A Snapshot of Climate Change Arguments: Searching for Recurring Themes in Tweets on Climate Change

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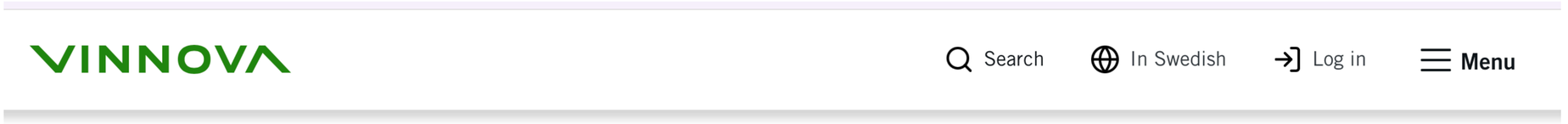
1: SB Sam at the Institute for Language and Folklore (Sweden)
2: Centre for Digital Humanities Uppsala at Uppsala University (Sweden)
3: Applied Computational Linguistics at University of Potsdam (Germany)

1. Funding for a small collaboration project (from Vinnova)



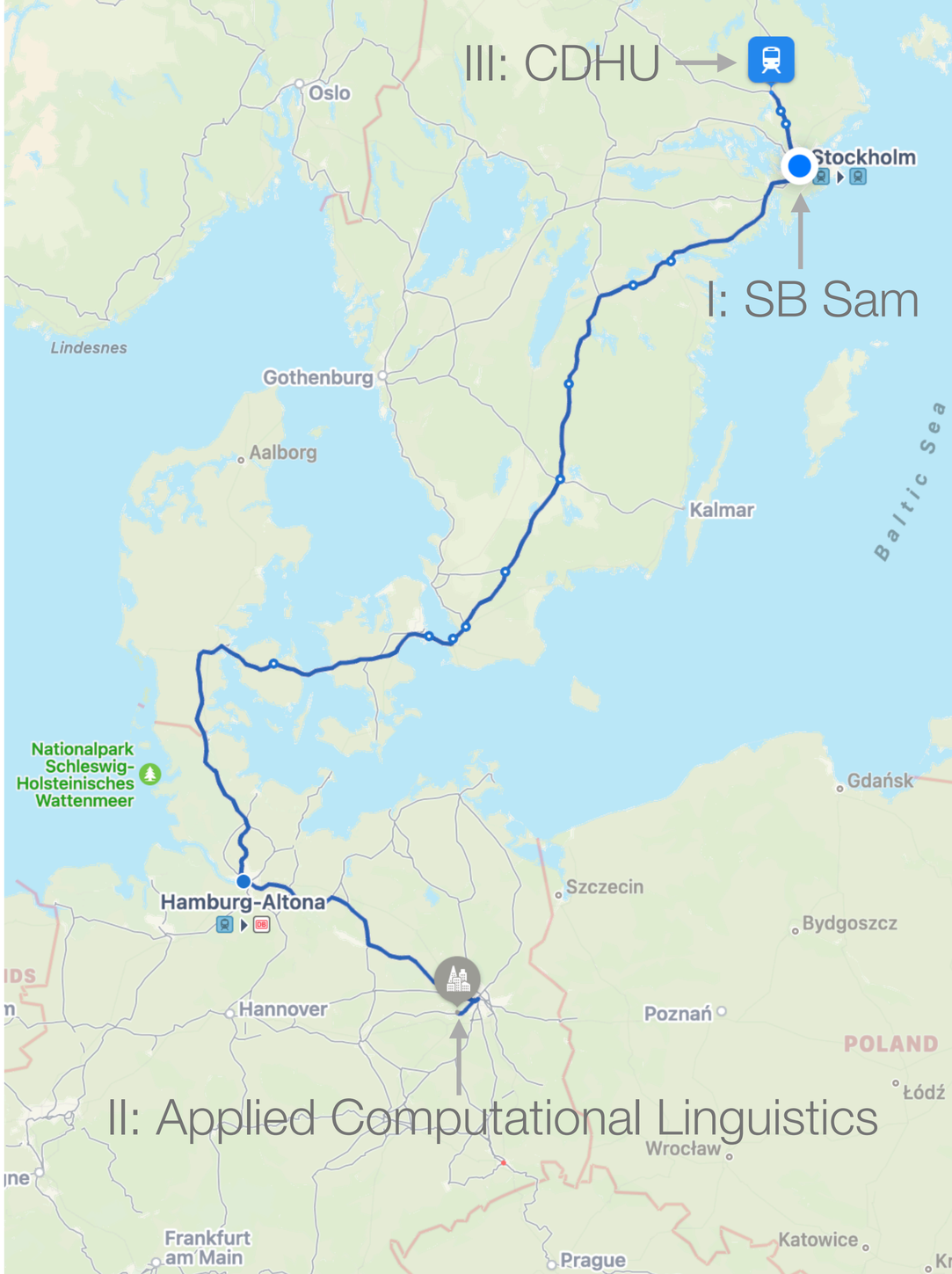
Start > Funding > Project database > Using the SB Sam NLP tools for manual and automatic annotation...

Using the SB Sam NLP tools for manual and automatic annotation of climate change texts

Reference number	2021-03973
Coordinator	Institutet För Språk & Folkminnen
Funding from Vinnova	SEK 208 606
Project duration	November 2021 - December 2022
Status	Ongoing

2. Three organisations

- I: SB Sam at the Institute for Language and Folklore (Sweden)
- II: Applied Computational Linguistics at University of Potsdam (Germany)
- III CDHU, Centre for Digital Humanities Uppsala at Uppsala University (Sweden)



I: SB Sam (society)

At the Institute for Language and Folklore. A part of the research infrastructure: The National Language Bank of Sweden

- Tools/methods from NLP and digital humanities to support research on written and spoken material.
- Different types of written and spoken material is made more accessible to researchers.
- The institute is a CLARIN Knowledge Centre for the Languages of Sweden (SWELANG).

