

COUNTY AXIS OF YUTU MAP'S IMAGERY: A HISTORICAL INTERPRETATIVE METHOD OF SHAANXI COUNTY'S MORPHOLOGY

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ABSTRACT

Yutu is a concept of mapping widely used in ancient China which characteristics lie in combining planes and facades, intuitive feelings and physical reality. The local chronicles provide comprehensive historical materials about local cities shading light to interpret the morphology of small and medium-sized counties in ancient China. During the reign of Qianlong (1735-1796 A.D.), the quality and quantity of compilations in Shaanxi local chronicles and the prominent scholars involved reached a peak, illustrating their cognitive image of the county's morphology and structure.

Axis is a major component and structural framework of traditional Chinese urban morphology. Particularly, the city's axis is a linear structure that governs urban space as well as a comprehensive carrier that embodies social politics and culture. Following and renovating the abstract procedure of Yutu maps, this paper analyses and re-interpret ascertained cartographic elements, quantifying and classifying them to illustrate the morphological structure and characteristics of the county's axis compositions.

We believe that an interpretative dimension of historical images can promote further awareness, long-term urban culture and space-time relationship for an adaptive development of Guanzhong.

Keywords: Shaanxi local chronicles, Guanzhong area, Yutu maps, morphological structure.

INTRODUCTION

Yutu is a map concept widely used in ancient China (Yi Bingyuan, 2008) (For the convenience of description, Yutu are collectively referred to as map hereinafter). The relevant some academic achievements in China are mainly concentrated in the fields of cartography, historical geography. Some academic achievements analyze the composition, characteristics (Que Weimin, 1996) and history (Pan Sheng, 2003) of maps in local chronicles from the perspective of cartography to illustrate the technique development and achievements of ancient Chinese cartography. In the past ten years, researchers have begun to reflect on the narrative mode in which ancient Chinese cartographic history has technique as its main research direction. (Cheng Yinong, 2019).

Axis is the important component and structural framework of traditional Chinese urban morphology. Particularly, the city axis is a linear structure that governs urban space as well as a comprehensive carrier that embodies social order and culture (Wu Tinghai, & Dai Wusan, 2005). Zhang Litao believes that the generalized urban axis is related to the urban form and is the axis of the urban development direction, while the narrow urban axis is the spatial shape of the city (Zhang Litao, 2007). Wang Jianguo pointed out that the urban axis usually refers to a linear spatial element which plays a controlling role in the spatial structure in the city...the axis is manifested through the external open space system of the city and its relationship with architecture,

and it is a basic approach for people to perceive and experience the relationship between urban environment and spatial form. (Wang Jianguo, 2003).

The local chronicles are comprehensive historical materials about local cities, and are important materials to interpret the morphology of small and medium-sized counties in ancient China (Cheng Yinong, 2001). It is urgent to carry out research on the city images of county maps in Shaanxi Province, so as to adapt the development of counties in Guanzhong to their history.

BACKGROUND

1. Counties in Guanzhong Reign

Guanzhong reign as one of the important birthplaces of Chinese civilization. It not only gave birth to the splendid achievements of primitive cultures such as Beishouling, Banpo, Jiangzhai, and the glory days of the Qin, Han, and Tang Dynasties. Guanzhong reign is also the oldest life and cultural beliefs and ancestral settlements of the Chinese people, and it gave birth to the national philosophy (Tang Daolie, & Wang Shusheng, 2004) (Figure 1).

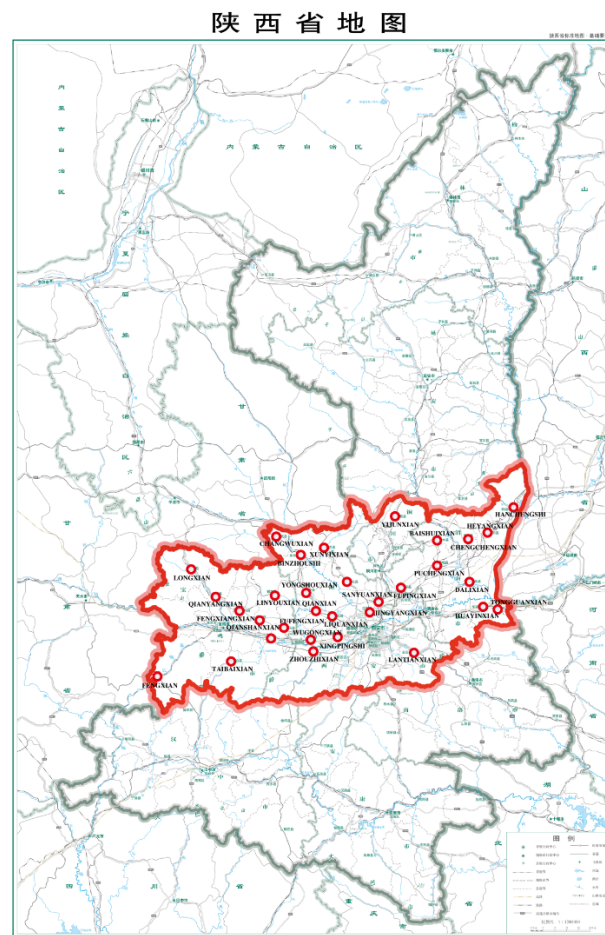


Figure 1. 1: 1200000 scale for Shaanxi Province Map and counties in the Guanzhong, September 2018. Source: Shaanxi Bureau of Surveying and Mapping and Geoinformation. Retrieve from: <http://snsm.mnr.gov.cn/Information/BiaoZhunDiTuList/1131>.

2. Maps in the Local Chronicles of Counties in Guanzhong

The ancients used different kinds of maps and images to illustrate their cognition of the spatial morphology of county. Local chronicles of the Qing Dynasty include different categories of map such as astronomy, historical evolution, frontier defense, water conservancy, transportation, territory, geography, city morphology, building and landscape. The category and quantity of maps also differ in different local chronicles. Map of territory mainly shows the jurisdiction or boundary of local city, map of geography mainly shows the natural environment of local city and map of city morphology mainly shows the basic image of local city. Map of territory and geography mainly represents the location and environmental characteristics of local cities on a large scale, and there is almost no image elements in the city (Figure 2).

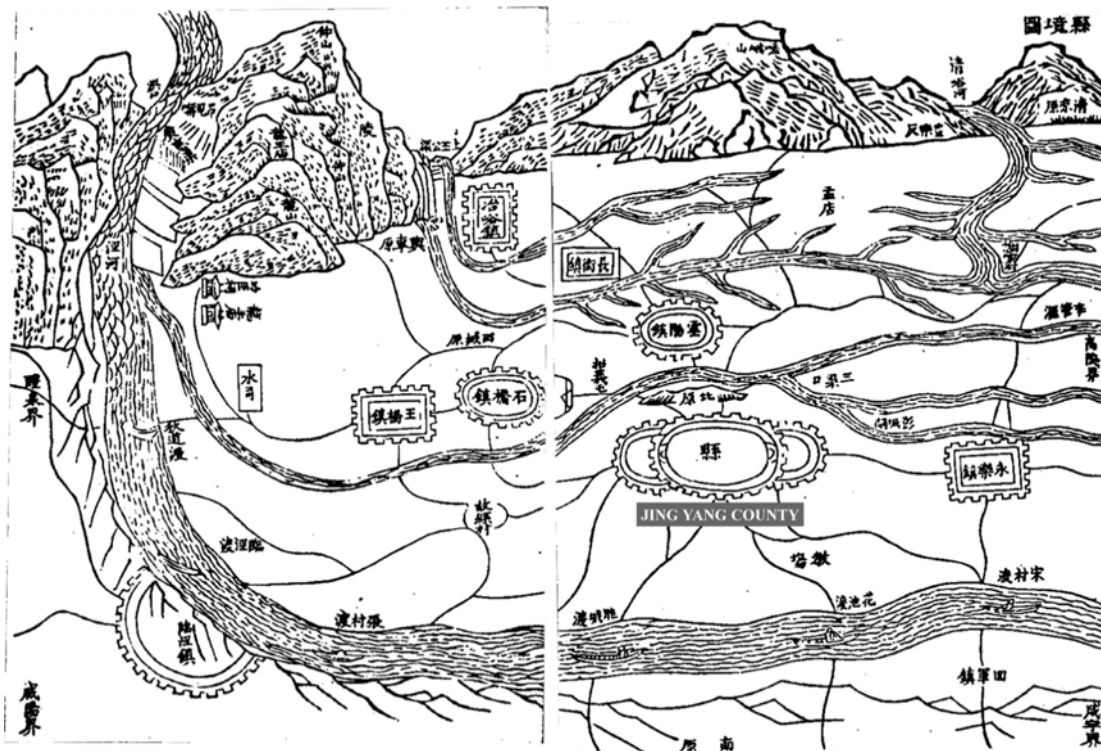


Figure 2. Jurisdiction map of Jingyang County from the local chronicle in the 43th year of Qianlong of Qing dynasty (1778 A.D.); Source: Phoenix Publishing House. (2007). China Local Chronicles Collection · Shaanxi Local Chronicles. Nanjing, Phoenix Publishing House.

The map of the local city mainly reflects the ancients' cognition of the composition and framework of the local city (Figure 3).

