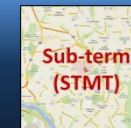
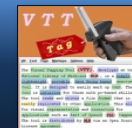
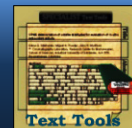
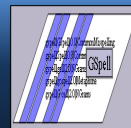
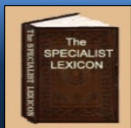
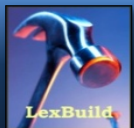


# The SPECIALIST Lexicon and NLP Tools - Application Examples

- Lexical Systems Group: <http://umlslex.nlm.nih.gov>
- The SPECIALIST NLP Tools: <http://specialist.nlm.nih.gov>

# Outline

- 1) Multiword approach – NER and POS
- 2) UMLS concept mapping - Norm
- 3) UMLS concept mapping - Derivations in query expansion
- 4) UMLS concept mapping - Synonyms in query expansion



# 1) Multiword Approach for POS Parser and NER

➤ Example-1 (PMID 9510650, TI):

- Multiword Approach:

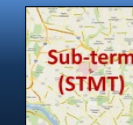
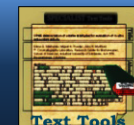
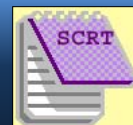
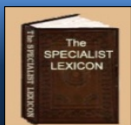
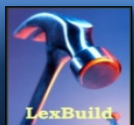
- The changes of **tear break up time** *after* myopic **excimer laser photorefractive keratectomy**

E0635418|Noun

E0764487|Noun

C2111106  
Lacrimation tear break-up time

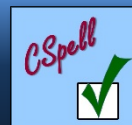
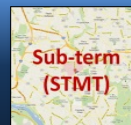
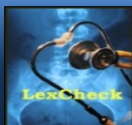
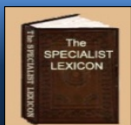
C2069669  
excimer laser photorefractive keratectomy



# The SPECIALIST NLP Tools for Example-1

- Install the STMT (Sub-Term Mapping Tools), <https://umlslex.nlm.nih.gov/stmt>
- Run the LSF (LexItem Subterm Finder)
- Two longest Lexicon multiwords in the sentence are identified, which are used as name entities for the key concepts in that sentence.
- This feature is implemented in MetaMap Lite.

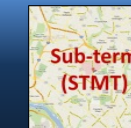
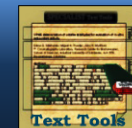
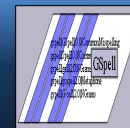
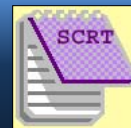
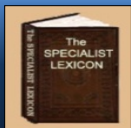
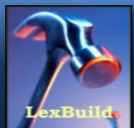
```
shell> lsf -p
- Please input a term (type "Ctl-d" to quit) >
The changes of tear break up time after myopic excimer laser photorefractive keratectomy
--- LexItem Multiword Subterms ---
break up time|E0635415
photorefractive keratectomy|E0225495
break up|E0220309
excimer laser|E0514806
excimer laser photorefractive keratectomy|E0764487
tear break up time|E0635418
```



