SOCIAL NETWORKS IN HELLENISTIC AND ROMAN ETRURIA: THE ECONOMIC EFFECTS OF ROMAN CONQUEST

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Abstract

The domination of Etruria by Rome is an aspect of Roman colonization which is generally well understood. Etruria, which began as a significantly more powerful entity than Rome, was brought to heel through the establishment of bilateral treaties and Roman colonies. This study seeks an even further nuanced model for the nature of the conquest of Etruria—namely looking at the underlying mechanisms that made the treaties and colonies successful. Social network analysis is particularly well suited for this task as it visualizes interaction and exchange between sites which often times dictates a sites success or failure. When enlarged to the regional scale SNA can be used to understand how a region prospers or declines based on site interactions. For my study I used SNA to discuss how Roman conquest affected Etruscan exchange networks—especially economic exchange networks—and how this network transformation was used to control the region of Etruria. The results show that Rome all but replaced the previous Etruscan network with their own Imperial network that seems, based on preliminary research, centered on strategically selected administration centers in Etruria—utilizing both native Etruscan sites and newly inaugurated Roman colonies.
Chapter 1- Introduction

The Etruscans have a history of study and interest that extends back to the early Roman Empire. The Emperor Claudius was drawn to this group of people who can be credited with the construction of the Roman Forum and the Temple of Jupiter Optimus Maximus. Claudius even wrote a commentary on the contributions of the Etruscans to Italian history. However, extensive study of the Etruscans would not begin until the Italian Renaissance following the discovery of various Etruscan tombs and sites by papal supported scholars. This long history of research has led to a general understanding of Etruscan history from the group’s beginnings in the Bronze Age to their assimilation by Rome. Thus, modern scholarship has focused more on understanding the fine grained details on the Etruscans, ranging from the construction of their identity in the Bronze Age, attribution of their artwork in tombs to specific schools of art, understanding their dressing customs, and production and distribution of their distinctive black glazed pottery.

In much the same vein, this study seeks to answer some of the underlying questions of the fall of the Etruscans during the Hellenistic Period. Scholars generally agree that the reason the Etruscans were unable to resist the Romans was due to their inability to organize into a unified force until it was much too late. There were also other economic and political factors such as the Etruscans’ isolation from their southern territories and the bilateral treaties used by

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1 The *Tyrrennica was a 20 volume treatise on the Etruscans which is now lost*
2 Friar Giovanni Nanni, also known as Annio da Viterbo, was commissioned by Pope Alexander IV to study and publish on the Etruscans in the 15th C.
3 For Bronze Age see Blake 2014; for tomb painting see Steigraber 2006; for dressing customs see Bonfante 1986; for black gloss pottery see Di Giuseppe 2012
Rome to divide the Etruscan cities. What is less clear is the macro-scale effect of Roman conquest on the region of Etruria.

Research has shown that the Romans did not use a blanket strategy in dealing with their enemies. Those who readily accepted Roman rule were treated much more leniently than those who resisted. Conversely, staunch resistance could lead to the settlement being destroyed and the leading citizens executed.⁴ The same policy held true in Etruria. Certain cities, such as Arezzo and Fiesole, maintained their leadership position even into the late Republican period while others, such as Populonia and Chiusi, were allowed to die off over the course of the Hellenistic Period.

Generally speaking, settlements of complex societies require some degree of interaction to survive. Varied availability of natural resources prevents any large degree of isolationism and forces settlements into a network of interaction and exchange. As settlements are added or removed from the network it is adapted to the new availability of resources within the network. This understanding of network adaptation at the macro-scale should be useful in understanding why some Etruscan sites seem to continue their economic prosperity well into the 1st C. BCE and others fall into a recession earlier, in the 3rd C. BCE.

To answer this question of network adaptation, social network analysis (SNA) is particularly useful as it provides a visual map which can be used to understand regional network transformations. This visualization aspect when paired with geographical mapping can then be used to understand economic or social boundaries and, therefore, administrative decisions on the part of the Romans when implementing their economic and socio-political policies in the region.

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⁴ Vecchi 2012 pg. 19; See also Appian Civil Wars Book V
The exact origins of the Etruscans is still a matter of debate. There are scholars who follow in the school of thought of Dionysius of Halicarnassus who believed that they were autochthonous, or literally born from the earth, which we interpret to mean they were native to the Italian peninsula. However, other research on the etymology of the Etruscan language shows that they may have origins in Lydia in Asia Minor. This theory has been supported by more modern forms of scientific research such as mitochondrial DNA analysis showing Etruscan DNA is related to that from Asia Minor and the Near East.

Regardless of how the Etruscans came to the Italian peninsula, we can trace their identity back to the Bronze Age. SNA done by Blake shows that a distinct ideological boundary formed for the Etruscans around the end of the Bronze Age. Furthermore, this analysis has helped in understanding the contemporary formation of other local identities (i.e. the Veneti) in the Italian peninsula which helps to distinguish the Etruscans from other natives.

The Etruscans developed out of an earlier Iron Age culture known as the Villanovans. Etruscan territory extended from the Arno River in the North to the Tiber in the east and south. They called themselves Rasenna and can be argued to have been the most historically significant native Italian cultural group to the development of the Italian peninsula. The Etruscans were especially good metal craftsmen and took full advantage of the colline metallifera, or the metal bearing hills, located in modern day Tuscany. From these hills the Etruscans were able to extract a wide range of metals, including copper, iron, and gold. These mineral resources were

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5 Dionysus of Halicarnassus *Roman Antiquities* 1.30
6 Bonfante 1990
7 Vecchi 2012: 15; See *Etruscan Papers in Honor of Sybille Haynes* 2009 for various mitochondrial analysis done on Etruscan skeletal remains.
exchanged widely in the Mediterranean and were a significant source of their wealth. These resources were also made into the ornate jewelry and adornment pieces that would later be found in the tombs of Etruscan elites.

Over the course of the Archaic period the Etruscans began to expand within Italy, and at their height reached from the Po River in the North down into modern day Campania in the south. This time of economic prosperity in Etruria is known as the “Golden Age” and is by far the most heavily researched time of the Etruscans. It is during this time that Etruria began utilizing foreign craftsmen from across the Mediterranean for their fresco art and pottery skills. Many of the highest quality tomb paintings from cities such as Tarquinia, Cerveteri, and Vulci are attributed to this time period.

The Etruscans’ high level of metalworking required access to raw materials such as tin which is not indigenous to Italy. This brought the Etruscans into contact with other complex societies in the Mediterranean such as the Greeks and Carthaginians who controlled or provided access to mineral rich regions such as Spain and the Near East. The wide influence of the Etruscans’ metalwork is attested to by their metal jewelry as well as bucchero pottery found from as far east as Ionia, the western coast of modern day Turkey.8

The late 7th C. BCE also marks the beginnings of Etruscan control in the city of Rome. According to legend, in 611 BCE Lucius Tarquinius Priscus, whom scholars believe came from Tarquinia, became the first Etruscan king of Rome. Under Priscus and his successors Rome began its transition from a simple settlement into a proper town. Some of the Tarquins’ projects

8 Vecchi 2012: 15
included the Capitoline Temple, the Cloaca Maxima, and the construction of the Forum Romanum.

However the final Etruscan king, Tarquinius Superbus, would spell the end of Etruscan dominance in Rome as abuse of his powers would lead to his and his family’s expulsion from Rome coupled with the establishment of the Roman Republic in 510/509 BCE. While this was not the end of the Etruscans as a people it did foretell what was to come for the Etruscans. Over the next three centuries Etruria was slowly isolated from the rest of the peninsula and gradually absorbed into the Roman sphere. The expulsion of the Etruscan kings and the establishment of the Roman Republic disconnected the Northern Etruscan states from their southern Campanian territories which they depended on for salt. The invasion of the Gauls during the 5th and 4th C. BCE, and the ongoing conflict with the Syracusan Empire in Sicily further exacerbated an already gloomy situation for Etruria.