SBSAM NATIONELLA SPRÅKBANKEN

II: Applied CL Discourse Research Lab

At University of Potsdam

- Research on both theoretical and applied aspects of discourse processing.
- One of the current projects: “Probing the discourses of climate change. What can automatic text mining reveal about climate change communication?”
  - Annotate and classify corpora.
  - Study trends in climate change communication
  - Climate change discourse glossaries

III: CDHU, Centre for Digital Humanities Uppsala

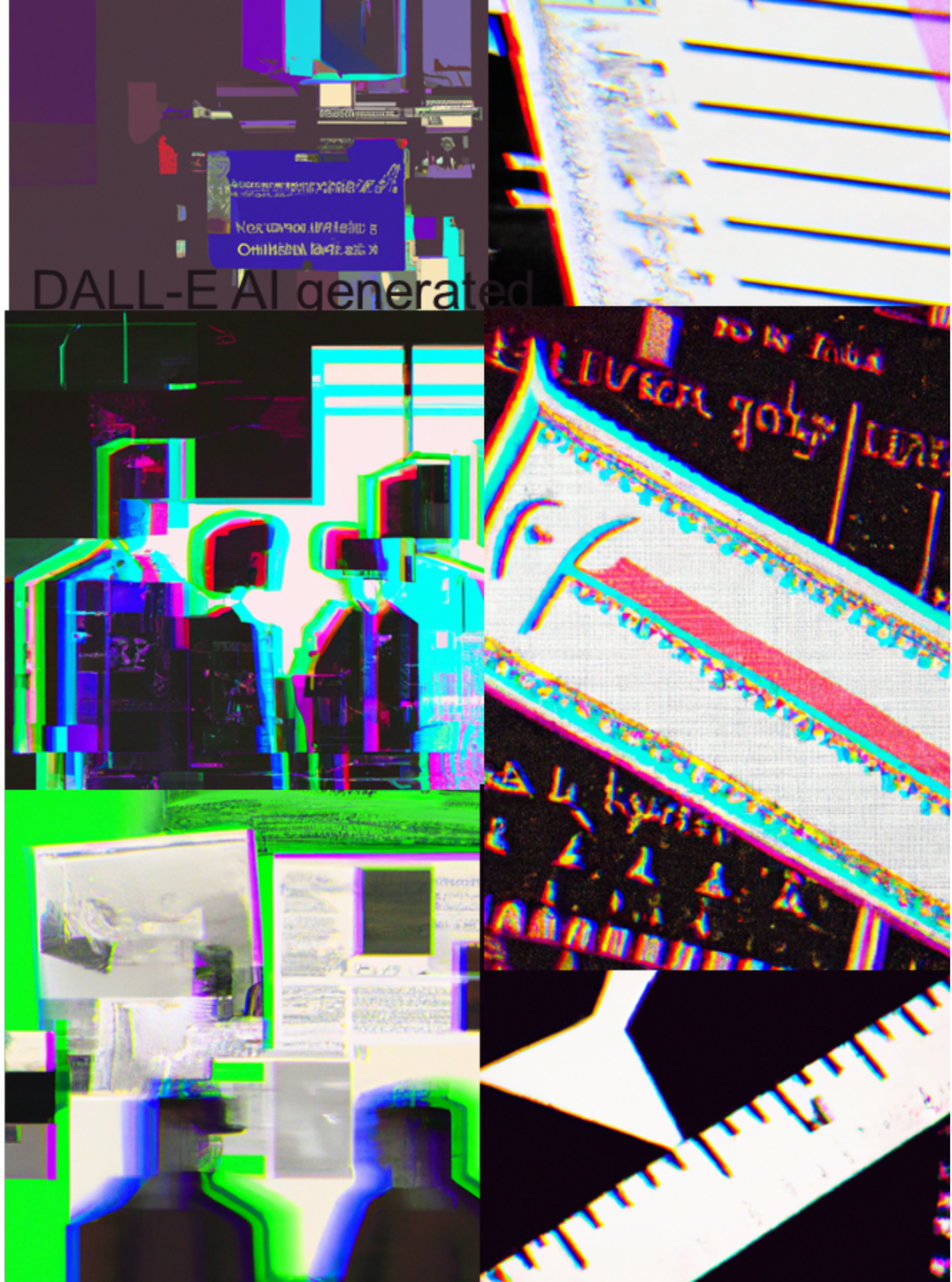
At Department of ALM, Uppsala University

- Digital infrastructure to technically support research in the humanities and social sciences at Uppsala University.
- Research initiation and support, e.g., through application support and seminars.
- Skills training and education, e.g., through workshops and courses.

UPPSALA UNIVERSITET

Centre for Digital Humanities Uppsala

CDHU



3. Background

The Intergovernmental Panel on Climate Change (IPCC) concludes that:

“It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred.
[...]
Global surface temperature will continue to increase until at least mid-century under all emissions scenarios considered. Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO2 and other greenhouse gas emissions occur in the coming decades.” (IPCC, 2021)

4. Aim

“It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred. [...]
Global surface temperature will continue to increase until at least mid-century under all emissions scenarios considered. Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO2 and other greenhouse gas emissions occur in the coming decades.” (IPCC, 2021)

- Given this information, wouldn’t it be expected that most discussions on climate change evolve around the subject of climate change mitigation?
- If not, what themes are then instead discussed?

We studied this for one example corpus: A corpus on German tweets.

