

The Copenhagen cholera epidemic 1853 in contemporary Danish newspaper prose: Some back-of-an-envelope calculations

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Introduction

Inspired by the fact that we were all hiding away from the Covid-19 2020–2021 I wanted to take a closer look at some other epidemic. I started to write this May 2020 and completed it about two years later. My hope was to find patterns of change in language use mirroring sentiments and attitudes expressed in words, bigrams and trigrams and frequency distributions. My first impulse was to analyze the Spanish flu 1918 since my I have a personal relation to that outbreak, since my grandfather died in it which affected everything that followed in my family's history. We have as yet little freely available data in our public corpora from that period, so I turned my attention to the Cholera epidemic in Copenhagen 1853. At the time, Copenhagen had around 130.000¹ inhabitants out of which 7.219 were diagnosed as having the disease out of which 4.737 (56,7%) died. Christian Molbech writes in a letter to Christian Knud Frederik Molbech, the July 3, 1853:

The first cholera case was found as early as the 12th June (i.e., the day before the opening of the parliament in June) — a young man from the area close to the naval barracks, who for quite some time had worked on a dredge. He has recovered, and was released from hospital the 25th. The authorities were able to conceal the earliest few cases for a fortnight.²

The epidemic spread from Copenhagen to other areas. Outside the capital 1.951 fatal cases were reported.³

The spread of an infectious disease does not occur in a vacuum; the Copenhagen epidemic is a part of the cholera pandemic (1846-1860)⁴ which is the third out of seven global outbreaks.⁵

Here I present some data analyses: (1) The number of newspaper articles mentioning *epidemi*, *pest*, *kolera* and *cholera* through the period 1846 to 1860 (Figure 1). (2) I repeated that analysis with the frequencies of words rather than articles in weekly aggregations of texts. (3) Finally I visualize a set of trigrams extracted from the corpus.

¹ <http://www2.kb.dk/udstillinger/medhist/kolera/koebenhavn1853.htm>

² Translated by the author. <https://bit.ly/3cOzLAq>

³ https://da.wikipedia.org/wiki/Koleraepidemien_i_K%C3%B8benhavn_1853

⁴ https://en.wikipedia.org/wiki/1846%E2%80%931860_cholera_pandemic

⁵ https://en.wikipedia.org/wiki/Cholera_outbreaks_and_pandemics



Figure 1. Number of newspaper pages mentioning any of the words *kolera*, *cholera*, *epidemi* or *pest*.

The data

The data was retrieved from Royal Danish Library's LOAR Repository.⁶ It comes in csv format, aggregated to yearly chunks. Each line is basically corresponding to one page of text in the newspaper.

Some low-hanging fruits

Using the Unix `grep` command makes it easy to count the number of pages containing a given word. So the graph in Figure 1, is simple plot of what is extracted using the shell script in Figure 2.

```
#!/bin/sh
echo "#year kolera cholera epidemi pest farsot"
for file in artikler*
do
    year=$(echo $file | tr -d '[:alpha:][:punct:]')
    kolera=$(grep -i kolera $file | wc -l)
    cholera=$(grep -i cholera $file | wc -l)
    epidemi=$(grep -i epidemi $file | wc -l)
    pest=$(grep -i pest $file | wc -l)
    farsot=$(grep -i farsot $file | wc -l)
    echo "$year $kolera $cholera $epidemi $pest $farsot"
done
```

Figure 2. Script for extracting the data for plotting Figure 1

Three things spring to my mind: (1) The obvious one. People wrote about this cholera outbreak in Copenhagen 1853. They wrote a lot. (2) The effect on the public discourse of the epidemic lasted for years and it did not return to pre-epidemic levels that decade. You see this on the shape of the curves; the incidence of words related to the epidemic rise rapidly from

⁶ Newspapers from Royal Danish Library <https://loar.kb.dk/handle/1902/157>

very low levels and then fade out slowly. The fact that the article count in Figure 1 never really decreases to counts before the cholera outbreak. Almost certainly the people felt like we do in relation to the Covid-19 epidemic: Will it ever be the same again? (3) People hadn't settled on how to spell the name of the disease yet, cholera and kolera. (4) The word *pest* seems to be widely used in Danish at the time, possibly as something annoying but also as epidemic disease in general.

I also made another analysis, where I aggregated text by week, and used text tokenized by word, see Figure 3. The week numbering starts with 1 at 1846-01-01 and ends at 1860-12-31 with week 781. The huge peak in the graph starts at 1853-06-24 at week 389. It reaches its highest point at the end of July, 1853-07-29, week 395. From what I can tell it continues until the beginning of October, but the mentions of *cholera* in the corpus is higher than the pre-outbreak into March the following year, week 425. There is a discrepancy between the two analyses, in that the article level analyses (Figure 1) implies a longer effect of the outbreak on the discourse than the per word one (Figure 3.)

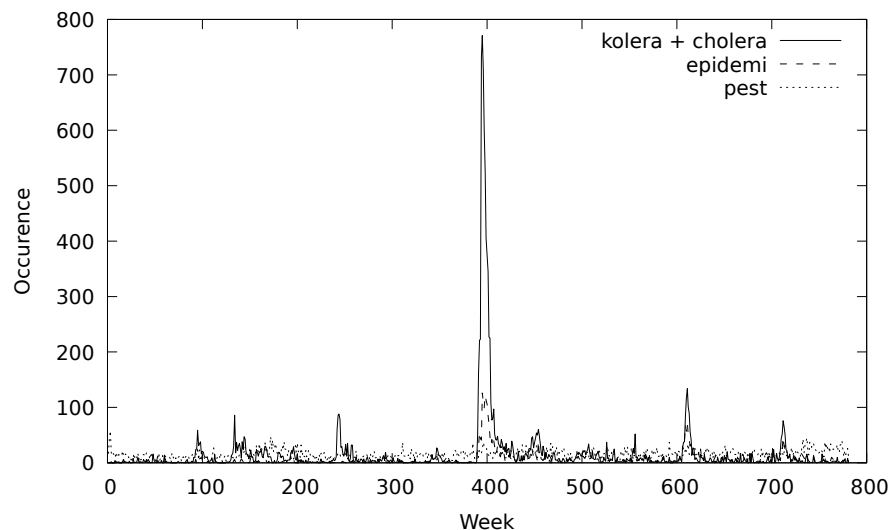


Figure 3. Here I use tokenized text, i.e., there is only one word per line, and I also aggregated the texts by week.

