Beyond *Guanxi*:
Chinese Historical Networks

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DOAJ DIRECTORY OF
OPEN ACCESS
JOURNALS

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From Kinship to Collegiality: Changing Literati Networks, 1100–1400

Abstract   This is study of changes in kinship and scholarly association in Wuzhou, a prefecture in the middle of Zhejiang province. The geographic extent of literati kinship connections became increasingly local from the twelfth century on, but paradoxically the kinship connections across the prefecture declined as well. However, at the same time cross-prefecture scholarly connections among literati increased, becoming the new foundation for literati group solidarity.

With social network analysis, it is possible to track social change at scale. An anecdote can be the starting point for an explanation of historical change, but it is data – the amassing of anecdotal information – that proves the case. This article relies on data from the China Biographical Database (discussed elsewhere in this issue by Michael Fuller and Wang Hongsu), which is a highly structured relational database of biographical data and the largest ever created for the study of Chinese history. I use this data not only to confirm a well-known argument about elite social change, but also to explore an unexpected paradox.*1

This study is based on biographical data from the prefecture of Wuzhou (Jinhua from the mid-fourteenth century onwards) in mid-Zhejiang province in southeastern China. The prefecture, a diamond shape 74 miles from north to south and 92 miles from east to west, was made up of seven counties at the time; it had about 155,000 registered households in the mid-twelfth century and 216,000 by the end of the thirteenth. In the late 1120s, when the capital of Song China fell to the Jurchens and was driven from the north China plain to Hangzhou in the southeast, Wuzhou and many other places suddenly found themselves near the capital with easy access to the court and information. Wuzhou literati, the very small segment of the population whose education made them eligible to compete for official appointments in the civil service examinations, saw greater success than it had ever known, and success bred success. However, Wuzhou, like the rest of the Song state in the south, fell to Mongols in the 1270s, and remained under foreign rule for the next century.

"Literati" is a translation of the term *shi,* a term that had been used since antiquity to denote the national political-social elite. During the course of the Song dynasty (960–1279) shared views of what defined men as *shi* shifted from birth and pedigree to merit as represented by learning, an attainment that written examinations were intended to assess. To translate *shi* as literati recognizes this change. From the government's perspective, the civil service examination system was a highly selective mechanism for choosing men for office. In some places, Wuzhou for example, the pass:fail ratio was set at 1:200. But from the perspective of those competing, participation alone had its rewards: meeting other men from the prefecture with a similar education, gaining access to local officials, meeting potential marriage partners, to name but a few. Above all, participa-

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1   "The China Biographical Database." The database is accessible online and is freely available to download from the website, https://projects.iq.harvard.edu/cbdb/. For the structure, logic, and goals of the database, see the article in this issue by Michael A. Fuller and Wang Hongsu. For a detailed explanation of all features the database see Michael A. Fuller, *The CBDB User's Guide,* (Cambridge, MA: China Biographical Database Project, 2020), https://projects.iq.harvard.edu/files/cbdb/files/users_guide_20200927.pdf.

tion became evidence that one was one of the *shi,* one of the literati, and thus a member of the national elite even while his life was lived out in his home locale. Although the number of candidates kept increasing and the proportion of those who passed kept decreasing, families were recompensed for their investment in educating their sons for twenty or thirty years.[2] However, this equation of examination participation with literati status became problematic when the Mongols, upon conquering the south in the 1270s, discontinued recruitment through literary examinations, and although they restored them in 1315, the numbers were so limited that it was no longer the best way to civil office.

Literati learning produced the sources for our knowledge of elite social associations and kinship. There is a widespread, but incorrect, notion that the education of civil service examination candidates consisted of memorizing the Confucian Classics and writing essays on passages from the Classics in a rigid format. Education meant learning to read and write in the first place and, as a student advanced, acquiring more knowledge of the textual tradition (the Classics and commentaries, historical writings, philosophical texts, and literary traditions) as well as mastering the art of composition in a variety of literary genres (poetic forms, rhapsodies, letters, inscriptions, prefaces, epitaphs, memorials, edicts, legal judgments, etc.).[3] Literary writings were typically "occasional;" that is, they were composed for or at a specific social occasion or event, but "occasional" understates the importance of literary writing for social communication and bureaucratic practice. All literati learned what they needed to know to participate in schools and exams, but some gained fame as "scholars", as *xuezhe,* or "those who learn." Being a "scholar" includes much of what we would expect – writing commentaries on the Confucian Classics and other texts, philosophical lectures, historical studies, statecraft treatises, local histories, and so on – but it almost always included producing occasional writings, often at the request of others, which in turn would be compiled by his students or descendants in the form of a literary collection. Although we might see literati who gained a following for their literary skill – whose compositions were sought after and served as models for others – as writers, they were "scholars" in the parlance of the time. Their literary collections, as well as the surviving collections of occasional writings of everyone else, are thus repositories of the literary exchanges that created the social networks of literati life.

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2   The classic study of the Song examination system is John W. Chaffee, *Thorny Gates of Learning.* On the role of the system in certifying social status see Peter K. Bol, "The Sung Examination System".

3   Although less attentive to the literary aspect of literati learning, the breadth of Song learning is evident from the articles in Wm. Theodore de Bary and John W. Chaffee, *Neo-Confucian Education.* The definitive history of the late imperial examination system is Benjamin A. Elman, *Cultural History of Civil Examinations.*

One genre of occasional writing, the epitaph, is the most widely-available source of what we know about kinship networks.[4] Epitaphs – biographical records placed in the grave of the deceased, but also included in the author's literary collection – give three generations of the patriline of the deceased, sometimes including wives and their parentage, the descendants of the deceased at the time the epitaph was written, and usually included the deceased spouses and the husbands of female descendants. Official titles of men and women are usually included. Getting a well-known person to write an epitaph added luster to the reputation of the deceased, so famous scholars were thus likely to write many epitaphs. Social historians have used these to make important arguments about how family strategies changed over time.

The general principle that literati families followed in selecting marriage partners for their sons and daughters was to treat marriage as an alliance between families that had the capacity to be of service to each other. Thus, in a family that saw government service as the family occupation, for example, a father who was an official (or aspired to be one) served his family best by marrying his children to the children of a man of equal or better status. Under such circumstances, where he was from would matter less than the rank he held. But what was thought to be of value in making a marriage was not set in stone. Social historians have argued that around the time the Song moved south, literati family strategies shifted. In essence, families shifted from pursuing national bureaucratic marriage, which would create allies within the national bureaucracy, to local marriage, which would cement relations with other powerful local families.[5] There are four interlocking ways of accounting for this. Institutionally, the examination system encouraged education and participation, but because the number of official positions available did not increase, literati families had ever less prospect of placing their sons in office and thus became ever less able to marry nationally; they began to conclude that local marriage alliances were vital for their descendants' well-being. Politically, there were two reasons: first, the intense fac-

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4   For the period under discussion genealogies have potential value, as the work by Zhong Chong noted below has shown. However, that research largely depended on genealogies held in the family.

5   This was proposed by Robert Hartwell, "Demographic, Political, and Social Transformation of China, 750–1550." The local elite thesis was given substance in an intensive local study by Robert Hymes; see Robert P. Hymes, *Statesmen and Gentlemen;* "Marriage, Descent Groups, and the Localist Strategy in Sung and Yuan Fu-chou." I find this convincingly demonstrated, but some have argued against a "localization" of the elite; see Bao Weimin, "Jingyingmen difanghuale ma?". Hymes's contention that this went together with the withdrawal of the state from local society should be understood as the Southern Song court's abandoning of the activist policies of late Northern Song. Beverly Bossler, in a study of Song Wuzhou families and chief councilor families, has shown that matching status was still the operative family strategy but that in Southern Song one was much more likely to find suitable partners locally; see Beverley Bossler, *Powerful Relations.* Hymes takes all this into account in Robert Hymes, "Sung Society and Social Change".

tionalism toward the end of the Northern Song period (960–1126) forced out certain families that had seen government as their family occupation; and second, the activist policies that had immensely extended the state's interference in society, economy, and education and had guided the court from the 1070s to the 1120s were abandoned as the reconstituted dynasty in the south focused its attention and resources on national defense, granting the families with bureaucratic experience but no career prospects greater leeway to play dominant roles in local society. Geographically, the move south left southern literati families in place, where they had already been for generations and, if they did attain office, gave them local bases to return to, whereas the northerners who remained with the Song state were now refugees. The counties with a strong literati presence, as measured by examination degrees, were in four areas (modern Zhejiang, Jiangxi, Fujian, and southern Jiangsu provinces) that had not been decimated by warfare (although some areas, including Wuzhou, had suffered from the Fang La rebellion in 1120). This meant that over time, families with histories of government service had gradually increased, making it easier to find marriage partners of similar status locally. A demonstrable result of these four developments was that local literati became increasingly interested in local society and their own role in its welfare and history, something that had not been apparent from their occasional writing during the Northern Song.