# The SPECIALIST NLP Tools for Example-1

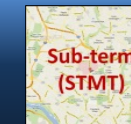
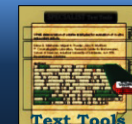
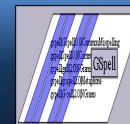
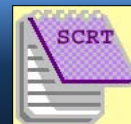
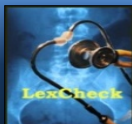
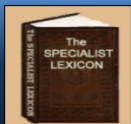
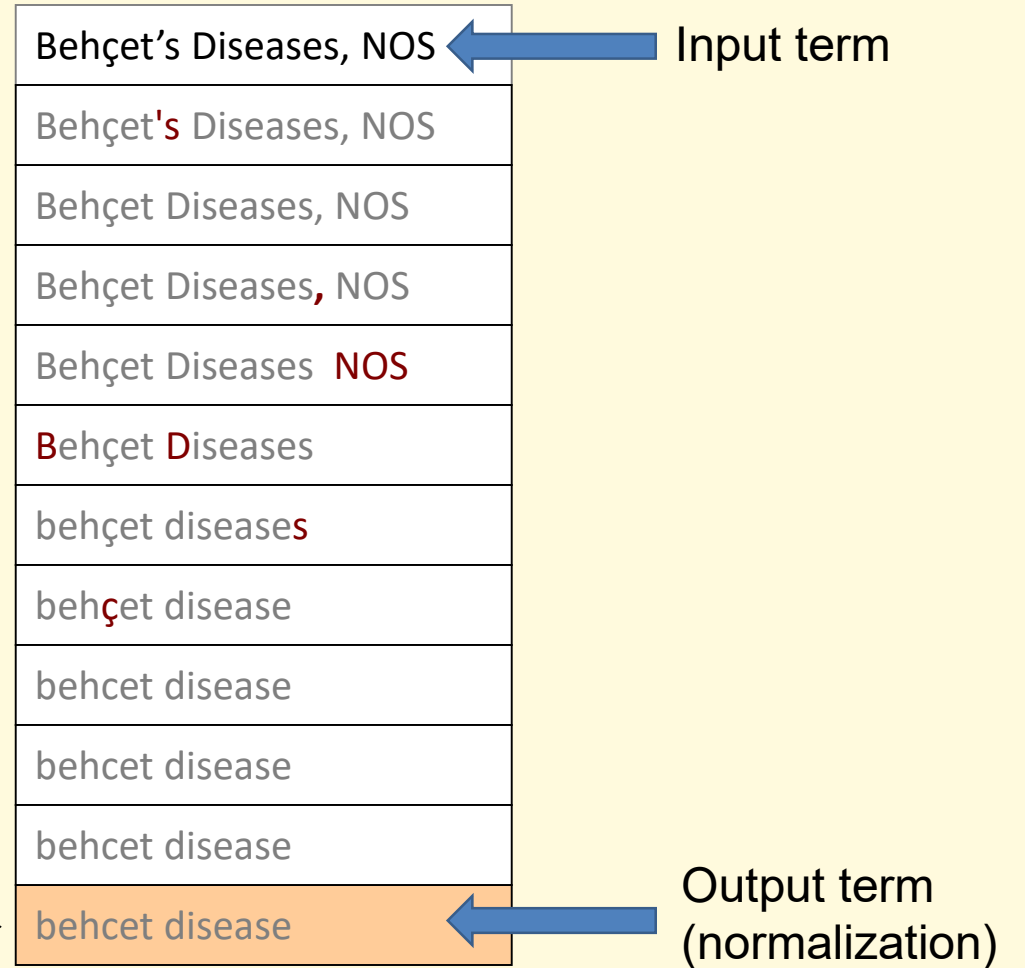
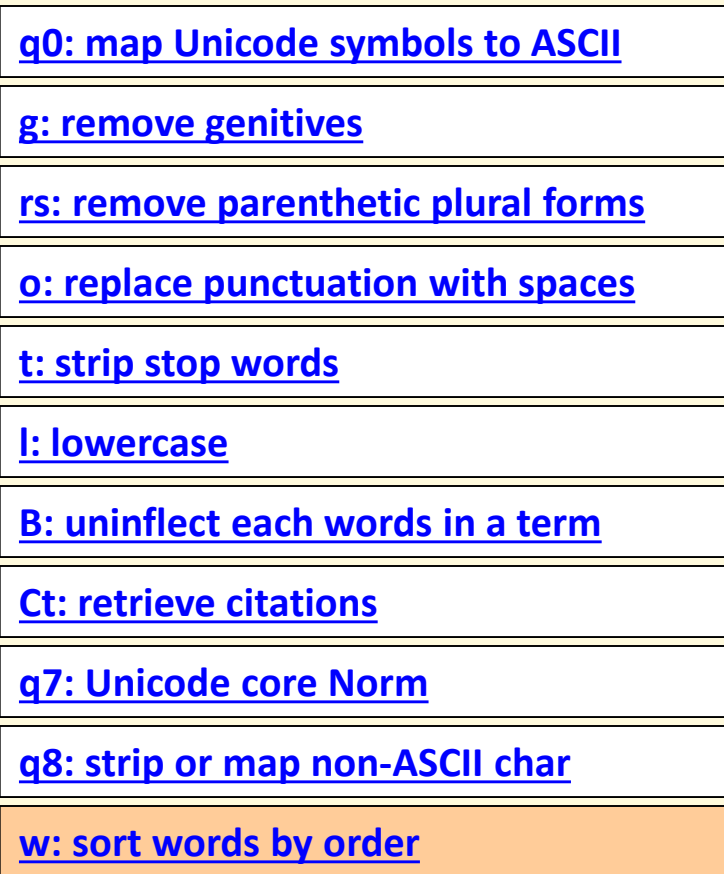
- Install the STMT (Sub-Term Mapping Tools), <https://umlslex.nlm.nih.gov/stmt>
- Run SMT to find the concept mapping and preferred term
- The concepts and preferred terms of “tear break up time” and “excimer laser photorefractive keratectomy” are found

```
shell> smt -p -pt
- Please input a term (type "Ctl-d" to quit)
tear break up time
tear break up time|break tear time up|C2111106|lacrimation tear break-up time|0
- Please input a term (type "Ctl-d" to quit) >
excimer laser photorefractive keratectomy
excimer laser photorefractive keratectomy|ceratectomy excimer laser photorefractive|C2069669|excimer
laser photorefractive keratectomy|0
```

