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► **To cite this version:**

Xie Liye, Zahid Daudjee, Liu Chunfu, Pauline Sebillaud. Settlement Relocation, Urban Construction, and Social Transformation in China's Central Plain, 2300-1500 B.C.. Asian Perspectives, 2020. hal-03086083

HAL Id: hal-03086083

<https://hal.science/hal-03086083v1>

Submitted on 18 Oct 2023

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« Settlement Relocation, Urban Construction, and Social Transformation in
China's Central Plain, 2300-1500 B.C. », *Asian Perspectives*, 2020, vol. 59,
n° 2, p. 299-329.

Settlement Relocation, Urban Construction, and Social Transformation in China's Central Plain, 2300–1500 B.C.

Liye XIE, Zahid DAUDJEE, Chun Fu LIU, and Pauline SEBILLAUD

ABSTRACT

Settlement relocation occurred repeatedly throughout global human history, often resulting insignificant sociopolitical and economic changes. Historical records document the use of settlement relocation as a strategy for social engineering in China no later than the late Shang dynasty (1250–1046 B.C.). We employ placemaking theory to examine social changes associated with population movements to Taosi (2300–1900 B.C.) and Erlitou (1750–1520 B.C.) and the processes of urban construction concomitant to the movements at each site. Furthermore, we employ structuration theory to interpret the process of political knowledge building as concerns settlement relocation and social engineering. Based on our assessment of settlement histories, divisions of space, burial patterns, and community formation, we conclude that the use of settlement relocation as political strategy was formulated during the Taosi and Erlitou eras, and that it was intentionally implemented for political reform by Phase II of Erlitou. **KEYWORDS:** placemaking theory, structuration theory, social transformation, Chinese archaeology, settlement archaeology, urbanization.

INTRODUCTION

SETTLEMENT RELOCATION REFERS TO THE PROCESS OF A POPULATION settling in a new place away from the original homeland, either voluntarily or under compulsion. Such relocations have commonly and repeatedly occurred throughout global human history, triggered by a wide array of factors including but not limited to changes in access to resources, natural cataclysmic events, military interventions, acts of political and social engineering, and religious reform (Birch 2013; Chao 1985; Duan et al. 1998; Jiang 2005; Li, M. 2016; Price 1995; Rossman 2017; Shi 1997). Settlement relocation has led to significant sociopolitical and economic changes in relation to the formation of early villages, cities, and states (Birch 2012, 2013). Some prominent examples include late prehistoric and early dynastic Egypt, Uruk and Urartian polities in the

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Mediterranean region, late preclassic Zapotec civilization in South America, and ancestral Huron-Wendat societies in North America (Birch 2012, 2013; Joyce and Winter 1996; Kennett and Kennett 2006; Millaire 2010; Osborne 2015; Sherman et al. 2010; Smith, A. 2003; Yoffee 1995). In the interest of developing a deeper understanding of settlement relocation and its sociopolitical consequences, this article examines the development of rulership strategies associated with settlement relocation and urban construction at the dawn of China's dynastic history.

According to extant texts, the legendary Xia dynasty is purported to have moved its capital city nine or ten times (Sun 2018), while the subsequent Shang regime had up to 13 instances of capital relocation (Chang, K. 1983; Huber 1988; Wang Z. 2010; Zhao T. 1970). These claims are consistent with the broad patterns found in the archaeological record of China's Central Plain between the late Longshan era and Shang dynasty, which show frequent transfer of regional political centers. Although most scholarly attempts to identify specific archaeological sites with the fragmentarily documented Xia and Early Shang capital cities have resulted in little consensus, Anyang is well-attested as the last capital city of the Shang dynasty (Tang et al. 2000). Research has also shown that the Late Shang King Pan Geng, who relocated the capital city to Anyang, was likely aware of the political implications and effects of capital relocation, employing it as a strategy for regime stabilization (Jiang 2005; Zhang G. 2004).

With respect to this tradition of capital relocation, two principal questions emerge. First, how did acts of capital relocation and urban construction assist in social engineering? Here, social engineering refers to ruling authorities' efforts to redefine and restructure society, specifically with respect to relationships between rulers and their subjects and relationships among subjects. Second, when did the causative linkage between settlement relocation and political control first become salient enough to encourage the application of settlement relocation as a political strategy? Given that capitals area specific type of settlement, we assume that knowledge building regarding the sociopolitical consequences of capital relocation could have begun through observation of the effects of settlement relocation in the pre-Shang era, which, while likely involving regional centers, would not *ab initio* have needed to involve dynastic capital cities.

Our study benefits from the results of over half a century's archaeological surveys, excavations, and research in the late Neolithic Taosi city and the early Bronze Age Erlitou urban center in China's Central Plain. Parallels in archaeological data from other world regions suggest that our observations are consistent with larger, region-independent processes of urbanization and power consolidation. Urban centers beginning as aggregations of populations have facilitated rapid expansion and hierarchicalization through their de-emphasis of kinship ties in diverse contexts the world over (Campagno 2019). Through the lenses of placemaking theory and structuration theory, we address these common tendencies in the specific context of predynastic China. Below, we present a conceptual framework incorporating placemaking theory and structuration theory. We employ placemaking theory to understand the relationship between the construction of a physical space and its structuring of social relationships and structuration theory to understand the process of political knowledge building as regards this relationship. We then examine the history of settlement development in the Taosi and Erlitou urban centers on a regional scale to investigate the dynamic processes of settlement relocation and urban construction during the pre-Shang Longshan and Erlitou eras in the Central Plain. Finally, we

employ the aforementioned conceptual framework to analyze whether resettlement to the Taosi and Erlitou sites and the development of these urban centers served an ancillary or intentional political end.

THEORETICAL BACKGROUND

Placemaking Theory

Placemaking refers to the process by which built environments are constructed, maintained, used, perceived, and imagined (Lefebvre 1991; Swenson 2012, 2015; Tuan 1990). Placemaking theory proposes that the built landscape both reflects and influences social interactions (Creekmore and Fisher 2014; Lawrence and Low 1990; Love 1999; Swenson and Jennings 2018; Tuan 2001). For example, monumental infrastructure serves both as a physical representation of the vast and specialized labor resources and administrative upkeep required to create it (Abrams and Bolland 1999) and a visible augmentation of a leader's persona and authority (Smith, Monica 2014). Physical forms also separate space and divide larger groups into smaller social units. Naturally, such divisions shape the interactions of the people who move within and around them. In addition, the activities associated with the act of construction necessitate group collaboration and create a physical center for social gathering (Inomata et al. 2015). Such gathering could lead to a wide range of outcomes, including forging a new social identity, producing a new unit division, or stimulating various interactions between individuals engaging in different or identical tasks.

The concept of placemaking provides a base from which to understand how the social interactions experienced in a given setting contribute to the cocreation of physical and political forms. Placemaking as a means of transforming social relationships can be a bottom-up or top-down process or a combination of both. Bottom-up processes emphasize individual participation in activities carried out in a given space, spontaneously regulating individual and collective behaviors and creating new identity configurations—even where such political outcomes are unintended. The historical record reveals that participation in construction projects has often encouraged individuals to develop a sense of connection with their location and governing authority (Clark 2004; Cowgill 2003; Pauketat 2000; Smith, A. 2000; Smith, Michael 2007). When architectural projects involve groups from different locales, the act of construction also provides an environment for resocialization and public negotiation. This newly developed group identity makes it easier to preside over a new polity affiliated with a new locale. Even the process of constructing houses involves social cooperation from individuals outside one's family, potentially resulting in bonds of social debt and obligation (Guengerich 2017). In this respect, the site of construction doubles as a site of community formation. In addition, repeated reconstruction and repair of socially significant structures, such as instances of palatial architecture, temples, and facilities for communal activities, entails consistent community involvement. The social nature of construction is thus fundamental for reinforcing social ties and sustaining leadership over groups (Brumfiel 1998:6; Hill and Clark 2001; Munson and Pinzón 2017; Rodning 2009), especially those of a preinstitutional character (Roscoe et al. 1993).

