | | | | | filler of a variants= slot. Be has no form equivalent to the past tense of a main verb. Ate, for example, agrees with any subject without regard to person or number, but was agrees only with first and third person singular subjects and were agrees with second and third person plural subjects as well as first person plural subjects.

19a. *We/they was going home.
19b. We/they ate at three o’clock.
19c. We/they were going home
19d. *I/he were going home.

Each of the inflectional forms of be (am, is, was, are, were, been, being) is given in a variant= slot with the appropriate agreement features. Cliticized and negative forms are also given. See the discussion in 4.2.4 and 4.2.5 below.

20. {base=be
   entry=E0012152
4.2.3 The Paradigms of do and have

The inflectional variants of the auxiliary verbs *do* and *have* are listed in `variant=` slots. The main verbs *do* and *have* are treated as ordinary irregular verbs.

21. {base=do
   entry=E0023651
   cat=aux
   variant=do;pres(fst_sing,fst_plur,second,thr_plur)
   variant=don’t;pres(fst_sing,fst_plur,second,thr_plur):negative
   variant=does;pres(thr_sing)
   variant=doesn’t;pres(thr_sing):negative
   variant=did;past
   variant=didn’t;past:negative
   }

22. {base=have
   entry=E003089
   cat=aux
   variant=have;infinitive
   variant=have;pres(fst_sing,fst_plur,second,thr_plur)
   variant=has;pres(third)
   variant=had;past
   variant=having;pres_part
   variant=hadn’t;past:negative
   variant=hasn’t;pres:negative
   variant=haven’t;pres(fst_sing,fst_plur,second,thr_plur):negative
   variant=’ve;pres(fst_sing,fst_plur,second,thr_plur)
   variant=’d;past
   }

4.2.4 Clitic Forms
In written English tensed auxiliary and modal verbs can be contracted onto the subject noun phrase.

23a. He’s going to the picnic.
23b. He’ll be leaving soon.
23c. He’d like to take us along.

These cliticized forms are recorded in the **variant** slot of auxiliary and modal verbs. For example, in the modal entry for *will* in example 24., the clitic forms ‘ll and ‘d are recorded in **variant** slots, with the same agreement features as *will* and *would* respectively.

24. {base=will
   entry=E0065450
   cat=modal
   variant=would;past
   variant=won’t;pres:negative
   variant=wouldn’t;past:negative
   variant=’ll;pres
   variant=’d;past
   }

4.2.5 Negative Contracted Forms

In written English *not* may be contracted onto the tensed auxiliary (including modal auxiliaries).

25a. He isn’t coming to the picnic.
25b. He won’t go with us.
25c. He didn’t even try.

These contracted forms might be thought of as involving a variant form of the adverb *not*. But, since the form of the contraction depends on the auxiliary, it is best to regard these as negative variants of the auxiliaries. *Can* has both *can’t* and *cannot*, while *will* has *won’t*, not *willn’t*. In SPECIALIST these contracted forms are recorded in **variant** slots. Since inflected forms of the auxiliary are contracted, there may be several **variant** slots containing negative contractions in an entry; *can*, for example, has **variant=can’t**, **variant=cannot**, and **variant=couldn’t** as its lexical entry shows.

26. {base=can
   entry=E0014877
   cat=modal
   variant=could;past
   variant=couldn’t;past:negative
   variant=cannot;pres:negative
   variant=can’t;pres:negative
   }

The feature **negative** in the negative contracted forms represents strict negation, as it does in the entries for strictly negative adverbs. See “True Negative Adverbs” on page 71.
4.3 Adjective Inflection (Comparison)

4.3.1 Regular Variants
Regular adjectives form their comparative and superlative according to the following rules:

The comparative suffix is *er*.

Following a consonant, *y* becomes *ie* before the *er* suffix.
Final *e* is deleted before the *er* suffix.

The superlative suffix is *est*.

Following a consonant before the *est* suffix, *y* becomes *ie*.
Final *e* is deleted before the *est* suffix.

As with verbs {y ~ e} alternation precedes final e-drop, so in words like *dizzy*, *y* becomes *ie* and the final *e* is subsequently dropped; it’s *dizzier* not *dizzieer*.

These rules give the pattern shown in Table 6.

<table>
<thead>
<tr>
<th>Base ends with:</th>
<th>Comparative ends with:</th>
<th>Superlative ends with:</th>
<th>Example Paradigms</th>
</tr>
</thead>
<tbody>
<tr>
<td>-C\textsuperscript{a} \textit{y}</td>
<td>-Cier</td>
<td>-iest</td>
<td>brainy: brainier, brainiest</td>
</tr>
<tr>
<td>-V\textsuperscript{n} \textit{y}</td>
<td>-Vyier</td>
<td>-Vyest</td>
<td>gray: grayer, grayest</td>
</tr>
<tr>
<td>-Ce</td>
<td>-Cer</td>
<td>-Cest</td>
<td>fine: finer, finest</td>
</tr>
<tr>
<td>-Ve</td>
<td>-Ver</td>
<td>-Vest</td>
<td>blue: bluer, bluest</td>
</tr>
<tr>
<td>-Xe</td>
<td>-Xer</td>
<td>-Xest</td>
<td>clear: clearer, clearest</td>
</tr>
</tbody>
</table>

Table 6. Adjective Inflection

a. C stands for any Consonant letter.
b. V stands for any Vowel letter.
c. X stands for any letter other than *y* or *e*.

Regular Adjectives have the code *reg* in their variants= slot.

4.3.2 Regular Doubling
Regular doubling adjectives follow the regular pattern except that they double the final consonant before the suffixes *er* and *est*, e.g. *fat*, *fatter*, *fattest*.

Regular doubling adjectives have the code *regd* in their variants= slot.

4.3.3 Irregular Adjectives
Any adjective which inflects in a way which does not conform to the rules for regular or regular doubling adjectives is considered irregular. The superlative and comparative of irregular forms are listed inside the code *irreg| | |*; the base form first, followed by the comparative and the superlative. Irregular adjectives include superlative cases like: *good*: *better*, *best* as well as cases which deviate more subtly from the rules for regular and regular doubling adjectives. E.g. *shy*, *spry* and *sly* violate {y ~ ie} alternation: *shy: shyer, shyest*. In *gooey* and *pricey*, *ey* alternates with *ie*: *gooey*: *gooner, gooiest*. *Old* has two paradigms, one regular and one irregular: *old*: *older, oldest*, and *old*: *elder, eldest*. *Far* has two irregular paradigms: *far: farther, farthest* and *far: further, furthest*. 
4.3.4 Invariant Adjectives

Invariant adjectives have no morphological comparative or superlative form. This includes non-gradable adjectives like *medical* or *daily* as well as periphrastic adjectives which compare with *more* or *most*. inv in the variants= slot of an adjective indicates that the adjective is invariant. Note that inv for adjectives and adverbs has a meaning quite different from inv for nouns. See “Invariant Nouns” on page 22.

27. 
{base=acoustic
  entry=E0006949
  cat=adj
  variants=inv
  position=attrib(3)
  position=pred
  stative
}

4.3.5 Periphrastic Adjectives

Periphrastic adjectives form their comparative and superlative with *more* and *most*. Since in standard English adjectives in periphrastic constructions do not inflect morphologically (*more beautifuller*), periphrastic adjectives are necessarily invariant. The code for periphrastic adjectives is periph. When an invariant adjective (inv) is periphrastic, it receives one variants= slot of the form variants=inv; periph.

4.4 Adverb Inflection (Comparison)

The variants of adverbs are similar to those of adjectives.

4.4.1 Regular Adverbs

Adverbs that form their comparative and superlative according to the regular pattern of English adverb inflection are considered regular, and their variants= slot contains the code reg.

Regular adverbs form their comparative and superlative according to the following rules:

The comparative suffix is *er*.

Following a consonant, *y* becomes *ie* before the *er* suffix.

Final *e* is deleted before the *er* suffix.

The superlative suffix is *est*.

Following a consonant before the *est* suffix, *y* becomes *ie*.

Final *e* is deleted before the *est* suffix.

\{y ~ ie\} alternation precedes final e-drop.

These rules are the same as the rules for regular adjective inflection: *early* (positive), *earlier* (comparative), *earliest* (superlative).

28. 
{base=early
4.4.2 Irregular Adverbs

When an adverb has an irregular comparative and/or superlative form, an \texttt{irreg} filler is used in the \texttt{variants=} slot. The \texttt{irreg} has three argument positions, the first for the base form, second for the comparative and the third for the superlative form. \textit{Well} is an irregular adverb: \textit{well} (positive), \textit{better} (comparative), \textit{best} (superlative).

29. \{base=well

4.4.3 Invariant Adverbs

Adverbs that have no comparative or superlative form have \texttt{inv} in their \texttt{variants=} slots. The code \texttt{inv} has a different meaning in adjective and adverb entries than it does in noun entries. See “Invariant Nouns” on page 22.

30. \{base=always

4.4.4 Periphrastic Adverbs

Adverbs which form the comparative and superlative with \textit{more} and \textit{most} have the code \texttt{periph} following a semi-colon after the \texttt{variants=} code. \textit{Often} is a periphrastic adverb: \textit{often} (positive), \textit{more often} (comparative), \textit{most often} (superlative).

31. \{base=often

4.5 Noun Inflection
4.5.1 Countability

A major distinction is made in the SPECIALIST lexicon between count and uncount nouns, corresponding to the traditional categories of countable, abstract and mass nouns. Both abstract and mass nouns are considered uncount. Generally, nouns are considered count if they have distinct singular and plural forms which agree with singular and plural verbs respectively. Some nouns are invariant in form, but may be count (e.g., sheep, shown in 33a-d.). Count nouns can be determined by numbers, a/an, many, etc., and they cannot occur in the singular with a zero determiner, whereas uncount nouns are the opposite (as in 34.)

32a. A book is on the desk.
32b. Two books/many books are on the desk.
32c. *Book is on the desk. Books are on the desk.
33a. A sheep is in the field.
33b. Two/sheep are in the field.
33c. Sheep is in the field.
33d. Sheep are in the field.
34a. * A sand is on the beach.
34b. * Two /many sands are on the beach.
34c. Sand is on the beach.
34d. *Sand are on the beach.

Uncount nouns are represented by the fillers uncount and groupuncount in the variants= slot; count nouns are indicated by reg, glreg, metareg, irreg, sing, plur, inv, and group(). Each of those codes is discussed below.

4.5.2 Regular Nouns

When a noun follows the regular pattern of English plural formation, the variants= slot contains the filler reg.

Nouns are considered regular if they conform to the following rules:

1. The plural suffix is s.
2. y becomes ie following a consonant before the s.
3. e is inserted before the plural suffix s if the base ends in s, z, x, ch, or sh.

The results of these rules can be summarized in Table 7.

<table>
<thead>
<tr>
<th>Base ends with:</th>
<th>Plural ends with:</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Cy a</td>
<td>-Cies</td>
<td>fly: flies</td>
</tr>
<tr>
<td>-s</td>
<td>-ses</td>
<td>illness: illnesses</td>
</tr>
<tr>
<td>-z</td>
<td>-zes</td>
<td>waltz: waltzes</td>
</tr>
<tr>
<td>-x</td>
<td>-xes</td>
<td>box: boxes</td>
</tr>
<tr>
<td>-ch</td>
<td>-ches</td>
<td>match: matches</td>
</tr>
<tr>
<td>-sh</td>
<td>-shes</td>
<td>splash: splashes</td>
</tr>
</tbody>
</table>
Table 7. Regular Noun Inflection

- **a.** C stands for any consonant letter.
- **b.** X stands for any termination other than y, s, z, x, ch or sh.

No other nouns are considered regular in this system.

Since these are orthographic rules which incompletely reflect phonological rules, some words which might be considered regular in English are irregular in this system. The word *stomachs*, for example, is considered an irregular plural in this system, since rule 3. does not distinguish “hard” from “soft” ch’s.

The rules above consider only the end of a term, whether or not the term consists of several words. So left headed multi-word terms like *body politic*, *court martial* and *notary public* which form their plural according to regular English rules applied to the first word of the term (*bodies politic*, *courts martial* and *notaries public*), are considered irregular. Similarly, *passersby*, *tablespoonsful*, and *filets mignons* are irregular.

Although many English words ending in o take es in the plural, the rules above categorize them as irregular, e.g. *buffaloes*, *potatoes*, *vetoes*, and *volcanoes*. Similarly, words ending in uy often participate in {y ~ ie} alternation, but since rule 2 requires a preceding consonant these words will be considered irregular (e.g. *colloquies*, *soliloquies*, *obsequies*).