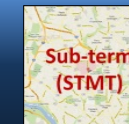
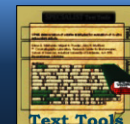
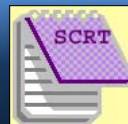
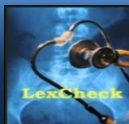
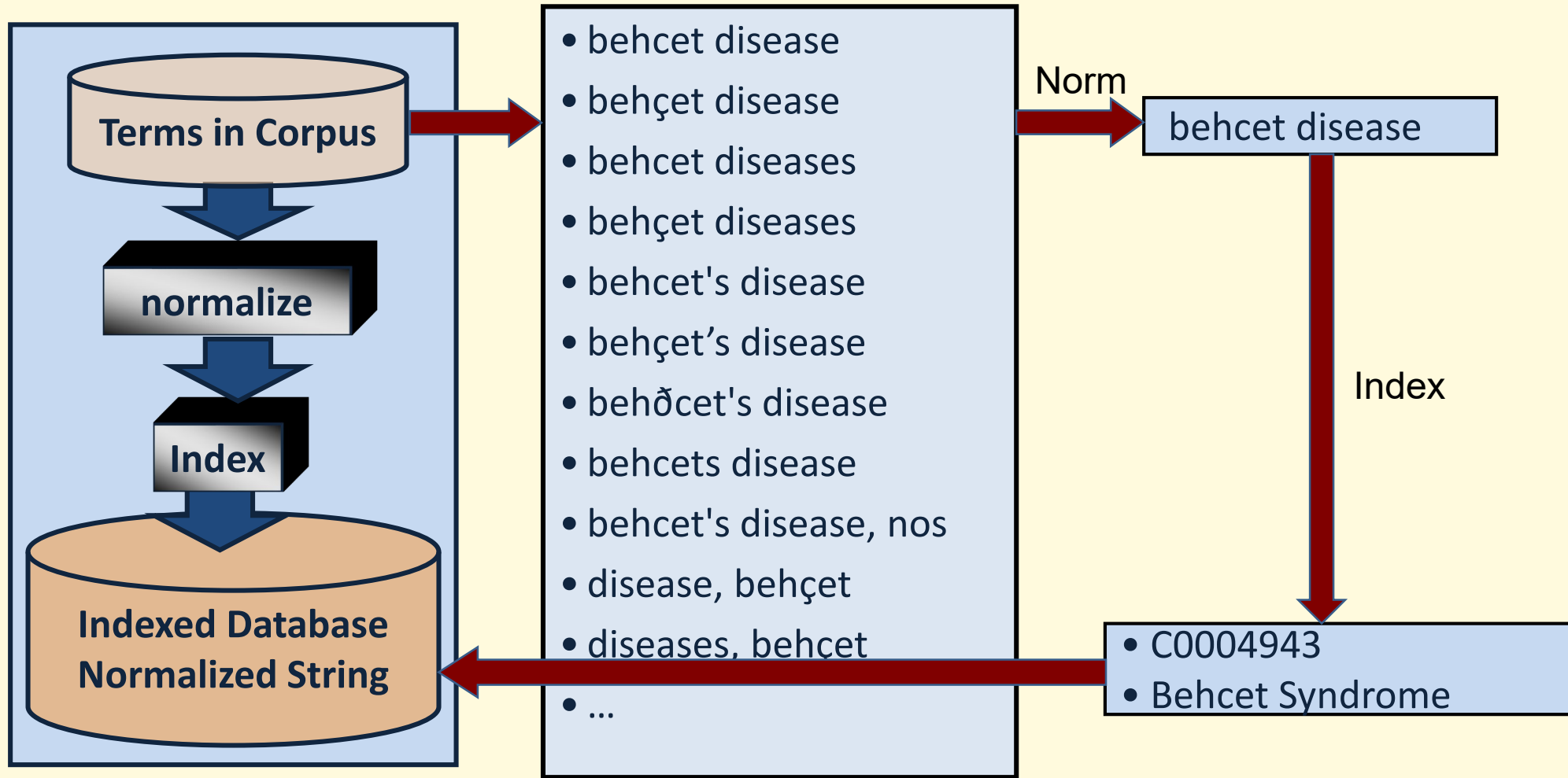