The slow decline of Etruria is conversely mirrored by the rise in power of Rome and would be epitomized by the siege and destruction of Veii in 396, a leading Etruscan city just 16 km from Rome. The next century was highlighted by a string of Etruscan defeats at the hands of the Romans and efforts by other native tribes to band together against Rome. This tribal alliance would be soundly defeated at Sentinum in 295 and by 273 many of the leading Etruscan states such as Tarquinia, Vulci, Volsinii, and Caere had all been taken by Rome. In addition Rome began garrisoning troops in southern Etruria, established the colony of Cosa on the Etruscan coast in 273, and built a network of roads including the Via Aurelia, Clodia, and Cassia which were originally intended for military use but also would come to be used for regional market exchange.
During the 2nd Punic War Roman control of Etruria would be tested when Hannibal crossed the Alps in search of Italian allies to fight against Rome. The Etruscans remained loyal to Rome and even offered support by way of shelter to the Roman people and many of their sacred artifacts. The literary evidence attests to the still thriving economy of Etruria during this period, which allowed the Etruscans to provide a wealth of material support to the Romans.\(^9\)

The final test of Roman-Etruscan relations would come in 91 BCE with the breakout of the Social War, which consisted of a number of tribes within Italy allying together to rebel against Roman rule. In order to dissuade some of the less disgruntled tribes from joining the alliance, Rome offered those who did not rebel full citizenship – Etruria being one of those groups. However, in the ensuing civil war between Sulla and Marius the Etruscans would support Marius to their own detriment and the final two major Etruscan cities not yet occupied by the Romans, Populonia and Volterra, were besieged and starved out.

In 44 BCE the final Etruscan saeculum came to an end; an end which the Etruscans believe spelled the end of their civilization according to the prophecy written in the *libri fatalis*.\(^{10}\) However, Etruria would not be formally absorbed into the Roman political system until 27 BCE when Augustus deemed it the 7th region in his unified Italy.

My own research focuses on the period just before the sack of Veii through the reign of Augustus and the Julio-Claudians. This period is the most disruptive in Etruscan history and thus the network of interaction in Etruria would have experienced the most alteration. Additionally this period sees the formal grant of full citizenship to the Etruscans as well as the complete absorption of Etruria into the Roman Empire under Augustus. Comparing the exchange network

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\(^9\) See *Fasti Triumphales*

\(^{10}\) See Censorius *De die natali*, 17.5-6
of the earlier Etruscan period, ca. 4\textsuperscript{th} C. BCE, to the later Roman period, ca. 1\textsuperscript{st} C. CE, it may be possible to understand the underlying mechanisms used by the Romans to exert control over the region of Etruria.

Social Networks

Social networks analysis (SNA) is particularly useful in understanding the socio-economic effects of Roman expansion as it focuses on the relationship between entities rather than on the entities themselves. This allows for a macro level understanding of change that would be lost in focusing on specific sites. Within this study SNA is used to analyze the effect of Roman control of Etruria and how the “connectivity” of Etruscan city-states was altered and abused to the advantage of the Romans.

The strength of social network analysis (SNA) rests in the tradition within sociology and anthropology which links social relationships to general outcomes for groups, or how the nature of the relationships between entities affects the outcome of the group as a whole.\textsuperscript{11} This is understood as the “structure” of the network and is the primary factor driving distribution of resources within a network. When coupled with spatial analysis SNA can be used to address even more specific research questions such as the impact of the conquest of Etruria.

The methodology of SNA was developed in the social and behavioral sciences from sociometry which sought to measure interpersonal relationships in small groups.\textsuperscript{12} In the 1930s Jacob Moreno invented the sociogram that was used as a means of depicting these relationships in two dimensional space, similar to the modern graphs used in SNA today. Following up on

\begin{footnotesize}
\begin{enumerate}
\item See Mills et al. 2015 pg. 6
\item See Brughmans 2013 pg. 632
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\end{footnotesize}
this, mathematics incorporated graph theory, statistical and probability theory, and algebraic models to help quantify these visualized relationships.

At the most basic level social networks are composed of entities and ties. The entities, referred to as “nodes” or “vertices”, are the actors within the network. These can be as micro-scale as individuals or as macro-scale as entire settlements. Nodes are connected with ties. Ties come in two forms: directed or undirected. A directed tie or “arc” is used to denote transfer from one entity to another. For example, if we know that Rome produced a specific pot and that pot was then found at Veii there would be a directed tie from Rome to Veii. An undirected tie or “edge” is used to denote a connection between two entities but not necessarily a directed flow of information or material.\(^ {13}\) Using the same example, an undirected tie would be if Rome and Veii both had a certain type of pot but did not necessarily receive the pot from each other.

Thanks to graph theory this information can then be mapped out in two dimensional space. The visualization aspect is important for an “intuitive understanding of the network.”\(^ {14}\) Visualization, whether in geographical or representational space, can be useful in gaining an understanding of the operational nature of the network. It allows for inferences to be made about the decisions of the entities that affect the connections between them, for example understanding the reason why Pisa and Luca may be connected but not Pisa and Perugia. This information can be further supplemented with temporal “snapshots” to show reactions to specific events in time such as the adaptation of the Aegean network following the eruption on Thera, or here the adaption of the Etruscan network to Roman conquest.\(^ {15}\)

\(^{13}\) See Glossary in Collar et al. 2015 for definitions of nodes and ties
\(^{14}\) Brughmans 2013 pg. 627
\(^{15}\) Leidwanger et al. 2013
Along with visualization, a set of vocabulary was borrowed from graph theory, which allows scholars to discuss the structure of the network: density, diameter, centrality, and other indices. Density refers to the proportion of actual ties to the number of possible ties within a network. Diameter measures the minimum number of connections between the farthest two entities which then gives a rough idea of the “size” of the network. Centrality is composed of a family of measurements but for this network only degree centrality, the relative number of ties to a node compared to the total number of ties in a network, and betweenness centrality, the ratio of edges passing through a node to the total number of edges passing through all nodes, are relevant.

Constructing the Network

In this study, SNA is used to understand the effects that Roman expansionist policy had on social relations between Etruscan sites; comparing the earlier Etruscan network with the later Roman network. This type of comparison may help illuminate the effects of Roman control of the region during the Hellenistic period.

The changes made to the network at the end of the Hellenistic period were implemented thanks to a number of factors. First, and likely the most influential, was the economic and political system put in place in Etruria. By the 2nd C. BCE most of Etruria had fallen under Roman control and numerous Roman colonies had been established throughout Etruria. Sites not under direct Roman control were politically tied to Rome through asymmetrical, bilateral treaties.

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16 Brughmans 2013; Mills et al. 2015
17 For a full list of vocabulary and an introduction to the usage of SNA see Hanneman and Riddle Introduction to Social Networks 2005 and Collar et al. 2015 “Networks in Archaeology: Phenomena, Abstraction, and Representation”
which effectively gave Rome political and military control. From these nodes Rome was able to construct an administrative network that was used to govern the region. The other factor is Etruscan resistance. Although Etruria submitted political and economic control to Rome, there are a few Etruscan cities which maintained many Etruscan traditions, such as the production of black gloss pottery during the 1st C. BCE. These sites likely would not have participated in the red gloss or possibly even the roman coinage network which would have excluded them from the network. Thus, the change in the networks is a reflection of these two mentalities working simultaneously to include and exclude sites.

The network itself is constructed using ceramic and numismatic materials from 64 sites within Hellenistic Etruria: the area from the Arno at the North to the Tiber to the East and down to Rome in the South. These common types of artifacts are especially good for understanding traces of relations between sites. Because these materials are used throughout the different strata of society and are often exchanged both within and between sites, their presence and absence at sites can attest to exchange or at least interaction between sites. Information was pulled from a variety of sources including catalogs, excavation and survey reports, and site analysis articles. Not having a central database to pull from did limit the scope of the research but thorough searches of publications and catalogs offered enough information to construct a robust database of sites with published information on pottery and coins.

The study is divided into two time periods. The first, the 4th to 3rd C. BCE, corresponds to just before the beginnings of military conflicts between the Romans and the Etruscans as well as some of the early annexations in Etruria. The second time period spans the 1st C. BCE to the early 1st C. CE. This period encapsulates both the disruption of the Social Wars in the network as
well as the formal, governmental inclusion of Etruria into the Roman Empire under the Emperor Augustus in 27.

For the first time period black gloss pottery and Etruscan coinage were used. To an extent this period can be seen as the “control.” In theory, the structure of the relations between Etruscan sites should be “natural” at this state—that is there should be little to no outside influences affecting the properties of the network. For the second period red gloss pottery and Roman coinage were used. This period is a reflection of the policies put in place by the Romans which then affected the structure of the Etruscan network.