Those few nouns which double the final consonant before the plural affix, (*busses*, *quizzes*, *fezzes*), are considered irregular; there is no regd code for nouns.

4.5.3 Greco-Latin regular plurals

Words of Classical origin, which are common in the biomedical domain, often retain their Latin or Greek inflectional pattern in English. SPECIALIST therefore encodes these words with the glreg filler of the variants= slot to indicate Greco-Latin inflection.

Nouns are considered Greco-Latin regular if they follow one of the paradigms illustrated in Table 8.

<table>
<thead>
<tr>
<th>singular ends with:</th>
<th>plural ends with:</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>-us</td>
<td>-i</td>
<td>focus/foci</td>
</tr>
<tr>
<td>-ma</td>
<td>-mata</td>
<td>trauma/traumata</td>
</tr>
<tr>
<td>-a</td>
<td>-ae</td>
<td>larva/larvae</td>
</tr>
<tr>
<td>-um</td>
<td>-a</td>
<td>ilium/ilia</td>
</tr>
<tr>
<td>-on</td>
<td>-a</td>
<td>taxon/taxa</td>
</tr>
<tr>
<td>-sis</td>
<td>-ses</td>
<td>analysis/analyses</td>
</tr>
<tr>
<td>-is</td>
<td>-ides</td>
<td>cystis/cystides</td>
</tr>
<tr>
<td>-men</td>
<td>-mina</td>
<td>foramen/foramina</td>
</tr>
<tr>
<td>-ex</td>
<td>-ices</td>
<td>index/indices</td>
</tr>
<tr>
<td>-x</td>
<td>-ces</td>
<td>matrix/matrices</td>
</tr>
</tbody>
</table>
Table 8. Greco-Latin Plural Nouns

These rules cover only a few common Greco-Latin patterns of noun inflection. Words like *corpus* (pl. *corpora*) are not considered Greco-Latin regular in our system. As with the regular inflection rule these rules apply only to the end of a term. Multi-word terms consisting of a Latin noun followed by a Latin adjective are not Greco-Latin plural even if both the noun and adjective inflect according to the Greco-Latin paradigm given in Table 8. For example, the plural of *Lactobacillus fermentum* is *Lactobacilli fermenta*.

In cases of apparent conflict between rules, *ma* ~ *mata* vs. *a* ~ *ae*, *sis* ~ *ses* vs. *is* ~ *ides* and *ex* ~ *ices* vs. *x* ~ *ces*, the one with the longer singular ending is used. That is, the plural of any word marked *g*reg ending in *ma* ends in *mata* not *mae* and the plural of a *gl*reg word ending in *sis* ends in *ses* not *sides*. The rare cases in which a word ending in *ma* does have a plural ending in *mae*, are treated as irregular. For example, *lacrima*, *mamma* and *squama* are irregular, not Greco-Latin regular in our system. Their plurals are *lacrimae*, *mammae* and *squamae*. Similarly, *axis* (plural *axes*) is irregular.

4.5.4 Meta-linguistic regular nouns

The plural of acronyms, in which the constituent letters of the orthography are pronounced as their letter name, numbers and other orthographically meta-linguistic nouns may form their plural with an apostrophe *s*. There is considerable individual variation in this, so the plural of *Ph.D.* may be written *Ph.D.*'s or *Ph.D.*s. Similarly the plural of *5* could be *5*’s or *5*s. The variants= slot filler *metareg* is used in SPECIALIST to capture this variation. Nouns (most often acronyms) coded as *metareg* can have a plural with simple *s* or with ’*s*.

4.5.5 Irregular Nouns

The plural form for irregular nouns is explicitly listed in an *irreg||filler of the variants= slot. The irregular plural form is given as the second argument of the *irreg||code, as illustrated in the lexical item for *calf* below.

34. `{base=calf
entry=E0014750
  cat=noun
  variants=irreg|calf|calves|
variants=uncount
  compl=pphr(of,np|leg|)
}

4.5.6 Fixed Singular Nouns

Some English nouns behave like count nouns but lack a plural form. These fixed singular forms are indicated by the filler *sing* in the variants= slot.

Nouns are considered fixed singular if they meet the following criteria:

1) They lack a plural form.
2) They agree with a singular verb.
3) They may be determined by a/an but do not appear with numerical determiners.
4) They do not appear with zero determiner.
These traits are illustrated by the fixed singular noun *lope*, ‘an easy swinging gate’.

35a. He jogged through the room at a lope.
35b. *They jogged through the room at two lopes.
35c. *Lope is a poor way to get home.

### 4.5.7 Fixed Plural Nouns

Fixed plural nouns, like fixed singular nouns, are basically count nouns. Fixed plurals are count nouns that lack a singular form. They are indicated in the variants= slot by the filler **plur**.

Nouns are considered fixed plural if they:

1) Agree only with plural verbs, and
2) have no distinct singular form.

The following examples illustrate those properties.

36a. The cattle are grazing.
36b. *A cattle is grazing.
36c. We saw those cattle.
36d. *We saw this cattle.
37a. We called the police.
37b. *We called a police.
38a. The surroundings were beautiful.
38b. *The surrounding was beautiful.
38c. These surroundings are beautiful.
38d. *This surrounding is beautiful.

Many fixed plurals seem to show regular plural morphology (e.g. *auspices, amends, entrails, guts, odds, remains, regards, particulars, premises*, etc.) but they are considered fixed plural rather than regular, since they lack a singular form.

40. 

    {base=surroundings
     entry=E0059344
     cat=noun
     variants=plur
    }

### 4.5.8 Invariant Nouns

Nouns are considered invariant if they have the same form in the singular and the plural (e.g. *sheep, means*), but remain countable. The variants= slot for these nouns is filled with the code **inv**. These nouns should not be confused with fixed singular, fixed plural, or uncount nouns which have only one form. Invariant nouns may be thought of as having both a singular and a plural form that happen to be the same.

41a. A sheep has been found.
41b. Five sheep have been found.
42a. The quickest means of travel is by plane.
42b. The means justify the ends.
43. There are five deer by the pond.
Words whose singular and plural are pronounced differently but spelled the same are coded invariant, e.g. *corps, Sioux, chamois*, etc.

Invariant nouns sometimes have homophonous (homographous) regular nouns, meaning “type of” the invariant noun.

45a. There are three fish in this bowl.
45b. There are four carnivorous fishes in this region.

Some terms denoting animals or fish are either invariant or regular depending on whether they are considered “game”.

46a. The hunters bagged three bear.
46b. We saw three bears in the woods.
46c. The fishermen caught six carp.
46d. We saw three carps in the pond.

In such cases there are two variants slots, one invariant and the other regular.

Invariant nouns are not limited to the common English vocabulary or to the sub-language of hunters. Table 9 lists some invariant nouns in the biomedical domain.

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>aditus</td>
<td>aditus</td>
</tr>
<tr>
<td>aquaeductus</td>
<td>aquaeductus</td>
</tr>
<tr>
<td>arcus</td>
<td>arcus</td>
</tr>
<tr>
<td>decubitus</td>
<td>decubitus</td>
</tr>
</tbody>
</table>

**Table 9.** Some invariant nouns as listed in Dorland’s Illustrated Medical Dictionary.

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>descensus</td>
<td>descensus</td>
</tr>
<tr>
<td>ductus</td>
<td>ductus</td>
</tr>
<tr>
<td>exitus</td>
<td>exitus</td>
</tr>
<tr>
<td>facies</td>
<td>facies</td>
</tr>
<tr>
<td>ictus</td>
<td>ictus</td>
</tr>
<tr>
<td>introitus</td>
<td>introitus</td>
</tr>
<tr>
<td>lacus</td>
<td>lacus</td>
</tr>
<tr>
<td>manus</td>
<td>manus</td>
</tr>
<tr>
<td>nexus</td>
<td>nexus</td>
</tr>
<tr>
<td>processus</td>
<td>processus</td>
</tr>
<tr>
<td>pulsus</td>
<td>pulsus</td>
</tr>
<tr>
<td>recessus</td>
<td>recessus</td>
</tr>
<tr>
<td>situs</td>
<td>situs</td>
</tr>
</tbody>
</table>
Table 9. Some invariant nouns as listed in Dorland’s Illustrated Medical Dictionary.

4.5.9 Group Nouns

Group nouns have a \texttt{group()} filler in their \texttt{variants=} slot. The argument of the \texttt{group()} code indicates the inflectional morphology of the noun, while \texttt{group()} refers to the agreement facts of the noun. The allowable arguments of the \texttt{group()} code are: \texttt{reg, irreg, sing, glreg}, and \texttt{metareg}.

The term \texttt{group} corresponds, generally, to the traditional term \textit{collective}. The singular form of group nouns is indeterminate as to number; it can agree with either a singular or plural verb. Collective nouns are much more common in British English than American English.

47a. The committee has met.
47b. The committee have met.
48a. My family are all Socialists.
48b. My family always votes Socialist.
49a. The majority of the class are freshmen.
49b. The majority of the class takes Spanish.

The meaning difference between these pairs of examples is said to be “point of view”. See Quirk et al. (1985, section 5.108), for further discussion and examples.

Some group nouns take a prepositional (of) phrase complement which indicates what the group denoted by the group noun consists of.

50a. A herd of cattle is/are munching grass in the meadow.
50b. The board of directors is/are angry over the attempted takeover.
50c. A bunch of flowers was/were lying on the floor.
50d. A tall stack of pancakes was/were his favorite breakfast.

Some group nouns are uncount, or fixed singular. They have no separate plural form, and the form they have is indeterminate between singular and plural. These nouns have the code \texttt{groupuncount} in their \texttt{variants=} slot.

51a. The new right are a bunch of dangerous hooligans.
51b. The new right is gaining votes in the south.

See “Group Uncount Nouns” below.

4.5.10 Uncount Nouns

Uncount nouns are indicated by the code \texttt{uncount} as filler for the \texttt{variants=} slot.

The term uncount corresponds to the traditional terms abstract and mass. These nouns have no separate plural form, and unlike group (count) or invariant nouns agree only in the singular. Only uncount nouns may appear in the singular with a zero determiner.

The examples below illustrate these properties for the nouns \textit{sincerity} and \textit{dirt}:

52a. Sincerity is hard to fake.
52b. *(Five) sincerities is/are hard to fake.
52c. Dirt is not good to eat.
52d. *(Five) dirts is/are not good to eat.

53. 

{base=dirt

  entry=E0023123
  cat=noun
  variants=uncount

}

Some uncount nouns have homophones (homographous) count nouns which mean “kinds, units, instances,” etc. of the uncount noun.

54a. He drank a lot of beer. (uncount)
54b. He drank five beers. (count (= bottles of beer))

55a. Arthritis is a painful disease. (uncount)
      There are several different arthritides. (count (= types of arthritis))

56a. Truth is the core of social morality.
56b. We hold these truths to be self evident.

Lexical entries for nouns like this have uncount and reg, irreg or glreg in their variants= slot.

4.5.11 Group Uncount Nouns

Uncount nouns, and fixed singular nouns which are group, are given the code groupuncount in their variants= slot. These nouns have no distinct plural form, but the singular agrees as both singular and plural. They differ from invariant nouns in that they cannot be determined by a, an or a number.

Group uncount includes unique uncount terms like United States, Kremlin and parliament, generic terms like intelligentsia, laity and faculty, as well as collective terms like mankind which simply lack a plural.

57a. The parliament is/are meeting today.
57b. Mankind is/are the main environmental problem.
57c. The intelligentsia is/are skeptical of the new order.

We consider words ending in ics which are indeterminate with respect to agreement to be group uncount (e.g. heuristics, optics, politics and statistics but not linguistics or physics.)

58a. His politics is/are of no interest to me.
58b. Linguistics is not an exact science.
58c. *Linguistics are not an exact science.

4.6 Agreement for Pronouns

In English, pronouns show agreement (concord) in terms of both number and person.

The variants= slot for pronouns records the person and number features needed for agreement. Three persons (First, Second, and Third) and two numbers (Singular and Plural) are combined in the six fillers for the variants= slot for pronouns.
Since there is so much syncretism of the singular and plural forms of second and third person pronouns, the codes second and third have been added to denote those pronouns which have syncretic singular and plural forms. The code free was also added to denote a pronoun which agrees with all person and number combinations. The result is summarized in Table 11.