1.   The Data

Beginning in the twelfth century, the number of Wuzhou literati competing in the civil service examinations steadily increased; some were extraordinarily successful, with four becoming chief councilors. The number of literati who became scholars and left behind literary collections and books also increased, and this continued to be the case into the late fourteenth century. This has provided a trove of data on kinship and social relationships, a good proportion of which has been included in the China Biographical Database (CBDB). For this study, all available kinship data for Wuzhou persons from Northern Song through Yuan has been entered into the CBDB.

At the time of writing, the CBDB has data on over 470,000 persons, mainly from the seventh through nineteenth centuries. Given how data is extracted from texts and the collection priorities, the amount of data varies by person and period. For the Tang, Song, and Yuan dynasties in particular, there is strong information on literary exchanges, kinship, careers, native places, and writings. Wuzhou persons in the CBDB are given in table 1.

The bar chart below shows the distribution by county and by dynasty. This is not evidence of changes in population, but of the number of persons who entered the historical record. One can see from this that Lanxi, for example, produced relatively more people of note during the Ming period.

Period	Total	With Index Year	Jinhua	Lanxi	Dong-yang	Yiwu	Yong-kang	Pu-jiang	Wuyi	Tangxi after 1471
Tang-Five Dynasties	86	67								
Song	1,584	1,375 (N. Song 229) (S. Song 1,146)	509	145	257	267	209	97	100	
Yuan	916	611	186	92	165	186	75	192	6	
Ming	1,556	1,371	244	393	281	197	208	192	12	29
Qing	316	164	33	40	125	32	20	60	3	3
ROC	20	20	8	2	4	2	4			
TOTAL	4,478	3,608	980	672	832	684	516	541	121	32

Tab. 1 The number of people in the CBDB listed with Wuzhou as their place of affiliation (*jiguan* 籍貫) by dynasty, the number with index years, and the distribution over counties. The concept of "index year" is explained below. Northern Song 960–1126, Southern Song 1127–1276, Yuan 1270–1368, Ming 1368–1644, Qing 1644–1911, Republic of China 1911–1949.
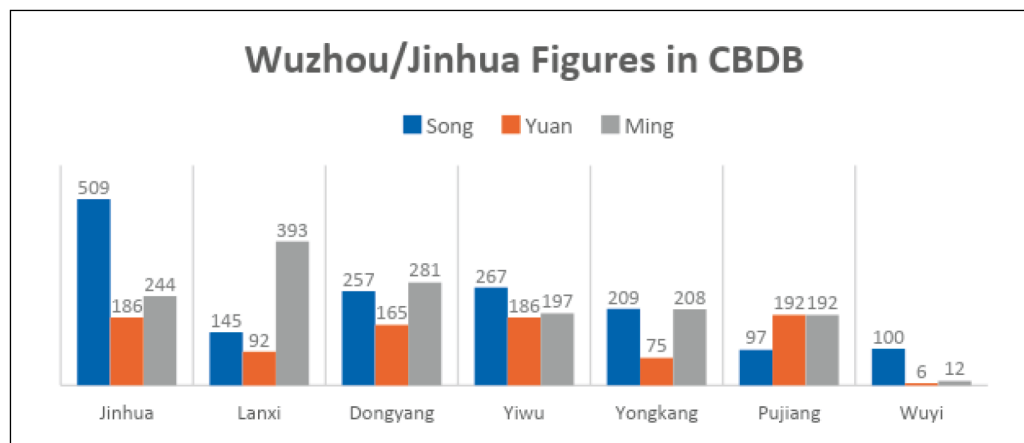
Chart 1 Distribution of Wuzhou persons in CBDB by county and dynasty.

Epitaphs provide the birth and death dates of the principals, however, this data is lacking for many of the people who appear in the CBDB. In most cases, however, it is possible to use other data to locate a person in time. As Fuller and Wang explain, to accomplish this the CBDB uses a heuristic, the "index year," a person's putative 60th year. Using index years allows one to base queries on persons we can be confident are from a given time period.

2. The Spatiality of Kin Relations

In order to test the theory that marriage networks narrowed, I designed a query to discover the spatial distribution of the kin relations of Wuzhou literati. In this case the results will include in and out migrants. The CBDB kinship query has four parameters, as explained in greater detail by Fuller and Wang:

- Number of Ancestral Generations
- Number of Descendent Generations
- Number of Collateral Links (number of horizontal or sibling links; a father's brother has one unit of "collateral" distance, a wife's sister has one unit of "marriage" distance and one unit of collateral distance).
- Number of Marriage Links (number of links defined by marriage; e.g. a wife's sister's husband has two units of "marriage" distance)
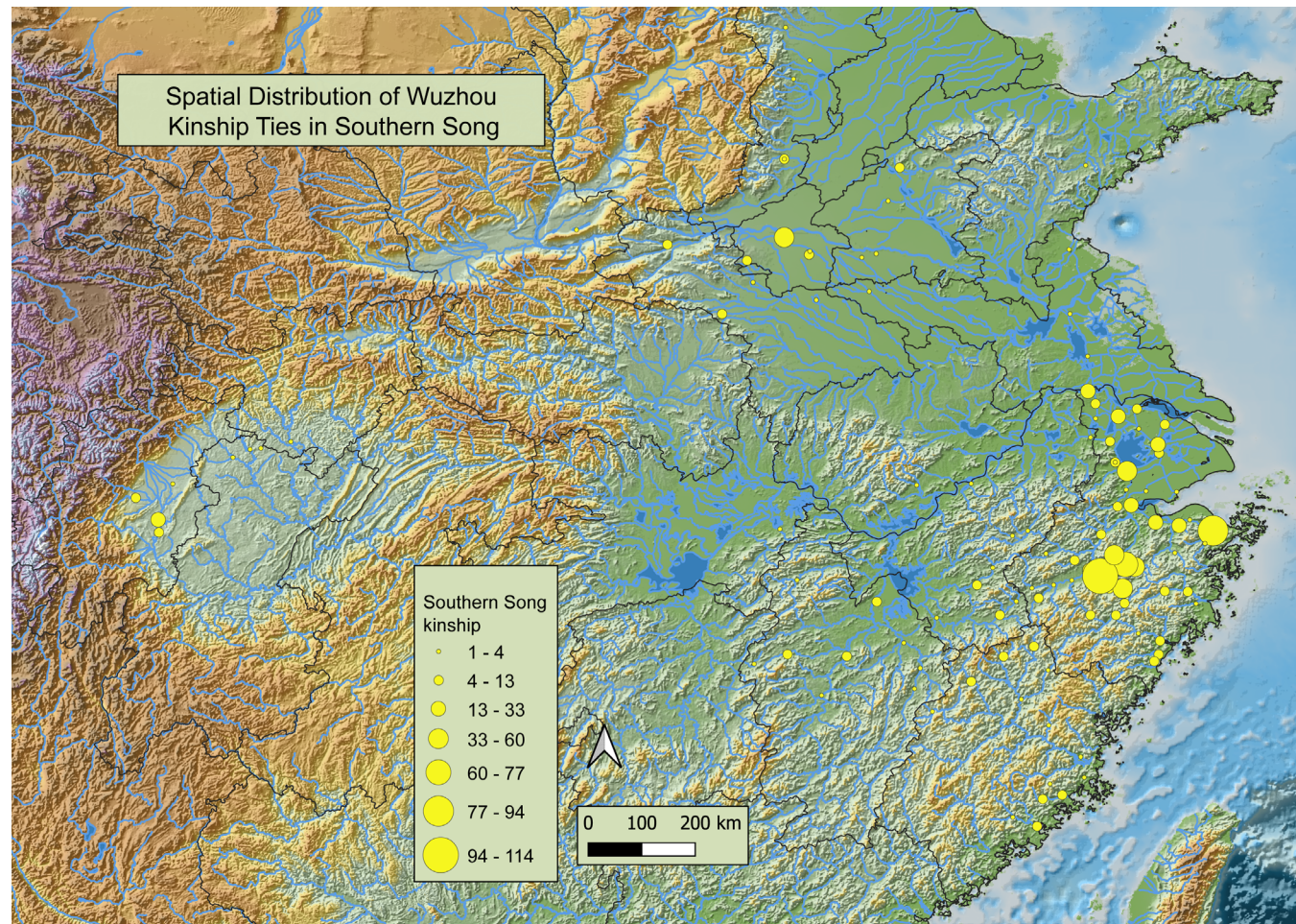
In all but one case I kept the collateral and marriage links constant at 1 and varied the vertical ancestral and descendant generations from 3 to 0. The results are in table 2.
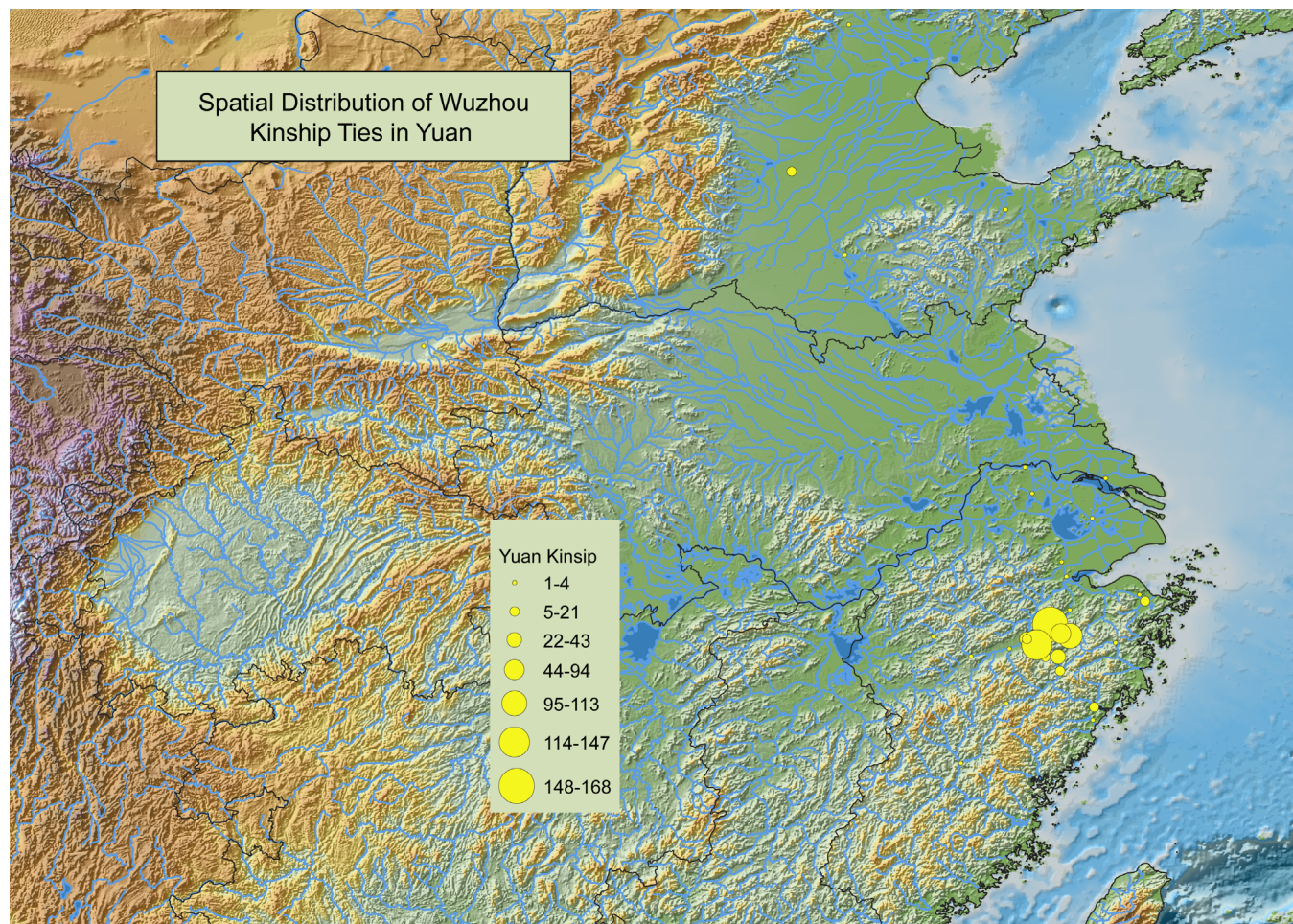
Two ways of interpreting this chart stand out. First, the Southern Song pattern is not so different from Northern Song that we would posit a change in family strategy. Second, Yuan kinship is extremely localized. Marriage did become more localized, but this is only obvious for the Yuan period. The maps below compare the spatial distribution of Southern Song and Yuan kinship with the parameters of 2-2-1-1. Ultimately, marriage did become more localized. The lack of a significant difference between Northern Song and Southern Song may be the result of refugees from the north settling in Southern Song Wuzhou. This did not happen when the Yuan conquered the Song in the 1270s.

Marriages were arranged to benefit the partner families. A narrowing of the geographic range thus means that families were able to find suitable partners locally. But what were the criteria for suitability? To put the question in another way, what were the interests that led families to see others as suitable partners, and how did these change over time? There were practical economic and security interests – families wanted affines who were at least as wealthy; there were status concerns – official status mattered, but there were also cultural concerns – in Southern Song, being well educated offered the prospect of examination success and shared values. We would expect, therefore, that as marriage partners become more local, there would be ever greater intermarriage between local literati. To test this I graphed the 2-2-1-1 kinship networks for Southern Song and Yuan. First, I identified the "giant component", namely the largest group of nodes that were connected together. Second, I labeled the persons in the component to see if different families were involved. Third, I colored the nodes by county to see if families from different counties were intermarrying. The Southern Song giant component had 1681 nodes, 57.43% of the records returned in the query. In the

Period	Query	Total records returned	Total records with addresses	Total unique counties	Records with Wuzhou addresses	% of kin from Wuzhou = F/J	Number of persons on the query list
N Song	3-3-1-1	2249	1736	115	776	0.45	230
N Song	2-2-1-1	1218	919	80	545	0.59	230
N Song	1-1-1-1	524	388	43	284	0.73	230
N Song	0-1-1-1	368	264	31	222	0.84	230
N Song	0-0-1-1	46	23	10	16	0.70	230
N Song	0-0-0-1	22	4	2	4	1.00	230
S Song	3-3-1-1	5446	4211	203	1945	0.46	1146
S Song	2-2-1-1	3504	2526	139	1491	0.59	1146
S Song	1-1-1-1	2021	1414	89	1050	0.74	1146
S Song	0-1-1-1	1343	870	52	754	0.87	1146
S Song	0-0-1-1	319	164	29	141	0.86	1146
S Song	0-0-0-1	185	45	19	34	0.76	1146
Yuan	3-3-1-1	2510	2086	52	1885	0.90	611
Yuan	2-2-1-1	2021	1674	38	1545	0.92	611
Yuan	1-1-1-1	1363	1114	29	1042	0.94	611
Yuan	0-1-1-1	1057	877	24	846	0.96	611
Yuan	0-0-1-1	293	213	18	200	0.94	611
Yuan	0-0-0-1	150	88	15	80	0.91	611

Tab. 2 Results of CBDB kinship queries concerning Song and Yuan persons with index years. The order is the number of Ancestral-Descendant-Collateral-Marriage generations or links. For Northern Song the 0-0-0-1 kinship results are too small to be meaningful. There is some duplication when two persons may have two different kinds of relationships, for example when ego's mother's brother is also his wife's father. However, this did not significantly alter the results. Of the 5446 records of the Southern Song 3-3-1-1 kinship query, there were only 45 duplicates (.008%), when the duplicates were stripped there were 4211 records with addresses and 203 unique addresses; of 4211 records with addresses, there were 1927 with Wuzhou addresses (45.7%, rounded to 46%).