The exact problems and justifications for the various materials will be discussed in detail in their respective chapters but a quick justification can be given here for the choice in materials. Pottery is ubiquitous throughout both the Etruscan and Roman world and has a long history of research in its production, distribution, consumption, and discard. Consequently, there is a large amount of research on both black and red gloss pottery as well as the development of typologies and chronologies for these types. This allows for precise dating of pots and sherds if any of three pieces of information are given in the literature:

1) The “type” of the sherd as it relates to the typologies of Lamboglia, Morel, Oxe, etc.

2) The typological name (e.g. Campania A)

3) The relative date of the stratum in which the sherd or pot was found. Thus, even without full information on the pieces from excavation reports or survey notes it was possible to date the pieces tightly enough to either include or exclude them from the study.
Coinage, while less prolific in the archaeological record, offers a bit more information without the need for cross referencing. Catalogued coinage has information on the mint location, date, find spot if known, and denomination. Also, unlike pottery, coinage can be seen as a direct representation of economic participation in a system. Coinage during the Republic and Empire were used almost daily for various reasons—most notably payment of soldiers and for mercantile exchange. The presence of coinage can therefore be used to gauge the economic enfranchisement of an area based on the type of coinage in circulation. For example, during the 4th C. BCE there was very little Roman coinage in circulation in Etruria and much more Etruscan coinage. By the 1st C. BCE Etruscan coinage had ceased production and Republican coinage becomes the norm. This shows the gradual insurgence of Roman coinage and likely the Roman economic system as well.

In many other cases, prestige items are used to understand impact on culture and identity. By using items which are much more prolific in the archaeological record, were used throughout the various levels of society, and in some cases are directly representative of economic activity I am able to also understand economic impact as well as impact on culture and identity. The first chapter will be devoted to discussing the pottery. This network is especially useful in understanding involvement and exclusion within the networks thanks to pottery’s archaeological abundance. The following chapter will discuss the numismatic network that will be used to give structure to the network and understand the rise and fall of major and minor actors. This chapter will also feature a “combined network” that superimposes the networks to give a holistic view of network adaptation.

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18 See Harl 1996 Ch. 1 and 2 on Roman coinage mint cycles, circulation, and usage
CHAPTER 2 - THE POTTERY NETWORK: ECONOMIC INVOLVEMENT

In order to understand the effects of Roman control on Etruria through social network analysis it is important to choose relevant proxies as they serve as the foundation for the network. A proxy is an archaeological material that serves as a concrete stand-in for the abstract “connection” between two entities. One of the proxies that I chose to fill this role is pottery—namely black gloss and red gloss pottery.

Pottery works particularly well as a socio-economic proxy as it can be indicative of various social class connections. For example, archaeologists have long understood that in any given complex market system there are two levels of exchange: local and regional.\(^\text{19}\) In the Roman context, the local level of exchange consists of trade between a city and its surrounding territory—what the Romans called the *ager*. The regional markets then would have been used for trade between these local systems.

Black gloss pottery is a fine ceramic produced throughout Italy from the 4\(^{th}\) C. BCE to the 1\(^{st}\) C. BCE. It is identified by the black slip that covers the entirety of the exterior of the pot, serving to make the surface impermeable and thus allowing for its use as a container for food and drink. Etruria imported large quantities of Attic black gloss pottery during the Classical period, and there is evidence for contact between Greece and Etruria even during the Bronze Age.\(^\text{20}\) Bucchero pottery was developed as an imitative yet cheaper form of the high quality metal work in Etruria. During the Classical period black gloss pottery was created as an alternative to its Attic import.

\(^\text{19}\) Smith 2010 *Regional and Local Market Systems in Aztec-Period Morelos*
\(^\text{20}\) See Blake 2014 on Mycenaean pots reaching Italy from Greece
The 4th and 3rd C. BCE are dominated by local production of black gloss within Etruria. However, by the 2nd C. BCE the production of black gloss was limited to a few Etruscan cities—Volterra and Arezzo—while many of the other cities, including Rome, imported their pottery. This trend continues into the 1st C. BCE until the production of black gloss stops and is replaced by the production of red gloss pottery at Arezzo.

Around the early 1st C. BCE red gloss pottery begins to supplant black gloss as the style of choice within Italy and by the late 1st C. BCE had completely replaced black gloss. However, in many ways red gloss is simply a continuation of black gloss pottery. It borrows many of the forms and simply changes the firing atmosphere from reducing to oxidizing to achieve the red finish. Moving into the 1st C. CE red gloss production expands to include many of the Augustan provinces outside of Italy, but much of the pottery within Italy can be sourced to Italian production centers. For the purposes of my research any forms of red gloss pottery which may be dated within the 1st C. BCE to the beginning of the 1st C. CE were considered regardless of production origin.

Both black gloss and red gloss pottery are found in a range of contexts, from elite burials and residential spaces to more modest residential spaces and stray finds within urban centers. This reflects the broad range of socio-economic status of consumers: consumption and discard of these types of pottery are not limited to higher or lower class consumers. In theory, this range of consumption should bolster the argument for the strict use of presence and absence of pottery at sites in order to determine inclusion or exclusion from the exchange network.

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21 Bedingfeld 2014 pg. 2
22 Roth 2007 pgs. 81-82
History of Research

In 1879 G.F. Gamurrini created the first definition of black gloss ware as ceramic *etrusco-campana*, alluding to its production in Campania and Etruria. This term has since been forgone for the term “black gloss” as petrographic analyses have shown that its production spans more than just these two regions and allows for a broader reference to the pottery at large. The study of black gloss ceramics was revolutionized in the 1950s when scholars transitioned away from an antiquarian approach to ceramic studies and began to focus more on the creation of typologies.

Nino Lamboglia was the leading scholar in creating the first typologies in which he divided black gloss ceramics into three classes based on the properties of the clay and gloss which came to be known as Campana A, B, and C—terms still in use today. Lamboglia’s definitions are as follows:

Campana A: “Pottery with a bright red clay, with a clean and regular break, and lustrous metallic black slip, iridescent and often with red patches around the foot.”

Campana B: “Pottery with a pale clay and deep black slip, noticeable uniform and opaque; less regular break.”

Campana C: “Pottery with a body clay fired grey and a slip of poor quality which is black or grey green.”

Lamboglia’s groupings correspond to large-scale production centers around the Bay of Naples (A), in North Etruria (B), and in Sicily (C). Within these fabric classes he further divided the

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23 Lamboglia 1952 p g. 142
ceramics based on shapes to create one of the first seriations for black gloss pottery. This allowed for the creation of a chronology of the pottery, which could then be used to date sites and archaeological finds. Within this format Lamboglia established that Campana A reached its height during the 3rd and 2nd C. BCE and Campana B and C from the mid-2nd to the end of the 1st C. BCE.  

This work was further expanded by Jean Paul Morel in the 70s and 80s and culminated in his publication of *Ceramique campanienne* which has become the handbook for study on black gloss pottery. Morel differs from Lamboglia in that he expanded his study to focus on medium and small scale production centers as well as Lamboglia’s large centers. Classifications for the vessels are done in a manner similar to Lamboglia’s work, and are based on their geometric shape. However with a broader set of production centers and a finer attention to details Morel created a much more expansive, mathematical typology in which the pottery is broken into categories, then genres, sorts, and finally series—each level becoming more specific. The level is then referenced by a numeral and the type of pot by a letter (i.e. 4231a).

Since Morel, more fine-grained studies have been completed at specific production centers within Italy such as that at Cales and Etruria. This has allowed for an understanding of specifics within production centers and a better understanding of chronological production and distribution of black gloss in Italy. Comparative analysis of the ceramics across centers has also brought to light the gradual standardization of black gloss production beginning in the 2nd C. BCE.

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24 Di Giuseppe 2012 pg. 8  
25 Pedroni 2001 for the Production at Cales, Stanco 2009 for the production in Etruria, and Di Giuseppe 2012 for a survey of production throughout Italy  
26 Di Giuseppe 2012 pg. 4
There have also been some criticisms of Morel’s typology. Roman Roth for example criticizes Morel’s approach from a functional and socio-economic standpoint as being too steeped in “Marxist ideology.” He argues that not enough attention is paid to the technological variations that may have occurred at the local level—a production chain, which Roth assumes was controlled by Roman elites in the 2nd C. BCE. However, as Di Giuseppe has shown Roth’s criticisms are biased as they do not take into account the technological limitations of Morel’s time. Furthermore his sample of material is too limited to argue for an understanding of Roman society and settlement patterns.