<table>
<thead>
<tr>
<th>Slot</th>
<th>Fillers</th>
</tr>
</thead>
<tbody>
<tr>
<td>variants=free</td>
<td></td>
</tr>
<tr>
<td></td>
<td>fst_plur</td>
</tr>
<tr>
<td></td>
<td>fst_sing</td>
</tr>
<tr>
<td></td>
<td>sec_plur</td>
</tr>
<tr>
<td></td>
<td>sec_sing</td>
</tr>
<tr>
<td></td>
<td>second</td>
</tr>
<tr>
<td></td>
<td>third</td>
</tr>
<tr>
<td></td>
<td>thr_plur</td>
</tr>
<tr>
<td></td>
<td>thr_sing</td>
</tr>
</tbody>
</table>

**Table 11.** Fillers of the variants= slot for pronouns.

These same codes are used as features in the variant= slot of auxiliary and modal verbs. See “Variants of Modals and Auxiliaries” on page 11.

### 4.7 Agreement for Determiners

Determiners are distinct from adjectives because they exhibit agreement with nouns in English. The variants= slot for determiners (cat=det) gives the number characteristics of the nouns that they determine; for example, a can only determine a singular count noun.

59a. *I need a mud. (uncount)
59b. *I need a boxes. (plural)
59c. I need a box. (singular)

And, both can only determine a plural (count) noun.

60a. *Both mud are mine. (uncount)
60b. *Both box are mine. (singular)
60c. Both boxes are mine. (plural)
There are six fillers for the **variants** slot of determiners.

<table>
<thead>
<tr>
<th>Slot</th>
<th>Filler</th>
</tr>
</thead>
<tbody>
<tr>
<td>variants=</td>
<td>sing</td>
</tr>
<tr>
<td></td>
<td>plur</td>
</tr>
<tr>
<td></td>
<td>uncount</td>
</tr>
<tr>
<td></td>
<td>singuncount</td>
</tr>
<tr>
<td></td>
<td>pluruncount</td>
</tr>
<tr>
<td></td>
<td>free</td>
</tr>
</tbody>
</table>

**Table 12.** Fillers of the variants slot for determiners

The fillers of the **variants** slot for determiners are discussed in sections 4.7.1 through 4.7.6 below.

### 4.7.1 Determiners of Singular Nouns

Determiners with the code **sing** can only determine singular count nouns. The examples in 61a. through 61c. show that *each* meets this criterion.

61a. Each boy did well.
     (count singular)
61b. *Each dirt was on the floor.
     (uncount)
61c. *Each boys did well.
     (count plural)

62. `{base=each
    entry=E0024304
    cat=det
    variants=sing
    }`

### 4.7.2 Determiners of Plural Nouns

Determiners with the code **plur** can only determine plural count nouns. The examples in 63a. through 63c. show that *many* meets this criterion.

63a. *Many boy did well.
     (count singular)
63b. *Many dirt was on the floor.
     (uncount)
63c. Many boys did well.
     (count plural)

64. `{base=many
    entry=E0038864
    cat=det
    variants=plur
    }`
4.7.3 Determiners of Uncount Nouns

Determiners with the code `uncount` can only determine uncount (aka mass) nouns. The examples in 65a. through 65c. show that `much` meets this criterion.

65a. *Much boy did well.
    (count singular)
65b. Much dirt was on the floor.
    (uncount)
65c. *Much boys did well.
    (count plural)

66. {base=much
    entry=E0041165
    cat=det
    variants=uncount
}

4.7.4 Determiners of Singular and Uncount Nouns

Determiners with the code `singuncount` can only determine singular or uncount nouns. The examples in 67a. through 67c. show that the determiner `this` meets this criterion.

67a. This boy went home.
    (count singular)
67b. This dirt was on the floor.
    (uncount)
67c. *This boys went home.
    (count plural)

68. {base=his
    entry=E0060692
    cat=det
    variants=singuncount
demonstrative
}

4.7.5 Determiners of Plural and Uncount Nouns

Determiners with the code `pluruncount` can only determine count plural or uncount nouns. The examples in 69a. through 69c. show that `more` meets this criterion.

69a. More boys went home.
    (count plural)
69b. More dirt was on the floor.
    (uncount)
69c. *More boy went home.
    (count singular)

70. {base=more
4.7.6 Free Determiners

Determiners with the code free are not restricted as to the number of the nouns they can determine. The examples in 71a. through 71c. show that some is such a determiner.

71a. Some boys went home.
71b. Some dirt was on the floor.
71c. Some boy went home.

5. Complementation

5.1 Verb Complementation Patterns

The SPECIALIST lexicon recognizes five basic categories of verb, depending on the complements they take: intransitive, transitive, ditransitive, linking, and complex-transitive. The first four of these categories bear the names of the traditional verb types to which they correspond. Although the term “complement” is sometimes restricted to verb phrase constituents which follow linking verbs like be, or which enter into an “intensive relation” with an object of a verb, here a complement is considered to be any element of the verb phrase predicated by the verb. However, the particle of a verb particle construction is not treated as a complement of the verb. The code part() is added (following a semi-colon ;) to the complementation codes to indicate a verb particle construction. See “Verb Particle Constructions” on page 48. Traditionally, the terms intransitive, transitive, and ditransitive refer to the number and type of noun phrases in the verb phrase. They are used here to refer to the number and type of complements in a verb phrase. Linking is a term traditionally used to refer to verbs which take a complement “referring to” or “in an intensive relationship” to another NP in the sentence. The term “linking” is retained and “complex-transitive” is used for verbs in which two complements may be regarded as being in a close semantic relationship with each other. Verbs can, and often do, fall into more than one category, and may have many complementation patterns within each category. The verb give illustrates the variety possible in complementation within a single verb entry.

73. {base=give
entry=E0029785
  cat=verb
  variants=irreg|give|gives|gave|given|giving|
  intran
  intran;part(out)
  intran;part(over)
  intran;part(in)
The examples in 74a. through 74e. illustrate each major complementation category:

74a. The bridge gave without warning. (intransitive)
74b. The handout gives the results. (transitive)
74c. He gave some money to charity. (ditransitive)
74d. He gave the Salvation Army his entire wardrobe. (ditransitive with dative movement)
74e. She was given to believe that her work was unacceptable. (complex transitive with object raising)

Note that several senses of the verb may be captured in the full entry for the verb.

### 5.1.1 Intransitive

A verb is marked intransitive if it may appear without any complement.

75a. He died.

intran

75b. The patient complained.

intran

Since adverbial particles are not considered complements, both die and add are intransitive in the
The following sentences:

76a. The patient gave up.
intran;part(up)
76b. Our fuel ran out.
intran;part(out)

Intransitive verbs may appear with non-complement adverbials.

77a. He died on Tuesday.
intran
77b. Our fuel ran out near Toledo.
intran

The intransitive verbs take no complement, but may take particles, as illustrated in Table 13.

<table>
<thead>
<tr>
<th>Slot</th>
<th>Particle Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>intran</td>
<td>blank</td>
</tr>
<tr>
<td></td>
<td>;part(particle)³</td>
</tr>
</tbody>
</table>

Table 13. Fillers for the intran= slot

- a. an particle (particle) code can be one of the following: about, across, against, ahead, along, aloud, apart, around, at, away, back, behind, by, down, forth, forward, forwards, free, in it, off, on, open, out, over, round, through, to, together, up, without.

5.1.2 Transitive

The slot tran= indicates a transitive verb. A verb is marked transitive if it takes a single complement. This may be a noun phrase, a prepositional phrase, or a clause. The codes following the equals sign refer to the syntactic category of the complement.

78a. I hit the boy. tran=np
78b. I propose that they initiate the project. tran=fincomp(ts)
78c. I propose going to the conference. tran=ingcomp:arbc
78d. I asked whether he meant it. tran=whfincomp

The tran= slot takes ten different fillers as illustrated in Table 14.

<table>
<thead>
<tr>
<th>Slot</th>
<th>Filler</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 14. Fillers for the tran= slot

| tran= | np       |
|       | np||     |
|       | pphr( , ) |
|       | binfcomp:interp |
|       | infcomp:interp |
|       | ingcomp:interp |
|       | ascomp:interp |
|       | whinfcomp:interp |
|       | fincomp() |
|       | whfincomp |

a. an interpretation (interp) code can be one of objc, subjc, arbc, nsc.

Each of those slot fillers are discussed in “Verb Complements” on page 36.

An interpretation code (represented by interp in the table above) consists of one of the following: objc, objr, subjc, subjr, arbc, or nsc. Interpretation codes are discussed in “Interpretation Codes” on page 39.

5.1.3 Ditransitive

A ditran= slot indicates a ditransitive verb. A verb is marked ditransitive if it takes two complements, either of which might be a noun phrase, a prepositional phrase, or a clause.

79a. I struck Mary a blow.
   ditran=np,np

79b. I wrote the letter to the president.
   ditran=np,pphr(to,np);datmvt

79c. He increased the dose from 5 tablets to 6 tablets.
   ditran=np,pphr(from,np,pphr(to,np))

79d. He showed us what he is able to do.
   ditran=np,whfincomp

79e. They sided with him against the authorities.
   ditran=pphr(with,np),pphr(against,np)

79f. The chairman must account to the stockholders for what he has done.
   ditran=pphr(to,np),pphr(for,whfincomp)

The ditran= slot takes two fillers separated by a comma, SPECIALIST allows five different fillers for the first position and five for the second as illustrated in Table 15.
Table 15. Fillers of the ditran\(=\) slot

The objects of ditransitive verbs may participate in Dative Movement. The SPECIALIST lexicon treats the dative shift phenomenon as a movement of the prepositionally marked indirect object into a position immediately following the verb. For example, “I gave Mary the book” is derived from “I gave the book to Mary” by Dative Movement. The verb give is coded ditran=\(=\), with the additional code, datmvt, indicating that the two objects may be permuted. This device not only allows the two codes ditran=\(=\),pphr(P,\(\_\)) and ditran=\(=\),\(\_\) to be collapsed into one code: ditran=\(=\),pphr(P,\(\_\));datmvt, it captures the identity of the NPs in each code. The first NP of the ditran=\(=\), code, the indirect object, is identified with the second NP in the ditran=\(=\),pphr(P,\(\_\)), and the second NP of the ditran=\(=\), the direct object, is identified with the first NP of the ditran=\(=\),pphr(P,\(\_\)) code.

80a. I wrote a letter to the president.
80b. I wrote the president a letter.

5.1.4 Linking
The link\(=\) slot indicates a linking verb. A verb taking one complement which is in a close semantic relationship to the subject is a linking verb. The clearest example of this linking relation is shown with the auxiliary verb be, which "links" the subject to the object, but verbs such as appear, feel, lie, remain, seem, become and get are also included. Linking verbs may take a wide range of complements.

81a. He is the chief.
   link=\(\_\)
81b. He seems to be a good boy.
   link=infcomp:subj
81c. The joke is in poor taste.
   link=advbl
81d. He is in New York.
   link=advbl
81e. The problem is believing everything he says.
   link=ingcomp:arbc
81f. The question is where the scissors are now.
   link=whfincomp
81g. The director appeared happy.
   link=\(\_\)
81h. He lives in Silver Spring.
   link=advbl
So-called middle-verbs like *weigh* and *cost* are considered linking verbs.

82a. It weighs five pounds.
   \text{link} = np

82b. It cost twenty dollars.
   \text{link} = np

Eight fillers are allowed for the \text{link} = slot, as illustrated in Table 16.

<table>
<thead>
<tr>
<th>Slot</th>
<th>Filler</th>
</tr>
</thead>
<tbody>
<tr>
<td>link=</td>
<td>np</td>
</tr>
<tr>
<td></td>
<td>pphr( , )</td>
</tr>
<tr>
<td></td>
<td>adj</td>
</tr>
<tr>
<td></td>
<td>advbl</td>
</tr>
<tr>
<td></td>
<td>edcomp:interp</td>
</tr>
<tr>
<td></td>
<td>infcomp:interp</td>
</tr>
<tr>
<td></td>
<td>ingcomp:interp</td>
</tr>
<tr>
<td></td>
<td>fincomp()</td>
</tr>
</tbody>
</table>

\textbf{Table 16.} Fillers of the \text{link} = slot

\subsection{5.1.5 Complex-transitive}

A \text{cplxtran} = slot indicates a complex transitive verb. A verb taking two complements which are in a close semantic relation to each other is a complex-transitive verb. The first complement is most often an NP, but it may also be a prepositional phrase, a finite clause, or an \text{-ing} clause. The second complement may be any one of a wide range of complements.