A top-down process requires that authorities be aware of the aforementioned linkage between constructing physical space and regulating social relationships. Thereupon, the authority organizes construction projects or uses spatial features as

visual or ideological stimuli to actualize an intended social structure (Fisher 2014; Wheatley 1971). For example, to reinforce or modify existing social connections, a presiding authority might deploy a settlement based on politico-economic spatial relations among preexisting settlements or arrange a settlement's layout based on existing or premeditated social segregation (Smith, A. 2003). In addition, an authority might consciously match the location and layout of a city to a cosmogram to engender political and economic centrality (Broda 2015; Carrasco 1999; Feng 2015; Lewis 2006; Price 1995; Sugiyama 2010; Wheatley 1971). An authority could also make monumental structures and ritual events exclusive or inclusive to regulate the manner of participation and interaction within a social gathering (Love 1999; Rodning 2013; Swenson 2012). Similarly, an authority could initiate large-scale public works involving current and potential subjects in order to realize an intended social order and give said order physical representation. For example, large-scale constructions such as city walls could have served a dual function in projecting power through their physical and symbolic presence while simultaneously reordering the socio-political landscape by signaling the capacity for force (Kim 2013).

All instances of settlement relocation would have entailed construction of domestic houses, shared spaces, and monumental structures, the building of which provides intensive opportunities for bottom-up resocialization and top-down social engineering. Gatherings and negotiations began even before the enactment of settlement relocation and construction projects themselves. The planning, deliberation, disputation, and sheer socialization of labor would have brought social groups together even before the physical acts of relocation and construction. By corollary, this same social work would necessarily have continued throughout the duration of resettlement and construction (Inomata et al. 2015; Kowalewski 2013). The forms of social organization visible in such gatherings bear out the performative nature of community formation and the aforementioned repetition and continuance of such social work is ultimately integral to the constitution of a city (Flad 2018).

Structuration Theory

Structuration theory indicates that the trajectory of social change is determined by the outcome of interactions between agentive participants and social structures comprising combinations of external and internal structures (Giddens 1984; Sewell 2005; Stones 2005). External structures are the rules and resources providing the conditions and restrictions for an agent's practices. Conversely, internal structures consist of an agent's practical awareness of existing external structures. Internal structures are similar to Bourdieu's (1977:78) notion of habitus in that human agents draw on their knowledge of external structures in their activities and practices and the aggregate influence of their daily practices continuously alters these structures either by agents' creative usage or as an unintended consequence. Both intended and unintended consequences of past agents' actions are incorporated into the structural matrix to be inhabited by later actors.

The archaeological record reflects the intentional actions of past agents living within the structures they inhabited, as well as the intended and unintended consequences of the actions which were incorporated in the structural matrix of later actors (Joyce and Lopiparo 2005). Employing the principles of structuration theory, archaeological case studies have shown that broad social changes such as the emergence of early cities were

unlikely to have resulted from an intentional, wholesale replacement of one structure by a completely new one. More likely, such changes stemmed from either knowledgeable agents manipulating an existing social structure or the unintended results of the daily practices of active agents (Joyce 2004; Joyce and Lopiparo 2005; Smith, Monica 2003; Ur 2014). Following the same logic, we assume that political knowledge building leading to the use of settlement relocation and urban construction as strategies for political reform began with the unintended political consequences of resettlement, the process of urban construction, and a transformation that was consistent with the understanding of social order at that time.

As mentioned earlier, multiple factors have made resettlement imperative throughout human history. Political reform was unlikely to have been among the necessitating factors for the earliest resettlement events; however, early resettlement events could have resulted in serendipitous social transformation. Relocation of populations or settlements dismantles the physical environment associated with an existing social order and thereby naturally reduces the situational pressures inherent to the existing external structure that obstruct social restructuring (even when this change in social relationships was unintended). The resultant dismantling of the existing logic of social organization and the sociopolitical hierarchy it entailed allows new agents to emerge and stake power claims outside the framework of the prior structure (Schwartz 2006). Furthermore, aggregations of populations, either resulting from circumstantial aggregation (e.g., the formation of Hierakonpolis in the Nile valley) or from premediated settlement (e.g., the formation of Monte Albán in the Oaxaca valley), created social contexts for practices that exceeded the limits related to preexisting social organization (i.e., kinship) and thereby invited social change (Campagno 2019). The planning and construction of a new settlement also presents opportunities for bottom-up resocialization and public negotiations that could have brought out unintended social changes. Early instances of resettlement and construction would have allowed for the accumulation of evidence of such a causal relation in the collective memory. Finally, if and only if the causal relationship between relocation, construction, and their political consequences becomes a source of internal structures, authorities can consciously apply relocation and construction as strategies for social reform.

LONGSHAN AND ERLITOU: TRANSFORMATIVE ERAS IN CHINA'S CENTRAL PLAIN

As historical records indicate, the relationship between settlement relocation and political restructuring in the Central Plain was first explicitly noted under the rule of King Pan Geng (r. ca. 1250–1192 B.C.). In accordance with structuration theory, settlement relocation and urban construction events prior to Pan Geng can therefore be seen as ostensible “political experiments” (as defined by Wright 2006:316) that produced the political experience and knowledge that ultimately led to Pan Geng’s successful application of capital relocation as a form of social engineering. Not coincidentally, settlement transformation and sociopolitical instability, as well as repeated collapse and regeneration across different regions in China, were experienced from late Longshan to Erlitou eras prior to the Shang period (Li, M. 2018; Sebillaud 2014; Shelach and Jaffe 2014). It is likely that social failures and innovations contributed to the creative, intentional use of capital relocation as a social engineering strategy in the Shang dynasty, if not earlier.

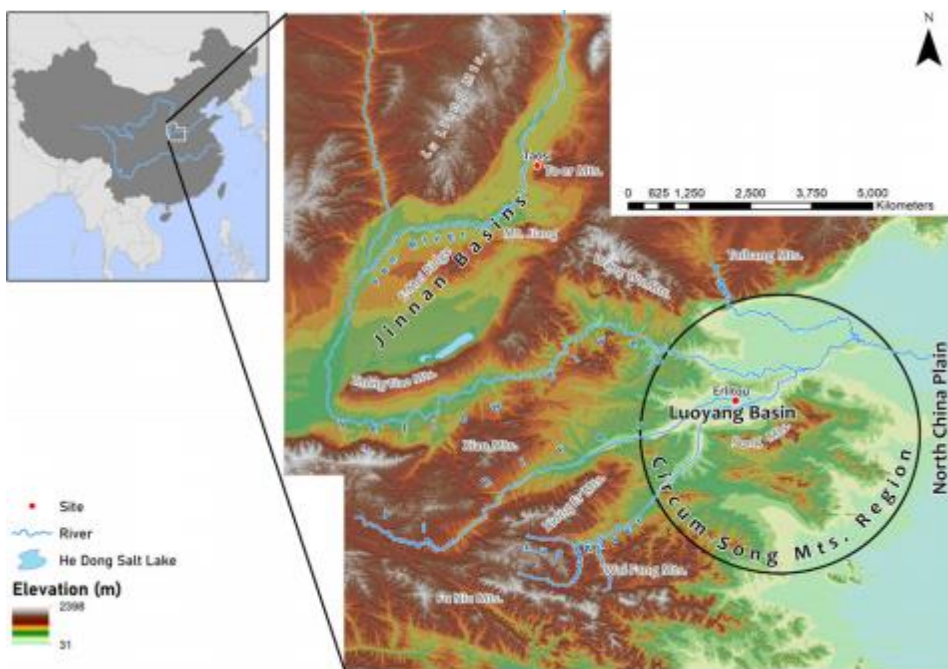


Fig. 1. Study area showing locations of Taosi and Erlitou sites in China (Source base map: SRTM 1 Arc-Second Global, doi:10.5066/F7PR7TFT).