Another criticism takes aim at Morel’s classification process itself. Reynolds Scott points out that Morel’s classification is based on the main shape of the vessel with handles being the determinant factor. Handles are rarely preserved on pots, however, and consequently two sherds with similar profiles but from different parts of the pot may have been included within the same category.

Similarly, red gloss pottery was first organized into a classification system in the late 1800s by Hanz Dragendorff—a classification system that is still in use in modern day scholarship. Since the classification by Dragendorff there has been an immense amount of scholarship and micro-level classifications within the red gloss type such as the Gaulish produced red gloss (Samian ware), or the red gloss from North Africa (African red slip), while

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27 See Roth 2007 “Problems associated with Morel’s approach” pg. 48
28 Di Giuseppe 2012 pgs. 6-8
29 Scott 2008 pg. 8
the Italian produced red gloss have been organized in the *Conspectus*: a chronological catalogue of the various Arrentine forms.\(^{30}\)

Red gloss ware is a fine ceramic product that in many ways is very similar to its preceding black gloss type. Production of red gloss pottery borrows many of the same forms from black gloss. Some scholars have argued that this is due to the inception of the red gloss type at Arezzo, which was one of the last sites to cease production of the black gloss type in the mid-1\(^{st}\) C. BCE.\(^{31}\)

For a long time red gloss was considered to have only been produced at Arezzo in Etruria. However, in 1966 kilns were discovered at Lyon in modern day France, demonstrating the existence of other workshops outside of Italy producing identical red gloss pottery.\(^{32}\) Since then, there have been discoveries of workshops at Pisa and Puteoli within Italy as well as production centers in Britain and North Africa. However, many of the non-Italian production centers only began operation in the 2\(^{nd}\) C. CE. For my own research only the productions of the Italian “Arrentine” type and from Southern Gaul are relevant, as these began producing in the mid-1\(^{st}\) C. BCE and the 1\(^{st}\) C. CE respectively.

Problems of Pottery as a Proxy

As proxies for economic interaction, black gloss pottery and red gloss pottery have considerable advantages. While these are not necessarily prestige items, they are highly visible

\(^{30}\) See Oswald and Price *An Introduction to the study of Terra Sigillata* for a survey of the various typologies; Hayes 1972 for ARS, Oswald 1936 for Samian, Oxe & Comfort 1968 and Ettlinger et al. 1990 for Arretine

\(^{31}\) Hayes 1997

\(^{32}\) Ettlinger et al. 1990 shows that pottery from an Augustan site in Germany which contains red gloss is composed of only 10% Arrentine and 60% from Lyon
items in the archaeological record, were widely circulated geographically, and were used in most of the social strata of Italian society during the Republic and Empire. Nevertheless, these pottery types did come with their own problems.

The first problem came with navigating the highly varied nomenclature for the same pottery types. For example, over the course of my research I have found red gloss pottery referred to as: red gloss, terra sigillata, Arretine ware, presigillata, red glazed, *vernice rossa*, or red slipped pottery. While it is possible that the diverse jargon affected the results of my analysis, I have made sure to search all sites with all possible vocabulary to ensure that the results were reflective of the actual body of evidence as opposed to my own selection bias. For the purposes of this study I have decided to refer to the red-colored pottery as “red gloss”. This removes any association with production centers, which are often not given in the publications, as well as implies the association with its predecessor—black gloss pottery.

The second problem was the lack of detail in the publications. Many publications lacked information on sherd or vessel counts, pottery forms in association with typologies, or information on place of production. These missing details inhibit the amount of information I am able to gain from the pottery; however, based purely on find spots and dates established by stratigraphy or type, it is still possible to build a robust social network for Etruria. In fact, the lack of information in many ways simplified the search and created a research plan where I was able to understand involvement within the network based on presence and absence of pottery within my time periods. For further analysis of the network such as weighted ties and centrality I simply chose a more cooperative medium—coins.
The Network

Because the network is composed of a single material it is impossible to use many of the mathematical evaluations mentioned previously (centrality, connectivity, directionality). This results in an “absolutely” dense network in which every active node is connected to all other active nodes. However, this network is useful for understanding involvement or exclusion of sites in the socio-economic network in Etruria.

Out of the 50 sites for which there was published information on their ceramics, there were 43 at which black gloss pottery was found that also dated within the time period in question (Figure 1). This represents a level of 86 percent participation based solely on published material that is open access – given greater access to publications it is likely that this number would increase to 90 or even 100 percent participation.

However, this is not a surprising aspect of the network. As mentioned previously black gloss pottery was used throughout Etruria at all levels of society. This information is best used as a comparative control to the second network during the 1st C. BCE and 1st C. CE of red gloss pottery.

The first observation is that the later, Roman period network is much less connected than the earlier one. Out of the 50 sites of the earlier network, only 23 sites had red gloss pottery (Figure 2). Earlier it was mentioned that this drop off could be a result of the varying vocabulary used when discussing red gloss pottery or simply a lack of published material about red gloss pottery at sites, however I find it highly unlikely that this factor alone would result in a 46 percent decrease in involvement within the network.
Between the 3rd C. BCE and the 1st C. BCE there seems to have been a consolidation of black gloss production centers. This is not a universal occurrence as there is evidence that sites other than Volterra and Arezzo are producing their own black gloss pottery. Yet, for the majority of sites within Etruria it seems that they resorted to importing their pottery either from these two sites or from Campania. In addition, with the introduction of red gloss pottery it seems that even fewer sites were used for production—narrowing down the locations to just Arezzo within Italy with some production centers abroad in Britain, Gaul, and North Africa.

The consolidation of black gloss production is relevant as it may relate to the production of red gloss. By the 1st C. BCE, outside of some continued local productions, only Arezzo was producing black gloss pottery. Arezzo is where red gloss production begins and for the most part is the only Italian production center for the pottery. It is possible that the earlier consolidation of production centers was maintained for the production of red gloss pottery. Generally speaking a smaller supply of the product may have put pressure on the supplier to be more selective in choosing markets to exchange with; only choosing the markets where it was economically beneficial or convenient, in this case areas of large consumption such as Rome and sites that lay along major trade routes to ports such as Pisa, Cosa, and Fiesole.

This accounts for some portion of the economic impact but it still does not explain why certain major Etruscan cities such as Vulci, Populonia, and Cerveteri do not have red gloss nor do other major port cities such as Talamone or Pyrgi. These sites may have been excluded for a number of reasons. One possibility is intended, conscious exclusion on the part of the Romans. It is also possible that the sites were abandoned or destroyed prior to the emergence of red gloss.

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33 Roth 2007
34 For Britain see Simpson 1952; for Gaulish see Stanfield and Simpson 1958; for North Africa see Hayes 1972
35 See Mayer 2012 Ch. 3 on commercial economies in the Roman Empire
perhaps during the 2nd Punic War, Social War, or Civil Wars. Lastly, it may be that the red gloss finds from these sites have gone unreported in the archaeological literature.

For certain sites such as Pyrgi or Cerveteri the lack of red gloss pottery is especially striking, so striking in fact that it must be due to either my own inability to locate data on their Roman finds or the lack of publications about such finds. In the case of Pyrgi the site was transformed into a Roman colony and the Romans invested quite heavily in its infrastructure. Furthermore, the site continued to be a major trading station for the Romans during the 1st C. BCE—specializing in fish.\textsuperscript{36} There is also evidence that during this period it served as a summer resort for the wealthy along with Punicum, a city not 10 km to the south.\textsuperscript{37} Pyrgi was also situated on the Via Aurelia, which was a major trade road extending from Rome to the port city of Pisa to the North. Therefore, in the case of Pyrgi the dearth of red gloss is almost certainly the result of incomplete publication.

Likewise the city of Cerveteri had a very intimate history with Rome, so much so that the Vestal Virgins, many sacred objects of Rome, and a portion of the population received shelter from Cerveteri during the Gallic invasion in 390 BCE.\textsuperscript{38} In 273 BCE the city then became a Roman praefecture. There is also evidence that during the Late Republic and Early Empire Cerveteri flourished in much the same way as Pyrgi—becoming a summer resort area and receiving investments in infrastructure under the Julio-Claudians.\textsuperscript{39} For all these reasons it seems extremely unlikely that there would not be significant quantities of red gloss pottery at both of

\textsuperscript{36} See Pyrgi Encyclopedia Britannica Entry
\textsuperscript{37} See Punicum Princeton Encyclopedia of Classical Sites
\textsuperscript{38} Vecchi 2012
\textsuperscript{39} Bedingfield 2014 pg. 16
these sites, especially because production of black gloss at Cerveteri ends at the same time that red gloss pottery begins circulation within Italy.

