



CKCC and ePistolarium

Topic Modeling and Network Analysis

Charles van den Heuvel

COST Action IS1310

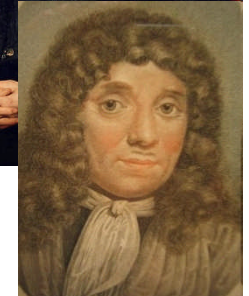
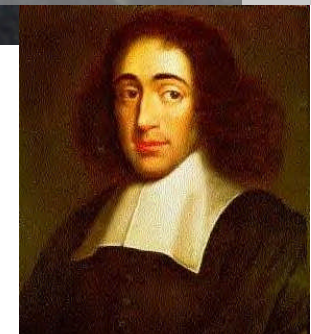
Reassembling the Republic of Letters

23rd March St'. Anne's College University of Oxford

CIRCULATION OF KNOWLEDGE AND LEARNED PRACTICES IN THE 17TH CENTURY DUTCH REPUBLIC

A Web Based Humanities Collaboratory on Correspondences

Isaac Beeckman	28
René Descartes	727
Hugo de Groot (Grotius)	8034
Christiaan Huygens	3090
Constantijn Huygens	7297
Antoni van Leeuwenhoek	282
Dirck Rembrantsz van Nierop	80
Jan Swammerdam	172
Total	20215



**CIRCULATION OF KNOWLEDGE AND LEARNED PRACTICES IN THE
17TH CENTURY DUTCH REPUBLIC
A Web Based Humanities Collaboratory on Correspondences**

How can we combine and structure various sets of letters of 17th-century scholars and their correspondents in such a way that we can **analyze** and **visualize** the **circulation and appropriation of knowledge** production in a wider international context and recognize the development of themes of interest and scholarly **debates in space and time?**

Method: **topic modeling** and **natural language techniques**

<http://ckcc.huygens.knaw.nl/epistolarium/>

Topic modeling

Documents are mixtures of topics

A topic is a probability distribution over words

Used to find

- similar words
- similar documents
- documents similar to arbitrary text

The problem of spelling variation

```
-- Huygens, Christiaan (1629-1695) -- 2261 0638 0344
0157 Hugens
0146 Christiano Hugenio
0145 Christian Hugens de Zulichem
0103 Hugens de Zulichem
0101 Huygens
0097 Huguens
0082 Hugenius
0078 Christianus Hugenius
0071 Chr. Hugenius
0051 Hugeni
0050 Zulichem
0047 Hugenio
0046 Chr. Hugens de Zulichem
0040 Hugonii
0038 Christiano Hugenio de Zulichem
0031 Hugenum
0026 Vgenio
0026 Archimede
0025 Huijgens
```

**344 x Christiaan Huygens
and
151 x The Hague**

0001 Hag. Comit.	0113 Hagae Com.
0001 's Gravenhaghe	0105 den Hage
0001 Hagae Comit.	0094 Hagae Comititis
0001 Den Haag	0072 Hag. Com.
0001 'S graven-hage	0040 la Haije
0001 Haye	0029 Hagae
0001 la Hayee	0016 den Haege
0001 's Graven Haghe	0014 la Hay
0001 den Haeg	0010 Hagae-Com.
0001 Dne Hage	0008 Hage
0001 Hagaecomit.	0005 's Gravenhage
0001 Hagae Com	0004 Hagam
0001 Haage	0004 Hagae Comitaten
0001 Haghe	0004 Den Haghe
0001 s' Gravenhage	0003 la Haya
0001 Hagae comitis	0002 Den Haech
0001 s'Graven-hage	0002 la haye
0001 Hagae com.	0002 La Haije
0001 den Haag	0002 Den Hagh
	0002 La Haye

