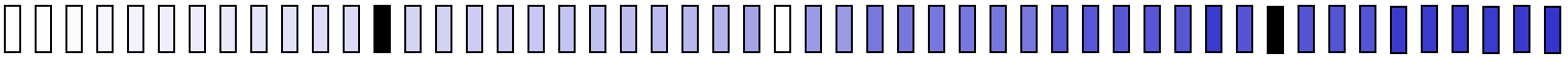
The SPECIALIST Lexicon and Lexical Tools

- Allen Browne
- Guy Divita
- Chris Lu



UMLS Knowledge Source Server (UMLSKS)

UMLSKS Version 2.1 UMLS Releases: 2002 2002AB

Metathesaurus | Semantic Network | SPECIALIST Lexicon

Search | Advanced Search | Documentation | Resources | Views/Profiles | Logout

Metathesaurus Focused Search:

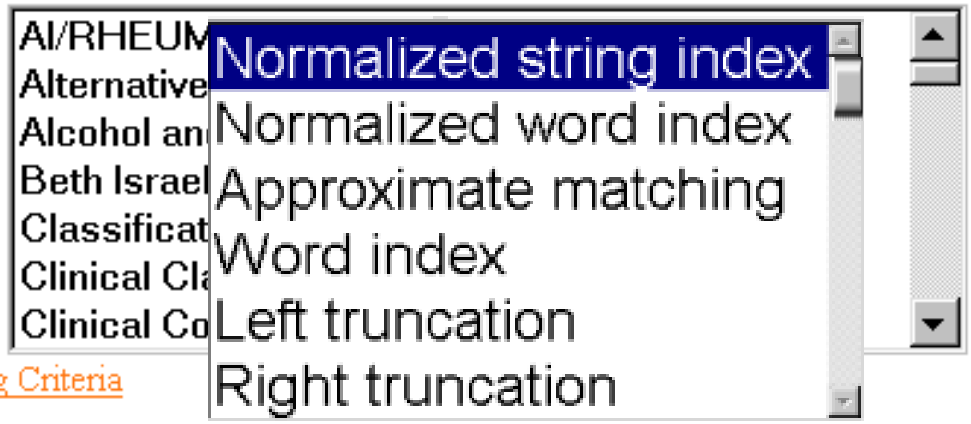
1) Select UMLS Release: 2002AB

2) Enter a term or a concept unique identifier (CUI):

- (•) Exclude suppressible synonyms
- ( ) Include suppressible synonyms

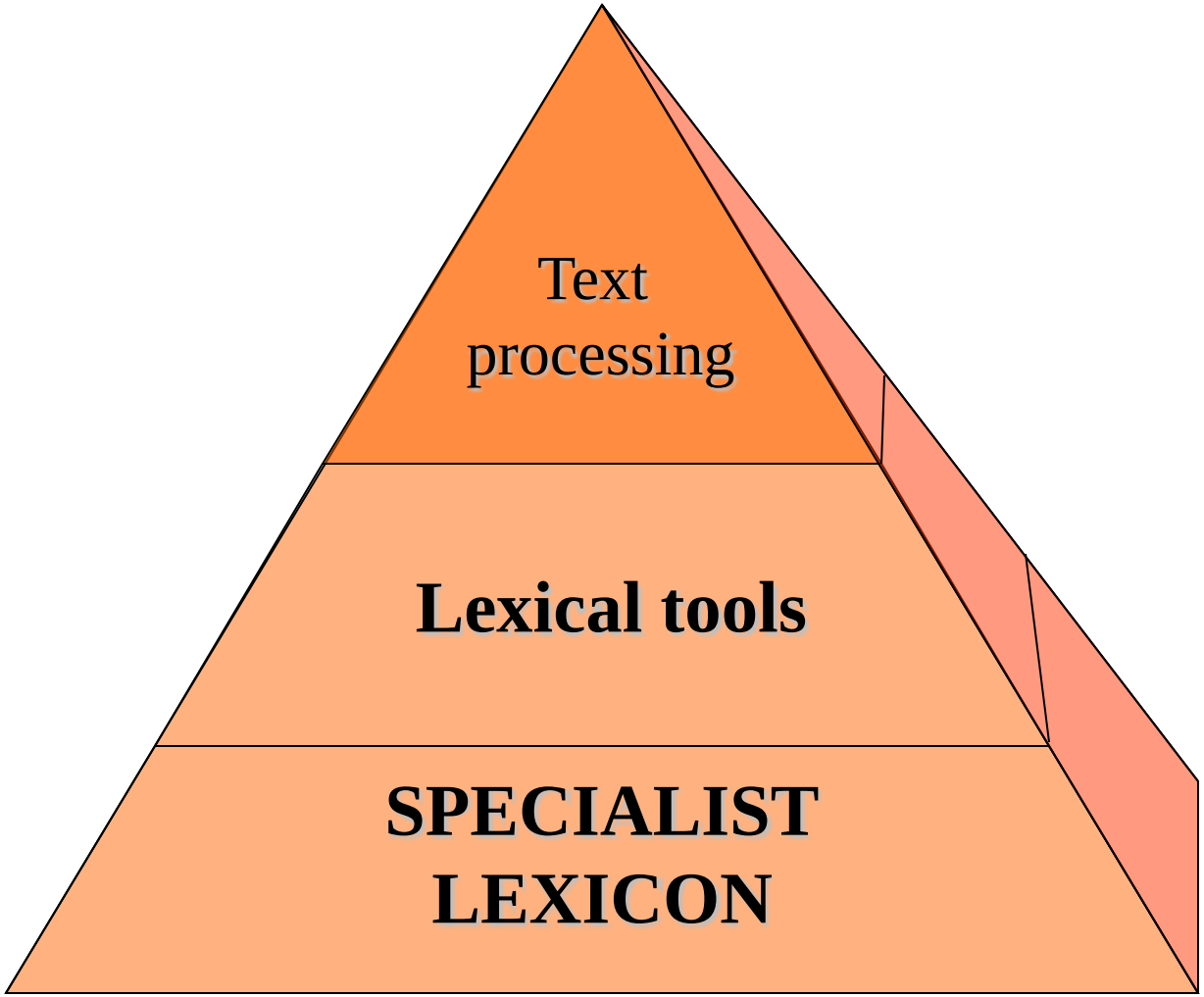
3) Restrict source vocabulary to:

(•) All Source Vocabularies ( ) Restrict to selected sources:



