Mining the History of Medicine

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Outline

- Text Mining tools for enriching content

- Mining the History of Medicine
- Semantic annotations:
  - entities, events
  - OCR correction
  - Time-sensitive term inventory and search

- A prototype search system for the history of medicine

Mining the History of Medicine

- National Centre for Text Mining, School of Computer Science www.nactem.ac.uk

- Centre for the History of Science, Technology and Medicine

AHRC
Digital Transformations
Big Data

Aim

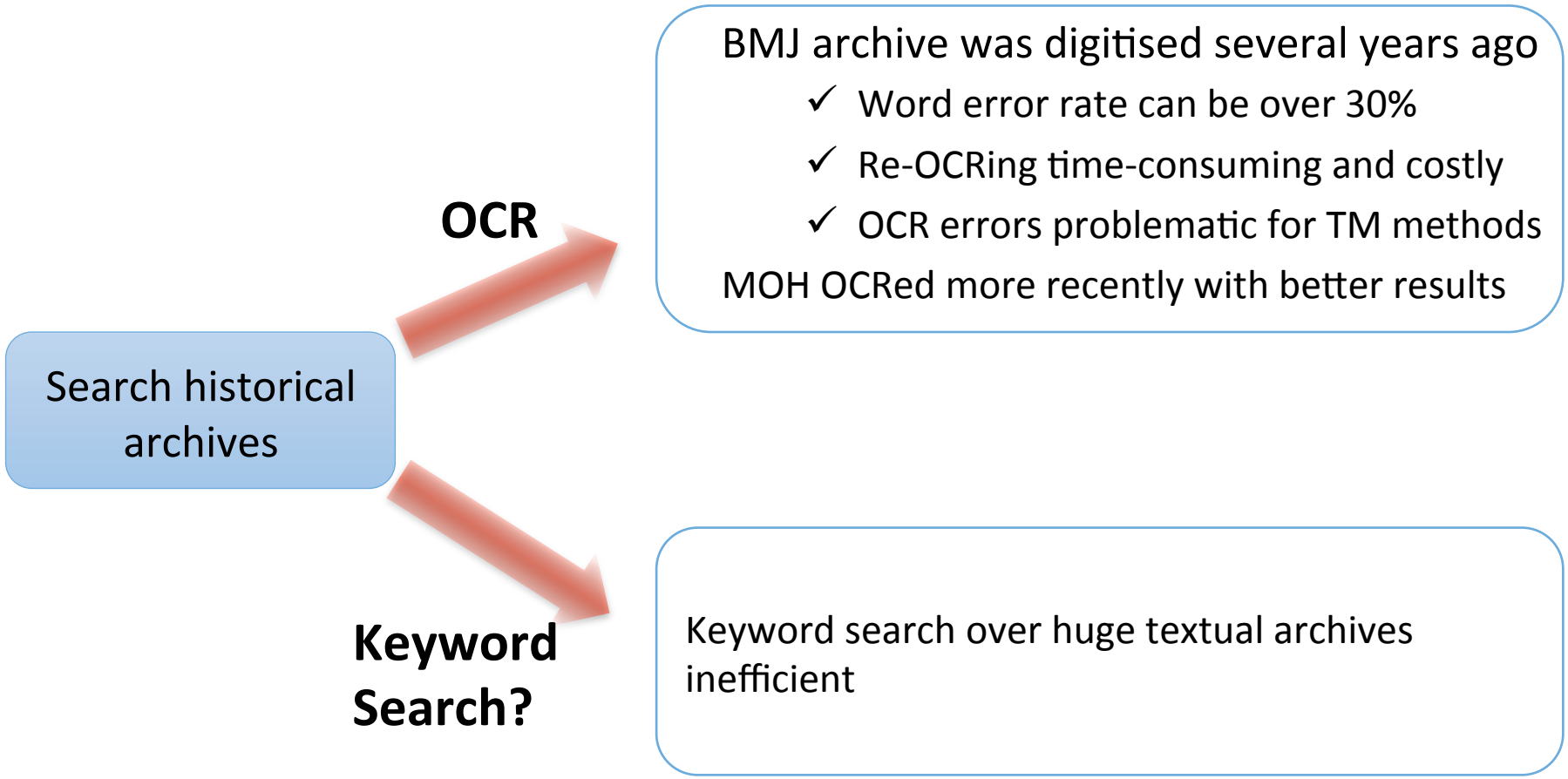
Semantic search system

- British Medical Journal (BMJ) (1840 – present) (350K articles)
- London Medical Officer of Health reports (MoH) (1848 – 1972)

Text Mining: tools, resources, infrastructure

Provide **different perspectives** (e.g. medical, public health) on the treatment and prevention of diseases

- ✓ over time
- ✓ in different areas


Search historical archives
OCR
BMJ archive was digitised several years ago
✓ Word error rate can be over 30%
✓ Re-OCRing time-consuming and costly
✓ OCR errors problematic for TM methods
MOH OCRed more recently with better results
Keyword Search?
Keyword search over huge textual archives inefficient

Solutions

- ✓ Apply OCR improvement techniques
- ✓ Automatically detect **semantic** information in text
  - ✓ ***Entities:*** conditions, signs or symptoms, therapeutic measures
  - ✓ ***Events:*** symptoms caused by lung disease
- ✓ Automatically identify **how the naming of concepts changes over time**

Semantic search system

- ✓ Automatic query building, term suggestions
  - historical variants unknown to the user
- ✓ Faceted search based on article metadata
  - Date, authors, title
- ✓ Faceted search based on semantic content
  - Combinations of entities and/or relationships

OCR Post Correction

- Re-OCR BMJ too time consuming for current project
- Our solution: post-correct original OCR output based on spell-checker output

SpellChecker	% errors resolved
ASpell	45%
Hunspell	60%
Word	63%
MAC OS	58%

Best open source spell checker

OCR Post Correction

- ✓ Hunspell produces ranked list of spelling corrections
- ✓ However, tailored to:
  - Human errors
  - General language

Our approach

Augment Hunspell dictionary with OpenMedSpel dictionary

Override default Hunspell correction ranking

- ✓ Rank suggestions according to **corpus frequency**
- ✓ Use **decade-specific word frequency** lists

BMJ OCR Errors – Example from 1840

JOHN MILLER, aged 26, glass-blower of Gateshead, was adnmitted August 27th, 1840, unider the care of Sir John Fife, with the usual syptnpoms of stone in the bladder, wlich he lhas laboured under from childhood. At the age of 12 years he was admitted into thtis infirmaryI, buit his frienids wotld niot allow the operation to be performed. Ile took a considerable (luantity of medicine, which greatly relieved him. Since then the symptomt of stone have been constantly presenit, but have not been very urgent. A.- About a month ago, after batlhing, the symptoms became much arggravated-so much so, as to comlpel him to apply again to the hospital for relief. On admission he was sallow and emaciated; laboured iunder symptoms of stone of a high degree, with great irritability of bladder, giviing rise to a frequient desire to inicturate, and occasionally to the in-voluntary discharge of faces from straining. Ile passed a larg,e quantity of mucus with his urine;-pulse small, tongue white, sliglht tlhirst, and appetite good.

Basic Hunspell Output

Correct changes made by Hunspell

Incorrect changes made by Hunspell

OCR Errors not detected by Hunspell

JOHN MILLER, aged 26, glass-blower of Gateshead, was **admitted** August 27th, 1840, **under** the care of Sir John Fife, with the usual **symptoms** of stone in the bladder, **which** he **has** laboured under from childhood. A 12 years he was admitted into **this infirmary**, friends **world into** allow the operation to be performed. **Ike** took a considerable (**quantity** of medicin , which greatly relieved him. Since then the **symptom** of stone have been constantly **present**, but have not been very urgent. A.- About a month ago, after **bathing**, the symptoms became much **aggravated**-so much so, as to **compel** him to apply again to the hospital for relief. On admission he was sallow and emaciated; laboured **under** sy of a high degree, with great irritability **ing** rise to a frequent desire to **inaccurate** lly to the **involuntary** discharge of faces rom straining. **Ike** passed a **lag,e** quantity of mucus with his urine;-pulse small, tongue white, **slight thirst**, and appetite good.

New Frequency-driven Hunspell Output

Corrections **only** obtained using frequency-driven method

Corrections obtained using both original and frequency-driven methods

Remaining errors with frequency-driven methods

JOHN MIL glass-blower of Gate
admitted 1840, under the care
Fife, wi ymptoms of stone in
which he has laboured under from childh d
12 years he as admitted into this infirmary, but his
friends **would not** allow the operation to be performed. **Lie**
took a considerable (quantity of medicine, which greatly
relieved him. Since then the **symptoms** of stone have been
constantly present, but have not been very urgent.
About a month ago, after bathing, the symptoms
aggravated-so much so, as to compel him to appl
the hospital for relief. On admission he was sa
emaciated; laboured under symptoms of stone of a high
degree, with great irritability of bladder, giving rise to
a frequent desire to inaccurate, and occasionally to the
involuntary discharge of faces from straining. **Lie** passed
a **large**,e quantity of mucus with his urine;-pulse small,
tongue white, slight thirst, and appetite good.

Avoiding Over-Correction

Original Text	Basic Hunspell	Frequency-driven Hunspell	Frequency-driven Hunspell augmented with OpenMedSpel
antithrombotic	anthropometric	anthropometric	antithrombotic
pathophysiological	physiological	physiological	pathophysiological
thromboembelism	thrombosis	thrombosis	thromboembolism
warfarin	wayfaring	warfarin	warfarin
transoesophageal	oesophageal	oesophageal	transoesphageal
echocardiography	electroocardiography	oesophageal	echocardiography
intracardiac	intra cardiac	intracellular	intracardiac
tomogram	mammogram	tomogram	tomogram

Evaluation

- ✓ Gold-standard collection of 24 hand-corrected documents
  - ✓ 3 documents from: 1840s, 1860s, 1880s, 1900s, 1920s, 1940s, 1960s, 1980s
- ✓ Documents selected according to likelihood containing OCR errors

Evaluation (Word Level Accuracy)

PMCID	Raw OCR	Basic Hunspell	Frequency-driven Hunspell	Basic Hunspell with OpenMedSpel	Frequency-driven Hunspell + OpenMedSpel
1840s	75.9%	83.6%	84.9%	83.3%	**85.6%**
1860s	86.6%	90.0%	91.2%	90.2	**93.1%**
1880s	82.6%	87.4%	88.9%	88.0%	**89.0%**
1900s	70.2%	80.7%	82.3%	81.7%	**84.3%**
1920s	74.2%	79.9%	82.7%	81.6%	**84.3%**
1940s	86.6%	88.1%	89.5%	89.4%	**91.3%**
1960s	94.9%	**91.9%**	**93.5%**	95.1%	**95.7%**
1980s	93.0%	**87.2%**	**89.9%**	**92.6%**	**94.8%**

Rule-based OCR correction

- ✓ Many regular OCR character recognition errors occur in BMJ
  - Two characters being recognised instead of one,
    - e.g. *h-> lh, t-> lt, m->mn, u-> ui*
  - Punctuation characters/digits erroneously appearing in words
    - e.g. *larg,e*
- ✓ Many character insertion problems corrected by Hunspell
  - ✓ Still some regular errors remain uncorrected
- ✓ Solution – apply rule-based pre-processing prior to Hunspell

Rule-based OCR correction

- ✓ Eight pattern replacement rules, i.e., *tll→th, wl→w, lh→h,hl→h,mn→m, nm→m,wv→w* and *ii→I*
- ✓ Remove punctuation characters and digits appearing in words, except when:
  - ✓ Digits are followed by letters denoting ordinal numbers not removed
  - Apostrophes denoting possessives not removed
  - Hyphens are only removed when they occur as the second or penultimate character of a word.
    - Hyphens in other positions are likely to form part of valid hyphenated words

Evaluation (Word Level Accuracy)

PMCID	Frequency-driven Hunspell + OpenMedSpel	Frequency-driven Hunspell + OpenMedSpel + Rule-based pre-processing
1840s	85.6%	**87.0%**
1860s	93.1%	**94.1%**
1880s	89.0%	**90.5%**
1900s	84.3%	**86.2%**
1920s	84.3%	**87.6%**
1940s	91.3%	**92.3%**
1960s	95.7%	**94.2%**
1980s	94.8%	**92.7%**

Extracting semantic types, events

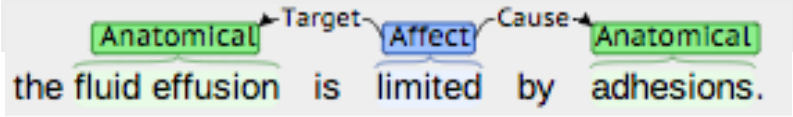
- ✓ Supervised methods
- ✓ Corpus composition
  - 25 articles from BMJ
  - 4 extracts from MOH
  - 70,000 words
- ✓ Articles from 4 key decades
  - 1850s, 1890s, 1920 and 1960s
  - Capture language/terminology changes over time

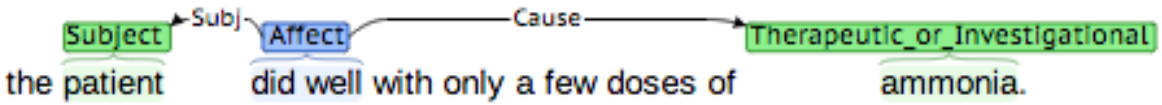
HIMERA corpus: Entity Types

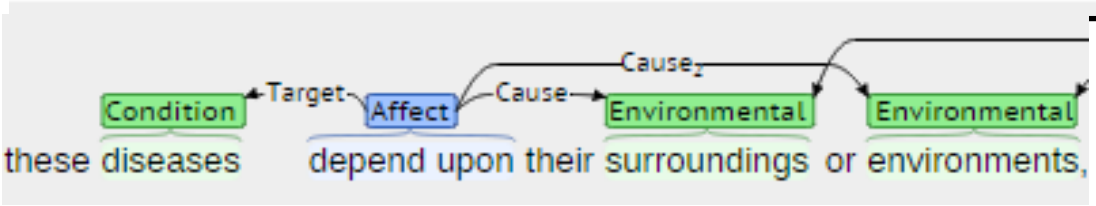
Type	Description	Examples
Anatomical	An entity forming part of the human body	*lung, lobe, sputum, fibroid*
Biological_ Entity	A living entity not part of the human body	*tubercle bacilli, mould, guinea-pig, flea*
Condition	Medical condition or ailment	*phthisis, bronchitis, typhoid*
Environmental	Environmental factor relevant to incidence/prevention/ control/treatment of condition	*humidity, high mountain climates, milk, linen, drains*
Sign_or_ Symptom	Altered physical appearance or behaviour as a probable result of injury or condition	*cough, pain, rise in temperature, swollen*
Subject	individual or group of cases under discussion	*asthma patients, those with negative reactions to tuberculin*
Therapeutic_ or_ Investigational	treatment, substance, medium or procedure, prescribed or used in investigation	*atrophine sulphate, generous diet, change of air, lobectomy*

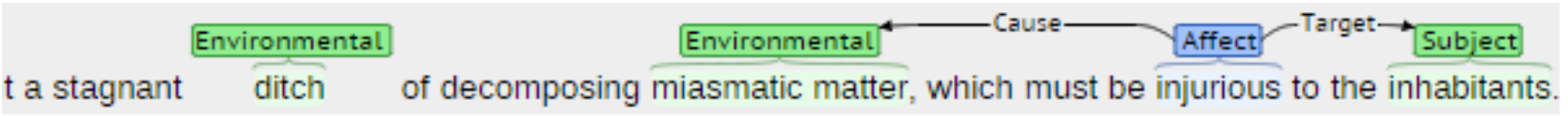
HIMERA Corpus: Events

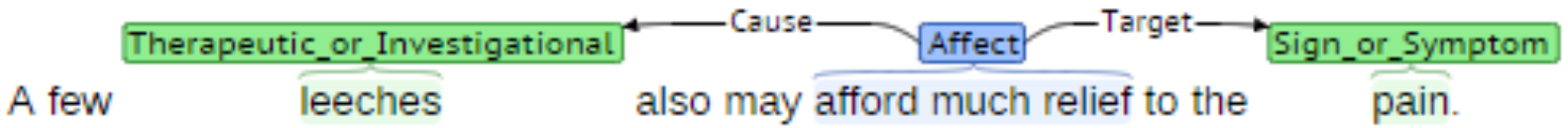
Type	Description	Participants
Affect	A entity or event is affected, infected, changed or transformed, possibly by another entity or event	Cause:-The cause of the affection Target: The entity or event affected Subject: The medical subject affected