## 2) Lexical Tools – Norm

11 LVG flow components in Norm

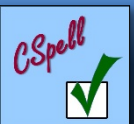
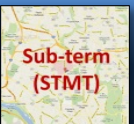
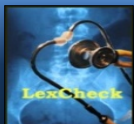
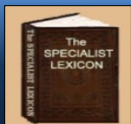
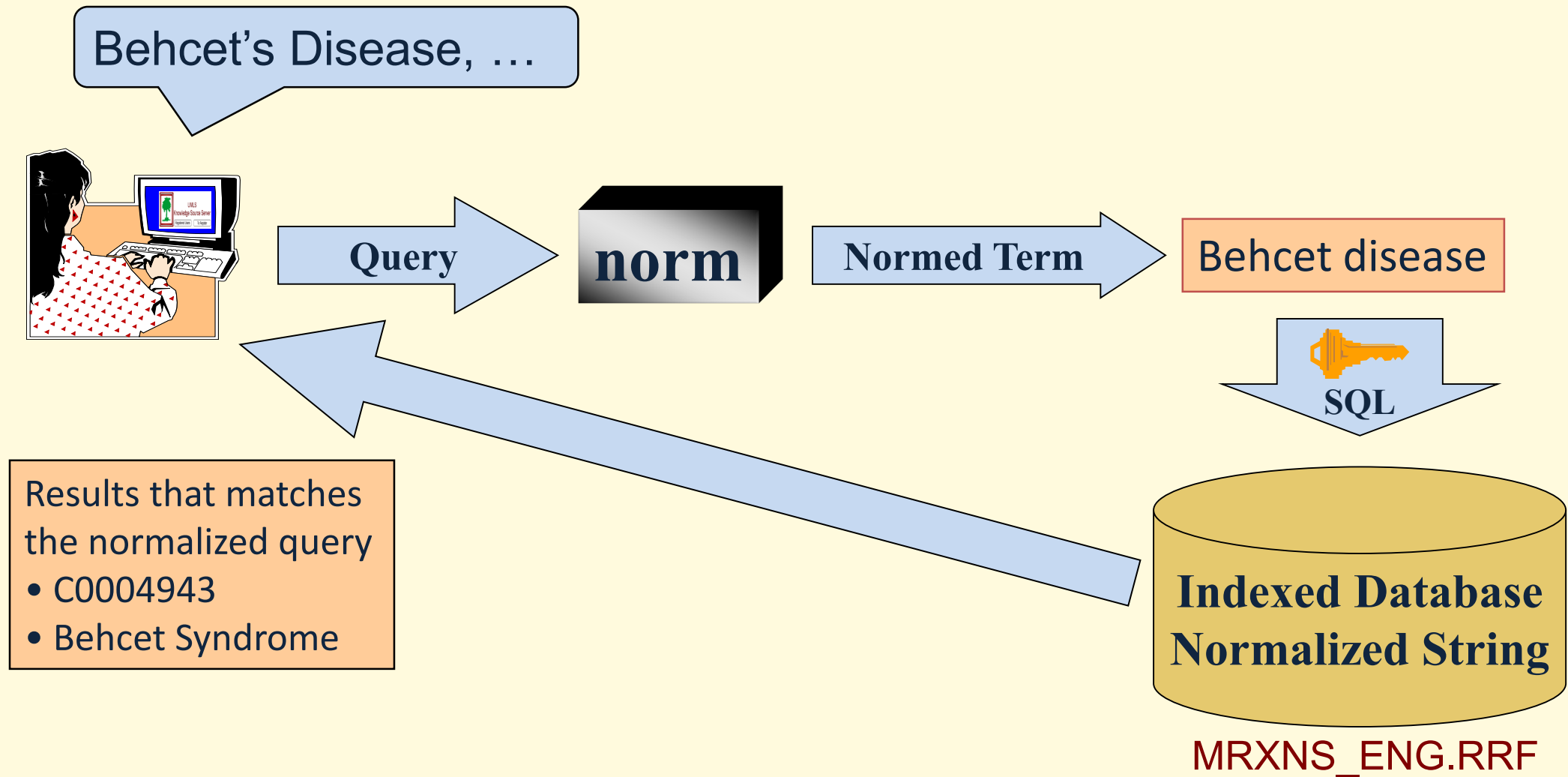


