Case study 1: Aristotle in the Republic of Letters

1. Introduction

The purpose of this first case study is explorative. It primarily concerns the first stages of research and the difficulties one may already encounter at the very beginning.

In order to be able to use ePistolarium effectively as a research tool, some background knowledge of the seventeenth-century background is essential. Investigations in the digital humanities begin with a question too. A short introduction of the seventeenth-century context is called for, before we can get started. In the history of science the seventeenth century is also called the period of the Scientific Revolution.[[1]](#footnote-1) The rejection of Aristotelian philosophy is seen as one of the central characteristics of this development. Among others this process involved the following changes:

First, the rejection of a world full of qualities – sound, colour, taste, gravity, levity, and so on – and its replacement by the two ‘Catholick principles’ (Robert Boyle) of matter and motion. More than any other philosopher, René Descartes was responsible for the introduction of this ‘mechanical philosophy.’ Colours were not real. They were sensations in the mind, caused by rotating particles (figure 1). Similarly, there was no such thing as gravitational attraction. Objects were simply whirled around in a vortex and pushed towards the centre as a result. The mechanical philosophy implied a rejection of teleological explanations, suggesting that the world was devoid of purpose. Similarly, by making matter completely passive, subject only to a few laws of motion, the mechanical philosophy caused anxiety about the place of mind in nature.

Second, a growing appreciation of the language of mathematics as a means of describing, if not understanding, nature. The most prominent exponents of this trend were Nicolas Copernicus, Galileo Galilei and Isaac Newton. This relates to the renewed interest in Plato during the Renaissance. Plato saw mathematics as the ideal of knowledge. Aristotle, by contrast, denied that mathematics was suited to understand nature: numbers were mere abstractions; mathematics only dealt with accidental properties such as size; mathematical objects being eternal, they are incapable of accounting for change; mathematics cannot provide causal knowledge, and so on. In light of this final point, it makes sense that the growing appreciation for mathematics was accompanied by a rising instrumentalism among some natural philosophers. Instead of explaining why bodies fall, one could give a mathematical description of how bodies fall.[[2]](#footnote-2)

