The structure and dynamics of scholarly networks between the Dutch Republic and the Grand Duchy of Tuscany in the 17th century

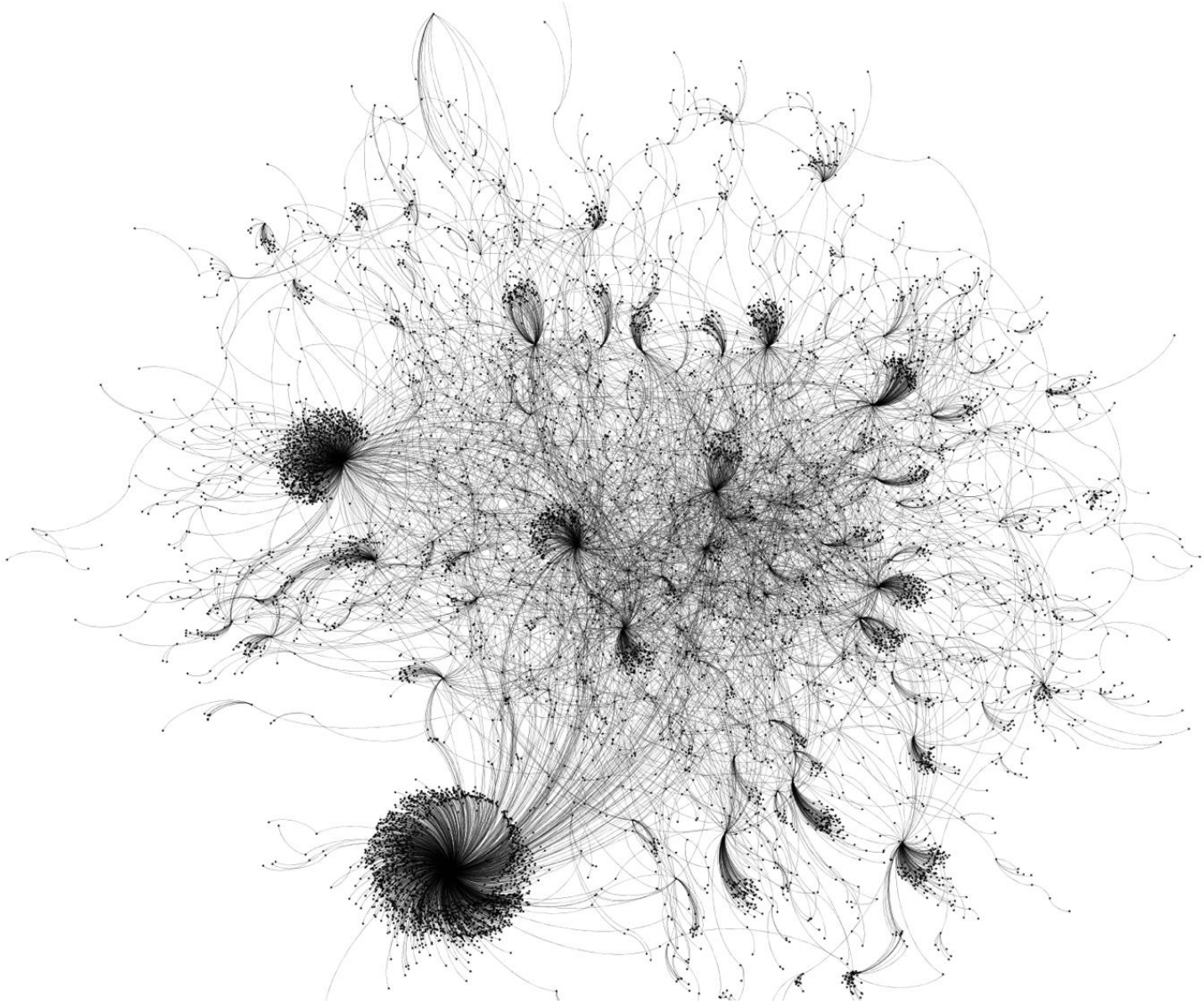
van Vugt, I.

