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JEROME'S CORPUS OF LETTERS AND NETWORK ANALYSIS*

Andra Jugănaru

Abstract

In recent decades, network analysis has gained significant popularity as a methodological approach among scholars. This paper focuses on the letter collection of Jerome of Stridon (ca. 347-420 AD) and employs network theory and specialized software for network analysis. The objective is twofold: to uncover statistical insights and to provide interpretations of different facets, including the actors' roles, the most influential figures within the network, and the patterns of letter usage. Additionally, the paper presents visual representations of the network.

Keywords: Jerome, letters, letter collection, network analysis, UCI.NET

In the past decades, two areas of research have triggered increasing attention from scholars. Substantial studies in epistolography, focusing on Late Antique letters and letter collections have been published, mostly in English. In addition, lately scholars have been applying to historical studies a variety of methods and tools belonging to network analysis. They have also developed new platforms and pieces of software which allow one to collect data related to letters. The present paper finds itself at the confluence of these two disciplines. In its first part, I will present some theoretical considerations on the use of network theory in (late antique) epistolography. In the second part, I will present the letter collection of Jerome (ca. 347-420 AD), as it has been transmitted to us, and I will explain the results provided by the use of the aforementioned methodology.

1. Late antique epistolography and network analysis

The term "network" has become more and more often used by historians in studies trying to explain relations among people and communities. Among its various approaches, one can observe a special interest for social networks. Without doubts, the multidisciplinary approach, consisting in using both quantitative tools of structural analysis (in other words, notions and algorithms of Mathematics) and qualitative methods of historical studies has provided promising results.

It is worth presenting the most representative publications. In 1997, Margaret Mullet initiated the study of the practice of letter writing in Byzantium with the help of network analysis. For the 135 letters of the Metropolitan Theophylact of Ohrid, she establishes "order zones" of relations, she classifies typologies of relations, and she provides visualizations.[1] Almost a decade later, Adam Shor analyzed the social network of Bishop Theodoret of Cyrus, relying on his letter collection.[2] More recently, Daniel Knox applied network analysis to the letter collection of Bishop Ennodius of Pavia in his Master thesis as well as in a series of articles.[3] In 2020, *A Companion to Byzantine Epistolography*, edited by Alexander Riehle, includes a comprehensive study of Johannes Preiser-Kapeller, the leading expert on network analysis applied to historical studied, on "Letters and Network Analysis".[4] Johannes Preiser-Kapeller is also the author of numerous other articles in which he explains at large various approaches of network theory, methods, and tools to different research problems of historical studies, such as commerce, episcopal networks, or climate changes, to quote just a few.[5] Mikael Papadimitriou is in the process of developing an impressive project on mapping the social network of the famous rhetorician Libanius, based on his immense corpus of 1544 letters.[6] The present author has also published preliminary results provided by network analysis applied to the letters of the three Cappadocian Fathers.[7]

Scholars have shown that network analysis in historical studies reveal not only the types and strength of relations between individuals, but it can also assess how these ties evolve and what role each actor plays within the network. As Johannes Preiser-Kapeller explains: "One central aim of network analysis is the identification of these structures of social relations which emerge from the sum of interactions and connections between individuals within a group or society and at the same time influence the scope of the actions of everyone entangled in such relations."[8]

Thus, what network analysis does is to collect "categories, intensity, frequency and dynamics of interactions and relations between individuals in a way which allows for further mathematical analysis."[9]

The rationale for adopting this approach is well explained in the introduction provided by Borgatti et al., in their work titled *Understanding Social Networks*. According to the authors, social networks offer a conceptual framework for analyzing the interrelationships among the elements of a social system. They refer to these elements as "actors" or "nodes".[10]

Methodology

In this section, I will explain the methodology used for the current research. In the following analysis, I will use the so-called "adjacency matrix" in order to formalize the existence of a connection between two actors. Thus, actors are the vertices of this matrix. Each node possesses certain attributes. The connections between the actors, called "ties," "links," or "edges," also possess attributes. In this context, the strength of a tie characterizes the number of letters exchanged between two actors. The depiction of a collection of nodes and ties is commonly known as a graph. Given that the terms vertices, nodes, and edges are not particularly suitable when discussing networks in which individual persons or communities are involved, scholars employ a unique terminology compared to other situations of network analysis. Thus, the term "actors" is preferred instead of vertices. Since the present study revolves around human subjects and adopts social network methodologies, I will consistently use the terms "actors" and "ties" throughout. The actors of the network under scrutiny represent either individuals, or groups of people (communities) encountered in the correspondence of Jerome. The ties represent epistolary or social interactions between the actors. In general, ties can represent relationships between actors of a network.

Two other parameters characterize social situations. *Attribute data* pertain to the: "attitudes, opinions and behavior of agents [actors] so far as these are regarded as the properties, qualities or characteristics that belong to them as individuals or groups." *Relational data* codify relationships, contacts, and interactions between actors and are represented by ties.[11]

All data is collected in matrices, from which graphs are drawn. The graphs are not only used for visualizing networks, but also for implementing mathematical operations on them, from graph theory and matrix algebra.