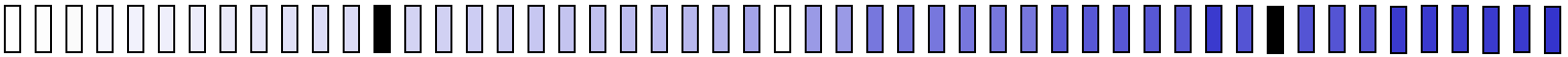
4) String Matching Criteria

Perform Concept Search | Perform Term Search


Text
processing
Lexical tools
SPECIALIST
LEXICON

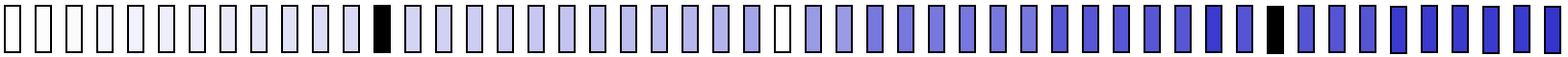
The SPECIALIST Lexicon

- A syntactic lexicon
- Biomedical and general English
- Over 180,000 records

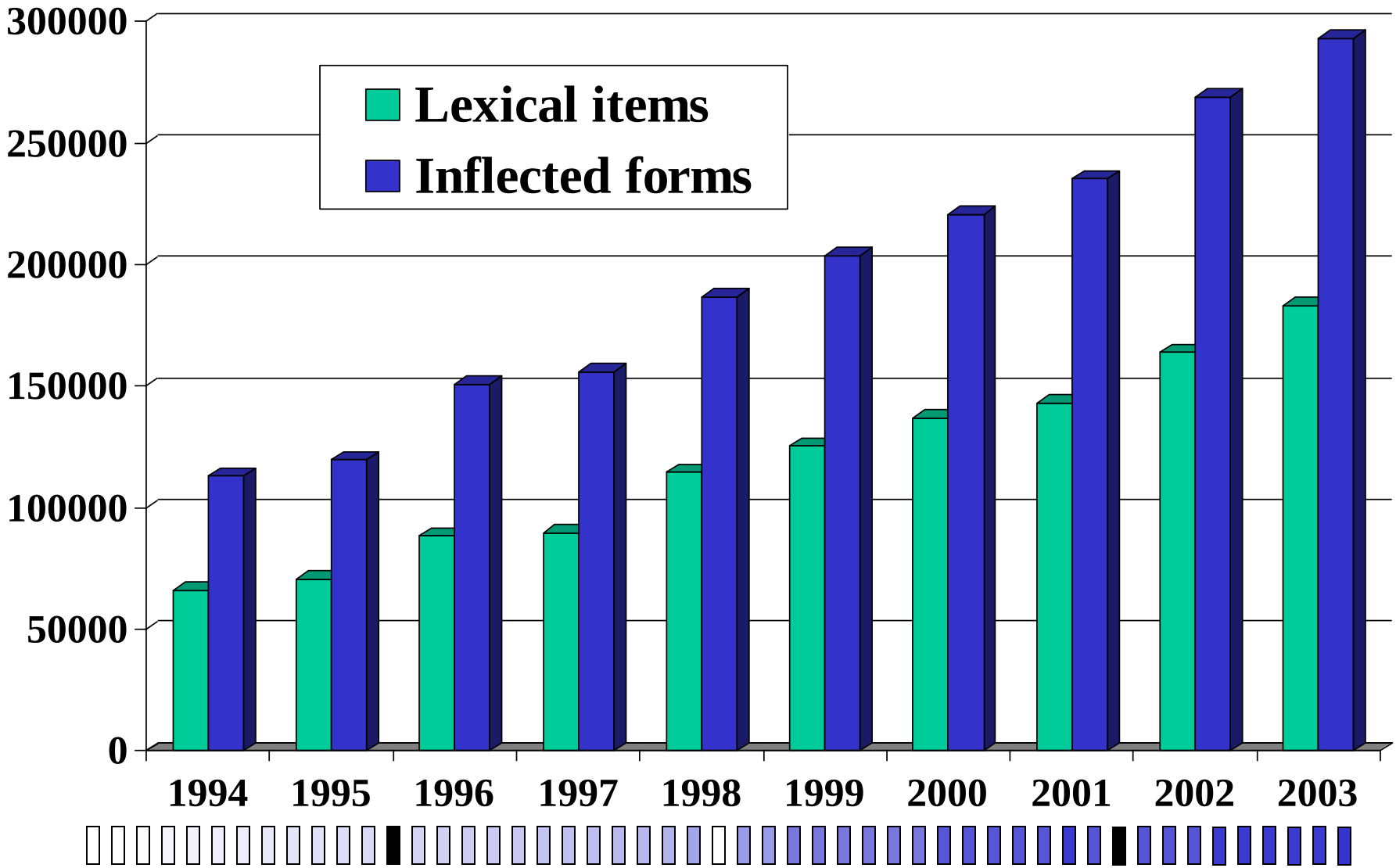


The SPECIALIST Lexicon

- General English:
- 10,000 most frequent words from the American Heritage word frequency list
- 2,000 words used by Longman's Dictionary of Contemporary English
- Verbs and adjectives identified by heuristics



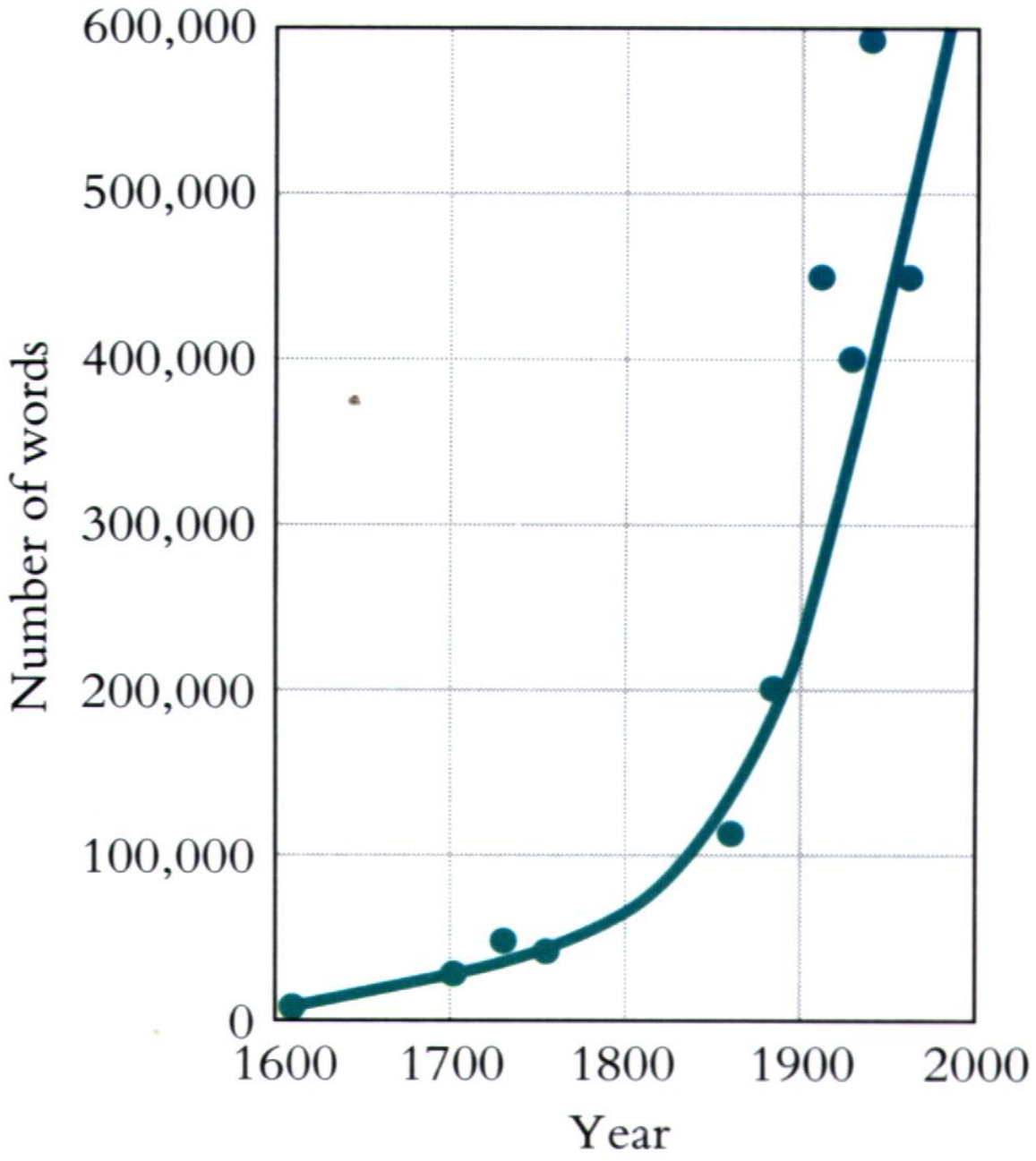
Lexicon Growth



George A. Miller

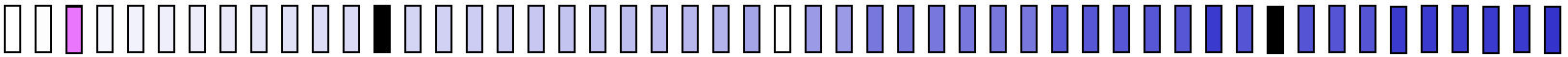
The Science of Words

1991



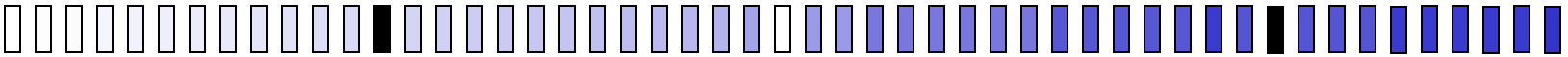
The SPECIALIST Lexicon

- Morphology
  - Inflection
  - Derivation
- Orthography
  - Spelling variants
- Syntax
  - Complementation for verbs, nouns, and adjectives