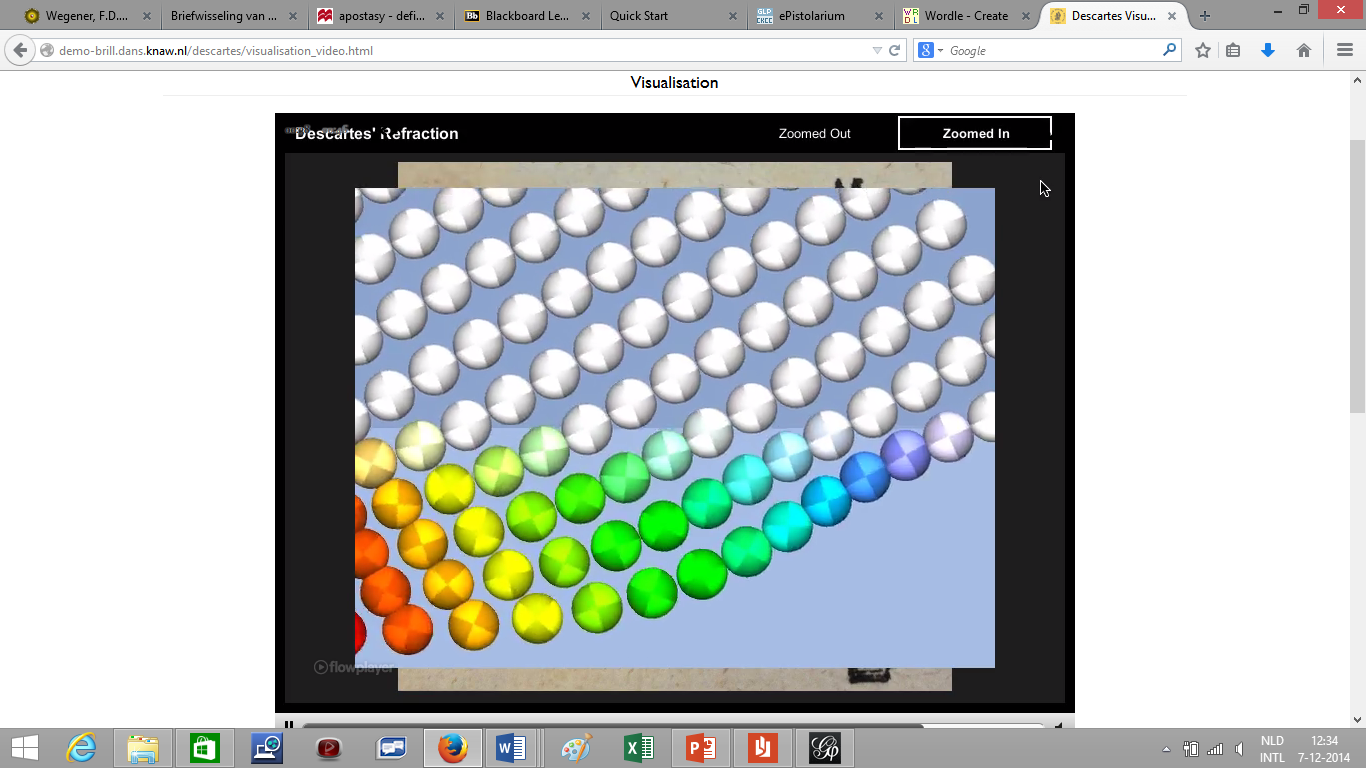


Figure 1: a computer visualisation of Descartes’ theory of refraction. Note that the video violates a central principle of Descartes’ philosophy by colouring the particles at a micro level. For more interactive demos see the project Dynamic Drawings: <http://demo-brill.dans.knaw.nl/project.html>. Other examples illustrate the use of the astrolabe and triangulation.

Thirdly, natural philosophers found new, more active ways of investigating nature. Rather than passively observing nature, seventeenth-century natural philosophers began to experiment on nature. Aristotle’s view of nature as the internal principle of motion of things excludes external intervention as a means of investigation. In a mechanical universe Aristotle’s distinctions between natural and violent motion no longer made sense; consequently there is nothing illegitimate about experimentation. In addition, Bacon famously criticized Aristotle’s use of syllogistic logic. Natural knowledge should be constructed from the ground up, on the basis of discrete empirical facts, not on supposedly self-evident universal principles and deductive reasoning. The Royal Society and the *Académie des Sciences* were based on a Baconian foundation.[[3]](#footnote-3)

Fourthly, a key-component or perhaps even one of the causes of the Scientific Revolution was the Copernican Revolution. In 1543 Copernicus’ *De Revolutionibus* was published. This book placed the sun rather than the earth in the centre of the universe. Its ultimate implications, of which Copernicus was only dimly aware, were radical. It signalled the collapse of Aristotle’s cosmology and physics. Aristotle made a distinction between the physics of the sublunar and the supralunar sphere. This distinction fell to pieces once the earth became a celestial body itself. As long as there was no new physics to explain why we don’t notice the diurnal and annual rotation of the earth, however, Copernicanism was hardly a viable philosophy. This is just what Galileo Galilei new theory of motion provided.[[4]](#footnote-4)

Now that we have a general picture of what the rejection of Aristotelian thought entailed, we may ask: what light does the ePistolarium shed on this development? To what degree can it be traced in the digital archive? An obvious approach to these questions, is to investigate the ways in which scholars talked about Aristotle in their letters. The major benefit is that it allows for the use of simple and clear search operations.

2. *Full text search*: ‘Aristoteles’

If you search for ‘Aristoteles’ (Dutch for Aristotle) you will get 98 hits.

**Q1: can you think of a more inclusive way of searching for Aristotle?**

Who wrote these letters? The fastest way to get a picture of this, is via *Visualization* → *Correspondent network*. This results in the following visualisation:



Figure 2: correspondent network search ‘Aristoteles’.

The size of the name is an indication of the number of letters written by this author. Lines show correspondence between individuals.