Publication date
2019

Document Version
Other version

License
Other

The structure and dynamics of scholarly networks between the Dutch Republic and the Grand Duchy of Tuscany in the 17th century



Ingeborg van Vugt

The structure and dynamics of scholarly networks between the Dutch Republic and the Grand Duchy of Tuscany in the 17th century

ACADEMISCH PROEFSCHRIFT
ter verkrijging van de graad van doctor
aan de Universiteit van Amsterdam
op gezag van de Rector Magnificus
prof. dr. ir. K.I.J. Maex
ten overstaan van een door het College voor Promoties ingestelde commissie,
in het openbaar te verdedigen in de Sala degli Stemmi, Palazzo della Carovana (Pisa, Italië)
op woensdag 29 mei 2019, te 10.00 uur

door Ingeborg van Vugt
geboren te Schiedam

PROMOTIECOMMISSIE

Promotores:	prof. dr. C.M.J.M. van den Heuvel	Universiteit van Amsterdam
	prof. dr. S. Pastore	Scuola Normale Superiore di Pisa
Copromotor:	prof. dr. J.J. Noordegraaf	Universiteit van Amsterdam
Overige leden:	dr. D.H. van Netten	Universiteit van Amsterdam
	prof. dr. I. van Renswoude	Universiteit van Amsterdam
	dr. L. Simonutti	Consiglio Nazionale delle Ricerche
	prof. dr. F. Benigno	Scuola Normale Superiore di Pisa
	prof. dr. G. Caravale	Università degli Studi Roma III
Faculteit	Faculteit der Geesteswetenschappen	

Dit proefschrift is tot stand gekomen binnen een samenwerkingsverband tussen de Universiteit van Amsterdam en de Scuola Normale Superiore met als doel het behalen van een gezamenlijk doctoraat. Het proefschrift is voorbereid in de Faculteit der Geesteswetenschappen van de Universiteit van Amsterdam en de Facoltà di Scienze Umane van de Scuola Normale Superiore.

This thesis was prepared within the partnership between the University of Amsterdam and the Scuola Normale Superiore with the purpose of obtaining a joint doctorate degree. The thesis was prepared in the Faculty of Humanities at the University of Amsterdam and in the Facoltà di Scienze Umane at the Scuola Normale Superiore.

Contents

Abbreviations

ASCH	Private Archives of the noble Dutch family Van Asch van Wijck, Prattenburg
ASF	Archivio di Stato di Firenze
BNCF	Biblioteca Nazionale Centrale di Firenze
BML	Biblioteca Medicea Laurenziana, Florence
BNF	Bibliothèque Nationale de France
CCF	Catalogo dei Carteggi - Firenze, Card Catalogue of the National Library of Florence
COR	Biblioteca Corsiniana, Rome
KB	Koninklijke Bibliotheek, National Library of the Netherlands
KNIR	Koninklijk Nederlands Instituut Rome
LMU	Ludwig Maximilian University Library, Munich
MdP	Mediceo del Principato, part of the Medici Archives in the State Archive of Florence
MM	Miscellanea Medicea, part of the Medici Archives in the State Archive of Florence
MOR	Biblioteca Moreniana, Florence
MPM	Museum Plantin-Moretus Archive, Antwerp
NA	National Archives of the Netherlands
NIKI	Nederlands Interuniversitair Kunsthistorisch Instituut, Florence
RIC	Biblioteca Riccardiana, Florence
UBA	Universiteitsbibliotheek Amsterdam
UBL	Universiteitsbibliotheek Leiden
UBU	Universiteitsbibliotheek Utrecht

Acknowledgements

This dissertation could not have been written without the help of many people and institutions. First of all, I am particularly grateful to my supervisors, Stefania Pastore, professor of Early Modern History at the Scuola Normale Superiore in Pisa, and Charles van den Heuvel, professor of Digital methods in historical disciplines at the University of Amsterdam, for their detailed and invaluable comments on my drafts. My special thanks are extended to my co-supervisor, Julia Noordegraaf, professor of Digital Heritage at the University of Amsterdam.

