



NLM

NLM
Summer
Lectures

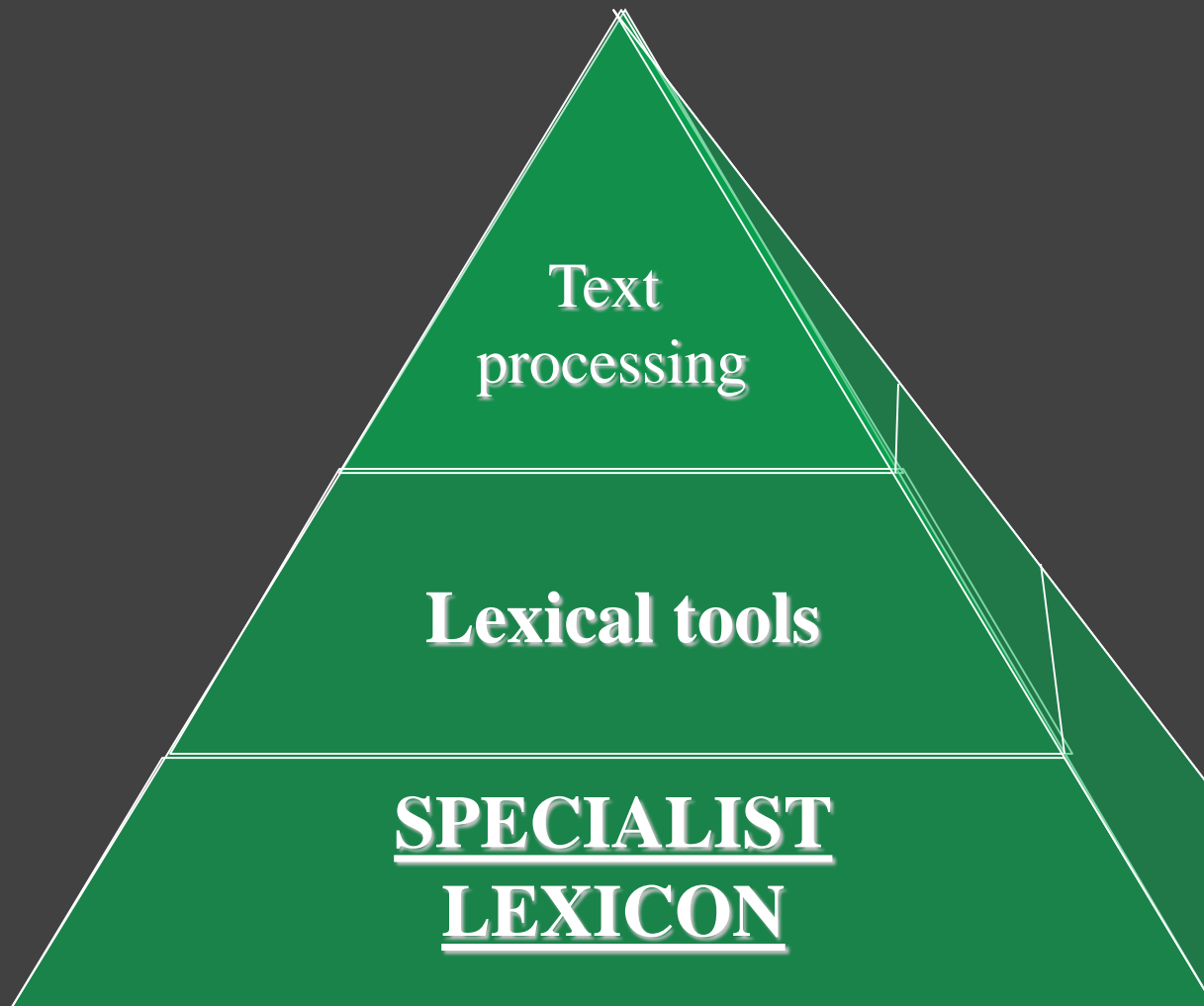
June 8, 2016



Allen Browne
Chris Lu

The SPECIALIST Lexicon and Lexical Tools

June 8, 2016



Lexicon: A fancy synonym for “dictionary”