Our case studies focus on the Taosi polity in the Jinnan basins (including Linfen Basin and Yuncheng Basin) and the Erlitou polity in Luoyang Basin, the two most significant polities in the Central Plain during the late Longshan and Erlitou eras (Fig. 1). These two polities fall into the geographic and chronological framework of the legendary Xia regimes (Table 1). Substantial scholarly attention in East Asia on Taosi and Erlitou has focused on linking these two sites to the capital cities of pre-Xia and Xia regimes (Feng 2008, 2015; He 2015b; IA CASS and Shanxi 2015:1119–1120; Iijima

TABLE 1. CHRONOLOGICAL SEQUENCE OF THE ARCHAEOLOGICAL CULTURES IN THE CENTRAL PLAIN MENTIONED IN THIS ARTICLE

ARCHAEOLOGICAL CULTURE	DATE	DYNASTY ^a
Yangshao	5000–3000 B.C.	n/a
Early Longshan	3000–2500 B.C.	n/a
Late Longshan/Taosi	2500–1900 B.C.	Xia (ca. 2070–1600 B.C.)
Xinzhai	1870–1720 B.C.	
Erlitou (Early Bronze Age)	1800–1530 B.C.	
Erligang (Early Shang)	1600–1400 B.C.	Shang
Middle Shang	1400–1250 B.C.	
Late Shang	1250–1046 B.C.	
Zhou	1046–256 B.C.	Zhou

^a Dynastic dates based on results of Xia-Shang-Zhou Chronology Project (XSZ 2000) and Zhang X. et al.

2012; Li M. 1985; Okamura 2003; Sun 2018; Wang K. 2001; Wang S. 2007; Zhang G. 2010; Zou 1980). Although not all scholars agree with such historiographic arguments, all agree that Taosi and Erlitou exemplify the most politically significant polities of this time within the Central Plain. In recent scholarship, Li, M. (2016) employed the concept of social memory to understand the relationships between Taosi and Erlitou political systems and the regimes of the Three Dynasties (i.e., Xia, Shang, and Zhou). Li concluded that the narratives and political systems of the latter were based on the social memory inherited and developed from the Taosi and Erlitou entities. Historical evidence affirms that Shang and Zhou dynastic authorities manipulated the narrative regarding the historical Xia capitals to legitimize their new rulership (Allan 1984; Li, M. 2016). Locating their capital cities in the same places as Xia capitals was a means of reckoning with prior hegemonies. It allowed political authority to accrue from the historical political centers and produced the appearance of continuity of rule (Li, M. 2016:309).

Discourse on the re-emergence of state society after periods of disintegration suggests that the regeneration of a political center is usually based on borrowed institutions and ideas from its precursor (Schwartz and Nichols 2006). As the dissolution of a former power structure is not entirely synonymous with the disappearance of all of its physical, ideological, and organizational resources, there is a sense in which a new leader or revolutionary group “inherits” the toppled state (Anderson 2006). The transference of information, ideas, and even components of the administrative bodies of a preceding state to the new polity all point to an inheritance of accrued political knowledge, which can materialize in overt attempts at social engineering. We suspect that capital relocation (and settlement relocation more generally) as a means of social engineering and memory materialization constituted important political strategies during the Taosi and Erlitou periods.

Jinnan Basins and Taosi Urban Growth during the Late Longshan Era

Contextualizing Taosi Urban Development in the Jinnan Basins — The Jinnan basins were among the most heavily populated regions in the Central Plain during the Longshan era (Li, M. 2016). Southern Linfen Basin and eastern Yuncheng Basin had dense settlements in the early Longshan era (Fig. 2a). Central Linfen Basin then experienced increased settlement nucleation around the Taosi site during the late Longshan era (Fig. 2b). Taosi was the earliest enclosed settlement in the Jinnan basins’ history and the only settlement that exceeded 100 ha during Taosi Culture Phase I (2300–2100 B.C.) (He 2013; Sebillaud 2014). Additional large settlements appeared in the Jinnan basins during Taosi Culture Phase II (2100–2000 B.C.) (Fig. 2b). However, no settlements were located within a 2 km radial distance from Taosi (He 2013). The Taosi political center was torn down during Phase III (2000–1900 B.C.). In the subsequent post-Longshan era, the total settlement size in the Jinnan basins decreased by about 85 percent and no settlement was larger than 30 ha (Jaang 2018). Population decline was common throughout the middle and lower Yellow River valleys, with Erlitou in Luoyang Basin being the only exception (Jaang 2018; Sebillaud 2014).

Settlement History of Taosi — Taosi is located north of Ta’er Mountains in Linfen Basin. It was a small, ordinary village during the late Yangshao or early Longshan era (He 2004, IA CASS and Shanxi 2015) (Fig. 3a). The settlement became a regional

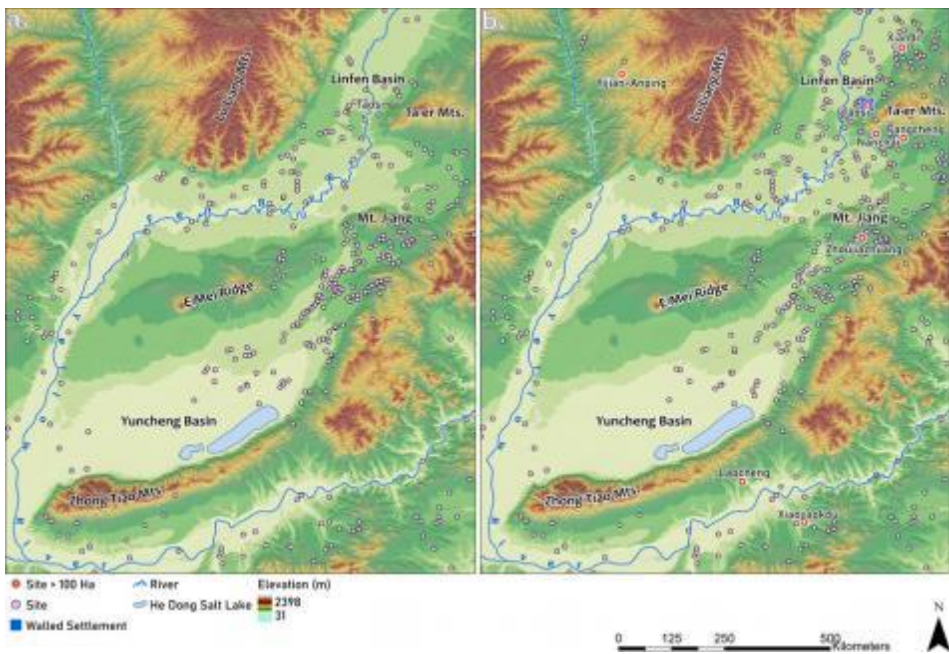


Fig. 2. Settlement distribution in the Jinnan basins during: (a) early Longshan; (b) late Longshan (Guojia 1991, 2006; He 2013; IAS CASS 1989; RCFANMC et al. 2011; SCA 1984–2011; Xu 2018) (Source base map: SRTM 1 Arc-Second Global, doi:/10.5066/F7PR7TFT).

center around cal. 2300 B.C. Phase I (2300–2100 B.C.) of the Taosi urban site included a 20 ha palace district with earthen walls enclosing rammed earth monumental structures (Fig. 3b). Lower ranking elites and commoners settled in separate sectors outside of the palace enclosure (Gao J. 2017; Liang and Yan 2007). The estimated total of 160 ha that was developed during Phase I (He 2018) included an altar, commoner's residential areas, apatial enclosure and lower rank elite's residential areas next to the enclosure, a storage zone, and a cemetery (Fig. 3b). A 1000 m² storage zone was present just southeast of the enclosure (Liang and Yan 2007). Elites and commoners shared a 4 ha cemetery south of the enclosure; approximately 10,000 burials were located there (Gao W. 1993; IA CASS and Shanxi 2015). Of 1309 excavated burials, extravagant elite graves amount to only 0.3 percent of the total. Each such elite tomb has a pit roughly 20 m³ in volume and containing between 100 to 200 high-value goods, including items of ritual importance that do not appear in lower-ranking tombs. Graves of middle-ranking elites represent 2.3 percent of the excavated tombs, while those of lower-ranking elite individuals represent 13.6 percent. The remaining graves were for commoners. Each rank had a designated zone within the cemetery. Burials were arranged in rows according to date of death.