Morphology

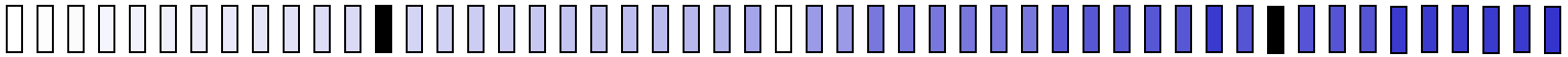
- Inflectional
  - nucleus -- nuclei
  - cauterize, cauterizes, cauterized, cauterizing
  - red, redder reddest
- Derivational
  - laryngeal -- larynx
  - transport -- transportation



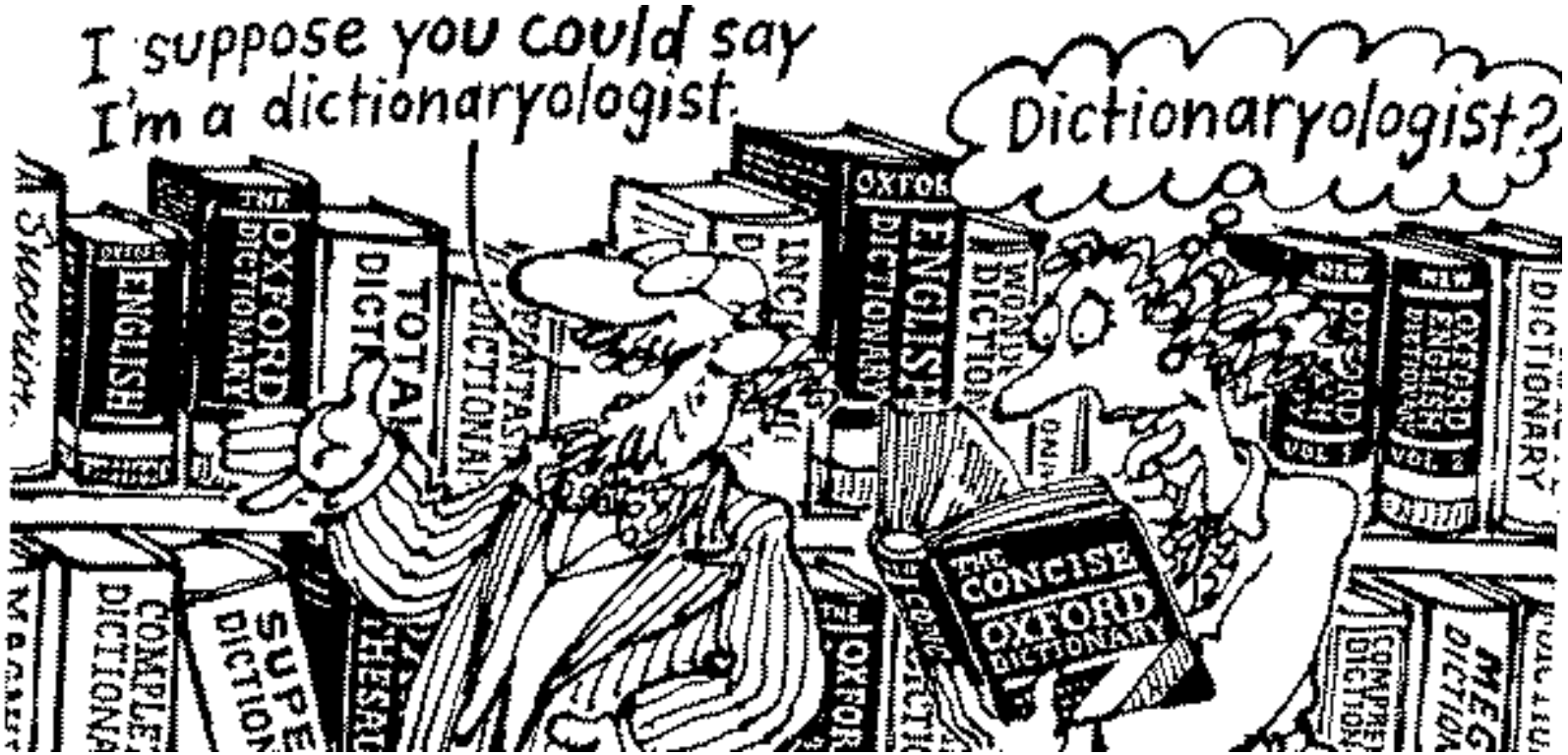
Inflectional Morphology

The pitcher wound up and he flang the ball at the batter. The batter swang and missed. The pitcher flang the ball again and this time the batter connected. He hit a high fly right to the center fielder. The center fielder was all set to catch the ball, but at the last minute his eyes were blound by the sun and he dropped it.

--J. H. "Dizzy" Dean



Derivational Morphology

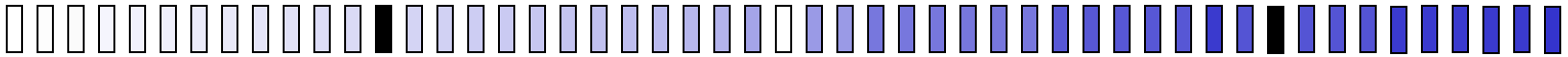


Dictionary + ology + ist

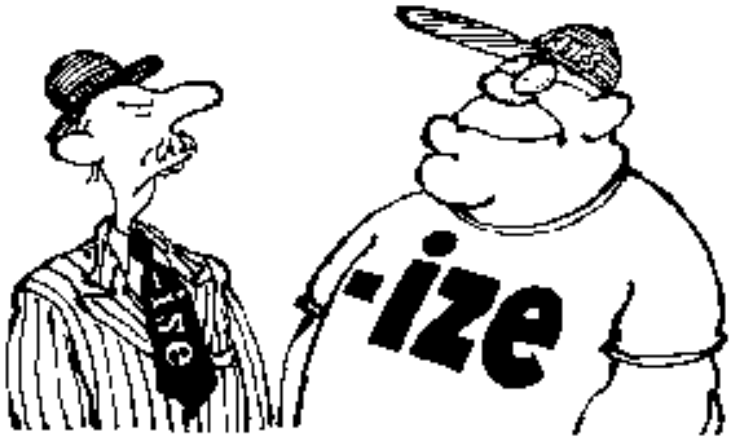
Orthography

Spelling Variation

- **align -- aline**
- **Grave’s disease -- Graves’s disease -- Graves’ disease**
- **anesthetize -- anaesthetise**
- **esophagus -- oesophagus**



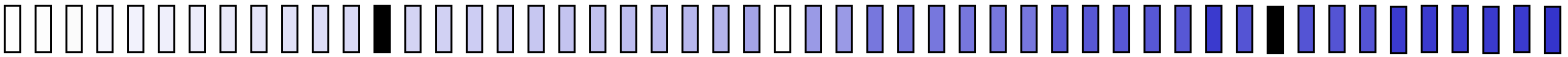
British and American Spelling



- Criticise -- criticize
- naturalise --naturalize
- centre -- center
- foetus -- fetus

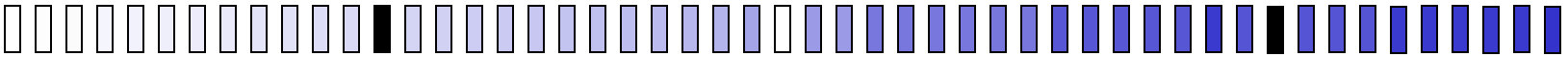
Syntax -- Verb Complements

- Intran
  - I’ll treat.
- tran=np
  - He treated the patient.
- ditran=np,pphr(with,np)
  - She treated the patient with the drug.