This study travelled with me across three continents. In writing it, therefore, I have met many scholars that have enriched my knowledge and helped me along the way. Many thanks go to the team of researchers of the *Six Degrees of Francis Bacon project* at the Carnegie Mellon University, where I spent three months in 2017 as a visiting scholar. I would like to mention one in particular, Scott Weingart, whose expertise enhanced my understanding of network theory. At the University of Pittsburgh, I came into contact with Matthew L. Lavin, to whom I am most grateful for his help in writing a script that sorted out the desired data from the messy *Catalogus Epistularum Neerlandicarum*. Another American experience has significantly contributed to my research. In 2017, I had the opportunity to participate at a research summit on network analysis in Washington DC: "Early Modern Digital Agendas: Advanced Topics" which was funded by the Institute for Advanced Topics in the Digital Humanities grant from the NEH's Office of Digital Humanities. This meeting led to inspiring conversations with scholars in a range of disciplines, and I am particularly grateful to Owen Williams, for welcoming all of us so warmly at the Folger Institute. Many thanks to Sebastian Ahnert for his help in creating an algorithm for my balance theory, and for patiently answering ad hoc emails to debug all possible errors in my python script. I am further indebted to Marie Alice Bell, Thea Lindquist, Rebecca Emmett, Matthew Symonds and Tara Wood for providing delightful social and intellectual companionship during my time at the Folger Institute.

I have greatly benefited from participating in the Huygens Institute for the History of the Netherlands in Amsterdam. I would like to express my appreciation for the interest of Steven Surdèl, whose enthusiasm for the Italian culture was contagious and it was a true pleasure to listen to his stories. The stimulating and pleasant environment of the Huygens Institute broadened my horizon, and I am indebted to Jan Bloemendaal, Eric Jorink and Huib Zuidervaart for sharing their expertise. Special thanks go to Ad Leerintveld, who kindly provided me with access to the xml files of the *Catalogus Epistularum Neerlandicarum* of the Royal Dutch Library of the Hague, which allowed me to crawl the records looking for all letters in the collections of the Netherlands. Moreover, I would like to thank Alan Moss for sharing without hesitation two unedited letters of Antonio Magliabechi in the private archives of the noble Dutch family Van Asch van Wijck, as well as Koen Scholten who generously provided me with several beautiful passages on Magliabechi in Kool's travel account. A special note goes to Gloria Moorman, with her I share an enthusiasm for everything that can be discovered in Italy and together we endlessly exchange thoughts about our research.

I am infinitely grateful to Pim van Bree and Geert Kessels, developers of the tool Nodegoat, who, over the past years, have received endless emails about any point that might occur to me in the development of my dataset and visualisations. I thank them for their patience and willingness to help me. Furthermore, I would like to thank a number of scholars from different universities for their valuable advice and suggestions: Djoeke van Netten, Dirk van Miert, Jetze Touber, Marten Düring, Matteo Valleriani, Florian Kräutli, Paula Findlen, Marie-Louise Coolahan, Dániel Margócsy, Andrew Pettegree, Jana Kittelman, Anne Purschwitz, Ian Maclean and Tobias Winnerling.

In Italy, I met many scholars, leading to inspiring conversations. I am very much indebted to Francesco Martelli, under whose guidance at the State Archive of Florence I developed a passion for archival research. He might still not know what a favour he did me, but his help gave my research the direction it has today. I would like to thank Maria Pia Paoli for her constant guidance, as well as Jean Boutier, Alessio Assonitis and Stefano Villani for their helpful suggestions.