During Phase II (2100–2000 B.C.), the urban site expanded to 280 ha and it was enclosed by newly constructed earthen walls (Gao J. 2007). The altar was enlarged and commoners spread out across the entire northern half of the city outside of the palace enclosure (He 2015a, 2018). The production of ordinary goods was concentrated in a 15 ha district at the city's south corner; craftspeople lived, worked, and were buried here (He 2011). The number of rammed earth monumental structures within the

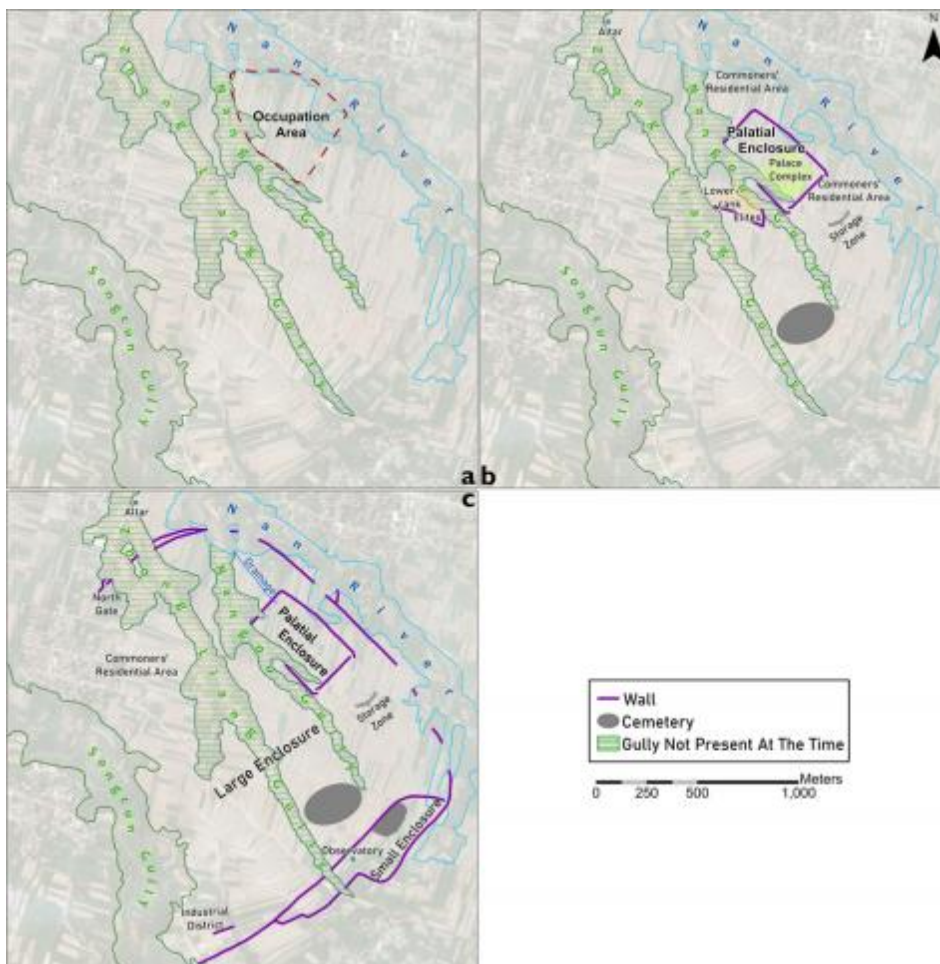


Fig. 3. Development of the Taosi settlement: (a) Occupation area during late Yangshao or early Longshan; (b) Taosi Urban Phase I layout; (c) Taosi Urban Phase II layout (Gao J. 2018; He Nu 2018; IA CASS and Shanxi 2015; IAS CASS et al. 2003, 2005; Li T. et al. 2013) (Base map: ESRI, ArcGIS [website], “World Imagery” updated 2/2/20).

palace enclosure also increased, with the largest structure having a 0.8 ha footprint (IAS CASS et al. 2008). A 10 ha ritual enclosure appeared at the southeast side of the Taosi urban site but could only be accessed from within the city walls; it included an astronomic observatory and new cemetery (IAS CASS et al. 2003, 2004, 2007; Wu et al. 2008) (Fig. 3c). The 1400 m² observatory was oriented toward the Ta’er mountain range. Elites and commoners again shared the new cemetery, which covered 1 ha and had a designated elite burial zone.

The Taosi settlement seems to have undergone political turmoil during Phase III (2000–1900 B.C.) (Gao J. 2017; He 2013). The city walls, palatial structures, observatory, and elite tombs from the earlier phases were razed. The previous palace enclosure was turned into a commoners’ residential zone containing ordinary workshops. Burials were clustered in discrete groups of up to 30 equidistant burials;

each cluster had similar dimensions (IA CASS and Shanxi 2015; IAS CASS and Linfen 1986). Corpse dumps (i.e., careless disposals of corpses), including dumps of dismembered, healthy young males, appeared during this phase (He et al. 2003; IAS CASS et al. 2005; Zhang Y. et al. 2011).

Community Formation and Disintegration at the Taosi Urban Site — The Taosi settlement evidently did not undergo a spontaneous process of economic and sociopolitical development from a small, ordinary village to a political and ritual center (He 2011, 2013). Instead, an abrupt transformation occurred that involved an increase in population due to local growth and congregation toward the center from the vicinity. The material remains of urban Taosi in Phase I thus display a much greater variety of cultural traits than either the small village that was first located there or contemporary urban sites elsewhere (Dai 2014; Liu L. 2004). Some scholars have argued that Taosi was the capital of the largest confederation of polities in the Central Plain at the time (e.g., Wang K. 2001; Zhang G. 2010). It is also possible that Taosi's rapid transformation into a regional center was associated with the relocation of a polity of yet unknown origin (Zhang G. 2010).

The palace enclosure separated the upper elites from the other Taosi residents in life, but individuals of all status levels shared a cemetery in death. The separation in living spaces along the designated burial zones within the cemetery announced and reinforced a hierarchical social order. The alignment of the burials toward Mt. Ta'er reveals a sacred landscape that symbolically inaugurated the mountain as the focus of a common social identity (Li, M. 2016). The communal cemetery and storage zone indicate strong ties between community members. The palace construction campaigns and the shared ritual landscape helped nurture a new community and establish a social order at the inception of the urban center.

The separation of Phase II elite graves from those of Phase I, as well as the changes in elite burial customs and raw materials used for ritual goods, suggest that the throne may have transferred to another clan (Gao J. 2017; IAS CASS et al. 2003). Meanwhile, the urban center expanded with the construction of city walls during Phase II. The construction of the astronomic observatory also reinforced a new identity associated with the Mt. Ta'er sacred landscape established earlier. Group activities surrounding massive construction and ritual activities continued to assist in the consolidation of social groups through their solicitation of active participation. Still, certain aspects of the community suggest differentiation. Besides social divisions structured by functional sectors, the burial of artisans outside of communal cemeteries emphasized a division of labor unseen in Phase I.

Phase III witnessed violent assault and the intentional destruction of all the monumental structures and elite tombs at Taosi. The replacement of large shared cemeteries with small burial clusters indicates the disintegration of a settlement-level community. Whether the collapse of the Taosi entity was due to conquest by peer entities (He 2013, 2015b; Zhang G. 2010) or a peasant revolt (Gao J. 2017; He 2011; IAS CASS et al. 2008) remains unclear. However, irrespective of immediate cause, tension between authorities' newly implemented socioeconomic structure and precity social organization and lifeways exerted significant pressure on the city and its denizens to revert to prior norms (Golden and Scherer 2013; Jennings and Earle 2016). The rapid expansion of the Taosi city in Phase II and the concomitant expansion of its regional socioeconomic network likely further exacerbated these challenges, destabilizing the social fabric of the city and precipitating political dissolution.

Luoyang Basin and Erlitou Urban Growth during the Erlitou Era

Contextualizing Erlitou Urban Development in Luoyang Basin — During the Longshan era, the lowlands of the region encompassing Song Mts. (i.e., Circum-Song Mts. Region, hereafter abbreviated to CSMR), including Luoyang Basin, the Ying-Ru river valleys, and the western North China Plain, were densely occupied (Fig. 4a, Fig. 5a). Many small polities competed with each other, resulting in intensified warfare in this region (Jaang 2018; Liu L. 2004; Ōnuki 1997; Wang L. 2006; Xu 2013; Zhang H. 2007). Regional centers, normally in the form of walled towns, appeared during the terminal Longshan era (e.g., Wangchenggang, Guchengzhai, and Wadian) and the subsequent Longshan-Erlitou transitional period of Xinzhai (e.g., Xinzhai, Dongzhao, and Huadizui). None of these centers were located in Luoyang Basin, however (Fig. 4a).