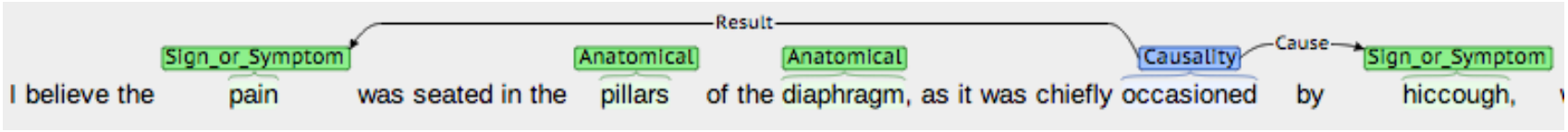


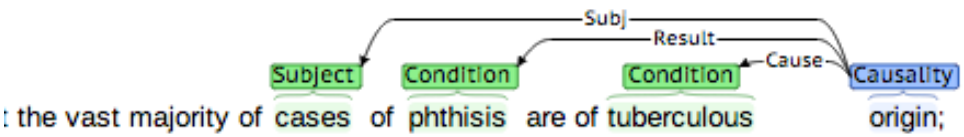


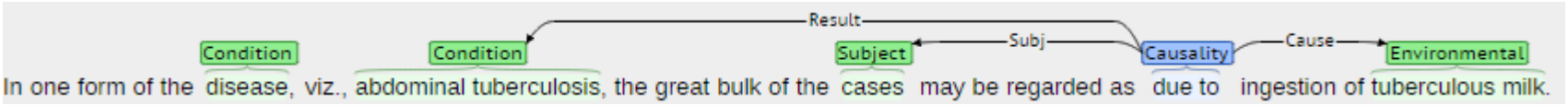


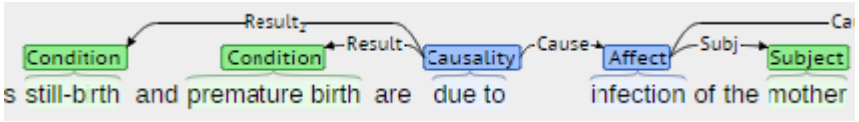


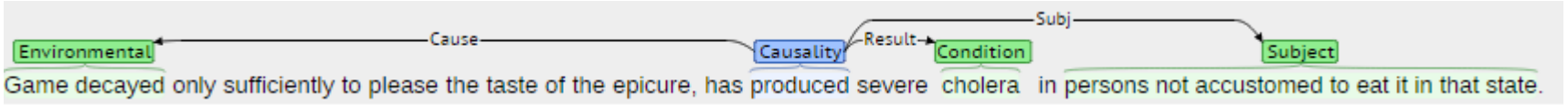
Type	Description	Participants
Cause	An entity or event results in the manifestation of another entity or event	Cause:-The cause of the event Result: The resulting entity or event Subject: The medical subject affected











Entity Agreement Rates (F-Score)

Type	Exact span agreement	Relaxed span agreement
Anatomical	0.81	0.85
Biological_Entity	0.99	0.99
Condition	0.92	0.95
Environmental	0.63	0.79
Sign_or_Symptom	0.84	0.88
Subject	0.70	0.81
Therapeutic_or_Investigational	0.73	0.78
TOTAL	0.80	0.86

HYMERA annotation counts

Entity Type	Count
Anatomical	2002
Biological_Entity	295
Condition	1499
Environmental	1268
Sign_or_Symptom	1171
Subject	1062
Therapeutic_or_Investigational	1046
TOTAL	8343

Event Type	Count
Affect	611
Causality	204
TOTAL	815

- Discrepancies in double annotated docs resolved
- *Anatomical entities* most numerous
- *Biological_Entity* sparse according to rare mention of microorganisms prior to 20th century

Entity recognition – NERSuite

- ✓ Entity Models trained NERSuite
  nersuite.nlplab.org
  - Pre-processing using GENIA tagger to generate features
- ✓ Default features for learning
  - Surface word forms
  - Base word forms
  - POS tags
  - Syntactic chunk tags
- ✓ Default features augmented with semantic features

Entity recognition Models

- ✓ **Baseline (BL)** – Default NERSuite features
- ✓ **Full MetaMap (FM)** – Semantic features added by applying MetaMap semantic tagger (133 types)
- ✓ **Selective MetaMap (SM)** – Semantic features added by mapping selected MetaMap categories to the seven HYMERA entity categories
- ✓ **UMLS Lookup (UL)** – Semantic features assigned using dictionary lookup in filtered version of the UMLS Metathesaurus dictionary.

UMLS ➔ Corpus Mappings

MetaMap Categories	Hymera category
Anatomical Abnormality, Body Substance Body Part, Organ, or Organ Component Body Location or Region, Body Space or Junction, Tissue	Anatomical
Animal, Mammal, Cell, Bacterium, Organism	Biological_ Entity
Food, Chemical Viewed Structurally Element, Ion, or Isotope, Hazardous or Poisonous Substance Substance, Natural Phenomenon or Process	Environmental
Disease or Syndrome, Pathologic Function	Condition
Clinical Drug, Amino Acid, Peptide, or Protein, Immunologic Factor, Organic Chemical, Pharmacologic Substance, Biologically Active Substance, Lipid	Therapeutic_or_ Investigational
Sign or Symptom, Finding	Sign_or_ Symptom
Group, Patient or Disabled Group	Subject

NERSuite Results (F-Score, 5-fold cross validation)

Type	BL (Exact)	BL (Relaxed)	UL (Exact)	UL (Relaxed)
Anatomical	0.73	0.79	**0.76**	**0.83**
Biological_Entity	0.70	0.72	**0.74**	**0.75**
Condition	0.73	0.82	**0.77**	**0.86**
Environmental	0.49	0.58	0.49	**0.60**
Sign_or_Symptom	0.66	0.71	**0.69**	**0.74**
Subject	0.74	0.81	**0.75**	0.81
Therapeutic_or_Investigational	0.57	0.64	**0.61**	**0.67**
ALL	0.67	0.74	**0.70**	**0.77**

UL results reported as most straightforward model to apply
MetaMap can be slow

Comparison

- ✓ **Anatomical** F-Score 0.82
- ✓ Comparable with anatomical entity recognition for (0.85 F-Score) (Pyysalo & Ananiadou, 2014)
- ✓ **Condition** F-Score of 0.76 (exact) and 0.86 relaxed
  - ✓ Comparable to disease recognition performance for electronic health records (0.75 exact/0.88 relaxed) (Kaephwan et al., 2014)

Pyysalo S, Ananiadou S (2014) Anatomical Entity Mention Recognition at Literature Scale. Bioinformatics 306:868–875
Kaewphan, S, Hakala, Kai and Ginter, F (2014) UTU: Disease Mention Recognition and Normalization with CRFs and Vector Space Representations, In Proceedings of the 8th International Workshop on Semantic Evaluation (SemEval 2014), pp. 807—811

Time-sensitive NER experiments

- ✓ How time-sensitive is NER?
- ✓ Split the HIMERA to decades
  - ✓ Used docs from a single decades as test data
  - ✓ Trained on combinations of docs from other decades

Time-sensitive NER example (Testing on 1890s docs)

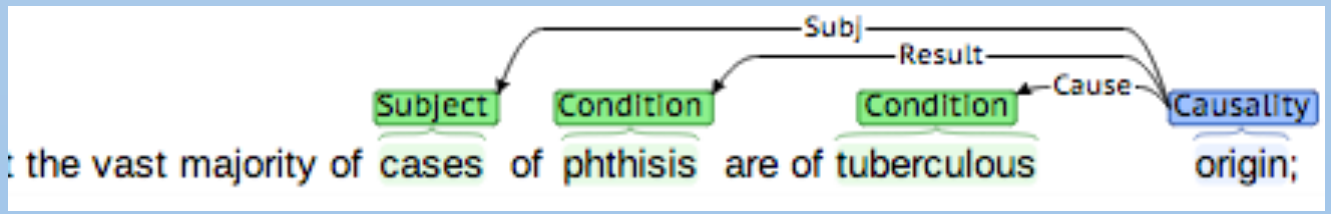
	Training Data					
Type	1850s	1920s	1960s	1850s /1920s	1920s /1960s	1850s /1920s/ 1960s
Anatomical	0.78	0.66	0.53	**0.83**	0.66	**0.84**
Biological_ Entity	0.41	0.87	0.13	0.88	**0.92**	**0.91**
Condition	0.79	0.77	0.72	**0.85**	0.67	**0.85**
Environmental	0.32	0.26	0.23	**0.38**	0.29	**0.44**
Sign_ or_Symptom	0.68	0.56	0.41	**0.72**	0.54	**0.72**
Subject	**0.79**	0.73	0.68	**0.80**	0.72	0.78
Therapeutic_or_ Investigational	0.35	0.39	0.19	**0.47**	0.33	**0.52**
ALL	0.70	0.64	0.51	**0.76**	0.61	**0.77**

Observations

- ✓ Similar pattern when different decades are test set
- ✓ When single decade used for training
  - ❑ Best results normally when decade immediately *prior* to test data is used for training
- ✓ When two decades used for training
  - ❑ Best results usually when decades *surrounding* test decade are used for training
- ✓ Best overall results when 3 decades used for training
  - ❑ But, usually only small performance difference from two surrounding decades
- ✓ **Temporal closeness** of training and test data more important than volume of training data
- ✓ As long as some temporally close training data is included, it is not harmful to include training data from more distant decades

Event Recognition

- EventMine www.nactem.ac.uk/EventMine/
- Detects triggers: *origin*
- Finds individual *event participants*
- Combines trigger-argument pairs into semantic structures



Event trigger recognition performance

Event Type	F-Score (Exact)	F-Score (Relaxed)
Affect	0.40	0.45
Causality	0.19	0.27
TOTAL	0.35	0.42

- Much sparser data than previous EventMine applications
- Event types have wide semantic scope
- Diverse range of triggers and stylistic variations can make recognition a challenge
- Events with multiple participants recognised

Ongoing annotation efforts

- ✓ **Ongoing work to triple the size of manually annotated corpus**
  - Different decades to provide greater evidence of language usage
  - More events

History of Medicine Terms

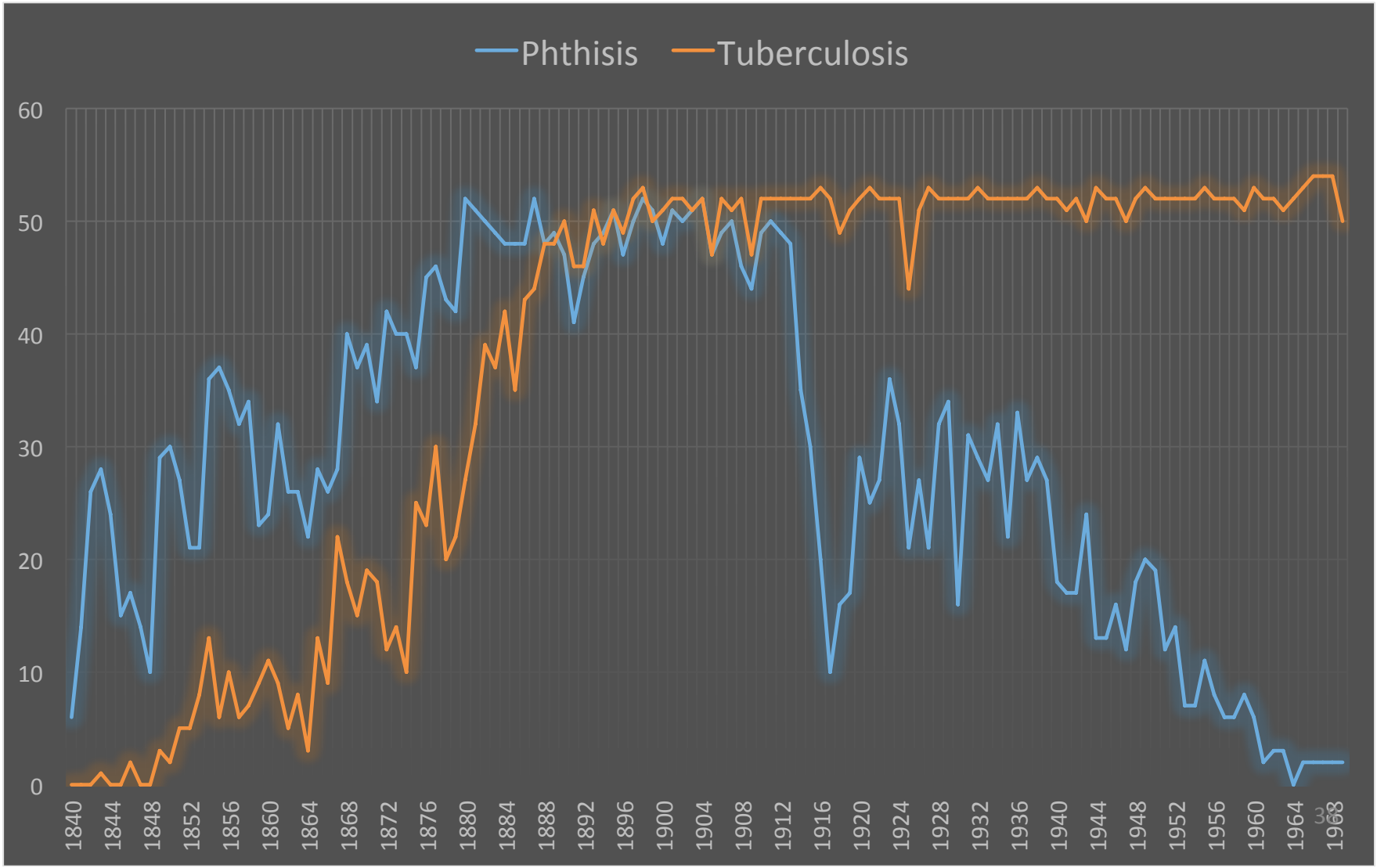
- ✓ Concepts can be expressed in many ways
- ✓ We take into account such variants to improve search

Lexical Variations	
oedema	edema
whooping cough	whooping-cough
pulmonary tuberculosis	tuberculosis
respiratory diseases	diseases of the respiratory system
Semantic Variations	
tuberculosis	phthisis
smallpox	variola