Social network analysis, in fact, first developed within the research field of sociology and scholars have used increasingly difficult mathematical operations for the analysis of large-scale networks.[12] In the following, I will present some basic tools, which I am using for the analysis of the letter collection of Jerome.

For this particular case, from the various approaches for network delimitation, I will be using the "ego-network." More precisely, I am surveying Jerome's collection of letters, gathering in a database data about the individuals or communities mentioned there (either addressees, or referred to – which I call "third parties"), about the chronology (whenever a chronological delimitation is possible), and about the localities (whenever there is evidence for them). The so-called "first order zone" includes the addressees of the letters, whereas the third parties form the so-called "second order zone." More approaches for the analysis of "ego-networks" exist.[13]

According to Borgatti's categorization and to the systematization of Johannes Preiser-Kapeller, these phenomena can be classified into four distinct types. The first one refers to "similarities". This category encompasses instances where two nodes share common attributes, such as behaviors, attitudes, beliefs, locations, or group memberships. For example, some actors of Jerome's network share the interest in asceticism. The second category, of "social relations," includes connections based on social ties, such as kinship relations, friendships, and emotional bonds such as "liking," "disliking," or "love," as well as connections based on cognitive awareness, such as "knowing someone." For example, some addressees of Jerome belong to the same families. Some others created ties of friendship. Next, the category of "interactions" comprises "behavior-based ties" that occur within the context of social relations. Borgatti characterizes these interactions as "discrete and separate events that may occur frequently but then stop." He gives as examples conversations or conflicts. These are not going to be part of the present study, because of the limit of space. Finally, the category of "flows" refers to situations in which actors exchange or transfer of resources or information. It also includes transferring influence.[14] In the context of this study, this situation is exemplified by a situation in which an actor recommends another actor.

The context of interactions enables one to consider the so-called "temporality of ties" and the dynamics of a network. Relationships between actors can be established, maintained, strengthened, changed, or terminated. Sources may capture the moment when an individual enters

or exits a network. However, most commonly used network analysis tools tend to focus on static models. Nonetheless, it is still possible to model temporal dynamics by assessing networks at different chronological intervals, using key moments or the so-called "time slices" that mark the development of the so-called "ego" network.[15] Due to the limitations of this paper, I will use a static model, referring only to two key-moments in Jerome's existence.

Despite the limitations due to the lack of complete information available in the surviving sources (as is the case in this particular study, in which one has to mention from the beginning that it is impossible to state that the letters of Jerome capture indeed all the relations established and maintained by him throughout his life), the relational data that one is able to collect remains significant and relevant.[16] Typically, collections of letters were passed down through one or more "editorial works" – as it will be explained further in this paper – sometimes initiated by the author himself. This indicates the author's discernment in selecting and preserving ties that he deemed significant.[17]

After collecting the data, I used a free piece of software, UCI.NET, since it offers enough tools for conducting a structural analysis of the data. In order to proceed, I used as basis the systematization presented by Johannes Preiser-Kapeller, who refers to three main levels of analysis for the data collected. First, he mentions to "the level of the single nodes." At this level, several measurements are employed. The most significant is the "degree" of a node, which quantifies the number of direct connections it has to other nodes. If the network is "directed", meaning that the direction of the connections is taken into consideration (for example, if a tie exists from actor A to actor B, it marks actor A sending a letter to actor B), then two other parameters can be computed. The "indegree" (or "inner degree") of a node A measures the number of ties linking other actors to actor A. In the context of this study, it represents the number of letters received by actor A. Similarly, the "outdegree" (or outer degree) of a node A represents the number of ties linking actor A to other actors in the network. In other words, in the present study, this measure represents the number of letters that actor A sent to other actors in the network. In the present study, the indegree of the "ego" of the network represents the number of letters received by Jerome. The outdegree of the "ego" represents the number of letters sent by Jerome. The "relative centrality" of a node determines its position along paths connecting otherwise unconnected nodes. The measure called "betweenness" represents the potential for

intermediation. The "eigenvector" measures a node's "centrality" based on its connections to highly "central" nodes. This means that even less well-connected nodes can have "indirect centrality." In the present study, this measure characterizes the actors that are connected to "important" actors in the network. Second, "the level of group of nodes" focuses on analyzing relationships between groups of actors. "Dyads", which are groups of two nodes, can be categorized as "null" if the two actors do not establish a connection. If, on the contrary, there is a connection between them, the tie is characterized as either "directed" or "asymmetric" if there is an interaction from one node to the other, but not necessarily the other way around (for example, Jerome sends a letter to Florentius), or as "symmetric," if the interaction is reciprocated (for example, Jerome and Augustine exchange letters). Dyads are classified as "un-weighted" (codified with the value 0 if there is no tie between the actors, or with any positive value otherwise) or "weighted" (representing the quantity of an interaction, such as the number of letters exchanged between the two actors of a dyad). Scholars also analyze "triads," which are sets of three nodes. The concept of "triadic closure" suggests that if actor A is friend with both actor B and actor C, actors B and C can become friends, due to the actions of actor A. The third level is "the level of the entire network." At this level, the analysis considers the entire network as a whole unit. The "size" of the network represents the number of nodes that comprise it. In the case of Jerome, the "size" represents all the actors involved in his correspondence, including the letter carriers (where data is available) and the actors referred to in the letters as direct acquaintance of Jerome. The "diameter" of the network measures the maximum distance between any two actors, indicating the number of links needed to establish a path between them. The "average distance" or "path" length represents the typical distance between two actors. The "density" of the network indicates the ratio of actual links present in the network compared to all possible links.[18] A higher density indicates a higher level of cohesion within the network.[19]