For other sites it is not a matter of lack of publications, but rather that the site was abandoned or destroyed at some point between the 3rd C. BCE and the 1st C. BCE. This seems to be the case for quite a few towns including Populonia, Talamone, and Vulci. Populonia and Talamone were on the wrong side of the Civil War between Sulla and Marius—supporting Marius. In response Sulla completely destroyed the towns and likely killed much of the male population and sold everyone else into slavery.\(^{40}\)

Vulci, however, seems to have simply been abandoned during the 3rd C. BCE following the dissolution of the Etruscan League. This abandonment was likely sparked by the establishment of the colony at Cosa, which absorbed much of the coastal area originally belonging to Vulci. Once cut off from the coast, Vulci would have suffered economically and many of the inhabitants likely would have moved elsewhere, possibly even to the city of Cosa itself.

Regardless of the reasons for these sites’ exclusion from the red gloss network they can be considered outliers as they only make up a small percentage of the number of sites that did not have red gloss pottery. For the vast majority of the sites it was not a matter of publications, destruction, or abandonment. Rather, there was outright disenfranchisement of the sites in favor of other sites. This becomes even more confusing when the sites that continue in the ceramic exchange and those that drop out are mapped against each other (Figure 3).

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\(^{40}\) Vecchi 2012 pg. 19
The map shows that aside from the coastal towns, many of which I have talked about as the outliers, sites that do not participate in the network are not grouped together in any meaningful way. Rather they are interspersed among other sites that continue to trade in red gloss ceramics. For example, Norchia near Tarquinia or Chianciano near Chiusi. These are significant towns which are in close proximity to major trade routes as well as large trade and residential cities. It would follow that they would also have red gloss pottery in some significant quantities, but they do not.

For some of these sites it is possible that they are being purposefully excluded; either forced exclusion from the Roman exchange network or a decision to isolate themselves from the Romanization of the peninsula. However, such detailed conclusions are impossible to draw from the much larger scope of the present study without much more detailed information on the pottery production and distribution during the periods in question or the specific sites’ historical context.

Both possibilities of exclusion rest on the assumption that red gloss pottery reflects the “Romanization” of the Italian peninsula and the Mediterranean at large. The adoption of red gloss pottery at certain sites and not at others may indicate an asymmetrical movement towards a “Romanized” Etruria. For example, sites that supported Sulla during the civil war likely would have continued to flourish in the late Republic and as a result would have adopted many of the Roman customs and practices. As part of this Roman package it is possible that red gloss pottery was a way of moving away from their more traditional Etruscan roots embedded in black gloss pottery. It is also during this late Republican period that there is a wide adoption of Latin as well as traditionally Roman values such as an emphasis on lineage, seen in genealogical inscriptions.
within tombs, and the Latinization of Etruscan names as represented in the statue of Aulus Metellus.41

Summary and Conclusion

Based on the ceramic network it seems that between the 3rd C. BCE and the 1st C. BCE a number of Etruscan cities are economically disenfranchised within the Roman economy. There are quite a few reasons for the exclusion of specific cities within this new Roman network. First, many of the cities of the 3rd C. BCE were either destroyed or abandoned soon after or during the expansion of Roman control in the 3rd and 2nd C. BCE. Second, some cities may have been “incidentally” excluded as the economic pay off of trading with these areas may have been too low for the cost needed to actually reach the cities. This may likely be the case for many of the interior Etruscan cities that do not lie on major land or water exchange routes. Some cities may have resisted any Romanization effects and consequently would have continued using locally produced pottery instead of the “Roman” red gloss type. Lastly, cities may have been “consciously” excluded from the network, or rather Roman colonies were set up within their vicinity which would have impoverished nearby Etruscan cities, and may even have indirectly resulted in their depopulation and abandonment.42

This final theory may fall under the abandonment hypothesis but I believe that the nuance here is important. Certain cities were simply abandoned due to the economic recession that hit Etruria during the 3rd and 2nd C. BCE. However, other cities may have been abandoned due to

41 Bonfante 1986
42 Salmon 1969 Roman Colonization under the Republic; Scott 1984 Cosa and its territory; BSA South Etruscan Survey
there being a lack of economic involvement because of the establishment of a Roman colony in the area (e.g. Cosa and the surrounding area).

It is also possible that the Roman road system played a role in structuring the network. Over the course of the 3rd C. BCE Rome would have numerous military engagements with Etruria. One of the mainstays of the Roman military was the roads that allowed for the efficient mobilization of large forces. Following the complete conquest of Etruria these roads would continue to be used, not only for military purposes but political and economic purposes as well. There are two roads specifically which cut through Etruria: the Via Cassia and Via Aurelia. The Via Aurelia leads from Rome to Cosa to Pisa and the Via Cassia lead right through the heart of Etruria by Veii and Volsinii, and connected to the Via Aurelia around Pisa. These roads likely would have played a major role in the economic enfranchisement of Etruscan cities from the 3rd to 1st C. BCE.

In a sense the change in this network may also be a reflection of the “Romanization” of the Italian peninsula over the course of the middle and late Republic. Based on evidence from cities such as Cerveteri and Cetamura there seems to be either a slight resurgence or at least a continuation of Etruscan identity after the 3rd C. BCE and even up until the 1st C. BCE. This may be reflected in the continued black gloss production and distribution even in the 1st C. BCE. However, it is likely that following the Social War and Civil War there was a mass reorganization of the Roman socio-political network, and consequently the economic network, as well as the political enfranchisement of the entire Etruscan population for their good faith towards Rome. Even in the 2nd C. BCE there is evidence of Rome’s growing cultural influence

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43 Laurence 1999
44 Colivicchi 2015; Bedingfield 2012
within Etruria as evidenced by the genealogical inscriptions in the tombs, the adoption of Latin as the language of choice, and the Latinization of Etruscan names.

While not providing the same depth of information that would be available with archaeometric studies it is possible to at least visualize Etruscan involvement in the socio-economic system during Roman expansion using pottery networks. The pattern points unequivocally toward a decline in participation in the broader economy, for a range of possible reasons. To explore those reasons further, another material proxy, coinage, is useful. There are counts of coins as well as mint locations, and these can be used to uncover some of the details of the structure of the network—namely degree and betweenness centrality measures both of which may offer an understanding of the involvement shown in the pottery record.
CHAPTER 3 - THE COIN NETWORK: STRUCTURING THE ETRUSCAN SOCIAL NETWORK

The numismatic record provides a much better picture of the economic impact of Roman expansion in Etruria than the pottery record. The wealth of information that any given coin may provide allows for discussion about the structure of the Etruscan network rather than just participation or exclusion. Any given example of a coin may provide: a find spot, a mint location, issuer, denomination, and with modern metrological research we can even locate the raw material sources for the coins and identify fakes. Thus the advantage of using coinage as a proxy is two-fold; it provides a direct representation of economic activity as well as metrics by which we can quantitatively analyze the network.

The minting of coinage is not unique to the Romans, as they likely adopted their own standards of production from the Greeks. However, it is likely that it is only the round form, based on a silver standard that is adopted from the Greeks. There is evidence of a different form of currency, the *aes rude*, dating back as early as the 8th C. BCE found on the Italian peninsula. This currency was based on a bronze standard and was essentially a bronze lump, which could double as raw material for bronze metal working.

It is not until the 5th C. BCE that anything resembling coinage is produced on the Italian peninsula. This manifests itself in the form of the *aes signatum*: a bronze ingot of a standard quality and weight that was embossed with a government stamp. While found throughout the Italian peninsula its production was based outside of Rome in Etruria, Umbria, and Reggio Emilia. By the 4th C. BCE these bronze bars had been replaced by the *aes grave*, the final

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45 Vecchi 2012
46 Vecchi 2012
iteration of Italian coinage that continues even into the Byzantine period.\footnote{Vecchi 2012} These coins were based on a governmental standard of quality and weight that was originally based on bronze but later in the Republic were based on silver. This type of Roman coinage survives best of the three forms and is covered the most heavily in modern scholarship on hoards and moneyer inscriptions.