83a. I called him a fool.
   \text{cplxtran} = np,np

83b. I consider him to be a genius.
   \text{cplxtran} = np,infcomp:objr

83c. We can’t risk him seeing us.
   \text{cplxtran} = np,ingcomp:objr

83d. I regard him as my brother.
   \text{cplxtran} = np,ascomp:objc

The \text{cplxtran} slot takes two fillers separated by a comma, as illustrated in Table 17.
5.2 Verb Complements

Twelve different codes are used to characterize the complements for which the verb is subcategorized. (Note that in an actual lexical entry these are used in combination with one of the five basic transitivity categories for verbs.) Each complement type is illustrated below. In the examples, complements of the type being exemplified are emphasized (in bold).

5.2.1 Noun Phrase Complements (Objects)

The codes np and np|N| are used to indicate a noun phrase, i.e. a noun, its determiner and all of its pre- and post-modifiers.

84a. I hit him.
   tran=np

84b. I saw my best friend’s favorite uncle, who owns the store.
   tran=np

84c. I gave the book to my friend.
   ditran=np,pphr(to,np);datmv

When a verb idiomatically requires a particular noun as a complement, it is marked np|N|, where N stands for the required noun.

85a. take account of the situation
   ditran=np|account|,pphr(of,np)

85b. shed light on
   ditran=np|light|,pphr(on,np)
Wh-clauses introduced by *what* and *whatever*, sometimes called headless relatives, are considered to be a type of np. Other types of wh-clause complements are explicitly marked with either the code `whinfcomp` or `whfincomp`.

86a. I consider **what you do** impossible.

86b. I accept **what you said**.

5.2.2 Prepositional Phrase Complements

The codes `pphr(P,O)` and `pphr(P,O,pphr(P,O))` are used for a prepositional objects. P stands for the preposition and O for its object. The object may be one of several complement types. SPECIALIST does not assign verbs any higher level of transitivity than two (ditransitive). Sentences like *We decreased the dose from 5 mg. to 3 mg.* are analyzed as containing only one prepositional phrase in addition to the direct object NP. The *from...to* prepositional phrase is taken to have the structure reflected in the form of the code, `pphr(from,np,pphr(to,np))`. The code `pphr(P1,O,pphr(P2,O))` implies both `pphr(P1,O)` and `pphr(P2,O)` alone.

87a. The cavity filled **with fluid**.

87b. She knows **about their having suddenly left for New York**.

87c. The temperature increased **from ninety-five to one hundred**.

88. `\{base=increase
entry=E0034077
cat=verb
variants=reg
intran
tran=np
tran=pphr(from,np)
tran=pphr(from,np,pphr(to,np))
tran=pphr(to,np)
ditrans=np,pphr(from,np)
ditrans=np,pphr(from,np,pphr(to,np))
ditrans=np,pphr(to,np)
\}`

SPECIALIST allows nine fillers for the object position of `pphr(_,_)` as illustrated in Table 18.
Table 18. Arguments of the pphr( , ) code.

<table>
<thead>
<tr>
<th>Code</th>
<th>( First Argument ,</th>
<th>Second Argument )</th>
</tr>
</thead>
<tbody>
<tr>
<td>pphr</td>
<td>Any Preposition</td>
<td>np</td>
</tr>
<tr>
<td></td>
<td></td>
<td>np</td>
</tr>
<tr>
<td></td>
<td></td>
<td>advbl</td>
</tr>
<tr>
<td></td>
<td></td>
<td>infcomp:interp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ingcomp:interp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>whinfcomp:interp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>binfcomp:interp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>edcomp:interp</td>
</tr>
</tbody>
</table>

5.2.3 Adjective Complements
The code *adj* is used for an adjective, along with its modifiers and complements. Only linking and complex-transitive verbs take adjective complements.

89a. The moon appears **blue**.
     link=adj
89b. The dinner seems **ready to eat**.
     link=adj
89c. I dyed the cloth **red**.
     cplxtran=np,adj
89d. I consider him **reckless**.
     cplxtran=np,adj
89e. I painted the house **light green**.
     cplxtran=np,adj
89f. The accused pleads **guilty**.
     link=adj

5.2.4 Adverbial Complements
The code *advbl* is a cover term for simple adverbs and adverbial prepositional phrases. The latter is distinguished from the code *pphr(P,np)* where the particular preposition (P) is explicitly mentioned. An *advbl* prepositional phrase is not constrained to a particular preposition.

90a. He showed me **to the door**.
     cplxtran=np,advbl
90b. He showed me **out**.
     cplxtran=np,advbl
91a. She carried it **to the meeting**.
5.2.5 Non-Finite Clause Complements

The SPECIALIST lexicon provides for a variety of non-finite complements: infinitive clauses as in 92a. and 92b. (infcomp and binfcomp), present participle clauses as in 92c. (ingcomp), and past participle clauses as in 92d. (edcomp).

92a. He wants to go home.
92b. I helped write the program.
92c. The law forbids stealing hubcaps.
92d. He wants a new house built.

5.2.5.1 Interpretation Codes

Non-finite clauses generally do not have overt subjects; the understood subject of the clause is usually identified with some NP in the matrix sentence. Interpretation codes are provided to indicate where these logical subjects are found. The interpretation codes (objc, objr, subj, subj, nsr, nsc) are attached to the code for the non-finite complement with a colon. Each of them is discussed in sections 5.2.5.1.1 through 5.2.5.1.7 below.

5.2.5.1.1 Object Control

Object control means that the direct object in the higher clause is logically both the object of the higher verb and the subject of the embedded (non-finite) clause.

93a. I advised him to go.
   cplxtran=np,infcomp:objc
93b. I told him to rethink the problem.
   cplxtran=np,infcomp:objc
93c. We warned him against stealing state secrets.
   cplxtran=np,pphr(against,ingcomp:objc)

Some object control sentences may be paraphrased with an embedded finite clause such that the object of the higher clause is coreferential with the subject of the lower clause. 94a. paraphrases 93a. and 94b. paraphrases 93b.

94a. I advised him that he should go.
94b. I told him that he should rethink the problem.

The interpretation code objc is attached (with a colon :) to complement codes which display object control.
5.2.5.1.2 Object Raising

Object raising means that the direct object in the higher clause is logically the subject of the non-finite clause and not the logical object of the higher clause.

95a. I intended him to win.
cplxtran=np,infcomp:objr
95b. I believe him to have stolen my watch.
cplxtran=np,infcomp:objr

Some object raising cases may be paraphrased with an embedded finite clause. 96a. is such a paraphrase of 95a. and 96b. paraphrases 95b.

96a. I intended that he would win.
96b. I believe that he stole my watch.

The interpretation code objr is attached (with a colon :) to complement codes indicating clauses which display object raising.

5.2.5.1.3 Subject Control

Subject Control means that subject of the higher clause is also the logical subject of the embedded infinitival clause:

97a. John promised to leap over the wall.
cplxtran=np,infcomp:subj
97b. He is training to swim the channel.
tran=infcomp:subj

Some subject control constructions may be paraphrased with an embedded definite clause having a subject coreferential with the subject of the higher clause. 98a. paraphrases 97a.

98a. John promised that he would leap over the wall.

The interpretation code subj is attached (with a colon :) to complement codes indicating clauses which display subject control.

5.2.5.1.4 Subject Raising

Subject Raising indicates that the subject of the higher clause is the logical subject of the embedded infinitival clause:

99a. John seems to have criticized Martha.
link=infcomp:subj
99b. John appears to firmly believe that he is Superman.
link=infcomp:subj

Subject raising constructions may not be paraphrased in the same way that subject control constructions are:

100a. *John seems that he criticized Martha.
100b. *John appears that he firmly believes that he is Superman.

Expletive *it subjects are possible in paraphrases of Subject Raising constructions:

101a. It seems that John has criticized Martha.
101b. It appears that John firmly believes that he is Superman.

The interpretation code `subj` is attached (with a colon :) to the complement codes indicating clauses which display subject raising.

### 5.2.5.1.5 Arbitrary Control

Arbitrary control indicates that the subject of the lower clause is not linguistically controlled. 102a. can be paraphrased by 102b. and 102c. can be paraphrased by 102d. The subjects of *hunting* and *write* are not linguistically identified.

102a. I dislike hunting.
    tran=ingcomp:arbc
102b. I dislike anyone hunting.
102c. I helped write the program.
    tran=binfcomp:arbc
102d. I helped someone write the program.

The interpretation code `arbc` is attached (with a colon :) to complement codes indicating clauses which display arbitrary control.

### 5.2.5.1.6 Non-Subject Control

This phenomenon appears in present-participle clause complements of verbs. Non-subject control means that the subject of the matrix verb controls a missing non-subject NP in the present participle clause. The subject of the present participle clause is understood to be arbitrarily controlled. For example, 103a. can be roughly paraphrased by 103b. in which the object of *wash* is *the car*. The logical subject of *wash* is not linguistically indicated.

103a. This car needs washing.
    tran=ingcomp:nsc
103b. This car needs someone to wash the car.
    tran=ingcomp:nsc
103c. Surgical instruments require constant sharpening.
    tran=ingcomp:nsc
103d. This abstract deserves careful reading.
    tran=ingcomp:nsc

The code `nsc` is used to indicate non subject control. This phenomenon also appears in infinitive clause complements of adjectives. It is further discussed on page 55.
5.2.5.1.7 Non-Subject Raising

Non-subject raising is the phenomenon often called “tough-movement”, wherein a non-subject noun phrase is missing from an infinitive complement and identified with an NP in the matrix clause. This phenomenon occurs primarily in infinitive complements of adjectives, and more rarely in adjective complements of nouns. We know of no verb which displays non subject raising. See page 50 for more detailed discussion.

5.2.5.2 Past Participle Clause Complements

The code edcomp is used for a past-participial clause. The code edcomp is required to have an interpretation code attached to it by a colon (:), indicating the subject of the past participial clause.

Table 19 illustrates the interpretation codes for edcomp.

<table>
<thead>
<tr>
<th>Code</th>
<th>Interpretation code</th>
</tr>
</thead>
<tbody>
<tr>
<td>edcomp</td>
<td>objc</td>
</tr>
<tr>
<td></td>
<td>objr</td>
</tr>
<tr>
<td></td>
<td>subjc</td>
</tr>
<tr>
<td></td>
<td>subjr</td>
</tr>
<tr>
<td></td>
<td>arbc</td>
</tr>
</tbody>
</table>

Table 19. Interpretation codes for edcomp

104a. I had the house **built by the best contractor in town**.
     cplxtran=np,edcomp:objr;nopass
104b. The car got **washed**.
     link=edcomp:subjc
104c. I saw the car **destroyed**.
     cplxtran=np,binfcomp:objr

5.2.5.3 Infinitive Clause Complements

The code infcomp is used for an infinitive clause, introduced by to. The code infcomp must have an interpretation code.

105a. We can’t afford **to do it**.
     tran=infcomp:subjc
105b. He allowed the neighbors **to use the car**.
     cplxtran=np,infcomp:objr
105c. He promised **to go**.
     cplxtran=np,infcomp:subjc
The table below illustrates the interpretation codes for infcomp.

<table>
<thead>
<tr>
<th>Code</th>
<th>Interpretation code</th>
</tr>
</thead>
<tbody>
<tr>
<td>infcomp</td>
<td>objc, objr, subj, subj, arbc, nsc</td>
</tr>
</tbody>
</table>

**Table 20.** Interpretation codes for infcomp in verb entries

An infcomp can have an overt subject if the complementizer for is present. This subject is not considered a complement of the verb but part of the to-infinitive complement. The interpretation code does not apply when there is an overt subject. The verb afford has the code tran=infcomp:subj because, in the absence of an overt subject marked by for, the subject of the infinitive complement is understood to be the subject of the matrix sentence, as shown in 106a. In 106b, the occurrence of an overt subject (the institution) overrules the interpretation code.

106a. We can’t afford to make that commitment.  
tran=infcomp:subj  
106b. We can’t afford for the institution to make that commitment.  
tran=infcomp:subj

### 5.2.5.4 Bare Infinitive Clause Complements

The code binfcomp is used for a “bare” infinitive clause, without to. The code binfcomp requires an interpretation code.

The table below illustrates interpretation codes for binfcomp.