5. Materials (= corpus)

GerCCT: An annotated corpus with German tweets on climate change Tweets collected in 2019 with the following criteria:

1. They should consist of a pair of
   - an original context tweet and
   - a reply to this tweet.

2. They should be written in German

3. They should contain the string “Klima” (climate).

Around 12,000 tweet pairs were retrieved, and 1,200 of these were randomly selected for manual annotation.

Information annotated (not used here)

Only the reply tweet was annotated (context tweet shown to the annotator).

- claim
  - unverifiable
  - verifiable

- evidence
  - reason
  - external evidence
  - internal evidence

- sarcasm

- toxic language

(See: R. Schaefer & M. Stede. 2022. GerCCT: An annotated corpus for mining arguments in German tweets on climate change.)

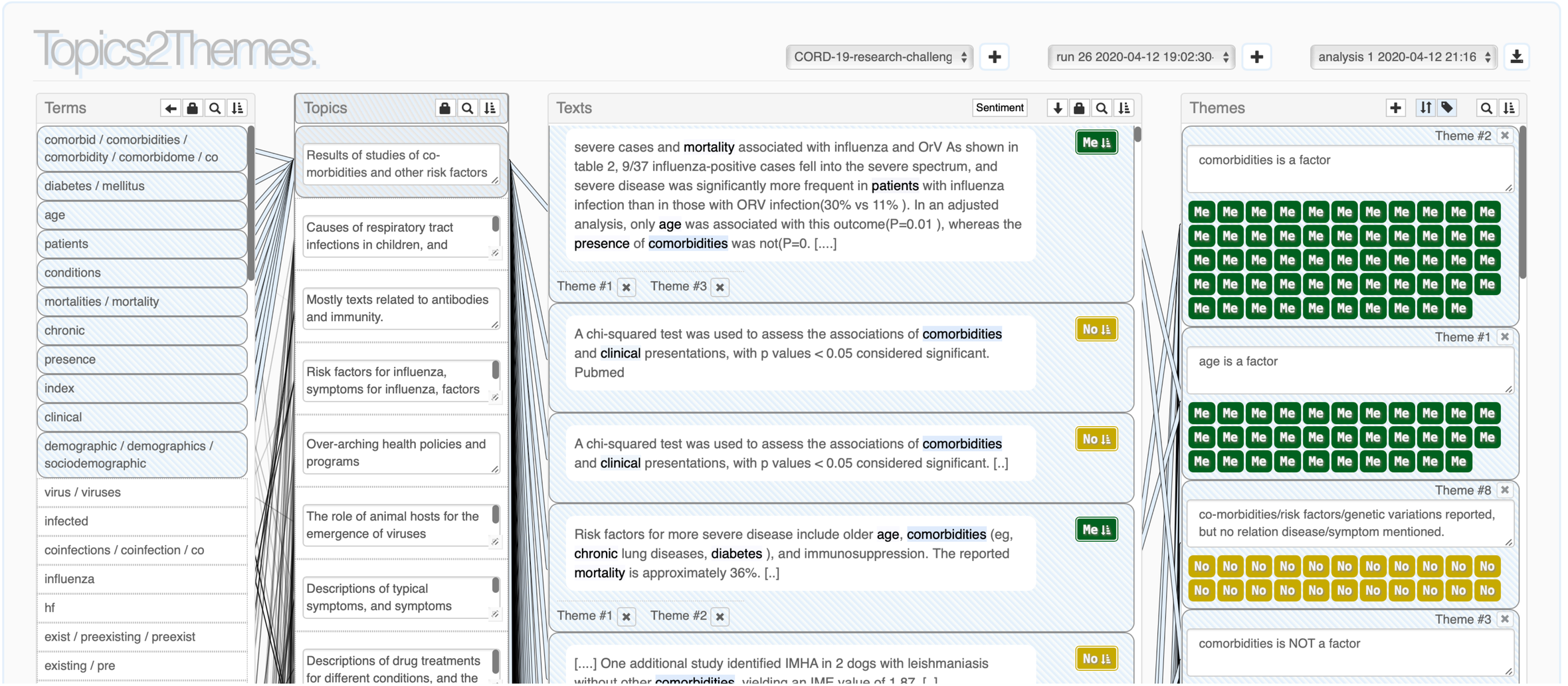
6. Method

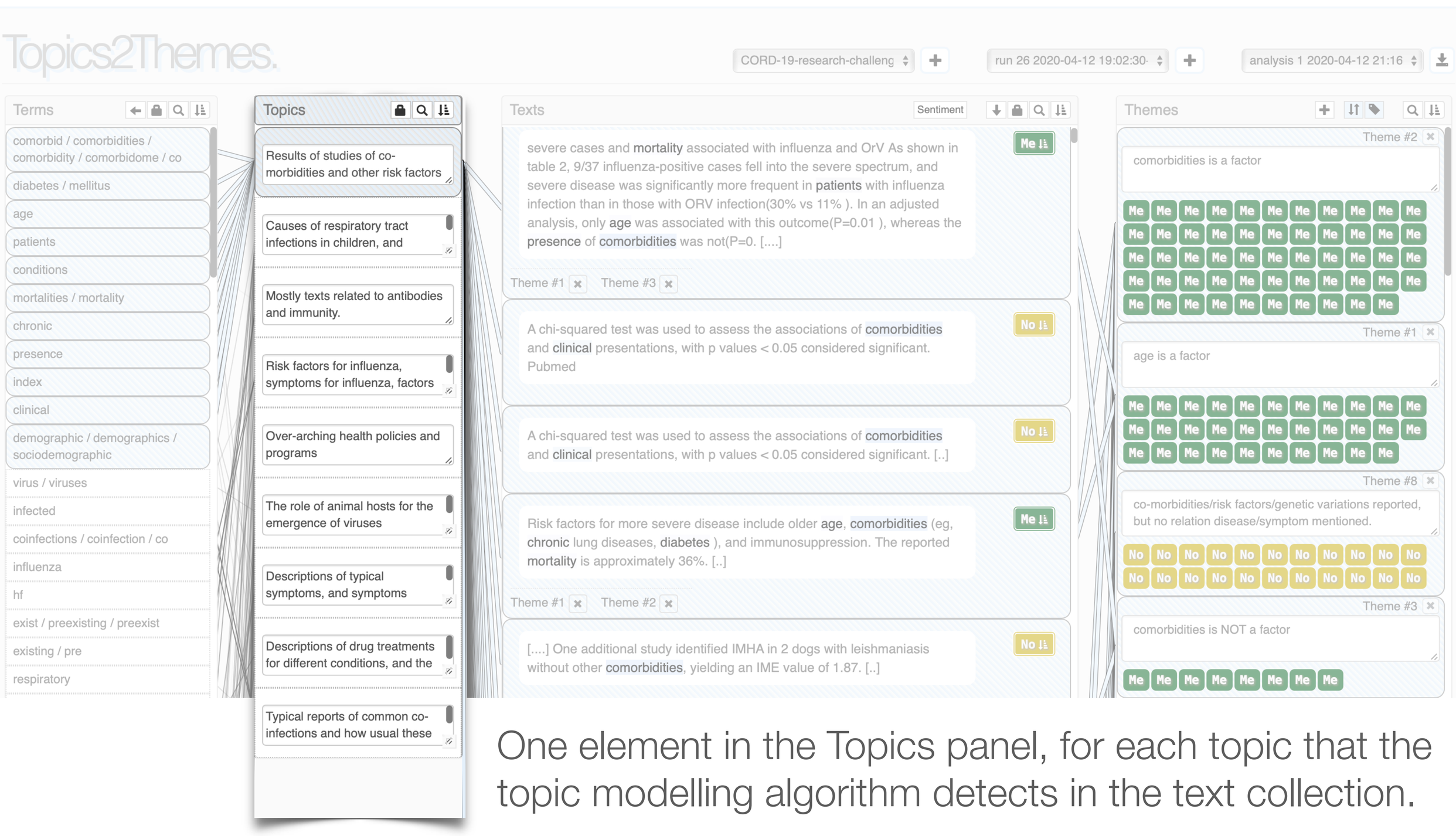
How to find examples of frequent themes among 1,200 climate tweets?
Did not have time to search for themes in 1,200 tweets, but in around 10%.
Strategy:

1. Used a topic modelling tool which automatically extracts recurring topics among the tweets, and then

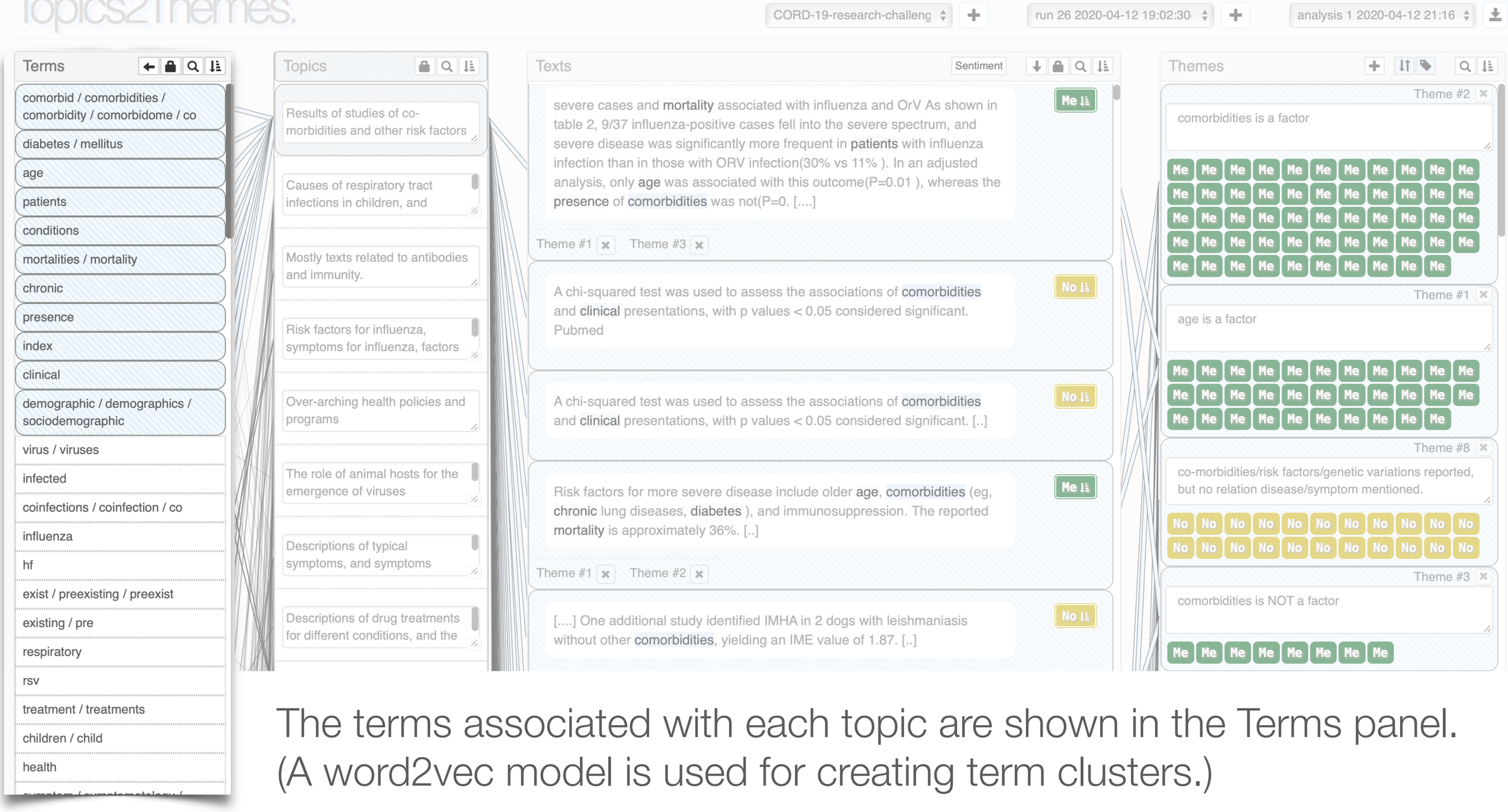
2. Searched for themes in tweets most closely associated with automatically extracted topics.