For this network the coins were divided based on the minting culture as well as date, which was more the result of the availability of data on coin collections as opposed to the ideal scenario. So, to the early time period—the 4\textsuperscript{th} and 3\textsuperscript{rd} C. BCE—belong the Etruscan coins and the Roman coins are only considered for the later period, between the 1\textsuperscript{st} C. BCE and 1\textsuperscript{st} C. CE. Additionally, while the mints are similar to each other within their own time periods they do follow two different traditions.

History of Research

Study of Etruscan coinage began during the \textit{Etruscheria} of the Italian Renaissance in tandem with the rediscovery of ancient Etruria. This earlier scholarship tends to be filled with many inaccuracies that have since been corrected in modern scholarship. The first scholar to contribute in a meaningful way to Etruscan numismatics was Joseph Hilarius Eckhel in 1826.\footnote{Eckhel 1826 \textit{Doctrina nummorum veterum}} Eckhel identified the coinage production of Populonia and Volterra but misattributed the productions of Dacia and Elis to Cosa and the Faliscans respectively. This was followed by Millingen (1841) who correctly associated the Roman and Etruscan productions of the \textit{aes grave}
but incorrectly dated the Populonia series to an earlier time period based on stylistic differences.49 In 1885 Garrucci published a scientific catalogue of the Etruscan, Roman, and Greek coins of Italy complete with findspots and hoard information.50 His chronology was based on the timeline created earlier in the 60s by Mommsen who dated the inception of Populonia’s coinage to the mid-6th C. BCE.51

Over the course of the 20th C. numerous Etruscan coin hoards would be published that added to and corrected the previous foundation of research provided in the 19th C. The most famous is the Populonia coin hoard from Poggio della Porcareccia. This hoard was published in 1941 by Scamuzzi and was complemented by an archaeological survey of Populonia by Minto in 1943.52 Porcareccia provided provenance information to numerous coin types as well as corrected the date for the introduction of the *denarius* to Etruria. This hoard has since been republished with its own corrections by various scholars.

In 2001 the first volume of a new series of *Historia Numorum* was published: a comprehensive survey of coinage in Italy that brings together many eminent numismatists such as Crawford, Price, and Rutter.53 My own coin database pulls from *Etruscan Coinage* by Italo Vecchi (2012) which aggregates data from various journals and museum collections into a two volume catalogue of Etruscan coinage spanning the entirety of its production and includes mint locations, series types, images of examples, ancient and modern find spots, as well as weights and denominations.

49 Millingen 1841 *Considerations sur la numismatique de l’ancienne Italie*
50 Garrucci 1885 *Le monete dell’Italia antica*
51 Mommsen 1860 *Geschichte des romischen Munzwesens*
52 Scamuzzi 1941 *Tesoro di monete antiche rinvenute a Populonia;* Minto 1943 *Populonia*
53 Rutter et al. 2001 ed. *Historia Numorum*
Similarly there is a wealth of information on Roman coinage. However, as virtually all of
the Roman coins used within this study are pulled from hoards only the history of hoard research
will be discussed here. In the 19th C. Cavedoni was the first scholar to publish information on
Roman coin hoards which was later expanded by the work of Mommsen and Bahrfeldt who
included information on the moneyer inscriptions on coins.\footnote{Cavedoni 1829 Saggio, 1854 Ragguaglio storico, 1860 Ragguaglio archeologico; Bahrfeldt 1923;}

For Republican hoards the current lead scholar is Michael Crawford who has also
published quite extensively on Republican coinage in general.\footnote{Crawford 1969 Roman Republican Coin Hoards, 1974 Roman Republican Coinage, 1985 Coinage and Money under the Roman Republic.} Additionally, there are a number
of other scholars who have published in the 20th C. For example, scholars such as Mattingly and
Sear have published on Imperial coinage and the value of coinage over the course of Roman
history respectively. However, both later imperial coinage and the value of these coins is of little
relevance to my own research. What is of use are the various online catalogues of both
Republican and early Imperial coinage through the American Numismatic Society in cooperation
with the Institute for the Study of the Ancient World at NYU. Together they have collected
information and published over 50,000 coins from both the Republic and Empire, pulling from
collections in the British Museum, the University of Virginia Art Museum, the American
Numismatic Society’s collection, and the Munzkabinett of the State Museums of Berlin.

Problems of Coinage as a Proxy

Besides pottery, my second choice in proxies for understanding the economic impact of
Roman expansion into Etruria is coinage. Outside of the gold and silver coins, coinage is not
considered a prestige item but is highly visible in the archaeological record, widely circulated in Italy, and for the most part used throughout the various strata of Roman society—barring the lower extremes such as slaves. Still, much like using pottery, the choice in using coins comes with a few problems.

The principal problem is the antiquarian approach to coinage that dominated numismatics for the better part of the last two centuries. In many cases this was a result not on the part of the academics but the nature of archaeological excavation. Coins are particularly valuable on the illicit trade and commercial market—even with much of their provenance information missing. For this reason coins are especially susceptible to looting, yet are still purchased in large quantities by museums and private collectors. In other cases it is the fault of the academic archaeologist that provenience information was not recorded as early archaeological excavations tended to have less detailed reports compared to modern day standards.

Regardless of the reason why, there is a wealth of information that was inaccessible in the numismatic record thanks to unreported find spots. This essentially limited my working sample of coinage from the over 50,000 examples to less than 10 percent (~3,000 examples). Based on this restriction alone it is possible that there are a multitude of sites, which did have Etruscan or Roman Republican coinage that have not been reported.

Another problem with coinage, even with the find spots, is the limited nature of the find locations. Generally speaking, coinage was used within the Roman economy for exchange to purchase goods, to pay taxes, to pay state contractors, or to pay soldiers—all of which would have occurred within city centers.\(^56\) Thus, it is significantly less likely that coins are going to be

\(^{56}\) Harl 1996 *Coinage in the Roman Economy* Ch. 1
found in the rural areas like pottery and also limits the number of sites that are included within the network. This becomes especially apparent with the 1st C. BCE and CE Roman coins.

With any given material it is only the final deposition that is known beyond doubt. The use life for high velocity items such as coinage and pottery is very difficult to understand without very constricted contexts or literary evidence. For pottery this is less of a problem as it is much more prolific in the archaeological record than coinage. It is impossible to know how many times the coins themselves changed hands or how many cities they would have traveled through before being deposited in their hoards.

For my later time period virtually all of the coin information is pulled from hoard publications. On the one hand, this is good as hoards can contain any number of coins produced during different time periods and locations which allows for more discussion about exchange in Italy. Coin hoards are also still indicative of inclusion within a network. Someone made the conscious decision to bury the hoard in that particular place and people were not likely to travel great distances simply to bury coins. On the other hand, this further limits the number of sites included within the network. Regardless of these problems I was able to collect enough information about coinages and the find spots to create two strikingly contrasting networks.

The Network

The two coin networks are composed of an accumulation of coin examples from various catalogues. I first grouped the coins based on their mint locations. For the Etruscan period there are currently a total of seven identified mints: Cosa, Luca, Pisa, Populonia, Vetulonia, Volsinii, and Vulci. For the later Roman period there are numerous mint locations but the majority of the
coins used within the network come from Gaul or Rome. Within this group I further divided the coins by material type: bronze, silver, and gold. Finally, within these subgroups I further divided and grouped the coins based on their denominations: 100 Units, 20 Units, Asses, Didrachms, Uncia, etc.