Never could I have finished this dissertation without my friends and family. I thank my parents who both always showed up to wave me goodbye whenever I went to Italy, helped me to move from the Netherlands to Italy and back again. They have continuously supported my plans and journeys enthusiastically and always believed in me, even when I did not. In that regard, I would also like to mention my brother Jos, Ingrid and Lise. Thank you for visiting me during my time in Pisa and making my absence from home easier through the many videocalls with little Lise. A better group of friends in the Netherlands is hardly imaginable. I sincerely thank Esther, Tanitha, Claire, Ilse and Nicole for your friendship despite the distance that often separated us. I owe a special thanks to my Italian family, for all their kindness and hospitality. Bianca, Luigi and Luca, you made Puglia my second home. Last but not least, I wholeheartedly thank Paolo Rossini for his unconditional support. We went through this PhD journey together and you were with me all the way.

Glossary of network analysis terms

This glossary is partly compiled in conjunction with the Early Modern Digital Agendas: Network Analysis institute in July 2017 at the Folger Institute in Washington DC, a research summit on the use of network analysis in the historical field. The glossary below aims to understand the terms used in the context of this study.[1]

Bipartite (also bimodal) network
A network of two node types in which connections are only between nodes of different types. One can perform a projection on a bipartite network.

Centrality of a node
A numerical measurement of importance of a node. Degree is a simple example. Four types of centrality: 1) Degree Centrality; 2) Closeness Centrality; 3) Betweenness Centrality; 4) Eigenvector Centrality.

Degree centrality – hubs
Number of connections a node has. A node with a high degree centrality has many connections (edges): a hub.

Closeness centrality
Closeness Centrality measures the proximity of a selected node to all other nodes within the graph.

Betweenness centrality - brokers
The number of "shortest paths" in the network that flow through a node or edge. To what degree a node provides a bridge to other nodes. A node X has a high betweenness centrality if the shortest path from Y to Z is through X. Nodes with a high betweenness centrality can also be thought as brokers.

Eigenvector centrality
Eigenvector centrality measures "the influence of a particular node by the connectedness of its closest neighbors. This can be thought of as the who you know type of centrality, wherein an individual node might not be thought of as important on its own, but its relationship to other highly connected nodes indicates a high level of influence. As Stephen Borgatti puts it: "the idea is that even if a node influences just one other node, who subsequently influences many other nodes (who themselves influence still more others), then the first node in that chain is highly influential" (Stephen P. Borgatti, 'Centrality and Network Flow', *Social Networks* 27 (2005), 61).

Cascade effect
A cascade has the potential to occur when people make decisions sequentially, with later people watching the actions of earlier people and from these actions inferring something about what the earlier people know. A cascade thus develops when people abandon their own information in favor of inferences based on earlier people's actions.

[1] https://folgerpedia.folger.edu/Glossary_of_network_analysis_terms, last accessed 1 April 2019.

Cliques
Cliques (or clusters) represent segments of the networks that are more tightly knit in their connections to one another, and more limited in their connections to other components of the network.

Clustering Coefficient
The clustering coefficient is a measure of the degree to which nodes in a graph tend to cluster together. It is often used to indicate the presence of Triadic closure. Duncan J. Watts and Steven Strogatz introduced the measure in 1998 to determine whether a graph is a small-world network.

Component
A connected part of the network. Networks often consist of multiple disconnected components.

CSV files
Comma separated values files allow data to be saved in a table structured format. CSVs look like a garden-variety spreadsheet but with a .csv extension (Traditionally they take the form of a text file containing information separated by commas, hence the name).

Degree (of a node)
The number of edges connected to a node. Variants include in-degree/out-degree, which counts the number of ingoing and outgoing edges in a directed network. Sometimes indicated by the size of the sphere representing the node. Also called degree centrality.

Density
Density (or cohesion) is a measurement of the number of edges across the network, which relate to its stability and facilitation of information flow.