Bigrams and trigrams

N-grams generation is not an end in itself. They are a starting point for many kinds of statistical and machine learning methods and applications in natural language processing.⁷ You extract n-grams by "sliding" through your tokenized text word by word, and sample n words. Bigrams and trigrams are special cases where you sample two or three words. I am a great fan of simplicity and elegance and hence I love Kenneth Ward Church's tool box which he described in his wonderful classic *Unix for Poets*⁸ where you are given methods to do a text analyses using simple tools that you find on all Unix/Linux machines. Here are some examples of trigrams containing the word *hovedstaden* across the weeks, i.e., the capital (in decreasing frequency):

cholera i hovedstaden

⁷ <https://en.wikipedia.org/wiki/N-gram>

⁸ <http://doc.cat-v.org/unix/for-poets/>

hovedstaden bortriver cholera
hovedstaden er cholera
hovedstaden af cholera
hovedstaden forekomne cholera
choleraepidemien i hovedstaden
epidemien i hovedstaden
hovedstaden udbrudte cholera

For some reason, I don't understand why, the actual name of the city Copenhagen, København (or whatever spelling) seem to occur rarely in comparison with the word hovedstaden, which is frequent, in particular 1853. Here is another sequence (containing *cholera er*) and sampled such that they begin with that phrase:

cholera er af
cholera er afgaaet
cholera er aften
cholera er aldeles
cholera er alter
cholera er aner
cholera er at
cholera er atter
cholera er begjeert
cholera erboldes som
cholera er borlfalden
cholera er bortfalden
cholera er cadetfiibs
cholera ere altsaa
cholera ere berovede

Figure 4-7 are of a visualizations of the frequencies of various trigrams.

1. Trigrams starting with *kolera i* or *cholera i* ("kolera in" or "cholera in" in English). The third word is often a place name, such as *cholera i hovedstaden* (i.e., "cholera in the capital"). There are other constructs like *cholera i begyndelsen* (i.e., "cholera in the beginning"). Repetitions are excluded, so the heights of the bars are more measures of diversity rather than abundance. See Figure 4.
2. Trigrams starting with *kolera er* or *cholera er* ("kolera" or "cholera" followed by "is" in English). These are constructs like *cholera er udbrudt* ("cholera is broken out"), *cholera er fra* ("cholera is from") etc. See Figure 5.
3. Trigrams starting with *kolera har* or *cholera har* ("kolera" or "cholera" followed by "has") in English). The words following *har* (i.e., "has") is similar to those following "cholera is". After all they are both conjugations of the same verb *have*; "has" is still present tense just like "is" but the cholera has been going on for a while when using "has". For instance, we have *cholera har hersket* ("cholera has ruled") as opposed to the "cholera is broken out" as mentioned in point 2 above. See Figure 6.
4. Finally, trigrams starting with *kolera havde* or *cholera havde* ("kolera" or "cholera" followed by "had") in English). One example is *cholera havde vist*, i.e., "cholera had shown". There are only handful words following this past tense construct of the verb

have. They only appear in five of the ten years I have in my time series. Since the numbers are so low, I am hesitant to draw any conclusions upon the set of words here. However, only one occurrence of *cholera havde* is before 1853, in 1849. The rest of them are in 1853, 1854, 1855 and 1856 (See Figure 7).

The *cholera havde* constructs seem to be discussions on why things happened as they did in 1853 as in this text

Saa vel paa St. Thomas som paa St. Croix vedligholdtes streng Karantæne, och intet Tilfælde af **Kolera havde vist** [authors emphasis] sig paa nogen av Øerne.⁹ (On St. Thomas as well as on St. Croix there was stringent quarantine, and no cases were encountered on the islands.)

The author of the text can thus preclude the contacts with the Danish West Indies as a source of the disease. The temporal distribution of the *cholera havde* constructs corroborates the conclusion above for the time series shown in Figures 1 and 3. People were talking a lot about Cholera 1853 and many years thereafter, just as we do now in relation to Covid.

⁹ <http://hdl.handle.net/109.3.1/uuid:dd96317c-bf59-463f-9e63-01ce718ae521>



Figure 4. Trigrams per year with the text beginning with `cholera i`. The highest bar is truncated, in reality it is ten times higher in order to make it fit into the page. I have also removed many repetitions.