**Q2: which of these names did you expect? which do you find surprising? try to explain the surprising results.**

Apparently, Aristotle is much talked about in the correspondence between Hugo de Groot and Niclaas Reigersberch. Contrary to what you might have expected, their names are much more prominent than those of natural philosophers such as René Descartes and Christiaan Huygens. The latter is even conspicuously absent from the visualisation. There is no letter to or from Christiaan Huygens in which ‘Aristoteles’ is mentioned. A first search immediately yields remarkable results! Before any conclusions can be drawn, however, the letters should be subject to closer investigation.

3. Aristotle and the natural philosophers

Exercise 1: investigate the correspondence between Hugo de Groot and Nicolaas van Reigersberch.

The largest share of the letters in which ‘Aristoteles’ is mentioned, 43 out of 98, consists of the correspondence between Hugo de Groot and Nicolaas van Reigersberch. This is a surprising result. At first sight you may expect that a closer investigation of these letters will lead to new insights in the place of Aristotle in the Dutch Republic of Letters. In this exercise you will explore the correspondence between Hugo de Groot and Nicolaas van Reigersberch.

You can find the letters between Hugo de Groot and Nicolaas van Reigersberch simply by scrolling within the *Result List*. But if you want to study them in separation, you need to isolate them.

1. Isolate the correspondence between De Groot and Van Reigersberch, using *senders* and/or *recipients*.

2. Before studying the individual letters, collect information about the correspondence using only the tools in the ePistolarium such as the *Geographical Map* under *Visualization*.

Now turn to the letters, starting with the first one dated 1635-02-12.

3. Try to make sense of the references to Aristotle in the correspondence. Use resources from outside the ePistolarium, such as www.dnbl.org, if needed.

4. What does the case of De Groot and Van Reigersberch teach us about the place of Aristotle in the Dutch Republic of Letters?

5. How does this case illustrate some of the limits and pitfalls of research in the ePistolarium? Do you think these limits apply to all research in the digital humanities?

The search for ‘Aristoteles’ initially yielded some surprising results. Whereas De Groot and Van Reigersberch were very prominent, Christiaan Huygens was notably absent from the correspondent network. Other well-known natural philosophers of the Scientific Revolution were missing too. To analyse the image of Aristotle among natural philosophers, two things need to be done.

First, interfering or irrelevant letters have to be excluded. Earlier we isolated the correspondence of De Groot and Van Reigersberch. Now we include all recipients and senders except De Groot and Van Reigersberch. Only 44 result remain. Caspar Barlaeus is now by far the most prominent scholar in the correspondent network.