# Apply Norm to Pre-Process Terms in Corpus





# Apply Norm on User's Input, Used it as a Key for Concept Mapping

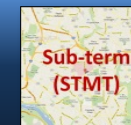
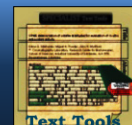
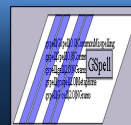
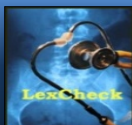
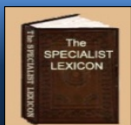
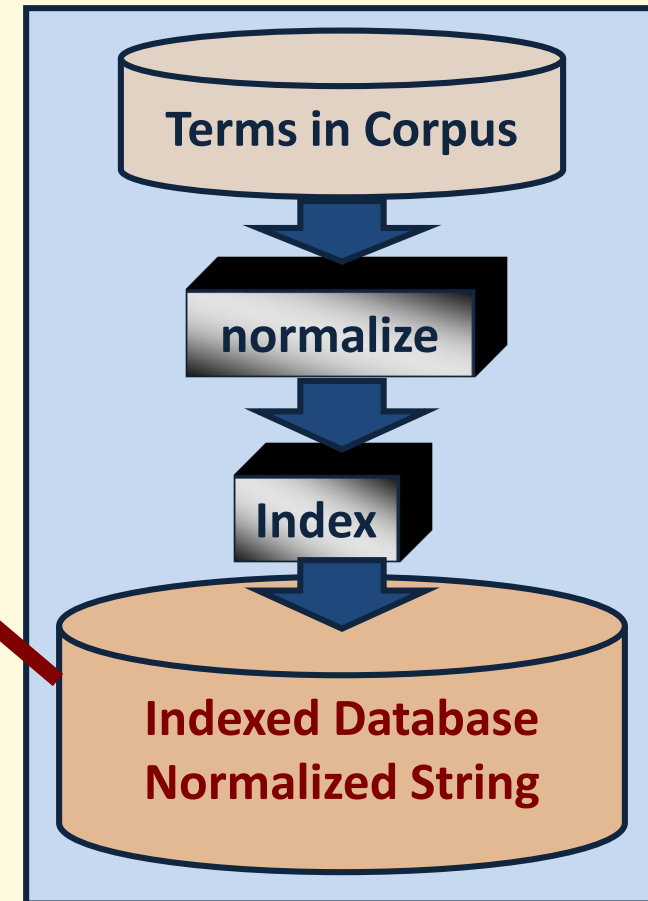




# Normalized Files are Distributed with UMLS Metathesaurus

## ➤ UMLS Normalized Files

- Normalized words: MRXNW\_ENG.RRF
- Normalized strings: MRXNS\_ENG.RRF



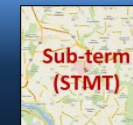
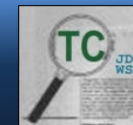
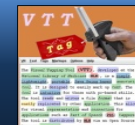
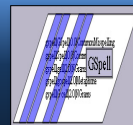
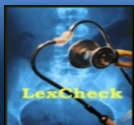
# The SPECIALIST NLP Tools for Example-2

- Install the Lvg for Norm, <https://umlslex.nlm.nih.gov/lvg>
- Install the STMT (Sub-Term Mapping Tools), <https://umlslex.nlm.nih.gov/stmt>
- Run the Norm to find the normalization forms