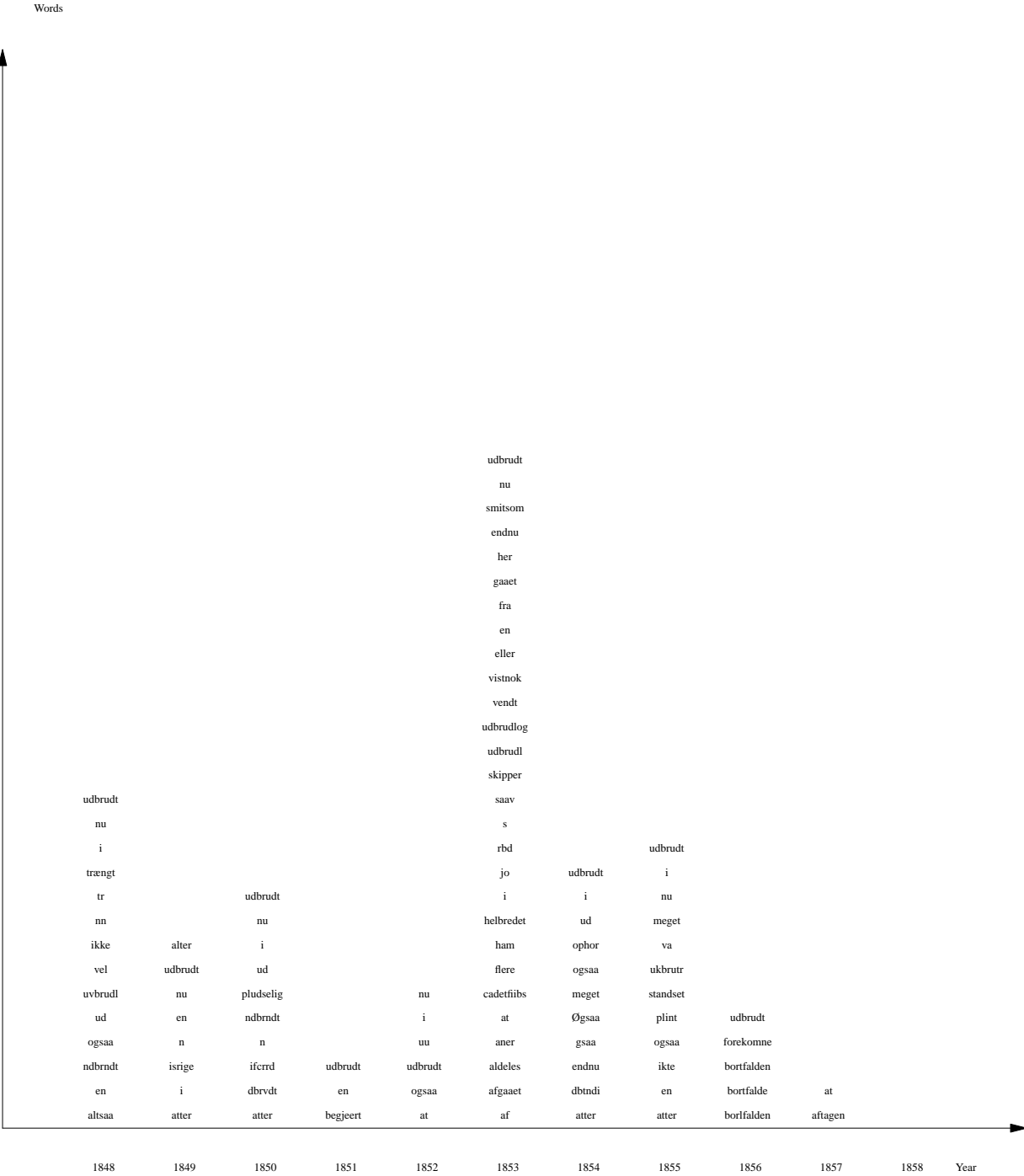


Figure 5. Trigrams per year with the text beginning with cholera er. The highest bar is truncated, in reality it is ten times higher in order to make it fit into the page. I have also removed many repetitions.