To create the graphical representation of the network, I used the "affiliation matrix" which I constructed based on the data collected from the letters. This matrix is a square matrix, meaning that it has equal numbers of rows and columns. Each axis of it contains the names of individuals or communities involved in Jerome's letters. The matrix encodes the affiliations shared among actors and does not measure the qualities of the actors.[20] As the ties between actors are not reciprocated, the graph

representing the network is oriented, meaning that the direction of a tie from one actor to another is significant.

Another way of codifying the ties established in the network is the "edgelist". An edgelist is a collection of pairs of nodes of a network which are connected. Edgelists are especially useful for quantifying the "weight" of a tie. In the context of this study, the weight of a tie represents a number reflecting how strong a connection is between the actors linked by that tie.

Therefore, after introducing the "affiliation matrix" in UCI.NET[21], I also generated edgelists to codify ties. Afterwards, I used the Netdraw tool to generate graphical representations of Jerome's network. I also used the other tools of the application to compute various values of the network.

It is significant to note that in the generated graphs, the length of a tie between actors does not represent a physical distance between them. To enhance clarity in the graphical representation, the position and depiction of graph components can be adjusted using the Netdraw function of UCI.NET. Since some letters do not specify their place of origin, it is not always possible to determine the physical distance between letter senders and addressees, or between addressees and actors mentioned in a letter. Therefore, the physical location of actors is not included in the representation.

Furthermore, the graphs do not depict the chronological span in which the letters were written. Instead, specific graphs can be created for critical years to visualize the temporal evolution of relationships between actors. Due to the limitations of this paper, I will use as a chronological point of reference the year 390, when Jerome had already established himself in Bethlehem.

Regarding the concept of "distance," it refers to the number of ties between two actors, as explained previously. As the number of ties increases, the distance also increases. However, the length of ties in the graph representation does not hold any interpretational significance.

One should emphasize that all the graphs are "single mode" graphs, similar to the affiliation matrices. They visualize a single type of data, namely actors and ties, without comparing their shared qualities.

2. The Letter Collection of Jerome and Network Analysis

Jerome's letters are, as Stefan Rebenich characterizes them, "the finest of Christian antiquity."[22] Andrew Cain even terms this collection of letters,

compared to the other collections of Late Antiquity, as "a luminary among luminaries."[23]

A close examination of the works of Jérôme Labourt, Andrew Cain, and Charles Christopher Mierow[24], allows one to establish some chronological details of the letters in Jerome's collection. The letter collection of Eusebius Hieronymus of Stridon (as this was his complete name) provides enough details about his life, with the exception of his childhood. He was born in Stridon around 347 to a non-aristocratic family. After being educated in his home town, he went to Rome to study. It was there that he was baptized (Pope Liberius may have baptized him) and that he met Rufinus of Aquilea for the first time. Around 367, he and Bonosus, a friend from his childhood, left Rome. Their destinations were Treves (in Gaul) and the Rhine region. It was in Treves that Jerome became acquainted with the monks from Egypt. He also read and copied commentaries of Hilary of Poitiers. Upon returning to Stridon, Jerome got to know a group of ascetics, led by Bishop Valerian. According to the letters, he also had connections with the priest Chromatius, archdeacon Jovinus, and deacon Eusebius (who received from him his *Ep. 7*[25]). The deacon Julian, the addressee of *Ep.* 6, became spiritual father of Jerome's sister. Heliodorus, Bishop of Altinum is the addressee of *Ep.* 14.

Scholars doubts whether *Ep.* 1, was written in Aquileia or in Antioch, which, together with the desert of Chalkis, became the destination of his first journey towards the East. As he confesses, he had to leave Aquileia suddenly, but he does not explain the reasons. Letters from 2 to 9 and from 11 to 17 were in fact written in Antioch or in the desert of Chalkis, where he lived as a hermit for a while. After that, in 379, he went to Constantinople. In the same year, he may have become a priest.

Dating *Ep.* 10 is difficult. If it does not belong to the series of *Ep.* 2-9 and 11-17, another hypothesis is that it was produced after 379, when Jerome was already in Constantinople. Scholars divide *Ep.* 18 into two distinct letters, commonly referred to as *Ep.* 18A and 18B. He might have written both of them in Constantinople. It was there that he met the Cappadocian Fathers still alive at that time (Gregory of Nyssa and Gregory of Nazianzus, as Basil of Caesarea had already passed away from September 378).