Spatial Distribution of Wuzhou
Kinship Ties in Southern Song

Southern Song
kinship
○ 1 - 4
○ 4 - 13
○ 13 - 33
○ 33 - 60
○ 60 - 77
○ 77 - 94
○ 94 - 114

0   100   200 km

Map 1 and 2 Spatial Distribution of Southern Song and Yuan Wuzhou persons in CBDB as reflected in a 2-2-1-1 kinship query. This level of kinship was chosen to reflect the extent of a given person's likely acquaintances. All maps by the author, using China Historical GIS layers.

figure below, Wuzhou counties are distinguished by color; grey represents a non-Wuzhou county.

Figure 2 shows the giant component of Yuan kinship. The differences are manifest. First, the giant component is much smaller, with 242 nodes out of 1321, only 18% of all nodes. Second, the graph largely segments by county, with only the northwestern quadrant showing some cross-county marriage. This is even more apparent when the other components are examined: all but one of them
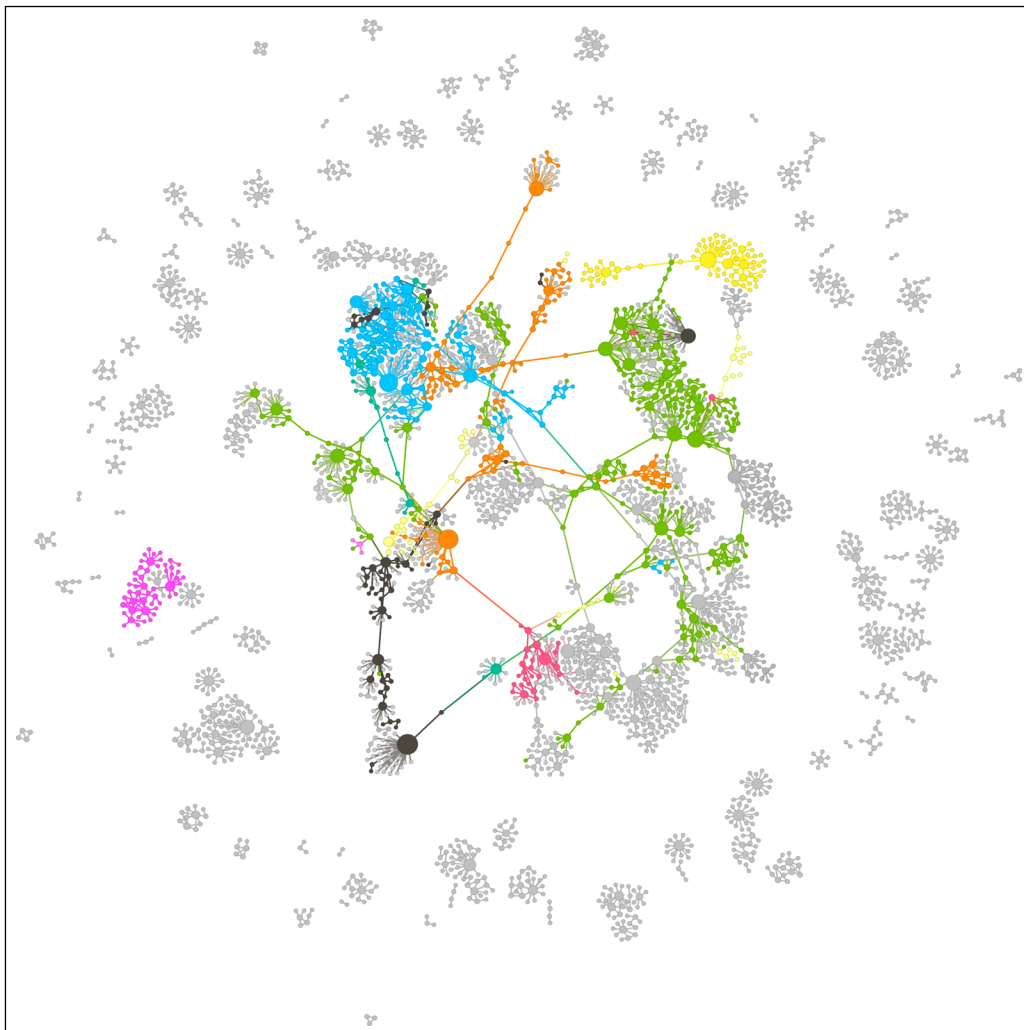

Fig. 1 The "giant component" with 1681 nodes in Southern Song 2-2-1-1 kinship relations. 56% of the records returned in the query are connected together. Wuzhou counties are colored. Unkown and non-Wuzhou counties are in grey. There is a degree of division by county and there is evidence of cross-county marriage. Graph generated with Gephi.
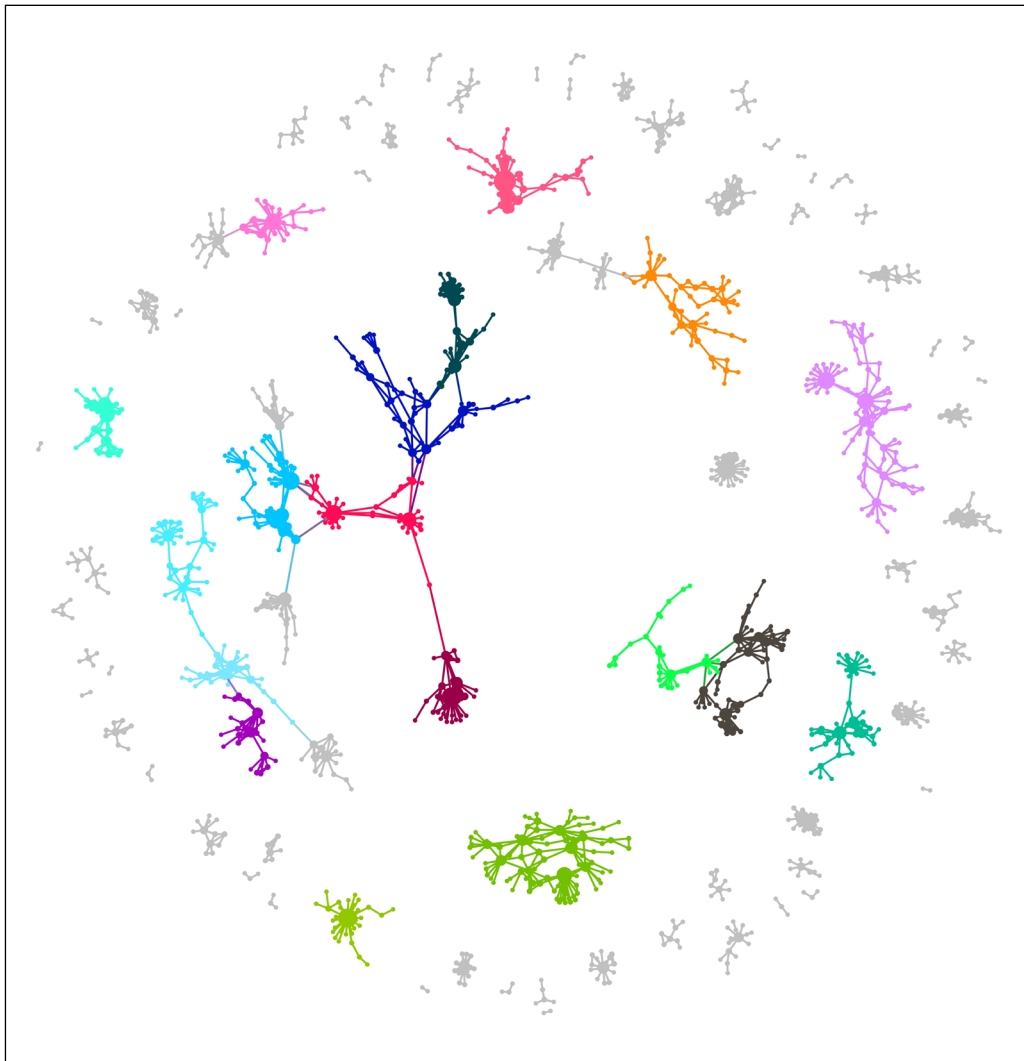
Fig. 2 The giant component of Yuan 2-2-1-1 kinship is composed of 242 nodes out of 1321. The nodes for persons from Wuzhou counties are colored. Others are grey.

are county specific. In this case, the giant component is small enough that we can look more closely at the surnames involved.

What is surprising is that the records for three of the four subcomponents are not only from a single county, as shown in figure 2, but that within the county they are also predominantly from a single surname. This means that the database had the fact of a marriage but lacked data on the affines. Yuan literati in Wuzhou were not intermarrying with well-documented families. This is a puzzle.