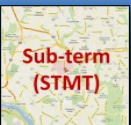
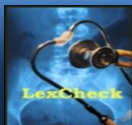
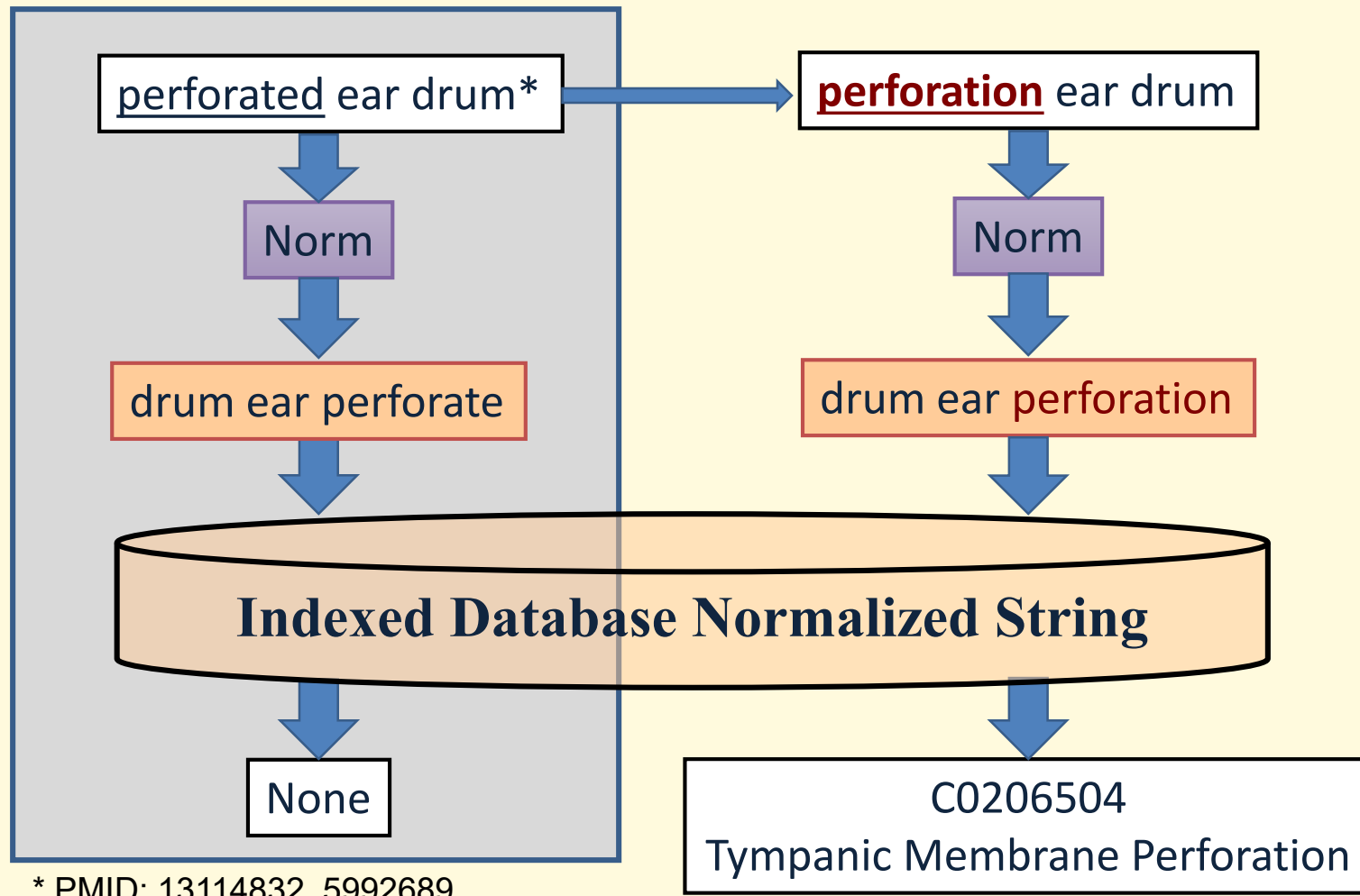
```
shell> norm -p
- Please input a term (type "Ctl-d" to quit) >
Behçet's Diseases, NOS
Behçet's Diseases, NOS|behcet disease
```

- Run SMT to find the concept and preferred term of user's input
- Please note that norm is implemented in the smt program

```
shell> smt -p -pt
- Please input a term (type "Ctl-d" to quit) >
Behçet's Diseases, NOS
Behçet's Diseases, NOS|behcet disease|C0004943|Behcet Syndrome|0
```



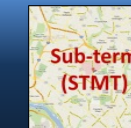
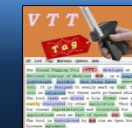
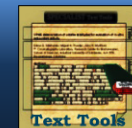
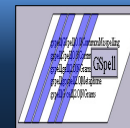
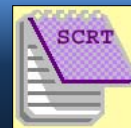
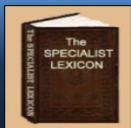
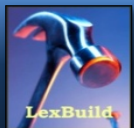
# 3) Derivations in Query Expansion for Concept Mapping