Another chronological point of reference in Jerome's life and epistolary activity is the year 382. It was then that he travelled for the second time to Rome, where he remained for three years. From this short period, he wrote *Ep.* 19-45. This time, he was accompanied by the Bishops Paulinus and Epiphanius. Pope Damasus appointed him as a secretary and

commissioned him with work on a Latin translation of the Scriptures. Thus, he started an intense philological work on the Bible. At the same time, he became one of the most assiduous supporters of asceticism. In parallel, he started to provide spiritual guidance to a group of noble Roman women interested in asceticism, with whom he kept his connections for the rest of his life. These ladies further influenced the course of his life, as it will be shown in the following lines. Some of the names mostly mentioned are Marcella, Asella (Marcella's sister), Paula, Eustochium, Blessila (Paula's daughters), and Laeta. In 384, Pope Damasus passed away, and thus Jerome remained without a protector. At the same time, he found himself criticized and blamed not only for illicit relations with the aristocrat ladies, but also for the death of Blessila, due to the harsh asceticism he encouraged her to undertake. In these conditions, in the fall of 385, Jerome left Rome for good, embarking himself for the last time in his life on a journey towards the East. Soon, Paula and one of her daughters, Eustochium, took the same route. Jerome reunited with Paula and Eustochium and in 386 (another reference year for the chronology of Jerome's life and epistolary collection) they founded together the monastery in Bethlehem. From this place he wrote the last letters of the collection, *Ep.* 46-154. One of the most striking transformations of Jerome's past relations is the one with Rufinus, at that time leader of a monastic community on the Mount of Olives. Since Rufinus became his fierce enemy, he had to depart to the West for good. It was also after 386 that Jerome finished his translations of the Scriptures, biblical commentaries and other writings. The precise moment of his death is not known and scholars propose either the year 419 or 420.[26]

In one of the works produced during his stay in Bethlehem, *De viris illustribus* (written in 393), Jerome made a catalog of notable Christian writers and their works. The last of the "illustrious men" presented was no one else than himself. This is not the only instance in which he presents himself as praiseworthy. In another writing, *The Apology against Rufinus*, he describes himself as no less than "philosophus, rhetor, grammaticus, dialecticus, hebraeus, graecus, latinus, trilinguis."[27] Thanks to this final chapter, we possess a nearly complete list of his works published before *De viris illustribus.* Among these, he mentions two collections of his own letters. One collection, titled "Ad Marcellam epistularum liber", included a selection of the letters addressed to Marcella, the Roman noble lady. The other collection, titled "Epistularum ad diversos liber", contained letters written after 382. Scholars agree that Jerome mentioned his own letters

in order to make them well known and that he was the first editor of his own epistolary collection.

Jerome's letters started to be examined in the fifteenth century. After Migne's *Patrologia Latina* (which contains the letters in volume 22) another significant edition was the one published by I. Hilberg in the *Corpus Scriptorum Ecclesiasticorum Latinorum* (Volumes 54, 55, and 56). In 1963, a comprehensive edition, consisting of eight volumes, was published by Jérôme Labourt.[28] More recently, in 2003, Niel Adkin published a critical edition and commentary of "Libellus de virginitate servanda", which is the title Jerome gave to *Ep.* 22.[29] Andrew Cain published two critical editions and commentaries: one on Jerome's epitaph for Paula, titled "Epitaphium Sanctae Paulae", the title of *Ep.* 108 (2013)[30], and another on a letter to Nepotian, focusing on the monastic clergy, *Ep.* 52 (2013).

Based on the results provided by scholars, Jerome's collection of letters, which comprises 154 pieces (or, in fact, 155, if one divides *Ep.* 18 into *Ep.* 18A and *Ep.* 18B) consists of 123 existing authentic letters authored by Jerome. While some of them examined the rhythm, the style, and the rhetorical devices, some others focused on his references from the Bible and classical literature.[31] Other researchers explored the religious content.

Jerome used letters in order to display, through rhetorical devices, his scholarly skills, especially his mastering of the Greek and Hebrew. He often got involved in controversies and proved to be a challenging character.

In the entire corpus of letters, out of the total 154 (or 155) items, 152 (or 153) are considered authentic. Scholars have shown that *Ep.* 150 was written later and *Ep.* 148 and 149 are inauthentic. Besides, Jerome is not the author of all letters, since 32 pieces have a different sender. Only 16 of these have Jerome as an addressee, which fact proves that Jerome felt the need to include in his own epistolary collection letters exchanged by other persons. In addition, Jerome translated from Greek to Latin some letters which he copied (especially those of Bishop Theophilus of Alexandria).

The following analysis will focus on *Ep.* 1-17, 18A, 18B, 19-79, 81-91, 97, 99, 101-110, 112-147, and 151-154, for the reasons mentioned above. The addressees of these letters are 83 individuals or communities.