THE INSOMNIACS DICTIONARY

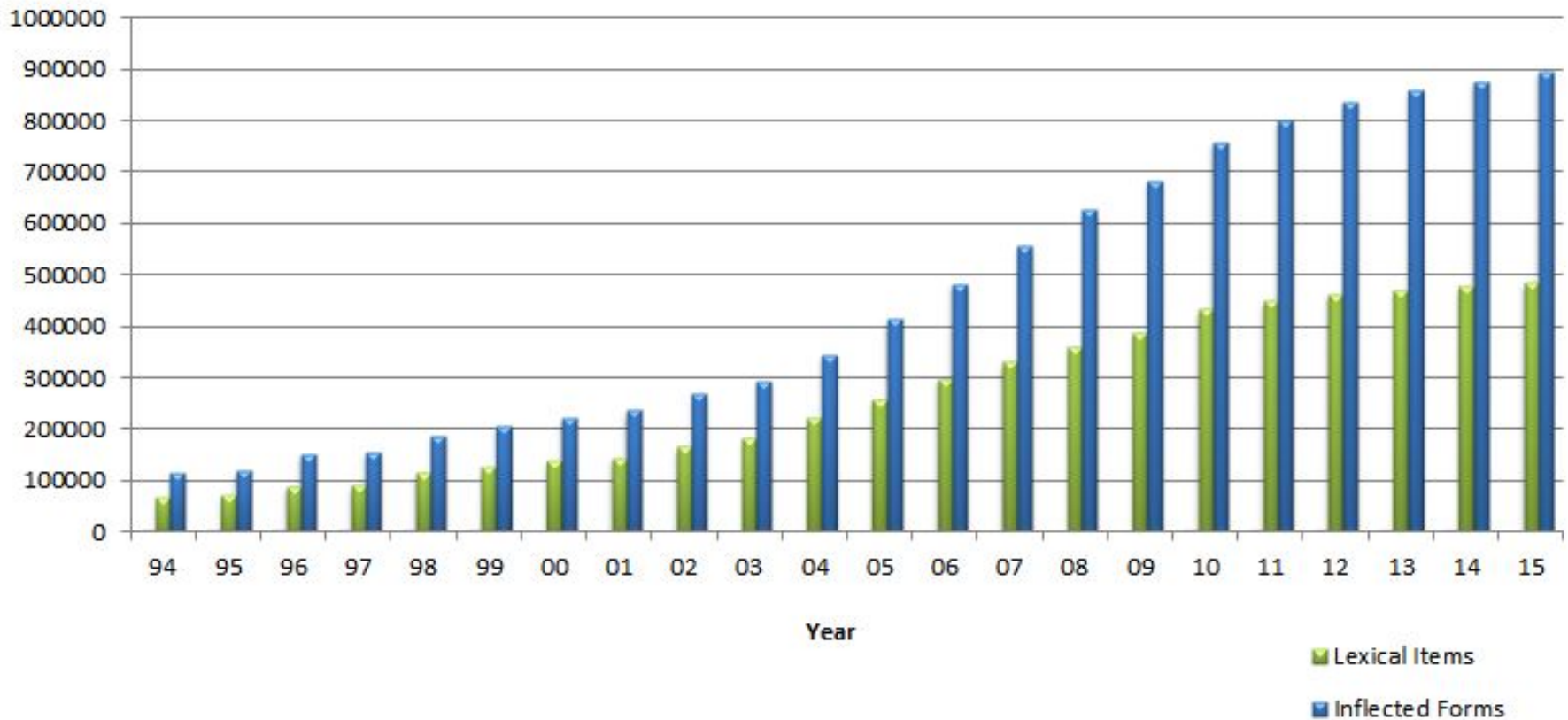
- Illeism:** Reference to oneself by use of the third person
- Infavoidance:** The act of covering up one's inferiority complex
- Inglenook:** A place by the fire or any warm and comfortable area
- Insilium:** Legal term for evil advice or counsel
- Jamais vu:** Illusion that one has never previously experienced a situation, when in fact it is quite familiar (see Déjà vu)
- Jen:** A compassionate love for all humanity or for the whole world
- Karateka:** A karate expert
- Kloof:** A deep ravine
- Kludge:** A system (especially of computers) made up of poorly matched components
- Lallation:** Pronouncing an “R” so that it sounds like an “L”
- Lapidation:** The act of stoning a person to death
- Latrocination:** A robbery that involves the use of force or violence
- Lexicon:** A fancy synonym for “dictionary”
- Litotes:** A form of understatement in which two negatives are used to make a positive (“he was not unhappy”)
- Longueur:** A long and boring passage in a work of literature, drama, music, etc.
- Macarism:** The practice of making others happy by praising them
- Matutinal:** Pertaining to anything that takes place in the morning
- Melorrhea:** The writing of excessively long musical works
- Meteorism:** A tendency to uncontrollable passing of intestinal gas
- Metrona:** A young grandmother
- Microperf:** The very small perforations along the edges of computer paper
- Migrateur:** A wanderer
- Mnemonic:** That which assists memory (a classic mnemonic device is the one familiar to astronomy students: “Oh be a fine girl, kiss me”—a unique way to remember the stellar classifications O, B, A, F, G, K, and M)
- Moria:** Morbid impulse to make jokes
- Omnistrain:** The stresses of modern life
- Omphaloskepsis:** The act of contemplating one's navel
- Onychophagy:** The habit of biting one's fingernails
- Oxymoron:** A phrase or expression composed of contradictory elements (“awfully good,” for example)