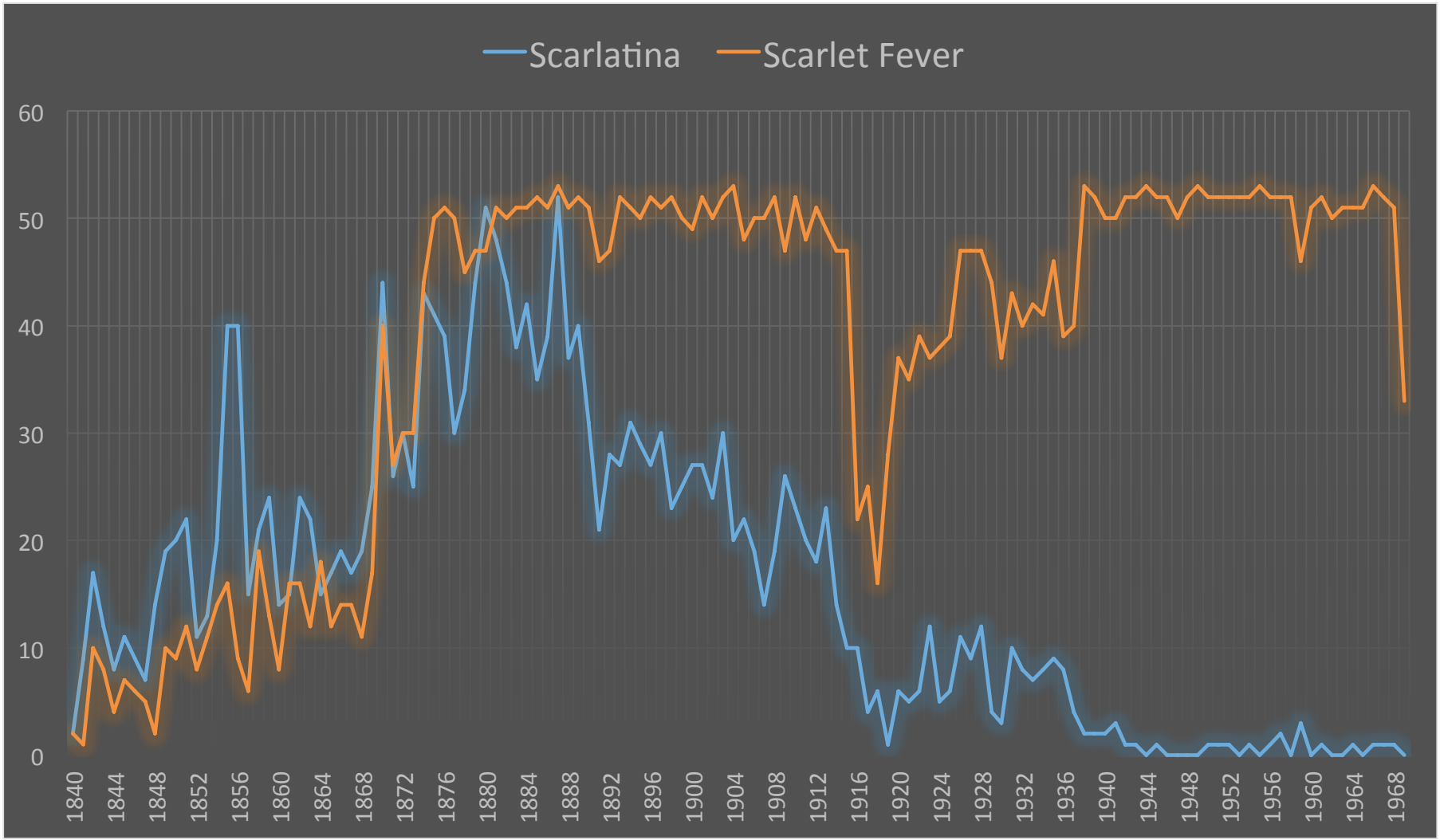
Building a Time Sensitive Terminological Resource

- ✓ Why not using existing resources?
  - MeSH, Disease Ontology, UMLS, Metathesaurus
- ✓ Used in search systems to *expand query terms*
- ✓ Textual variants of concepts **change over time**
  - Existing resources tend to focus on **contemporary** terminology
  - **Historically-relevant** variants not covered in a comprehensive and consistent manner

Term Variation in BMJ
Phthisis vs. *Tuberculosis*



Term Variation in BMJ
Scarlet Fever vs. *Scarlatina*



Time Sensitive Terminological Inventory

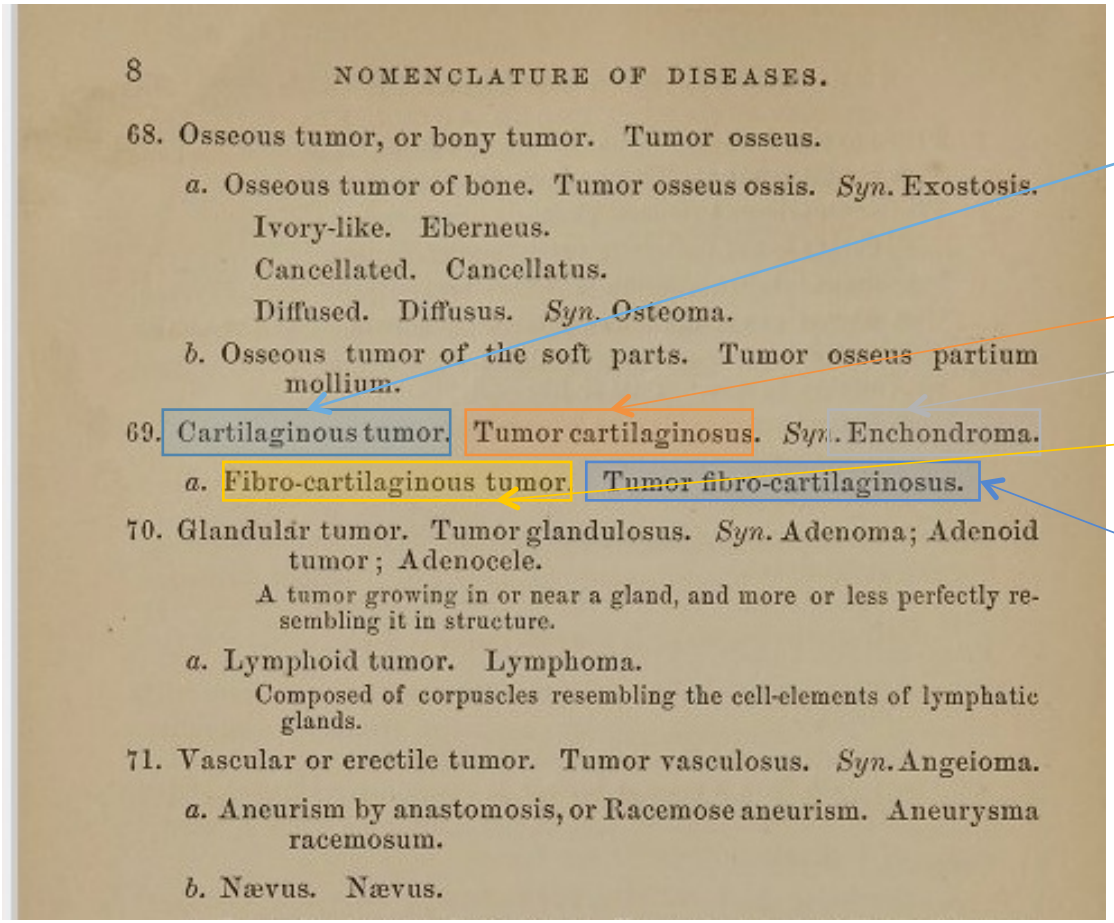
- ✓ **Time sensitive inventory of medical terminology**
  - Complements existing terminological resources
  - Accounts for term variants over time
- ✓ **How?**
  - Extracted term variants from 19th c. medical lexica
  - Identified more variants using *distributional semantics* to BMJ and MOH archives

Processing Historical Lexica

19th century medical lexica: NLM Archive

Name	Year	# top-level entries
Nomenclature of diseases	1872	1347
Index of diseases, their symptoms, and treatment	1882	522

Processing Historical Lexica - example



8 NOMENCLATURE OF DISEASES.

68. Osseous tumor, or bony tumor. Tumor osseus.

a. Osseous tumor of bone. Tumor osseus ossis. *Syn.* Exostosis.
Ivory-like. Eberneus.
Cancellated. Cancellatus.
Diffused. Diffusus. *Syn.* Osteoma.

b. Osseous tumor of the soft parts. Tumor osseus partium mollium.

69. Cartilaginous tumor. Tumor cartilaginosus. *Syn.* Enchondroma.

a. Fibro-cartilaginous tumor. Tumor fibro-cartilaginosus.

70. Glandular tumor. Tumor glandulosus. *Syn.* Adenoma; Adenoid tumor; Adenocele.
A tumor growing in or near a gland, and more or less perfectly resembling it in structure.

a. Lymphoid tumor. Lymphoma.
Composed of corpuscles resembling the cell-elements of lymphatic glands.

71. Vascular or erectile tumor. Tumor vasculosus. *Syn.* Angeioma.

a. Aneurism by anastomosis, or Racemose aneurism. Aneurysma racemosum.

b. Nævus. Nævus.

Synonym set

- English main term
- Latin main term
- Synonym list
- Sub-type English term
- Sub-type Latin term

Processing Historical Lexica

- ✓ Link UMLS concepts to historical concepts
  - approximate string matching
- ✓ 1,588 UMLS and historical concepts linked
  - 2,422 historical synonyms/variants not in UMLS
    - e.g., *cerebro-spinal fever* as a synonym of *epidemic meningitis* only in historical resource
  - ✓ 800 historical concepts could not be linked to UMLS concepts
- ✓ *lack of comprehensive historical coverage in UMLS*

Need for Distributional Semantics

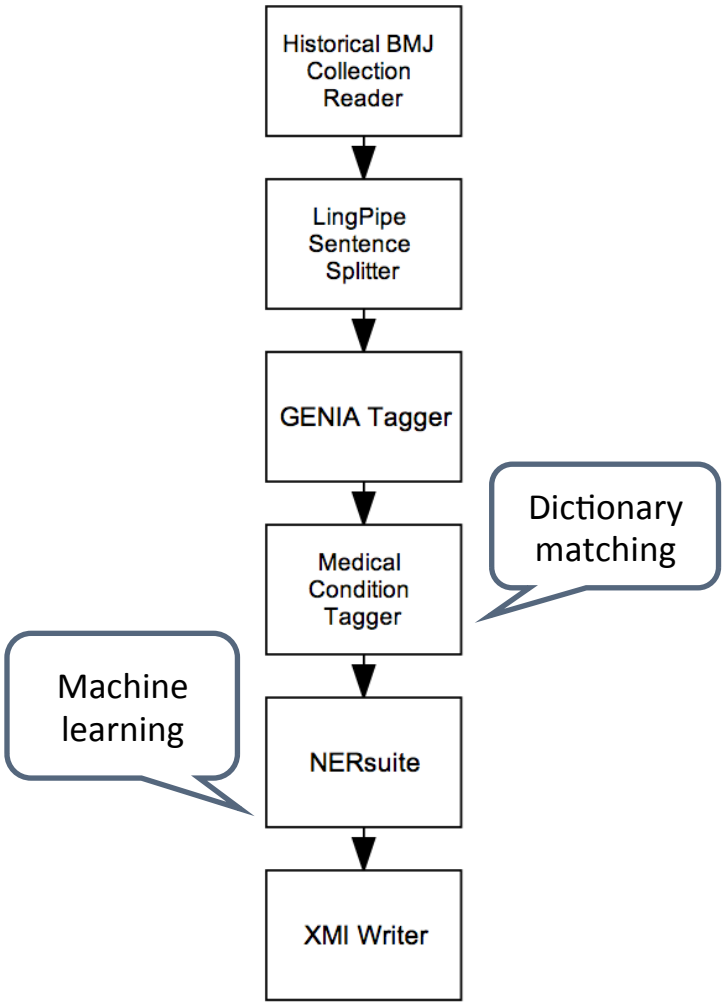
- ✓ Different lexica to account for terminology usage in different time periods
- ✓ **Distributional semantics techniques** –
- ✓ Processed complete BMJ and MOH archives to extract semantically related terminology across complete archive time-span

TM Methods for Historical Variant Identification

- ✓ Pre-processing
- ✓ Distributional similarity measures
- ✓ Detection of historically relevant term variants

Pre-Processing

- ✓ Extracted disease terms
- ✓ Combined 2 disease NERs
- ✓ Dictionary matching from 19th lexica
  - ✓ Index of Diseases
  - ✓ Nomenclature of Diseases
- ✓ Trained on NCBI Disease Corpus



Distributional Similarity Measures

- ✓Generate Context vector for each term
- ✓6 word window around term
- ✓High cosine similarity between context vectors indicates related terms

scarlet fever

47366.48	46344.15	30555.26	31896.95	15241.49	11759.56	7407.69	7388.65	…	4608.19
measles	**diptheria**	**fever**	**cough**	**death**	**pox**	**fatal**	**small**	**…**	**typhoid**

scarlatina

11474.87	5436.11	5434.60	2892.64	2413.52	4326.59	875.16	2340.05	…	2071.56
measles	**diptheria**	**fever**	**cough**	**death**	**pox**	**fatal**	**small**	**…**	**typhoid**

$$cos(\theta) = \frac{A \cdot B}{\|A\|\|B\|} = 0.8434$$

Distributional Similarity Measures

scarlet fever

scarlatina 0.8434
whooping cough 0.7415
measles 0.7094
diphtheria 0.6689
acute pneumonia 0.6501
chicken pox 0.6407
german measles 0.6336
diarrhoeal disease 0.6301
infantile diarrhoea 0.6234
diarrhea 0.6208
croup 0.6093
mump 0.6042
typhus fever 0.5535
…

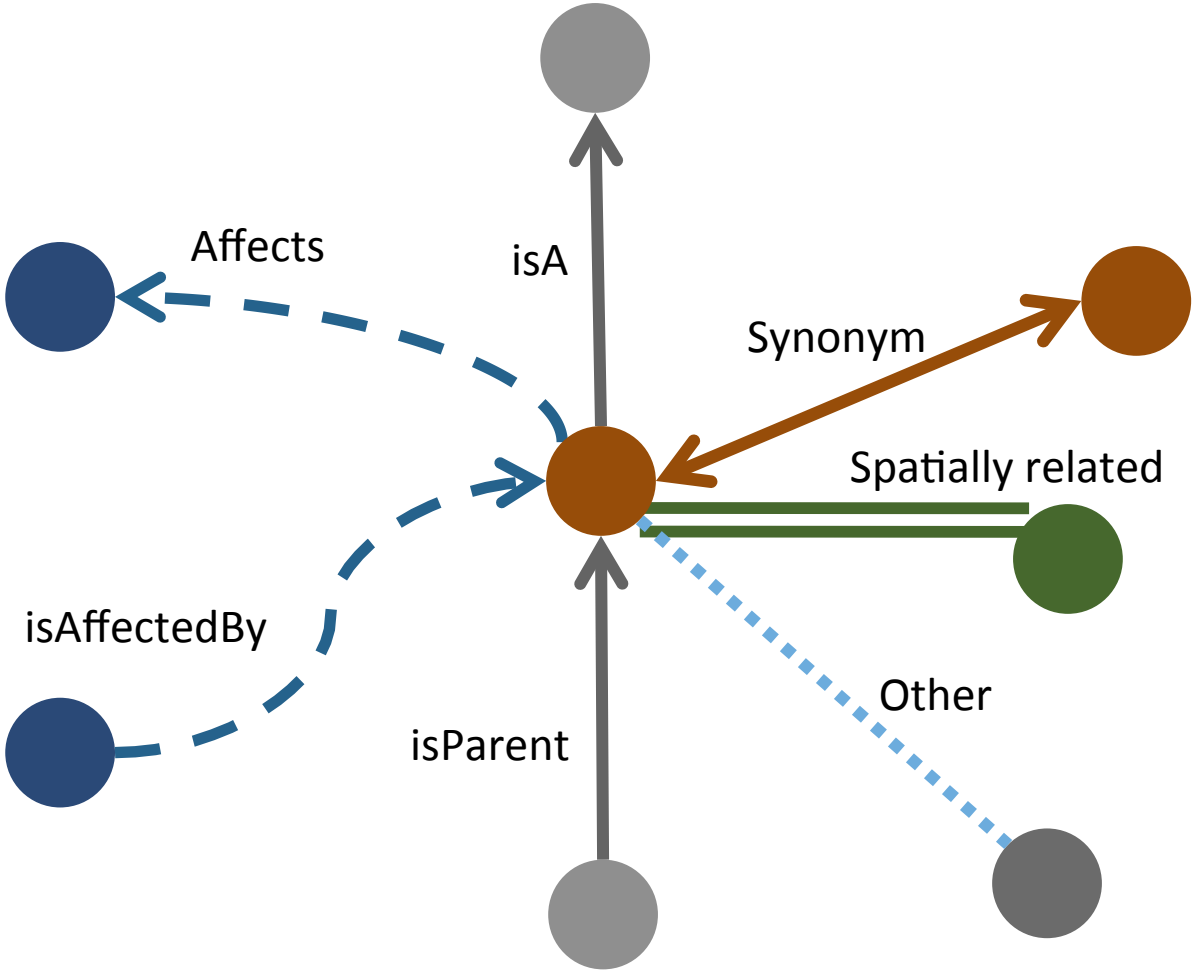
Automatic Evaluation of DSM output

- ✓ Use UMLS Metathesaurus
  - ✓ At least one UMLS synonym is identified >70% cases
  - ✓ MOH reports, *all* synonyms listed in UMLS discovered by the DSM method in 49% of cases