<table>
<thead>
<tr>
<th>Code</th>
<th>Interpretation code</th>
</tr>
</thead>
<tbody>
<tr>
<td>binfcomp</td>
<td>objc, objr, subj, subj, arbc</td>
</tr>
</tbody>
</table>

**Table 21.** Interpretation codes for binfcomp in verb entries

107a. I had him critique the document.  
cplxtran=np,binfcomp:objr  
107b. Please help me write the invitations.
The SPECIALIST Lexicon

5.2.5.5 Present Participle Complements

The code \texttt{ingcomp} is used for a present participial clause. The code \texttt{ingcomp} requires an interpretation code as illustrated in the following table.

<table>
<thead>
<tr>
<th>Code</th>
<th>Interpretation code</th>
</tr>
</thead>
<tbody>
<tr>
<td>ingcomp</td>
<td>objc</td>
</tr>
<tr>
<td></td>
<td>objr</td>
</tr>
<tr>
<td></td>
<td>subjc</td>
</tr>
<tr>
<td></td>
<td>subjr</td>
</tr>
<tr>
<td></td>
<td>arbc</td>
</tr>
<tr>
<td></td>
<td>nsc</td>
</tr>
</tbody>
</table>

Table 22. Interpretation codes for \texttt{ingcomp}

108a. She advised completing the project as soon as possible. 
\quad \text{tran}=\texttt{ingcomp:arbc}

108b. I saw him running down the street. 
\quad \text{cplxtran}=\texttt{np,ingcomp:objr}

108c. I approve of him finishing before the due date. 
\quad \text{cplxtran}=\texttt{pphr(of,np),ingcomp:objr}

108d. This car needs washing. 
\quad \text{tran}=\texttt{ingcomp:nsc}

108e. We tried to prevent him from dropping the course. 
\quad \text{cplxtran}=\texttt{np,pphr(from,ingcomp:objc)}

An \texttt{ingcomp} can have a subject in the genitive case. As with the \textit{for} subject of the to-infinitive, this subject is not considered a complement of the verb. Notice that the interpretation code does not apply when an explicit subject is present. The verb \texttt{report} has the code \texttt{tran=ingcomp:subjc} in both 109a. and 109b., indicating that the subject of the participial clause is controlled by the subject of \texttt{report}. But when there is an explicit genitive subject as in 109a. the interpretation code \texttt{subj} is ignored.

109a. They reported John’s having noticed an error in the manuscript. 
\quad \text{tran}=\texttt{ingcomp:subjc}

109b. They reported having noticed an error in the manuscript. 
\quad \text{tran}=\texttt{ingcomp:subjc}
5.2.6 Finite Clause Complements

Finite clause complements have tensed verbs, and show subject-verb agreement. They appear as full sentences generally introduced by the complementizer *that*. The code `fincomp()` is used to indicate finite clause complements.

5.2.6.1 Types of Finite Clause Complement

There are eight variations of `fincomp()`, each with or without an extraposed subject code, as illustrated in Table 23.

<table>
<thead>
<tr>
<th>Code</th>
<th>Arguments</th>
<th>Extrapolated</th>
<th>Subject Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>fincomp</td>
<td>o</td>
<td></td>
<td>subj</td>
</tr>
<tr>
<td>fincomp</td>
<td>t</td>
<td></td>
<td></td>
</tr>
<tr>
<td>fincomp</td>
<td>p</td>
<td></td>
<td></td>
</tr>
<tr>
<td>fincomp</td>
<td>s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>fincomp</td>
<td>ts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>fincomp</td>
<td>tp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>fincomp</td>
<td>sp*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>fincomp</td>
<td>tsp</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 23. Variations of fincomp( ). *Note: there are no current instances of the code sp in the lexicon.*

Each of these codes is discussed in 5.2.6.1.1.- 5.2.6.1.8. below.

5.2.6.1.1 fincomp(o)

This code represents a finite clause with an optional *that* complementizer.

110a. They decided *(that) this was the right course of action.*
    tran=fincomp(o)

110b. We assured him *(that) it would all turn out right.*
    ditran=np,fincomp(o)

5.2.6.1.2 fincomp(t)

This code represents a finite clause with a required *that* complementizer.

111. I conclude *that you are a linguist.*
    tran=fincomp(t)

5.2.6.1.3 fincomp(p)

This code represents a finite clause with an optional *that* complementizer which may be realized as the proform *so or not.*
112a. I assume (that) you’re going home tomorrow.
    tran=fincomp(p)
112b. I assume so.
    tran=fincomp(p)

5.2.6.1.4 fincomp(s)
This code represents a subjunctive clause with an optional that complementizer. A subjunctive clause is a finite clause with an untensed verb (subjunctive form), or should followed by an untensed verb. Although finite complement was defined above in terms of having a tensed verb, subjunctive clauses are considered finite complements in spite of their apparent lack of tense.

113. I suggest (that) you (should) be here on time.
    tran=fincomp(s)

5.2.6.1.5 fincomp(ts)
This code represents a subjunctive clause with a required that complementizer.

114. We require that you (should) be here.
    tran=fincomp(ts)

5.2.6.1.6 fincomp(tp)
This code represents a finite clause with a required that complementizer, which may be realized as so or not.

115a. I advised him that the cargo bay door was open.
    ditran=np,fincomp(tp)
115b. I advised him so.
    ditran=np,fincomp(tp)
115c. I so advised him.
    ditran=np,fincomp(tp)

5.2.6.1.7 fincomp(sp)
This code represents a subjunctive clause with an optional that complementizer, which may be realized as so or not. It is possible that such complements do not occur in English. The current SPECIALIST lexicon has no instances of fincomp(sp).

5.2.6.1.8 fincomp(tsp)
This code represents a subjunctive clause with a required that complementizer which can also be realized as so or not.

116. He moved that this be stricken from the record.
5.2.6.2 Extrapos ed Subject

The interpretation code subj is attached to a fincomp( ) to indicate that the finite complement is an extrapos ed subject. That is, it appears postverbally only with an explicative it subj ect. For example, appear takes a fincomp(p) which is understood as the subject of appear. In 117a. and 117b. so and that John won are understood as the subject of appear.

117a. It appears that John won.
117b. It appears so.

5.2.7 WH Complement Clauses

5.2.7.1 WH Finite Clause Complements

Finite clause complements introduced by a wh-word are coded whfincomp. Wh-finite complements can be introduced by whether, how, why, where, when, who, and sometimes if.

120a. He asked whether they were coming.
120b. He asked me if I’d be there on time.
120c. I decided how I would go about it.
tran=whfincomp
120d. They expected to ascertain whether this was appropriate.
tran=whfincomp

5.2.7.2 WH Infinitive Complements

Infinitival clauses introduced by wh-words are coded whinfcomp; whinfcomp requires an interpretation code to indicate the subject. All whinfcomps in the SPECIALIST lexicon have been given the interpretation code arbc.

121a. I don’t know where to send the money.
tran=whinfcomp:arbc
121b. I decided how to go about it.
tran=whinfcomp:arbc
121c. He chose where to go.
tran=whinfcomp:arbc

5.2.8 As Absolute Clause Complements

As absolute clauses consisting of a predicate introduced by as are coded ascomp. The predicate may be a noun, adverb, prepositional phrase or ed-clause. The code ascomp requires an interpretation code.

122a. We all looked upon him as one of us.
cplxtran=pphr(upon,np),ascomp:objc
122b. He qualified as team chief.
tran=ascomp:subj
122c. The generals all regarded Uzbekistan as well out of missile range.
cplxtran=np,ascomp:objc

5.3 Verb Particle Constructions

English verbs often form a sort of compound with an adverbial particle. These particles themselves are entered in the lexicon as adverbs with a modification_type=particle code. Verbs which have particles, like beat, tear, and run have the code part() attached to the complementation for the complementation patterns in which the verb takes a particle.

123a. They beat him up.
123b. They tore down the theatre.
123c. They like to run around.

Each of the verb complement slots intran, tran=, ditran= and cplxtran= can be followed by a part() code indicating the particle of a verb particle construction. The argument of part() is the particle.

124. {base=tear
5.3.1 The Passive Construction

All of the complementation patterns represented in the SPECIALIST lexicon represent the verb phrase in active mood. Each transitive, ditransitive or complex-transitive code is subject to passivization unless it has been marked with the code `nopass`. The code `nopass` is added after a semi-colon (;) to those patterns which have no passive counterpart. The main verb `have` does not allow passive as illustrated in 125a. and 125b.

125a. He had a fancy coffee cup.
   tran=np;nopass
125b. * A fancy coffee cup was had by him.

5.4 Noun Complementation

The slot `compl=` contains codes indicating noun complements. The possible complements of the noun are listed in Table 24.

<table>
<thead>
<tr>
<th>Slot</th>
<th>Fillers</th>
</tr>
</thead>
<tbody>
<tr>
<td>compl=infcomp:interp</td>
<td></td>
</tr>
<tr>
<td>compl=fincomp()</td>
<td></td>
</tr>
<tr>
<td>compl=whfincomp</td>
<td></td>
</tr>
<tr>
<td>compl=whinfcomp:interp</td>
<td></td>
</tr>
<tr>
<td>compl=pphr( , )</td>
<td></td>
</tr>
<tr>
<td>compl=ascomp:interp</td>
<td></td>
</tr>
</tbody>
</table>

Table 24. Fillers of noun compl= slot

These codes have the same meaning as when they appear as complements of a verb.
5.4.1 Infinitive Clause Complements

Infinitive clause complements of nouns are coded with the code `infcomp`. Each `infcomp` is marked with an interpretation code; one of: `objr`, `objc`, `subj`, `subj`, `nsr`, or `arbc`. The interpretation codes are interpreted as they are for verbs, except that some nouns exhibit non-subject raising. (See “Infinitive Clause Complements” on page 44, and “Non Subject Raising” on page 52). The code `objc` indicates that the subject position of the `infcomp` may be controlled by an object genitive (indicated by the preposition of, or ’s genitive). The code `subj` indicates that the subject position of the `infcomp` can be controlled by a subjective genitive (of or ’s genitive). The code `objr` indicates that the object genitive may be interpreted as the subject of the `infcomp` and not as an argument of the noun. The code `subj` indicates that the subjective genitive may be interpreted as the subject of the `infcomp` and not as an argument of the noun. This is most clear in the case of nominalizations, where terms like subject and object can be analogized to the verb. Other abstract nouns can also have interpretation codes. For example, in the noun entry for `right` given in example 127, `infcomp:subj` indicates that `John` and `suspects` in 126a. and 126b. are understood to be subjects of the infinitive complements and are arguments of `right` as well.

126a. John’s right to remain silent.
126b. The right of suspects to remain silent.

127. {base=right
   entry=E0053603
   cat=noun
   variants=reg
   variants=uncount
   variants=groupuncount
   compl=pphr(to,np)
   compl=infcomp:subj
}

5.4.2 Non Subject Raising

Nouns such as `breeze` and `snap` can trigger Non-Subject Raising. See “Non Subject Raising” on page 54 in the “Adjective Complementation” section.

The code `nsr` indicates that the subject of a predicate noun phrase is understood as some non-subject NP in its infinitive complement. The subject of the infinitive complement is arbitrarily controlled unless an explicit `for` subject is present.

128a. This pen is a breeze to write with.
128b. This tool is a snap to use.
128c. This tool will be a snap for even the clumsiest linguist to use.

129. {base=breeze
   entry=E0014027

5.4.3 Finite Clause Complements

Finite clause complements for nouns are coded `fincomp`. As a noun complement `fincomp` is allowed the same range of variation as indicated for verbs in Table 22 on page 45.

130a. His awareness that he was wasting time was not sufficient.

5.4.4 WH Finite Clause Complements

The code `whfincomp` has the same meaning as a noun complement that it has as a verb complement. It represents a finite complement introduced by a `wh` word. See “WH Finite Clause Complements” on page 47 under Section 5.2.

132a. The reason why he decided to attend was unclear.

5.4.5 Prepositional Phrase Complements

The prepositional phrase complement codes `pphr(P,0)` and `pphr(P,O,pphr(P,O))` have the same meaning in noun entries that they do in verb entries. See “Prepositional Phrase Complements” on page 37.

134a. The adequacy of the railroad system for military transportation was brought into question.
5.4.6 WH Infinitive Complements

This code is used for an infinitive clause, introduced by a *wh* word. As with verbs, **whinfcomp** must have an interpretation code. See “WH Infinitive Complements” on page 48.