The SPECIALIST Lexicon

- A syntactic lexicon
- Biomedical and general English
- Over 490,000 records

Lexicon Growth

SPECIALIST LEXICON Growth

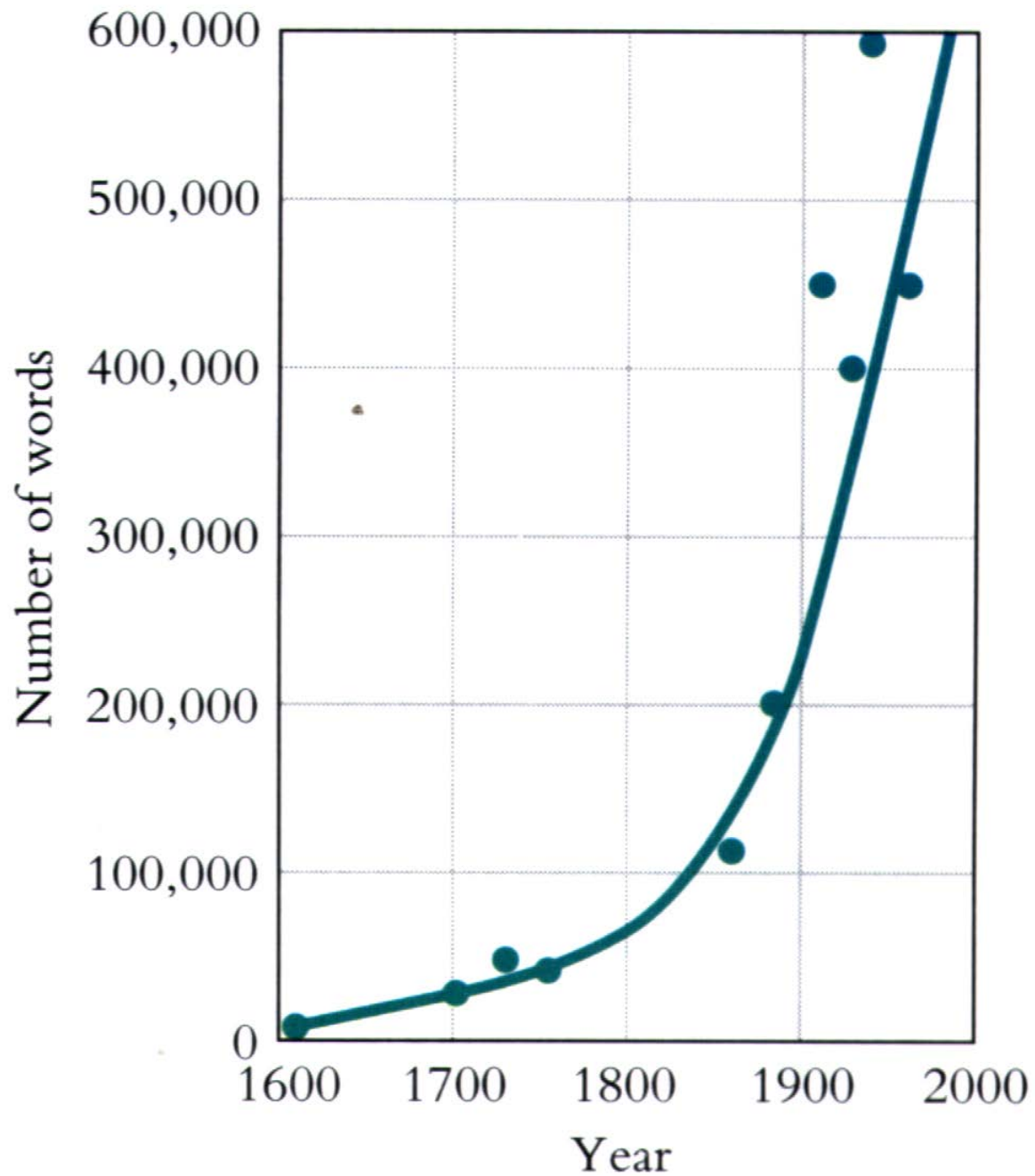


village
square the circle
square
square
fair and square root

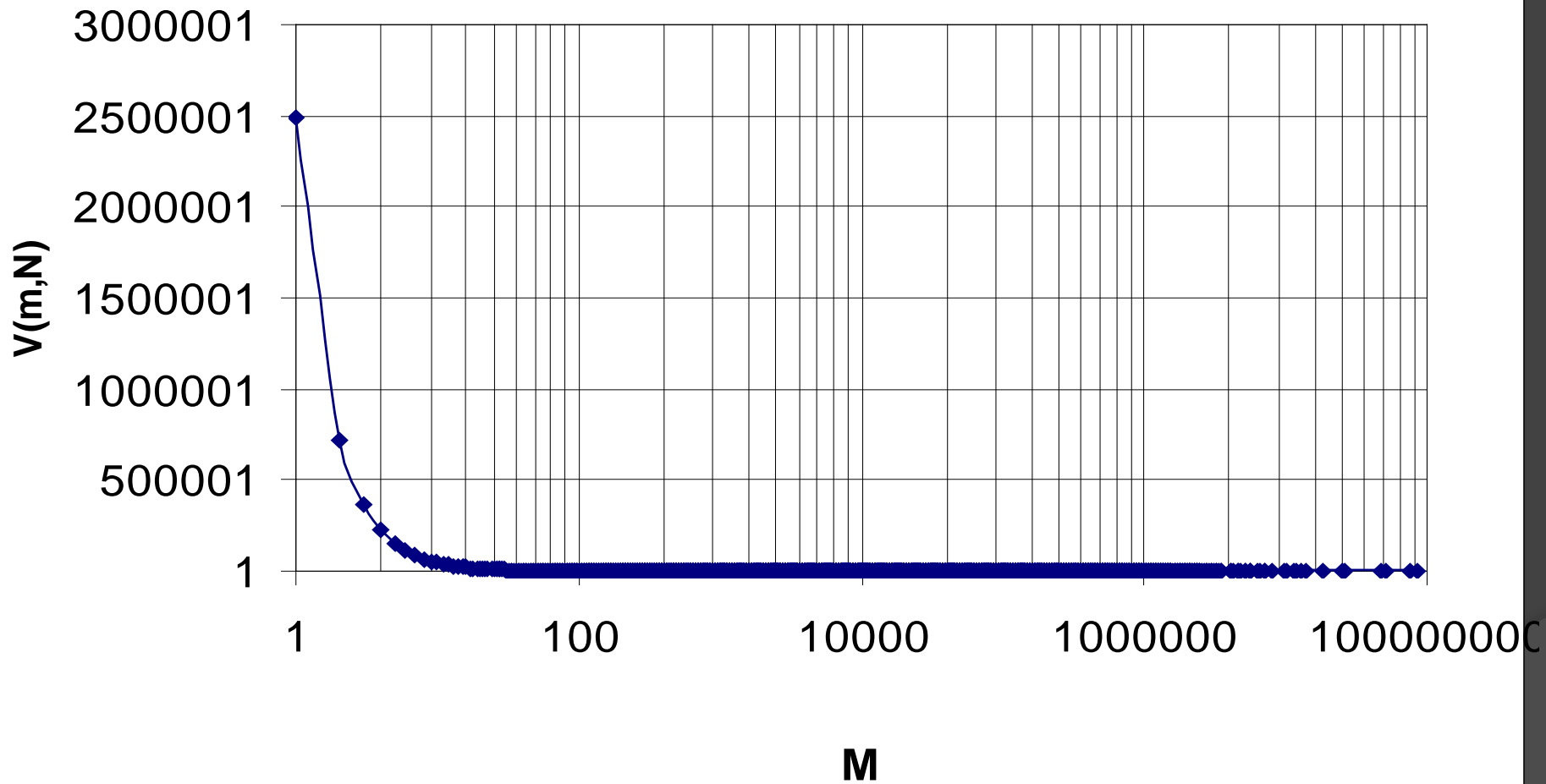
George A.
Miller

The Science
of Words

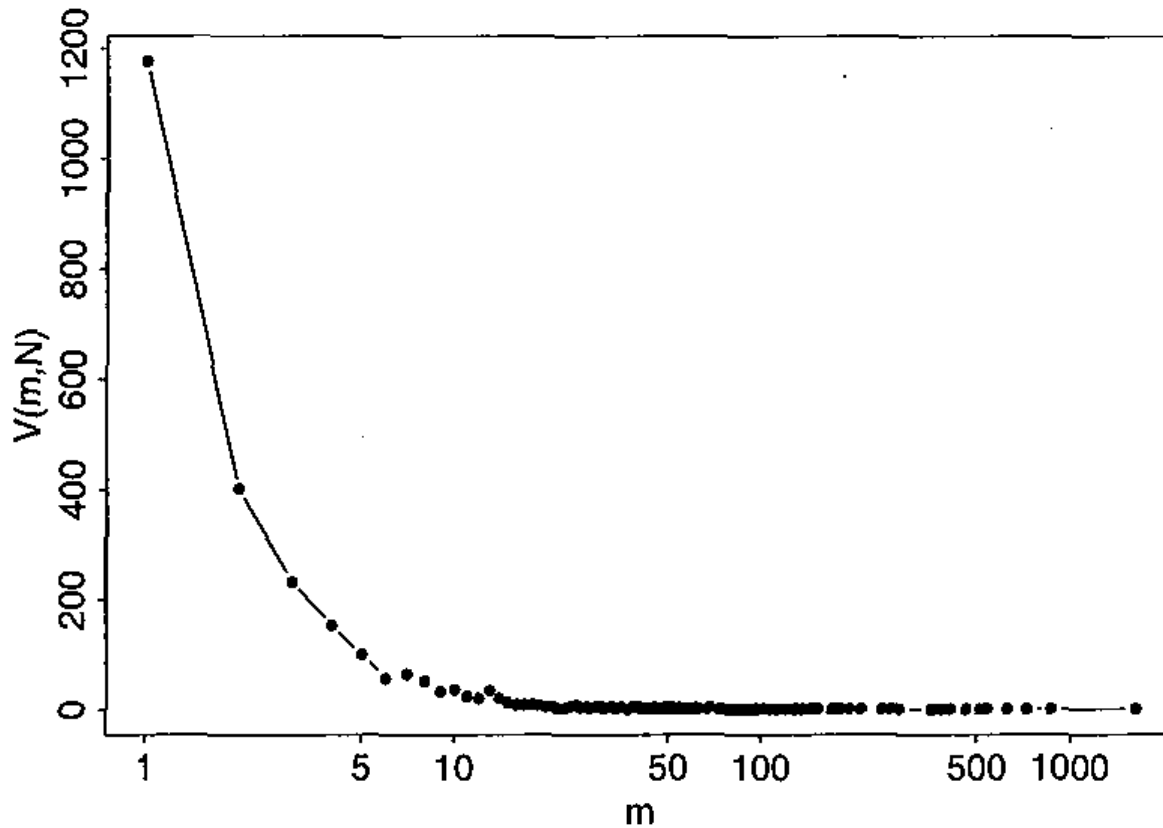
1991



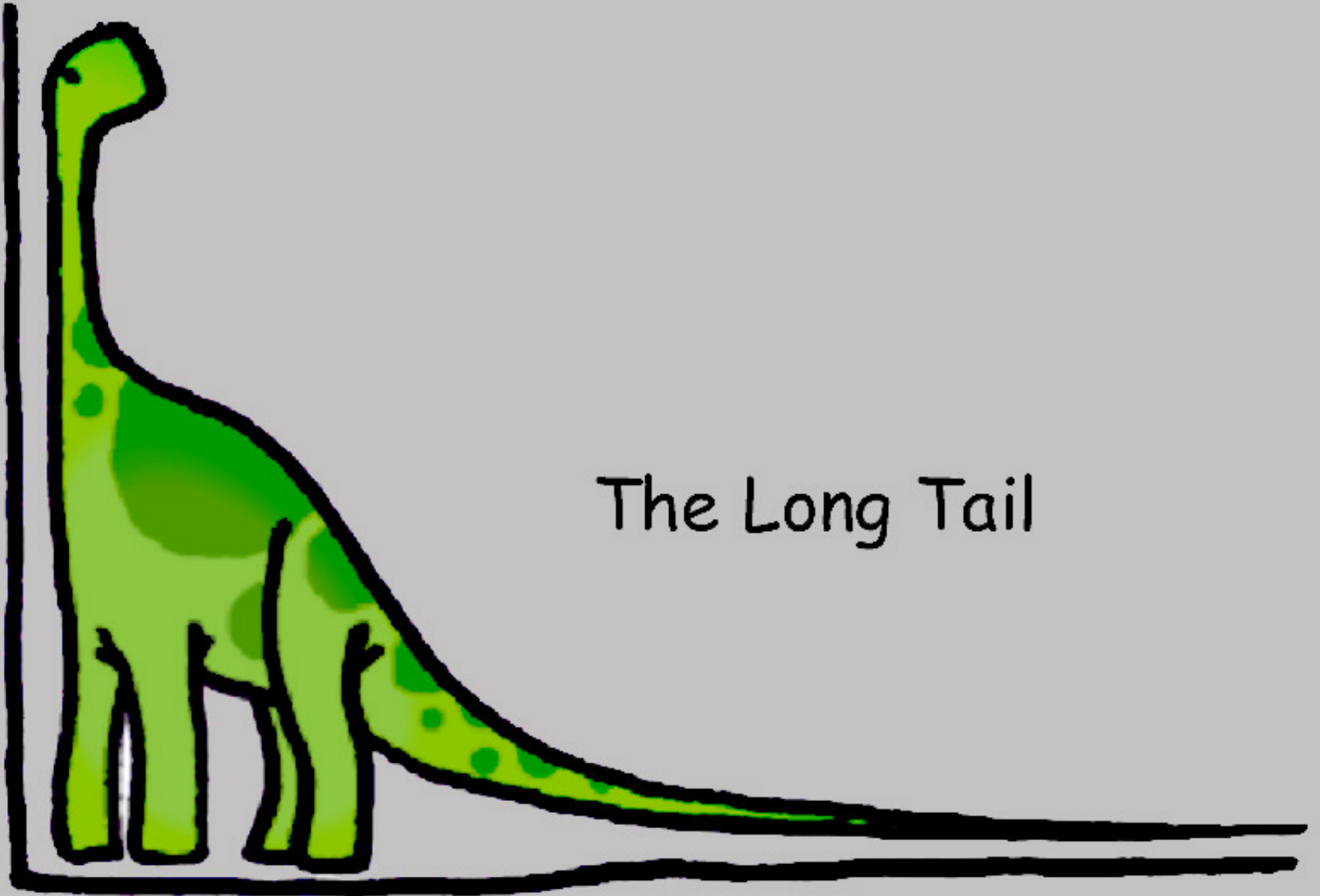
Frequency Spectrum of Medline 2006