3.   If Not Kinship, Then What?

The examination system provided a state-sanctioned way in which local men could be recognized as literati, come to know each other, have contact with local officials, and learn from each other, even if they did not pass the examination. The foregoing shows that kinship had been an important way in which literati families established relationships with each other during the Southern Song. Before 1315, Yuan did not recognize literati through an examination system and, moreover, there is no evidence for a significant prefecture-wide marriage network. We know that literati continued to exist, but what held them together?

Accounting for the disappearance of the larger kinship network is not essential to this study, but Zhong Chong's intensive study of the genealogies of 169 lineages of 75 surnames in the North River basin in Dongyang County in Wuzhou suggests a likely explanation.[6] First, genealogies in this particular area were not being compiled for the first time until the thirteenth century with a high point in the fourteenth prior to the founding of the Ming, and almost none were compiled for the first time after that. Second, almost all the persons from which a genealogy began were officials or degree holders, although it can be shown in some cases that kin were already living in the locale prior to the apical ancestor of the genealogy. Third, the lineages that appear after 1400 were, with the exception of a few small ones, all branches of lineages established outside the basin. Fourth, the formation of these genealogy-based lineages went together with the advent of single-surname villages. Once single-surname villages emerged in this area, they continued; indeed, they have dominated the countryside until the present day. How they came about is not hard to fathom. Someone who became an official acquired more land – some of which they could hold tax-free. They then instituted the practice of maintaining a genealogy as a means of ensuring unity and mutual aid among their descendants, giving their kin a good reason to live together, even if they rarely held property in common. If there was adequate land and they avoided natural and human disasters, over time the estate would become a village. Descent groups can be tracked through their genealogies; generations increasing in number is a good sign that they lived in the same area, sometimes segmenting into multiple villages, and saw the advantages of kinship solidarity. Many members would likely spend their lives farming, some were merchants, and a very few might make a career as an official, teacher, or government clerk (in Yuan). Under such circumstances, the security of the growing descent group was best served by intermarriage with surrounding descent groups like

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6   Zhong Chong, *Bei Jiang pendi.* See the map, pp. 112–113, showing the location of the lineages and tying segmented descent groups to the home lineage. For a bibliography of all the editions of all the genealogies used, see pp. 240–276. For an introduction to his methods and major findings, see "Zhejiang Dongyang shi Beijiang."

their own.[7] Prefaces to genealogies written in Yuan began to promote the idea that the genealogy-based descent group – not the bureaucratic success of an individual – was not only part of the moral enterprise of social cohesion and unity, but was also the way in which literati could serve the common good of society from the bottom up.[8]

But how did literati in Wuzhou maintain their identity as literati under the circumstances? This became a particularly pressing issue during the Yuan period, first when there was no civil service examination system and thereafter when it was reduced to a minor avenue of recruitment. There are anecdotes about families with a history of service and scholarship who stopped making the effort. We can imagine that from a practical point of view, ambitious people might see greater value in lineage building and controlling land and water. No doubt some proportion of Wuzhou families with literati backgrounds did exactly this. What could those who thought, for whatever reason, that being literati mattered do?

The answer in Wuzhou was learning, and Wuzhou was notable during the Yuan as a place where literati learning flourished. There was also a bit of an incentive: the household (not the wider descent group) with a son registered at a county school or a state-recognized academy was relieved of labor service, something that set them apart from the merely well-to-do, although keeping a son in school for decades was also expensive. Chinese literati from the south had very little prospect of advancing to high office under the Mongols, but for those seeking office recommendation, not examination, it was the most promising route, and although for many this meant appointment as a teaching official or academy master, such a post was quite respectable. However, the recommendation required recognition. We might expect that in Yuan, literati would have depended more heavily on learning to create social networks that would thus provide recognition, and that they would seek access to the nearest, best-known, and best-connected literati in the locality. Collegiality would replace kinship and networks of collegiality were likely to take shape locally.

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7   Zhong has found examples of this. Even today, marriage relations continue between the Yaxi Lu 雅溪盧 family of Luzhai 盧宅 and the nearby Li family of Lizhai 李宅. The seven volume Lu genealogy is now in the Harvard Yenching Library; *Yaxi Lu shi.*

8   Peter K. Bol, "Local History and Family in Past and Present."

4.   Collegiality

In the following, I test these two propositions. Networking through learning was not new. Was this only a matter of degree? Or was something else changing as well?

First, I will explain the CBDB's approach to social associations. CBDB codes about 300 different kinds of associations. The CBDB network query allows queries by selected associations. The output also reports relationships between the persons discovered in the query. For example, a query that reports that A, B, C, and D were the students of X will also report if A had relationships with B, C, or D. Thus, a query about the associations of a group of people will reveal multiple networks and subnetworks. Some, such as friendship and teacher-student relationships are attested to by a third party, but most are evidenced by literary exchanges. The CBDB allows the user to select which associations to include in a query. For the purposes of this query, I included all codes for the friendship, teacher-student, scholarly affiliation, common membership, academic patronage, literary/artistic associations, and "writings" that evidence associations between people; the latter is the largest category of all. Writings includes subtypes: commemorative texts, epitaphs, prefaces and postfaces, ritual texts, biographical texts, explanatory texts, admonitory texts, correspondence, and various other texts for social occasions.

I began with the lists of persons with Southern Song and Yuan index years used in the kinship query. However, in contrast to the multiple generational kinship queries, the social association was limited to a distance of 1; that is, I included the friend but not the friend's friend, a distance of 2. I wanted to compare two periods of equal length that had some similarities. One was to include a generation that lived through the conquest by the Yuan in the first case and the Ming in the second. Another was that both periods were times of scholarly activity, so that the results would not be skewed in favor of one period. The first group had index years from the year prior to the death of Lü Zuqian in 1181 (as he did much to activate literati learning in Wuzhou), through to 1294, the last year of the conqueror Khubilai's Khan's reign. This was meant to capture the post-Lü Zuqian generations and those who lived through the Song-Yuan transition. The second, 1295 (post-Khubilai) to 1403 (the Yongle usurpation) was meant to capture persons who came of age during the Yuan and those who lived through the Yuan-Ming transition. I limited queries to one node distance and constrained the query to include associates with index years in the same period index year, in order to avoid generating extremely large networks and reduce the number of associations to people from earlier and later periods (for example, a person in 1400 who writes a preface to a book Lü Zuqian wrote in 1170 has formed a meaningful association, but not one that involves another person at the time). However, this also meant that persons whose index years were unknown were excluded from the results. This dramatically reduced the size of the results. For example, a query

of only teacher-student associations in the 1295–1403 list returned 99 instances, but when persons without index years were included the same query returned 178 instances. We should assume that the query results are indicative of relative volume rather than a representation of all relevant data in the CBDB.

Table 3 records the number of persons in the query, the number of persons returned by the query (nodes), and the total number of associations. It shows that there were almost twice as many relations per node in Yuan as in Song, that there was a giant component comprising twice the number of persons, and that there were on average twice as many associations per year. The Yuan literati network was larger and more active than it had been in Song.

In addition to the metrics of size and frequency, we can also show the central figures in the Wuzhou literati learning network and where they came from. The density of the graphs in figures 3 and 4 is impressive, although it makes them less useful. They do, however show major figures in the network. In both cases, we are seeing the "giant component."

A more useful view, figures 5 and 6, shows those people in the network who have at least seven associations.

Four network algorithms were used to assess relative centrality in the network. The most straightforward is "degree" (or "degree centrality"). This is the total number of persons a figure is connected to as recorded in the CBDB. Slightly more complicated is "weighted degree," which takes the number of persons one is connected with, but also how many instances of connections he has with each of them. In Southern Song Wuzhou, for example, Lü Zuqian was connected to more people than Zhu Xi (node size) but Zhu Xi's weighted degree was greater (label size). The third is "betweenness centrality," which measures the degree to which a person connects persons together who would otherwise be unconnected. For example, suppose there are two separate networks of three people each, and then a seventh person who has connections to both networks. That person is "between" the two and has the greatest "betweenness centrality" of all seven. The fourth is "eigenvector centrality," which computes the approximate importance of each node as the sum of the centrality values of the nodes that it is connected to. This is a measure of influence within a network.