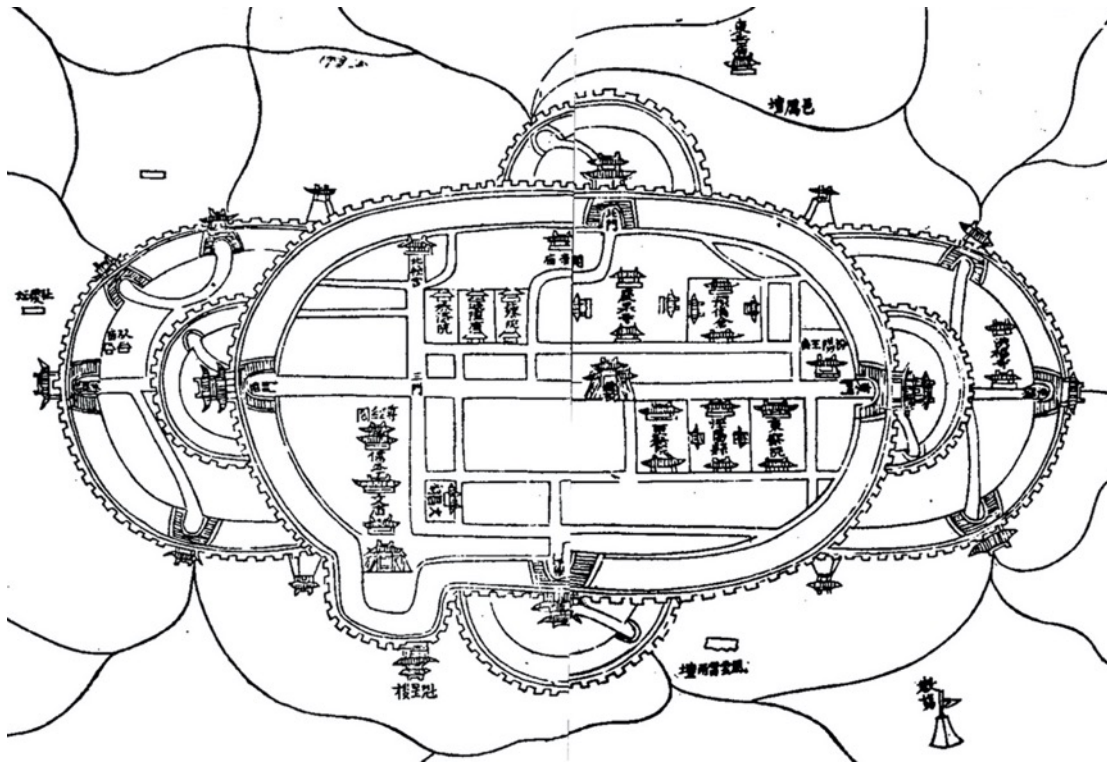
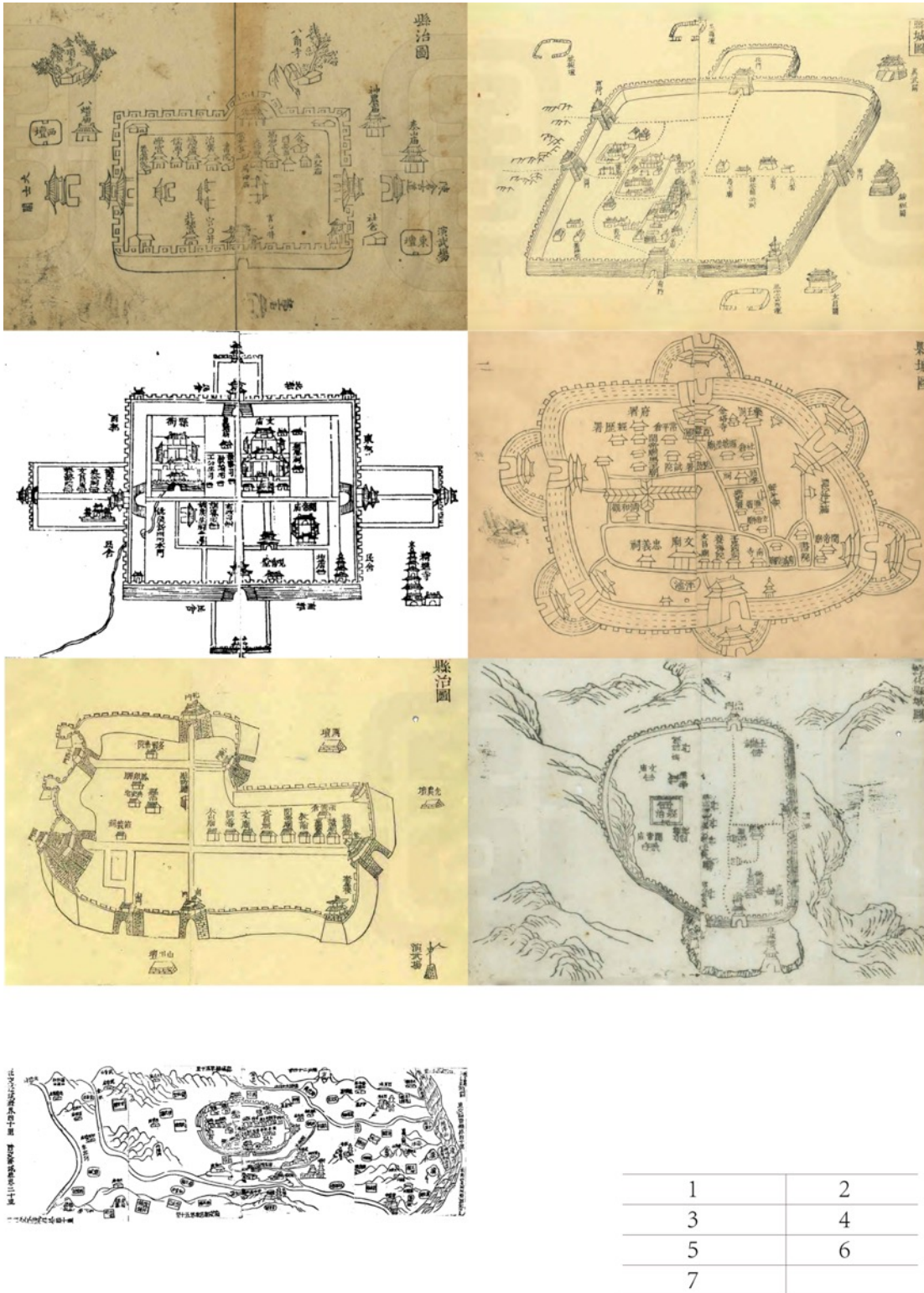


Figure 3. Map of Jingyang County from the local chronicle in the 43th year of Qianlong of Qing dynasty (1778 A.D.); Source: Phoenix Publishing House. (2007). China Local Chronicles Collection · Shaanxi Local Chronicles. Nanjing, Phoenix Publishing House

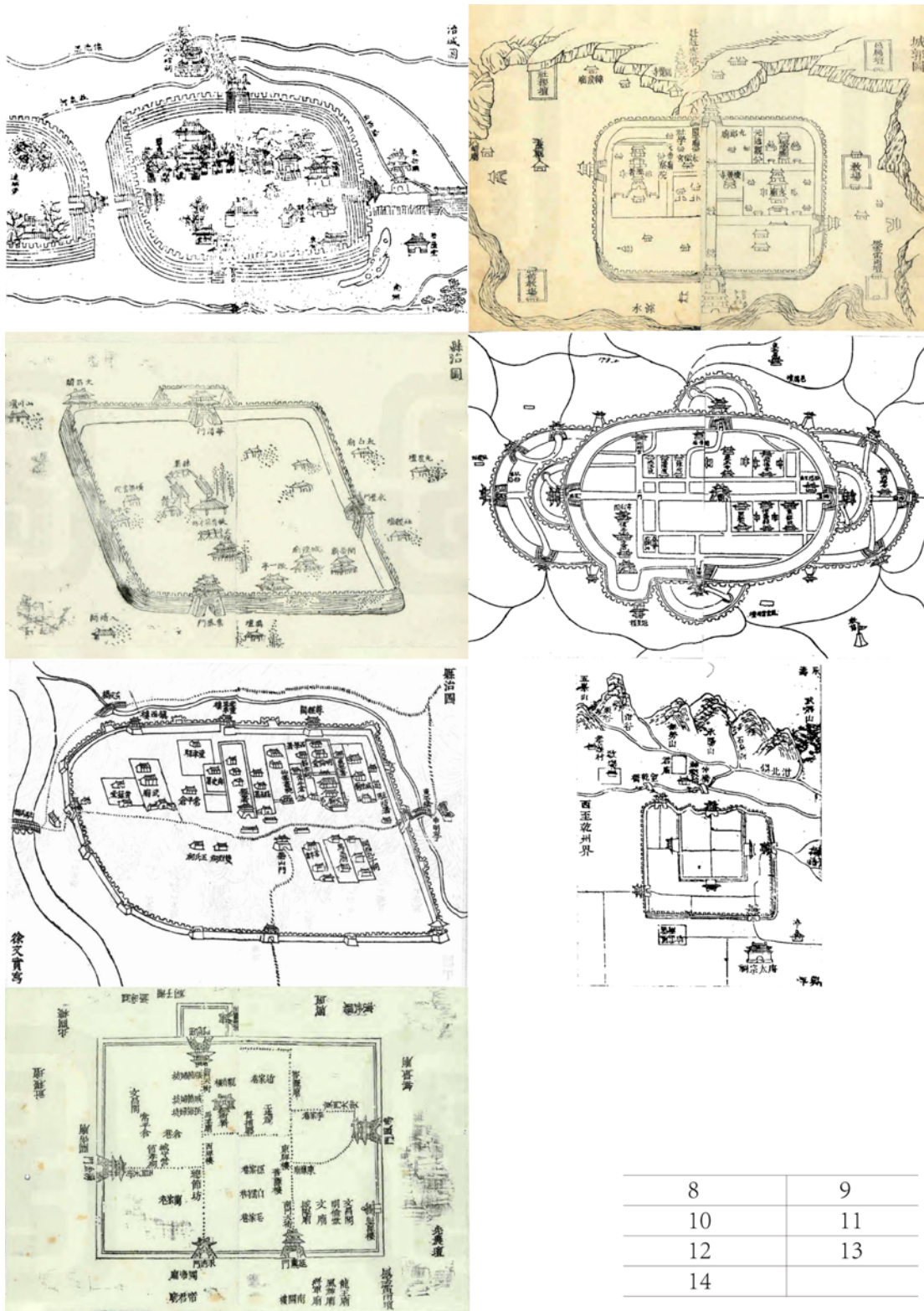
The county map in the local history is a descriptive map that directly expresses various elements such as county walls, buildings, roads, mountains and rivers with highly pictographic graphical symbols. A map symbol is an image element, which combined to form the overall image of the county. County maps in local chronicles showing the conditions inside and outside the county have the following characteristics: (1) The county wall clearly divides the map into two major areas: inside and outside the county; (2) The symbols of the map may be exaggerated and deformed, and the map has almost no scale and scale. The same map symbol may show multiple meanings of city imagery. For example, the symbol of a building in the map can represent buildings with different functions and names (Yi Bingyuan, 2008). Territory, geography and city morphology are the important categories of maps to analyze the cognition of ancients of the spatial morphology of local county. This paper selects the maps that can reflect the internal shape of the counties in Guanzhong during Qianlong reign as the research object (Figure 4, 5, 6, 7).