Frequency Spectrum: Alice in Wonderland



Number of Words ->



The Long Tail

Word Frequency ->

The SPECIALIST LEXICON

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

Morphology

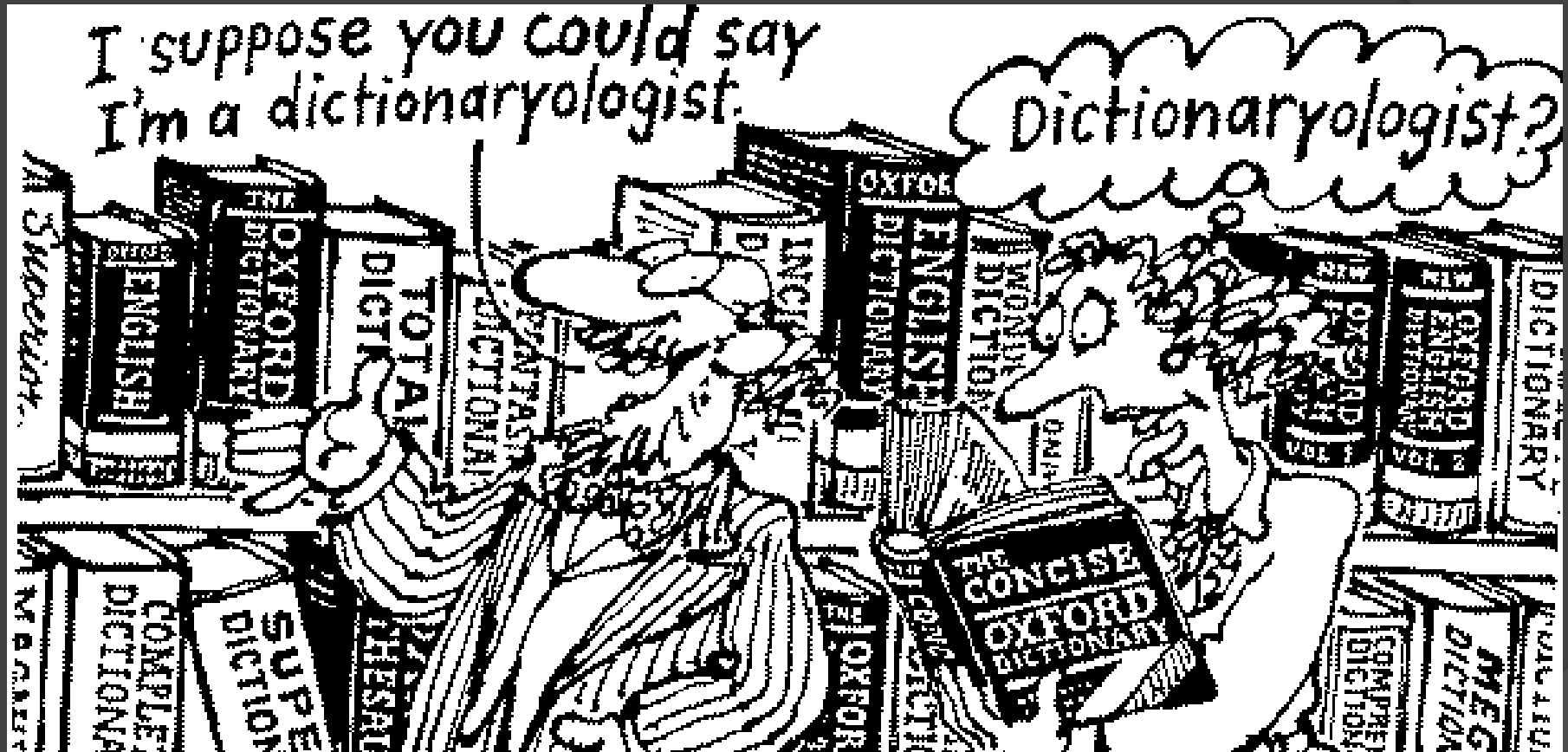
⦿ Inflectional

- nucleus, nuclei
- cauterize, cauterizes, cauterized, cauterizing
- red, redder reddest

⦿ Derivational

- laryngeal -- larynx
- transport -- transportation

Derivational Morphology



Dictionary+ology+ist