136. The decision **when to leave** was hers alone.

5.5 Adjective Complementation

Complements of adjectives are indicated as fillers of the **compl** slot. The possible fillers for the complement slot of adjective entries are illustrated in Table 25.
5.5.1 Infinitive Clause Complements

The code \texttt{infcomp} indicates a \textit{to} infinitive clause complement. As with verbs, interpretation codes attached with a colon are used to indicate to-infinitive complements. As an adjective complement \texttt{infcomp} can have \texttt{subjc}, \texttt{subjr}, \texttt{arbc}, \texttt{nsr}, or \texttt{nsc} attached. The codes \texttt{subjc}, \texttt{subjr} and \texttt{arbc} are used analogously to their use in verb complements. \texttt{objc} and \texttt{objr} do not apply to \texttt{infcomps} in adjective entries, since \texttt{compl=} slots do not take double arguments. Table 26 illustrates the interpretation codes that go with \texttt{infcomps} in adjective entries.

<table>
<thead>
<tr>
<th>code</th>
<th>interpretation code</th>
</tr>
</thead>
<tbody>
<tr>
<td>infcomp</td>
<td>subjc</td>
</tr>
<tr>
<td></td>
<td>subjr</td>
</tr>
<tr>
<td></td>
<td>arbc</td>
</tr>
<tr>
<td></td>
<td>nsr</td>
</tr>
</tbody>
</table>

Table 26. Interpretation codes for Adjectives

The noun phrase modified by the adjective, or the subject of the linking verb in a predicative construction, is considered the subject of the adjective. \textit{They} is the subject of \textit{eager} as well as the subject of \textit{please} in 138a. and \textit{problem} is the subject of \textit{easy} as well as the subject of \textit{solve} in 138b.

138a. They are eager \texttt{to please}.
\texttt{compl=infcomp:subjc}

138b. This is an easy \texttt{problem} \texttt{to solve}.
\texttt{compl=infcomp:subjc}

138c. They are careful \texttt{to avoid mistakes}.
\texttt{compl=infcomp:subjc}

138d. The author is ready \texttt{to write}.
\texttt{compl=infcomp:subjc}

Table 25. Fillers of the adjective \texttt{compl=} slot.

<table>
<thead>
<tr>
<th>Slot</th>
<th>Fillers</th>
</tr>
</thead>
</table>
| compl= | infcomp:interp
          | fincomp( ) |
          | whfincomp |
          | whinfcomp |
          | advbl |
          | pphr( , ) |
          | ascomp:interp |

Table 25. Fillers of the adjective \texttt{compl=} slot.
138e. The potatoes are ready to eat.
compl=infcomp:nsc
The code nsr (for non subject raising) appears mainly with adjectives, and the code nsc (for non subject control) appears with ingcomps in verb entries and with infcomps in adjective entries.

139. {base=eager
entry=E0024307
cat=adj
variants=inv;periph
position=attrib(1)
position=pred
compl=infcomp:subj
compl=fincomp(ts)
compl=pphr(about,np)
compl=pphr(for,np)
stative
nominalization=eagerness|noun|E0024309
}

140. {base=careful
entry=E0015340
cat=adj
variants=inv;periph
position=attrib(1)
position=pred
compl=infcomp:subj
compl=fincomp(t)
compl=whfincomp
nominalization=carefulness|noun|E0015342
}

5.5.2 Non Subject Raising
The code nsr indicates that the subject of the infinitive is arbitrarily controlled; that there is a non-subject NP missing from the infinitive clause; and that the NP which appears as the subject of the adjective is interpreted as this missing NP, not as the logical subject of the adjective. As example 141b. demonstrates, the missing NP need not be an argument of the verb of the infinitive clause. This phenomenon has been called Tough-Movement. Non-Subject Raising occurs only in adjectives and nouns.

141a. John is tough to please.
compl=infcomp:nsr

141b. This instrument is difficult to teach students to fly with.
5.5.3 Non-Subject Control

The code nsc indicates that the subject of the infinitive clause is arbitrarily controlled; that there is a missing non-subject NP in the infinitive complement; and that the subject of the adjective is interpreted as the missing NP of the infinitive clause as well as the subject of the adjective.

143a. The book is ready to print.
compl=infcomp:nsc

The adjective ready participates in both non-subject control (infcomp:nsc) and subject control (infcomp:subj), as evidenced by the ambiguity in example 144a.

144a. The chickens are ready to eat.
144b. The chickens are ready for someone to eat the chickens.
144c. The chickens are ready for the chickens to eat something.
144d. The chickens are ready.

Example 144b. is the non-subject control paraphrase of 144a. The subject control reading is paraphrased in 144c. Both readings of 144a. entail 144d. indicating that the chickens is the logical subject in both cases.

5.5.4 Finite Clause Complements

The code fincomp( ) is used to indicate a finite clause complement as it is in entries for verbs. See “Finite Clause Complements” on page 45.

145. They were certain that it would be possible.

In some cases, the code subj is attached to a fincomp( ) to indicate that the finite complement is an extraposed subject. That is, the finite complement can appear only after a predicate adjective with an expletive it subject.

146. It is likely that he will be there.
compl=fincomp(o):subj

147. {base=likely
5.5.5 WH Infinitive Clause Complements

As with verbs, **whinfcomp**: interp indicates an infinitive clause with a \textit{wh}-element. It requires an interpretation code. See “WH Infinitive Complements” on page 48 in Section 5.2.

148. He wasn’t sure **whether to go**.
    compl=whinfcomp:subj

149. {base=sure
    entry=E0059287
    cat=adj
    variants=reg
    variants=inv
    position=attrib(1)
    position=attrib(3)
    position=pred
    compl=fincomp(o)
    compl=whfincomp
    compl=whinfcomp:subj
    compl=infcomp:subj
    compl=pphr(of,np)
    compl=pphr(of,ingcomp:subj)
    stative
    nominalization=sureness|noun|E0059290

5.5.6 WH Finite Clause Complements

As with verbs, the code **whfincomp** represents a finite clause introduced by a \textit{wh}-element. See “WH Finite Clause Complements” on page 47 in Section 5.2.

150. Be careful **what you say**.
    compl=whfincomp
5.5.7 Adverbial Complements

As with verbs, advbl indicates an adverbial complement, i.e. an adverb or prepositional phrase. See “Adverbial Complements” on page 38 in Section 5.2.

151. The building is situated in a large field.
compl=advbl

5.5.8 Prepositional Phrase Complements

The prepositional phrase codes pphr(P,O) and pphr(P,O,pphr(P,O)) are used analogously to their use in verb entries. See “Prepositional Phrase Complements” on page 37.

152a. adequate for the task
152b. adequate for solving the problem
compl=pphr(for,np)

6. Nominalizations of Verbs and Adjectives

Verbs and adjectives which have nominalized forms have the slot nominalization= filled by the base form, category (noun) and EUI of the noun which is its nominalization. Nouns that are the nominalizations of verbs or adjectives have a nominalization_of= slot containing the base form, category and EUI of the verb or adjective of which they are the nominalizations. The elements of these cross references are separated by pipe “|” symbols. The verb accumulate has as its nominalization the noun accumulation. The noun phrase in 153b. is closely related in meaning to the sentence in 153a.

153b. John’s accumulation of wealth

154. {base=accumulate
   entry=E0006764
   cat=verb
   variants=reg
   intran
   tran=np
   nominalization=accumulation|noun|E0006765
}

155. {base=accumulation
   entry=E0006765
   cat=noun
   variants=uncount
   variants=reg
   compl=pphr(of,np)
   compl=pphr(by,np)
7. Acronyms and Abbreviations

Acronyms and abbreviations have the slot `acronym_of=` or `abbreviation_of=` followed by the base form of their expansions. If the expansion is itself in the lexicon, the EUI of the expansion is included following a pipe “|” symbol.

156. `{base=PCB
   entry=E0004653
   cat=noun
   variants=metareg
   acronym_of=polychlorinated biphenyl|E0048706
}

157. `{base=polychlorinated biphenyl
   entry=E0048706
   cat=noun
   variants=reg
   variants=uncount
}

158. `{base=ACh
   entry=E0000061
   cat=noun
   variants=uncount
   abbreviation_of=acetylcholine|E0006837
}

159. `{base=acetylcholine
   entry=E0006837
   cat=noun
   variants=reg
   variants=uncount
}

8. Proper Nouns

Proper nouns are marked with the feature `proper`.

160. `{base=Austria
   entry=E0000523
`
9. Adjective Positions

SPECIALIST recognizes two main positions for adjectives: attributive and predicative. An adjective between the determiner and the head noun of a noun phrase is in attributive position. One following the verb either as a predicate adjective in a linking construction or as the second member of a complex transitive construction is predicative. Most adjectives are both attributive and predicative. In addition, SPECIALIST recognizes attributive adjectives with discontinuous complements, and adjectives that post-modify nouns. The position= slot records position information for adjectives.

The possible fillers for the position slots of adjectives are listed below:

<table>
<thead>
<tr>
<th>Slot</th>
<th>Fillers</th>
</tr>
</thead>
<tbody>
<tr>
<td>position=</td>
<td>attrib(1)</td>
</tr>
<tr>
<td></td>
<td>attrib(2)</td>
</tr>
<tr>
<td></td>
<td>attrib(3)</td>
</tr>
<tr>
<td></td>
<td>attribc</td>
</tr>
<tr>
<td></td>
<td>pred</td>
</tr>
<tr>
<td></td>
<td>post</td>
</tr>
</tbody>
</table>

Table 26. Fillers of the position= slot

9.1 Attributive Adjectives

Attributive adjectives occur between determiners and nouns:

161. The red apple was eaten.

The code attrib(N) appears in the position= slot of attributive adjectives; N is a number (1-3) to indicate its place in the normal sequence of adjectives. Some adjectives can only occur in attributive positions, e.g. mock, favorite and roast. But most adjectives occur in both predicative and attributive positions. As the examples in 162a. through 162d. illustrate, roast is attributive only and raw is both attributive and predicative.

162a. They ate roast lamb for dinner.
162b. *The lamb they ate for dinner was roast.
162c. They ate raw vegetables for dinner.
162d. The vegetables they ate for dinner were raw.
9.1.1 Position Classes for Attributive Adjectives

Each attributive adjective is assigned a number indicating its type. The numbers reflect the typical order of occurrence in an NP. Qualitative adjectives (attrib(1)) generally precede color adjectives (attrib(2)) and classifying adjectives (attrib(3)). Color adjectives generally precede classifying adjectives.

163a. The **big red stone** house.
   attrib(1), attrib(2)
   attrib(3)

163b. ? The **red stone big** house.
   attrib(2), attrib(3), attrib(1)

*Acute* is qualitative and classifying in different senses. When *acute* means perceptive, as in example 164a., it is qualitative (attrib(1)); when it means “having a short and relatively severe course” as in example 164b., it is classifying (attrib(3)).

164a. It was apparent only to the most **acute** observer.
   position=attrib(1);

164b. He suffers from **acute abdominal** hemorrhage.

164c. ? He suffers from **abdominal acute** hemorrhage.

*Abdominal* is a classifying adjective. Example 164c. is unnatural because qualitative adjectives generally precede classifying adjectives.

165. {base=acute
   entry=E0007127
   cat=adj
   variants=inv;periph
   position=attrib(1)
   position=attrib(3)
   position=pred
   stative
   nominalization=acuity|noun|E0007121
   nominalization=acuteness|noun|E0007129
   }

166. {base=abdominal
   entry=E0006444
   cat=adj
   variants=inv
   position=attrib(3)
   position=pred
   stative
   }

The SPECIALIST Lexicon
Collin’s COBUILD Dictionary makes these distinctions and has been consulted in coding adjectives. Each of the position classes is described below in sections 9.1.1.1 through 9.1.1.3.

### 9.1.1.1 Qualitative Adjectives

A qualitative adjective can have more or less of the quality it describes, and it may be preceded by an intensifier. If several adjectives are used together, qualitative adjectives come before color and classifying adjectives. The code `attrib(1)` appears in the `position=` slot of qualitative adjectives. *Severe* is a qualitative adjective.

167a. A **severe** burn
167b. The most **severe** burn
167c. A **severe abdominal** pain
167d. ? An **abdominal severe** pain

168. 

```
{base=severe
erentry=E0055474
cat=adj
variants=reg
position=attrib(1)
position=pred
nominalization=severeness|noun|E0055476
nominalization=severity|noun|E0055478
}
```

### 9.1.1.2 Color Adjectives

A color adjective may be modified by an adjective which describes the color more exactly, such as *clear, pale, or bright*. In a group of adjectives, the color adjective comes after any qualitative and before any classifying adjectives. The code `attrib(2)` appears in the `position=` slot of color adjectives.