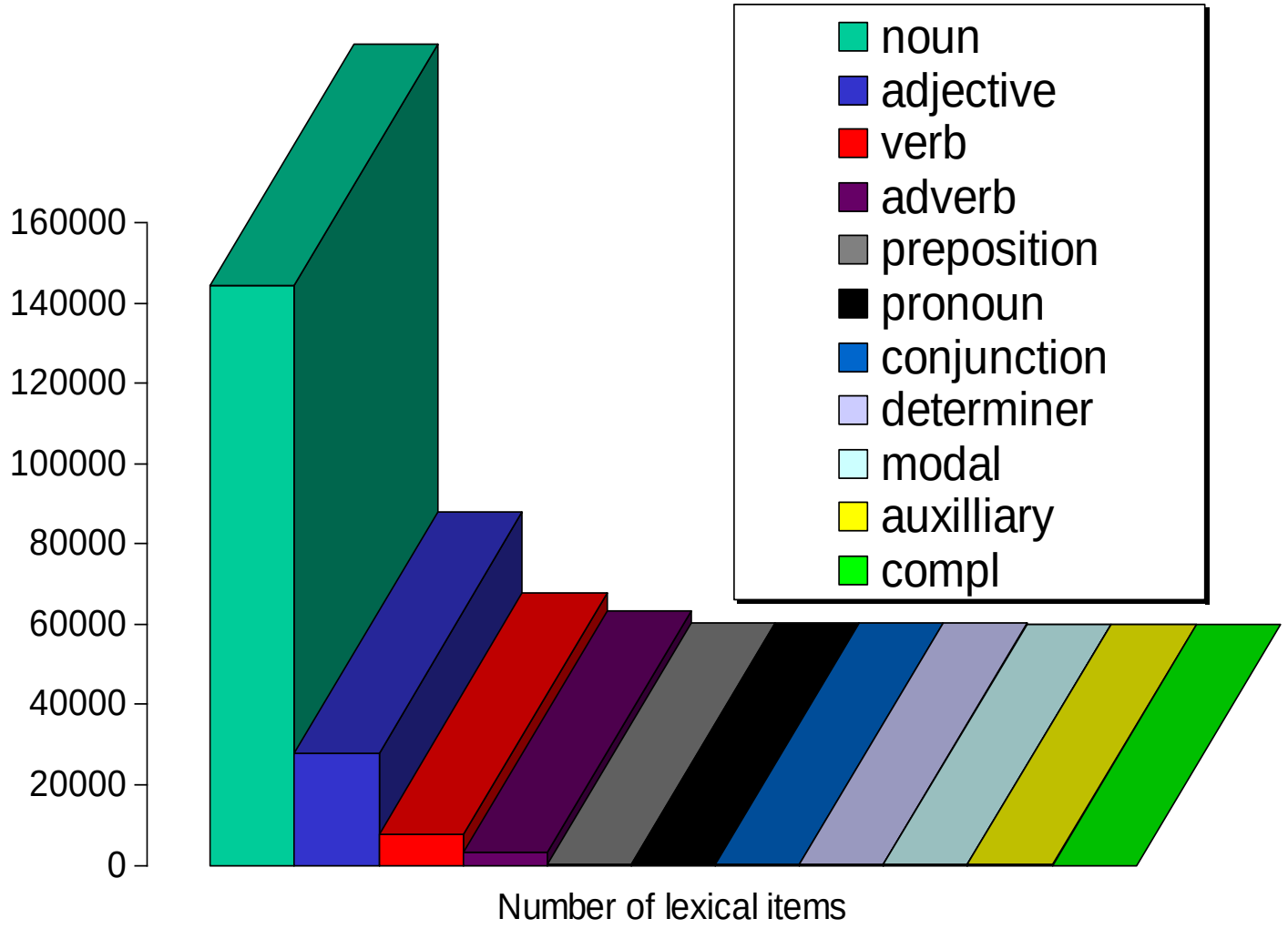


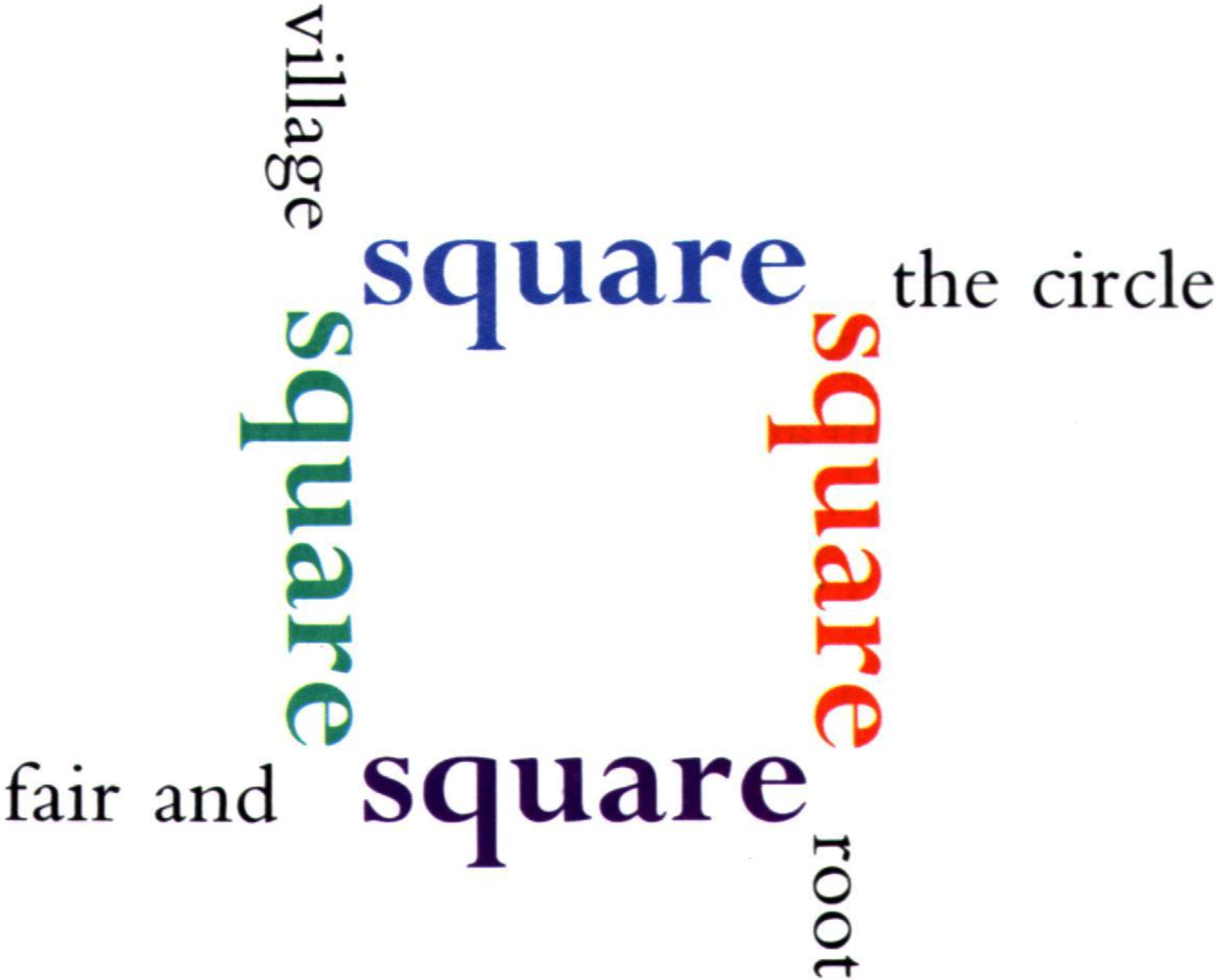
Syntax -- Verb Complements

{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
}



The 2003 SPECIALIST Lexicon




village
square
the circle
square
square
fair and
square
root

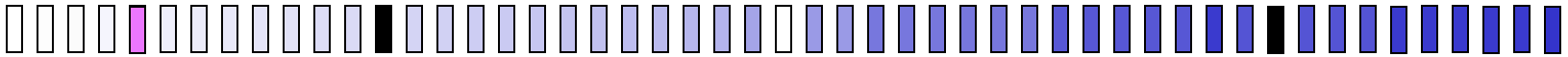
Lexicon Unit Records

{**base=**Kaposi's sarcoma
spelling_variant=Kaposi sarcoma
entry=E0003576
cat=noun
variants=uncount
variants=reg
variants=glreg
}

{**base**=chronic
entry=E0016869
cat=adj
variants=inv
position=attrib(1)
position=pred
stative
}

{**base**=aspirate
entry=E0010803
cat=verb
variants=reg
tran=np
nominalization=aspiration|noun|E0010804
}

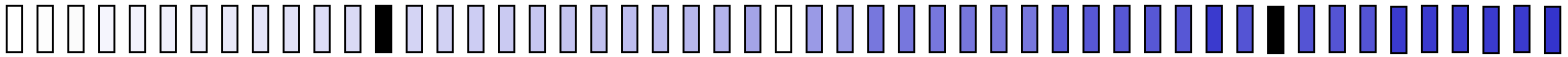
{**base**=in
entry=E0033870
cat=prep
}



Noun Variants

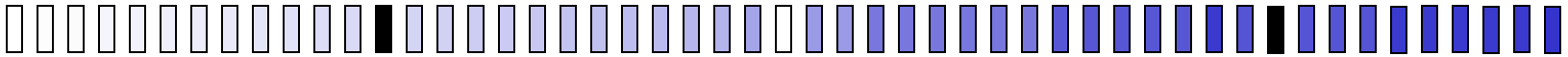
{base=Kaposi's sarcoma
spelling_variant=Kaposi sarcoma
entry=E0003576
cat=noun
variants=uncount
variants=reg
variants=glreg
}

- Kaposi’s sarcoma
- Kaposi’s sarcomas
- Kaposi’s sarcomata
- Kaposi sarcoma
- Kaposi sarcomas
- Kaposi sarcomata



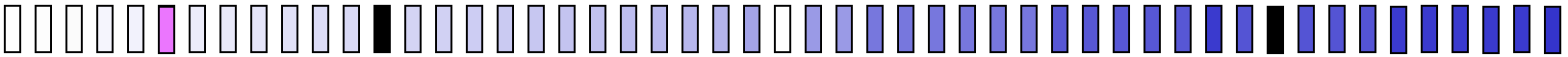
Regular Nouns

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



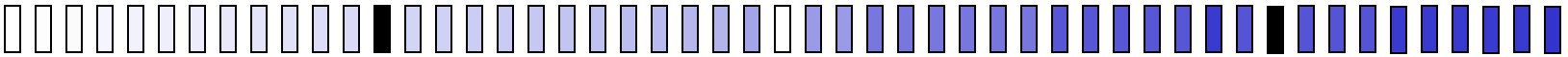
Regular Nouns

Base ends with	Plural ends with	Examples
Cy	Cies	fly: flies
-s	-ses	illness: illnesses
-z	-zes	waltz: waltzes
-x	-xes	box: boxes
-ch	-ches	match: matches
-sh	-shes	splash: splashes
X	Xs	book: books