Expert Evaluation of DSM output

- ✓ Automatic evaluation general performance of DSMs
- ✓ However
  - No historical synonym coverage
  - No other types of semantic relations between related terms
- ✓ Expert evaluation covers
  - 348 source-target term pairs examined by expert, with cosine similarity greater than 0.8
  - Only 18% identified as synonyms using UMLS
  - Expert asked to characterise semantic relation (if any) between the two terms

Possible relations between terms



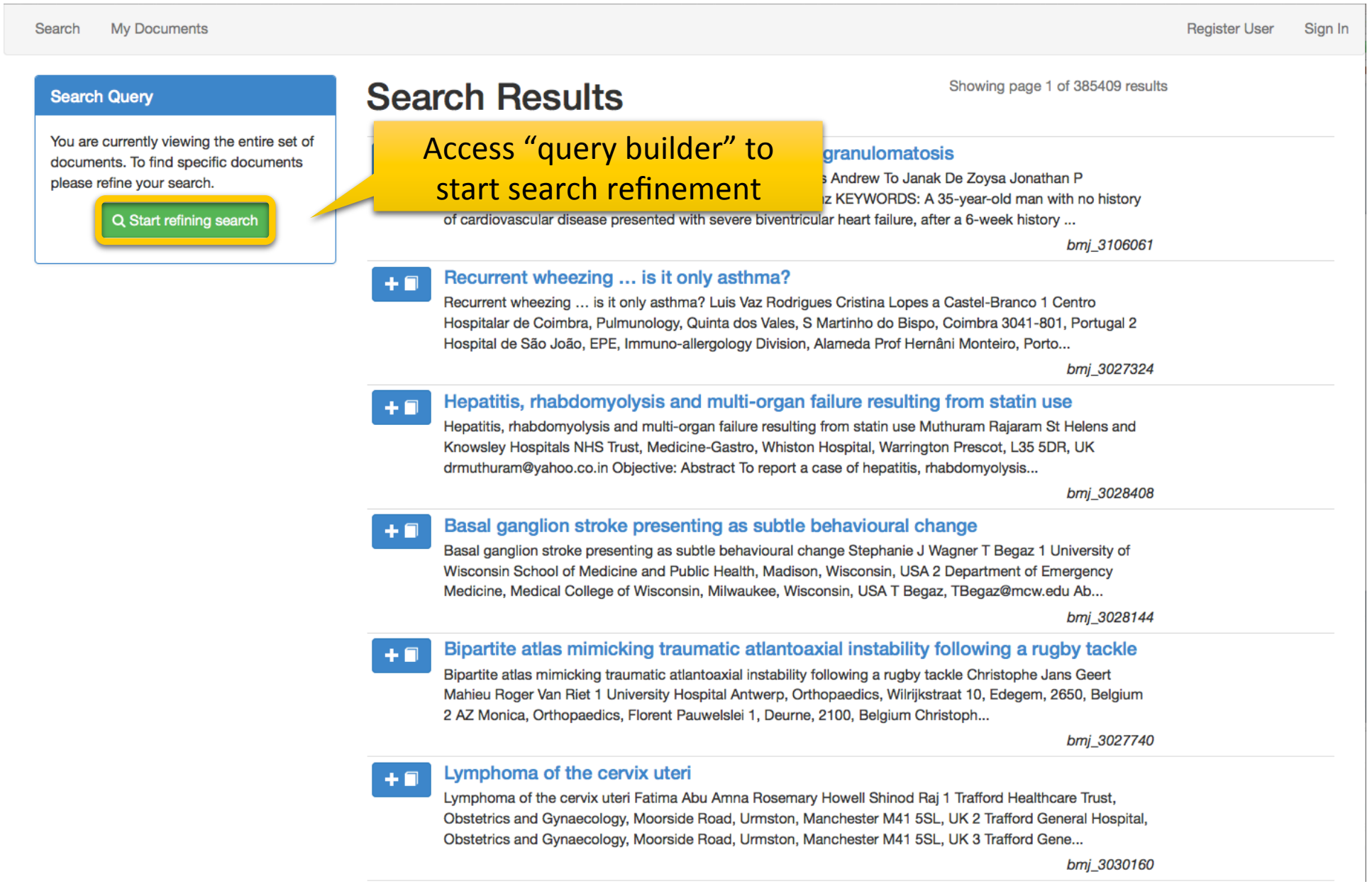
Expert evaluation results

Event Type	Count
Synonym	83 (24%)
isA	21 (6%)
isParent	35 (10%)
Affects	10 (3%)
isAffectedBy	11(3%)
Spatially Related	19 (5%)
OtherRelation	35 (10%)
TOTAL SEMANTICALLY RELATED	216 (62%)
Unrelated	106 (30%)
Non-disease pair	26 (7%)

- ✓ Expert identified more synonyms than UMLS
  - DSM can identify more synonyms
- ✓ 62% of pairs semantically related

Semantic annotation of archives

- ✓ Integrated: OCR correction, NER, event into interoperable pipeline for medical history
- ✓ Automatically recognised NEs used as input terms to DSM methods
  - ✓ Recognised semantic relations between a large number of medical terms belonging to different semantic classes
  - ✓ Created a wide coverage, historically-aware resource of medical terminology


Search
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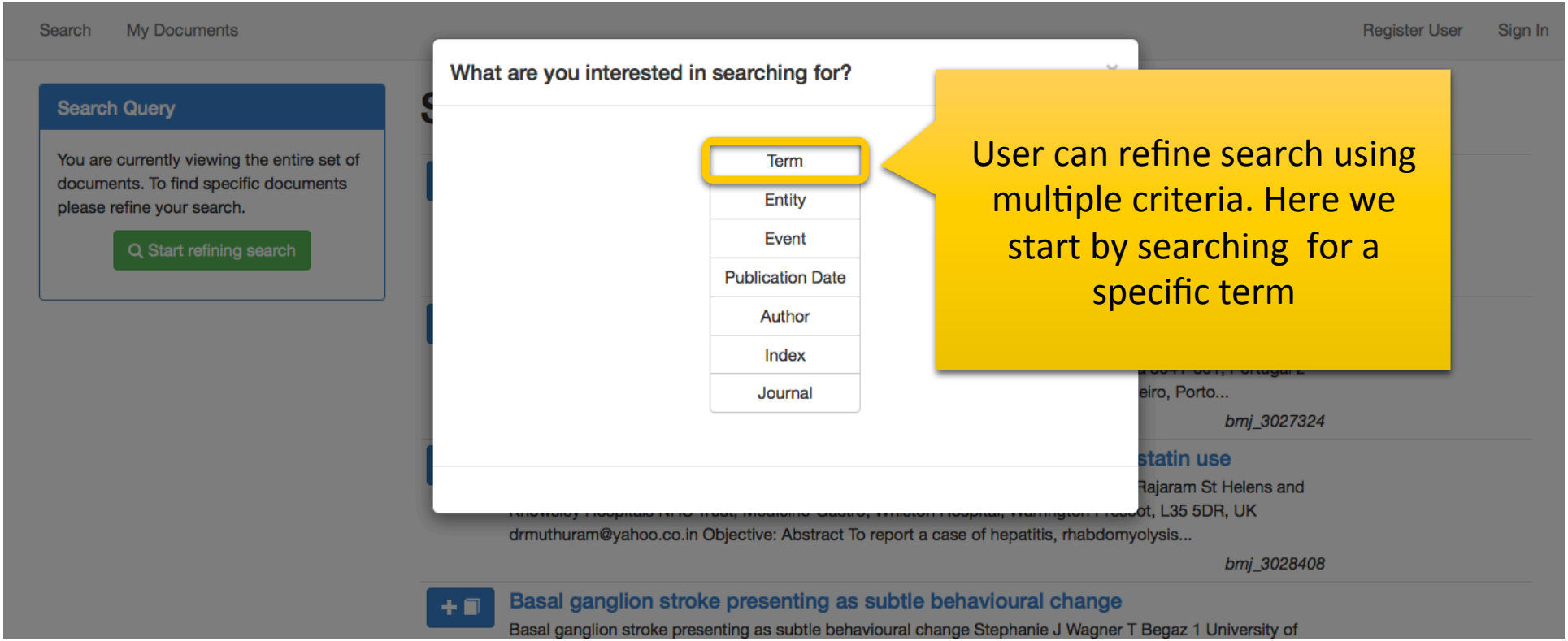
You are currently viewing the entire set of documents. To find specific documents please refine your search.
Start refining search
Access “query builder” to start search refinement
Search Results
Showing page 1 of 385409 results
granulomatosis
s Andrew To Janak De Zoysa Jonathan P
z KEYWORDS: A 35-year-old man with no history of cardiovascular disease presented with severe biventricular heart failure, after a 6-week history ...
bmj_3106061
Recurrent wheezing ... is it only asthma?
Recurrent wheezing ... is it only asthma? Luis Vaz Rodrigues Cristina Lopes a Castel-Branco 1 Centro Hospitalar de Coimbra, Pulmunology, Quinta dos Vales, S Martinho do Bispo, Coimbra 3041-801, Portugal 2 Hospital de São João, EPE, Immuno-allergology Division, Alameda Prof Hernâni Monteiro, Porto...
bmj_3027324
Hepatitis, rhabdomyolysis and multi-organ failure resulting from statin use
Hepatitis, rhabdomyolysis and multi-organ failure resulting from statin use Muthuram Rajaram St Helens and Knowsley Hospitals NHS Trust, Medicine-Gastro, Whiston Hospital, Warrington Prescot, L35 5DR, UK drmuthuram@yahoo.co.in Objective: Abstract To report a case of hepatitis, rhabdomyolysis...
bmj_3028408
Basal ganglion stroke presenting as subtle behavioural change
Basal ganglion stroke presenting as subtle behavioural change Stephanie J Wagner T Begaz 1 University of Wisconsin School of Medicine and Public Health, Madison, Wisconsin, USA 2 Department of Emergency Medicine, Medical College of Wisconsin, Milwaukee, Wisconsin, USA T Begaz, TBegaz@mcw.edu Ab...
bmj_3028144
Bipartite atlas mimicking traumatic atlantoaxial instability following a rugby tackle
Bipartite atlas mimicking traumatic atlantoaxial instability following a rugby tackle Christophe Jans Geert Mahieu Roger Van Riet 1 University Hospital Antwerp, Orthopaedics, Wilrijkstraat 10, Edegem, 2650, Belgium 2 AZ Monica, Orthopaedics, Florent Pauwelslei 1, Deurne, 2100, Belgium Christoph...
bmj_3027740
Lymphoma of the cervix uteri
Lymphoma of the cervix uteri Fatima Abu Amna Rosemary Howell Shinod Raj 1 Trafford Healthcare Trust, Obstetrics and Gynaecology, Moorside Road, Urmston, Manchester M41 5SL, UK 2 Trafford General Hospital, Obstetrics and Gynaecology, Moorside Road, Urmston, Manchester M41 5SL, UK 3 Trafford Gene...
bmj_3030160