Severe floods and subsequent geological disasters during 2100–1800 B.C. affected most areas in the middle and lower Yellow River valleys. They might have caused the archaeologically evident depopulation and economic decline of the previously flourishing Longshan societies (Jaang 2018; Sebillaud 2014; Xu H. 2006; Zhang C. 2017). Luoyang Basin was inundated between 2000 and 1750 B.C. (Xia et al. 2014) (Fig. 5b). After 1750 B.C., the basin became a fertile alluvial plain that attracted a large population migrating from CSMR and beyond (Jaang 2012b; Ōnuki 2014; Xia et al. 2014) (Fig. 5c). At least 19 settlements appeared in the basin during Erlitou Culture Phase I, 74 settlements in Phase II, and over 90 settlements in each of Phases III and IV (Liu, Chen, Wright et al. 2019). As the basin became the most densely populated area

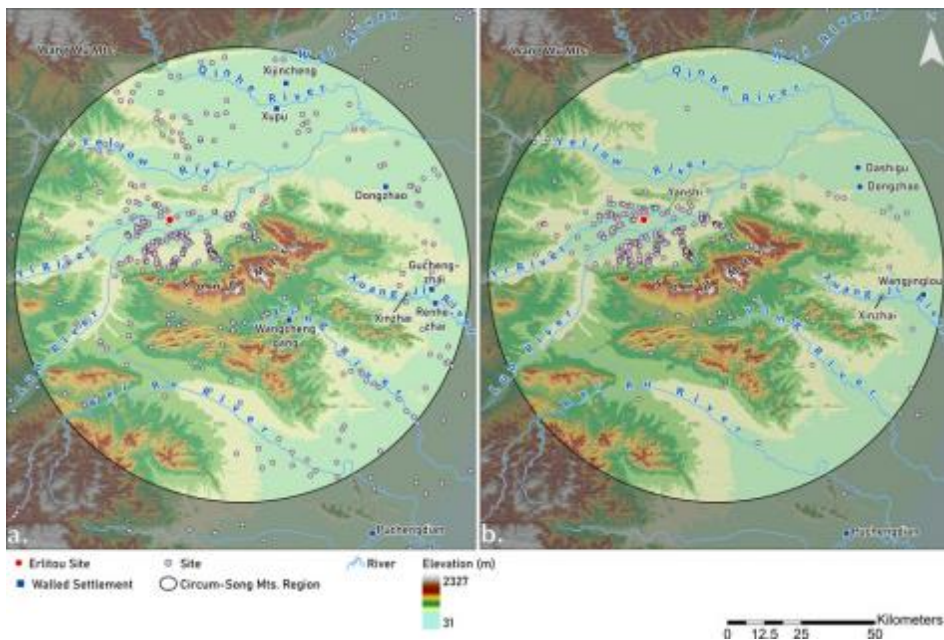


Fig. 4. Settlement distribution in Circum-Song Mts. Region (CSMR): (a) Longshan—Xinzhai; (b) Erlitou (Guojia 1991; IACASS 1999; IAE CASS 2005; Liu, Chen, Lee et al. 2002–2004; SCA 1984–2011; Xu 2018) (Source base map: SRTM 1 Arc-Second Global, doi:10.5066/F7PR7TFT).

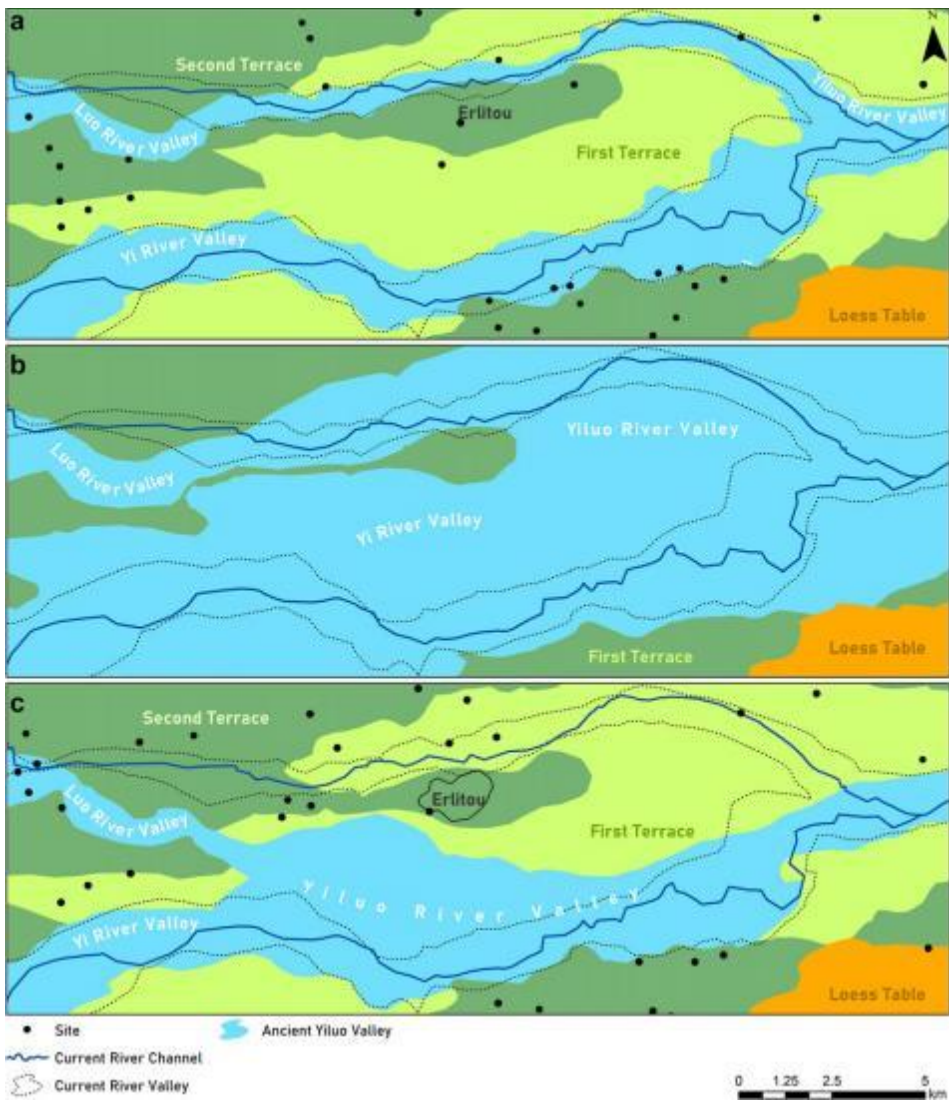


Fig. 5. Environmental changes and settlement distributions in Yiluo Basin between Longshan and Erlitou: (a) Longshan; (b) flood period (2000–1750 B.C.); (c) Erlitou (1750–1530 B.C.) (Guojia 1991; IAE CASS 2005; IA CASS 1999; Xia et al. 2014).

in CSMR (Fig. 4b), Erlitou Culture became a more inclusive and powerful state with a large economic network extending 500 km radially from the Erlitou site (Liu and Chen 2003; Xu H. 2013). Secondary centers distributed at intervals were centered around the Erlitou site, serving as communication and transportation nodes, military towns, or specialized production sites (IAE CASS 2005; Liu, Chen, Lee et al. 2002–2004; Ōnuki 1997; Xu H. 2013).