7. The tool: We used the topic modelling tool Topics2Themes

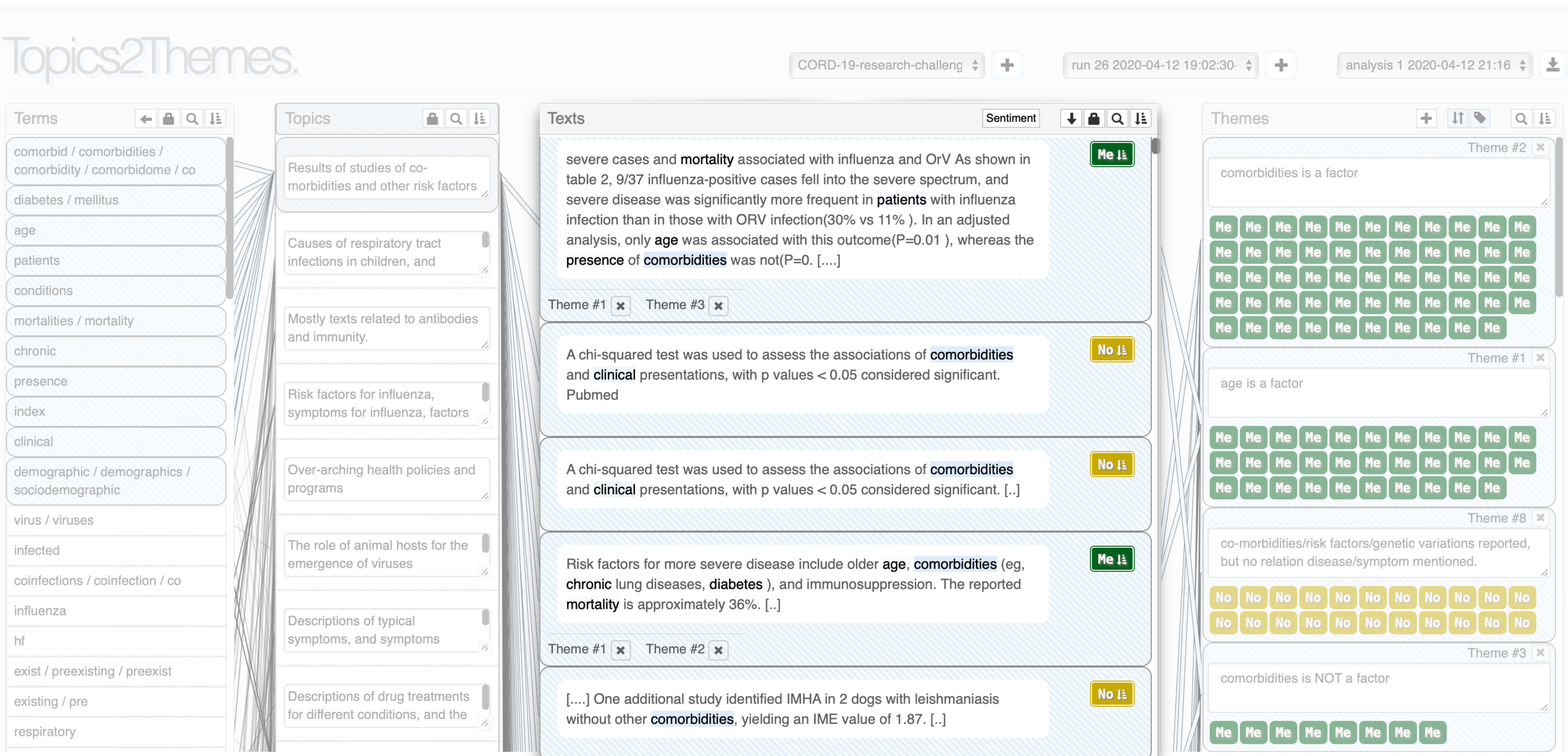




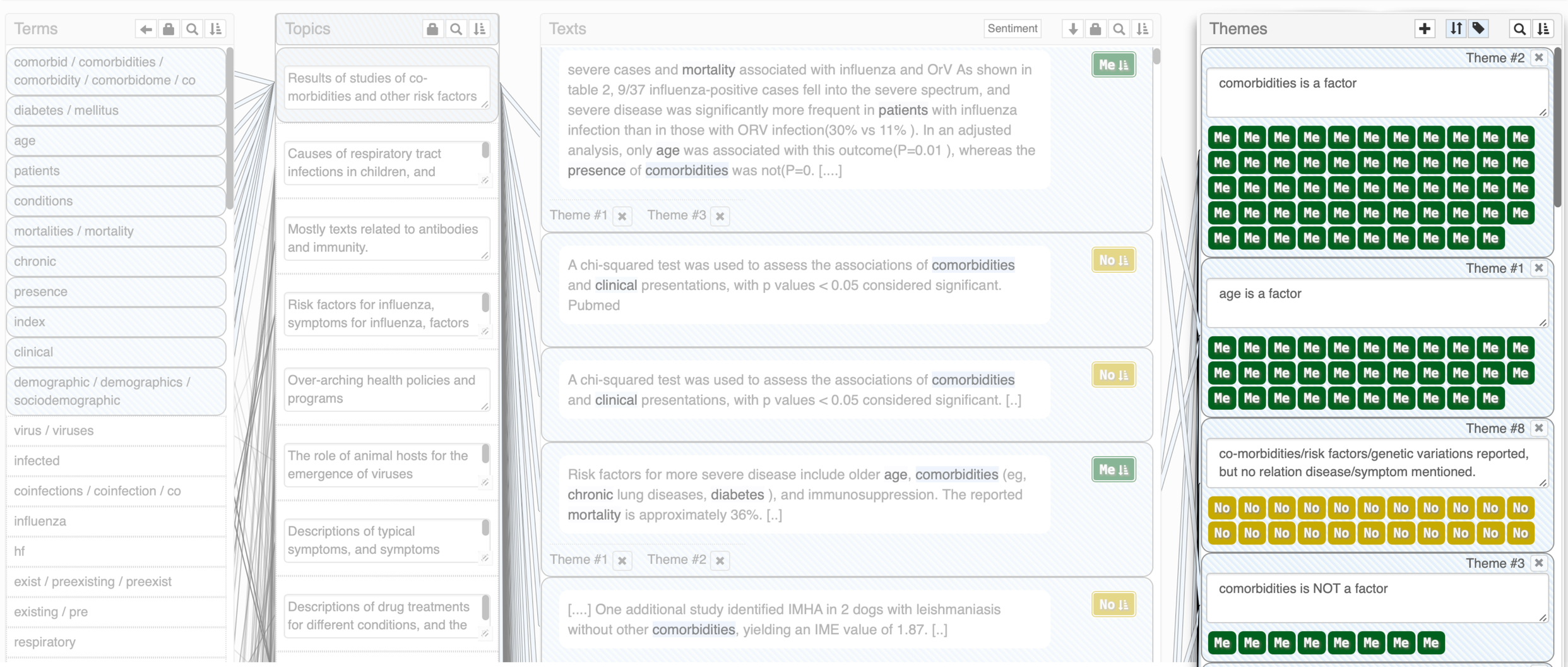
One element in the Topics panel, for each topic that the topic modelling algorithm detects in the text collection.