1508 la Haye
0113 Hagae Com.
0105 den Hage
0094 Hagae Comitiss

en het werck te reguleren nae het <PERSON>Erfractaet van Spiers</PERSON>

- classifier learns that “het” (DET) never precedes a PER

<PERSON>de Sweedse</PERSON> comm [issai] ren

- classifier learns that only a noun can be a PER

Named Entity Recognition

```
-- Huygens, Christiaan (1629-1695) -- 2261 0638 0344
0157 Hugens
0146 Christiano Hugenio
0145 Christian Hugens de Zulichem
0103 Hugens de Zulichem
0101 Huygens
0097 Huguens
0082 Hugenius
0078 Christianus Hugenius
0071 Chr. Hugenius
0051 Hugeni
0050 Zulichem
0047 Hugenio
0046 Chr. Hugens de Zulichem
0040 Hugenii
0038 Christiano Hugenio de Zulichem
0031 Hugenium
0026 Vgenio
0026 Archimede
0025 Huijgens
```

0004 Hagam
0004 Hagae Comitatus
0004 Den Haghe
0003 la Haya
0002 Den Haech
0002 la haye
0002 La Haije
0002 Den Hagh
0002 La Haye
0001 Den Haeghe

The problem of the structure of the letters: multiple languages and mixed content

Metadata	1618-07-14 Huygens, Constantijn (1596-1687) London (GB)	Dutch Huygens, Maurits (1595-1642) [Den Haag (NL)]
Text	<p>Ik schrijf u maar niet dikwijls, want gij hoort toch alles uit de brieven aan onze ouders. Gij moet mij wat meer van dat duel vertellen. Ik kan nog niet goed eene laars aantrekken en ben dus nog niet naar Cambridge en Oxford geweest. Den 20^{sten} van deze maand gaan wij naar Bagshot, waar de Koning ook zal zijn.</p> <p>'Hier je menay de Gheyn veoir la galerie a peintures du feu prince par l'adresse de certains gentilshommes anglois qui m'ont grandement obligé. Celle du conte d'Arondel avec les antiquitez etc. de Gheyn m'avoit fait veoir par cy devant. Choses admirables en verité. Au reste nous voicy au pais le plus gentil du monde ou journellement nous voyons des palais et paisages <i>om op clavecingel-dexels te schilderen</i>'. Mijn knecht bevalt mij erg goed; wij spreken samen niets dan Engelsch.</p> <p>Ce 4^e de Juillet 1618. De Lambeth.</p>	

Circulation of Knowledge and Learned Practices in the 17th-century Dutch Republic

Home | Project | ePistolarium | First experiments | Corpus | Products | Methodology | Education | Help |
Contact

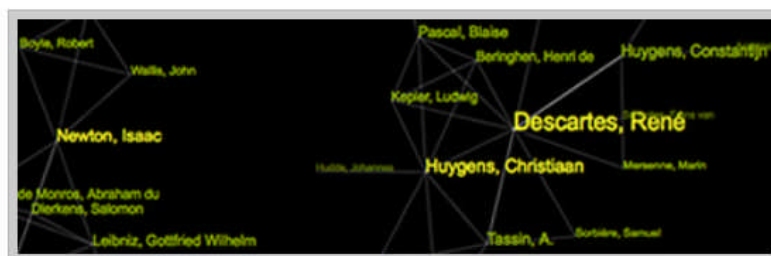
A Web-based Humanities'

Collaboratory on Correspondences.

The scientific revolution of the 17th century was driven by countless discoveries in the workshop, in the observatory and in society at large.

A dramatic increase in the amount of information gave rise to new knowledge. But how were new elements of knowledge disseminated and appropriated? In short: how did knowledge circulate?

In order to answer this question the CKCC project built a web application called *ePistolarium*. With this application researchers can browse and analyze around 20,000 letters that were written by and sent to 17th century scholars who lived in the Dutch Republic. Moreover, the ePistolarium enables visualizations of geographical, time-based, social network and co-citation inquiries.



Go to the [ePistolarium](#) and browse through the letters with the faceted search tool.



[Watch the instruction video to get started.](#)



Read more about the [CKCC project](#) and its outcomes in [publications and lectures](#).