The basis of my ties for this time period were any two nodes which shared a similar coin type—regardless of mint location. For example, all 20-asses silvers were tied to each other even if they were minted in different locations. Practically speaking, it seems unlikely that without some inscription indicating the mint location the Etruscans themselves would have been able to distinguish a Populonia coin from a Vulci coin, and the overwhelming majority of Etruscan coins do not have these inscriptions. Additionally, this mint information while not directly built into the network still manifests itself in the centrality measures. The mints tend to have a much larger variety of coin types than the recipient cities and this shows in the larger number of ties for mint nodes relative to non-mint nodes. For the Roman period it is much more likely the users were aware of the various mints based on coinage iconography and inscriptions. However, I would argue the limited number of mint sites used within this study make this small additional bit of information irrelevant to the purpose of the study.57

The total number of sites for both time periods is 64 sites with all 64 being part of the later Roman network and a fewer number (~62) being part of the Etruscan network. As previously mentioned there are a number of advantages to this network over the pottery network. First and foremost, this network is not absolutely dense—certain sites are more central and connected than others. For example, in the pottery network every active node was tied to every

57 All of the hoards used for the Roman time period come from four mint locations: Rome, Lugdunum, Cisapline Gaul, and North Africa. This is not an exhaustive list of 1st C. BCE mint locations but this is the extent of mints used within this study.
other active node in the network yielding a density of 1.\textsuperscript{58} Within the coin network not every node is connected to the all the others and some nodes have more ties than others which decreases the overall density of the network (~.04). This allows for discussion about “degree centrality.” Degree centrality refers to the number of edges connected to a node relative to the overall number of ties within a network.\textsuperscript{59} Generally speaking this centrality measure may be associated with a site’s importance economically and even culturally within a network.\textsuperscript{60} The sparsity of the coin network also provides information on the vulnerability of sites. Because some sites are less central and located on the periphery of the network they are more vulnerable to removal from the network if certain sites fail to continue into the Roman period. As will be shown this is an extremely important measure for the transformation of the network during the Roman period.

Within the Etruscan coin network it becomes very apparent which sites are central and which are halo or periphery sites. For example, Populonia was a major coin production center during the 4\textsuperscript{th} and 3\textsuperscript{rd} C. BCE and therefore produced a large amount of coinage that it shares with many of the sites within the network. The relative output of each of the seven Etruscan coin production centers can easily be seen by the degree centrality of the node—as represented by the relative size of the node (Figure 4).

As shown in Figure 4 the mint with the highest output as well as the most central site in the coin network is Populonia. The centrality of Populonia translates into its importance for the continued inclusion of a number of sites within the network—no other mint location is even

\textsuperscript{58} A density of .6 including the non-active nodes
\textsuperscript{59} Collar et al. 2015 see degree centrality definition pg. 20
\textsuperscript{60} Populonia, Vulci, Volterra, and Volsinii were all part of the duodecempoli which were the 12 leading Etruscan cities in Etruria
marginally as important to the network’s cohesion. Applying a manual cut point test to Populonia, manually removing this node from the network, results in a pair of dyads and makes a number of sites more vulnerable to isolation within the network. This is a very important test as Populonia is one of the major sites that does not continue into the Roman period. Many of the sites that then become isolated also do not continue into the Roman period.

What is even more interesting about this centrality measure is that there are a number of sites which were not production centers but in some cases are even more central than some of the smaller mints, namely Blera, Cecina, Cerveteri, and Roselle. The most important of these four sites is Cecina. It both has the highest centrality score of the four and is the most important to the continued inclusion of a couple of sites within the network. Removing Cecina from the network isolates Sovana from the network and creates a dyad between Arezzo and Vetus Urbs (Orvieto).

Additionally, when the cut test is applied to all of the mint locations and the four important halo sites that do not continue into the Roman period, a pattern of isolation emerges. Many of the sites that were dependent on these sites for inclusion in the network become isolates within the Roman coin network (Figure 5). In fact it is purely the dyads and networks that are either part of what I call a “Command Dyads” or “Command Networks,” dyads or networks which have one or more nodes which were Roman pottery production or trade centers or colonies, which continue from the Etruscan network into the Roman network. All of the other sites in the Roman network are new inclusions. This is especially important as almost all of the new additions to the network that have the highest centrality scores are Roman colonies.

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61 Arezzo, Vetus Urbs, Luca, and Pisa here are part of Command Dyads and Cosa is part of a Command Network. It is important to understand that Etruscan Cosa while in a similar location is not the same as the Roman colony of Cosa which was established in the 3rd C. BCE (273).

62 Capena, Roman Cosa, and Sutrium
There are a number of other interesting occurrences in the transition from the Etruscan to the Roman network. For example, Veii is not included in the Etruscan network even though it is one of the duodecempoli. This is probably because of its destruction in the beginning of the 4th C. BCE. However, it does appear in the Roman network. Additionally, similar to the pottery network, there is a stark increase in the number of isolates within the Roman network: the Etruscan network having only three isolates and the Roman network having 48. However, the Roman coin network (~.06) is denser than the Etruscan coin network (~.04); for each node there are significantly more ties between them. This translates into a much more cohesive network that is more resistant to collapse than the Etruscan network; each node becomes more central, requiring more cuts to collapse the network.

This transformation of the coin network from the Etruscan to Roman period combined with the change in density of the network speaks to the application of the Imperial control over the region of Etruria. During the Etruscan period cities were more or less self-sufficient city-states that thrived or declined based on the exchanges they had with neighboring city-states. The implementation of bilateral treaties between Rome and the cities of Etruria removed many of these ties between settlements. Additionally, Roman expansion and conquest destroyed many of the most important Etruscan mints. By the Augustan period a Roman administration had been put in place that was much more resistant to collapse thanks to the consolidation of sites included in the network, the increase in ties between the sites, and the increased number of central sites in the network. This provided Rome with an economic framework to firmly control Etruria and possibly even assist in the Romanization of the region.

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63 The stray find at Castel d’Asso may even be discounted which would increase the isolate count to 49 which is 77% of the network.
Combining the Networks

In order to have a more holistic approach to the networks I decided to combine the pottery and coin networks with each other. This was done by “correcting” the two networks’ site lists so that they matched. For example, in the Etruscan coin network Cecina is a site that does not appear in the pottery network. So I added it to the pottery network but it shows as not having any black gloss pottery. In this way the matrices for the coin and pottery networks matched and could be easily layered on each other to create a combined network. This combined network has the added benefit of both maintaining the relative density and degree centrality measures of the individual networks but I also use an extra measure, betweenness centrality, which is useful in understanding positional power within networks.

Betweenness centrality is a measure of the fraction of the number of edges passing through a site over the number of all edges passing through all sites. It is essentially the centrality of a site as it relates to the ability of other sites to exchange with each other. For example, in a linear three-site network between Veii, Vulci, and Cerveteri with Veii in the center, Veii would have a high betweenness centrality score as it is the only avenue by which Cerveteri and Vulci can communicate with each other. When scaled up to the region this measure can be useful in understanding which cities are important for the exchange of information amongst the other sites in the network.

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64 All sites with accessible pottery data were included in the pottery network. Sites added to the pottery network from the coin network were merely added in order to create mirroring matrices to assist in layering the networks. The absence of the pottery in this new matrix does not affect the measures used in other parts of the research.
65 See Hanneman and Riddle Ch. 10 “Centrality and Power”; also see Collar et al. 2015 “Networks in Archaeology”
66 Collar et al. 2015 see betweenness centrality definition pg. 17
Within the Etruscan network there are four specific sites which have relatively high betweenness centrality scores as represented by the relative size of the nodes: Populonia, Cecina, Volterra, and Vetulonia (Figure 6). The lowest score is Cecina but it still has a score twice as high as the next highest site’s score. This result is expected for Populonia, Vetulonia, and Volterra as they are both included in the pottery network and are also mint locations in the coin networks. Cecina, while not a mint location, does have the highest centrality score of the non-mint sites within the Etruscan network. What this measure shows is that these four sites are extremely important for the continued exchange of information, in this case economic information, between sites that are part of the coin network and sites that are part of the pottery network, which are divided quite distinctly within the network.

In the coin network these four cities are also the sites that are destroyed or excluded from the network—to the detriment of their dependent sites. Looking at the Roman network there is a series of seven sites which replace these previous four as the most central sites: Arezzo, Cosa, Capena, Fiesole, Pisa, Sutrium, and Veii (Figure 7). Cosa, Capena, and Sutrium understandably become prominent within the network as they are Roman colonies established within Etruria and will become centers of economic exchange and political administration.

What is more interesting about the Roman network are the native Etruscan sites that continue into the Roman period. The cut test in the coin network showed that a few of these sites—specifically Arezzo and Pisa, were isolated into Command Dyads following the removal of Populonia and Cecina from the network. This combined network reinforces the argument that these halo sites have some independent advantages that drew the Romans to these sites. I argue that the independent advantages that these two sites have is their geographic location within Italy. Pisa lies directly on the coast at the mouth of the Arno River and Arezzo lies equidistant
from the Arno and Tiber Rivers in the northeastern edge of Etruria proper. These locations would have been especially useful in controlling trade within and outside of Italy. It is also likely not coincidence that both of these sites become major production centers of red gloss pottery in the 1st C. BCE which, as I mentioned previously, some scholars argue is an identifier of Roman influence or control of a region.