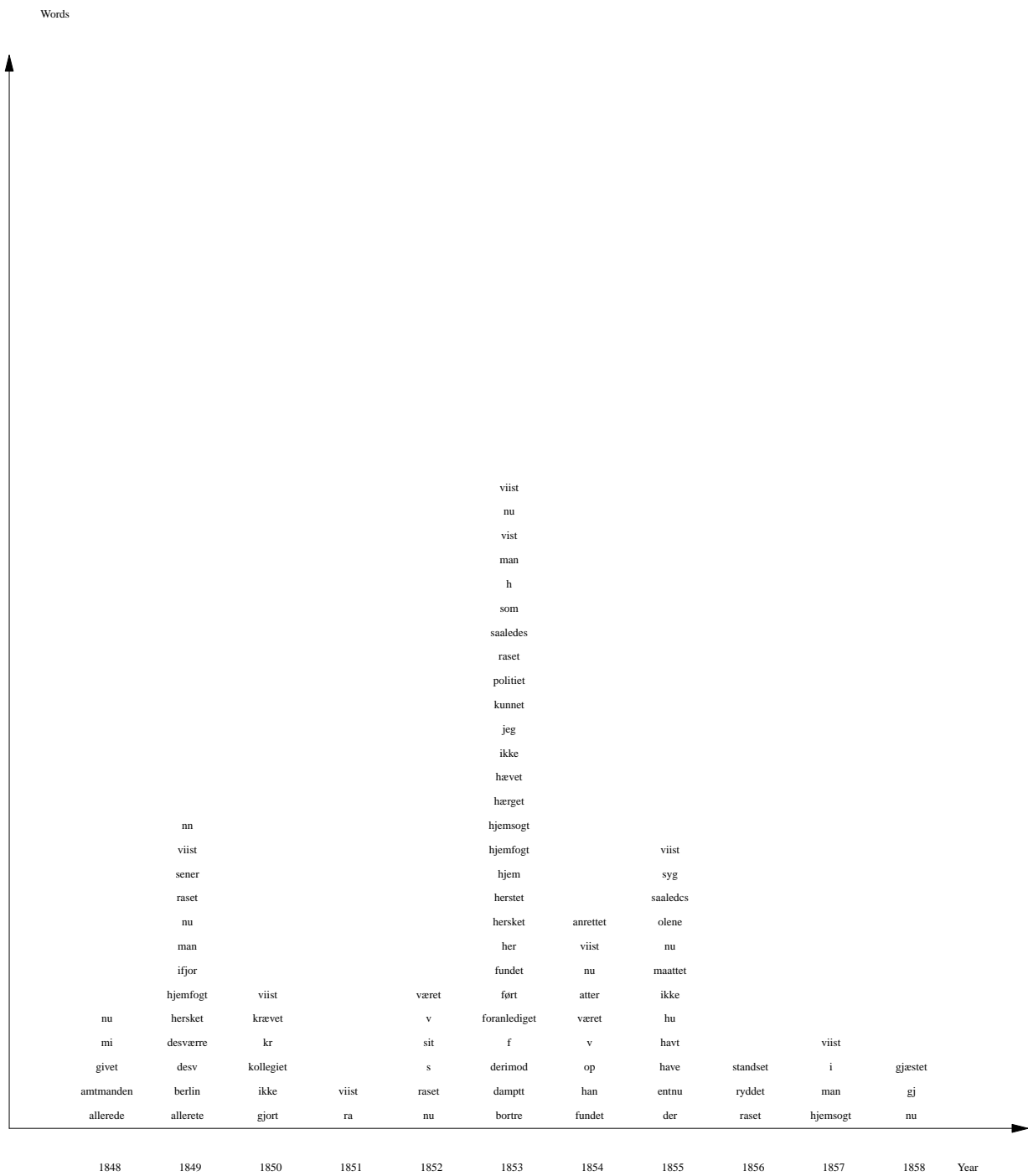


Figure 6. Trigrams per year with the text begining with cholera har.



Figure 7. Trigrams per year with the text begining with cholera havde.

Lessons learned

- 1 My idea was that just inspection of the words in their context should give information about emotions or sentiments. I suppose that this was just due to my naivete when it comes to languages, since I cannot really find anything of that kind.
- 2 The tools coming with a standard Linux distribution isn't as unicode compliant one would wish. Some twenty years later, the nice utility `tr` is still not really UTF-8. Neither is the GNU implementation of Brian Kernighans graphics language `pic` which I used for the bigrams.
- 3 There is another big problem connected with the use of our newspaper text corpora for computational linguistics. The poor OCR quality.