As far as the typology of letters is concerned, I will follow the typology proposed by Charles Christophe Mierow.[32] He started with the "little books, or "pamphlets," or, as Jerome himself termed them, "libelli." These are *Ep.* 14, which is an exhortation to the ascetic life, the well-known *Ep.* 22 and *Ep.*130 (both being exhortations to virginity), *Ep.* 52 (an exhortation about the duties of the clergy), *Ep.* 53 (concerning learning), *Ep.* 57 (in

which he explains the best method of translating), *Ep.* 58 (in which he explains how a priest should live).

Another type of letters includes those that delve into moral and ethical inquiries. Examples of these include *Ep.* 54 and 123 (on widowhood), *Ep.* 107 and 128 (both dealing with how a mother should bring up and educate her daughter), *Ep.* 117 (having a double addressee, a mother and daughter, discussing widowhood, virginity, and the avoidance of scandal and temptation), as well as *Ep.* 122 and 147 (both focusing on penitence). Monastic life is the subject of *Ep.* 145.

A significant part of Jerome's letter collection revolves around matters of scriptural interpretation. They all let him pass as an authority in matters of biblical questions, especially since they reply to former inquiries addressed to him. The letters from this category are *Ep.*18A and 18B (on the book of Isaiah), *Ep.* 20 (discussing the word "hosanna"), *Ep.* 21 (on the parable of the prodigal son, presented by the Gospel of Luke 15:11-32), *Ep.* 25 (explaining the ten names used by the Hebrews to refer to God), *Ep.* 26 and 29 (explaining certain Hebrew terms), *Ep.* 30 (regarding the Hebrew letters inserted in Psalm 118), *Ep.* 36 (an answer to several scriptural questions), *Ep.* 55 (addressing three questions on the New Testament), *Ep.* 65 (a commentary on Psalm 65), and *Ep.* 140 (an exposition of Psalm 89).

Another category comprises letters in which Jerome tackles doctrinal matters and refutes what he considers as being heterodox beliefs. These are *Ep.* 15 and 16 (discussing the dispute over three claimants to the bishopric of Antioch and the nature of the three *hypostases* in God), *Ep.* 41 (arguing against the Montanists), *Ep.* 42 (opposing Novatian), *Ep.* 48 (against Jovinian), *Ep.* 61 (defending himself of charges of Origenism), *Ep.* 84 (defining and justifying his own stance on Origen and his texts), *Ep.* 85 (responding to questions on free will and the holiness of children of believers), *Ep.* 109 (countering Vigilantius' arguments), *Ep.* 126 (addressing a query on the origin of the soul), and *Ep.* 133 (discussing Pelagius' teachings).

Jerome also composed a number of epitaphic and consolatory letters upon the deaths of his friends. These are *Ep.* 23 (regarding the passing of Lea), *Ep.* 39 (concerning Blesilla), *Ep.* 60 (on Nepotian), *Ep.* 66 (on Paulina), *Ep.* 75 (on Lucinus' passing), *Ep.* 77 (on Fabiola), *Ep.* 79 (on Nebridius), *Ep.* 108 (on the death of Paula, his closest friend), *Ep.* 118 (on Julian's wife and daughters), and *Ep.* 127 (on the passing of Marcella).

Lastly, the collection includes several personal notes from Jerome. These are *Ep.* 8, 9, 11, and 12 (expressing dissatisfaction with the lack of

correspondence from the addressees), *Ep.* 13 (urging reconciliation with his aunt), *Ep.* 31 and 34 (on received gifts), *Ep.* 45 (a farewell letter), and *Ep.* 71 (praising the virtues of his addressee and encouraging him to visit the Holy Land).

The following image is a visualization of the entire network of Jerome's letters.

Figure 1

The following image is a visualization of the same network according to the degree of ties, as resulted from UCI.NET.
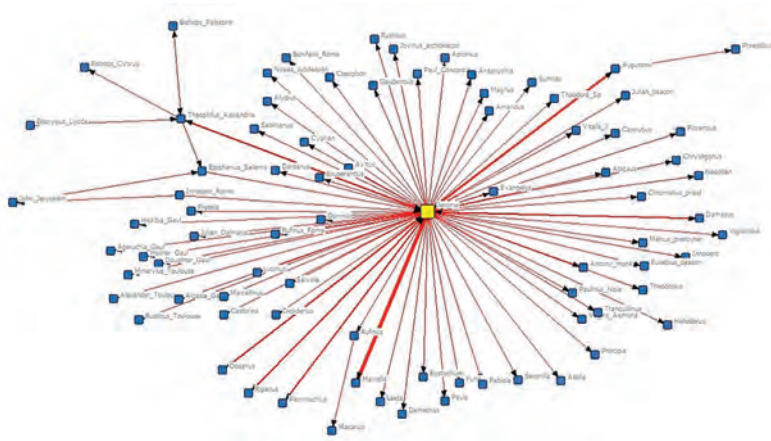
Figure 2

The following table, generated with the help of UNI.NET, shows the hierarchy of the addressees of Jerome's letters, according to the value of the indegree. This represents the number of letters they received from all possible addressees.