Search
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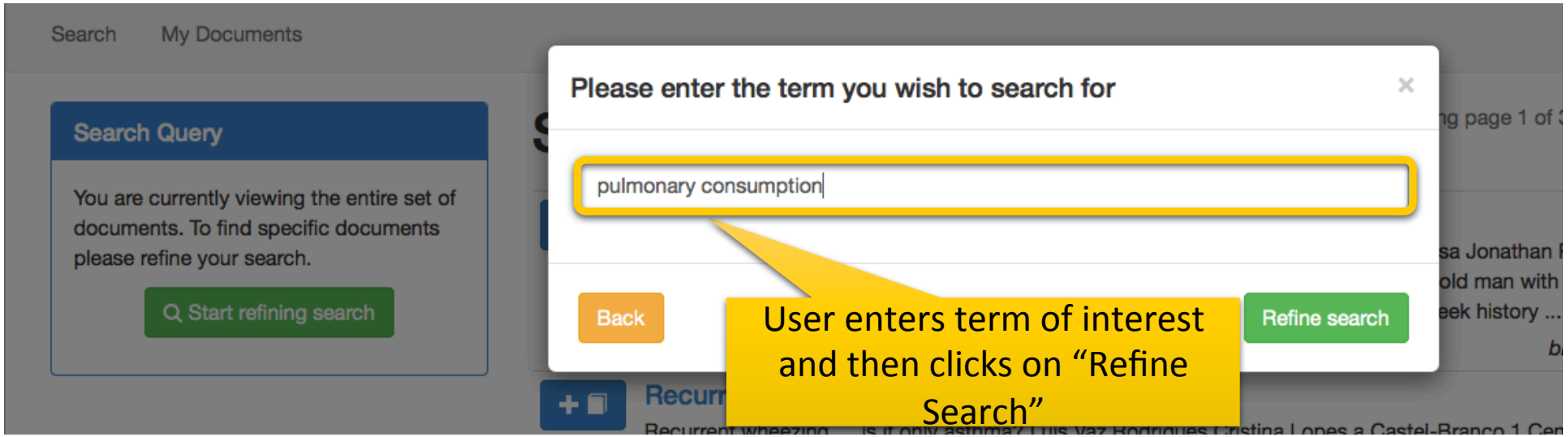
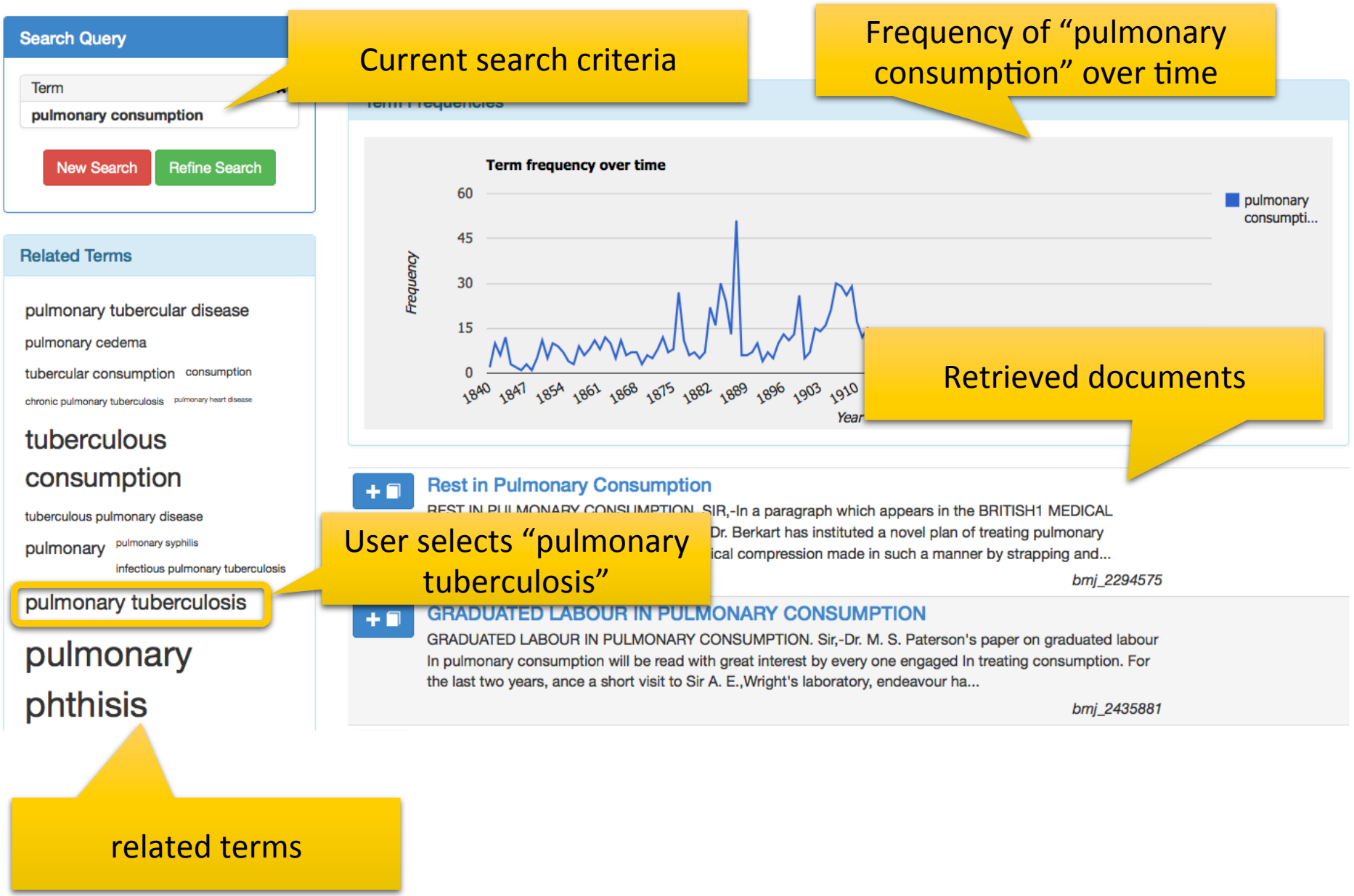
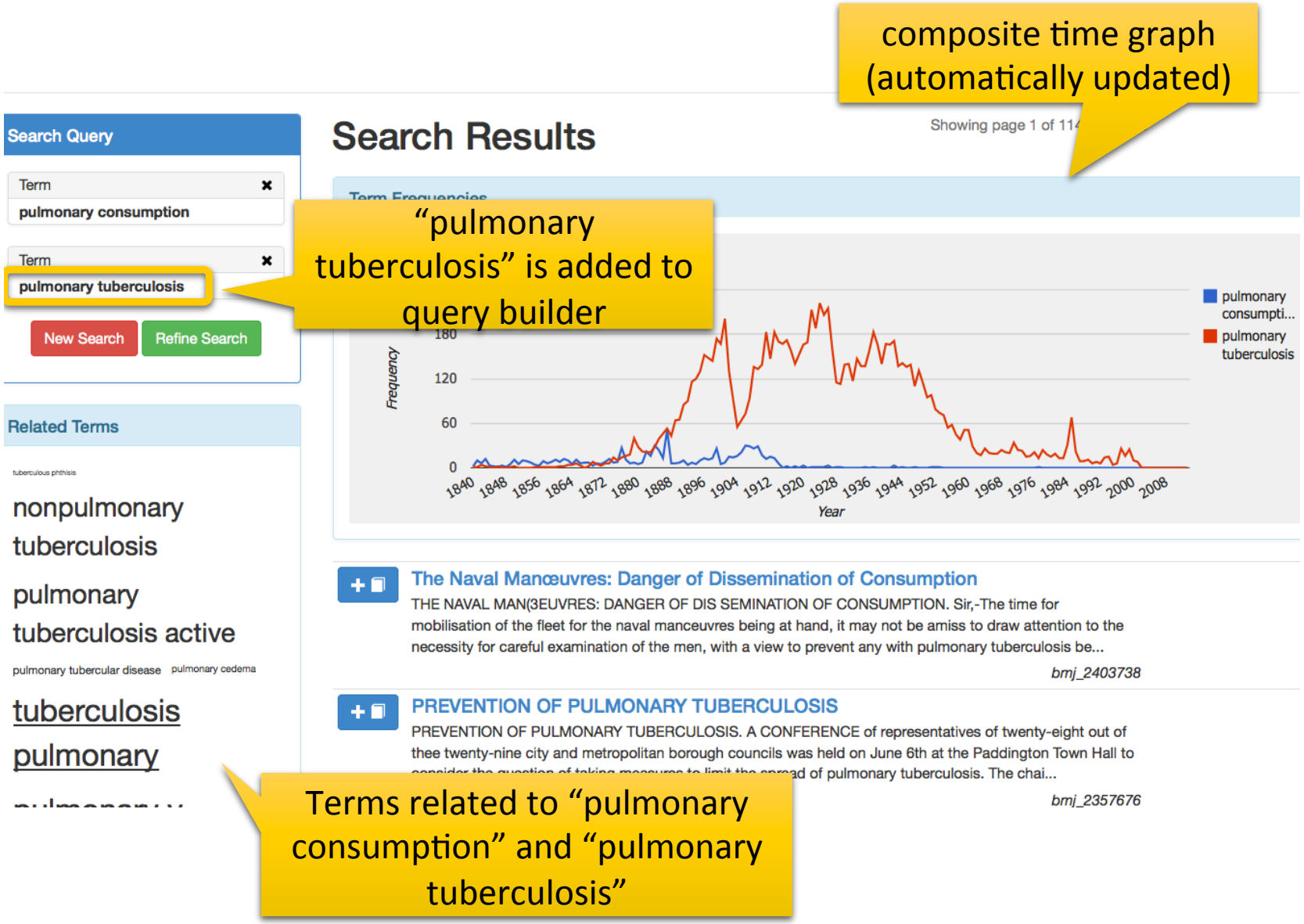
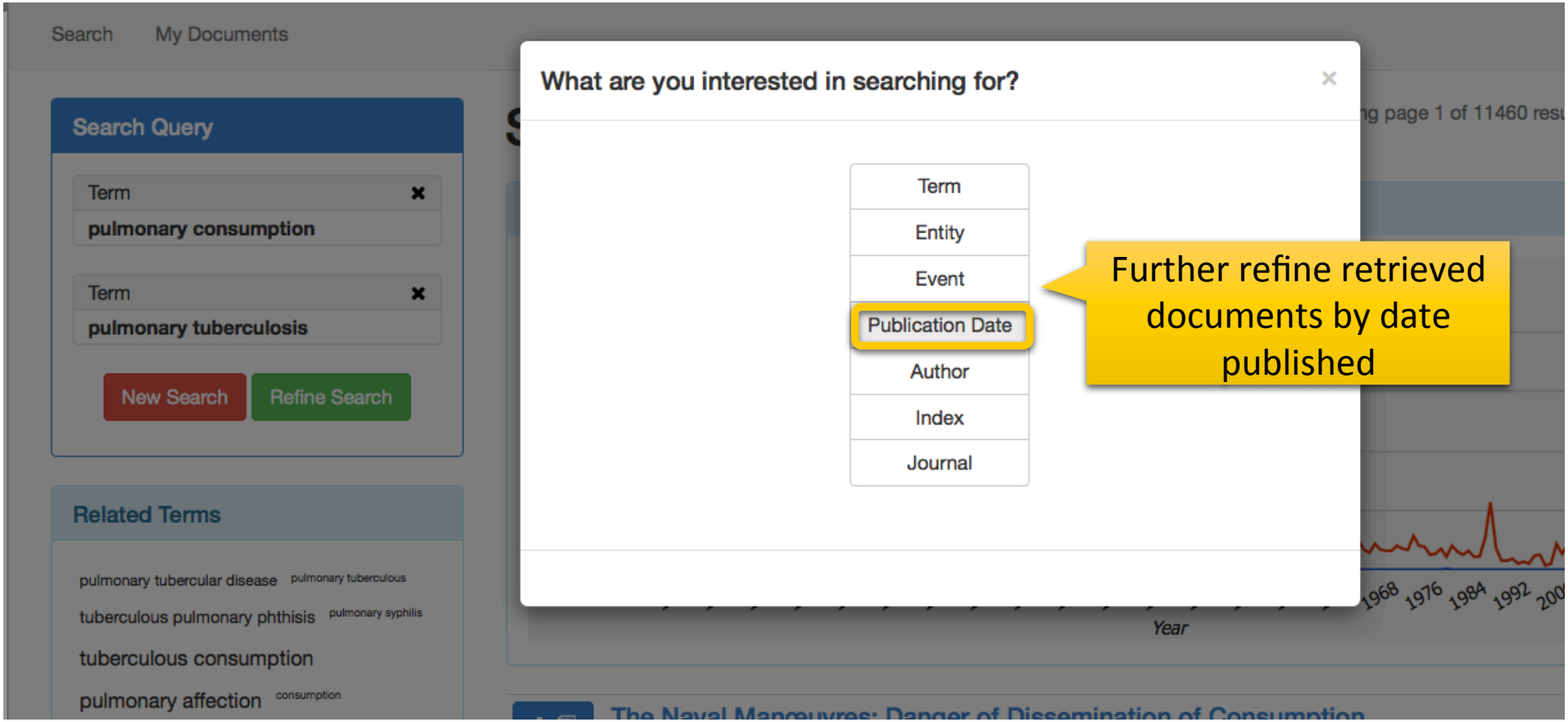
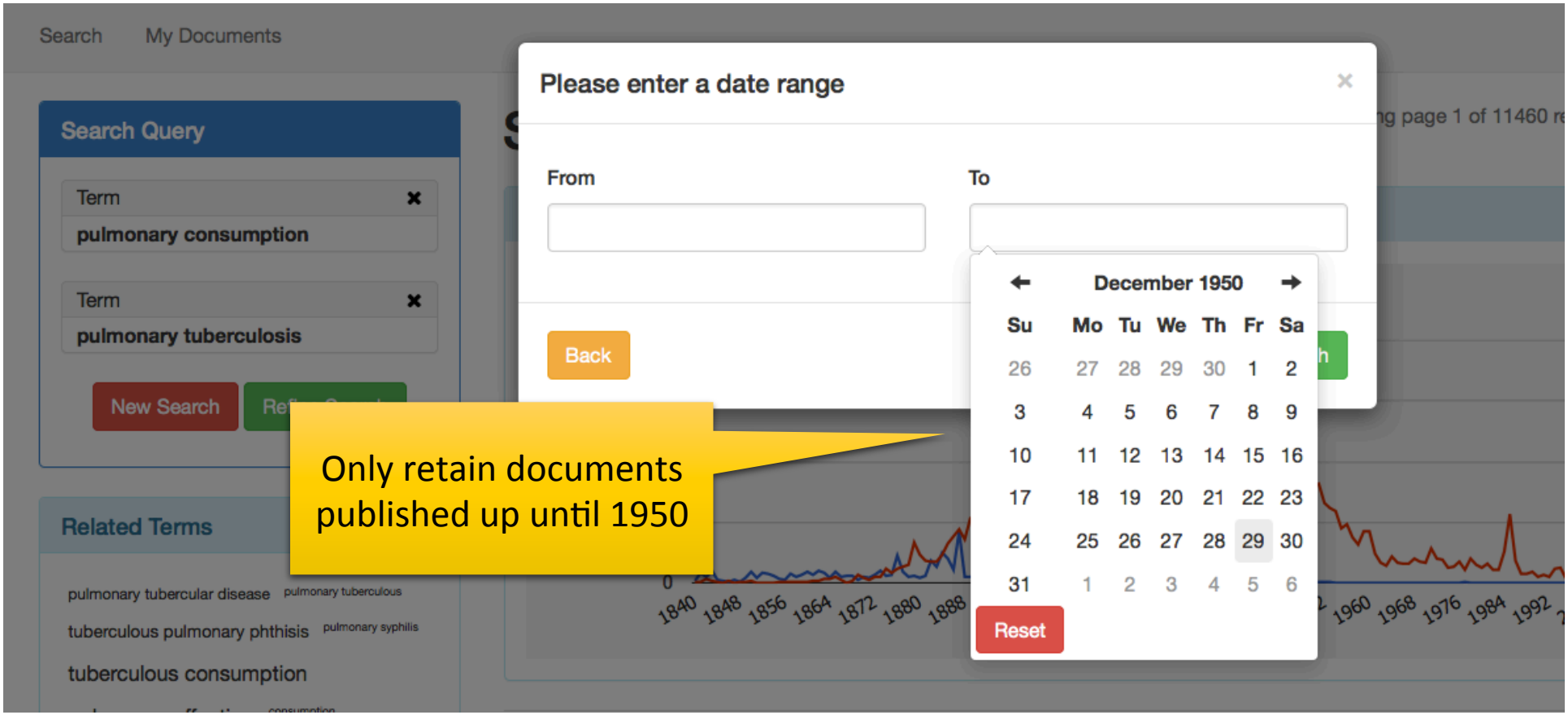
You are currently viewing the entire set of documents. To find specific documents please refine your search.
Start refining search
What are you interested in searching for?
Term
Entity
Event
Publication Date
Author
Index
Journal
User can refine search using multiple criteria. Here we start by searching for a specific term
bmj_3027324
statin use
drmuthuram@yahoo.co.in Objective: Abstract To report a case of hepatitis, rhabdomyolysis...
bmj_3028408
Basal ganglion stroke presenting as subtle behavioural change
Basal ganglion stroke presenting as subtle behavioural change Stephanie J Wagner T Begaz 1 University of


Search
My Documents
Search Query
You are currently viewing the entire set of documents. To find specific documents please refine your search.
Start refining search
Please enter the term you wish to search for
pulmonary consumption
Back
Refine search
User enters term of interest and then clicks on “Refine Search”


Search Query
Term
pulmonary consumption
New Search
Refine Search
Current search criteria
Frequency of “pulmonary consumption” over time
Related Terms
pulmonary tubercular disease
pulmonary cedema
tubercular consumption
consumption
chronic pulmonary tuberculosis
pulmonary heart disease
tuberculous consumption
tuberculous pulmonary disease
pulmonary
pulmonary syphilis
infectious pulmonary tuberculosis
pulmonary tuberculosis
pulmonary phthisis
Term frequency over time
Frequency
60
45
30
15
0
1840
1847
1854
1861
1868
1875
1882
1889
1896
1903
1910
Year
pulmonary consumpti...
Retrieved documents
Rest in Pulmonary Consumption
REST IN PULMONARY CONSUMPTION. SIR,-In a paragraph which appears in the BRITISH1 MEDICAL
Dr. Berkart has instituted a novel plan of treating pulmonary
ical compression made in such a manner by strapping and...
bmj_2294575
GRADUATED LABOUR IN PULMONARY CONSUMPTION
GRADUATED LABOUR IN PULMONARY CONSUMPTION. Sir,-Dr. M. S. Paterson's paper on graduated labour
In pulmonary consumption will be read with great interest by every one engaged In treating consumption. For
the last two years, ance a short visit to Sir A. E.,Wright's laboratory, endeavour ha...
bmj_2435881
User selects “pulmonary tuberculosis”
related terms


composite time graph (automatically updated)
Search Query
Term
pulmonary consumption
Term
pulmonary tuberculosis
New Search
Refine Search
"pulmonary tuberculosis" is added to query builder
Search Results
Showing page 1 of 11
Term Frequencies
Frequency
180
120
60
0
1840 1848 1856 1864 1872 1880 1888 1896 1904 1912 1920 1928 1936 1944 1952 1960 1968 1976 1984 1992 2000 2008
Year
pulmonary consumpti...
pulmonary tuberculosis
Related Terms
tuberculous phthisis
nonpulmonary tuberculosis
pulmonary tuberculosis active
pulmonary tubercular disease
pulmonary cedema
tuberculosis
pulmonary
The Naval Manœuvres: Danger of Dissemination of Consumption
THE NAVAL MAN(3EUVRES: DANGER OF DIS SEMINATION OF CONSUMPTION. Sir,-The time for mobilisation of the fleet for the naval manceuvres being at hand, it may not be amiss to draw attention to the necessity for careful examination of the men, with a view to prevent any with pulmonary tuberculosis be...
bmj_2403738
PREVENTION OF PULMONARY TUBERCULOSIS
PREVENTION OF PULMONARY TUBERCULOSIS. A CONFERENCE of representatives of twenty-eight out of thee twenty-nine city and metropolitan borough councils was held on June 6th at the Paddington Town Hall to
of pulmonary tuberculosis. The chai...
bmj_2357676
Terms related to "pulmonary consumption" and "pulmonary tuberculosis"