Erlitou Settlement History — Located north of the ancient Yiluo river, Erlitou was first occupied by several small villages during the late Yangshao through early Longshan ca. 3500–2500 B.C. (Fig. 5, Fig. 6a). Erlitou had a 600–700 year occupational gap (Liu

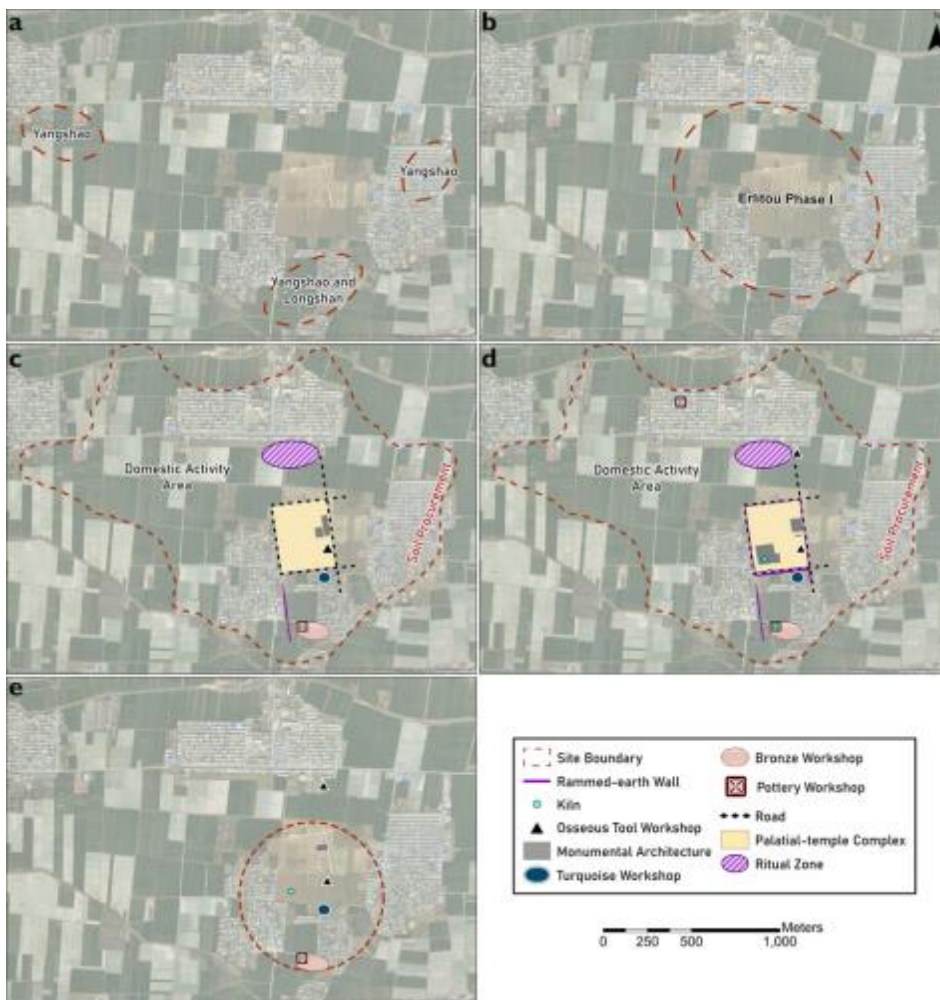


Fig. 6. Development of the Erlitou settlement: (a) Yangshao and Longshan eras; (b) Erlitou Urban Phase I; (c) Erlitou Urban Phase II; (d) Erlitou Urban Phase III–early Phase IV; (e) Erlitou Urban late Phase IV (Chen 2016; Chen and Li 2016; Liu L. 2006; Liu and Xu 2007; Xu H. 2018; Zhao Haitao 2016) (Base map: ESRI, ArcGIS [website], “World Imagery” updated 2/2/20).

and Xu 2007), but was reoccupied during the early Bronze Age (1750–1530 B.C.) and subsequently developed into the primary center of the Erlitou state (IA CASS 2014).

The early Bronze Age Erlitou site is divided into four phases based on joint consideration of stratigraphy and ceramic seriation. Covering more than 100 ha during Phase I (1750–1680 B.C.), Erlitou was the largest and most densely populated settlement in CSMR at the time (Xu et al. 2004) (Fig. 6b). Features discovered so far include trash pits and small solitary burials scattered across the settlement (IA CASS 1999; Li Z. 2008). Houses and administrative buildings have not been found, but high-value items such as white pottery, ivory, turquoise artefacts, oracle bones, inscribed signs, and bronze artefacts appeared in small numbers (IA CASS 1999).

The settlement expanded to more than 300 ha and began to show evidence of planning during Phase II (Fig. 6c). A palace-temple district of 10.8 ha surrounded by four intersecting roads occupied the highest spot on the site (IA CASS 1999). Politically significant architecture, graves of high-ranking elites, and human sacrifices were located within this district. A workshop enclosed with rammed earth walls was established south of the palace-temple district during the latter half of Phase II; it was dedicated to the production of two symbols of power, that is, objects made of bronze and turquoise (Chen 2016; IA CASS 2014; Liu and Xu 2007; Zhao Haitao 2016). Elite residences were generally concentrated in and around the palace-temple district, but a few exceptions have been found throughout the settlement (Li Z. 2008; Liu and Xu 2007). Commoners' daily domestic activities were concentrated in the western section of the settlement (IA CASS 2014).

Beginning late Phase II, burials show 4–5 gradations of class based on the amount of energy invested in creating pits and the type of grave goods. The highest ranking elites were buried in the largest pits and were interred with bronze items; such burials are absent outside of the Erlitou site (Li Z. 2008). The burials within the palace-temple district were exclusively of the upper two classes during Phases II and III. Corpse dumps, some of which included individuals buried alive as human sacrifices (Li Z. 2008; Yang X. 1987), appeared in very small numbers in Phase II through early Phase IV (IA CASS 1999:240–249, 2014: Appendix Table 5-2). In addition to solitary burials, small segregated burial zones also appeared, each zone likely dedicated to a core family or extended family (Li Z. 2008; Zhang H. 2007). Artisans and their families were buried close to where they lived or worked (Li Z. 2008; Liu L. 2006). Collectively, these characteristics suggest that work affiliations represented an important social tie much like the case of kin affiliations within the Erlitou urban site. Overall, burials and houses were in proximity to each other, and burials of the poor and wealthy (or of commoners and elites) were to some extent intermingled across the site (Li Z. 2008).

The size and layout of the settlement established in Phase II remained largely unchanged until the first half of Phase IV (1564–1521 B.C.), varying only with maintenance and further development. Evidence suggests that the palace-temple district became a more privileged and exclusive space for elite activities toward the end of Phase II or beginning of Phase III (Fig. 6d). First, walls were constructed to enclose the district. Second, the largest compounds were built on top of rammed earth platforms 2–3 meters tall. Third, the main buildings in each elite compound were erected on secondary platforms to further elevate them (IA CASS 1999; Liu and Xu 2007). At the same time, the number of ordinary living facilities within the complex were significantly reduced (Xu et al. 2004).

Erlitou's political importance declined in Late Phase IV (Zhao Haitao 2016). Most of the political infrastructure of previous times was abandoned (Fig. 6e). New rammed earth structures made of lower-quality materials appeared in the old core zone, but these too were abandoned just before the end of Phase IV. The production of turquoise and bronze objects was also terminated at the end of Phase IV. During this time, the number and size of corpse dumps reached their peak. All the other walled towns belonging to the Erlitou state were also abandoned. Meanwhile, new politically important infrastructure appeared in Yanshi (6 km northeast of Erlitou) and Zhengzhou (85 km east of Erlitou) (Henan 2001; Liu X. 2013). Due to political conquest during the subsequent Upper Erligang Phase (1450–1250 B.C.), the Erlitou

settlement became an ordinary village about 30 hain size (Liu and Chen 2001; Xu et al. 2004; Zhao Haitao 2016).

Community Formation and Disintegration at the Erlitou Urban Site — In Erlitou, the discrete burial arrangement and the variations in forms and styles of burial pottery suggest a congregation of inhabitants with extant external affiliations in Phase I. The quality of the artifacts suggests the coexistence of commoners and elites at the site's inception. Many scholars argue that Erlitou was a regional center from its inception because it was the largest site in the region and contained objects intended for elite use. However, current findings at the site do not support claims that a regional center was planned in advance. The reoccupation of the Erlitou site during the Bronze Age more likely resulted from a bottom-up process, involving increasing numbers of spontaneous move-ins as the land became habitable. The site's material remains demonstrate urgency in the attempt to recover from a prolonged period of disaster, as well as lack of premeditation with respect to long-term site occupation. Results from decades of excavation and full-coverage coring have not found durable residential structures dated to Phase I. Pottery was mostly hand-made, appearing less tidy and rougher in design than the antecedent Longshan pottery, which was usually wheel-thrown, refined, and intricate (Jaang 2012a).

North-south burial orientation emerged in Erlitou and across all Erlitou Culture sites, in contrast to the preceding Longshan and Xinzhai tradition of east-west orientation in CSMR (Gao X. 2012; Yuan 1996). The change in burial orientation does not seem to have been dependent on landscape alignment, social affiliation, or geographic origin of the ancestors of the interred. Rather, the new orientation was most likely formulated as a ritual response to the previous natural disaster. The reorientation incidentally provided an opening for the formation of a shared identity, but the formation of the new, large community at Erlitou was unlikely to have been premeditated because there was no clear settlement organization, no plan for long-term occupation, and no evidence of the communal activities that would have been needed for producing enduring social bonds.