Marcella	19
Augustine	9
Damasus	7
Pammachius	6
Theophilus of Alexandria	6
Oceanus	4
Riparius	4
Eustochium	3
Paula	3
Paulinus of Nola	3
Rufinus	2

Figure 3

The following table, also generated in UCI.NET, represents the hierarchy of the outdegrees of the actors in Jerome's network. It is remarkable that Augustine is an actor who sends most letters, besides Jerome himself.

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Sender	Out Deg
Jerome	132
Augustine	9
Theophilus_Alexandria	6
Damasus	2
Epiphanius_Salamis	2
Innocent_Rome	2
Rufinus	1
Pammachius	1
John_Jerusalem	1
Oceanus	1
Bishops_Palestine	1
Dionysius_Lydda	1
Anastasius_Rome	1

Figure 4

The following table, generated with the same application, shows the hierarchy of the indegree of the actors in the network. According to the data, it is not Jerome who receives most letters in the network, but Marcella. When correlating this result with the previous data, one can realize that the only letters received by Marcella and recorded by Jerome himself in his collection are the ones sent by himself to her. This fact is surprising, given the influence that Marcella had among the Roman noble ascetically-inclined ladies who became Jerome's spiritual daughters.

Recipient	In Deg
Marcella	19
Jerome	17
Augustine	9
Theophilus_Alexandria	8
Damasus	7
Pammachius	6
Oceanus	4
Riparius	4
Eustochium	3
Paula	3
Paulinus_Nola	3
Epiphanius_Salamis	2
Rufinus	2
John_Jerusalem	2
Florentius	2
Heliodorus	2
Principia	2
Evangelus	2
Boniface_Rome	2

Figure 5

Marcella, the rich pious Roman lady, who gathered around her in her household on the Aventine Hill an entire circle of ascetically-oriented ladies, is by far the most frequent addressee of Jerome.

On the other hand, it is significant to mention that around one third of the surviving letters from Jerome are, in fact, addressed to women. Among these too, Marcella is the most frequently mentioned name. This fact may be explained due to her influence within the ascetic aristocrat ladies, who became Jerome's spiritual daughters. As for the other female recipients, most of them are addressed only once, with none of them receiving more than three letters. However, Jerome mentions frequent corresponding with Paula and Eustochium, which fact suggests that some letters have been lost. The letters addressed to women that survived primarily focus on doctrinal matters and the interpretation of scriptures. The collection does not include a single letter in which any of these female addressees write to Jerome, which fact is an indication that Jerome was not interested in keeping letters from women.

The following image is a representation of the types of relations as they occur in the correspondence of Jerome. The multiple relations are also graphically represented. The categories that I took into consideration for this analysis were: acquaintance, administrative subordination, ecclesiastical adversity, ecclesiastical alliance, fellow monk, fellow presbyter, friendship, patronage, kinship, spiritual father, and teacher. As it has been explained before, the direction of the relations is significant. If friendship or kinship are reciprocated relations, patronage or spiritual father are not. Therefore, I marked a reciprocated relation from actor A to actor B as a link directed from A to B and as another link from B to A.

Figure 6

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If one analyzes the hierarchy of the relations that were established in Jerome's network, one can observe, as represented in the following graphic, that the friendship relations occur most. These were reciprocated, so the value represented in the table has to be divided by two. The value of kinship also has to be divided by two, since it is a reciprocated value. After doing all these calculations, one can observe that, in fact, spiritual fatherhood, which is not a reciprocated relation, occupies a very important role in Jerome's network. Another significant relation is that of ecclesiastical adversity. An explanation of this fact is the highly polemical character of Jerome, as revealed by many of his letters.

friendship	98
kinship	50
Spiritual father	43
Fellow monk	32
Ecclesiastical adversity	29
Ecclesiastical alliance	26
Acquaintance	20
Patronage	11

Types of relations
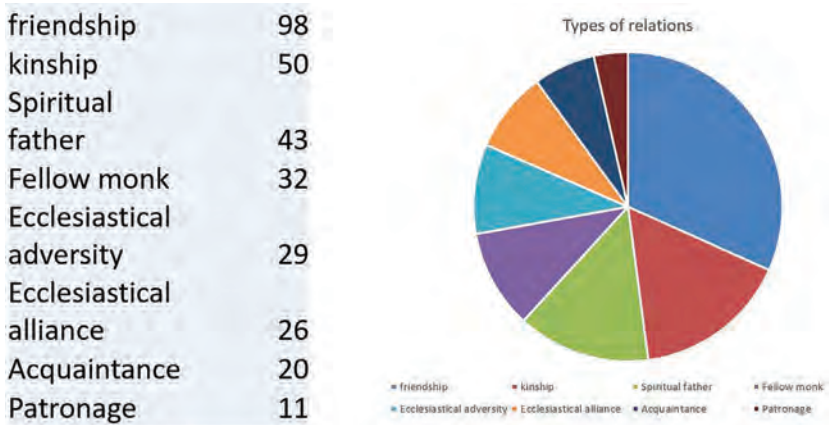
Figure 7

It is significant to see the values of betweenness in the network of Jerome. As the following figure shows, Theophilus of Alexandria and Epiphanius of Salamis have the highest values in the network. The table also confirms the potential of Rufinus and Augustine for intermediacy.