Bigrammes



Bigrammes

18 af cholera	115 kolera den	46 af cholera	78 kolera ten	98 kolera den	73 kolera den	42 af cholera	50 af cholera
14 kolera den	38 kolera ten	42 kolera den	50 af cholera	63 af cholera	49 af cholera	20 cholera og	25 cholera og
10 kolera drn	33 af cholera	36 kolera ten	43 kolera den	23 cholera og	15 cholera og	15 kolera den	12 cholerasygge og
6 cholera epidemien	27 a kolera	36 a kolera	27 kolera xen	17 a kolera	13 kolera	10 kolera i	12 cholera epidemien
6 a kolera	16 kolera	23 kolera hen	17 a kolera	12 kolera d	10 cholera epidemien	10 cholerasygge og	7 ny cholera patient
5 cholera	10 cholera og	15 kolera	14 kolera ten	10 kolera	9 a kolera	9 kolera len	7 a kolera
4 mod cholera	6 som epidemien	10 kolera drn	12 cholera og	9 kolera ten	8 kolera ten	9 cholera epidemien	6 ved cholera
3 ved epidemiens	6 for cholera	9 sidste epidemi	10 kolera	9 cholerasygge og	7 kolera i	9 as cholera	6 nye cholera tilfælde
3 kolera ten	6 as cholera	9 kolera i	8 cholera i	7 cholera epidemien	7 har epidemien	8 under cholera	6 har cholera
3 kolera	5 cholera epidemien	9 kolera d	8 af epidemien	7 as cholera	7 epidemien i	8 kolera ten	6 epidemien i
3 imod choleraen	5 cholera epidemi	8 af epidemien	7 cholera	6 x kolera	7 cholerasygge og	8 at cholera	6 cholera i
3 for epidemien	5 at cholera	7 cholera eller	6 under epidemien	6 cholera i	6 under cholera	7 cholera	5 har choleraen
3 epidemiens udbrud	4 udbrudte cholera	6 til epidemiens	6 nye cholera tilfælde	5 mod cholera	6 kolera dcn	6 nye cholera tilfælde	5 epidemien have
3 cholera tilfælde	4 kolera drn	6 da cholera	6 kolera drn	5 kolera i	6 cholera er	6 nye cholera patienter	5 choleraen er
3 cholera og	4 cholera i	6 cholera og	6 for cholera	5 cholera epidemi	6 cholera eller	6 epidemien i	4 under cholera
3 cholera i	4 choleraens udbredelse	6 cholera epidemien	5 mod cholera	5 cholera eller	5 som epidemien	6 epidemien ere	4 til cholera
3 choleraen i	4 cholera	6 cholera epidemi	5 epidemiens udbrud	5 cholera	5 epidemien har	6 cholera epidemien	4 naar epidemien
3 choleraen	4 at epidemien	5 under epidemien	5 cholera men	4 tid epidemien	5 da epidemien	6 choleraen i	4 mod cholera
3 cholera bitter	4 af kolera	5 under cholera	5 as cholera	4 nye cholera tilfælde	5 cholera i	6 af epidemien	4 kolera i
3 cholera	3 mod cholera	5 os kolera	5 af kolera	4 nye cholera tilfælde	5 at choleraen	5 ved cholera	4 i epidemiens
3 af epidemien	3 kolera peter	5 denne epidemi	4 mod cholas	4 nye cholera patienter	4 nye cholera tilfælde	5 kolera epidemien	4 cholera epidemien
2 til koleraen	3 kolera len	5 cholera er	4 kolera i	4 for choleraen	4 nye cholera patienter	5 da choleraen	4 cholera patient anmeldt
2 opgive cholera	3 kolera d	5 as kolera	4 epidemi som	4 for cholera	4 m kolera	5 cholera patienter anmeldte	4 cholera ere
2 om cholera	3 imod choleraen	5 af kolera	4 da cholera	4 epidemi er	4 hvor cholera	5 choleraen er	4 choleraen nu
2 ligne cholera	3 cholera som	4 til cholera	4 cholera tilfælde anmeldte	4 epidemien varer	4 epidemien viist	5 af kolera	4 cholera eller
2 kolera fra	3 cholera patient	4 nye cholera tilfoelde	4 cholera tilfælde anmeldt	4 epidemien i	4 epidemi blive	4 virkelig cholera	4 cholerae trænge
2 i cholera lignende	3 cholera hospital	4 nye cholera tilfælde	4 cholas udbredelse	4 cholera var	4 cholera epidemien	4 til cholera	4 at choleraen
2 et cholera lignende	3 cholera er	4 mod cholas	4 cholera lignende tilfælde	4 cholera patienter anmeldte	4 denne epidemi	4 i cholera	3 vedvarer epidemien
2 epidemi har	3 choleraen	4 kolera johan	4 cholera har	4 cholera men	4 cholera patienter anmeldte	4 hvor epidemien	3 ved epidemien
2 epidemi er	3 cholera efter	4 kolera h	4 cholera fra	4 cholera hvoraf	4 cholera ikke	4 epidemi har	3 raser epidemien
2 epidemien har	3 cholera bitter	4 for epidemien	4 aug cholera	4 cholera	4 cholera epidemi	4 denne epidemi	3 om cholera
2 epidemien ere	3 cholera	4 for cholera	4 at cholera	3 m kolera	4 at cholera	4 cholera tilfælde anmeldt	3 nye cholera syge
2 epidemien er	3 as kolera	4 faaet kolera	4 af choleraen	3 kolera drn	3 ved cholera	4 cholera epidemi	3 modtager cholera
2 cholera epidemi	3 asiatiske cholera	4 epidemi som	3 ved cholera	3 fra epidemiens	3 synes epidemien	4 choleraen viist	3 med cholera
2 denne epidemi	2 ved choleraens	4 epidemien nu	3 sidste epidemi	3 et cholera	3 nye cholera tilfoelde	4 at choleraen	3 kolera ten
2 cholera vare	2 omtalte cholera	4 cholera men	3 kolera og	3 epidemiens begyndelse	3 nye cholera tilfælde	4 af choleraen	3 kolera epidemien
2 cholera syge	2 mod koleraens	4 cholera ikke	3 kolera epidemi	3 epidemien har	3 mod cholera	3 ved kolera	3 hvor epidemien
2 cholera lignende tilfælde	2 m kolera	4 cholera i	3 imod cholera	3 epidemien endnu	3 kolera fra	3 under epidemien	3 er epidemien
2 cholera epidemi	2 kolera fra	4 cholera hospital	3 et cholera lignende	3 cholera epidemien	3 kolera epidemien	3 udbrudt cholera	3 epidemiens begyndelse
2 choleraens udbredelse	2 kolera dorthea	4 cholera af	3 er epidemien	3 cholera tilfælde anmeldt	3 imod cholera	3 siden epidemien	3 epidemien ere
2 cholera der	2 kolera det	4 asiatiske cholera	3 epidemiens videre	3 cholera have	3 holde epidemien	3 paa cholera	3 en epidemi
2 cholera af	2 holde choleraen	4 as cholera	3 epidemien gjore	3 cholera er	3 er cholera	3 om cholera	3 en cholera syg
2 at choleraen	2 herskende cholera	3 m kolera	3 epidemien en	3 choleraen i	3 epidemi med	3 nye cholera tilfælde	3 cholera epidemi
2 asiatisk cholera	2 for epidemien	3 kolera maren	3 epidemien egentlig	3 choleraen er	3 epidemien ude	3 kolera fra	3 cholera tilfælde og
2 asiatisk cholera	2 fik cholera	3 kolera kolera	3 en epidemi	3 at choleraen	3 epidemiens udbredelse	3 kolera	3 cholera tilfælde anmeldt
2 af epidemiens	2 et cholera	3 hvor cholera	3 cholera epidemiens	3 at cholera	3 epidemien nu	3 for cholera	3 cholera syg var
1 virkelige cholera	2 epidemi ere	3 epidemien varer	3 cholera tilfælde	3 af kolera	3 en cholera syg	3 epidemiens udbredelse	3 cholera syge
1 virkelig cholera	2 epidemiens udbrud	3 epidemiens standsning	3 cholera syge af	3 af epidemien	3 de cholera	3 epidemien nu	3 cholera patienter
1 vigs anticholera syre	2 epidemien og	3 epidemien i	3 cholera naar	2 ved cholera	3 cholera udbrud	3 epidemien her	3 choleraen i
1 ved choleraen	2 epidemien indvirker	3 en cholera syg	3 cholera ikke	2 var cholera	3 cholera tilfoelde anmeldt	3 en cholera	3 at cholera