[Watch a five minute introduction to this project.](#)

<http://ckcc.huygens.knaw.nl/>

[New Search](#)[Save Search](#)[Open Search](#)[Result List](#)[Visualization](#)

Faceted search

Similarity search

Full text search

demonstrat*



Search



Give suggestions

+aqua +aquae +aquam +aquas +aquis +demonstratur
 +particulae +particulam +particulas +particulis +ratione
 +rationem +rationes +rationibus +rationis +rationum

Date

☐ Combine senders and recipients

Senders

All None

☐ Arnauld, Antoine (1612-1694)
☐ Baert, Pieter J. (fl. 1676-1691)
☐ Bannius, Johannes Albertus (1598-1644)
☐ Barlaeus, Caspar (1584-1648)
☐ Bartholin, Erasmus (1625-1698)
☐ Beaune, Florimond de (1601-1652)
☐ Beeckman, Isaac (1588-1637)

627 resultsOrder By: Date

1599-04-01

Groot, Hugo de (1583-1645)
Delft (nl)

1600-07-26

Groot, Hugo de (1583-1645)
Den Haag (nl)

1607-01

Groot, Hugo de (1583-1645)
[Den Haag (nl)]

1608-04-12

Groot, Hugo de (1583-1645)
[Den Haag (nl)]

1612-07-18

Beeckman, Isaac (1588-1637)
Saumur (fr)

1612-10-24

Laren, Jeremias van (1590-1638)
Franeker (nl)

1600


Geographical Map
 Display the results on a map.

Timeline
 Spread the results over time.

Correspondent Network
 See who is writing to whom.

Cocitation Graph
 See who is mentioned the most in the letters.
Venetië,
Venezia (i)Staten va
Den HaagHeinsius, Daniël (1580-1655)
Leiden (nl)Heinsius, Daniël (1580-1655)
Leiden (nl)?
?Beeckman, Isaac (1588-1637)
Zierikzee (nl)
<http://ckcc.huygens.knaw.nl/epistolarium/>

[New Search](#)[Save Search](#)[Open Search](#)[Back to results](#)[Share this letter](#) | [Previous letter](#) | [Next letter](#)

Metadata

1639-04-03

desc004/3197

Beaune, Florimond de (1601-1652)
Blois (fr)Mersenne, Marin (1588-1648)
[Paris (fr)]

Appendix of: -

Appendices: -

Text

Monsieur et Révérend Père,

J'ai reçu les trois lettres et le paquet que vous m'avez envoyés cette semaine, et j'ai reçu un particulier contentement de la démonstration de M.^r [Descartes](#) touchant la règle de M.^r [Fermat](#).

Pour ce qui est du développement du galand, il n'était point besoin que vous prissiez la peine de m'envoyer celui de M.^r [Descartes](#); je vous en ai toutefois obligation. Il n'y a autre différence entre le sien et le mien, sinon que, selon sa façon ordinaire, il est bref, et j'ai expliqué le calcul et la façon au long. En relisant toutefois la copie semblable à celle que je vous ai envoyée extraite du brouillard où j'avais fait le calcul (car j'en ai voulu retenir un exemplaire), j'ai remarqué une faute de transcription d'un signe *plus* au lieu du signe *moins*, que je crains qu'il se trouve en la vôtre, et quoique la pensée le corrige assez, néanmoins, si elle s'y trouve, je serai bien aise que vous la corrigiez. C'est dans le premier feuillet, dans la seconde face, après ces mots: «*Et si nous*

$$+\frac{1}{9}n^2$$

[New Search](#)[Save Search](#)[Open Search](#)[Back to results](#)[Share this letter](#) | [Previous letter](#) | [Next letter](#)

vellem exactius, utrūm simile quid non sit inventum; et si scias, ad me scribe: excolerem enim confusam adhuc in cerebro meo speculationem illam, si aequae novam suspicarer atque certa est.

Interim me ama, vive feliciter et vale. Adhuc à me litteras accipies ante discessum.

Bredae Brab., 7^o Kal. Aprilis.

Tuus si suus

Du Perron.