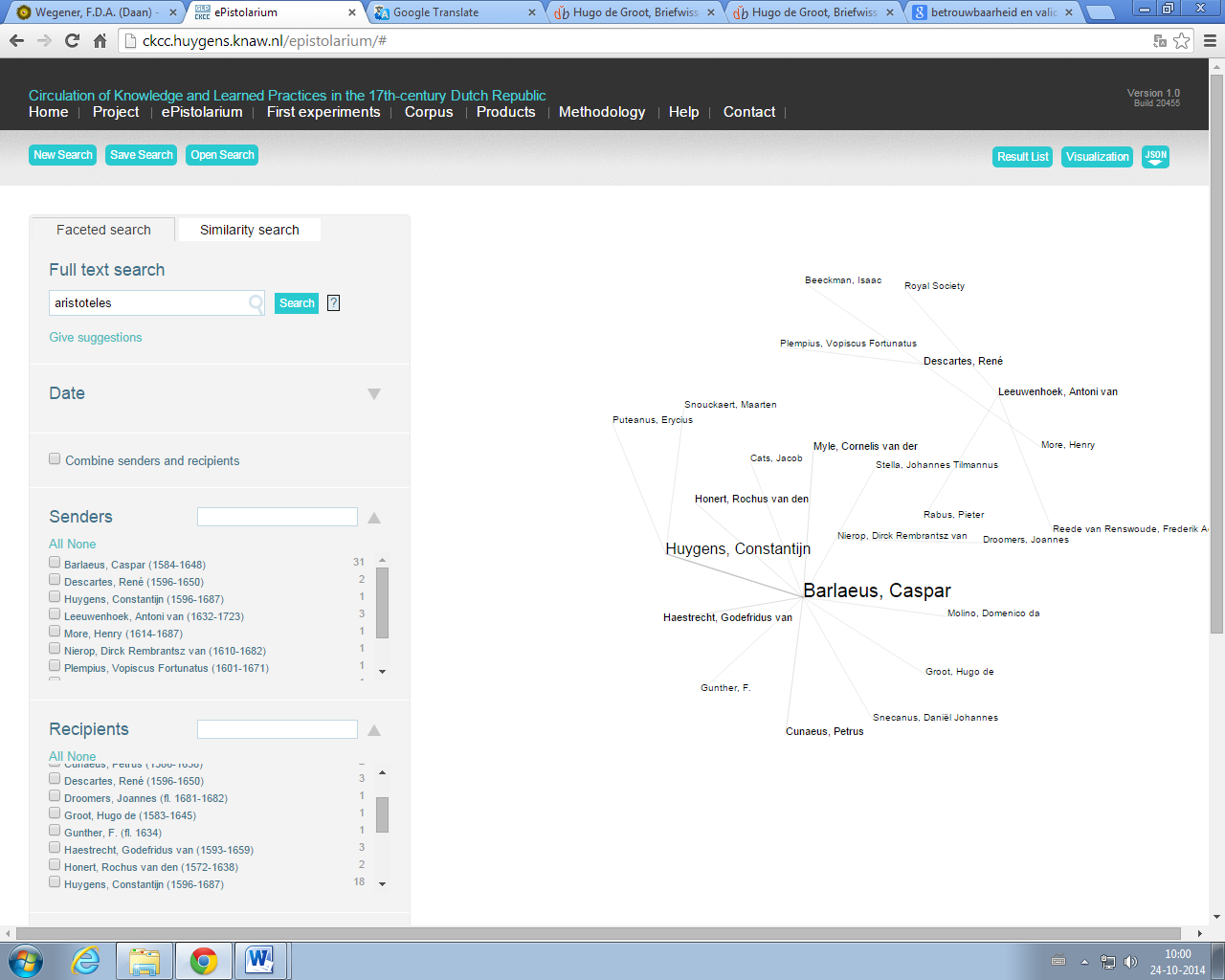


Figure 3: correspondent network search ‘Aristoteles’, excluding De Groot and Van Reigersberch.

But Barlaeus was more a humanist, a man of letters, than a natural philosopher. So he would refer to Aristotle’s *Ethics* or *Poetics* instead of the *Physics* or *Posterior Analytics*.[[5]](#footnote-5) For our present purposes it seems legitimate, therefore, to exclude Barlaeus’ correspondence too. But now only 22 letters remain!

Second, the search operation has to become more inclusive. The letters in the ePistolarium were written in many languages, Dutch being only one of them (and coded language another). So one option is to search for Aristoteles Aristotle Aristote. This is the same as a search for Aristoteles OR Aristotle OR Aristote. It is less laborious to search directly for *named persons* ‘Aristotle’! This will safe you the trouble of different languages. Yet in both cases, your search will exclude results like ‘Aristoteliciens’. A full text search for Aristot\*, which comes down to all words starting with Aristot will also include those references. This leads to 85 hits and the following correspondent network.