Networks will always have more and less central figures. In this case, I also want to know where the most central figures are from and the degree to which local figures draw together literati from across the prefecture. Comparing Lü Zuqian and Song Lian in table 4, the local figures with the most associates, we see that both had prefecture-wide networks and national networks. But this similarity belies an important difference between Song and Yuan in terms of who dominated local networks. In figures 3–6, the nodes are color coded to differentiate between persons from Wuzhou and others. The difference is more apparent in

Index Year Periods	Persons in query list	Unique persons (nodes)	Associ- ations (edges)	Ave. number of relations per node	Giant compo- nent unique persons (nodes)	Giant component edges	Percent-age in the giant component	No. of years	Assoc. per year
1180–1294	947	1180	1019	.9	430	1008	0.36	115	8.86
1295–1403	766	1439	2169	1.5	851	2167	0.60	109	19.89

Tab. 3 Social associations in Southern Song and Yuan compared.

Fig. 3 The "giant component" in literati networks with associations limited to persons with index years 1180–1294 (left) and 1295–1403 (right). The size of the node represents the number of connections a person has, the label size represents the weighted degree, colored nodes correspond to native counties in Wuzhou, and grey nodes represent people with unknown addresses and non-Wuzhou addresses. The size of the name corresponds to the weighted degree. The thickness of the edge reflects the number of associations between persons.
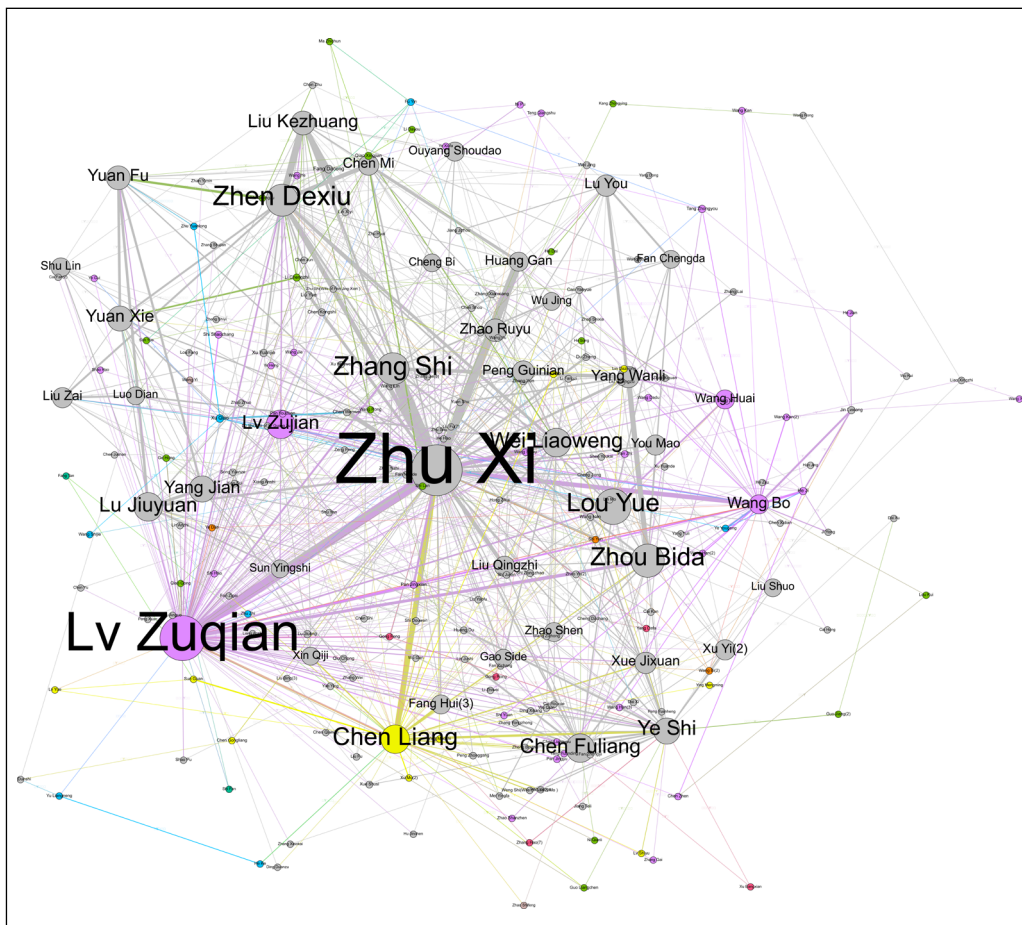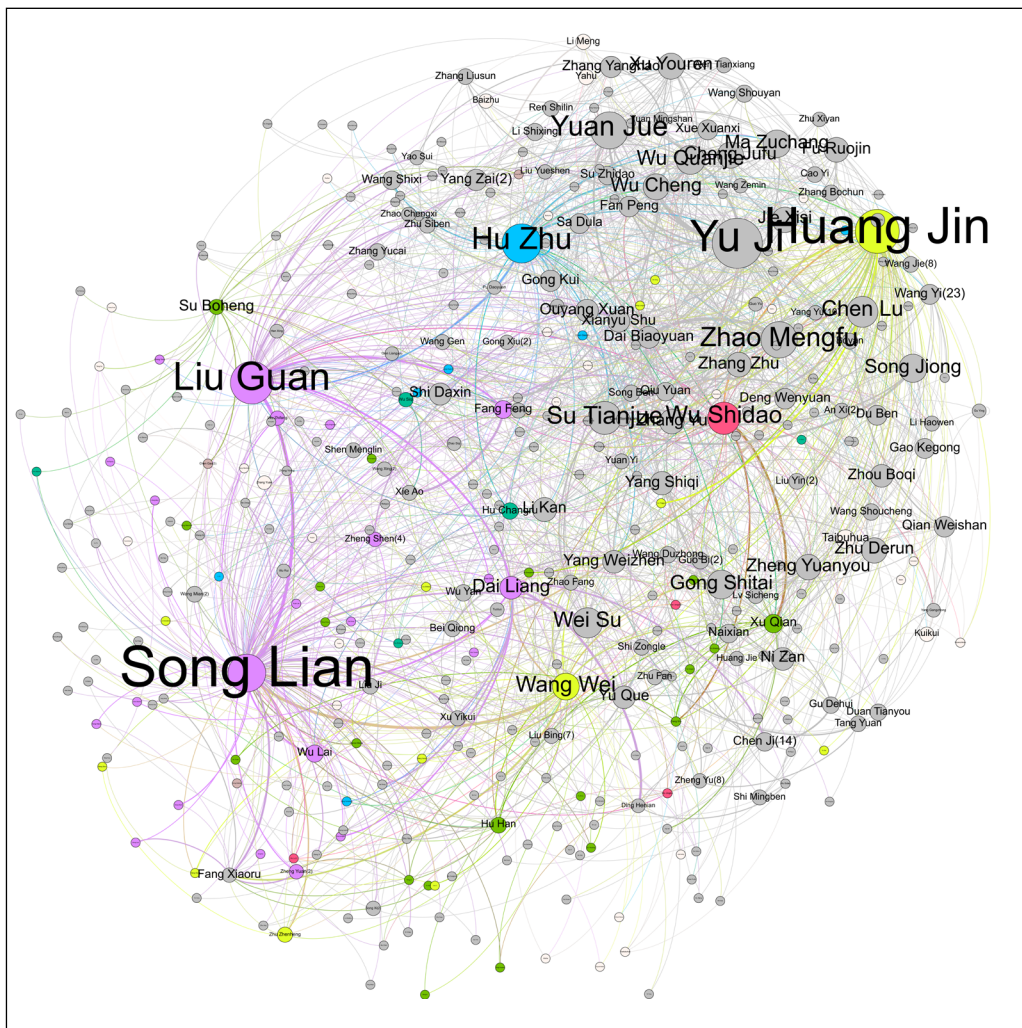
Fig. 4 The "giant component" in literati networks with associations limited to persons with index years 1180–1294 (left) and 1295–1403 (right). The size of the node represents the number of connections a person has, the label size represents the weighted degree, colored nodes correspond to native counties in Wuzhou, and grey nodes represent people with unknown addresses and non-Wuzhou addresses. The size of the name corresponds to the weighted degree. The thickness of the edge reflects the number of associations between persons.