1	2
3	4
5	6
7	

Figure 4. The maps in local chronicles of Guanzhong during the reign of Qianlong (1735-1796 A.D.); Source: Made by author

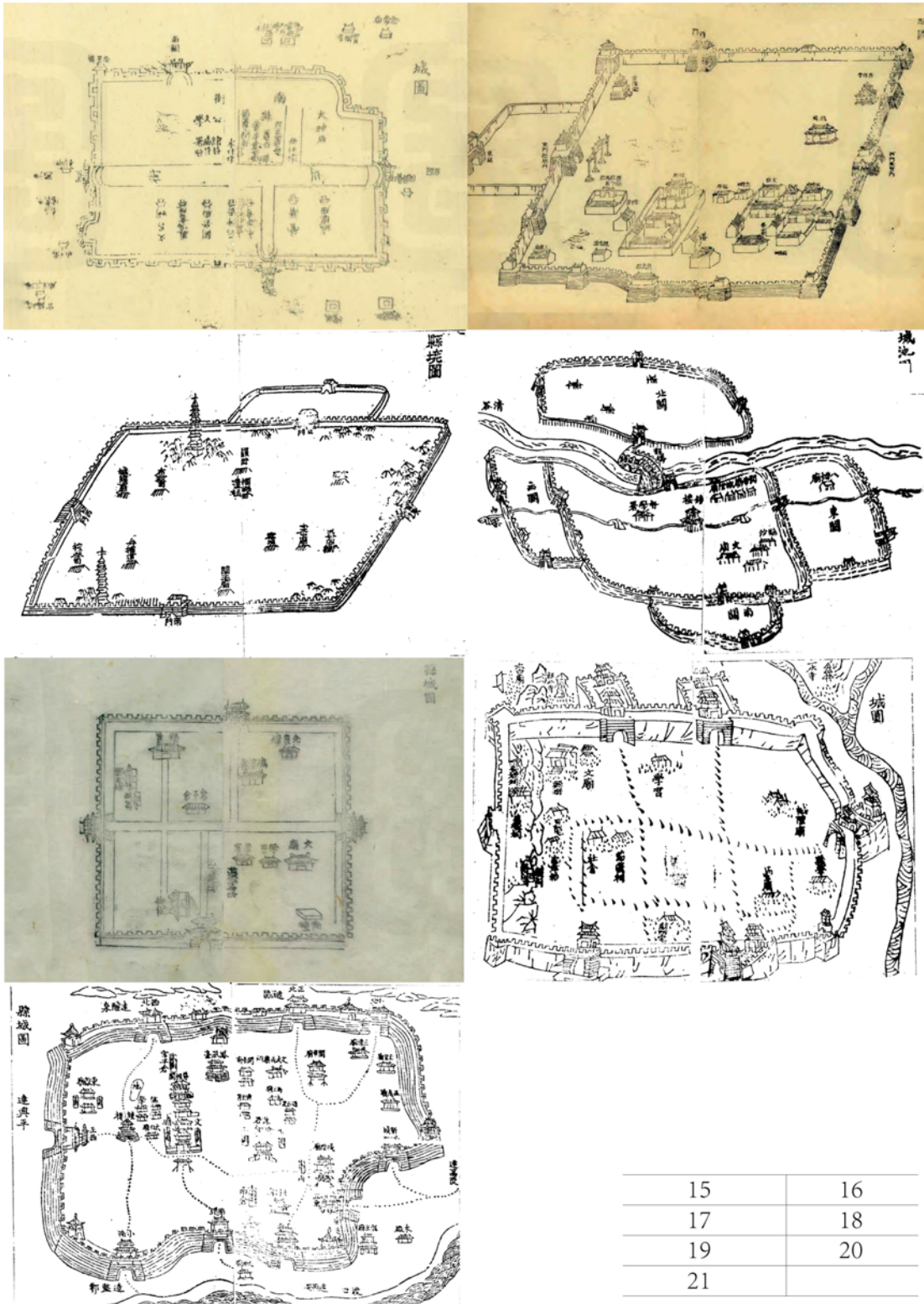
1, Baoji County; 2, Chaoyi County; 3, Chengcheng County; 4, Dali County; 5, Fufeng County; 6, Chunhua County; 7, Heyang Count;



8	9
10	11
12	13
14	

Figure 5. The maps in local chronicles of Guanzhong during the reign of Qianlong (1735-1796 A.D.); Source: Made by author;

8, Fuping County; 9, Hancheng County; 10, Lintong County; 11, Jingyang County; 12, Huayin County; 13, Liquan County; 14, Lantian County;



15	16
17	18
19	20
21	

Figure 6. The maps in local chronicles of Guanzhong during the reign of Qianlong (1735-1796 A.D.); Source: Made by author

15, Qishan County; 16, Mei County; 17, Pucheng County; 18, Sanyuan County; 19, Tongguan County; 20, Wugong County; 21, Xianyang County;

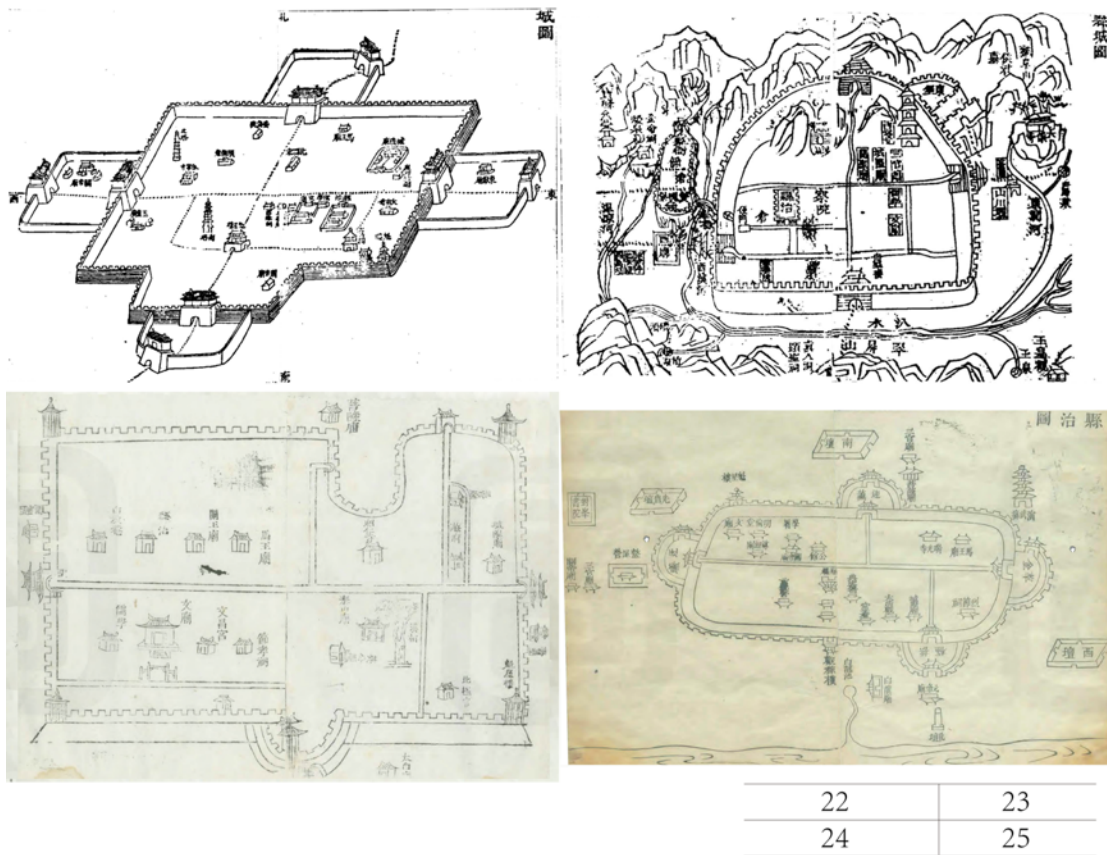


Figure 7. The maps in local chronicles of Guanzhong during the reign of Qianlong (1735-1796 A.D.); Source: Made by author

22, Xingping County; 23, Sanshui County; 24, Changwu County; 25, Zhouzhi County

METHODOLOGY

The county axis in the image is derived by interpreting cartographic symbols in the map of the local history. Referring to Wang Jianguo's research, this paper analyzes the spatial elements and morphological characteristics of the integral axis in the maps from the local chronicle of counties in Guanzhong. The research on the maps of counties provides the image basis for the development of counties to adapt to their cultural background, space-time relationship and history.

Reading and Classifying County Axis in the Map

There are three main steps in the statistics and classification of different elements in the map, which is the foundation for analyzing the characteristics of the county axis.

First, check the text in the map. Image symbols are usually accompanied by text descriptions. Image symbols combined with text annotation are common expressions in city maps. Identify and check the text information in the maps of the 25 counties through the written records in the local chronicles.

Second, identify and transform the cartographic elements in the map (Figure 8). The reading and quantity statistics of image elements in the map are the basis of quantitative analysis of the axis. Combining textual information, identify the information of cartographic symbols drawn by freehand

landscape style in the map. Replace the freehand landscape style symbols in map with geometric elements of different colors and shapes and clarify the category and location of the elements in the map. There are different graphical symbols of buildings or artificial elements such as the government, the temple, the city walls, gates, arches, bridges, etc. in the map. The quantity of image elements can be counted by reading the map directly and combining text annotation. It is difficult to directly quantify the graphical symbols such as roads, mountains and waters, etc.