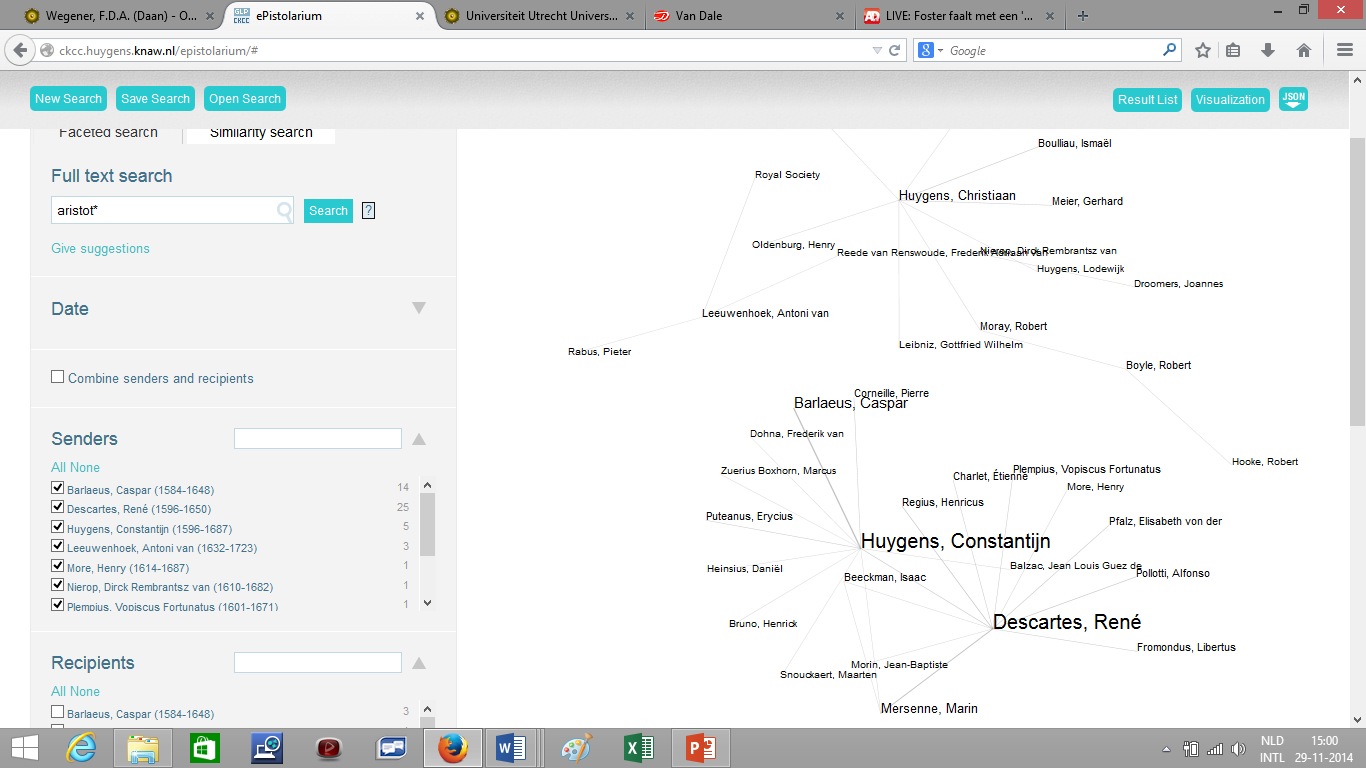


Figure 4: search for Aristot\*, excluding the correspondence of De Groot and Barlaeus.

**Q3: explain the presence of Caspar Barlaeus in the results and comment on our earlier decision to exclude him from the search. To what degree is it legitimate to adjust your search until you get the desired (or expected) results?**

Earlier, we were surprised by the small place of René Descartes and the absence of Christiaan Huygens. A few minor alterations in the search can have major effects on the results. Descartes is now one of the focal points. The obvious reason for this change is that Descartes and Huygens mostly wrote their letters in French and thus spoke of ‘Aristote’.

The correspondence network almost reads like a who’s who from the Scientific Revolution. The fact that all these men and women mentioned Aristotle[[6]](#footnote-6) in their letters confirms the view that he did play an important (though not necessarily positive) role in this period. Of course, this is nothing new.

Exercise 2: exploring the correspondent network

The correspondent network is particularly useful as a heuristic instrument in historical research. Try the following step-by-step approach.

1. Make a list of the persons you already know and recall what you know about them. What could be their connection to Aristotle?

The ePistolarium is particularly useful to find more obscure persons that have not been studied much in the historical literature.

2. Make a list of at least five persons you don’t know. Find information about them. What could be their connection to Aristotle?

Now study content of the letters.

3. To what degree were your expectations confirmed or contradicted?

Now focus especially on one or two of the obscure or surprising references.