Keywords

solvi quā̄m cubos utrūm quaestiones instrumentis absolutum discedam tantūm ideoque unaquaeque imaginari aequationum redii numerum repperi existimo minuta radices aliae

Similar letters

- 1646-02 (Descartes, René - ?) 85%
- 1687-03-10 (Huygens, Christiaan - Tschirnhaus, Ehrenfried Walther von) 84%
- 1673-03-25 (Huygens, Christiaan - Louis XIV, king of France) 84%
- 1657-10-19 (Sluse, René François de - Huygens, Christiaan) 84%
- 1656-06-28 (Huygens, Christiaan - Schooten, Frans van) 84%
- 1657-12-18 (Sluse, René François de - Huygens, Christiaan) 84%
- 1658-06-07 (Sluse, René François de - Huygens, Christiaan) 84%
- 1655-06-13 (Huygens, Christiaan - Wallis, John) 84%
- 1640-02-08 (Descartes, René - Hogelande, Cornelis van) 84%

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Faceted search

Similarity search

Full text search

demonstrat*



Search



Give suggestions

+aqua +aquae +aquam +aquis +demonstratur
+particulae +particulam +particulas +particulis +ratione
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Date

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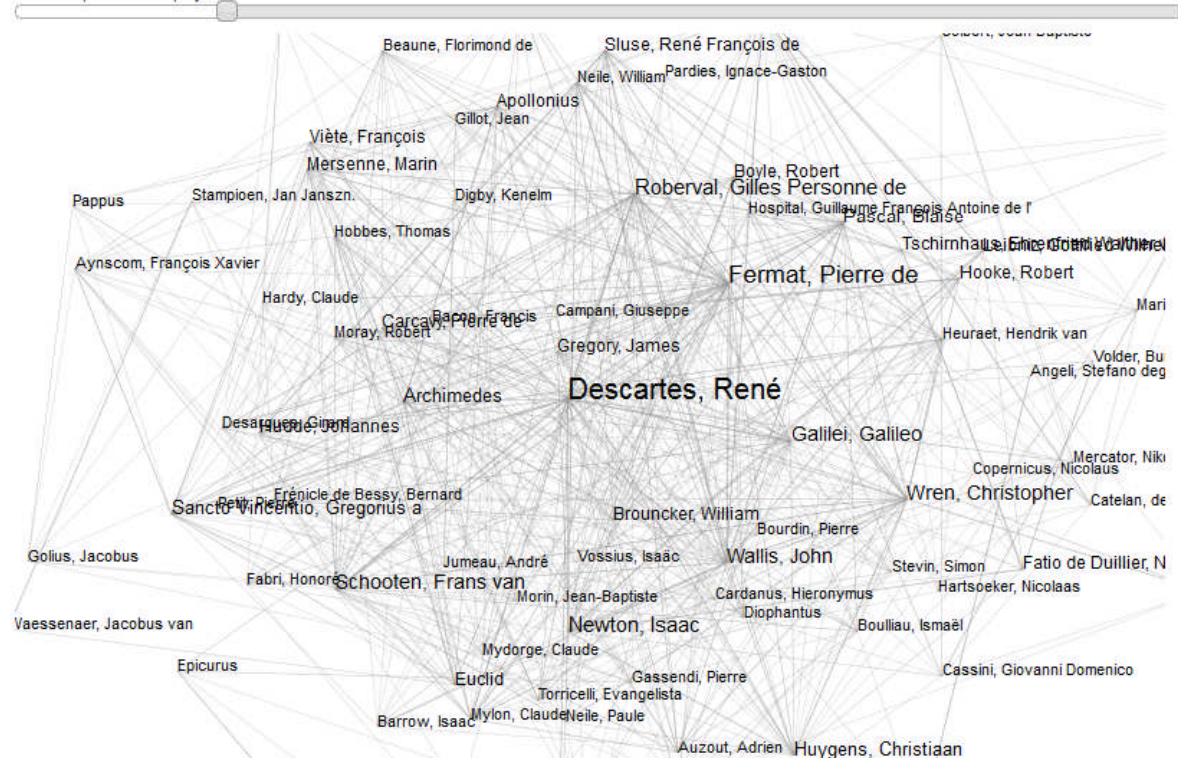
ckcc.huygens.knaw.nl/epistolarium/#

NB: 399 names have been hidden in order to ensure the graph's clarity. They occur 5 or fewer times in your result set.