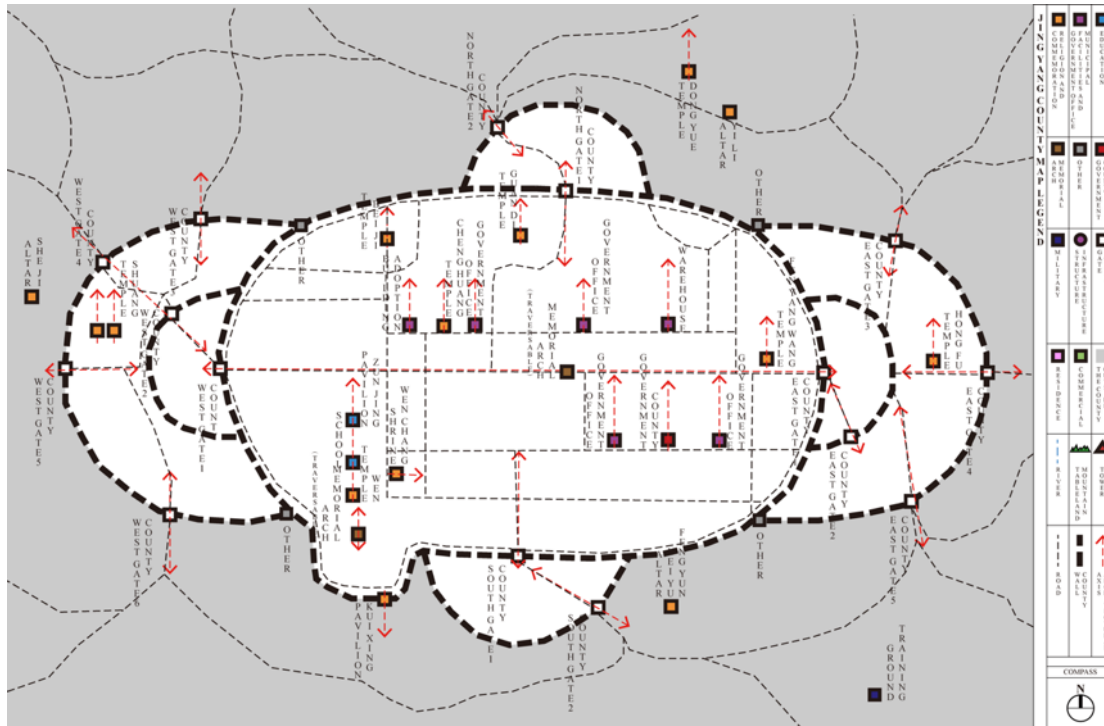


Figure 8. Category and location of element in the map of Jingyang County from the local chronicle in the 43th year of Qianlong of Qing dynasty (1778 A.D.); Source: Made by author

Finally, the county axis is derived based on the spatial distribution of elements in the map. Analyze the morphological characteristics of the county axis in the map by the quantity of axis, the quantity, category and the spatial distribution of the elements of axis.

FINDINGS

1. Local Chronicles of Counties in Guanzhong during the Qianlong Reign

This paper takes the county determined in the 47th year of Qianlong as the research object. Among the 35 counties identified, Xi'an Prefecture is composed of Chang'an County and Xianning County, which are not included in the study. According to the table 1, there are no city maps in the local chronicles of 8 counties, and there are no local chronicles in 4 counties during the Qianlong period. The Local Chronicles of Weinan County could not obtain the materials due to technical reasons. According to the data, a total of 25 counties in Guanzhong area of Shaanxi during the Qianlong period can be compared and analyzed.

Table 1 Basic Information of the Local Chronicles of Guanzhong County in Qianlong Period; Source: Made by author

COUNTY	DYNASTY	YEAR	AUTHOR	MAP	SOURCE
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BAO JI COUNTY	THE 29TH YEAR OF QIANLONG IN THE QING DYNASTY	1764	XU QIFENG, ETC.	•	NATIONAL DIGITAL LIBRARY OF CHINA (http://www.nlc.cn/)
CHAO YI COUNTY	THE 45TH YEAR OF QIANLONG IN THE QING DYNASTY	1780	JIN JIAYAN, ZHU TINGMO, ETC.	•	NATIONAL DIGITAL LIBRARY OF CHINA (http://www.nlc.cn/)
CHENG CHENG COUNTY	THE 49TH YEAR OF QIANLONG IN THE QING DYNASTY	1784	DA ZHI, ETC.	•	CHINA LOCAL CHRONICLES COLLECTION-SHAANXI LOCAL CHRONICLES
CHUN HUA COUNTY	THE 49TH YEAR OF QIANLONG IN THE QING DYNASTY	1784	WAN TINGSHU, ETC.	•	NATIONAL DIGITAL LIBRARY OF CHINA (http://www.nlc.cn/)
FU FENG COUNTY	THE 44TH YEAR OF QIANLONG IN THE QING DYNASTY	1779	SONG SHILUO, ETC.	•	NATIONAL DIGITAL LIBRARY OF CHINA (http://www.nlc.cn/)
FU PING COUNTY	THE 43TH YEAR OF QIANLONG IN THE QING DYNASTY	1778	WU LIUAO, ETC.	•	CHINA LOCAL CHRONICLES COLLECTION-SHAANXI LOCAL CHRONICLES
HAN CHENG COUNTY	THE 49TH YEAR OF QIANLONG IN THE QING DYNASTY	1784	BI YUAN, FU YINGKUI, ETC.	•	NATIONAL DIGITAL LIBRARY OF CHINA (http://www.nlc.cn/)
HE YANG COUNTY	THE 34TH YEAR OF QIANLONG IN THE QING DYNASTY	1769	XI FENGQIAN, ETC.	•	CHINA LOCAL CHRONICLES COLLECTION-SHAANXI LOCAL CHRONICLES
HUA YIN COUNTY	THE 53TH YEAR OF QIANLONG IN THE QING DYNASTY	1788	LU WEIHUAN, XU GUANGJI, LI TIANXIU, ETC.	•	CHINA LOCAL CHRONICLES COLLECTION-SHAANXI LOCAL CHRONICLES
JING YANG COUNTY	THE 43TH YEAR OF QIANLONG IN THE QING DYNASTY	1778	GE CHEN, ETC.	•	CHINA LOCAL CHRONICLES COLLECTION-SHAANXI LOCAL CHRONICLES
LAN TIAN COUNTY	THE 59TH YEAR OF QIANLONG IN THE QING DYNASTY	1794	GAO YU, MAXUECI, ETC.	•	NATIONAL DIGITAL LIBRARY OF CHINA (http://www.nlc.cn/)
LI QUAN COUNTY	THE 49TH YEAR OF QIANLONG IN THE QING DYNASTY	1784	JIANG QICHANG, SUN XINGYAN, ETC.	•	CHINA LOCAL CHRONICLES COLLECTION-SHAANXI LOCAL CHRONICLES
LIN TONG COUNTY	THE 41TH YEAR OF QIANLONG IN THE QING DYNASTY	1776	SHI CHUANYUAN, ETC.	•	NATIONAL DIGITAL LIBRARY OF CHINA (http://www.nlc.cn/)
MEI COUNTY	THE 44TH YEAR OF QIANLONG IN THE QING DYNASTY	1779	LI DAISHUANG, ETC.	•	NATIONAL DIGITAL LIBRARY OF CHINA (http://www.nlc.cn/)
PU CHENG COUNTY	THE 47TH YEAR OF QIANLONG IN THE QING DYNASTY	1782	ZHANG XINJING, ETC.	•	CHINA LOCAL CHRONICLES COLLECTION-SHAANXI LOCAL CHRONICLES
QI SHAN COUNTY	THE 44TH YEAR OF QIANLONG IN THE QING DYNASTY	1779	PING SHIZENG, GUOLVHENG, ETC.	•	NATIONAL DIGITAL LIBRARY OF CHINA (http://www.nlc.cn/)
SAN YUAN COUNTY	THE 48TH YEAR OF QIANLONG IN THE QING DYNASTY	1783	LIU SHAOBAN, ETC.	•	CHINA LOCAL CHRONICLES COLLECTION-SHAANXI LOCAL CHRONICLES
TONG GUAN COUNTY	THE 30TH YEAR OF QIANLONG IN THE QING DYNASTY	1765	YUAN WENGUAN, ETC.	•	NATIONAL DIGITAL LIBRARY OF CHINA (http://www.nlc.cn/)
WU GONG COUNTY	THE 26TH YEAR OF QIANLONG IN THE QING DYNASTY	1761	KANG HAI, ETC.	•	CHINA LOCAL CHRONICLES COLLECTION-SHAANXI LOCAL CHRONICLES
XIAN YANG COUNTY	THE 16TH YEAR OF QIANLONG IN THE QING DYNASTY	1751	ZANG YINGTONG, ETC.	•	CHINA LOCAL CHRONICLES COLLECTION-SHAANXI LOCAL CHRONICLES
XING PING COUNTY	THE 42TH YEAR OF QIANLONG IN THE QING DYNASTY	1777	GU SHENGLEI, ZHANG XUN, ETC.	•	CHINA LOCAL CHRONICLES COLLECTION-SHAANXI LOCAL CHRONICLES
SAN SHUI COUNTY	THE 50TH YEAR OF QIANLONG IN THE QING DYNASTY	1785	GE DEXIN, ETC.	•	CHINA LOCAL CHRONICLES COLLECTION-SHAANXI LOCAL CHRONICLES
CHANG WU COUNTY	THE 48TH YEAR OF QIANLONG IN THE QING DYNASTY	1783	FAN SHIFENG, HONG LIANGJI, LITAIJIAO, ETC.	•	NATIONAL DIGITAL LIBRARY OF CHINA (http://www.nlc.cn/)