The terms associated with each topic are shown in the Terms panel. (A word2vec model is used for creating term clusters.)



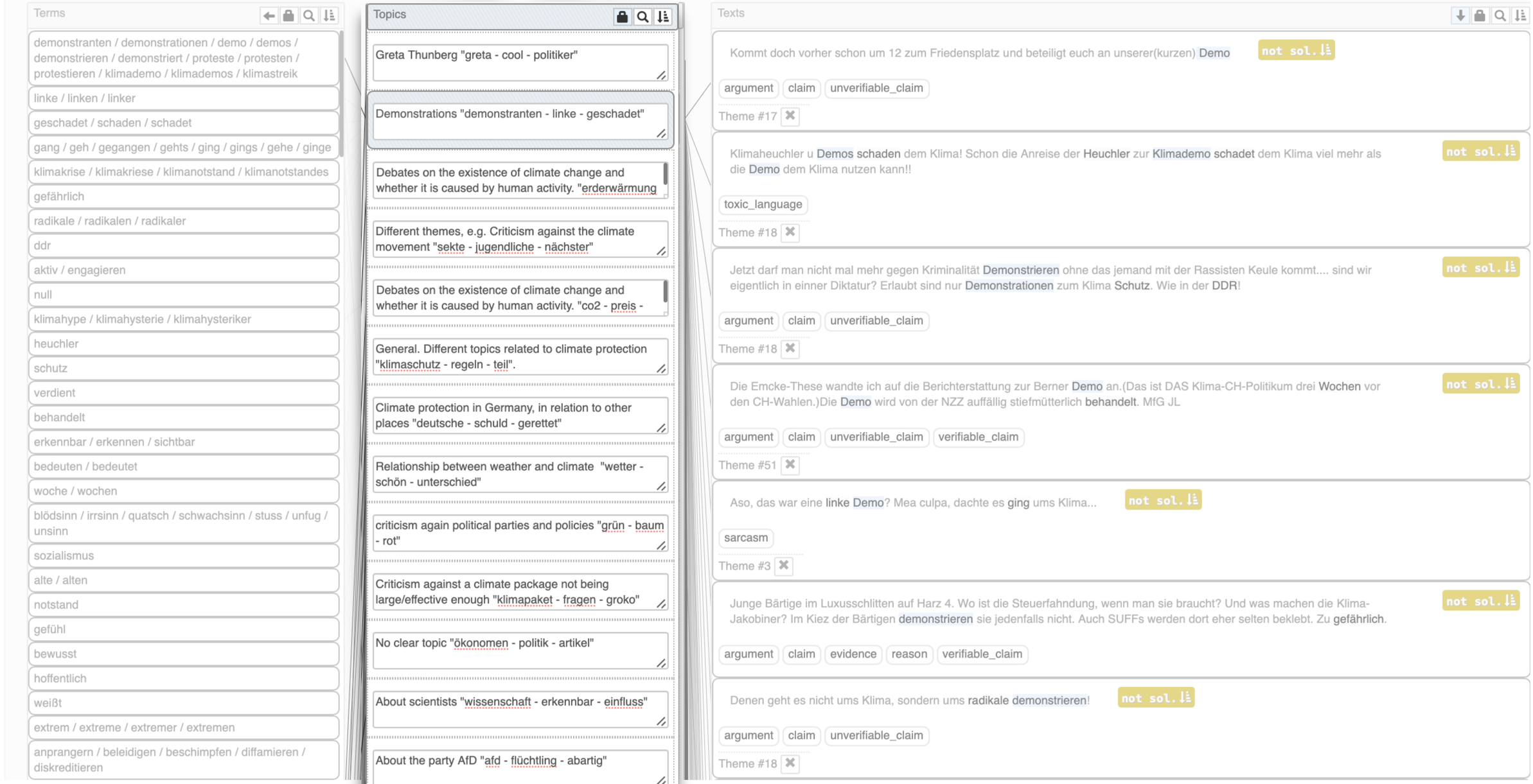
Texts associated with each topic in the Texts panel.