Greco-latin Regular nouns

singular ends with:	plural ends with:	Examples
–us	–i	focus/foci
–ma	–mata	trauma/traumata
–a	–ae	larva/larvae
–um	–a	ilium/ilia
–on	–a	taxon/taxa
–sis	–ses	analysis/analyses
–is	–ides	cystis/cystides
–men	–mina	foramen/foramina
–ex	–ices	index/indices
–x	–ces	matrix/matrices

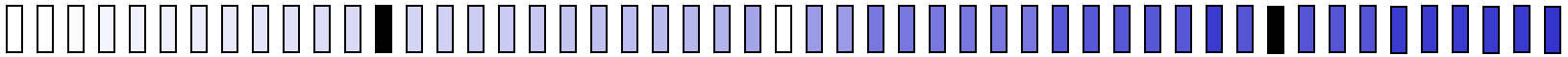


Uncount Nouns

(abstract or mass)

```
{base=smallpox
entry=E0056359
        cat=noun
        variants=uncount
}
{base=potassium
entry=E0049387
        cat=noun
        variants=uncount
}
```

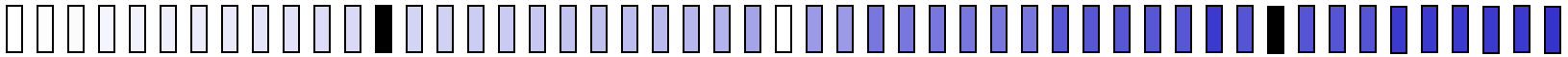
- * a smallpox
- * two smallpoxes
- much smallpox
- * a potassium
- * two potassiums
- much potassium



Fixed Plural Nouns

{base=police
entry=E0048616
cat=noun
variants=plur
}

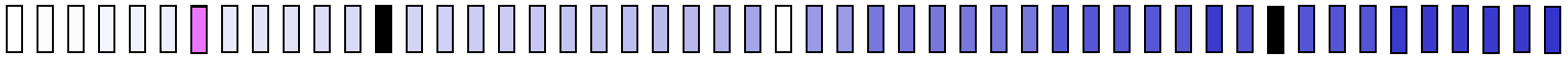
{base=scissors
entry=E0054633
cat=noun
variants=plur
}



Irregular Nouns

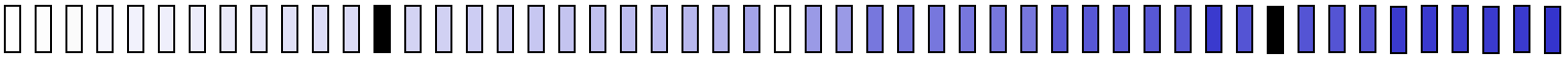
{base=corpus
entry=E0019113
cat=noun
variants=irreg|corpora|
variants=reg
}

{base=larynx
entry=E0036919
cat=noun
variants=irreg|larynges|
variants=reg
}



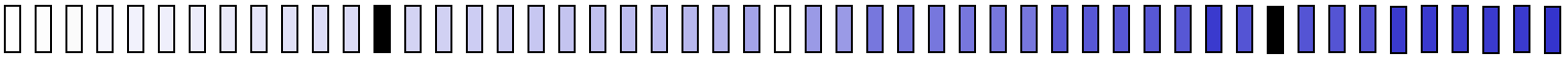
Regular Verbs

- The third person present tense suffix is *s*.
  - *y* becomes *ie* following a consonant before *s*.
  - *e* is inserted between z, x, ch, or sh and *s*.
- The past tense suffix is *ed*.
  - *y* becomes *ie* following a consonant before *ed*.
  - Final *e* is deleted before *ed*.