ZHOU ZHI COUNTY	THE 58TH YEAR OF QIANLONG IN THE QING DYNASTY	1793	YANG YI, ETC.	•	NATIONAL DIGITAL LIBRARY OF CHINA (http://www.nlc.cn/)
DA LI COUNTY	THE 51TH YEAR OF QIANLONG IN THE QING DYNASTY	1786	HE YUNHONG, ETC.	•	NATIONAL DIGITAL LIBRARY OF CHINA (http://www.nlc.cn/)
YONG SHOU COUNTY	THE 58TH YEAR OF QIANLONG IN THE QING DYNASTY	1793	JIANG JI, ETC.	○	CHINA LOCAL CHRONICLES COLLECTION-SHAANXI LOCAL CHRONICLES
HU COUNTY	THE 42TH YEAR OF QIANLONG IN THE QING DYNASTY	1777	WANG YICHENG, SUN JINGLIE, ETC.	○	CHINA LOCAL CHRONICLES COLLECTION-SHAANXI LOCAL CHRONICLES
BAI SHUI COUNTY	THE 19TH YEAR OF QIANLONG IN THE QING DYNASTY	1754	LIANG SHANCHANG, ETC.	○	CHINA LOCAL CHRONICLES COLLECTION-SHAANXI LOCAL CHRONICLES
WEI NAN COUNTY*	THE 43TH YEAR OF QIANLONG IN THE QING DYNASTY	1778	WANG YICHENG, WEI XIANGLIE, ETC.	○	○
GAO LING COUNTY	○	○	○	○	○
QIAN YANG COUNTY	○	○	○	○	○
LIN YOU COUNTY	○	○	○	○	○
FENG COUNTY	○	○	○	○	○

• means that there are county maps in Local Chronicles of Guanzhong County; ○ means that there are no county map in Local Chronicles of Guanzhong County; * For technical reasons, Weinan County could not obtain the specific data of county chronicles in Qianlong period.

Table 1 shows the basic information of the local history of counties in Guanzhong during the Qianlong period. According to the table, in the 18 years from 1751 to 1769, only 6 counties edited local history. In the four years from 1776 to 1780, ten counties completed the compilation of local chronicles, in the six years from 1782 to 1788, ten counties completed the compilation of local chronicles, and in the two years from 1793 to 1794, three counties completed the compilation of local chronicles. During the last two decades of Emperor Qianlong's reign, local chronicles of 23 counties were completed, accounting for 80% of the counties in Guanzhong. The compilation of county local chronicles was concentrated in a relatively short period of time, making comparative analysis of the maps possible.

2.Elements in the Maps

The morphological characteristics of the elements in the map were clarified through the identification and transformation the cartographic symbols of the 25 maps (Figure 9, 10, 11, 12).

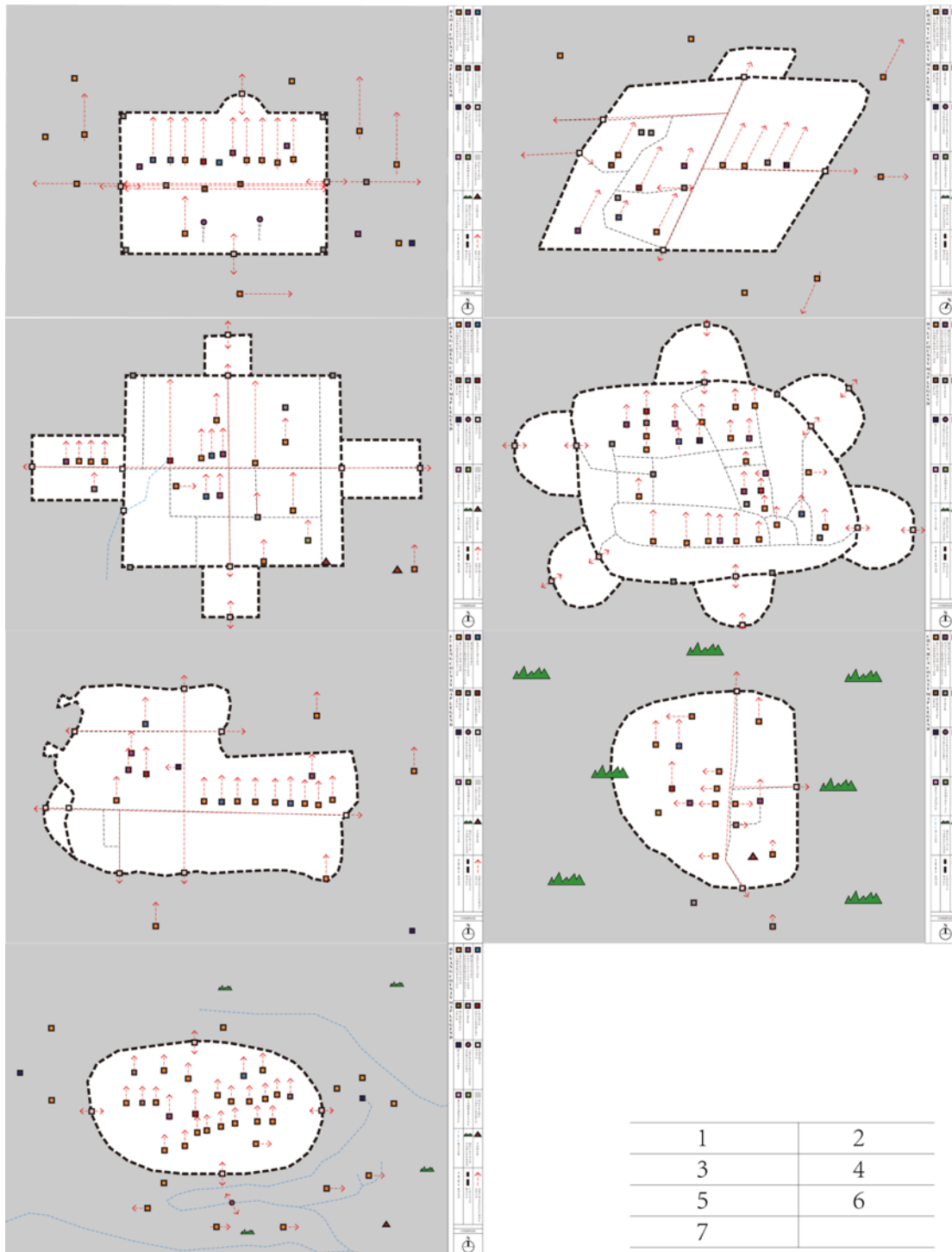


Figure 9. Category and location of element in the maps from the local chronicle during the reign of Qianlong (1735-1796 A.D.); Source: Made by author.

1, Baoji County; 2, Chaoyi County; 3, Chengcheng County; 4, Dali County; 5, Fufeng County; 6, Chunhua County; 7, Heyang Count;

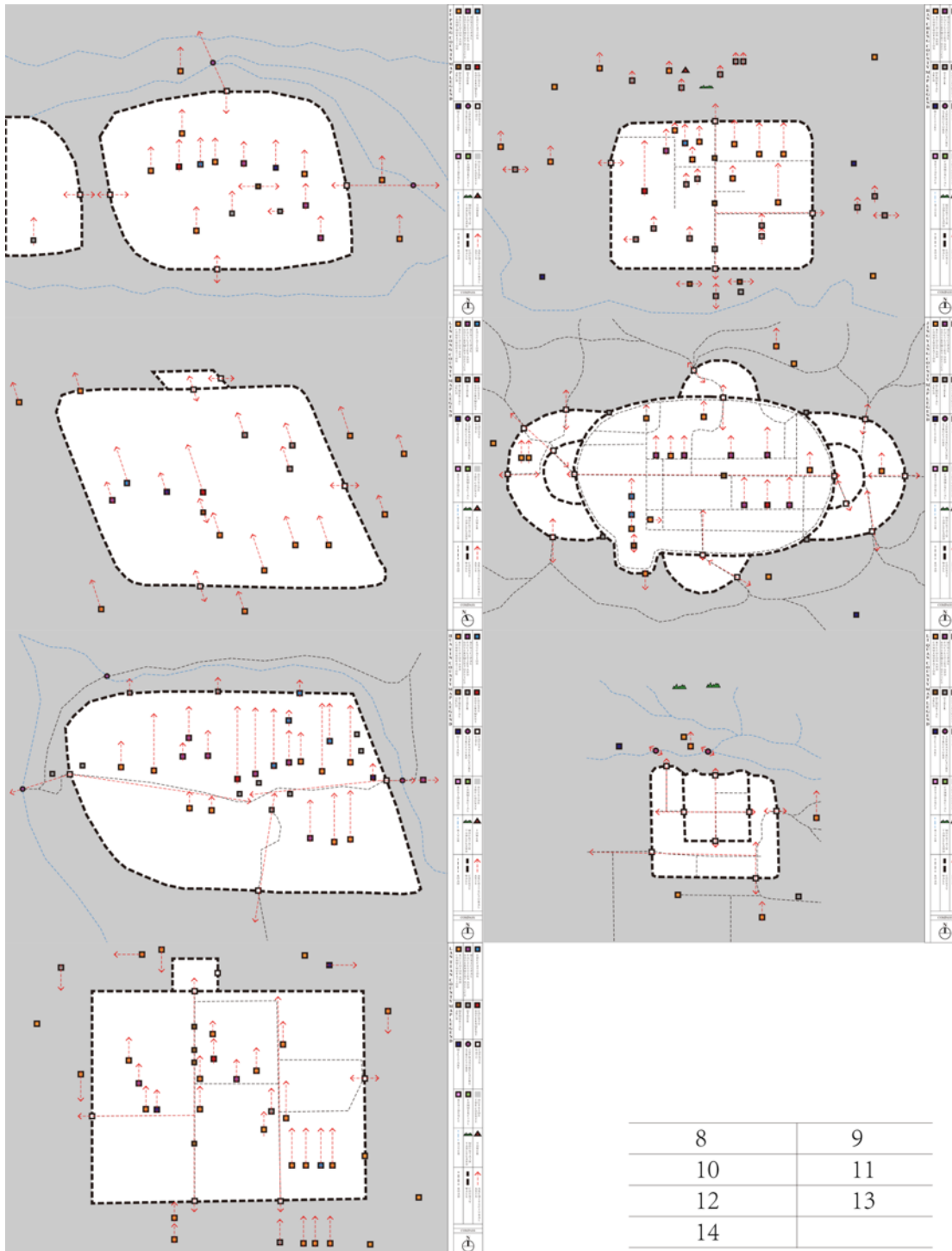


Figure 10. Category and location of element in the maps from the local chronicle during the reign of Qianlong (1735-1796 A.D.); Source: Made by author.