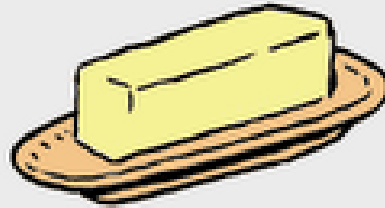
Derivational Morphology



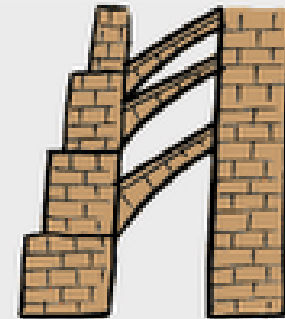
WAITER



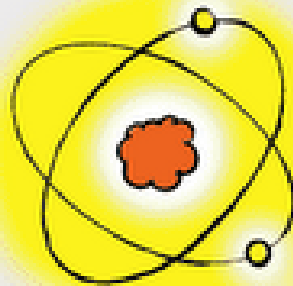
WAITRESS



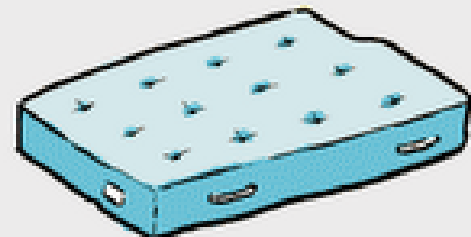
BUTTER



BUTTRESS



MATTER



MATTRESS

© 2006 Stivess

Orthography

Spelling Variation

- ⦿ align -- aline
- ⦿ Grave's disease -- Graves's disease -- Graves' disease
- ⦿ anesthetize -- anesthetise
- ⦿ Esophagus -- oesophagus
- ⦿ foetus – fetus
- ⦿ centre -- center