4. In relation to which issues is reference made to Aristotle? Try to find more information about these issues until you fully understand the meaning of the reference. This is a sure way to enrich your understanding, not only of the seventeenth-century image of Aristotle, but also of the debates within and preoccupations of the Republic of Letters.

A word cloud may also help you visualize Aristotle’s image in the Republic of Letters.

5. Make a document in which you put all the *phrases* in which Aristotle’s name is mentioned. Then make a word cloud using a site like <http://www.wordle.net/> Which words, or kinds of words, are commonly used in relation to Aristotle? It may be convenient to focus on one language at a time.

The correspondent network also shows that not all networks are connected. Leeuwenshoek’s correspondence with the Royal Society, and Dirck Rembrantsz van Nierop’s correspondence with Joannes Droomers are separated from the central network surrounding Descartes. In addition there is a large network surrounding Christiaan Huygens. It is likely that the separate parts of the network reveal different images of Aristotle. To be sure of this, one has to look at the individual letters, but the correspondent network draws attention to it.

The correspondent network does not say much about the image of Aristotle in the Republic of Letters. In the end, you will have to consult the individual letters, but there are other options too. By exporting texts from the ePistolarium, you can create word clouds for example. Working within the ePistolarium, the *cocitation graph* gives an image of the names that are frequently mentioned in the letters. Proximity of names indicates that they are mentioned together.