Caution! Increasing the threshold can slow down your browser!

Close

Maximum persons to display 88

<http://ckcc.huygens.knaw.nl/epistolarium/>

Experiment 1

Questions:

1) Who are the key players in the debate around the discoveries of the ring structure and moons of Saturn in the seventeenth century. (long history in seven stages from 1616 - 1685)

2) Is the theory of Van Helden valid?

Conclusion:

Yes, but found app. 30% additional names

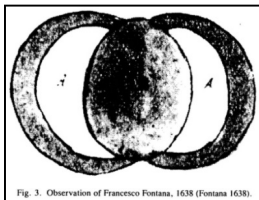
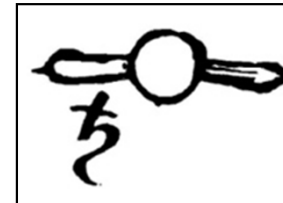


Fig. 4. Observation of Francesco Fontana, 1645 (Fontana 1646, p. 141).



Source: Huib Zuidervaat (Huygens ING)

Experiment 2

Question

Are expressions of confidentiality in letters of Hugo Grotius representative for other 17th century correspondences as well?

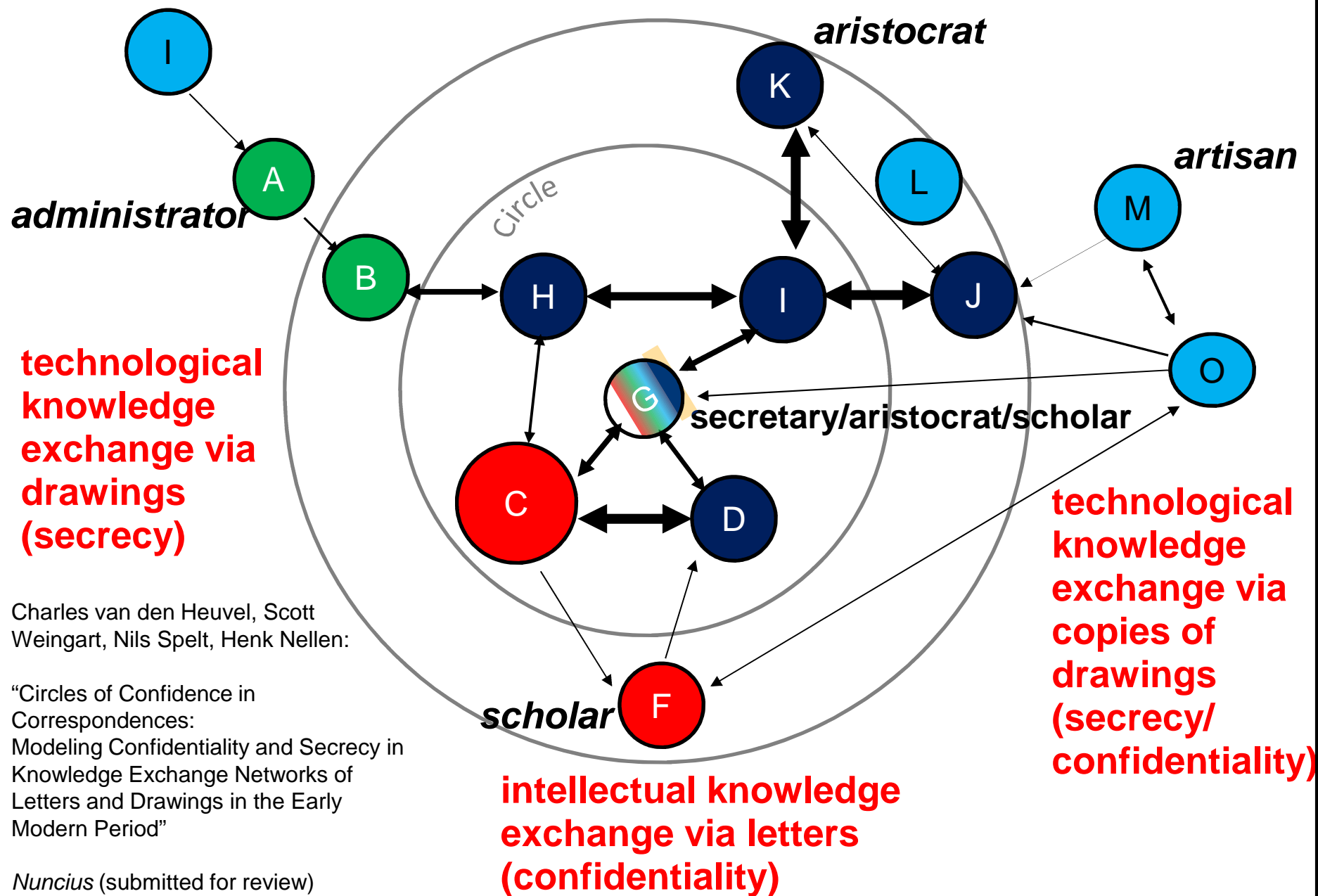
Conclusion:

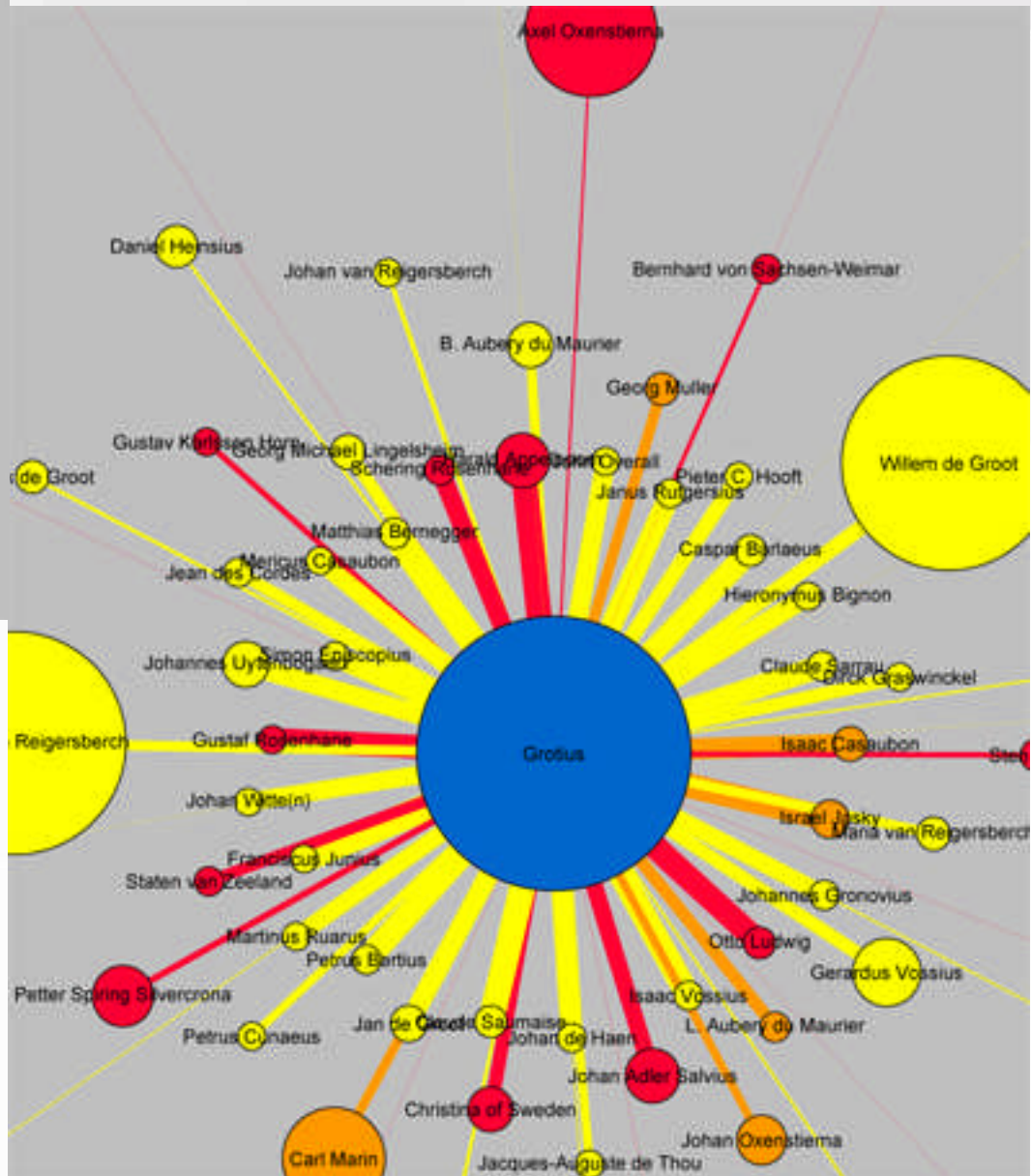
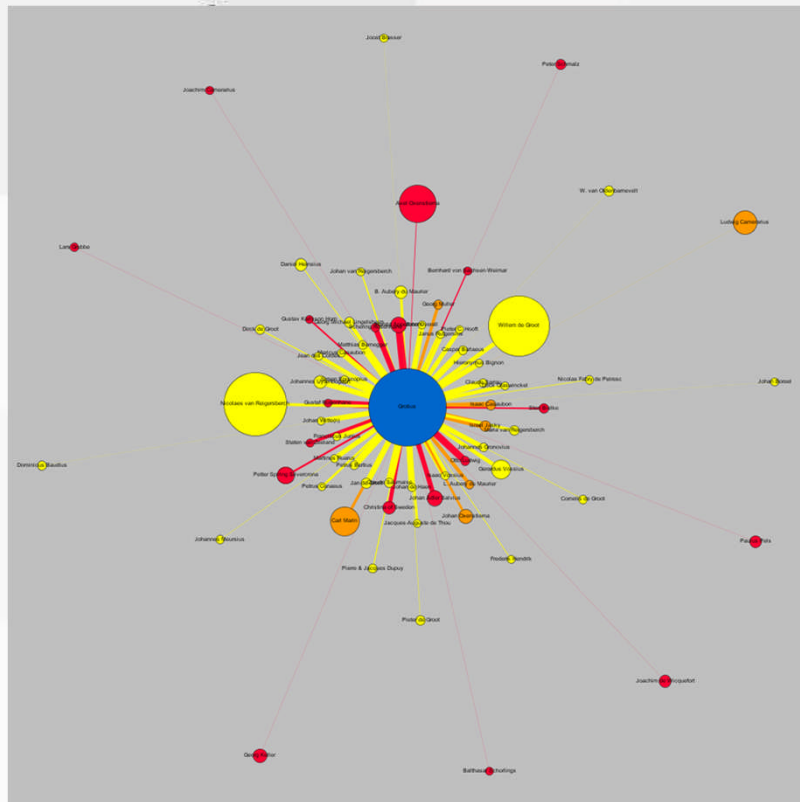
we found some extra references in the work of Grotius, but hardly in other correspondences

Problems:

implicit language and small data sets

source: Henk Nellen and Charles van den Heuvel





reciprocity in personal (yellow),
professional (red), and
overlapping (orange) networks
Grotius

data-analysis visualization :Nils Spelt
Erasmus University Rotterdam
Intern at Huygens ING
September-November 2014

future VRE's should enable

- making sense of texts: **improving topic modeling and NLS techniques** to make concepts more explicit
- making sense of the nature and topology of networks (formal networks, informal networks of confidentiality etc.) by **combining (meta-)data of people/topics**
- making sense of networks and maps: **contextualization by creating multilayered maps and networks**
- making sense by exploring and annotating texts, networks, maps and other media and by making uncertainties explicit: **creating interfaces for interpretation**



Thank You

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