Search
My Documents
Search Query
Term
pulmonary consumption
Term
pulmonary tuberculosis
New Search
Refine Search
Related Terms
pulmonary tubercular disease
pulmonary tuberculous
tuberculous pulmonary phthisis
pulmonary syphilis
tuberculous consumption
pulmonary affection
consumption
What are you interested in searching for?
Term
Entity
Event
Publication Date
Author
Index
Journal
Further refine retrieved documents by date published
Year
1968
1976
1984
1992


Search
My Documents
Search Query
Term
pulmonary consumption
Term
pulmonary tuberculosis
New Search
Related Terms
pulmonary tubercular disease
pulmonary tuberculous
tuberculous pulmonary phthisis
pulmonary syphilis
tuberculous consumption
Please enter a date range
From
To
Back
December 1950
Su Mo Tu We Th Fr Sa
26 27 28 29 30 1 2
3 4 5 6 7 8 9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
31 1 2 3 4 5 6
Reset
Only retain documents published up until 1950
0
1840
1848
1856
1864
1872
1880
1888
1960
1968
1976
1984
1992

Search My Documents Register User Sign In

Search Query

Term ✖
pulmonary consumption

Term ✖
pulmonary tuberculosis

Publication Date ✖
To 1950-12-31

New Search | Refine Search

Further refine retrieved documents by date published

Related Terms

pulmonary affection

non pulmonary tuberculosis

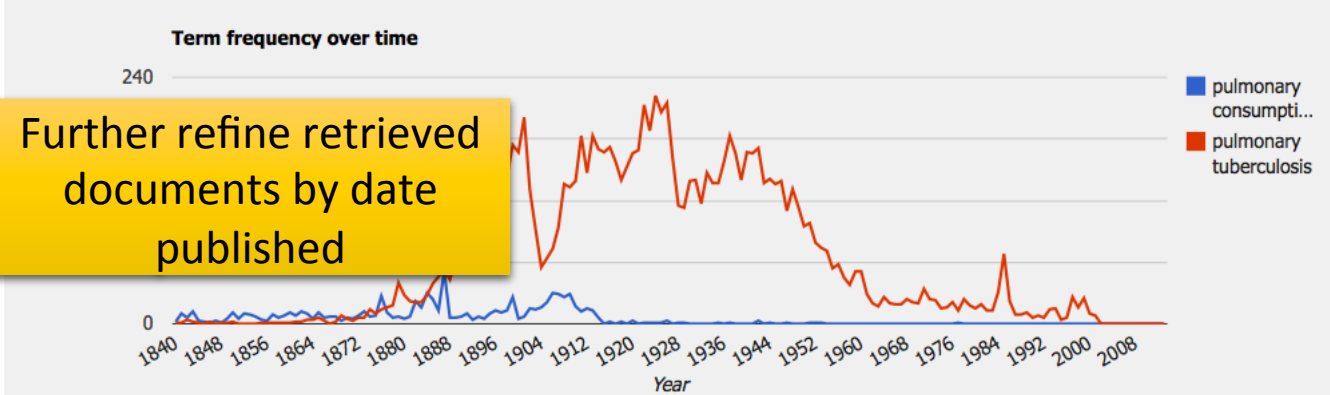
pulmonary tubercular disease

incipient pulmonary tuberculosis

Search Results

Showing page 1 of 6328 results

Term Frequencies



The Naval Manœuvres: Danger of Dissemination of Consumption

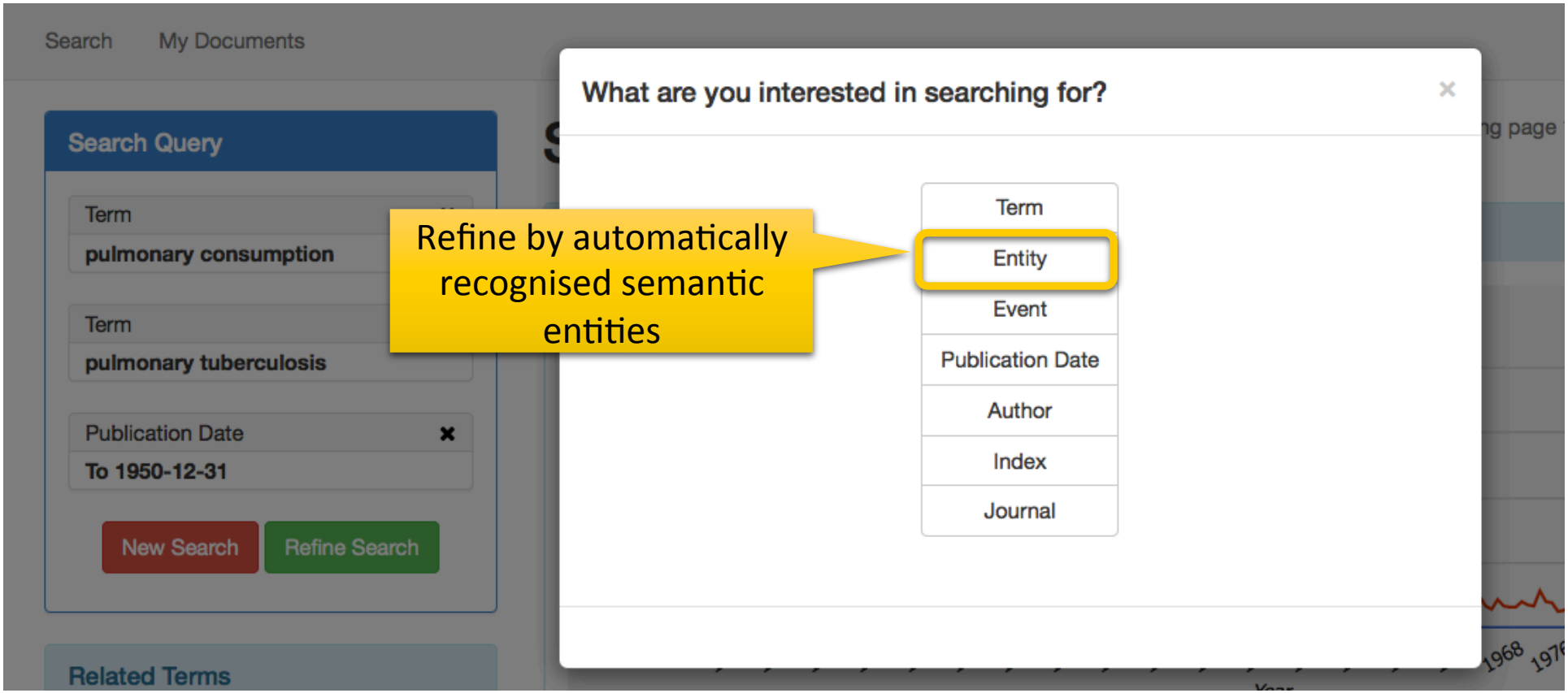
THE NAVAL MAN(3EUVRES: DANGER OF DIS SEMINATION OF CONSUMPTION. Sir,-The time for mobilisation of the fleet for the naval manceuvres being at hand, it may not be amiss to draw attention to the necessity for careful examination of the men, with a view to prevent any with pulmonary tuberculosis be...

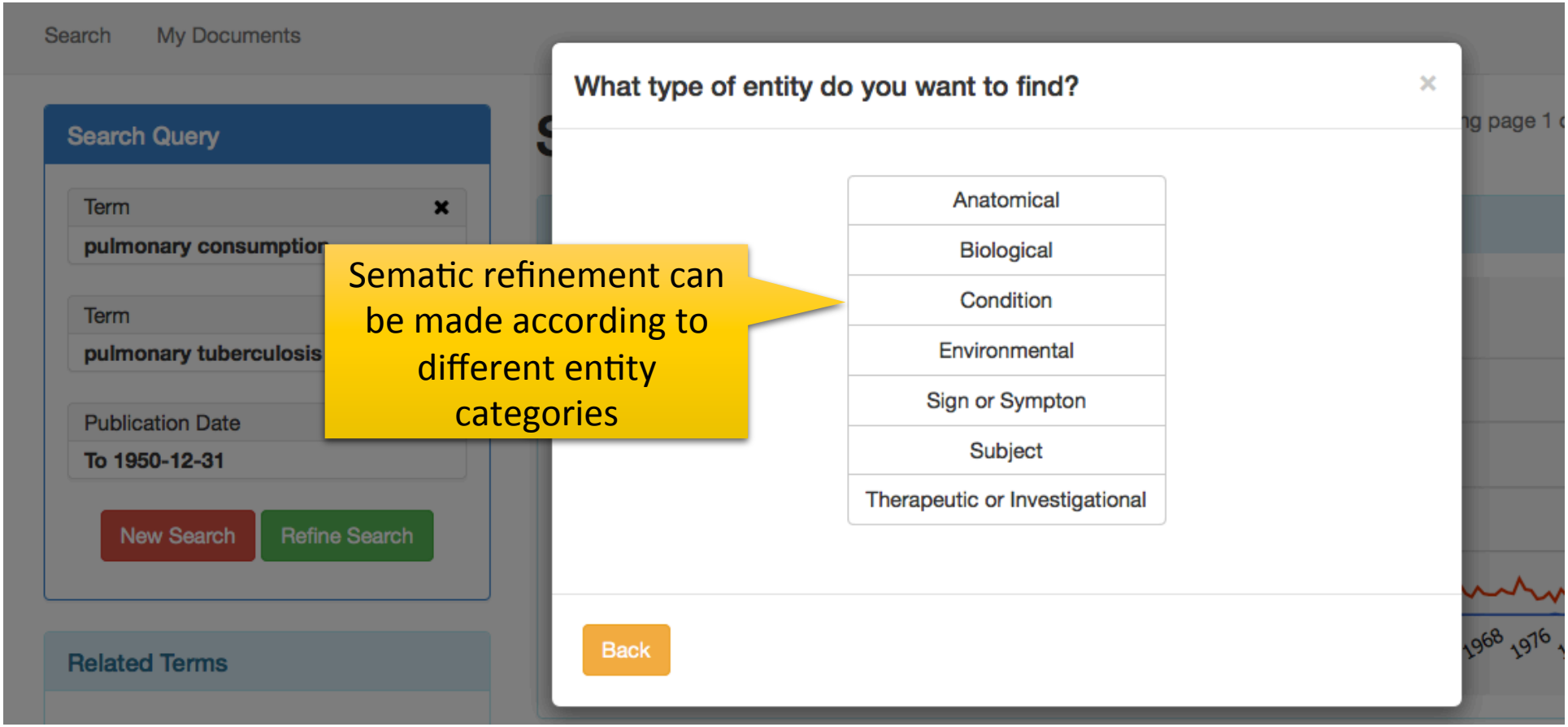
bmj_2403738

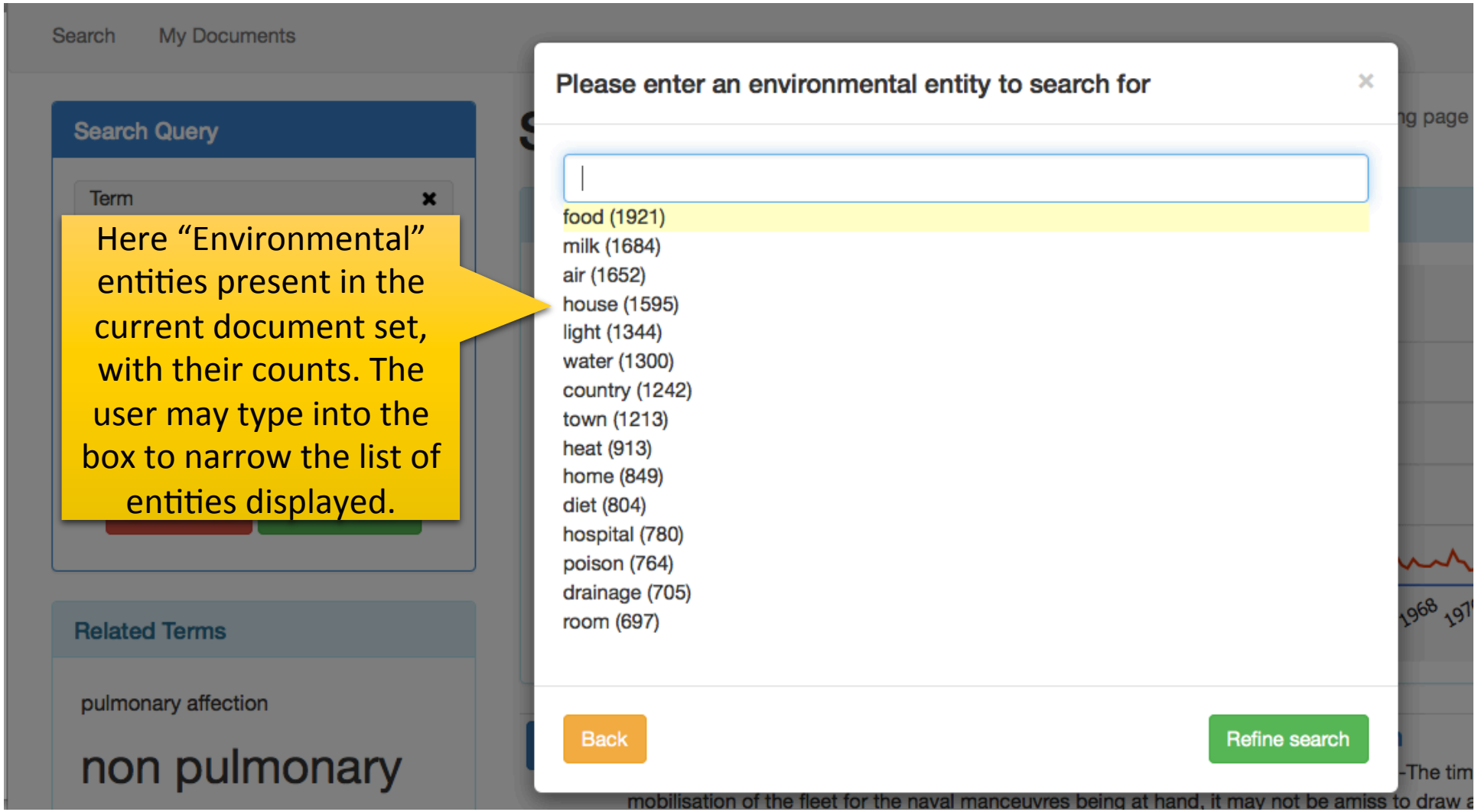
PREVENTION OF PULMONARY TUBERCULOSIS

PREVENTION OF PULMONARY TUBERCULOSIS. A CONFERENCE of representatives of twenty-eight out of thee twenty-nine city and metropolitan borough councils was held on June 6th at the Paddington Town Hall to consider the question of taking measures to limit the spread of pulmonary tuberculosis. The chai...

bmj_2357676


Search
My Documents
Search Query
Term
pulmonary consumption
Term
pulmonary tuberculosis
Publication Date
To 1950-12-31
New Search
Refine Search
Related Terms
What are you interested in searching for?
Refine by automatically recognised semantic entities
Term
Entity
Event
Publication Date
Author
Index
Journal


Search
My Documents
Search Query
Term
pulmonary consumption
Term
pulmonary tuberculosis
Publication Date
To 1950-12-31
New Search
Refine Search
Related Terms
What type of entity do you want to find?
Anatomical
Biological
Condition
Environmental
Sign or Sympton
Subject
Therapeutic or Investigational
Back
Sematic refinement can be made according to different entity categories
1968
1976