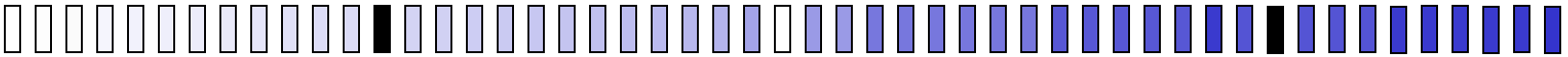
Regular Verbs

- dismiss:dismisses, dismissed, dismissing
- agree: agrees; agreed; agreeing
- dry: dries, dried, drying



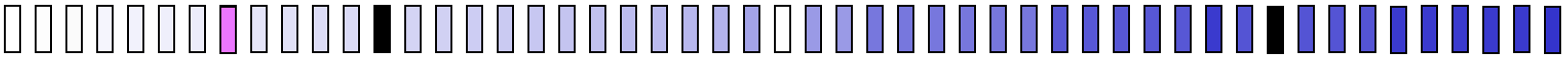
Regular Doubling Verbs

- End in a CVC pattern
- Double the final consonant before *ed* and *ing*.
- Are otherwise regular
- variants=regd
- e.g. control: controls, controlled, controlling



Irregular Verbs

{base=dive
cat=verb
    variants=reg
    variants=irreg|dives|dove|dove|diving|
    intran
    intran;part(in)
    ...
}



Dive vs. Dove

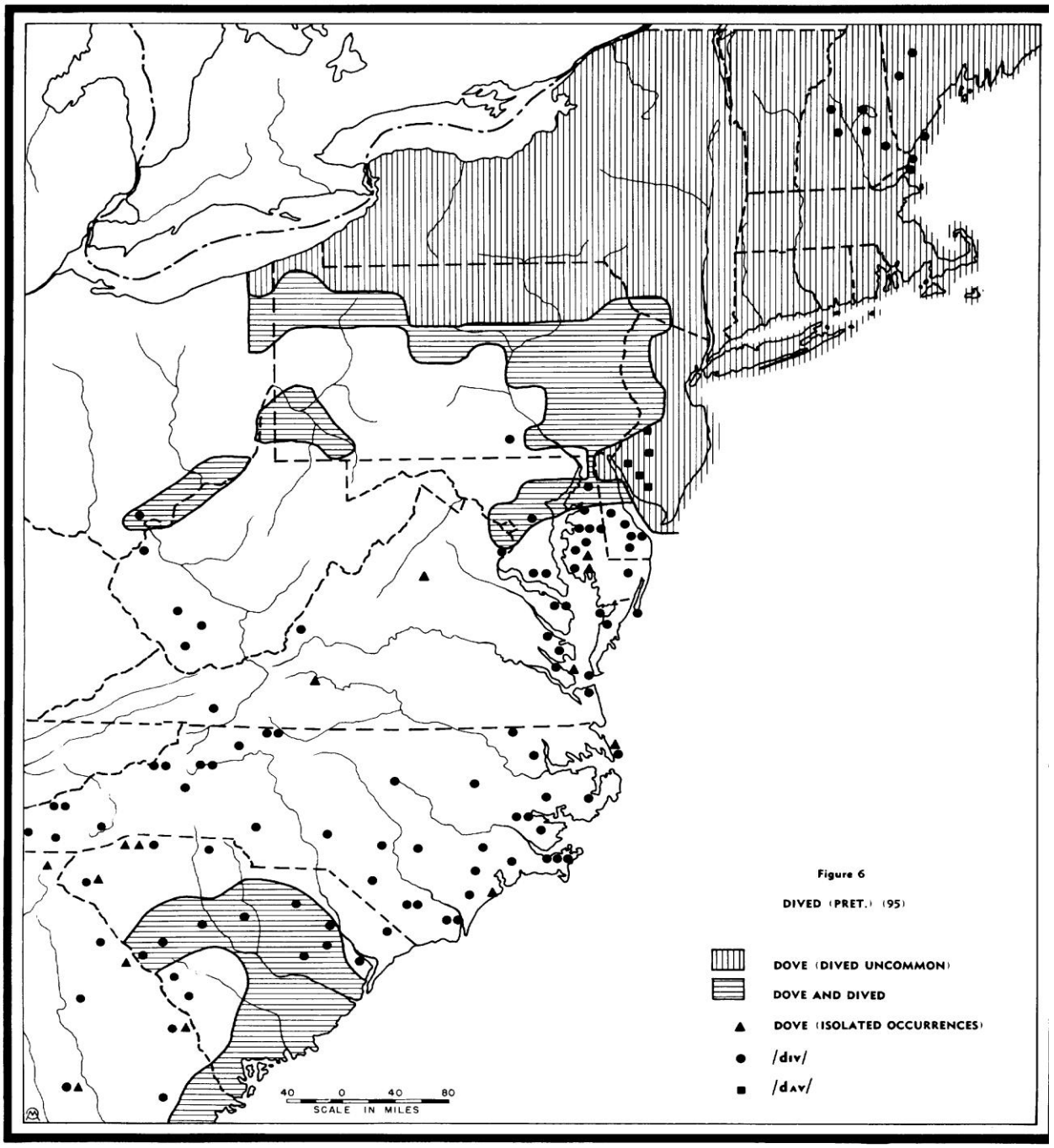
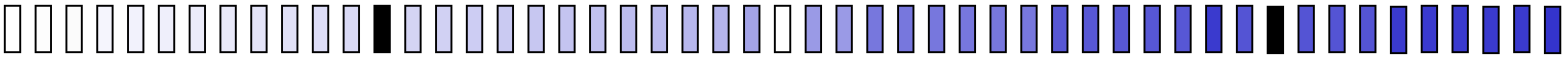


Figure 6
DIVED (PRET.) (95)
DOVE (DIVED UNCOMMON)
DOVE AND DIVED
DOVE (ISOLATED OCCURRENCES)
/dɪv/
/dʌv/
40 0 40 80
SCALE IN MILES

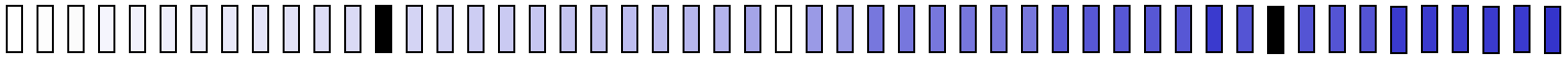
Regular Adjectives and Adverbs

- The comparative suffix is *er*.
- The superlative suffix is *est*.
  - *y* become *ie* after a consonant before *er* or *est*.
  - Final *e* is deleted before *er* or *est*.
- e.g. green: greener, greenest



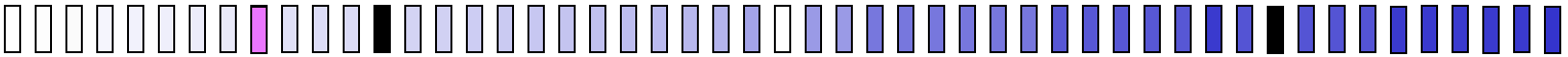
Regular Doubling Adjectives and Adverbs

- CVC final pattern
- Final consonant is doubled before ed or est.
- Otherwise regular
- e.g. red: redder, reddest



Ancillary Data Bases

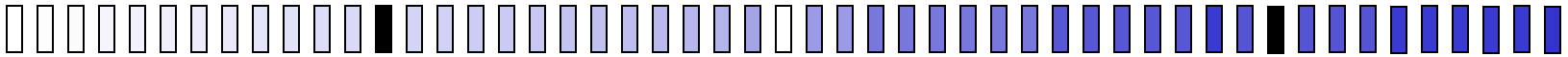
- Synonymy
  - sm.db
- Derivation
  - dm.db, dm.rules
- Inflection
  - im.rules
- Neoclassical compounds
  - nc.db