8, Fuping County; 9, Hancheng County; 10, Lintong County; 11, Jingyang County; 12, Huayin County; 13, Liquan County; 14, Lantian County;

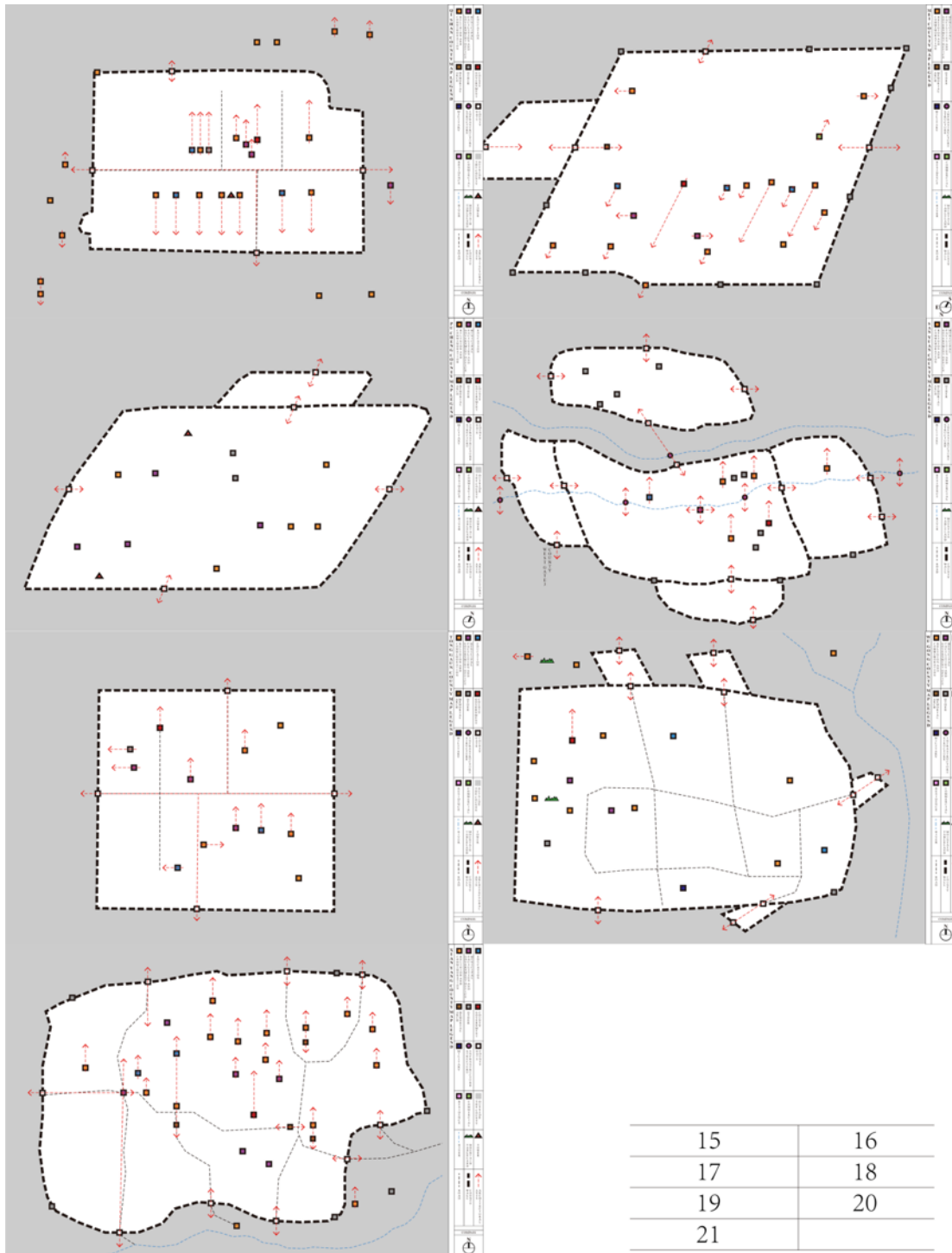


Figure 11. Category and location of element in the maps from the local chronicle during the reign of Qianlong (1735-1796 A.D.); Source: Made by author.

15, Qishan County; 16, Mei County; 17, Pucheng County; 18, Sanyuan County; 19, Tongguan County; 20, Wugong County; 21, Xianyang County;

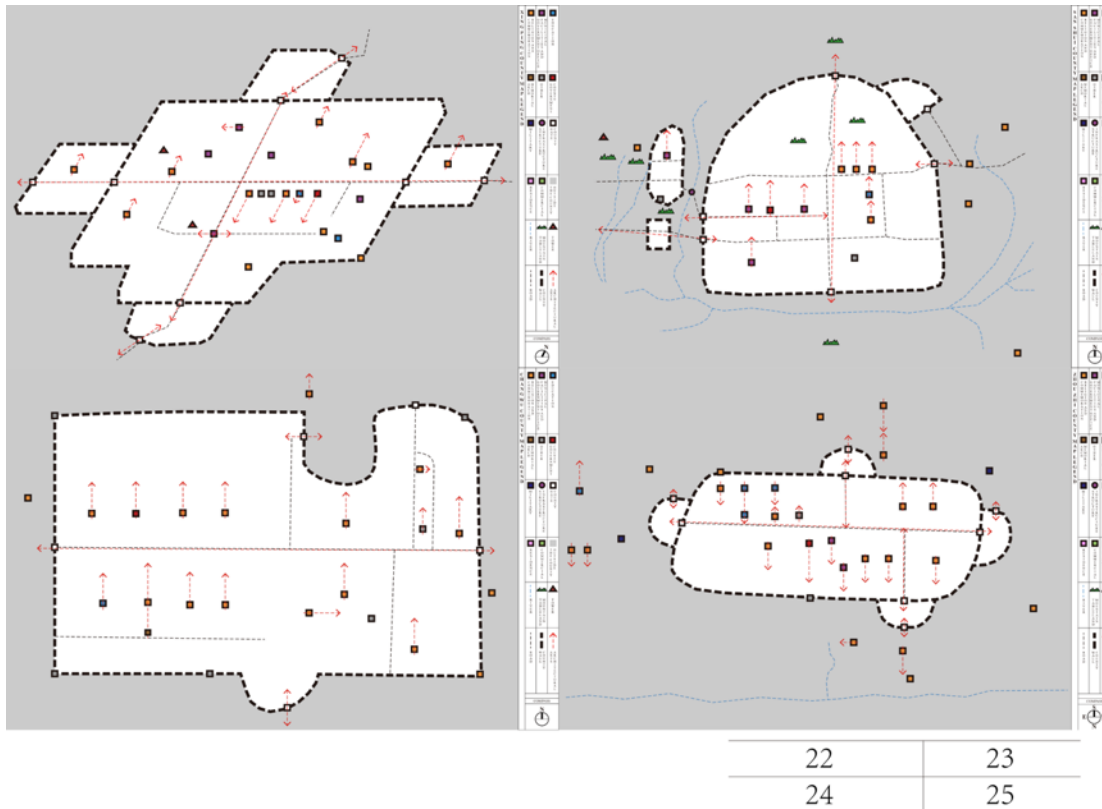


Figure 12. Category and location of element in the maps from the local chronicle during the reign of Qianlong (1735-1796 A.D.); Source: Made by author.

22, Xingping County; 23, Sanshui County; 24, Changwu County; 25, Zhouzhi County

Through the identification of different elements in the map, the image elements in the map are classified into 11 categories according to their functions, namely religion and commemoration (RC), education (ED), government and municipal facility (MG), county gate (CG), barbican (BA), military (MI), commerce (CO), road (RO), wall (WA), natural environment (NE) and others (OT). As the three categories of road, wall and natural environment in the map are drawn applying traditional Chinese freehand landscape painting techniques, the exact number of elements cannot be counted. This paper only identifies whether these three types of elements are included in the map.

Table 2 The category and quantity of the elements in the maps of the 25 counties in Guanzhong; Source: Made by author

COUNTY	RC	ED	MG	CG	BA	MI	CO	RE	OT	RO*	WA*	NE*	TOTAL
BAO JI COUNTY	18	3	4	4	0	1	0	0	0	○	●	●	38
CHAO YI COUNTY	11	1	3	5	1	1	0	0	4	●	●	○	26
CHENG CHENG COUNTY	12	2	4	8	4	0	1	0	6	●	●	●	37
CHUN HUA COUNTY	11	1	2	3	0	0	0	0	3	●	●	●	20
FU FENG COUNTY	12	3	4	7	1	1	0	0	0	●	●	●	28
FU PING COUNTY	9	1	6	5	0	1	0	0	3	○	●	●	25
HAN CHENG COUNTY	19	1	2	4	0	1	0	0	18	●	●	●	45

HE YANG COUNTY	30	1	4	4	0	2	0	0	3	○	●	●	44
HUA YIN COUNTY	9	4	10	3	0	1	0	0	9	●	●	●	36
JING YANG COUNTY	15	1	7	13	6	1	0	0	4	●	●	○	47
LAN TIAN COUNTY	25	1	3	6	1	1	0	0	3	●	●	○	40
LI QUAN COUNTY	5	0	0	8	0	0	0	0	1	●	●	●	14
LIN TONG COUNTY	12	1	2	5	1	1	0	0	3	○	●	●	25
MEI COUNTY	12	3	3	4	1	0	1	0	10	○	●	○	34
PU CHENG COUNTY	5	0	4	5	1	0	0	0	2	○	●	●	17
QI SHAN COUNTY	20	3	5	4	0	0	0	0	1	●	●	○	33
SAN YUAN COUNTY	4	1	7	13	4	0	0	0	10	○	●	●	39
TONG GUAN COUNTY	5	2	4	4	0	0	0	0	1	●	●	○	16
WU GONG COUNTY	10	1	2	8	4	1	0	0	2	●	●	●	28
XIAN YANG COUNTY	19	2	5	7	0	1	0	0	6	●	●	●	40
XING PING COUNTY	13	2	4	8	4	0	0	0	2	●	●	○	33
SAN SHUI COUNTY	8	1	4	6	1	0	0	0	2	●	●	●	22
CHANG WU COUNTY	17	1	1	5	0	0	0	0	4	●	●	●	28
ZHOU ZHI COUNTY	19	4	2	8	4	2	0	0	2	●	●	●	41
DA LI COUNTY	17	2	6	12	6	1	0	0	8	●	●	○	52
MEDIAN	12	1	4	5	1	1	0	0	3	/	/	/	33
AVERAGE	13.5	1.7	3.9	6.4	1.6	0.6	0.1	0.0	4.3	/	/	/	32.0

* As the three categories of road, wall and natural environment in the map are drawn applying traditional Chinese freehand landscape painting techniques, the exact number of elements cannot be counted; ● means that the map contains this category; ○ means that the map does not contains this category.