Search
My Documents
Search Query
Term
Here “Environmental” entities present in the current document set, with their counts. The user may type into the box to narrow the list of entities displayed.
Related Terms
pulmonary affection
non pulmonary
Please enter an environmental entity to search for
food (1921)
milk (1684)
air (1652)
house (1595)
light (1344)
water (1300)
country (1242)
town (1213)
heat (913)
home (849)
diet (804)
hospital (780)
poison (764)
drainage (705)
room (697)
Back
Refine search
1968
mobilisation of the fleet for the naval manœuvres being at hand, it may not be amiss to draw

Search | My Documents | Register User | Sign In

Search Query

Term ✖ **pulmonary consumption**

Term ✖ **pulmonary tuberculosis**

Publication Date ✖ **To 1950-12-31**

Environmental ✖ **milk**

New Search | Refine Search

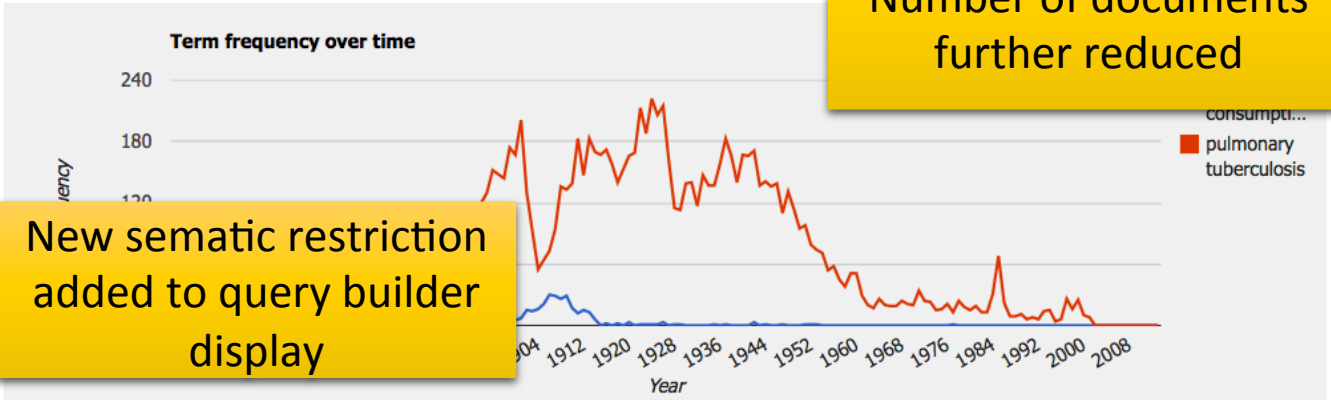
Search Results

Showing page 1 of 1684 results

Number of documents further reduced

New sematic restriction added to query builder display

Term Frequencies



Related Terms

primary pulmonary tuberculosis

non pulmonary tuberculosis

pulmonary tubercular disease

tuberculous pulmonary phthisis

symptomless pulmonary

PREVENTION OF PULMONARY TUBERCULOSIS

PREVENTION OF PULMONARY TUBERCULOSIS. A CONFERENCE of representatives of twenty-eight out of thee twenty-nine city and metropolitan borough councils was held on June 6th at the Paddington Town Hall to consider the question of taking measures to limit the spread of pulmonary tuberculosis. The chai...

bmj_2357676

THE PREVENTION OF CONSUMPTION

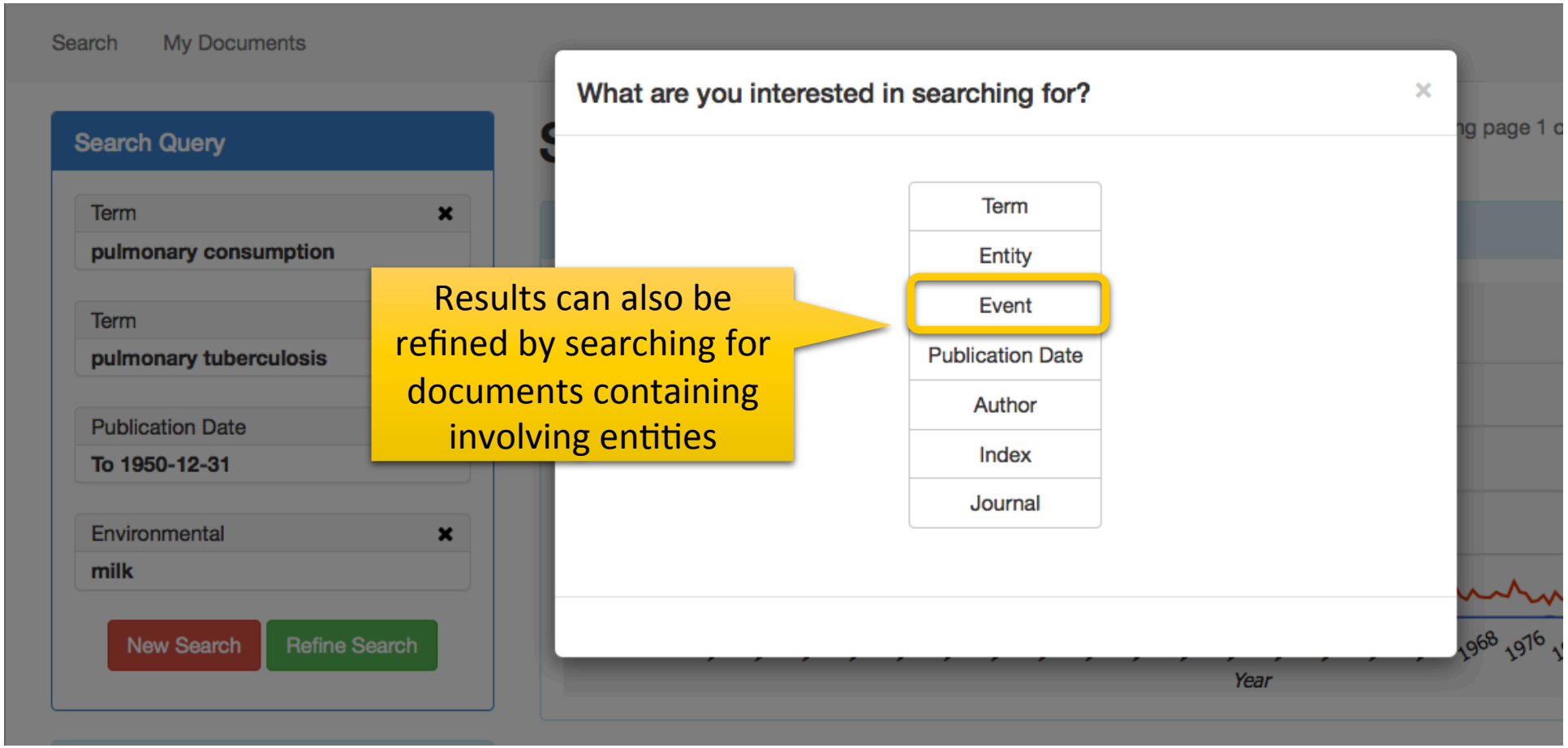
THE PREVENTION OF CONSUMPTION. NOTTINGHAM. THE Committee of the Nottingham and Nottinghamshire Association for the Prevention of Consumption is to be congratulated on the progress shown in the report for the year I90I. Twelve months ago a site had been given by the President for a sanatorium, but ...

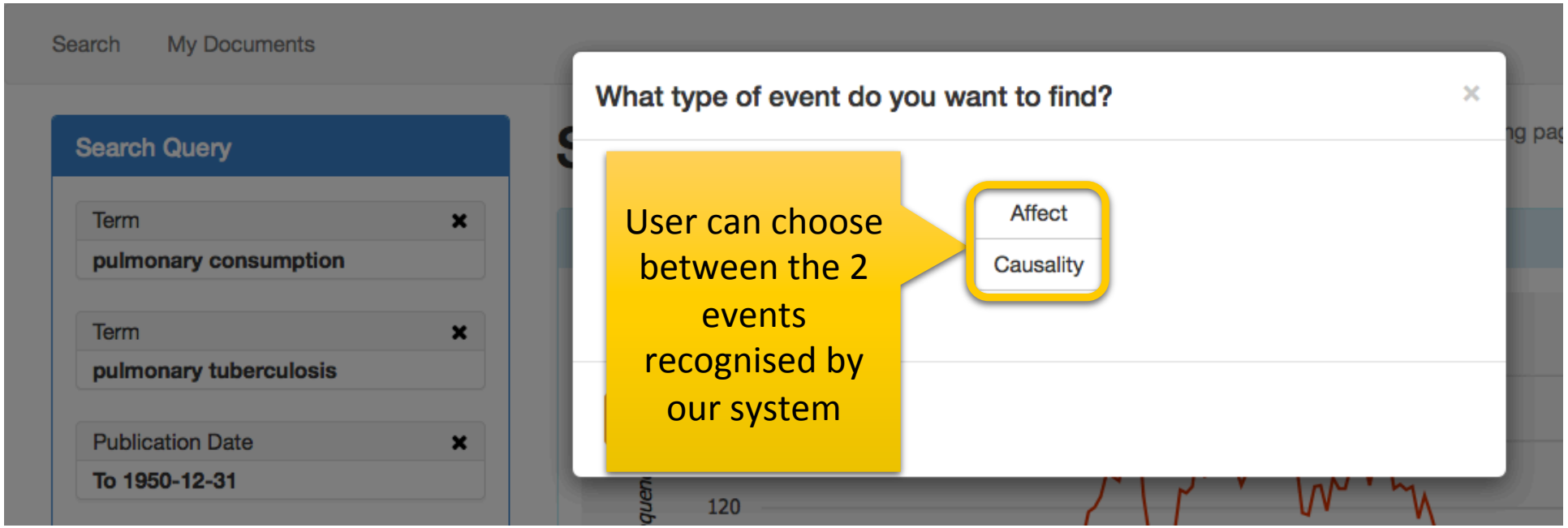
bmj_2512381

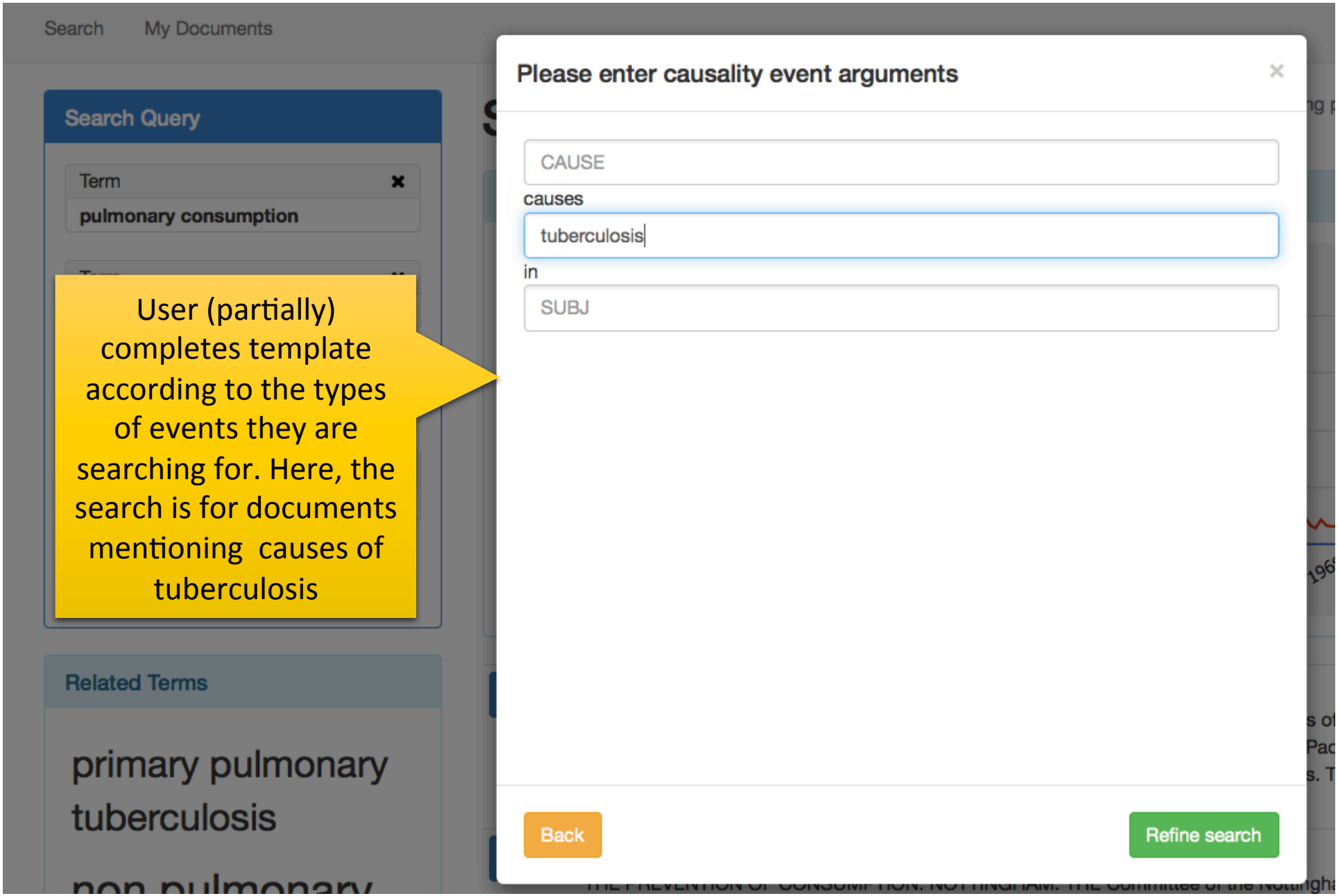
Sydney

[FROM OUR SPECIAL CORRESPONDENT.] BUREAU OF MICRO-BIOLOGY. The Government Bureau of Micro-Biology was established rather less than two years ago, but practical -work was not begun until the beginning of 1909, and the first annual report of the work accomplished during that year has just been iss...

bmj_2336789


Search
My Documents
Search Query
Term
pulmonary consumption
Term
pulmonary tuberculosis
Publication Date
To 1950-12-31
Environmental
milk
New Search
Refine Search
What are you interested in searching for?
Term
Entity
Event
Publication Date
Author
Index
Journal
Results can also be refined by searching for documents containing involving entities
Year
1968
1976


Search
My Documents
Search Query
Term
pulmonary consumption
Term
pulmonary tuberculosis
Publication Date
To 1950-12-31
What type of event do you want to find?
User can choose between the 2 events recognised by our system
Affect
Causality
120


Search
My Documents
Search Query
Term
pulmonary consumption
Related Terms
primary pulmonary tuberculosis
Please enter causality event arguments
CAUSE
causes
tuberculosis
in
SUBJ
Back
Refine search
User (partially) completes template according to the types of events they are searching for. Here, the search is for documents mentioning causes of tuberculosis

Document display

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An Address ON RAND MINERS' PHTHISIS

Bibliographic information

Record

Reference	2322304
Title	An Address ON RAND MINERS' PHTHISIS
Year	1905
Issue	2337
Page Info	919--922

Semantic information

Content

Document content

RAND MINERS' PHTHISIS.

ON

*RAND MINERS' PHTHISIS.

Delivered to the North of England Branch of the Brit8h Medical

Association at Blyth.

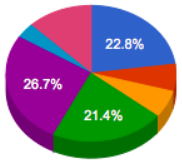
By THOMAS OLIVER, M.A., M.D., LL.D., F.R.C.P.,

Physician, Royal Infirmary, Newcastle-upon-Tyne.

WHEN the invitation to deliver an address to the members of this Branch was conveyed to me by your Honorary Secretary, my first impulse was to refuse, for I felt I had nothing new to communicate to you; but when Dr. Anderson was good enough to suggest that a paper on miners' phthisis, as met with in men returned from the Transvaal, would be acceptable to the Brane, I acceded to the request of the Council, not that I could throw any fresh light upon the important problems connected with the malady, but that, living as we a in a large mining centre, it seemed to me to be a subject that had interest for all of us, and one to which in discussion you could contribute more than I could give.