Diameter (of a network)
The largest shortest path length.

Dyad
Two nodes, usually connected by an edge.

Edge
Connections, link, or ties between nodes.

Ego Network
A network focused around one central node. A classic example is a correspondence network derived from the collected letters of a single individual.

Homophily
The tendency of nodes to become connected to other nodes that are similar under a certain definition of similarity.

Multimodal network
A network consisting of multiple types of nodes. Whereas the sociologist can work with complete unimodal or otherwise bimodal networks, the historian has to rely on the availability of the past. This

means that every piece of evidence that has come down to us needs to be included to interpret relations in the past: letters, books, persons, memberships, journals and so forth. This leads to a range of different kinds of nodes and links: the multimodal network emerges.

Node
Sometimes called a "vector" because it marks the intersection of lines, and sometimes called an actor, nodes are the elements of a network that are being connected.

Projection (of a bimodal network)
Transformation of a bimodal network into a weighted network of just one of the two original node types in which the weight of the connection is the number of shared neighbors in the bipartite network. When you project a bipartite network, in other words, you transform one of the node types into an edge: instead of two people nodes being connected to a place, they are connected to each other, and the place becomes the edge connecting them.

Power law or scale-free degree distribution
Intuitively one might expect the degree distribution in a network to follow a bell curve, which is more formally described as a normal (or Gaussian) distribution: a large rounded peak tapering away rapidly on each side. A simple probability distribution that resembles a bell curve or normal distribution is the roll of two dice. The distribution is centered around the number 7 and the probability decreases as you move away from the center on either side. A power-law distribution, by contrast has no peak; instead it decreases continuously and rapidly for increasing degrees. In fact the distribution of the data points within a power-law distribution is so broad across several orders of magnitude that it is normally plotted on logarithmic axes. On these axes a power law distribution appears as a straight diagonal line, which means that the shape of the distribution is the same for high and low degrees, resulting in what is known as a scale-free degree distribution. Whether we look at the network as a whole, or at a specific region, due to the scale-free distribution we will always find a few relatively well-connected nodes or "hubs", and a much larger number of nodes with a relatively small number of connections compared to the hubs. A wide range of networks have been shown to exhibit this property, including power grids, social networks, and the world-wide web.

Shortest path
The fewest number of steps between two nodes in the network.

Signed Graph
A signed graph is a network in which every edge is designated to be either positive or negative. These edges are also called signed edges. This type of graph is essential in the structural balance theory.

Small-world
The "small-world hypothesis", first developed by Duncan J. Watts and Steven Strogatz, expresses the idea that every individual in a given population can reach every other via some "short" chain of intermediaries.

Structural balance theory
The principles underlying structural balance are based on theories in social psychology dating back to the work of Heider in the 1940s and generalized and extended to the language of graphs beginning with the

work of Cartwright and Harary in the 1950s. Structural balance theory attends to a group's network of negative (-) and positive (+) sentiments and posits that this network alters over time toward particular structural forms of balance. Using the term "friend" to designate a positive sentiment and the term "enemy" to designate a negative sentiment, the classic balance model defines a sentiment network as follows: + + + (balanced); + + - (unbalanced); + - - (balanced); - - - (unbalanced/balanced).

Transitivity

Transitivity of a relation means that when there is an edge from *x* to *y,* and also from *y* to z then there is also a tie from *x* to *z* (friends of my friends are friends) Transitivity depends thus on triads.

Triad

Three nodes connected by an edge.

Triadic Closure

Triadic closure is a measure of the tendency of edges in a graph to form triads. The basic principle of triadic closure is that if two people in a social network have a friend in common, then there is an increased likelihood that they will become friends themselves at some point in the future.

Unipartite or unimodal network

A network of just one node type, in contrast to a bipartite network. Networks are typically unipartite. In a social network, such as the epistolary community of the Republic of Letters, correspondents are the nodes, and the relationships linking them are the edges.