393

394

395

396

397

398

399

400

Weeks

Bigrammes

57 af cholera	31 af cholera	46 af cholera	18 af cholera	12 af cholera	6 epidemien er	7 af cholera	10 under epidemien
19 kolera den	9 af kolera	12 cholera og	8 cholera epidemien	3 ved epidemiens	4 epidemien i	5 cholera er	6 af cholera
14 cholera epidemien	6 under cholera	12 cholera i	5 hvor cholera	3 ved cholera	4 cholera er	4 ved cholera	4 epidemien en
12 cholera og	6 epidemien har	11 as cholera	5 epidemien have	3 under epidemien	4 af cholera	4 cholera epidemien	3 under choleraepidemien
9 cholera i	6 cholera epidemien	6 ingen cholerasygge	4 under cholera	3 i cholera	3 ved choleraen	4 at epidemien	3 epidemien i
9 as cholera	6 af choleraen	6 af kolera	4 cholera er	3 hvor cholera	3 ved cholera	3 under cholera	3 epidemien ere
8 under cholera	5 under epidemien	5 cholerasygge og	3 kolera i	3 epidemiens begyndelse	3 cholera epidemien	3 kolera i	3 cholera
7 cholerasygge og	5 kolera i	5 cholera de	3 epidemien er	3 epidemien nu	3 choleraen have	3 cholera og	2 ved epidemien
6 mod cholera	5 cholera samt	4 cholera har	2 ved cholera	3 epidemien navnlig	2 under choleraen	3 choleraepidemien i	2 for cholera
5 epidemien i	5 at cholera	4 cholera epidemien	2 naar cholera	3 epidemien er	2 under cholera	3 choleraen i	2 epidemi som
5 epidemien have	5 as kolera	4 cholera det	2 epidemi som	3 da epidemien	2 kolera blandt	3 cholera bortdode	2 epidemisk vil
5 cholera siden	4 med kolera	3 kolera ten	2 en epidemi	3 cholera og	2 epidemien have	3 cholera	2 en epidemi
5 at cholera	4 kolera epidemien	3 kolera i	2 en cholerasyg	3 cholera epidemi	2 epidemien blev	2 var cholera	2 cholera tilfælde i
5 af kolera	4 kolera den	3 cholera udbrod	2 e kolera	3 af choleraens	2 eholera epidemien	2 under epidemien	2 choleraen har
4 ved kolera	4 cholerasygge og	3 cholerasygge anmeldte	2 eholera epidemien	2 ved choleraen	2 de cholera betrængte	2 under choleraepidemien	2 cholera bureauet
4 ved cholera	4 cholera i	3 cholera paa	2 ebolera epidemien	2 medens choleraen	2 de cholera be	2 under choleraens	2 blive epidemisk
4 naar epidemien	4 cholera epidemi	3 cholera men	2 cholerasyg kone	2 hyppigt cholera lignende	2 choleraen har	2 til cholera	1 ved choleraen
4 mod choleraen	3 kolera fra	3 cholera er	2 cholera paa	2 grasserende cholera	2 choleraen er	2 om cholera	1 ved cholera
4 epidemien og	3 hvor epidemien	3 cholera der	2 cholera og	2 er epidemien	2 cholera	2 of cholera	1 under koleraen
4 epidemien er	3 for choleraen	3 at cholera	2 cholera indtruffet	2 epidemi kan	2 at epidemien	2 modtage cholera	1 under choleraepidcmien
4 en epidemisk	3 epidemien der	3 as kolera	2 cholera epidcmien	2 cholera lignende eller	2 af kolera	2 kolera den	1 under choleraen
4 cholera hun	3 cholera havde	2 ved epidemien	2 choleraen har	2 cholera epidemien	2 af epidemien	2 imod cholera	1 under cholera
4 choleraen er	3 cholera har	2 ved choleraen	2 choleraen ere	2 choleraens ophor	1 værende cholera beirængte	2 ikke cholera	1 udgift cholera
4 cholera angrebne	3 choleraen og	2 ved cholera	2 cholera ei	2 choleraen have	1 ved koleraen	2 epidemiste cholera	1 til koleraen
4 cholera	3 choleraen men	2 var cholera	2 cholera	2 choleraen grasserede	1 ved epidemien	2 epidemi som	1 til choleraens
4 a kolera	3 choleraen er	2 under cholera	2 cholera	2 cholera	1 ved choleraevidemien	2 epidemiske cholera	1 st cholera
3 ved choleraen	3 cholera bureauet	2 s kolera	2 as kolera	2 as epidemien	1 ved choleraevide	2 epidemien ere	1 skolasenets og
3 med cholera	3 as cholera	2 over epidemiens	2 af kolera	1 vor epidemien	1 ved choleraepidenien	2 den epidemiste	1 overstaade epidemi
3 kolera og	2 ved choleraepidemien	2 og epidemien	2 af choleraen	1 virkelige cholera	1 undgaal epidemien	2 den epidemiske	1 overftaaede epidemi
3 kolera fra	2 ved choleraen	2 lera epidemien	1 ved choleraepidemiens	1 ved kolera	1 under epidemien	2 cholera nu	1 oktbr choleraen
3 for epidemien	2 the cholera	2 kolera fra	1 ved chcleraepidemien	1 ved epidemien	1 under cdoleraepidemien	2 cholera men	1 nyt cholera tilfælde
3 for cholera	2 nye cholera tilfælde	2 i cholera	1 ve cholera br	1 ved choleraemdemien	1 udbrudte cholera	2 cholera have	1 mandskabet ascholera
3 epidemisk sygdom	2 med cholera	2 for cholera	1 under choleraepidemien	1 ved choleraepidemien	1 uagtet cholera	2 cholera har	1 kolera tilfælde
3 epidemien man	2 kolera netop	2 et cholera til	1 under choleraen	1 ved choleraens	1 tilboit koleradode	2 cholera eller	1 kolasvsgge rr
3 epidemien har	2 kolera kort	2 epidemien være	1 under choleraepidemien	1 tiltalt skolera	1 tgbl cholera	2 cholera der	1 kolerapatient i
3 efter cholera	2 kolera har	2 epidemien ved	1 udbrudt epidemi	1 til cholera betrcrngte	1 stg koleratilsalte	2 cholera at	1 koleralarge var
3 cholera thi	2 intet cholera tilfælde	2 epidemiens lykkelige	1 til cholera	1 the epidemic	1 stedse kolera	2 cholera af	1 kolera i
3 cholerasygge hvoraf	2 hvor kolera	2 epidemien nu	1 ten kolera	1 the cholera	1 stedse cholera	2 at choleraen	1 koleraen il
3 cholera saa	2 herskende cholera	2 epidemien i	1 tdasposten kolera	1 ten cholera	1 sorger cholera	1 være epidemisk	1 koleraen dels
3 cholera ingen	2 har cholera	2 epidemien antages	1 sporadiske kolera	1 større epidemi	1 sor cholera	1 vid cholera	1 i skolasenets
3 cholera har	2 grasserende cholera	2 en epidemi	1 sporadiflc cholera	1 skolera i	1 som choleraepidemien	1 under epidemiens	1 hvorpaa kolera
3 cholera fra	2 from cholera	2 ebolera epidemien	1 som epidemi	1 serente kolera	1 sig cholera tilscrilde	1 udbruttr kolera	1 hvorpaa cholera
3 choleraen var	2 for koleraen	2 cholera viist	1 som choleraen	1 pri kolera	1 sig cholera tilfælde	1 tverrig choleraen	1 holera epidemien
3 cholera det	2 forinden epidemiens	2 cholera til fælde	1 seneste cholera dødsfald	1 og choleraens	1 portsmouth koleraen	1 tnodstaae choleraens	1 frygtelige epidemi
3 af epidemien	2 er choleraen	2 cholera tilfælde	1 red cholera	1 nye cholera tilfælde	1 porismouh choleraen	1 til choleraens	1 formedelst choleraen
3 af choleraen	2 epidemi siden	2 cholera syge	1 opbor afgkolera borettninae	1 nu epidemien	1 ogsaa choleraen	1 til cholera bettrngte	1 for cholera patienter
2 under epidemien	2 epidemien trufne	2 cholera indtruffet	1 og cholera lignende	1 mod choleraen	1 og epidemien	1 til cholera bettrængte	1 fl cholera
2 tiltager epidemien	2 epidemiens udbrud	2 cholera hjemsogte	1 octbr cholera	1 mod cholera	1 og cholera	1 til cholera betrcrngte	1 faa kolera
2 tab epidemien	2 epidemien i	2 cho leraepidemien	1 nyt cholera tilfælde	1 mer epidemien	1 ofte cholera	1 tid cholera	1 et cholera tilfælde
2 studeret choleraen	2 epidemien have	2 choleraen i	1 nye cholera tilfælde	1 med epidemien	1 nye koleratill	1 thi koleraen	1 epidemi har
401	402	403	404	405	406	407	408 Weeks