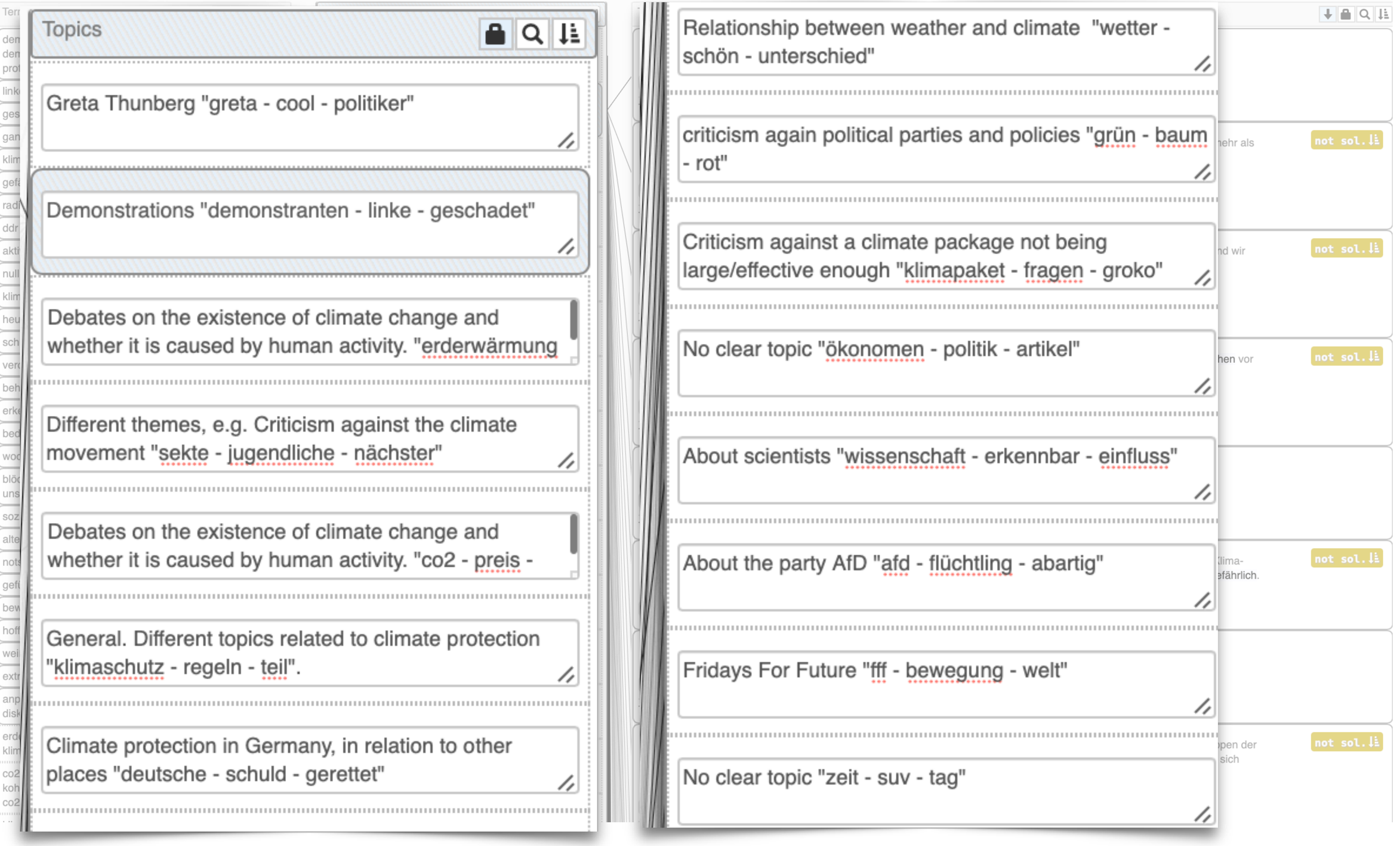
The user can create elements in the Themes panel, representing potential themes found when analysing the texts.