Veii is the surprising continuity in this network given the hostile history with Rome. Veii had been sacked almost 300 years earlier and by the 1st C. BCE it is likely that the geographic area had been completely absorbed into the territory of Rome and the population itself almost completely replaced with Romans. To some degree Fiesole may also be added to this category as the city is incorporated into the economic vicinity of Roman Florence. However, it has the added benefit of also being a part of the pottery network, which Florence was not, bolstering its centrality score.

All seven of these sites have equal centrality scores—both degree and betweenness—which further shows their importance to the Roman network. It should be mentioned that the combined Roman network is almost one-fifth as dense as the Etruscan network. This seems to spawn from the inclusive nature of the Etruscan network which had many more ties between sites as well as overall higher proportion (~95%) of sites included in the network. The Roman network on the other hand had a much lower proportion of participation (~45%) as over half of the sites were excluded from the network. However, the density score is likely more a reflection of the high number of isolates as opposed to the actual number of ties within the network. The density of the active nodes is likely even more dense than the Etruscan network, and combined with the increased number of central sites is much more resistant to collapse as evidenced by the fact that many of these sites continued to be prominent even into the Medieval Period.
Summary and Conclusion

There are some very stark contrasts between the Etruscan coin network and the Roman coin network. The Etruscan coin network is comprised of a few especially central sites such as Populonia, Cecina, Blera, and others. Once these sites are removed from the network a number of their halo sites either become dyads or isolates—completely removed from the larger network. This is important as many of these sites are also sites that do not continue into the Roman period.

Additionally, there a few interesting additions to the Roman coin network—Roman Cosa, Capena, and Sutrium—all of which are Roman colonies established during the 3rd C. BCE. This Roman network is also comprised of sites with much more equivalent centrality scores compared to the Etruscan network, which may be indicative of the Imperial administration that was put in place by Augustus. This administration both consolidated the network and made it much more resistant to collapse by increasing the connectivity between the sites.

It is also likely not by mistake that a large number of the sites included in this “Administrative Network” are sites that lie on major trade routes such as the Arno or Via Aurelia, are in the immediate vicinity of Rome or a major pottery production center such as Arezzo or Pisa, or lie along the coast such as Cosa or Gravisca. This mirrors pretty closely the pottery network, which showed the same pattern of isolation and continuation.

The combined networks further support many of the findings from the coin networks. A number of sites that were central to the Etruscan network do not continue and are replaced by new sites in the Roman network. These sites include both native Etruscan sites as well as newer Roman colonies established over the course of the 3rd – 1st C. BCE. The Roman network also
increases the relative density of the network as well as the number of central sites. This helps to buffer the Roman network from collapse, and is reflected in the continued survival and dominance of these cities in Italy even into the medieval period.
CHAPTER 3 - CONCLUSION

Social networks are an especially useful way of gauging economic impact on areas providing that proper proxies are chosen. For my own study I decided to use pottery and coinage, both of which are highly visible in the archaeological record, used throughout the various social strata of society, and have a relative long history of research and scholarship from which to pull information. The macro level approach of SNA allows for an understanding of the economic impact on the entire region. This is especially useful in Mediterranean and Roman studies as the Romans did not conquer cities but entire regions in their campaigns. This is not to say that different subareas of each region were not affected differently by Roman expansion, but even this variable response can be captured in social networks when temporally different networks are compared.

This study focuses on the economic impact of Roman expansion on the region of Etruria. In some ways the results were expected, but there were some new insights on the administration during the Roman period. It is well agreed upon that Etruria was economically strangled during the Roman period, barring a few exceptions. This is made clear through the pottery network which shows the involvement of cities between the Etruscan network during the 4th and 3rd C. BCE and the Roman network during the 1st C. BCE and 1st C. CE. A massive portion of sites become isolates in the Roman period—a number of which were part of the Etruscan League.

A similar response is represented in the coin network but coinage offers the advantage of a more in depth analysis of the structure of the network. The coin network shows that there were a number of cities, both mints and non-mints, which were especially important to the continued cohesion of the network as a whole. This is a consequence of the fairly loose confederate organization of Etruria in which each city governed itself and certain cities held more power
within the region than others. When conflict began with the Romans and many of these cities fell and were colonized, their dependent sites became isolates. In the place of these important Etruscan sites, new sites rise to prominence that comprised both native Etruscan sites and Roman colonies. This new Roman network is much more cohesive and is made of a larger number of central sites, making it more resistant to collapse than the looser Etruscan network.

These findings are further supported by the combined networks that provide a more holistic view of economic impact than the individual Etruscan and Roman networks. These networks show that there are four specific centers in the Etruscan period, which are important to the exchange of information between other sites within the network. These sites are destroyed by the Romans and are then replaced by their halo sites and a few new additions by the Romans. Although there are significantly more isolates within the Roman network, this new network is denser when only the active nodes are considered. The number of sites that are important to the exchange of information between sites is increased from four to seven and the overall centrality scores of sites in the network increases. I argue that this is a reflection of conscious decisions on the part of the Romans. They specifically chose these sites, many of which lie in geographically important positions along rivers and the coast, as administrative centers for the Augustan 7th Region of Italy.

The selection of cities used to govern Etruria seems to be based on the strategic locations of the sites for political, economic, and militaristic reasons. Veii is the most surprising choice due to its history with Rome. However, it is very likely that by the 1st C. BCE the population of Veii had been completely replaced by Romans, or at least Etruscans who had fully adopted Roman culture. Furthermore, geographically Veii was only 16 km away from Rome and likely would have experienced the full effect of the Romanization process. Fiesole, similarly, while not
directly next to Rome was within the vicinity of Roman Florence. Consequently it may have also been absorbed into the political and economic sphere of a nearby Roman city.

The less surprising choices are Capena, Cosa, and Sutrium which were all Roman colonies established between the 3rd and 1st C. BCE. Roman colonies, especially those founded *ex novo* were especially important administrative and military bases that were used by the Romans to maintain control of recently conquered regions. It is no coincidence that all three of these colonies were established in Southern Etruria where the bulk of the important and more hostile Etruscan cities were located.

Arezzo and Pisa, while not as obvious choices as the Roman colonies, were also not surprising. By the mid-1st C. BCE black gloss pottery production was beginning to be replaced by the newer red gloss production, specifically centered on the city of Arezzo. Arezzo lies equidistant from both the Arno River and the Tiber River that were important trade routes for intra-Italian trade. At the mouth of the Arno River is the city of Pisa which, along with Cosa, was one of the main ports used for foreign exchange outside of Italy.

This Imperial administrative network allowed for a large number of these sites to continue as important sites even into the medieval period. While the size of the network decreased from the Etruscan to Roman period, using only active nodes within the network the overall density of the network increased. This correlates to an increase in cohesion of the network. As centrality scores move closer together the vulnerability of the network decreases as it takes more site failures to collapse the network. This consolidated, cohesive network is likely a hallmark of Roman Imperial administration and the continued importance of these sites is a testament to the strategic decisions of Rome.
This study is likely the first of its kind. To my knowledge no other previous scholars have used social network analysis to understand Etruscan inter-site relationships and how these were manipulated or replaced by the Romans in their colonization ventures. Based on the results of this study it seems that SNA is particularly useful for understanding the adaptation of networks in transitional periods, which may also reflect conscious choices being made by the Romans. However, this study does suffer from the restrictive timespan that I was given to complete my research as well as the availability of data from just a desktop computer and university library. It would be interesting to see if the same model of an imperial administrative network is also visible in other provinces and regions but there are also many areas which I believe I can expand on my study to give a much more holistic idea of the Roman colonization of Etruria.
Figure 1. The Etruscan Black Gloss Network.
Figure 2. The Roman Red Gloss Network.

Figure 3. Find spots for Black Gloss (BG) and Red Gloss (RG) pottery within Etruria.
Figure 4. The Etruscan Coin Network. Node size is dictated by degree centrality scores where the larger the node the higher the centrality score.

Figure 5. The Roman Coin Network. Node size is dictated by degree centrality scores where the larger the node the higher the score.
Figure 6. Combined Etruscan Network. Node size dictated by betweenness centrality scores where the larger the node the higher the score.

Figure 7. Combined Roman Network. Node size is dictated by betweenness centrality scores where the larger the node the higher the score.
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