169a. A rather unusual **red** flower
169b. An old **brown** wooden desk
169c. The **purple** gown

170. 

```
{base=purple
erentry=E0051252
cat=adj
variants=reg
position=attrib(2)
position=pred
stative
nominalization=purpleness|noun|E0337506
}
```
9.1.1.3 Classifying Adjectives

A classifying adjective cannot have more or less of the quality it describes, unlike qualitative adjectives. In a string of adjectives, classifying adjectives follow qualitative and color adjectives and come closest to the noun. The code \texttt{attrib(3)} appears in the \texttt{position=} slot of classifying adjectives. Many technical adjectives like \textit{cardiac} which are closely related to nouns are classifying.

171a. A \textbf{steel grey cardiac} monitor  
171b. ? A \textbf{cardiac steel grey} monitor.  
171c. *The most \textbf{cardiac} monitor.

172. \{\textit{base}=cardiac  
\hspace{1cm} \textit{entry}=E0015228  
\hspace{1cm} \textit{cat}=adj  
\hspace{1cm} \textit{variants}=inv  
\hspace{1cm} \textit{position}=attrib(3)  
\hspace{1cm} \textit{position}=pred  
\hspace{1cm} \textit{stative}  
\}

Adjectives denoting materials like \textit{woollen, silken} and \textit{earthen} are usually classifying. \textit{Wooden}, in the sense “made of wood” is a typical classifying adjective. In the sense “leaden, stiff, unemotional” it is qualitative.

172a. A \textbf{brown wooden} desk  
172b. ? A \textbf{wooden brown} desk  
172c. * A more \textbf{wooden} desk.

173. \{\textit{base}=wooden  
\hspace{1cm} \textit{entry}=E0065576  
\hspace{1cm} \textit{cat}=adj  
\hspace{1cm} \textit{variants}=inv  
\hspace{1cm} \textit{position}=attrib(1)  
\hspace{1cm} \textit{position}=attrib(3)  
\hspace{1cm} \textit{position}=pred  
\hspace{1cm} \textit{stative}  
\hspace{1cm} \textit{nominalization}=woodenness|noun|E0065577  
\}

9.1.2 Attributive Adjectives with Complements

“Attributive complement” adjectives are those attributive adjectives which have a discontinuous complement occurring after the noun. The code \texttt{attribc} indicates an attributive adjective which may take a complement.

174a. It was an \textbf{easy} problem to solve.
174b. He is a difficult person to talk to.

Non Subject Raising (“tough movement”) adjectives are generally attribute but not all attribute adjectives participate in Non Subject Raising.

9.2 Predicative Adjectives

Predicative adjectives occur after the verb and are generally in a close semantic relation to the subject, as in 175a. or in a semantic relation to another object complement, as in 175b.

175a. The painting is ugly.
175b. He thought the painting ugly.

Predicative adjectives may have complements.

176a. He is happy to be here.
176b. He is hopeful that he will win.
176c. He was slow getting up.
176d. The piano is impossible for me to move.
176e. The problem is easy to solve.

Most adjectives can occur predicatively. Adjectives which can occur predicatively have the filler pred in their position= slot.

9.3 Post-Nominal Adjectives

The code post appears in the position= slot of post-nominal attributive adjectives. Post-nominal attributive adjectives occur after the nouns they modify:

177a. The man responsible went to prison.
177b. The president elect campaigned hard.

Post-nominal adjectives are quite rare. Some like elect and galore occur only post-nominally.

177c. The president elect
177d. *The elect president
177e. presents galore
177f. *galore presents

178. {base=elect
entry=E0024672
cat=adj
variants=inv
position=post
stative
}
In other cases there is a sense difference which depends on whether a form is prenominal or post-nominal. Proper is attributive in the sense shown in 179a. It is post-nominal in the sense shown in 179b.

179a. **proper** writing
179b. writing **proper** (excluding say rebuses and pictograms)

Post-nominal adjectives include culinary (often borrowed) adjectives like: *florentine, carbonara*, and *newburg*.

The post code is reserved for those few adjectives which either must occur post-nominally or occur post-nominally in a special sense. Post-nominal occurrences of ordinary adjectives are considered to involve a reduced relative clause. The examples in 181a. through 181c. are not considered instances of post-nominal adjectives.

181a. a sword **red** with blood
181b. a friend **worried** about his health
181c. an officer of the court **sworn** to uphold the law

One symptom of the difference between true post-nominal adjectives and adjectives in a reduced relative construction is that ordinary adjectives need to be conjoined or have complements in a reduced relative construction.

182a. *a sword **red***
182b. *a friend **worried***
182c. *an officer of the court **sworn***

### 10. Stative Adjectives

The feature stative is added to all adjectives which are static, or relatively unchanging, in nature. If an adjective cannot be used with the progressive or imperative, it is considered stative. The adjective *tall* is stative, as 183b. and 183c. show. *Nasty* is not stative, as 184b. and 184c. show.
183a. He is tall.
183b. *He is being tall.
183c. *Be tall.

184a. He is nasty.
184b. He is being nasty.
184c. Be nasty.

185. 

186. 

11. **Adverb Modification types.**
Adverbs are marked in SPECIALIST to indicate their modification type. Each adverb entry must have at least one `modification_type` slot. This slot takes four different fillers. Sentence modifiers and verb modifiers have a **manner**, **temporal** or **locative** feature. Table 28 illustrates the fillers of the `modification_type` slot.

<table>
<thead>
<tr>
<th>Slot</th>
<th>Fillers</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>modification_type</code></td>
<td>sentence_modifier</td>
<td>manner</td>
</tr>
<tr>
<td></td>
<td>verb_modifier</td>
<td>temporal</td>
</tr>
<tr>
<td></td>
<td>particle</td>
<td>locative</td>
</tr>
<tr>
<td></td>
<td>intensifier</td>
<td></td>
</tr>
</tbody>
</table>

**Table 28.** Fillers of the `modification_type` slot
11.1 Adverbial Particles

Particles are listed as adverbs in the SPECIALIST lexicon. They are given the modification type \texttt{particle}.

187. He backed \texttt{up} the hard disk.
   \texttt{modification\_type=particle}

188. \{\texttt{base=up} \texttt{modification\_type=verb\_modifier;locative} \texttt{modification\_type=particle}\}

11.2 Intensifiers

Intensifiers modify adjectives or adverbs. They are marked with the modification type \texttt{intensifier}.

189. They are \texttt{quite} happily married.

190. \{\texttt{base=quite} \texttt{modification\_type=intensifier} \texttt{modification\_type=sentence\_modifier;manner} \texttt{modification\_type=verb\_modifier;manner}\}

11.3 Sentence Modifiers

Sentence modifiers modify whole sentences. The code for sentence modifiers is \texttt{sentence\_modifier}.

191a. \texttt{Unfortunately}, I wasn’t able to visit him.

191b. \texttt{Frankly}, it wasn’t very good.

192. \{\texttt{base=frankly} \texttt{modification\_type=intensifier} \texttt{modification\_type=sentence\_modifier;manner} \texttt{modification\_type=verb\_modifier;manner}\}

11.4 Verb Modifiers

Verb modifiers modify the verb phrase. The code for verb modifiers is \texttt{verb\_modifier}.

193a. Fred typed \texttt{busily} all day.
He worked slowly and carefully.

{base=carefully
 entry=E0015341
 cat=adv
 variants=adv
 modification_type=verb_modifier;manner
 }

11.5 Locative, Temporal and Manner Adverbs

Sentence and verb modifiers are given one additional feature from the set locative, temporal, or manner.

11.5.1 Locative

Locative adverbs indicate direction, location, etc. As a diagnostic, the interrogative adverb where generally elicits a locative adverbial answer.

195a. He didn’t run far.
195b. He walked the dog around.

{base=around
 entry=E0010426
 cat=adv
 variants=adv
 modification_type=verb_modifier;locative
 modification_type=particle
 }

11.5.2 Temporal

Temporal adverbs indicate time, duration, etc. As a diagnostic, the interrogative adverb when generally elicits a temporal adverbial answer.

197a. The newspaper arrives daily.
197b. She exercises often.

{base=often
 entry=E0043653
 cat=adv
 variants=adv
 modification_type=verb_modifier;temporal
 }

11.5.3 Manner

Manner adverbs indicate the way an action was accomplished. As a diagnostic, the interrogative adverb how generally elicits a manner adverbial answer.

199a. The teacher politely assessed the student.
199b. They taunted him cruelly.

{base=politely
 entry=E0015341
 cat=adv
 variants=adv
 modification_type=verb_modifier;manner
 }
12. Interrogative

Certain pronouns, adverbs and determiners are subject to wh-movement in the formation of questions, and relative clauses. These wh-elements are marked with the code **interrogative**.

### 12.1 Interrogative Pronouns

The interrogative pronouns are: *what, whatever, when, where, which, whichever, who, whoever, whom, whomever, and whose*.

201a. What did you say?  
201b. Who did you see?

### 12.2 Interrogative Adverbs

The interrogative adverbs are: *how, however, when, whence, whenever, where, wherein, wherever, whither, why, whyever*.

203a. How did you do that?  
203b. Where have you been?

### 12.3 Interrogative Determiners

The interrogative determiners are: *what, whatever, which, whichever*.
205a. Which book did you buy?
205b. What book would you recommend?

206. 

\{base=which
  entry=E0065318
  cat=det
  variants=free
  interrogative
\}

13. Negation

There are two classes of negative adverbs recognized in SPECIALIST, true sentence negators and broadly negative adverbs. The two types are discussed in 13.1 and 13.2.

13.1 True Negative Adverbs

Negative adverbs, which produce true sentence negation, are given the feature negative. Sentence negation produces a sentence contradictory to its positive counterpart. 207b. is a sentence negation of 207a. as evidenced by the fact that 207c. is contradictory.

207a. I eat pizza.
207b. I never eat pizza.
207c. * I eat pizza and I never eat pizza.

208. 

\{base=never
  entry=E0042565
  cat=adv
  variants=inv
  modification_type=sentence_modifier;temporal
  negative
\}

The negative contracted forms of modals and auxiliaries also have the feature negative with the same meaning.

13.2 Broadly Negative Adverbs

The feature broad_negative is added to the entries of terms like hardly, scarcely, rarely, barely and seldom which are broadly negative.

Broadly negative adverbs are not strictly sentence negators, but they trigger certain syntactic phenomena associated with negation, specifically polarity items, positive question tags, and fronting with subject/aux inversion. They are not strict sentence negators in that they do not produce a contradiction when conjoined to their positive counterpart. 209a. and 209b. are not contradictory because hardly and seldom are broad negative adverbs. Compare those to 210a. and 210b. which are contradictory.

209a. I hardly finished the work, but I did finish it.
209b. He seldom fails exams, but sometimes he does.
Broadly negative adverbs participate in syntactic phenomena associated with negation. Three such phenomena are discussed below.

**Negative polarity items:**

Broadly negative adverbs allow negative polarity items, just as strict negatives do.

- **211a.** He never lifted a finger to help. (strict negative)
- **211b.** I have hardly any beans left. (broad negative)
- **211c.** I seldom had any beans left. (broad negative)
- **211d.** I have any beans left.

- **212a.** He did not lift a finger to help. (strict negative)
- **213a.** He hardly lifted a finger to help. (broad negative)
- **213b.** He seldom lifted a finger to help. (broad negative)
- **213c.** He lifted a finger to help.

**Positive question tags:**

Strict negatives co-occur with positive question tags. The broad negative adverb *scarcely* in 214b. and 214d. is subject to dialectal variation - for some speakers it is grammatical only with positive question tags, like the strict negation in 214a. and 214c., but for other speakers it is grammatical only with negative question tags, as in 214d. and 215b.

- **214a.** They don’t seem to care, do they? (strict negative)
- **214b.** (*)They scarcely seem to care, do they? (broad negative)
- **214c.** (*)They don’t seem to care, don’t they? (strict negative)
- **214d.** (*)They scarcely seem to care, don’t they? (broad negative)

- **215a.** (*)They hardly have any friends, have they?
- **215b.** (*)They hardly have any friends, haven’t they?

**Fronting with subject/aux inversion:**

Both strict and broad negatives allow subject/aux inversion with fronting. The broad negative in 216b. allows inversion with fronting just like the strict negative in 216a.