Derivational Facts and Rules

dm.facts

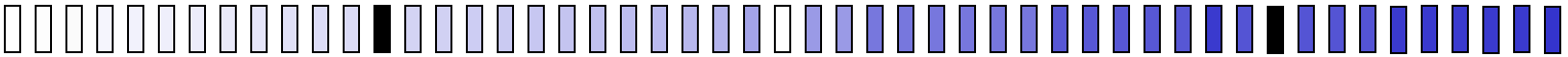
treatment|noun|treat|verb
prohibition|noun|prohibitive|adj
cell lineage|noun|cell line|noun
photochemotherapeutic|adj|photochemotherapy|noun
pharmacotherapeutic|adj|pharmacotherapy|noun



Derivational Facts and Rules

dm.rules

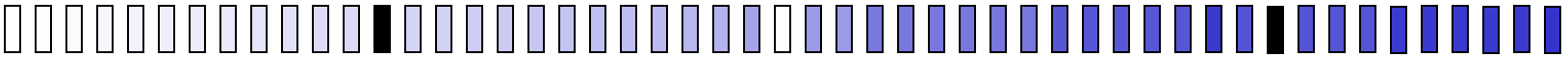
 # e.g. alienation|alienate
ation$|noun|ate|verb
ration|rate; station|state;



Inflectional Facts and Rules

im.rules

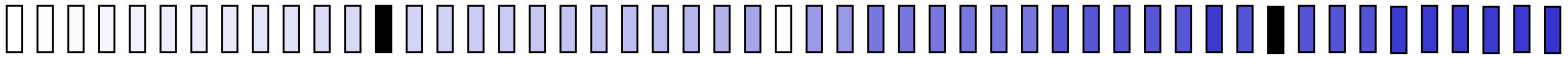
```
# Noun rules (glreg)
us$|noun|singular|i$|noun|plural
    antus|anti;
ma$|noun|singular|mata$|noun|plural
a$|noun|singular|ae$|noun|plural
um$|noun|singular|a$|noun|plural
on$|noun|singular|a$|noun|plural
sis$|noun|singular|ses$|noun|plural
is$|noun|singular|ides$|noun|plural
men$|noun|singular|mina$|noun|plural
ex$|noun|singular|ices$|noun|plural
x$|noun|singular|ces$|noun|plural
```



Neoclassical compounds

nc.db

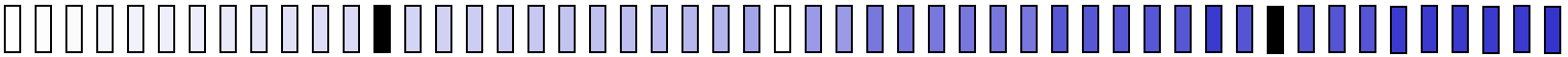
abdomin(o)|abdomen|root
ab|away from|prefix
acanth(o)|prickle|root
acar(o)|mite|root
acetabul(o)|acetabulum|root
ad|towards|prefix
agogue|inducing|terminal
albumin(o)|albumin|root
sis|condition|terminal
stomy|surgical opening|terminal



Synonyms

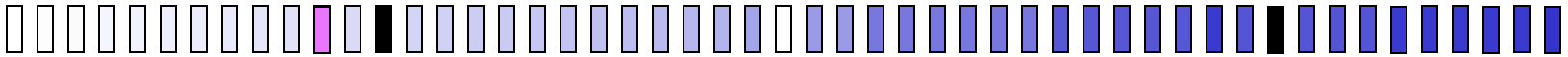
sm.db

alar|adj|wing|noun
amygdaline|adj|tonsil|noun
articular|adj|joint|noun
bulbar|adj|medulla oblongata|noun
fununcular|adj|boil|noun
genicular|adj|knee|noun
hepatocellular|adj|liver cells|noun
lazar|adj|leprosy|noun
lenticular|adj|crystalline lens|noun
ypsiliform|adj|upsiloid|adj
wolfram|noun|tungsten|noun
double vision|noun|diplopia|noun



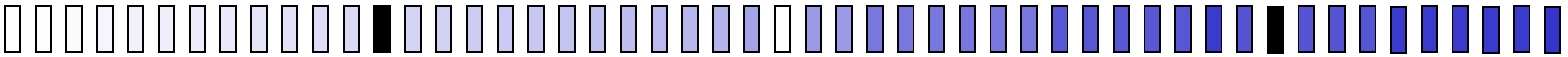
Relational Tables

- One line records
- Pipe separated Fields -- “|”
- Keyed to EUI
- LRAGR matches forms to EUIs
- Word index: LRWD



Relational Tables

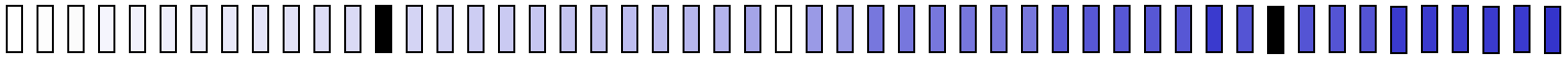
- LRAGR - Agreement
- LRCMP - Complements
- LRFIL - Files
- LRFLD - Fields
- LRMOD - Modification
- LRNOM - Nominalization
- LRPRN - Pronouns
- LRPRP - Properties
- LRSPL - Spelling
- LRTRM - Trademarks
- LRWD - Word index



LRAGR

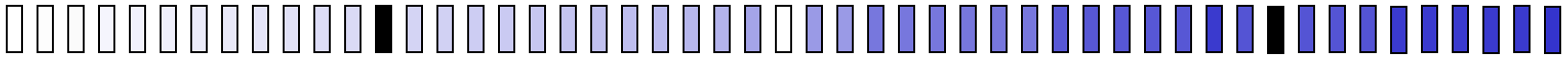
Agreement and Inflection

- EUI - Entry ID
- STR - Inflected form
- SCA - Syntactic category
- AGR - agreement information
- BAS - Base form (morphological)
- CIT - Citation form (base=)



LRAGR

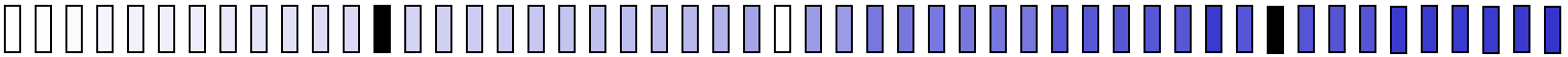
E0003576| Kaposi sarcomas| noun| count(thr_plur)| Kaposi sarcoma| Kaposi's sarcoma|
E0003576| Kaposi sarcomata| noun| count(thr_plur)| Kaposi sarcoma| Kaposi's sarcoma|
E0003576| Kaposi sarcoma| noun| count(thr_sing)| Kaposi sarcoma| Kaposi's sarcoma|
E0003576| Kaposi sarcoma| noun| uncount(thr_sing)| Kaposi sarcoma| Kaposi's sarcoma|
E0003576| Kaposi's sarcomas| noun| count(thr_plur)| Kaposi's sarcoma| Kaposi's sarcoma|
E0003576| Kaposi's sarcomata| noun| count(thr_plur)| Kaposi's sarcoma| Kaposi's sarcoma|
E0003576| Kaposi's sarcoma| noun| count(thr_sing)| Kaposi's sarcoma| Kaposi's sarcoma|
E0003576| Kaposi's sarcoma| noun| uncount(thr_sing)| Kaposi's sarcoma| Kaposi's sarcoma|



Number Words

- ‘one’, ‘thirteen’ ‘fifty’, ‘thousand’, ‘million’
- Not in the lexicon.
  - No part of speech
  - Used to construct number expressions:

    “Three thousand eight hundred and five”
- To be released in the 2003 lexicon.
- Accompanying number tools.