Orthography

HAGAR THE HORRIBLE CHRIS BROWNE



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
}
```

Syntax -- Verb Particle Constructions

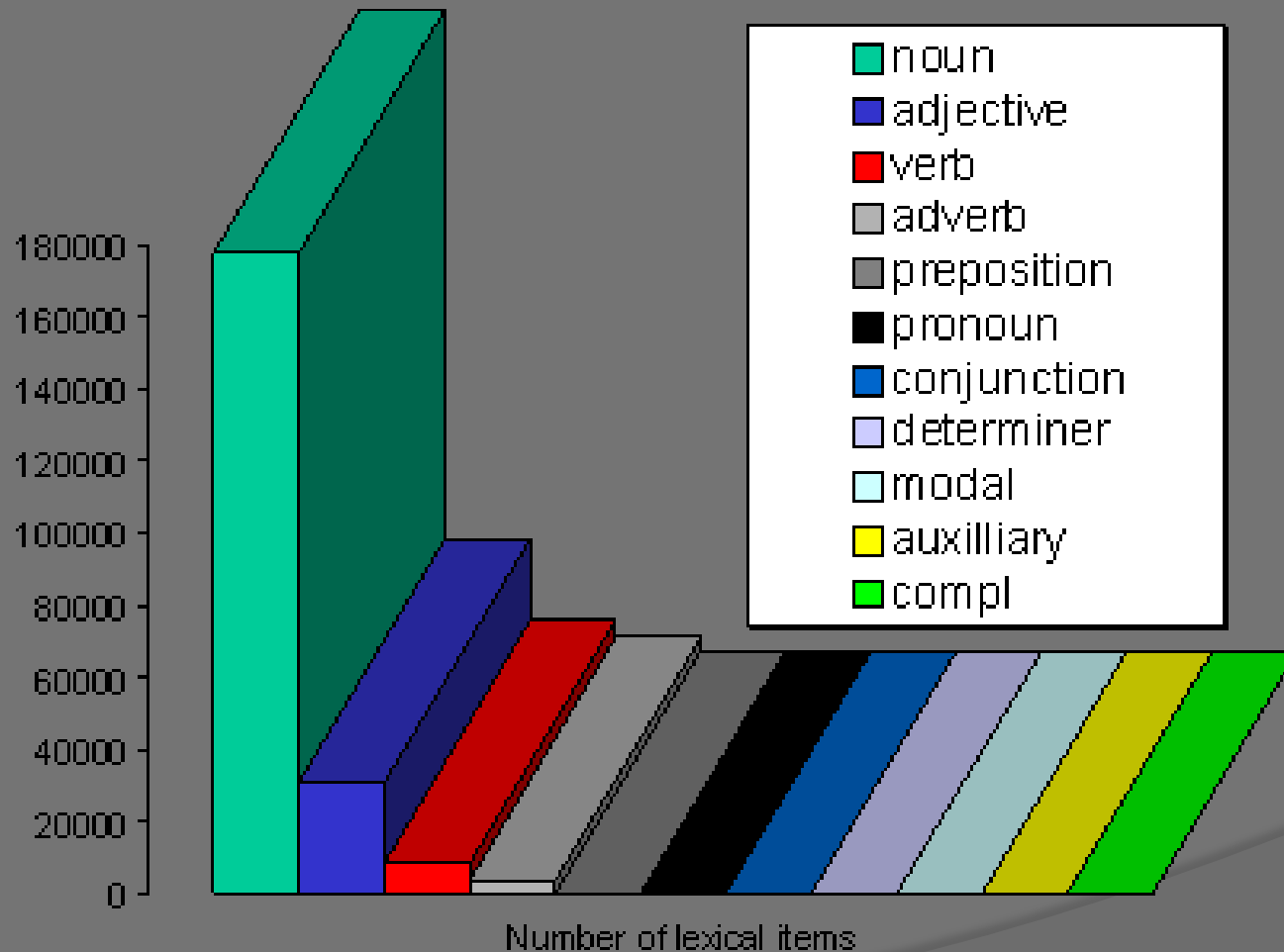


© King Features Syndicate.

clean up
scrub down
look up

```
{base=clean
  entry=E0017272
  cat=verb
  variants=reg
  intran
  intran;part(up)
  tran=np
  tran=np;part(up)
  nominalization=clean|noun|E0017273
  nominalization=cleanup|noun|E0319808}
```

Categories – Parts of Speech



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
}
```

Orthographic vs. Lexicographic Word:

Why, for instance, if a two-word boy scout feels chilly on his one-word campground, does he pull up a two-word camp chair in front of his one-word campfire? Anyone who seeks a strictly logical answer to such questions is chasing will-o'-the-wisps (chargeable in telegrams as a single word, because of the hyphens) in a semantic bog.

UTF-8

```
{base=resume
spelling_variant=résumé
spelling_variant=resumé
entry=E0053099
      cat=noun
      variants=reg
}
```

```
{base=role
spelling_variant=rôle
entry=E0053757
      cat=noun
      variants=reg
}
```

```
{base=deja vu
spelling_variant=deja-vu
spelling_variant=déjà vu
entry=E0021340
      cat=noun
      variants=uncount
}
```

```
{base=cafe
spelling_variant=café
entry=E0420690
      cat=noun
      variants=reg
}
```