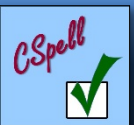
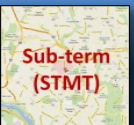
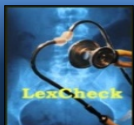
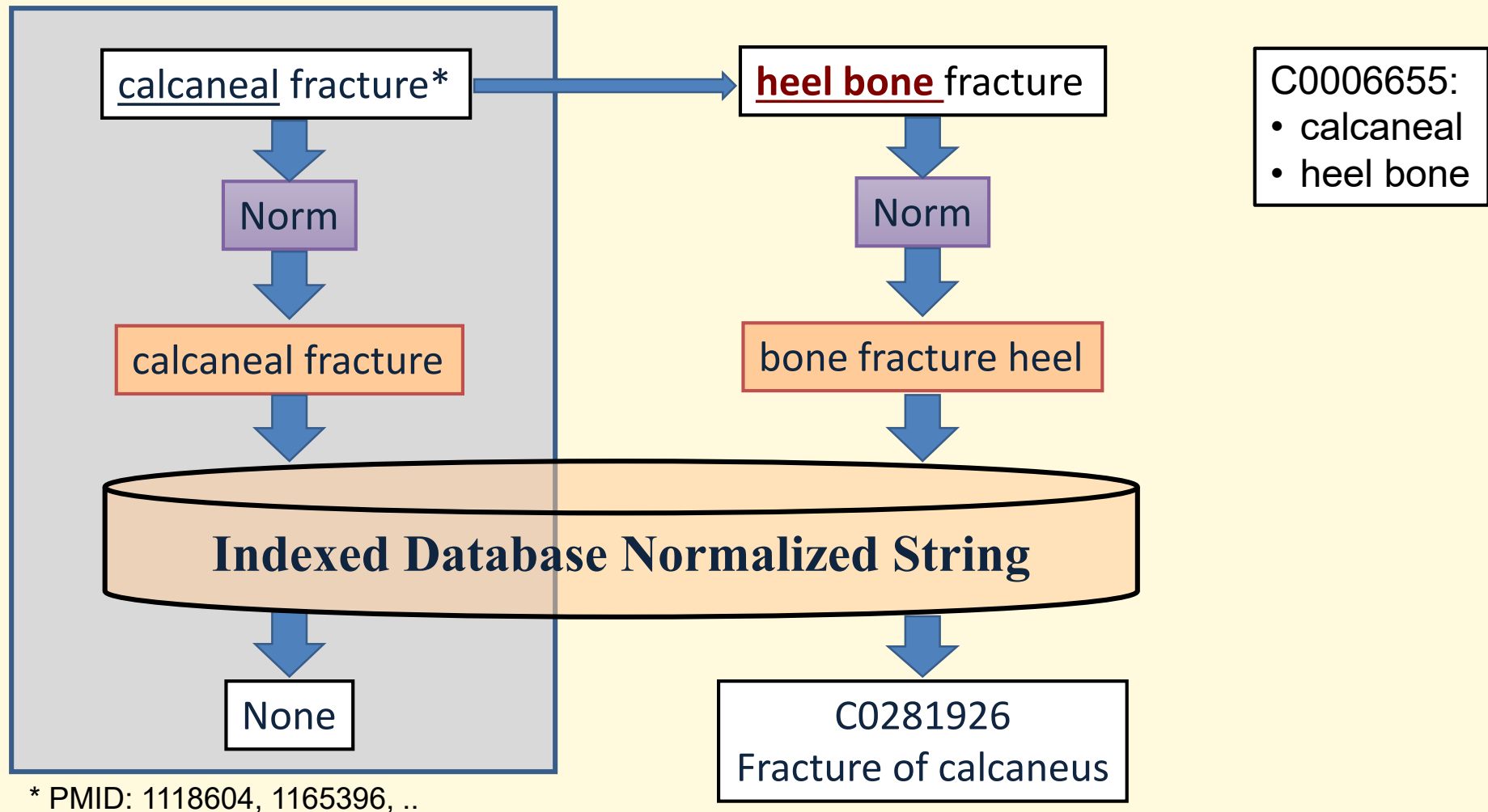
# The SPECIALIST NLP Tools for Example-3

- Install the STMT (Sub-Term Mapping Tools), <https://umlslex.nlm.nih.gov/stmt>
- Run SMT to find the concept mapping and preferred term of the input
- 5 different subterm substitutions were performed to find the same concept (C0206504)
- The substitution example in the previous page is high-lighted

```
shell> smt -p -pt
- Please input a term (type "Ctl-d" to quit)
perforated ear drum
perforated ear drum|eardrum perforated|C0206504|Tympanic Membrane Perforation|1
perforated ear drum|membrane perforate tympanic|C0206504|Tympanic Membrane Perforation|1
perforated ear drum|eardrum perforate|C0206504|Tympanic Membrane Perforation|1
perforated ear drum|drum ear perforation|C0206504|Tympanic Membrane Perforation|1
perforated ear drum|membrane perforated tympanic|C0206504|Tympanic Membrane Perforation|1
```