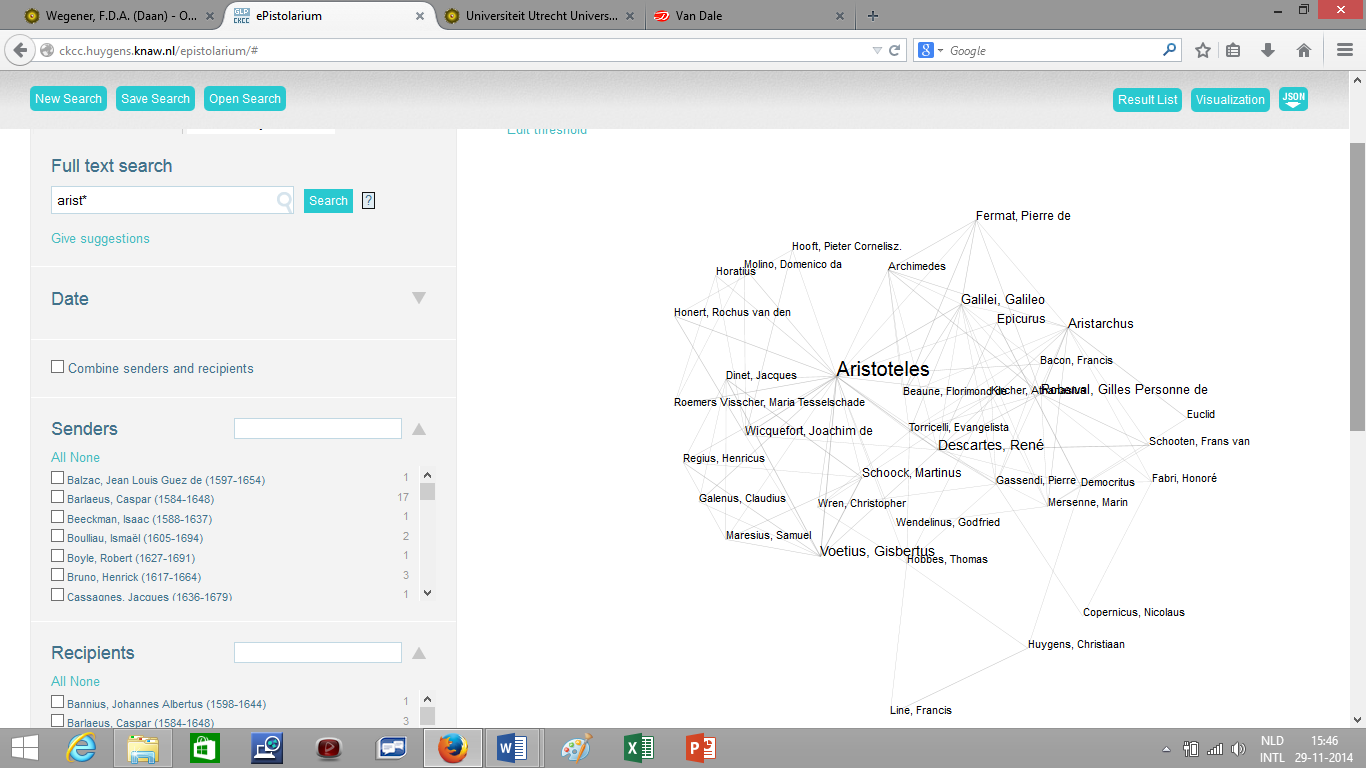


Figure 5: cocitation graph search ‘Aristot\*’, excluding the correspondence of De Groot and Barlaeus.

The cocitation graph will quickly get cluttered. In the figure, ‘151 names have been hidden in order to ensure the graph’s clarity.’ Some names are unreadable just the same. Fortunately, the threshold can be edited at will.

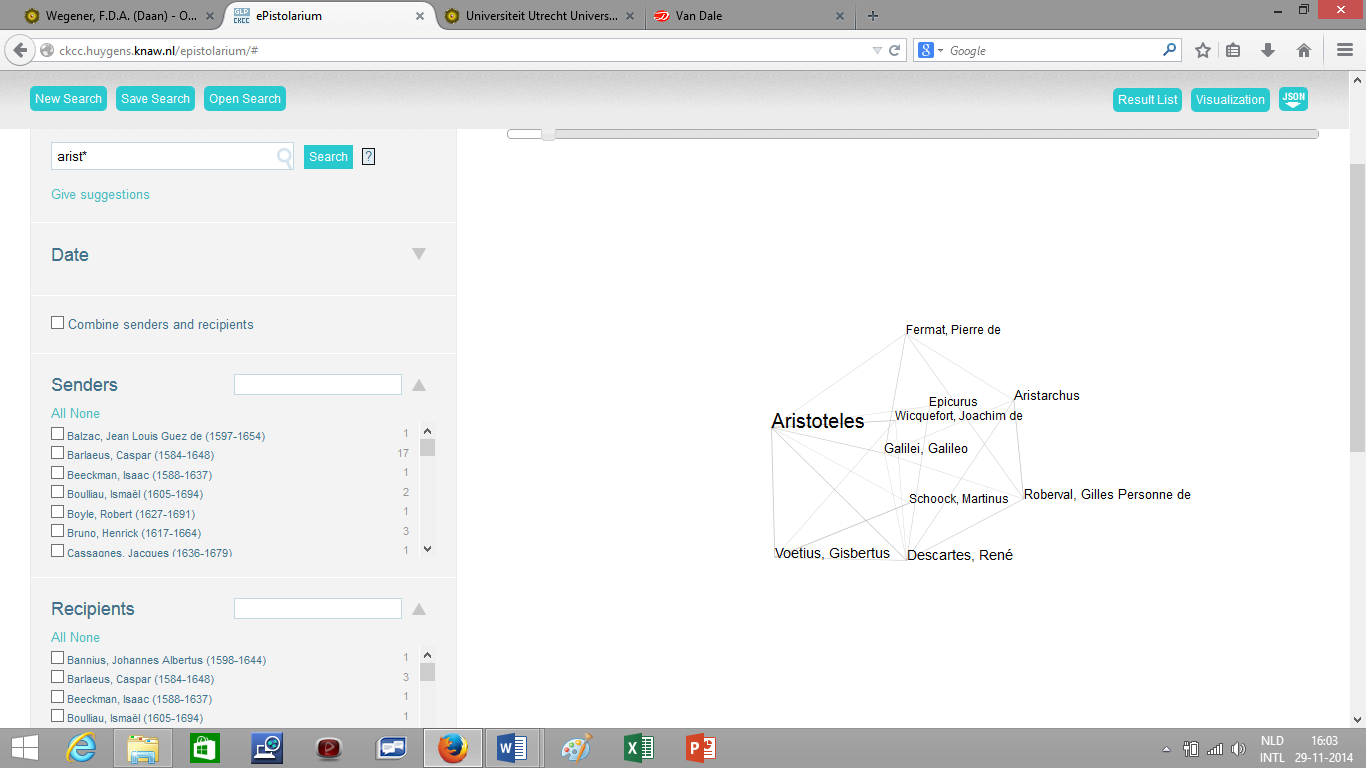


Figure 6: *cocitation graph* search ‘Aristot\*’, excluding the correspondence of Hugo de Groot and Barlaeus. Threshold edited to a maximum of 10 persons on display.