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*

Leach – Leaches

Stomach – Stomachs ← irregular

Greco-latin Regular nouns

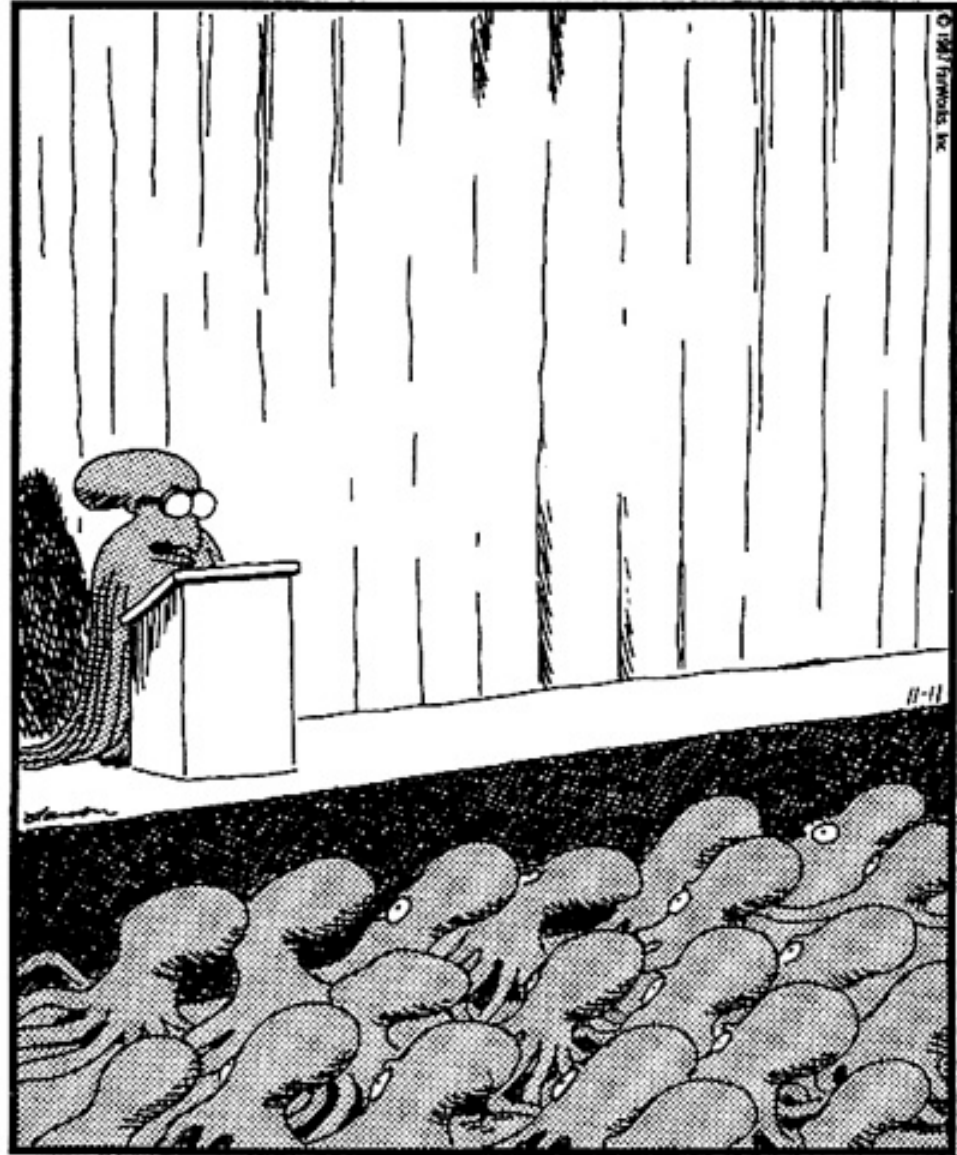
singular ends with:	plural ends with:	Examples
-us	-i	focus/foci
-ma	-mata	trauma/traumata
-a	-ae	larva/larvae
-um	-a	ilium/ilia
-on	-a	taxon/taxa
-sis	-ses	analysis/analyses
-is	-ides	cystis/cystides
-men	-mina	foramen/foramina
-ex	-ices	index/indices
-x	-ces	matrix/matrices

Octopuses

```
{base=octopus  
entry=E0204527  
cat=noun  
variants=reg  
variants=greg  
}
```

THE FAR SIDE

By GARY LARSON



"Fellow octopi, or octopuses ... octopi? ... Dang, it's hard to start a speech with this crowd."

All rights reserved.

THE FAR SIDE © 1987 FARWORKS, INC.

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

* This form does not occur

Countability

● Mail

* A mail

much mail

* many mails

● E-Mail

An e-mail

much e-mail

many e-mails

* This form does not occur

Uncount Nouns

Singulars



Spaghetti



Broccolo



Jacuzzi

EARLY
+ 1/2

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*.
- The past participle is the same as the past tense.
- The present participle suffix is *ing*.
 - *y* becomes *ie* following a consonant before *ing*.
 - Final *e* is deleted before *ing*
unless preceded by *e*, *y* or *o*.

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

control: controls, controlled, controlling

Irregular Verbs



Bite: bite, bites, bit, bitten

Irregular Verbs

{base=bite

entry=E0013219

cat=verb

variants=irreg|bite|bites|bit|bitten|biting|

intran

tran=np

cplxtran=np,advbl

}

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 (ggreg)

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

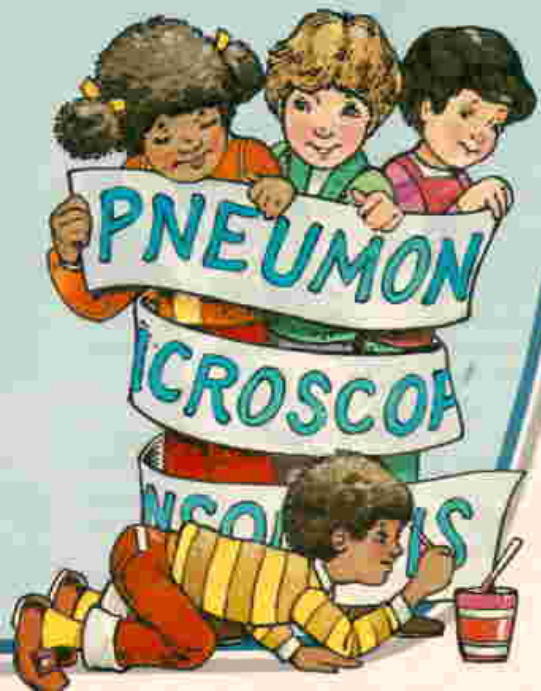
ad|towards|prefix

agogue|inducing|terminal

albumin(o)|albumin|root

sis|condition|terminal

stomy|surgical opening|terminal



PNEUMONULTRAMICROSCOPIC SILICOVOLCANOCONIOSIS

pneu.mo.no.ul.tra.mi.cro.scop.ic.sil.i.co.vol.ca.no.co.ni.o.sis
\
'n(y)u:-m*-(.)no--.*l-tr*-.mi--kr*-'ska:p-ik-'sil-i-(.)ko--(.)v\
n [NL, fr. Gk pneumo-n + ISV ultramicroscopic + NL
silicon +]a:l-'ka--no--.ko--ne--'o--s*s ISV volcano + Gk
konis dust : **a pneumoconiosis caused by the inhalation of
very fine silicate or quartz dust**

-- Merriam Webster's 3rd International Dictionary, page 1747.