Subsequently, the Erlitou settlement expanded significantly, its layout finally becoming clear in Phase II. Similar to Phase I, residents in Phase II and subsequent phases continued to consist mainly of small migrating kin groups who had not previously resided together (Liu and Xu 2007; Zhang H. 2007). The area occupied in Phase I ultimately became the core zone of the expanded settlement. Elites appear to have lived and been buried mostly in and surrounding the core zone, but the core zone was not exclusive to elites. For example, the osseous tool workshop located within the palace-temple complex produced utilitarian items for both elites and commoners (Chen and Li 2016).

The palace-temple architecture restricted access to specific gatherings or ceremonies and the walls enclosing the bronze and turquoise workshops restricted access to the production of objects symbolizing power. Turquoise and bronze objects advertised the power of the elites and played a key role in the imagining of a new social structure and the acceptance of a common political authority over the aggregated populations. The new social order appears to have been realized mainly through construction campaigns for the monumental architecture and use of open spaces as centers for social interaction. Unlike the palace-temple district (Fig. 6c), access to the

ritual zone was unobstructed. The presence of roads surrounding the palace-temple district also implies the presence of one or more large, open plazas near the palace-temple facilities. Open space ensured the visibility of activities in the ritual zone and plazas and provided opportunities for interactions between inhabitants of the entire settlement. In addition, outdoor hearths were scattered across the site, while indoor hearths were rare (IA CASS 1999; 2014). This arrangement encouraged public cooking and offered additional opportunities for communal interaction. The strategic combination of restricted and open spaces effectively nurtured a cooperative, structured society, as evidenced by the unfortified palace-temple complex and the merging of residential and burial spaces for lower ranking elites and commoners across the settlement.

Political control and more sophisticated methods of retaining power developed in Phase III. The rebuilding of old monumental architecture and construction of additional structures during Phase III and early Phase IV implies that the palace-temple district was of enduring significance. The enclosure of the district with walls that are too thin (only 2 m thick) and too short (i.e., without a pit foundation) to serve as fortifications indicates increased control over access to politically indispensable social gatherings in a cooperative society. Such prioritization of power control is in alignment with the social division between groups initiated in Phase II. The scale of the largest of the palace-temple constructions and the presence of large tombs with bronze vessels suggest the presence of a king (Thorp 1991). The courtyards in front of the elevated halls of the palaces or temples could accommodate enormous audiences attending performances in the raised halls (Bagley 1999; Thorp 1991). The elimination of ordinary living facilities from the palace-temple enclosure ensured that people sensed it as a privileged space, while the controlled production of objects symbolizing power in the workshop enclosure preserved the leaders' right to rule (Chang, K. 1983; Keightley 2000).

The number of communal properties also increased during Phase III and early Phase IV. Outdoor hearths across the settlement, as well as the presence of nine hearths within one structure containing large quantities of roasted animal bones (IA CASS 1999:160, 163), suggest a continued tradition of feasting or communal food sharing. Significant increase in the number of sacrifices suggest an increase in the use of physical coercion to legitimize the established social order, although the evidence of violence is still very low compared to the evidence of cooperative activities.

The Erlitou urban center lost political importance as political authority began to be transferred to the Shang cities of Yanshi and Zhengzhou during late Phase IV. The continued production of bronze objects, as well as the rapid building and subsequent abandonment of several small monumental constructions in the previous core zone of Erlitou, could indicate a failure in the attempt to restore the old royal family to power or establish a new king at the site. Finally, all politically important activities in Erlitou ceased and the polity itself vanished in the upper Erligang period.

Discussion: Understanding Taosi and Erlitou in the Broader Geographic and Chronological Contexts

The occupational histories of Taosi and Erlitou show contrasting trajectories toward the formation of a hierarchical polity. The establishment of the Taosi urban site resulted mainly from top-down planning. It likely entailed the movement into Taosi of a

preexisting polity or at least of ruling authorities, who had retained previous clan ties with the site after resettlement. The social structure was significantly more hierarchical than that of any preexisting society in the Central Plain, however. Furthermore, the palace district was the earliest such functional sector in the region. The different residential sectors and burial zones corresponding to different echelons of social status and wealth also point to an emergent social hierarchy, with an established political authority associated with the palace district.

Subsequent expansion of the Taosi urban center involved both top-down infrastructure expansion and bottom-up population congregation into the city. He (2018) argues for the presence of master planning of the Taosi layout guided by cosmological concepts. Furthermore, He deduces that the distance of each residential district from the palace enclosure was a direct function of its residents' vertical distance in class rank from the highest ranked elite. However, historical and ethnographic cases across the globe show that spontaneous settlement growth can produce a similar city layout (Smith, Michael 2010; Ur 2014). In fact, the earliest cities on the globe commonly exhibit clear planning only for the central district, while residential zones remain unplanned (Smith, Michael 2007).

The clearest and least controversial evidence for the presence of top-down urban planning at Taosi is the construction of the palace district at the urban site's inception. However, such an act had no local precedent, and thus most likely represented a political innovation based on historical knowledge derived from elsewhere. The earliest example of a palace district on the Chinese mainland is from Liangzhu (3300–2300 B.C.) in the lower Yangzi region (Liu, Wang, Chen et al. 2017), a city which emerged from the congregation of populations seeking arable land (Wang N. 2007). At Liangzhu, the palace district was constructed subsequent to population aggregation around 3000 B.C. (Liu, Wang and Chen 2015). Contemporaneous with Taosi, Shimao city (2300–1800 B.C.) on the north Loess Plateau also had a palace district and exhibited a similar degree of social hierarchy (Jaang et al. 2018; Liu, Wang, Chen et al. 2017; Sun et al. 2018).

At the apex of Taosi's mortuary hierarchy, elite burials were characterized by an extremely large quantity of high-value goods. Such burials were unprecedented in the Central Plain, but common among earlier cultures in eastern China, including the Hongshan, Dawenkou, and Liangzhu cultures (Gao W. 1993; Zhang, C. et al. 2019; Zhao Hui 2000). The elite material cultures of both Shimao and Taosi also shared similarities with Liangzhu (Han 2010; Xu F. 2014), further suggesting inspiration by precedent based on historic knowledge of the exotic lower Yangzi region.

Although the motivation for inventing palace construction as a strategy for social restructuring remains unclear, such a strategy generated extraordinarily complex political societies in both Taosi and Shimao. Both the top-down and bottom-up processes of population concentration concurrent with these executive decisions would have yielded much of the information required to establish urban construction as a strategy for social engineering. Even the eventual political dissolution of Taosi might have provided the foundations for later rulers' political wisdom, stimulating alternative models for maintaining city lifeways and their associated modes of social organization in the Erlitou and subsequent Shang societies.

In contrast to Taosi, initial settlement at Erlitou during the Bronze Age appears to have resulted from bottom-up opportunist land acquisition as a response to prolonged and severe natural disasters. The community at Erlitou appears to have formed from

serendipitous, bottom-up social bonds as facilitated by ritual practice and communal cooking and food sharing. Clear evidence of top-down planning appears only for Phase II. Subsequent urban development at Erlitou then echoes the development of Taosi to a certain extent, beginning in particular with the construction of politically important architecture in the palace-temple district. Later expansion of the infrastructure continued to encourage shared commitments and interactions among participants, forging a sense of continuity between place and the people of the new community. The process of constructing an urban center by beginning with a palace district and then building secondary or politically tangential infrastructure was reproduced in the development of all subsequent Shang cities (Chang H. 2018; Niu 2018; Wang X. 1999; Yuan 2017; Zhang G. 2003, 2015).