It is good to dwell upon the pros and cons of the two visualisations. A high threshold produces an orderly image with clear and distinct names. One could argue that the most important individuals remain, assuming that frequent reference indicates importance. At the same time, much information is also lost. Not only do you lose many obscure scholars, but ‘big names’ such as Nicolas Copernicus and Francis Bacon are gone too. Which version is better?

That depends on what you want to know. To interpret the visualisation some background knowledge is necessary. On the basis of secondary literature one would expect to see two things. In the first place, one would expect that Aristotle is discussed across the entire field of knowledge. Aristotle’s philosophy was comprehensive. In the Middle Ages, it formed the basis of the university curriculum. His influence was felt in all disciplines. Consequently, the rejection of his philosophy was not piecemeal but wholesale. Secondly, one would expect much discussion surrounding Descartes. After all, his all-inclusive ‘mechanical philosophy’ aimed to dethrone and replace Aristotle’s worldview. His *Discours de la Méthode* (1637) sparked a major controversy on the continent. These characteristics can be recognized in the visualizations. The first points to the general image, the second to the central controversy.

4. Conclusion

How can ePistolarium help you get started with your research? Some knowledge of the seventeenth-century background is vital to come up with research questions, to avoid pitfalls, and to interpret results. Especially at the first stages of an investigation there are numerous pitfalls. Even the results of a simple search like ‘Aristoteles’ – a unique name, which refers to only one individual – cannot be trusted before the letters have been studied (exercise 1). Furthermore, initial results may be disappointing if you don’t know how to search effectively. It is important to find search terms that are both inclusive and discriminating. Once such obstacles have been overcome, the ePistolarium can help you get off to a flying start (exercise 2). This case study has been strictly limited the initial stages of research and has not investigated developments over time. This is done in the second case study on René Descartes: the linchpin of the correspondent network and a controversial philosopher. How did he acquire this place in the Republic of Letters?

1. The body of literature on the subject is enormous. For an introduction to the subject see e.g. P. Dear, *Revolutionizing the Sciences. European Knowledge and its Ambitions 1500-1700* (Basingstoke 2001). For an accessible collection of articles, see: M. Hellyer (ed.), *The Scientific Revolution*. *The Essential Readings* (Malden 2003). For a comprehensive historiographical overview of the Scientific Revolution until 1990, see: F. Cohen, *The Scientific Revolution. A Historiographical* *Inquiry* (Chicago 1994). Although historians have questioned the usefulness of the term, it seems indispensable. S. Shapin, *The Scientific Revolution* (Chicago 1996): ‘There was no such thing as a scientific revolution and this is a book about it.’ [↑](#footnote-ref-1)
2. P. Dear, *Discipline and experience*. *The Mathematical Way in the Scientific Revolution* (Chicago 1995). [↑](#footnote-ref-2)
3. S. Shapin and S. Schaffer, *Leviathan and the Air-Pump. Hobbes, Boyle and the Experimental Life* (Princeton 1985). [↑](#footnote-ref-3)
4. T. Kuhn, *The Copernican Revolution*. *Planetary Astronomy in the Development of Western Thought* (London 1957). [↑](#footnote-ref-4)
5. T. Kuhn, *The Copernican Revolution. Planetary Astronomy in the Development of Western Thought* (London 1985) 127. P. Dear, *Revolutionizing the Sciences. European Knowledge and its Ambitions, 1500-1700* (London 2001) 30-33. [↑](#footnote-ref-5)
6. Assuming that the term Aristotle is indeed used to designate the philosopher and not something of someone else. This assumption, though natural, can be misleading. [↑](#footnote-ref-6)