Bigrammes

	8 af cholera	8 af cholera	5 af cholera	4 under epidemien	4 epidemien i	4 ved epidemien	4 of cholera	5 of cholera
	5 epidemien i	4 cholera epidemien	4 epidemien synes	3 de choleraetrængte	4 af cholera	2 under epidemien	3 kan epidemisk	4 the cholera
	5 cholera epidemien	3 cholera ialt	3 under epidemien	3 af cholera	2 ved epidemien	2 cholera bortdode	3 cholera eller	2 i choleraiden
	3 hvor epidemien	2 with cholera	3 choleraetrængte i	2 epidemien er	2 eholera epidemien	2 cholera	3 cholera but	2 herskende choleraepidemi
	3 forsvundne epidemi	2 til epidemisk	3 av epidemien	2 cholera epidemien	2 cholera epidemien	2 af cholera	3 af kolera	2 eholeraepidemien i
	3 epidemi for	2 rigeligt cholera	2 with cholera	2 choleraetrængte og	2 cholera	1 ved choleraepidemien	3 af cholera	2 cholera men
	2 epidemien endnu	2 hvad epidemien	2 ved choleraepi	2 cholera	1 ved choleraen	1 under koleraepitemien	2 under epidemien	2 cholera is
	2 cholera epidemi	2 epidemisk cholera	2 typhnsepidemien for	2 af kolera	1 ved cholera	1 til choleraetrængte	2 selve kolera	2 cholera but
	2 as kolera	2 epidemien synes	2 rigeligt cholera	1 ved kolera	1 under choleraepidemien	1 til choleraetrængte	2 kolera angrebne	2 af choleraepidemien
	2 alle choleralignende	2 epidemien her	2 lera epidemien	1 ved choleraepidemien	1 under cholera	1 ra koleraefængte	2 epidemisk cholera	1 with cholera
	1 ved choleraen	2 cholera stof	2 epidemisk natur	1 ved cholera	1 udbrydende cholera	1 nce kolera	1 vev choleraepidenien	1 when cholera
	1 ved cholera	2 as cholera	2 epidemien har	1 typhusepidemien sor	1 udbredte koleraen	1 mod choleraen	1 ved epidemien	1 ved epidemien
	1 var kolera	2 af epidemisk	2 epidemien er	1 til epidemisk	1 udbredte choleraen	1 koleraepitemien bar	1 ved cholera	1 vaeret cholerahospital
	1 vare choleraetifad	1 ved choleraepi	2 en choleraepidemie	1 til cholerasmiten	1 til choleraetrængte	1 kolera etrcngte	1 under koleraepitemien	1 under eholeraepidemien
	1 under hboleraepidemitt	1 ved choleraen	2 cholera stof	1 til choleralazaicth	1 te koleraetrængte	1 kolera kammerjomfru	1 under cholera	1 under choleraiden
	1 under choleraepidemien	1 ved cholera	2 choleraepi demien	1 til choleraens	1 sin cholera	1 kolera epilemi	1 under choleraepidemien	1 under cholera
	1 under choleraen	1 under epidemien	2 cholera epidemien	1 til choleraetrængte	1 nvt choleraetifælde	1 kolera belobe	1 til epidemiens	1 that cholera
	1 uagtet epidemien	1 under choleraliden	2 choleraepidemie at	1 som typhusepidemien	1 koleraetifalde de	1 koleraefængte og	1 til choleraakomiteen	1 sommer herfiendecholera
	1 to cholera	1 under choleraen	2 af kolera	1 som ihyvhiioepidemien	1 kolera til	1 koleraetrængte i	1 til choleraens	1 og epidemien
	1 til choleraakomiteen	1 under choleraepidemien	2 af epidemisk	1 som epidemi	1 kolera n	1 i epidemien	1 selve cholera	1 no cholera
	1 til choleraetrængte	1 uagtet epidemien	1 ved koleraepidc	1 sidste koleraangrebne	1 kolera etrcngte	1 herskende choleraepidemi	1 raepidemien have	1 malignant cholera
	1 that epidemic	1 tor koleraetrængtes	1 ve choleraetrængte	1 sidste koleraangrebne	1 koleraen nu	1 hcrflende choleraepidemi	1 og epidemien	1 lite epidemic
	1 te koleraetrængte	1 paa choleralazarethet	1 under chvleraepidemieu	1 rpitemiif kolera	1 koleraen i	1 haster choleraen	1 og choleralæger	1 kunde epidemien
	1 sor choleraetrængte	1 og choleraiden	1 under choleraepidemien	1 rn koleraepiteini	1 koleraen fig	1 haarcce cholera	1 no cholera	1 koleraetid har
	1 overstaede cholera	1 of cholera	1 til epidemist	1 nye koleraetifælde	1 koleraetrængte i	1 fra choleras	1 lhvera epidemien	1 koleraiden propfulde