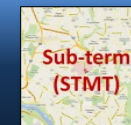
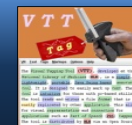
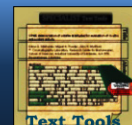
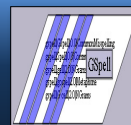
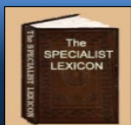
# 4) Synonyms in Query Expansion for Concept Mapping



# The SPECIALIST NLP Tools for Example-4

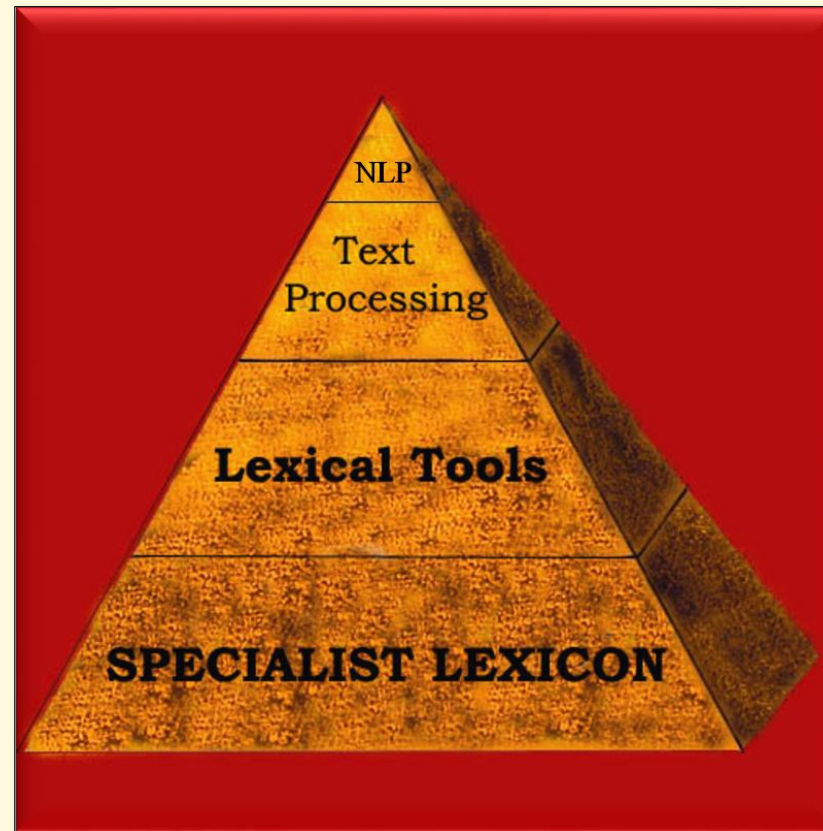
- Install the STMT (Sub-Term Mapping Tools), <https://umlslex.nlm.nih.gov/stmt>
- Run SMT to find the concept mapping and preferred term
- 7 different subterm substitutions were performed to find 3 concepts
- The substitution example in the previous page is high-lighted

```
shell> smt -p -pt
- Please input a term (type "Ctl-d" to quit)
calcaneal fracture
calcaneal fracture|calcis fracture os|C0281926|Fracture of calcaneus|1
calcaneal fracture|calcaneus fracture|C3669285|Fracture of calcaneus of equine limb|1
calcaneal fracture|calci fracture o|C0281926|Fracture of calcaneus|1
calcaneal fracture|calci fracture os|C0281926|Fracture of calcaneus|1
calcaneal fracture|fracture heel|C0281926|Fracture of calcaneus|1
calcaneal fracture|calcaneus fracture|C0281926|Fracture of calcaneus|1
calcaneal fracture|calcaneal|C0006655|Bone structure of calcaneum|1
calcaneal fracture|bone fracture heel|C0281926|Fracture of calcaneus|1
calcaneal fracture|calcis fracture o|C0281926|Fracture of calcaneus|1
```





# Questions



- Lexical Systems Group: <http://umlslex.nlm.nih.gov>
- The SPECIALIST NLP Tools: <http://specialist.nlm.nih.gov>