The Protein of a tobacco mosaic virus, Dahlemense strain

acetylseryltyrosylserylisoleucylthreonylserylproylserylglutami
nylphenylalanylvalylphenylalanylleucylserylserylvalyltryptoph
ylalanylasparylproylisoleucylglutamylleucylleucylasparaginy
lvalylcysteinylthreonylserylserylleucylglycylasparaginyglutami
nylphenylalanylglutaminythreonylglutaminyglutaminyalanyla
rginythreonythreonylglutaminyvalylglutaminyglutaminyphe
nylalanylserylglutaminyvalyltryptophyllsylproylphenylalanyl
proylglutaminyserylthreonylvalylarginylphenylalanylproylgly
cylasparylvalyltyrosylsystylvalyltyrosylarginyltyrosylasparaginy
lalanylvalylleucylasparylproylleucylisoleucylthreonylalanylleu
cylleucylglycylthryonylphenylalanylasparylthreonylarginylasp
araginylarginylisoleucylisoleucylglutamylvalylglutamylasparag
inylglutaminyglutaminyserylproylthreonythreonylalanylgluta
mylthreonylleucylasparylalanylthreonylarginylarginylvalylasp
artylasparylalanylthreonylvalylalanylisoleucylarginylserylalan
ylasparaginylisoleucylasparaginylleucylvallasparaginylglutam
ylleucylvalylarginylglycylthreonyllycylleucultyrosylasparaginy
lglutaminyasparaginythreonylphenylalanylglutamylserylmeth
ionylserylglycylleucylvalyltryptophylthreonylserylalanylproylal
anylserine

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

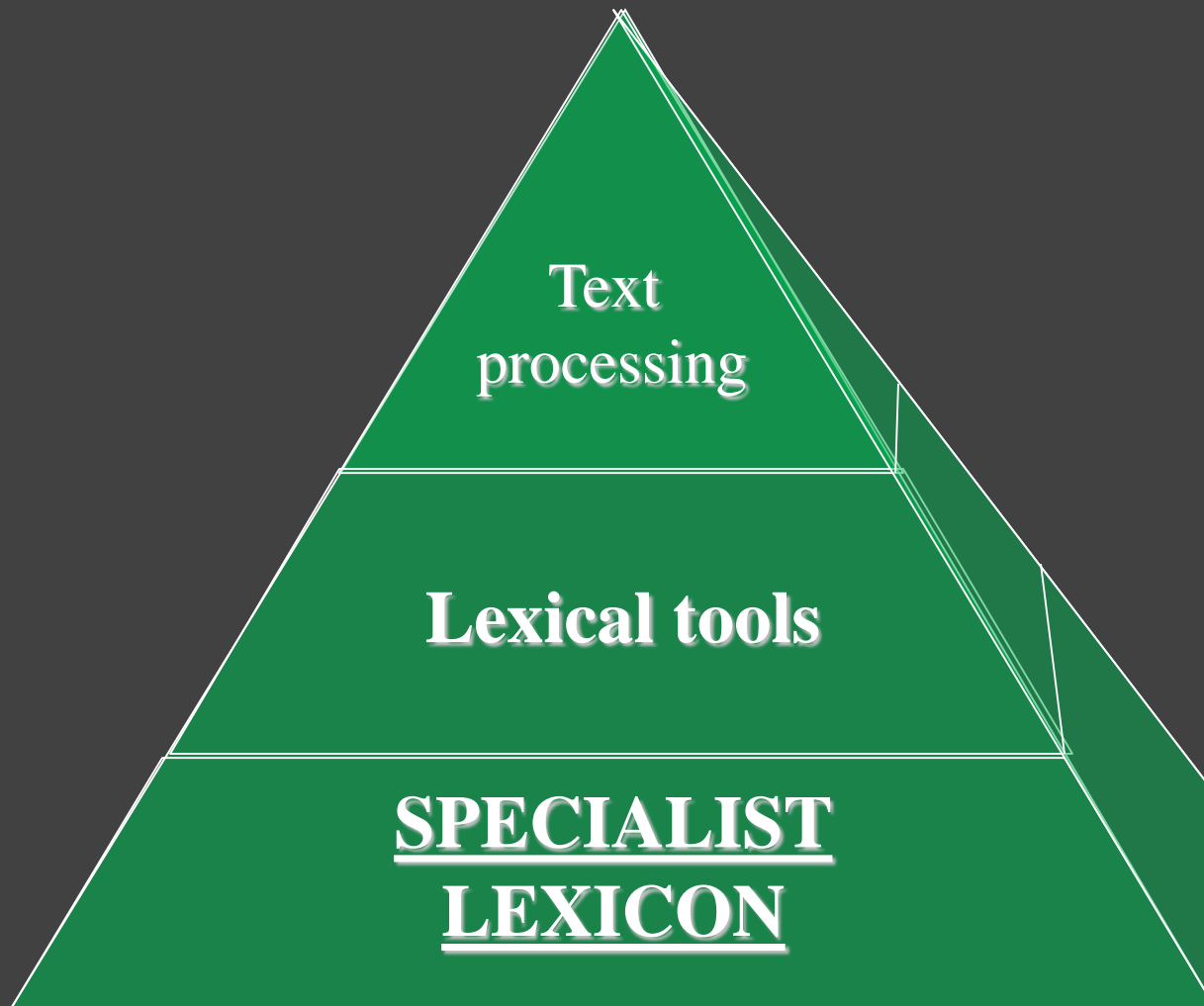
lazar|adj|leprosy|noun

lenticular|adj|crystalline lens|noun

ypsiform|adj|upsiloid|adj

wolfram|noun|tungsten|noun

double vision|noun|diplopia|noun



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

The Lexical Systems Group

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