	1 og epidemien	1 nod choleraepidemien	1 til epidemiff	1 nye choleraetif	1 kdolra epidemien	1 fra choleraela	1 lra epidemiens	1 kolera men
	1 lignende epidemier	1 mnligen cholerasyge	1 til epidemi	1 nogen kolerafyq	1 i kolera	1 et cholerasmittet	1 kolera utgiften	1 kiobrnarn koleraetid
	1 kolera ombord	1 lil choleralazarethet	1 til choleraakomiteen	1 nogen cholerasyz	1 i choleraetiden	1 epidemien planen	1 kolera udgiften	1 i koleraiden
	1 kolera og	1 leraepidemien pengene	1 til choleraetrængte	1 lazarebet epidemien	1 i cholera	1 epidemien isominer	1 kolera tilfalde	1 hvor epidemien
	1 kolerafyge og	1 kolerasyge i	1 te koleraetrængte	1 koleraetifælde anmeldte	1 for epidemien	1 epidemien isoiuner	1 kolera og	1 hvor choleraepatienter
	1 koleraen som	1 koleras vpkor	1 strakkelige epidemi	1 kolera sygdommen	1 fer epidemien	1 epidemien i	1 koleraepitemien bar	1 herfiendecholera epidemi
	1 koleraen harte	1 kolera hje	1 som typhnsepidemien	1 kolera spittemien	1 f choleraen	1 epidemien have	1 koleraen stegne	1 faaet kolera
	1 koleraen har	1 koleraetrængtes understøttelje	1 som epidemi	1 kolera lpittemien	1 er choleras	1 epidemien da	1 kolera eller	1 faaet cholera
	1 kolera broen	1 koleraebraengie faa	1 side cholera	1 kolera i	1 epidemien mistede	1 epidemie derefter	1 koleraetrængte i	1 eyolera epidemien
	1 koleraetrængte har	1 for choleraetrængte	1 samme epidemi	1 kolerafyq de	1 epidemien livrindrinflisi	1 epidemi dp	1 kan epidemist	1 epidemi maa
	1 kolera afdodea	1 for choleraetrængte	1 rigeligt kolera	1 kolera er	1 epidemien isommer	1 enkelte cholerasyge	1 jndfriden choleraen	1 epidemien ved
	1 koldfeber epidemier	1 epidemisk natur	1 of cholera	1 koleraepiteini at	1 epidemien har	1 eholera epidemi	1 holeraepidemien nodlidendes	1 epidemien tvrlc
	1 indtil choleraepidemien	1 epidemisk kolera	1 nye choleraetifælde	1 koleraen har	1 epidemien fædrel	1 de kolera	1 haare cholera	1 epidemien idet
	1 hvor cholera	1 epidemien vare	1 lom typhnsepidemien	1 koleraangrebne ere	1 epidemien belobe	1 de koleraetrængte	1 from cholera	1 epidemien have
	1 holera epidemien	1 epidemien nu	1 komme choleraetrængtel	1 ihyvhiioepidemien for	1 epidemien	1 dee choleraen	1 epidemist cholera	1 epidemien grasserede
	1 herskende cholera	1 epidemien kjobenbavn	1 kolera undervejs	1 havne cholerafri	1 epidemi deels	1 choleraetifal de	1 epidemisk kolera	1 epidemien endnu
	1 hboleraepidemitt finants	1 epidemien i	1 kolerasyge er	1 for choleraetrængte	1 eet choleraetifalde	1 cholerasyge kunde	1 epidemiens tid	1 epidemic a
	1 har choleraen	1 epidemien c	1 kolera stof	1 fdolera epidemien	1 de kolera	1 choleras udbrud	1 epidemien stedse	1 epidemic
	1 gen epidemisk	1 epidemi at	1 kolera iali	1 epidemisk natur	1 choleraetifælde der	1 cholerasmittet sted	1 epidemiens ophor	1 druknede cholera
	1 et choleralazareth	1 en choleraepidemie	1 kolera epidemien	1 epidemi saa	1 choleraetifalde de	1 cholera og	1 epidemien mistet	1 de choleraetrængte
	1 et choleralazareth	1 cholera epidemien	1 koleraepidemi at	1 epidemien troede	1 choleraetiden soger	1 cholerahospi taler	1 epidemien jaaledcs	1 de cholera
	1 epidemisk tbaaftccr	1 eh leraepidemien	1 koleraepidc micii	1 epidemien stort	1 cholera sil	1 cholera hjemsogte	1 epidemien ikke	1 kolera c
	1 epidemiske sygdom	1 demist cholera	1 koleraen og	1 epidemien renoualious	1 choleras hjem	1 choleraepidemien ministeren	1 epidemien har	1 cholera whether
	1 epidemi har	1 de koleraebraengie	1 koleraen har	1 epidemien i	1 cholera og	1 cholera epidemien	1 epidemien endnu	1 cholera were
	1 epidemi gjorde	1 cholerasyge i	1 koleraetrængte i	1 epidemien har	1 cholera morbus	1 cholera epidemie	1 epidemien as	1 choleraiden ved

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Bigrammes



Bigrammes