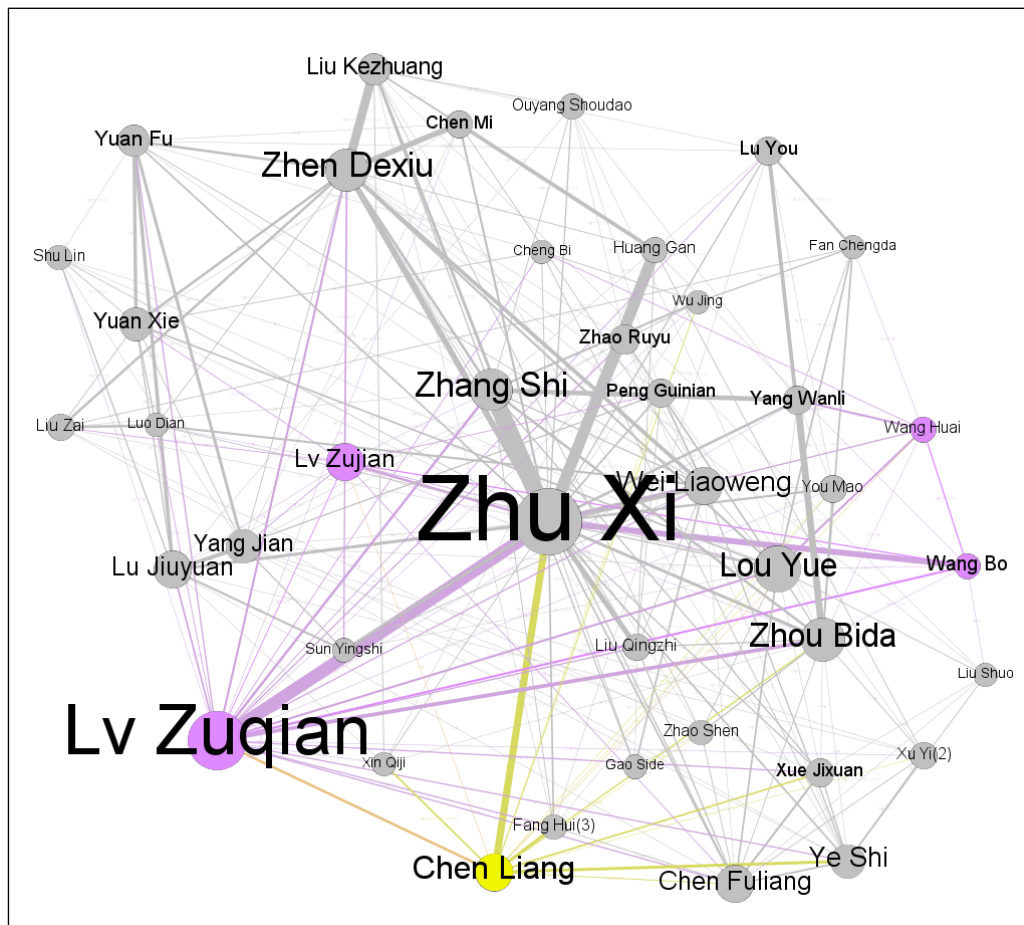**Fig. 5** The most central persons in the two networks in figures 3 and 4 based on their having associations with at least seven other persons.
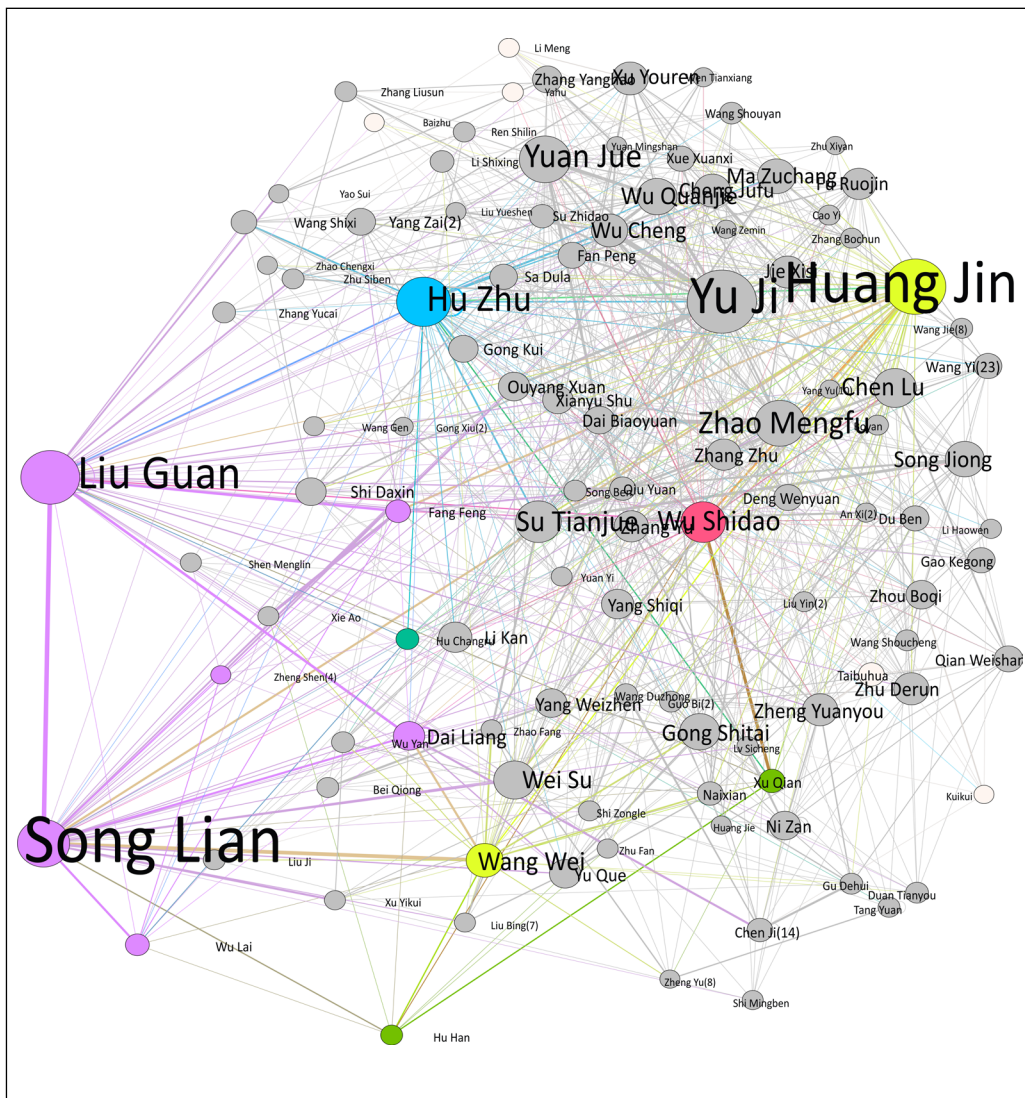
Fig. 6 The most central persons in the two networks in figures 3 and 4 based on their having associations with at least seven other persons.

	nodes	edges	addresses	Wuzhou counties	Wuzhou nodes	Wuzhou edges
Lü Zuqian	215	365	70	7	85	123
Song Lian	361	497	93	6	86	142

Tab. 4 Comparing the networks of Lü Zuqian in Song and Song Lian in Yuan-Ming.

tables 5 and 6, which give the results of the four algorithms for the two periods, listing the 25 highest-ranking persons in each category. Those from Wuzhou are in grey cells. The most obvious finding is that during the first period, the majority of important network figures were from outside Wuzhou.

However, from Yuan into Ming, 1295–1403, local men dominated networks of learning.

Amalgamating all the results, during the first period only 22% of the 25 most central persons were Wuzhou literati, but during the second period the number doubles to 44%. If we observe only the top ten persons in Song-Yuan, then 27% were from Wuzhou, but in the Yuan-Ming period they made up 70%. Taking into account just the top 25 persons, in the Southern Song-Yuan period only 32% of the associations were with Wuzhou literati, versus 65% in the Yuan-Ming period.