- **216a.** Never had he seen a more perfect apple. (strict negation)
- **216b.** Hardly have I ever used a better dictionary. (broad negative)

217. {base=seldom
eq=E0055050
   cat=adv
   variants=inv
   modification_type=sentence_modifier;manner
   broad_negative
}
14. Pronouns
Pronouns in the SPECIALIST lexicon are involved in 3 systems:

1. variants - concerns person/number verb agreement.
2. gender - concerns reference/coreference.
3. type - concerns government, possession, reflexiveness, quantification and deixis.

Each of these systems is discussed in sections 14.1 through 14.3 below.

14.1 Person and Number
Person and number are matters of agreement or concord. The codes which mark person and number for pronouns are recorded as fillers of the variants= slot. They are described in Section 4.6 on page 26. Table 11, which describes the fillers of the variants= slot for pronouns, is repeated here for convenience.

<table>
<thead>
<tr>
<th>Slot</th>
<th>Fillers</th>
</tr>
</thead>
<tbody>
<tr>
<td>variants=</td>
<td>fst_plur</td>
</tr>
<tr>
<td></td>
<td>fst_sing</td>
</tr>
<tr>
<td></td>
<td>free</td>
</tr>
<tr>
<td></td>
<td>sec_plur</td>
</tr>
<tr>
<td></td>
<td>sec_sing</td>
</tr>
<tr>
<td></td>
<td>second</td>
</tr>
<tr>
<td></td>
<td>third</td>
</tr>
<tr>
<td></td>
<td>thr_plur</td>
</tr>
</tbody>
</table>

Table 29. Fillers of the variants= slot for pronouns.

14.2 Gender for Personal Pronouns
The gender= slot records restrictions on the referents/antecedents of pronouns in terms of humanness and sex.

<table>
<thead>
<tr>
<th>Slot</th>
<th>filler</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender=</td>
<td>pers(masc)</td>
</tr>
<tr>
<td></td>
<td>pers(fem)</td>
</tr>
<tr>
<td></td>
<td>pers</td>
</tr>
<tr>
<td></td>
<td>neut</td>
</tr>
</tbody>
</table>

Table 30. Fillers of the gender= slot for pronouns

The organization of gender codes in SPECIALIST is illustrated in Figure 1 on page 73. Pronouns marked pers refer only to humans (or figurative humans), pers(masc) pronouns refer only to male humans (or figurative male humans) and pers(fem) pronouns refer to female humans (or
Figure 1. gender codes for pronouns

figurative female humans). Pronouns marked neut (for neuter) refer only to non-humans. Pronouns not marked for gender place no human or sex restrictions on their referents or antecedents.

218.  {base=she
e  entry=E0055585
cat=pron
variants=thr_sing
gender=pers(fem)
type=subj
14.3 Type

Type covers a variety of phenomena, discussed in 14.3.1 through 14.3.6. The fillers of the type= slot are summarized in Table 31.

<table>
<thead>
<tr>
<th>slot</th>
<th>filler</th>
<th>Concerned with</th>
</tr>
</thead>
<tbody>
<tr>
<td>type=</td>
<td>obj</td>
<td>Government</td>
</tr>
<tr>
<td></td>
<td>subj</td>
<td></td>
</tr>
<tr>
<td></td>
<td>poss</td>
<td>Possession</td>
</tr>
<tr>
<td></td>
<td>possnom</td>
<td></td>
</tr>
<tr>
<td></td>
<td>refl</td>
<td>Reflexivity</td>
</tr>
<tr>
<td></td>
<td>univ</td>
<td></td>
</tr>
<tr>
<td></td>
<td>indef(neg)</td>
<td>Quantification</td>
</tr>
<tr>
<td></td>
<td>indef(assert)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>indef(nonassert)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>dem</td>
<td>Deixis</td>
</tr>
</tbody>
</table>

Table 31. Fillers of the type= slot for pronouns

14.3.1 Government

Each pronoun has a type code indicating its case: subj for nominative case and obj for accusative case. Nominative case pronouns can occur in subject position and accusative case pronouns can
occur in object position. The pronoun he is nominative (subj), not accusative (obj); so 221b. is ill formed. Him is accusative (obj), not nominative (subj); so 222b. is ill formed.

221a. He talked to the committee.
221b. * The committee talked to he.

222a. The committee talked to him.
222b. * Him talked to the committee.

Pronouns which can occur either in subject or object positions get both subj and obj type codes. The pronoun it can be either nominative or accusative.

225a. It saw me.
225b. I saw it.

14.3.2 Possession

The type codes poss and possnom indicate possessive pronouns. Pronouns marked poss are pre-nominal possessive pronouns which occur before nouns in noun phrases; they cannot occur as noun phrases or heads of noun phrases.

227b. His book is on the table.
227c. Its name is Fido.
227d. *My is on the table.

The pronouns marked **poss** are: *her, his, its, my, one’s, our, their, whose and your.*

228. 

Pronouns marked **possnom** are possessive nominals which can be noun phrases, or appear in predicative constructions.

229a. Mine is on the table.
229b. That book is mine.
229c. Yours died.
229d. The tadpole that died was yours.
229e. *Her died. (poss)
229f. *The tadpole that died was her. (poss)

Possessive nominals are doubly pronominal; *mine* represents the second person and refers to something possessed by the second person. The possessive nominal pronouns are: *hers, his, mine, ours, theirs, and yours.*

230. 

Two pronouns, *his* and *whose*, are both pre-nominal possessives and possessive nominals. They are given both codes **poss** and **possnom**. Possessive (genitive) noun phrases are like *his* in this respect.

231a. His book is on the table.
231b. His is on the table.
231c. The book on the table is his.
232b. John’s is on the table.
232c. The book on the table is John’s.
14.3.3 Reflexive

Reflexive pronouns, which occur obligatorily in the same clause following their antecedents, are marked with the type code `refl`.

234a. John saw himself.

The reflexive pronouns are: *herself, himself, itself, myself, oneself, themself, themselves, yourself, and yourselves.*

14.3.4 Quantification

Pronouns which have quantifier like properties receive one of the type codes `univ`, `indef(assert)`, `indef(nonassert)` or `indef(neg)`.

Pronouns which are manifestations of a universal quantifier are marked with the code `univ` in their type= slot. The universally quantified pronouns are: *all, each, everybody, everyone, everything.*

Indefinite pronouns are divided into three series corresponding to the quantifiers they contain; *some, any or no.* Indefinite pronouns of the non-assertive series, *(any)* are marked `indef(nonassert)`; indefinite pronouns of the assertive series *(some)* are marked `indef(assert)`; and indefinite pronouns of the negative series *(no)* are marked `indef(neg)`.

The code `indef(neg)` is equivalent to the feature negative. It indicates a sentence negation.

1. The `indef(nonassert)` pronouns are: *any, anybody, anyone, and anything.*

236. {base=anybody
       entry=E0009846
2. The **indef(assert)** pronouns are: *some, somebody, someone*, and *something*.

237. {base=something
   entry=E0056737
   cat=pron
   variants=thr_sing
   gender=neut
   type=indef(assert)
   type=obj
   type=subj
}

3. The **indef(neg)** pronouns are: *nobody, none, no one*, and *nothing*.

238. {base=none
   entry=E0042838
   cat=pron
   variants=third
   type=indef(neg)
   type=obj
   type=subj
}

14.3.5 Deixis

Demonstrative pronouns have the code **dem** in their **type** slot. The demonstrative pronouns are: *that, these, this* and *those*. These pronouns are also demonstrative determiners, and the **type=dem** code is equivalent to the **demonstrative** code for determiners.

239a. That is a big fish.
239b. This is an even bigger one.

240. {base=this
   entry=E0060693
   cat=pron
   variants=thr_sing
   type=dem
   type=obj
}

The SPECIALIST Lexicon
The feature **demonstrative** marks the deictic determiners: *this*, *that*, *these*, and *those*. Each of those determiners is also a demonstrative pronoun.

241a. That fish is really big.
241b. This fish is even bigger.

242. {base=that
   entry=E0060479
   cat=det
   variants=singuncount
   demonstrative
   }

14.3.6 Deictic Determiners
### Symbols

**A**
- abbreviation_of = 60
- acronym_of = 60
- adj = 9
- adv = 10
- advbl = 37
- arbc = 42, 52
- ascomp = 50
- attrib(1) = 61
- attrib(2) = 61
- attrib(3) = 61
- attribc = 64
- aux = 11

**B**
- bincmp = 45
- broad_negative = 71

**C**
- cat= = 11
- compl = 11
- compl= = 32
- conj = 11
- cplxtran= = 37

**D**
- dem = 75
- demonstrative = 79, 80
- ditran= = 35

**E**
- edcomp = 44

**F**
- fincomp = 47
- fincomp(o) = 47
- fincomp(p) = 47
- fincomp(s) = 48
- fincomp(sp) = 48
- fincomp(t) = 47
- fincomp(tp) = 48
- fincomp(ts) = 48
- fincomp(tsp) = 48
- free (determiner) = 32
- fst_plur = 15
- fst_sing = 15

**G**
- gender= = 73
- gireg = 23
- group = 27
- groupuncount = 28

**I**
- indef(assert) = 79
- indef(neg) = 79
- indef(nonassert) = 79
- infcomp = 41
- ingcomp = 46
intensifier 68
interrogative 70
intran 33
inv (adjective) 19
inv (adverb) 21
inv (noun) 25
irreg 19, 21, 24
L
link= 36
locative 69
M
manner 69
metareg 24
modal 15
modification_type= 67
N
negative 71
neut 73
nominalization= 59
nominalization_of= 59
nopass 51
noun 11
np 38
nsc 55
nsr 55
O
obj (pronoun type)  75
objc 35
objr 35
P
part() 50
particle 68
past 12
past_part 12
periph 20
pers 73
pers(fem) 73
pers(masc) 73
plur 25
plur (determiner) 30
pluruncount 31
position= 62
poss 76
possnom 76
post  65
pphr( , ) 40
pphr( , ,pphr( , )) 40
pred 65
prep 11
pres 12
pres_part 12
pron 11
proper 60
R
refl 78
reg 12, 19, 20
regd 19

S
sec_plur 29
sec_sing 29
second 15, 29
sentence_modifier 68
sing 24
sing (determiner) 31
singuncount (determiner) 31
spelling_variant= 5
stative 66
subj 50
subj (pronoun type) 75
subjc 42
subjr 42

T
temporal 69
third 15, 29
thr_plur 15, 29
thr_sing 15, 29
tran= 34
type= 75

U
uncount 27
univ 78

V
variant= 15
variants= 11, 15, 29
verb 11
verb_modifier 68

W
whfincomp 49
whinfcomp 50
An index of example lexical entries.

A

abdominal 62
abdominal delivery 7
accumulate 59
accumulation 59
acetylcholine 60
ACh 60
acoustic 20
Act 6
acute 62
adequacy 54
always 21
anesthetic 5
anybody 78
appear 49
around 69
Austria 60
awareness 53

B

be 16
beer 6
breeze 52

C

calf 24
can 18
cardiac 64
careful 56
carefully 69

D

decision 54
deer 25
dirt 27
<table>
<thead>
<tr>
<th>Letter</th>
<th>Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>do</td>
<td>17</td>
</tr>
<tr>
<td>E</td>
<td>each 30, eager 56, early 20, elect 65</td>
</tr>
<tr>
<td>F</td>
<td>frankly 68</td>
</tr>
<tr>
<td>G</td>
<td>give 32</td>
</tr>
<tr>
<td>H</td>
<td>have 17, he 75, 76, herself 78, him 76, his 78</td>
</tr>
<tr>
<td>I</td>
<td>increase 39, it 75</td>
</tr>
<tr>
<td>L</td>
<td>likely 57</td>
</tr>
<tr>
<td>M</td>
<td>many 30, may 16, more 31, much 31, must 16</td>
</tr>
</tbody>
</table>
| N | }
| n | a | s | t | y | 6 | 7 |
| n | e | v | e | r | 7 | 1 |
| n | o | n | e | _ | 7 | 9 |

O

often **21, 69**

P

**PCB 60**
politely **69**
polychlorinated **60**
proper **66**
purple **63**

Q

quite **68**

R

**reason 53**
right **52**

S

seldom **72**
severe **63**
she **74**
some **32**
something **79**
sure **58**
surroundings **25**

T

tall **67**
tear **50**
that **80**
this **31, 79**
treat **9**
U

up 68

W

well 21
what 70
which 71
why 70
will 18
wooden 64

Y

your 77
yours 77