	Betweenness
Theophilus_Alexandria	181
Epiphanius_Salamis	85
Rufinus	11
Augustine	10
John_Jerusalem	1

Figure 8

Since the letters addressed to women occupy a significant place in the network of Jerome, it is worth analyzing this particular correspondence as a subnetwork of Jerome's entire network. The following image (figure 9) is a representation of the classification of letters addressed to women.

Various scholars published studies shedding light on Jerome's relationships with women and their works provide valuable insights into this topic. Among the notable publications are Barbara Feichtinger's *Apostolae apostolorum: Frauenaskese als Befreiung und Zwang bei Hieronymus* (1995), published by P. Lang.[33] This work explores the concept of women's asceticism as a form of liberation. Christa Krumeich's dissertation titled *Hieronymus und die christlichen feminae clarissimae* (1993), conducted at Bonn University[34], focuses on Jerome and the renowned Christian women of his time. J. N. D. Kelly's monograph, titled *Jerome. His Life, Writings, and Controversies* (1975), provides a comprehensive examination of Jerome's life, writings, and the controversies he was involved in. It touches upon his relationships with women as well.[35] Jo Ann McNamara's article, "Cornelia's Daughter: Paula and Eustochium" (1984)[36] delves into the lives of Paula and Eustochium, highlighting their connection with Jerome and the significance of their genealogy. Elizabeth Clark's collection of essays and translations titled *Jerome, Chrysostom, and Friends* (1979) offers valuable insights into Jerome's thoughts on various topics, including his views on his relations with women.[37]

Furthermore, if one wishes to explore Jerome's writings on female piety, some other works can be consulted. Patrick Laurence's *Jérôme et le nouveau modèle féminin. La conversion à la 'vie parfaite'* (1997)[38] analyzes Jerome's perspective on the new ideal of Christian womanhood and the concept of living a perfect life with the help of asceticism.

In addition, Jerome's writings on women in his letters, as well as his polemical and exegetical works, have been thoroughly discussed by scholars. David Wiesen, in his book *St. Jerome as a Satirist: A Study in Christian Latin Thought and Letters* (1964),[39] explores Jerome's use of satire and its implications in Christian Latin thought, including his perspectives on women. Fannie LeMoine's article "Jerome's Gift to Women Readers" (1996)[40] focuses on the impact of Jerome's writings on female readership. Patricia Cox-Miller's article "The Blazing Body: Ascetic Desire in Jerome's Letter to Eustochium" (1993)[41] examines the theme of ascetic desire in Jerome's letter to Eustochium.

These publications provide a wealth of information for those interested in understanding Jerome's relationships with women and his writings on female piety.

Jerome engaged in correspondence with several noble Roman women, as mentioned above, and a collection of 33 preserved letters reveals his interactions with 10 distinguished ladies. The recipients of these letters are:

1. Marcella: Jerome wrote to Marcella *Ep.* 23-29, 32, 34, 37, 38, 40-44, 46, 59, and 97. Additionally, Pammachius, a senator from the gens Furia and Marcella's cousin, is mentioned in the latter letter.
2. Asella: Jerome addressed a letter to Asella, *Ep.* 45.
3. Paula: Jerome corresponded with Paula in *Ep.* 30, 33, and 39.
4. Eustochium: *Ep.* 22, 31, and 108 were dedicated to Eustochium.
5. Principia: Jerome exchanged *Ep.* 65 and 127 with Principia.
6. Furia: Jerome wrote to Furia in *Ep.* 54.
7. Fabiola: *Ep.* 64 was sent by Jerome to Fabiola.
8. Salvina: Jerome sent to Salvina *Ep.* 79.
9. Laeta: Jerome addressed *Ep.* 107 to Laeta.
10. Demetrias: Jerome wrote *Ep.* 130 to Demetrias.

These preserved letters offer valuable insights into Jerome's communication and relationships with these Roman noble women.

The following image represents the hierarchy of women addressed by Jerome, according to the number of letters they receive from him. One can observe that the Roman noble ladies receive most letters. This group is, moreover, comparable to the group of women from Gaul, also directed by Jerome.

Marcella	19
Eustochium	3
Paula	3
Principia	2
Virgins_Aemona	1
Castorina	1
Asella	1
Serenilla	1
Furia	1
Fabiola	1
Theodora	1
Salvina	1
Laeta	1
Mother_Gaul	1
Daughter_Gaul	1
Hedibia_Gaul	1
Algasia_Gaul	1
Ageruchia_Gaul	1
Anapsychia	1
Demetrias	1

Figure 9

The following image shows the graphical representation of the network of women from Rome connected Jerome to Jerome. The colors and the thickness of the ties represent the strength of the ties between actors. As it can be observed, Jerome had most of his letters sent to Marcella, but Paula and Eustochium were also among his favorite correspondants.