ETIOLOGY.

Entity Types

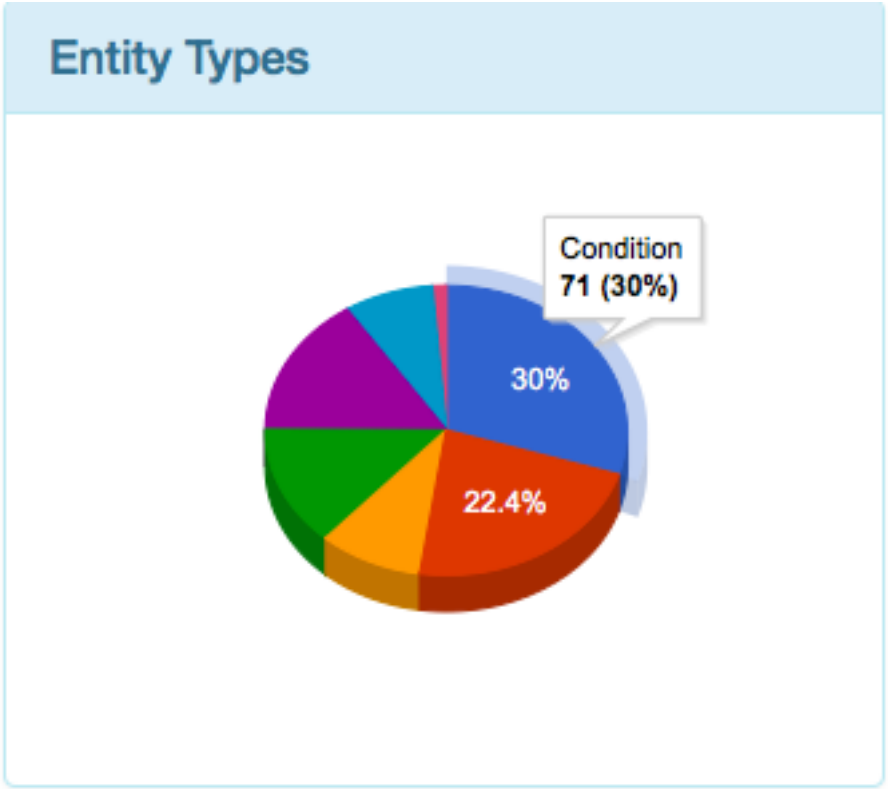


Entities

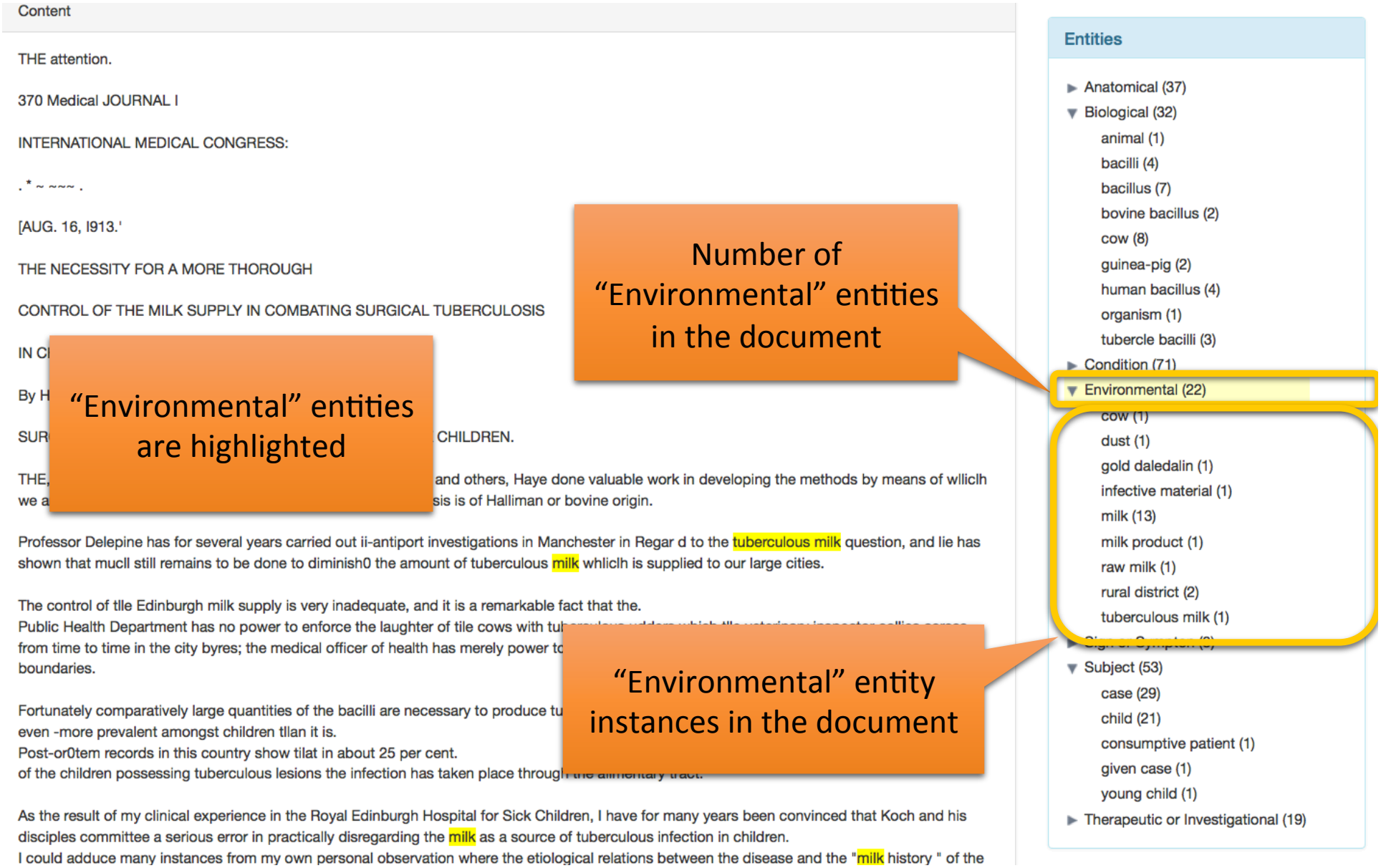
- Anatomical (111)
- Biological (15)
- Condition (95)
- Environmental (89)
- Sign or Sympton (52)
- Subject (27)
- Therapeutic or Investigational (27)

Events

- Affect (14)
- Causality (10)



Pie chart shows the distribution of entity types in a document.
Hovering the mouse over a section reveals the entity type in question


Content
THE attention.
370 Medical JOURNAL I
INTERNATIONAL MEDICAL CONGRESS:
[AUG. 16, I913.'
THE NECESSITY FOR A MORE THOROUGH
CONTROL OF THE MILK SUPPLY IN COMBATING SURGICAL TUBERCULOSIS
CHILDREN.
and others, Haye done valuable work in developing the methods by means of wlliclh
sis is of Halliman or bovine origin.
Professor Delepine has for several years carried out ii-antiport investigations in Manchester in Regar d to the tuberculous milk question, and lie has shown that mucll still remains to be done to diminish0 the amount of tuberculous milk whliclh is supplied to our large cities.
The control of tlle Edinburgh milk supply is very inadequate, and it is a remarkable fact that the.
Public Health Department has no power to enforce the laughter of tile cows with tu
from time to time in the city byres; the medical officer of health has merely power to
boundaries.
Fortunately comparatively large quantities of the bacilli are necessary to produce tu
even -more prevalent amongst children tllan it is.
Post-or0tem records in this country show tilat in about 25 per cent.
of the children possessing tuberculous lesions the infection has taken place through
As the result of my clinical experience in the Royal Edinburgh Hospital for Sick Children, I have for many years been convinced that Koch and his disciples committee a serious error in practically disregarding the milk as a source of tuberculous infection in children.
I could adduce many instances from my own personal observation where the etiological relations between the disease and the "milk history " of the
"Environmental" entities are highlighted
Number of "Environmental" entities in the document
"Environmental" entity instances in the document
Entities
Anatomical (37)
Biological (32)
animal (1)
bacilli (4)
bacillus (7)
bovine bacillus (2)
cow (8)
guinea-pig (2)
human bacillus (4)
organism (1)
tubercle bacilli (3)
Condition (71)
Environmental (22)
cow (1)
dust (1)
gold daledalin (1)
infective material (1)
milk (13)
milk product (1)
raw milk (1)
rural district (2)
tuberculous milk (1)
Subject (53)
case (29)
child (21)
consumptive patient (1)
given case (1)
young child (1)
Therapeutic or Investigational (19)

The earliest observation on the contagious nature of tuberculosis occurs in the Ordinances of Man in India, thirteen centuries B.C.
In these, pulmonary consumption and swelling of the glands of the neck are declared to be unclean, incurable diseases.
Those who wanted to marry are cautioned not to select a spouse from a consumptive fancily even though the family had a good lineage and possessed great wealth.
These laws show a knowledge of tuberculosis, and as the disease was regarded as an impediment to marriage it seems likely that it was regarded as contagious.
In Europe the earliest reference to the contagious nature of tuberculosis was made
about 390 B.C.
In this he states: "The majority of those who had nursed this disease [phthisis] had
did not generally subscribe to this view, preferring the idea of the tuberculous diath
About one hundred years later Aristotle realized that consumption could be spread
Galen and Avicenna held similar views.
It is more than a tragedy that these early Greek observations were disregarded and forgotten in later centuries, for it was only towards the end of the seventeenth century that in Latin countries such as Spain and Italy the contagious nature of the disease was again being recognized.
In Britain, Edward Mainwaring was possibly the first to assert that tuberculosis was spread by contact, as in 1667 he wrote: "You must not frequently converse with a phthisical person whose unwholesome breath may infect the sound by drawing in put-id vapours which the other breathes forth, but above all a phthisical bedfellow is most dangerous to affect a sound person and chiefly to be avoided."

Later, in 1694, Richard Morton in his book Phthisis logia, which is an outstanding presentation of the symp symptomatology of tuberculosis, wrote: "
A contagious principle also propagates the disease, for, as I have found by experience, an affected person may poison a bedfellow by a kind of
imar ineteenth century, however, leaders of the profession like Bright and Addison (1839),
also sness of tuberculosis, and attached great importance to diathesis.
This dominated men's minds that little or no progress had been made for centuries
rega
Laer

* A S rsity of London on March 6, 1947.

conc urred the disease was tuberculosis, was of the opinion that at least in France tuberculosis was not usually con contagious.
That tuberculosis could be produced in animals by inoculation with tuberculous material was shown in 1843 by Klenke, and in 1868 Villein finally proved experimentally that tuberculosis was an infectious disease.
It was Villein who first showed that tuberculous material from bovine sources was more virulent for rabbits than' that from human.
In 1867 William Budd, of North Tawton, as a result of a study of the geographical distribution tion of consumption in past and present times, concluded: "The tuberculous matter itself is (or includes) the specific matter of the disease and constitutes the material by which phthisis is propagated from one person to another and disseminated throughout society." Even after the dis cover of the tubercle bacillus by Koch- in 1882 we find from the Collective Investigation Record (British Medical Association, 1883) that many British physicians reported that they had never observed a case of probable trans mission of the disease' from a case of phthisis.
Later, Theobald Smith (1896, 1898) reported the existence of " a distinctively human or sputum, and a bovine variety of tubercle bacillus."

Though Koch proved that the tubercle bacillus was the cause pecans and stressed the importance of inhalation of infected sputum in the spread of the disease, it is strange how in 1901, while accepting that- human and bovine types were different, he yet concluded that the latter was rarely pathogenic for man.
Koch (1882) had undoubtedly found the bovine bacillus in human disease, for he had obtained from a case of caseous pneumonia (No.
27) a culture of tubercle bacilli which after inoculation into the anterior chamber of the eye proved virulent for rabbits.
In 1911 the British Royal Commission proved conclusively that the bovine bacillus was a definite cause of tuberculosis in man.
It is not surprising that Koch went astray when we consider the relative rarity of primary abdominal tuberculosis in Germany as compared with this

Cases where specific causes of tuberculosis are mentioned in the document

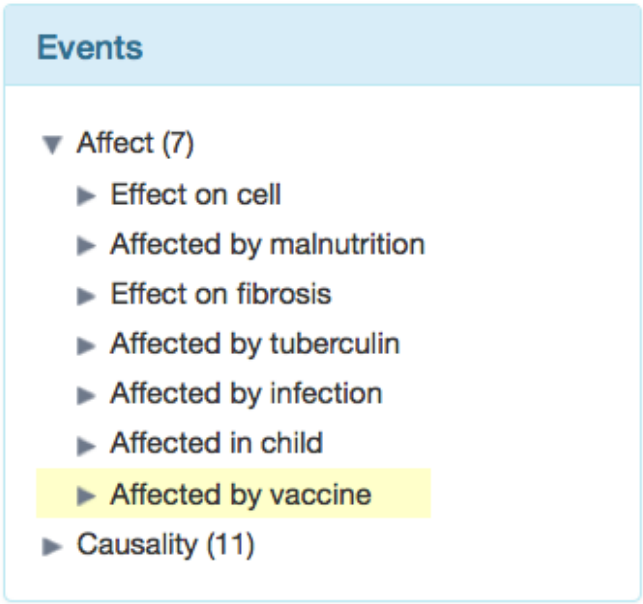
Phrases identifying Causality events are highlighted

- Causality (11)
  - inoculation causes tuberculosis
  - bovine bacillus causes tuberculosis
  - inhalation causes respiratory tuberculosis
  - Cause of lesion
  - Cause of meningitis
  - Caused by infection
  - Caused by treatment
  - Caused by infection
  - Cause of respiratory tuberculosis
  - Cause of infection
  - Cause of tuberculosis

Prophylactic vaccination with B.C.G. is still a controversial question, and over 20 years of trial has left the medical profession in a state of confusion as regards its efficacy.
Many reports, chiefly from Scandinavia and more recently from America (Aronson and Palmer, 1946),.
and the recent Memorandum to the Minister of Health (Tytler, 1946) testify to the advisability and the adequacy of this m
It is uncertain, however, that in a mixed population such as ours the same results would hold as elsewhere, particularly prevalent disease with us, and frequent infection must be the lot of us all.
The discovery by Petroff et at.
(1927-8) that B.C.G. could dissociate into avirulent R and virulent S forms raised.
doubts in the minds of many regarding the use of a living vaccine.
No definite case of tuberculosis has, however, yet been proved as resulting from the use of properly prepared B.C.G. va
Vaccines of killed bacilli have been employed with apparent success by Goodwin and Schwentker (1934), Opie et al. (1
As in all tuberculosis research, it will be long before we can assess and pass a final judgment on the efficacy of B.C.G.
This interval must be at least 15 to 25 years in order to allow us to judge its efficacy in the young adult age group, in wh such a serious problem.
Meanwhile, B.C.G. may serve a useful function until chemotherapeutic or immunological research provides us with som of tuberculosis as penicillin has been for pyogenic infections.
In his Memorandum Tytler (1946) has given all the essentials for a scheme of prophylactic vaccination.
It is hoped that those in authority will carefully consider his suggestions, as the disaster at Liebeck is still fresh in our mi

With regard to the cure of established tuberculous disease, nothing can be added to the valuable contribution which D' the chemotherapy

of tuberculosis.
Streptomycin is still under trial vaited with interest.



Affect events allow us to explore, e.g., whether therapeutic measures have a positive or negative effect

Conclusions

- ✓Explore further archives using topic analysis
- ✓Automatic clustering of search results according to similarities of semantic content
- ✓Expand types of entities and events and enrich further BMJ
- ✓Link with other archives
- ✓Create a rich annotation database

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