However, strategies of governance at Taosi and Erlitou differed according to the contrast between their respective beginnings. The presence of outer city walls at Taosi (where they served as a defensive measure against either general outsiders or a specific threat) and the absence of such structures at Erlitou reflect contrasting attitudes toward outsiders at the two sites. The Erlitou layout provided more flexibility for bottom-up social negotiation. This practice extended from the experience of spontaneous community formation in Erlitou Phase I to the subsequent period in which frequent newcomers were accommodated. However, the upper elite also employed new strategies to secure their right to rule. Rulers at both Taosi and Erlitou used exotic, luxurious goods to communicate differentiation in power and wealth and monumental structures (including an enclosed palace district) to communicate authority. Furthermore, Taosi continued the common Neolithic elite practice of using mainly jade and elaborate ceramic objects to communicate the standing of an individual. Although such symbols of status and power held a similar meaning in the Erlitou context, the Erlitou ruling class also pioneered the usage of cast bronze ritual vessels—which required the development of extraordinarily broad resource and knowledge networks for production and politically strategic circulation—to advertise and reinforce the establishment of new sociopolitical and socioeconomic systems (Campbell 2018; Liu and Chen 2003; Xu H. 2013; Zhang, C. et al. 2019). As evidenced by the enclosed workshop for bronze and turquoise items, Erlitou rulers also controlled access to knowledge regarding the production of power symbols for the first time in the history of the Central Plain. In fact, control over production of politically salient objects appeared even before rulers at Erlitou began to control access to the palace-temple complex by constructing walls around it. Altogether, this likely minimized the necessity for undertaking large-scale construction campaigns in Erlitou compared to Taosi, especially at the level of community structures. In fact, according to Shelach and Jaffe (2014:354), the total volume of public construction works at Erlitou was seven times less than that at Taosi.

Development patterns at Taosi and Erlitou reveal two concurrent tendencies. On the one hand, both societies reapplied inherited knowledge from earlier periods, but on the other hand, both societies accrued further political knowledge which would later be applied by Shang rulers. The combination of bottom-up population aggregation and top-down planning in each site's development pattern embodies this simultaneous production of new outcomes and application of old ones. Indeed, this relation is borne out by the inheritance of rulership strategies. Taosi initiated the trend of top-down production of social divisions through palatial construction, then this model was reproduced in Erlitou Phase II and subsequent Shang cities. In this respect, Taosi and Erlitou show a mixture of

both intentional political strategization and serendipitous success, embodying at very least the potential for the induction of critical strategic information into the collective wisdom of the Central Plain's ruling elite. Hence, it can be seen that the two patterns of settlement relocation in the initial stage of Taosi and Erlitou would have provided much of the knowledge required to establish settlement relocation—particularly capital relocation—as a strategy for social engineering.

Many other urban sites in the Central Plain active during the periods between Taosi and Erlitou, including the much smaller cities of Wangchenggang, Guchengzhai, Xinzhai, Dongzhao, and Huadizui, might also have been affected by similar dynamic processes of urbanization and social transformation. Such processes may have contributed to the accumulation of political knowledge regarding the use of settlement relocation and urban construction as strategies for social engineering at the dawn of China's dynastic history. Our research on Taosi and Erlitou establishes a theoretical framework by which to analyze these processes, capturing two important landmarks in this larger political knowledge building process. In future work, we will employ this theoretical framework to produce a wider ranging narrative of the process that includes some of the other sites mentioned in this article.

CONCLUSION

The Taosi and Erlitou societies reveal both the reapplication of inherited knowledge from earlier periods and the aggregation of further political knowledge to be later applied by Shang rulers. The combination of outcomes from bottom-up population aggregation and top-down planning embodies the sites' simultaneous production of new outcomes and reapplication of old ones. That is to say, both societies evolved over a period of flux, and their legacy of experimentation in political strategy stands as a testament to this reality.

Records of capital relocation during the Xia and Shang dynasties establish that resettlement already constituted an intentional, politically motivated act of social engineering at the inception of Chinese dynastic history. Given the Xia and Shang instrumental use of resettlement and urban construction, it follows that the inception of these practices must be sought in an earlier period. In accordance with structuration theory, we can ascertain that the earliest instances in which settlement relocation and urban construction led to political reform were most likely unintentional. In arguing for intentionality, it is insufficient to point to a single instance in which unintended, serendipitous consequences occurred. Political experimentation may have occurred over an extended duration before rulers realized a definitive causal relationship and began deliberately relocating populations and developing urban centers to sustain their power. Our analysis of the Taosi and Erlitou sites sheds light on a period characterized by positive political outcomes following the application of resettlement and urban construction. Our results suggest that the development of these strategies as political tools for social engineering in the Central Plain of China began around the establishment of the Taosi urban site, then were emulated by Erlitou rulers starting in Erlitou Phase II. The subsequent Shang dynasty replicated such practices, further reinforcing the idea that experimentation at the Taosi and Erlitou sites was productive of strategic political knowledge.

Given the chronological relationship between the settlements of Taosi and Erlitou, the development of Erlitou seems to bear all the hallmarks of an intentional act of social

engineering. In the case of Taosi, relocation en masse and hierarchical differentiation through top-down city planning revealed the benefits for social reorganization imminent in acts of resettlement and urban construction. The progression of the Erlitou site from bottom-up population aggregation to top-down planning through the construction of a palace complex reveals a trajectory for rulership that had been altered in response to the lessons of prior experience. Both settlements underwent rapid expansion during stable periods marked by conspicuous acts of urban construction; however, Erlitou was not intended to be a political center from its inception, and only became so later on. This suggests a conscious shift in rulership strategy. Given that the immediate creation of a palace enclosure at Taosi had no local precedent, it is possible that this earlier act of construction constituted intentional reapplication of imported political strategies. Nonetheless, the active reorientation of rulership during Phase II of Erlitou more strongly suggests intentionality. This implies a learning period bounded by the histories of the two sites, beginning with experimentation at Taosi and culminating in strategic execution at Erlitou.

Motivations for resettlement in dynastic China were manifold, often with apolitical motives co-occurring with legitimately political ambitions (Lin 1986; Liu and Chen 2001; Shi 1997; Wang Z. 2010:223–227; Yang S. 1986; Zhu 1989). However, because the intentional political outcomes of the Shang dynasty presume an antecedent, incubatory period and because the political character of the strategies employed is attested in the historical record, pre-Shang precedents remain salient. The joint political lessons of Taosi and Erlitou were inherited by the rulers of the later Shang and Zhou dynasties (recognized by Li, M. 2016). While it is impossible to definitively assert when such acts began to bear political intent, subsequent instances of population relocation and urban construction recorded in the annals of Xia and Shang dynastic history by later (mostly Han) historians put a chronological upper limit on the era in which they would have been recognized as political strategies. Moreover, the experimental character of the political direction at Taosi suggests a chronological lower limit on the emergence of these strategies of social engineering. Given the suggestive convergence of the histories of Taosi and Erlitou, the sequential relation between the two sites, and the chronological limitations on when intentionality could have emerged, we conclude that settlement relocation and urban construction were implemented as intentional strategies for social engineering no later than Phase II of Erlitou.

Finally, it must be noted that populations experiencing periods of rapid growth after initial resettlement share certain fundamental characteristics. Whether the product of top-down processes (as in the case of planned or intentional resettlement) or bottom-up accumulation (as in the case of circumstantial aggregation), cities bringing together populations from a wide range of origins necessarily disrupt forms of organization based on kinship ties. The decontextualization of old kinship ties in a new environment, coupled with the capacity for reorganization of urban spaces, allows for the establishment of new hierarchical orders with the power to supersede prior systems of social organization. While resettlement is not always an inherently political act, its utility as a political tactic can be gleaned from the eventual consequences of resettlement, wherein political power is consolidated in a new urban environment. The eventual social stratification of the Taosi and Erlitou Cultures shows the power of this knowledge in producing convergent social evolution. The political integration at Taosi generated a body of political knowledge that would ensure the maintenance of

subsequent societies of similar structural complexity. Even though such hierarchical societies were eventually dismantled, they solidified the potential for resettlement and urban construction as means of social engineering—and in the process, signaled the feasibility of such strategies to the leaders to follow.

ACKNOWLEDGMENTS

This research was funded by the University of Toronto's Connaught New Researcher Award to Xie and Scholars-in-Residence award to Xie, Daudjee, and Liu. We thank Takeshi Inomata, Ed Swenson, Nu He, Haitao Zhao, Xingcan Chen, and Max Friesen for generously sharing their thoughts on the subject and providing feedback on earlier drafts of the manuscript; Casey Lun, Judy Perpose, Siyun Guo, and Deepika Elango for joining us in the pilot study of this project; and Rowan Flad and the two anonymous reviewers for providing invaluable comments that helped us broaden the conceptual scope and improve the clarity of our discussions. All errors remain our own.

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