Table 2 shows the categories and quantities of the elements contained in the maps of the 25 counties in Guanzhong, Shaanxi. According to table, the categories of wall, county gate and religion and commemoration are included in each map. Only the map of Liquan County has no elements of government and municipal, while the maps of Liquan County and Pucheng County have no elements of education. The maps of 7 counties do not include road, the maps of 8 counties do not depict the natural environment, and 11 counties do not have the element of barbican and military, which account for 28%, 32%, 44%, and 44% of the total number of counties. Only 2 counties have the element of business, accounting for 8% of the total counties. From a quantitative point of view, the category of religion and commemoration is the core content of the map. county gate and wall are necessary facilities for the counties in the map, while government and municipal facility are important functions of the counties in the map. Education, military, barbican, and commerce are the minor county function categories of the counties in the map.

To sum up, the elements of the religion and commemoration in the maps of the Guanzhong region of Shaanxi are the core and necessary category, while the walls and county gate are the necessary content. Government and municipalities are universal and major content of counties in the map, and education is universal and minor content. The natural environment, military, road, and

barbican are non-universal and minor categories in the maps of county. Finally, the category of commerce are the marginal elements in the map.

3.County Axis in the Map

Identify the county axis through the spatial distribution of map elements. Select elements that can be distributed in a linear spatial sequence across all or most of the county area. These selected elements are integrated to form the county's axis (Figure 13).

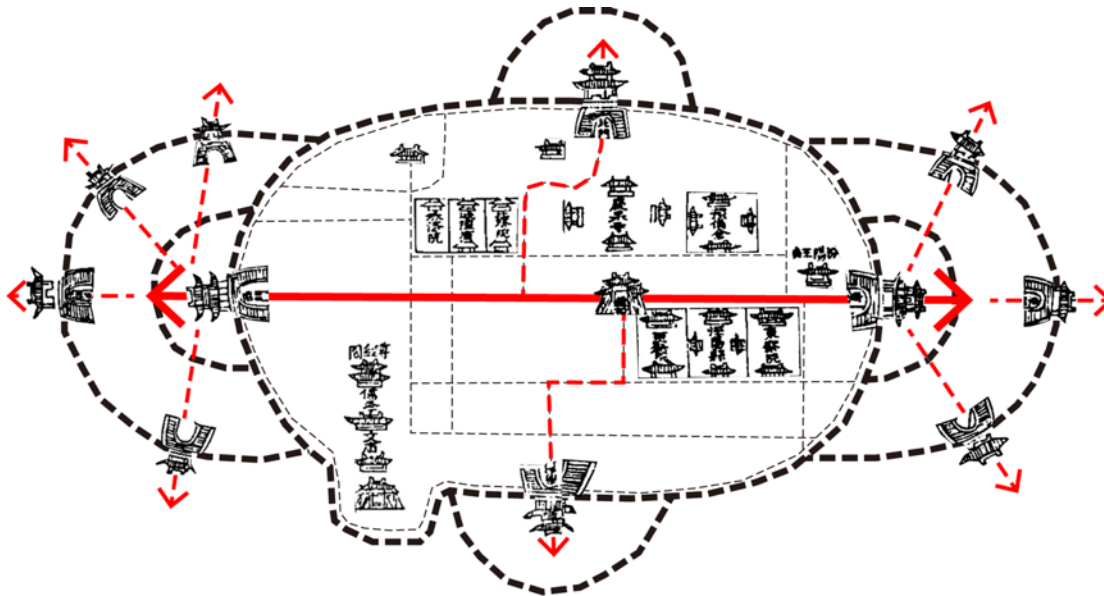


Figure 13. Axis morphology in the map of Jingyang County from the local chronicle in the 43th year of Qianlong of Qing dynasty (1778 A.D.); Source: Made by author

Table 3 illustrates the element of the county axis of Guanzhong, shows the category and quantity of the element on the county axis and along the county axis. According to the left side of Table 3, the categories of the elements on the axis in all the county map include the city gate. In 7 counties, the elements on the axis do not include roads, which is the same as the number of maps without road, indicating that road is also a necessary category for the county axis. A total of 14 counties have no barbican on the axis, which is 3 more than the counties without the barbican category in the map, indicating that barbican is the main category that constitutes the county axis. Only 7 counties have religion and commemoration elements on their axes, and 3 counties have urban government and municipal facility elements on their axes, which shows that these two categories are the minor category of the county axes. Finally, the axis of all counties does not include the category of education, military and commerce. Only Jingyang County, Lantian County and Xingping County include the four categories of religion and commemoration, government and municipal facility, barbican and road, and only Xianyang County include the four categories of religion and commemoration, government and municipal facility, barbican and road.

According to the right side of Table 3, there are 19 counties which the element along the county axis contain the category of religion and memorial, indicating that this is the main category of elements on both sides of the axis. There are 9 counties which the element along the axis that do not contain the category of government and municipal facility, and 12 counties which the element along the axis that do not contain the category of education, indicating that these two categories are minor categories along the axis. Only 3 counties which the element along the axis that contain

the category of military, and 1 county which the element along the axis that contain the category of commerce, indicating that these two categories are marginal categories along the axis. Finally, there is no county which the element along the axis that contain the category of barbican. There are 11 counties which the element along the axis that contain 3 categories of religion and commemoration, education, government and municipal facility, while Fuping County and Huayin County have one more category of elements than other counties.

Table 3. Quantity and Category of the Element of the County Axis in Guanzhong (Shaanxi); Source: Made by author

COUNTY	ELEMENT ON THE COUNTY AXIS									ELEMENT ALONG THE COUNTY AXIS							
	RC	ED	MG	CG	BA	MI	CO	RO	OT	RC	ED	MG	CG	BA	MI	CO	OT
BAO JI COUNTY	3●	○	○	2●	○	○	○	○	1●	6●	2●	3●	○	○	○	○	○
CHAO YI COUNTY	○	○	○	2●	1●	○	○	●	○	○	○	○	○	○	○	○	1●
CHENG CHENG COUNTY	○	○	○	4●	2●	○	○	●	○	6●	2●	4●	○	○	○	○	○
CHUN HUA COUNTY	○	○	○	2●	○	○	○	●	○	5●	○	○	○	○	○	○	1●
FU FENG COUNTY	○	○	○	2●	○	○	○	●	○	8●	2●	○	○	○	○	○	○
	○	○	○	2●	○	○	○	●	○	○	1●	○	○	○	○	○	○
	○	○	○	2●	○	○	○	●	○	○	○	○	○	1●	○	○	○
FU PING COUNTY	1●	○	1●	2●	○	○	○	○	○	4●	1●	3●	○	○	1●	○	○
HAN CHENG COUNTY	5●	○	○	2●	○	○	○	●	1●	○	○	○	○	○	○	○	○
HE YANG COUNTY	○	○	○	2●	○	○	○	○	○	15●	○	2●	○	○	○	○	2●
HUA YIN COUNTY	○	○	3●	2●	○	○	○	●	1●	8●	1●	5●	○	○	1●	○	○
JING YANG COUNTY	1●	○	○	6●	4●	○	○	●	○	4●	1●	3●	○	○	○	○	○
LAN TIAN COUNTY	4●	○	○	2●	1●	○	○	●	○	○	○	○	○	○	○	○	○
LI QUAN COUNTY	○	○	○	2●	○	○	○	●	○	○	○	○	○	○	○	○	○
	○	○	○	2●	○	○	○	●	○	○	○	○	○	○	○	○	○
LIN TONG COUNTY	○	○	○	1●	1●	○	○	○	1●	○	○	○	○	○	○	○	○
MEI COUNTY	1●	○	○	2●	1●	○	○	○	○	3●	3●	○	○	○	○	1●	○
PU CHENG COUNTY	○	○	○	2●	○	○	○	○	○	4●	○	3●	○	○	○	○	1●
	○	○	○	2●	○	○	○	○	○	○	○	○	○	○	○	○	○
QI SHAN COUNTY	○	○	○	2●	○	○	○	●	○	8●	3●	5●	○	○	○	○	1●
SAN YUAN COUNTY	○	○	○	4●	2●	○	○	○	○	3●	1●	3●	○	○	○	○	○
	○	○	2●	5●	2●	○	○	○	○	○	○	○	○	○	○	○	○
TONG GUAN COUNTY	○	○	○	2●	○	○	○	●	○	1●	1●	2●	○	○	○	○	○
WU GONG COUNTY	○	○	○	4●	2●	○	○	●	○	○	○	○	○	○	○	○	○
XIAN YANG COUNTY	1●	○	1●	2●	○	○	○	●	○	3●	○	1●	○	○	○	○	○
	○	○	1●	2●	○	○	○	●	○	○	○	○	○	○	○	○	○
	○	○	○	2●	○	○	○	●	○	○	○	○	○	○	○	○	○
XING PING COUNTY	○	○	○	4●	2●	○	○	●	○	8●	○	2●	○	○	○	○	2●
	1●	○	○	4●	2●	○	○	●	○	○	○	1●	○	○	○	○	○
SAN SHUI COUNTY	○	○	○	1●	○	○	○	●	○	5●	1●	2●	○	○	○	○	○
	○	○	○	1●	○	○	○	●	○	○	○	1●	○	○	○	○	1●
	○	○	○	2●	○	○	○	●	○	○	○	○	○	○	○	○	○
CHANG WU COUNTY	○	○	○	2●	○	○	○	●	○	9●	1●	1●	○	○	○	○	1●
ZHOU ZHI COUNTY	○	○	○	2●	2●	○	○	●	○	3●	○	1●	○	○	○	○	○