Scholar Networks in Wuzhou, 1180–1294			
Degree	**Weighted degree**	**Eigenvector centrality**		**Betweenness centrality**	
Lü Zuqian (215)	Zhu Xi (488)	Lü Zuqian	1.00	Lü Zuqian	0.083
Zhu Xi (125)	Lü Zuqian (357)	Zhu Xi	0.74	Zhu Xi	0.034
Chen Liang (78)	Zhen Dexiu (150)	Zhang Shi	0.34	Chen Liang	0.027
Wang Bo (65)	Chen Liang (149)	Chen Liang	0.34	Wang Bo	0.027
Ye Shi (53)	Wang Bo (149)	Zhen Dexiu	0.32	Ye Shi	0.013
Zhang Shi (44)	Zhang Shi (130)	Zhou Bida	0.30	Zhou Bida	0.007
Zhen Dexiu (39)	Ye Shi (120)	Ye Shi	0.30	Lou Yue	0.006
Zhou Bida (36)	Zhou Bida (100)	Lou Yue	0.30	Wei Liaoweng	0.006
WeiLiaoweng (36)	Liu Kezhuang (99)	Chen Fuliang	0.29	Zhen Dexiu	0.005
Lou Yue (35)	Wei Liaoweng (95)	Wei Liaoweng	0.28	Liu Kezhuang	0.004
Lu Jiuyuan (31)	Lou Yue (72)	Wang Bo	0.26	Lü Zujian	0.004
Chen Fuliang (30)	Lu Jiuyuan (70)	Lü Zujian	0.26	Fang Dacong	0.004
Liu Kezhuang (27)	Huang Gan (64)	Lu Jiuyuan	0.26	Lu You	0.004
Lü Zujian (24)	Yang Wanli (62)	Yuan Xie	0.22	Zhang Shi	0.004
Lu You (23)	Chen Fuliang (59)	Yuan Fu	0.20	Yuan Fu	0.003
Huang Gan (22)	Chen Mi (59)	Chen Mi	0.20	Xu Qiao	0.003
Yuan Xie (21)	Yuan Fu (59)	Yang Wanli	0.20	Huang Gan	0.003
Chen Mi (20)	Lu You (53)	Zhao Ruyu	0.19	Jin Lüxiang	0.003
Yuan Fu (19)	Yuan Xie (53)	Lu You	0.19	Tang Zhongyou	0.002
Yang Wanli (18)	Lü Zujian (43)	Liu Kezhuang	0.18	Zhu Zhi	0.002
Yang Jian (18)	Yang Jian (41)	Yang Jian	0.17	He Ji	0.002
Zhao Ruyu (15)	Zhao Ruyu (31)	You Mao	0.16	Lu Jiuyuan	0.002
Liu Zai (14)	Liu Zai (31)	Liu Qingzhi	0.16	Qiao Xingjian	0.002
Fang Dacong(13)	Fang Dacong (29)	Fang Hui	0.15	Chen Fuliang	0.002
He Ji (13)	Liu Qingzhi (29)	Shu Lin	0.15	Wang Shijie	0.002

Tab. 5 Four measures of centrality of persons in the network depicted in Figure 5 left. Wuzhou persons are in grey cells.

Scholar Networks in Wuzhou, 1295–1403						
Degree	**Weighted degree**	**Betweenness centrality**		**Eigenvector centrality**	
Song Lian (361)	Song Lian (528)	Song Lian	0.20	Song Lian	1.00
Huang Jin (240)	Huang Jin (316)	Huang Jin	0.12	Huang Jin	0.77
Liu Guan (110)	Liu Guan (173)	Liu Guan	0.04	Liu Guan	0.49
Wang Wei (86)	Yu Ji (155)	Wang Wei	0.03	Yu Ji	0.47
Yu Ji (77)	Dai Liang (128)	Dai Liang	0.03	Hu Zhu	0.40
Dai Liang (68)	Wang Wei (126)	Su Boheng	0.03	Zhao Mengfu	0.35
Hu Zhu (64)	Hu Zhu (105)	Xu Qian	0.01	Wu Shidao	0.33
Su Boheng (56)	Yuan Jue(2) (89)	Hu Zhu	0.01	Wang Wei	0.32
Yuan Jue (55)	Su Tianjue (82)	Yu Ji	0.01	Dai Liang	0.30
Wu Shidao (53)	Wu Cheng (82)	Wu Shidao	0.01	Yuan Jue	0.30
Zhao Mengfu (51)	Wu Shidao (81)	Fang Xiaoru	0.01	Wei Su	0.29
Wei Su (42)	Zhao Mengfu (81)	Zhao Mengfu	0.01	Su Tianjue	0.27
Su Tianjue (40)	Wei Su (66)	Hu Han	0.01	Wu Quanjie	0.26
Xu Qian (39)	Su Boheng (65)	Yang Weizhen	0.01	Gong Shitai	0.25
Chen Lu (38)	Wu Quanjie (65)	Wei Su	0.01	Cheng Jufu	0.25
Gong Shitai (36)	Yang Weizhen (62)	Wu Lai	0.00	Chen Lu	0.24
Yang Weizhen (35)	Xu Qian (59)	Hu Changru	0.00	Xu Qian	0.23
Wu Cheng (35)	Chen Lu (59)	Xie Ao	0.00	Li Kan	0.22
Zhang Zhu (34)	Zheng Yuanyou (57)	Gong Shitai	0.00	Ma Zuchang	0.22
Xu Youren (33)	Gong Shitai (55)	Fang Feng	0.00	Xianyu Shu	0.22
Zheng Yuanyou (33)	Dai Biaoyuan (54)	Wu Cheng	0.00	Yang Weizhen	0.22
Cheng Jufu (32)	Cheng Jufu (53)	Zheng Shen	0.00	Zheng Yuanyou	0.21
Ma Zuchang (32)	Zhang Zhu (51)	Cheng Jufu	0.00	Wu Cheng	0.21
Song Jiong (31)	Fang Xiaoru (51)	Zhang Yining	0.00	Zhang Yu	0.21
Wu Quanjie (29)	Xu Youren (50)	Chen Lu	0.00	Shi Daxin	0.20

Tab. 6 Four measures of centrality of persons in the network depicted in Figure 6 right. Wuzhou persons are in grey cells.

5.   Conclusion

From Song into Yuan, localization in kinship and learning took place along parallel tracks. Although the spatial distribution of kinship networks in Southern Song was not significantly different from Northern Song, in Yuan, kinship was almost entirely local. Similarly, Southern Song networks of learning formed around a mixture of local and external persons, whereas in Yuan local literati were the central figures. But behind this parallel lies an important difference. The prefecture-wide kinship network of Southern Song disappeared in Yuan when marriages became strictly local. However, there was a network that brought literati together across the prefecture, a network based on literati learning. The difference with the learning network of Southern Song was a difference in size, intensity, and leadership.

The literati were both a social and a cultural formation. These two aspects may have changed in similar ways, but they were not the same. It was possible to have a learning network without a parallel marriage network, and it was possible to have marriage alliances that were based on lineage alliances rather than office and examinations. I think this was a predictable outcome of the new models of decent group solidarity that took shape in Southern Song and had been accumulating more members with every generation. The larger the lineage the fewer the literati or, to put it another way, the larger the lineage the greater the number of members who had to devote themselves to making a living. Learning networks made it possible for some members to transcend their circumstances.[9]

The localization of intellectual leadership was not total. In Southern Song, literati learning was aimed at preparing literati for national roles. Zhu Xi was the most important of the scholars from elsewhere who spread their ideas about learning and self-cultivation by attracting students and correspondents from many places. But why should local scholars have become so dominant in Yuan? The answer is two-fold. First, a need for introductions and recommendations made personal contact important, and having famous people at hand was convenient. Literati like Song Lian, who had already gained fame as a writer and intellectual while living in Wuzhou before he entered the orbit of the Ming dynasty founder, had themselves benefitted from the attention of their seniors. Local scholarship could be self-sustaining. This leads to a second reason: Wuzhou was one of the first places in Yuan where local scholars successfully promoted the idea

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9   Some lineages made considerable efforts to maintain the literati identity of their lineage, by investing in education and working to keep ties to the state. The Zheng family of Pujiang is a famous example of this and it has continued into the present, although most of its members were farmers. See Chang Jianhua 常建華, "Yuan Ming shiqi yimen Zheng shi ji qi guifan de shehui yingxiang 元明時期義門鄭氏及其規範的社會影響"; Danjō Hiroshi, "Gimon Teishi to Genmatsu"; John W. Dardess, "The Cheng Communal Family."

that there were local traditions of learning that local literati should care about.[10] This was, in my view, part of an effort by local scholars to persuade local elites to invest in literati learning and accept literati views of moral behavior, good government, and social responsibility at a time when literati could not count on government support. In doing so, they separated collegiality from kinship.

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10   See the discussion of Wu Shidao and his *Record of Honoring Our Locale* in Peter K. Bol, "The Rise of Local History."

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