Figure 10

Conclusions

Analyzing the correspondence of Jerome with the help of the network tools and the visualization of the networks of all actors or of part of the actors provides several conclusions. Jerome made use of letters not just as a simple communication tool, but also as a propagandistic tool. He used individual letters and letter-collections to gain a status of an expert on the Bible and asceticism. The women included in the "subnetwork" of Jerome contributed to this image. Besides, this subnetwork also shows Jerome was able to promote himself among these actors as a translator, textual critic, and interpreter of the Bible, since he had both the philological skills and the spiritual authority to approach its text in the original languages, not only Greek, but especially Hebrew.

NOTES

[1]   Margaret Mullet, *Theophylact of Ohrid. Reading the Letters of a Byzantine Archbishop* (Aldershot: Variorum, 1997).

[2]   Adam M. Shor, *Theodoret's People. Social Network and Religious Conflict in Late Roman Syria* (Berkeley: University of California Press, 2011).

[3]   Daniel Knox, "Trading Letters. A Network Analysis of Ennodius of Pavia's Letter Collection (A.D. 500-513)," MA Thesis at Central European University, 2016.
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[4]   Johannes Preiser-Kapeller, "Letters and Network Analysis," in *A Companion to Byzantine Epistolography* (Leiden: Brill, 2020): 431-465.

[5]   Johannes Preiser-Kapeller, L. Reinfandt, Y. Stouraitis (eds.), *Migration Histories of the Medieval Afroeurasian Transition Zone. Aspects of mobility between Africa, Asia and Europe, 300-1500 C.E.* (Studies in Global Migration History 39/13), (Leiden, 2020), https://brill.com/view/title/55556.
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[6]   https://mikepnyu.hosting.nyu.edu/LibaniusSite/index.html, last accessed 11th June 2023.

[7]   Andra Jugănaru, "A Network Analysis of the Cappadocian Fathers' Letter Collections. An Introduction," in *Byzantium. An Unending Civilization. Proceedings of the International Annual School of Byzantine Studies (2018-2020)*, coord. Ana-Maria Răducan (Cluj-Napoca: Ed. Meda, 2022), 77-98.

[8]   Johannes Preiser-Kapeller, "Letters and Network Analysis," 433.

[9]   Ibid.

[10] Borgatti et al, *Analyzing Social Networks*: 11.

[11] Daniel Knox, *Trading Letters*: 7.

[12] Borgatti et al, *Analyzing Social Networks*: 433.

[13] Ibid., 434.

[14] Ibid., 434-435.

[15] Ibid., 435.

[16]   Ibid.
[17]   Ibid.
[18]   Ibid., 436-439.
[19]   Ibid., 439.
[20]   Daniel Knox, *Trading Letters*: 10.
        See also Scott, *Social Network Analysis*: 11–98.
[21]   https://sites.google.com/site/ucinetsoftware/home.
[22]   Stephen Rebenich, *Jerome* (London: Routledge, 2013), 79.
[23]   Andrew Cain, *The Letters of Jerome: Asceticism, Biblical Exegesis, and the Construction of Christian Authority in Late Antiquity* (Oxford: Oxford University Press, 2009), 4.
[24]   *The Letters of Saint Jerome*, trans. Charles Christopher Mierow (London: Longmans, 1963), 3-8.
[25]   In this article, I will refer to Jerome's letters using the abbreviation *Ep.* Followed by the number corresponding to the letters, as preserved in the French critical edition of Jérôme Labourt, *Lettres* (8 vols., Paris: Les Belles Lettres, 1949–1963).
[26]   *Ibid.*
[27]   Ap. C. Ruf. 3.6.
[28]   Jérôme Labourt, *Lettres* (8 vols., Paris: Les Belles Lettres, 1949–1963).
[29]   Niel Adkin, *Jerome on Virginity: A Commentary on the Libellus de virginitate servanda (Letter 22)* (Cambridge: Cambridge University Press, 2003).
[30]   Andrew Cain, *Jerome's Epitaph on Paula. A Commentary on the Epitaphium Sanctae Paulae with an Introduction, Text, and Translation* (Oxford: Oxford University Press, 2013).
[31]   Marianne Sághy, "The Master and Marcella: Saint Jerome Retells the Bible to Women," *Retelling the Bible. Literary, Historical and Social Contexts*, ed. Dolezalová, L., Visi. T., Peter Lang, Frankfurt, 2010, 127-138.
[32]   *The Letters of Saint Jerome*, trans. Charles Christopher Mierow (London: Longmans, 1963), 10-20.
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39   David Wiesen, *St. Jerome as a Satirist: A Study in Christian Latin Thought and Letters*, Cornell University Press, 1964.

40   Fannie J. LeMoine, "Jerome's Gift to Women Readers", in *Shifting Frontiers in Late Antiquity*, ed. by. Ralph W. Mathisen and Hagith S. Sivan, Variorum, 1996, 230-241.

41   Patricia Cox Miller, "The Blazing Body: Ascetic Desire in Jerome's Letter to. Eustochium," *Journal of Early Christian Studies* 1 (1993) 21-45.

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