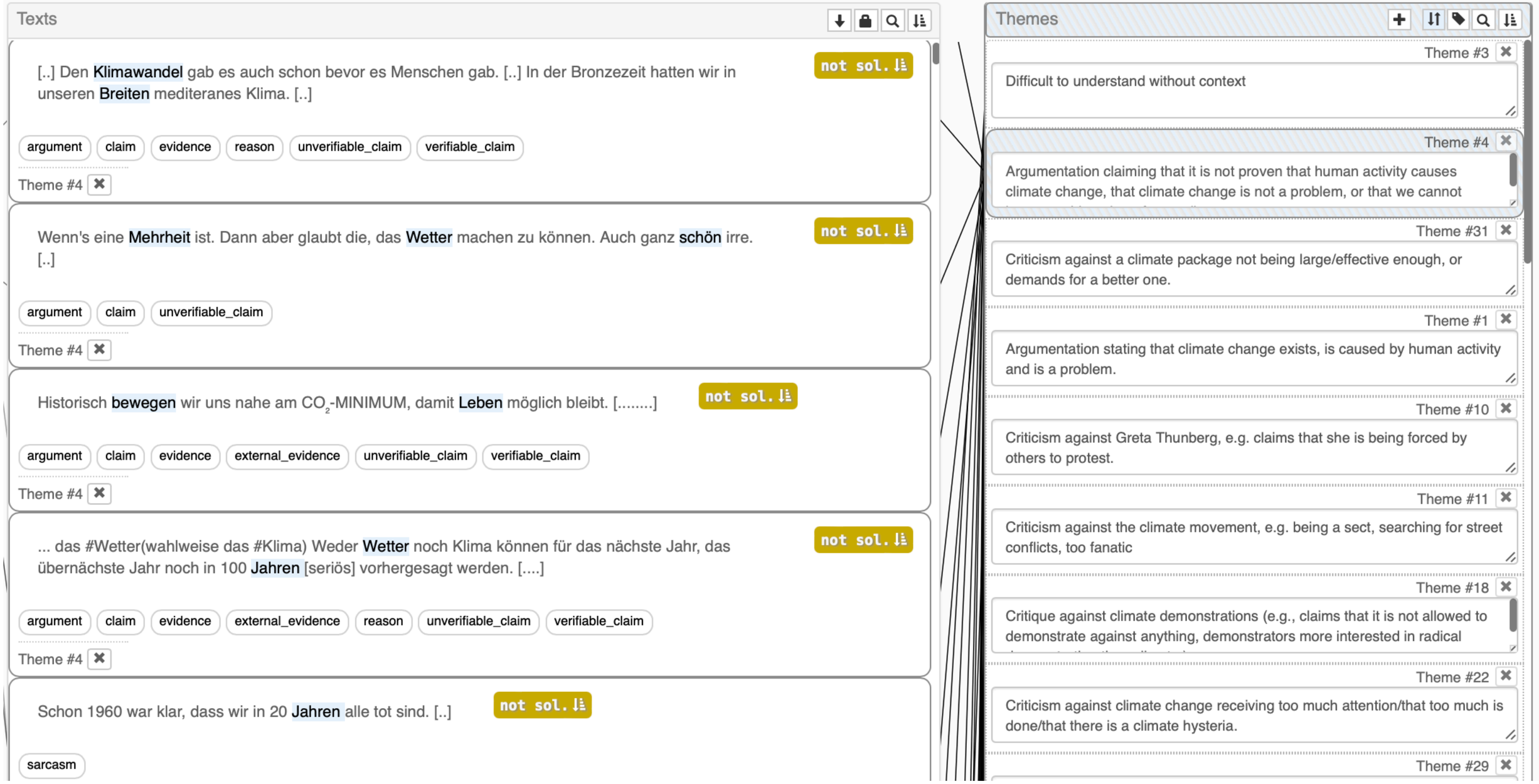
8. Results

What recurring themes were found among the 1,200 climate tweets?



15 stably occurring topics extracted


Topics
Greta Thunberg "greta - cool - politiker"
Demonstrations "demonstranten - linke - geschadet"
Debates on the existence of climate change and whether it is caused by human activity. "erderwärmung
Different themes, e.g. Criticism against the climate movement "sekte - jugendliche - nächster"
Debates on the existence of climate change and whether it is caused by human activity. "co2 - preis -
General. Different topics related to climate protection "klimaschutz - regeln - teil".
Climate protection in Germany, in relation to other places "deutsche - schuld - gerettet"
Relationship between weather and climate "wetter - schön - unterschied"
criticism again political parties and policies "grün - baum - rot"
Criticism against a climate package not being large/effective enough "klimapaket - fragen - groko"
No clear topic "ökonomen - politik - artikel"
About scientists "wissenschaft - erkennbar - einfluss"
About the party AfD "afd - flüchtling - abartig"
Fridays For Future "fff - bewegung - welt"
No clear topic "zeit - suv - tag"



Theme candidates were manually identified and assigned in around 120 tweets

The 14 themes that occurred at least three times

Theme
(a) Criticism against a climate package not being large/effective enough, or demands for a better one.
(b) Argumentation claiming that it is not proven that human activity causes climate change, that climate change is not a problem, or that we cannot know anything about future climate.
(c) Argumentation stating that climate change exists, is caused by human activity and is a problem.
(d) Criticism against Greta Thunberg, e.g. claims that she is being forced by others to protest.
(e) Criticism against the field and background of a scientist in relation to the subject of climate change.
(f) Criticism of that climate change receives too much attention/too much is done/there's a hysteria.
(g) Criticism of the climate movement, e.g., for being a sect, searching for street conflicts, too fanatic.
(h) Critique against climate demonstrations, e.g., claims that it is not allowed to demonstrate against anything else, more interest in radical demonstration than climate.
(i) Critique against party strategies in relation to climate change.
(j) Criticism against those working against climate change doing activities that emit a lot of CO2.
(k) Discussions about the relation between weather and climate.
(l) Critique against that (or trying to find reasons why) someone does not worry about climate change.
(m) Criticism towards politicians for not doing enough for the climate.
(n) Discussions about different economic instruments for climate protection.

9. Next steps

- Run topic modelling also on the un-annotated set
- Include the context tweets
- Try other topic modelling algorithms

Thank you!

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- Topics2Themes:
  https://github.com/mariask2/topics2themes
- SB Sam and The National Language Bank of Sweden:
  https://www.sprakbanken.se/sprakbankeninenglish.html
- Probing the discourses of climate change. What can automatic text mining reveal about climate change communication?
  http://angcl.ling.uni-potsdam.de/research/climate.html
- Centre for Digital Humanities Uppsala
  https://www.abm.uu.se/cdhu-eng

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