DA LI COUNTY	○ ○ ○ 4● 2● ○ ○ ● ○	7● 1● 1● ○ ○ ○ ○ ○
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● means that the map contains this category, numbers means the quantity of the element: ○ means that the map does not contain this category

4.Characteristics of the County Axis in the Map

Table 4 shows the quantity, direction, range, type of county axis and spatial distribution of the elements along the axis the county axis of Guanzhong. According to the statistics of the table, 17 counties have only one axis, while the remaining 8 counties are multi-axis, accounting for 68% and 32% of the total counties, respectively. Of the eight multi-axis counties, five counties have two county axes and three counties have three county axes. Among counties with only one axis, there are 11 counties on the east-west axis and 6 counties on the north-south axis, accounting for 44% and 24% of the total counties, respectively. The five counties with two axes are composed of the east-west axis and the north-south axis. For counties with three axes, two counties consist of two east-west axes and one north-south axis, and one county's axis consists of two north-south axes and one east-west axis. Counties with two county axes and three county axes account for 20% and 12% of the total counties, respectively. According to statistics from the maps of the Guanzhong in Shaanxi province, there are significant differences in the number of axis directions and categories. According to the statistics in the table 4, there are significant differences in the quantity of counties in both axis direction and category. The east-west direction is an important characteristic of the county axis, and most counties in Guanzhong have only one county axis.

Table 4. The quantity, direction, range, type of county axis and the spatial distribution of elements along the county axis; Source: Made by author

COUNTY	COUNTY AXIS QUANTITY	COUNTY AXIS DIRECTION	COUNTY AXIS RANGE	COUNTY AXIS TYPE	THE SPATIAL DISTRIBUTION OF ELEMENTS ALONG THE COUNTY AXIS
BAO JI COUNTY*	1	EAST-WEST	THROUGH THE COUNTY + OUTSIDE THE COUNTY	SINGLE LINEAR AXIS	FISHBONE-SHAPED PARALLEL
CHAO YI COUNTY	1	NORTH-SOUTH	THROUGH THE COUNTY	SINGLE LINEAR AXIS	/
CHENG CHENG COUNTY	2	EAST-WEST NORTH-SOUTH	THROUGH THE COUNTY THROUGH THE COUNTY	COMPOUND LINEAR AXIS	FISHBONE-SHAPED PARALLEL /
CHUN HUA COUNTY	1	NORTH-SOUTH	THROUGH THE COUNTY	SINGLE LINEAR AXIS	FISHBONE-SHAPED PARALLEL
FU FENG COUNTY	3	EAST-WEST EAST-WEST NORTH-SOUTH	THROUGH THE COUNTY THROUGH THE COUNTY THROUGH THE COUNTY	COMPOUND LINEAR AXIS	FISHBONE-SHAPED PARALLEL / /
FU PING COUNTY*	1	EAST-WEST	THROUGH THE COUNTY + OUTSIDE THE COUNTY	SINGLE LINEAR AXIS	FISHBONE-SHAPED PARALLEL
GAO LING COUNTY	1	NORTH-SOUTH	THROUGH THE COUNTY	SINGLE LINEAR AXIS	/
HAN CHENG COUNTY	1	NORTH-SOUTH	THROUGH THE COUNTY + OUTSIDE THE COUNTY	SINGLE LINEAR AXIS	/

HE YANG COUNTY*	1	EAST-WEST	THROUGH THE COUNTY	SINGLE LINEAR AXIS	FISHBONE-SHAPED PARALLEL
HUA YIN COUNTY	1	EAST-WEST	THROUGH THE COUNTY	SINGLE LINEAR AXIS	FISHBONE-SHAPED PARALLEL
JING YANG COUNTY	1	EAST-WEST	THROUGH THE COUNTY	SINGLE LINEAR AXIS	FISHBONE-SHAPED PARALLEL
LAN TIAN COUNTY	1	NORTH-SOUTH	THROUGH THE COUNTY	SINGLE LINEAR AXIS	/
LI QUAN COUNTY**	2	EAST-WEST	THROUGH THE COUNTY	COMPOUND LINEAR AXIS	/
		NORTH-SOUTH	THROUGH THE COUNTY		/
LIN TONG COUNTY*	1	NORTH-SOUTH	THROUGH THE COUNTY	SINGLE LINEAR AXIS	/
MEI COUNTY*	1	EAST-WEST	THROUGH THE COUNTY	SINGLE LINEAR AXIS	FISHBONE-SHAPED PARALLEL
PU CHENG COUNTY*	2	EAST-WEST	THROUGH THE COUNTY	COMPOUND LINEAR AXIS	FISHBONE-SHAPED PARALLEL
		NORTH-SOUTH	THROUGH THE COUNTY		/
QI SHAN COUNTY	1	EAST-WEST	THROUGH THE COUNTY + OUTSIDE THE COUNTY	SINGLE LINEAR AXIS	FISHBONE-SHAPED PARALLEL
SAN YUAN COUNTY*	2	EAST-WEST	THROUGH THE COUNTY	COMPOUND LINEAR AXIS	FISHBONE-SHAPED PARALLEL
		NORTH-SOUTH	THROUGH THE COUNTY		/
TONG GUAN COUNTY	1	EAST-WEST	THROUGH THE COUNTY	SINGLE LINEAR AXIS	FISHBONE-SHAPED PARALLEL
WU GONG COUNTY	1	NORTH-SOUTH	THROUGH THE COUNTY	SINGLE LINEAR AXIS	/
XIAN YANG COUNTY	3	EAST-WEST	THROUGH THE COUNTY	COMPOUND LINEAR AXIS	FISHBONE-SHAPED PARALLEL
		WEST-SOUTH	THROUGH THE COUNTY		/
		NORTH-SOUTH	THROUGH THE COUNTY		/
XING PING COUNTY	2	EAST-WEST	THROUGH THE COUNTY	COMPOUND LINEAR AXIS	FISHBONE-SHAPED PARALLEL
		NORTH-SOUTH	THROUGH THE COUNTY		/
SAN SHUI COUNTY	3	EAST-WEST	THROUGH THE COUNTY + OUTSIDE THE COUNTY	COMPOUND LINEAR AXIS	FISHBONE-SHAPED PARALLEL
		EAST-WEST	THROUGH THE COUNTY		/
		NORTH-SOUTH	THROUGH THE COUNTY		/
CHANG WU COUNTY	1	EAST-WEST	THROUGH THE COUNTY	SINGLE LINEAR AXIS	FISHBONE-SHAPED PARALLEL
ZHOU ZHI COUNTY	1	EAST-WEST	THROUGH THE COUNTY	SINGLE LINEAR AXIS	FISHBONE-SHAPED PARALLEL
DA LI COUNTY	1	EAST-WEST	THROUGH THE COUNTY	SINGLE LINEAR AXIS	FISHBONE-SHAPED PARALLEL

* Indicates that there is no road in the map of the county, and the county axis is estimated based on the spatial distribution characteristics of the elements; ** Indicates that county in the map has simply drawn the county gate, wall and road, and the county axis is inferred from the drawn map elements.

In the table, the axis of five counties extends from inside to outside the county, accounting for only 20% of the total quantity of counties, and only one of them is the north-south county axis. The quantity and spatial distribution of elements along the axis show significant differences in the direction of the county axis. All the elements along the east-west axis are distributed in the fish-bone shape and contain different county functions. Except for Chunhua County, there are almost no elements distributed along the north-south axis in the map of the counties in Guanzhong.

CONCLUSIONS

Most of the local chronicles of the Guanzhong region during the Qianlong period contained maps depicting the internal conditions of the county. The categories of county wall, gate, religion and commemoration are the elements in all county maps. The less important element categories are government and municipal administration, education. It illustrates that the ancients' cognition of the counties focused on the spiritual influence and continuity, rather than the depiction and recording of ordinary life.

Most of the county axes in the maps of Guanzhong reign illustrate a simple single axis morphology, while the quantity of composite morphology of the axis is small. The axis direction of the map is dominated by the east-west direction, the quantity of north-south axis is small, and there are very few deflection axes. The elements along the east-west axis are distributed in a fishbone-like parallel form, while the elements on both sides of the north-south axis are slightly distributed.

The morphology of the county axis in the map of the Guanzhong is based on the road as the core trunk and the gate as the node at both ends. Some of the roads that make up the axis are scattered with the traversable buildings or structures of religious and memorial category, such as archways and bell towers. Three categories of elements are mainly distributed on both sides of the axis, namely religion and commemoration, education, government and municipal facility. The county axes form the maps in local chronicles of Guanzhong during Qianlong period was not only the important traffic artery, but also an important carrier of cultural and spiritual emblem, and also the important part of the urban morphology that unified material and spirit.

This paper does not correlate the descriptions and records of buildings or structures in the local chronicles of the Guanzhong reign with maps to further analyze its relationship with architecture, environment and county axis.

We believe that an interpretative dimension of historical images can promote further awareness, long-term urban culture and space-time relationship for an adaptive development of Guanzhong.

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