{base=two

cat=number_word

entry=N0000003

variant=second;ordinal

variant=second;denominator,singular;part_denominator

variant=second;denominator,plural;part_denominator

variant=half;denominator,singular;full_denominator

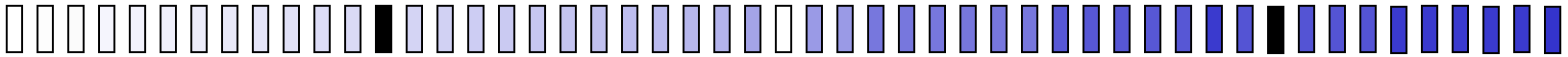
variant=halves;denominator,plural;full_denominator

number_type=unit

value=2

digit=2

}

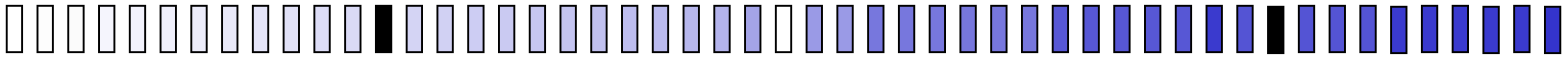


{base=twelve
cat=number_word
entry=N0000013
variants=reg
number_type=teen
value=12
}

{base=billion
cat=number_word
entry=N0000032
variants=reg
number_type=magnitude
power=3
}

{base=twenty
cat=number_word
entry=N0000021
variants=reg
number_type=decade
value=20
digit=2
}

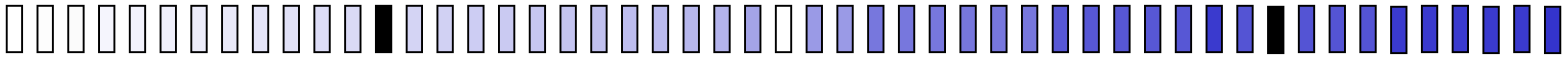
{base=sexdecillion
cat=number_word
entry=N0000046
variants=reg
number_type=magnitude
power=17
}

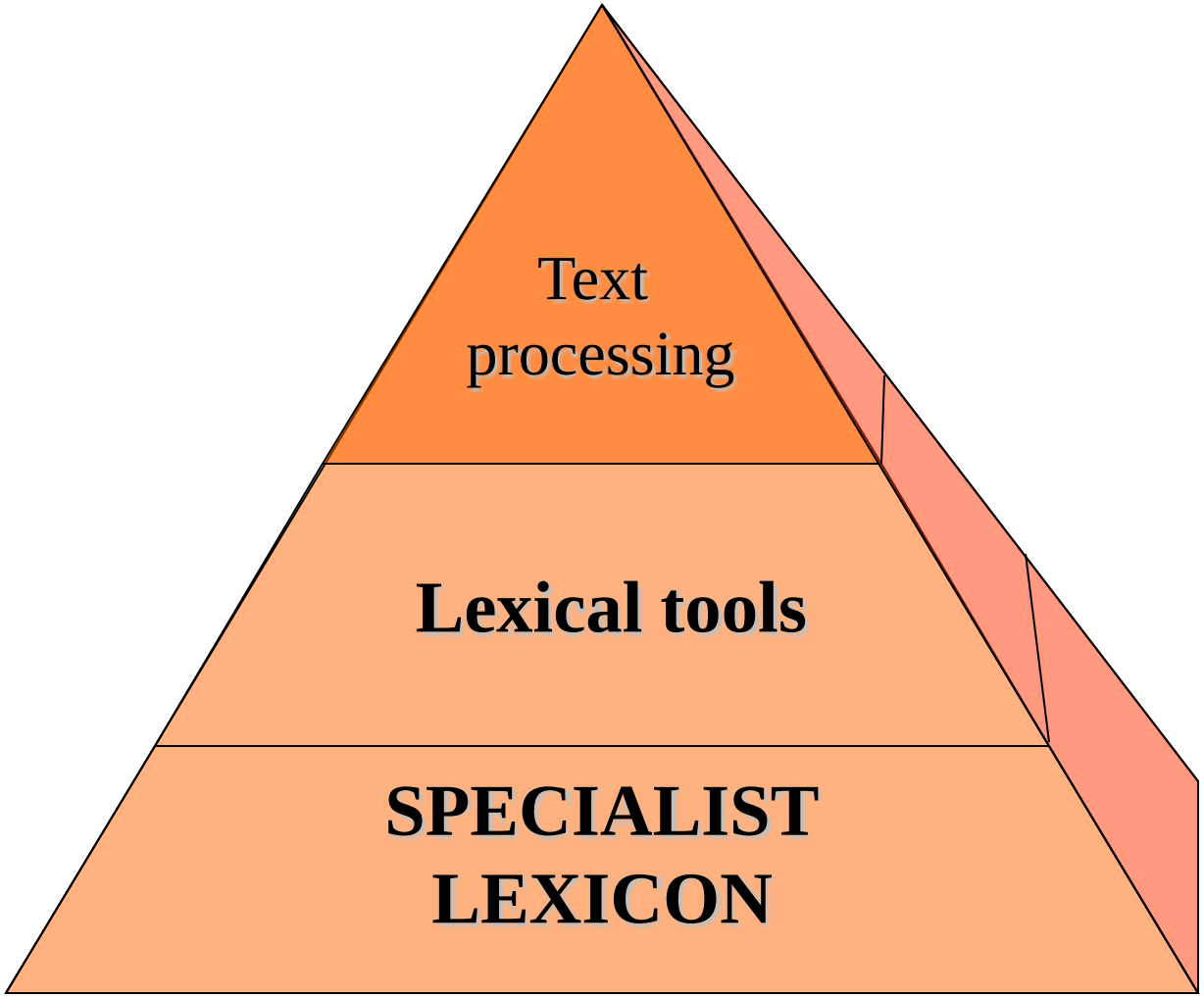


sixty four million four hundred thousand

Multiplier	**Head**	**Addition**
sixty Four	million	four hundred thousand

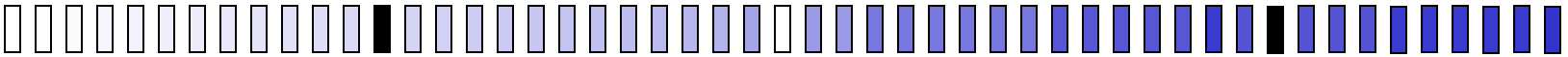
64 * 1,000,000 + 400,000 = 64,400,000




Text
processing
Lexical tools
SPECIALIST
LEXICON

Lexical Tools

- Wordind -- breaks strings into words
  - Produces the Metathesaurus word indexes (MRXW)
- LVG -- performs various lexical transformations
- NORM -- a selection of LVG transformations,
  - Used for Metathesaurus indexing
  - Produces the Metathesaurus Normalized word and string indexes (MRXNW & MRXNS)
  - Used to access those indexes



Normalization

- **Hodgkin Disease**
- **HODGKINS DISEASE**
- **Hodgkin's Disease**
- **Disease, Hodgkin's**
- **HODGKIN'S DISEASE**
- **Hodgkin's disease**
- **Hodgkins Disease**
- **Hodgkin's disease NOS**
- **Hodgkin's disease, NOS**
- **Disease, Hodgkins**
- **Diseases, Hodgkins**
- **Hodgkins Diseases**
- **Hodgkins disease**
- **hodgkin's disease**
- **Disease;Hodgkins**
- **Disease, Hodgkin**

- **disease hodgkin**