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ANALYZING AND VISUALIZING DISSEMINATION PATTERNS AND EMERGING TRENDS ON TYPO-MORPHOLOGY STUDIES IN CHINA

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ABSTRACT

Beyond the long development history from Conzen's morphology to Muratori and Caniggia's typology in Europe, the attention on understanding the continuity of urban form from Chinese scholars are emerging noticeably. It is worth to mention that although there are several articles about the application of typo-morphology into the Chinese context, the work of the literature review is apparently waiting for a more comprehensive and objective study. Thus, a better collecting and demonstrating of the typo-morphology works of literature is urgently requested by tracing the evolution process and dissemination pattern in the Chinese academic community.

This study establishes a quantitative study and visual survey by offering abundant visualized graphics about citations and authorship patterns, and relevant bibliography based on the database of Web of Science (WoS) and China National Knowledge Infrastructure (CNKI) by utilizing Citespace. It provides an in-depth analysis of the current theoretical background aiming to inspire further typo-morphological research and practices in the Chinese context and beyond.

Keywords: Typo-Morphology, urban morphology, Chinese context, dissemination pattern.

INTRODUCTION

With the rapid urbanization, China, in line with western countries, is facing a threat to the urban heritage conservation by touristic, real estate extension, economic development, etc. (Bideau and Yan, 2018; Ke et al., 2009), mainly due to the centralized political and regulatory system (Li et al., 2020). Although it is slightly retarder than the west, typo-morphology as an important part of the inclusive and sustainable conservation approach (Historic Urban Landscape approach) has been gradually recognized and emphasized in China for the last 20 years (Bandarin and Oers, 2012; Chen and Romice, 2009; Gu and Xu, 2014). In this paper, we focus on the dissemination of the research dimension of this Italian approach in China by providing a series of quantitative studies on account of a systematic literature review.

Following the introduction and research background, the study maps the main propagating network of studies on typo-morphology from three sequent aspects: the research evolution pattern of typo-morphology studies is visualized as citation networks; the generated research hotspots are investigated as top-ranked clusters; the occurrence and trends of relevant keywords are identified as chronologically. Based on those aforementioned indicators, this paper further offers a better understanding of the global status quo and trend of typo-morphology studies and focuses on the Chinese academic field. In which, the current research development and shortcomings are recognized and illustrated in a graphic and quantitative way. The findings demonstrate that the study on typo-morphology has caused widespread and animated responses in the Chinese academic community, but the majority of publications are still in Chinese, not English.

BACKGROUND

The typo-morphology approach is considered as one of the most remarkable ways in the global urban conservation field born in Italy from the 1950s (Bandarin and Oers, 2012). It is firstly illustrated in detail by Italian scholar Caniggia and Muratori under the influence of the urban morphology theory from British school (Conzen, 2004) and architecture typology approach from French school (Chen and Thwaites, 2018; Gianfranco and Luigi, 2017). Since then, a number of researchers started working on this topic and trying to apply this western approach in their own urban context (Whitehand et al., 2014). Professor Davis, from the University of Oregon, made comparisons on commercial-residential buildings located in three metropolis-New York, Amsterdam, and Kyoto(Davis, 2009). While Barke tried to identify the form of multi-household dwelling in the working-class districts of a Spanish city (Barke, 2011). Besides, Kropf did a critical analysis of the building types' definition o set a common framework in order to better examine urban forms(Kropf, 2014a).

It is worth to mention that the discussion on the application of the typo-morphology approach in Chinese cities arose more and more attention in a global dimension from the last decade (Gu and Xu, 2014; JWR Whitehand et al., 2011). Professor Fei Chen from Liverpool University pointed out that the typo-morphology approach can be used to offer design suggestions in historic cities, such as Suzhou, by analyzing the urban transformation process (F. Chen, 2012). A few years later, she further applied her research on another Chinese historic city, Nanjing, offering an in-depth understanding of socio-cultural reasons (Chen and Thwaites, 2018). While Li and Gauthier revealed the morphogenetic process of the residential forms in the old city wall area of Guangzhou (Li and Gauthier, 2014). In addition, Young scholar Xie interpreted the possible implications of the urban planning proposal of Gulangyu Island and generates a more suitable framework for planning strategy (Xie, 2019).

However, it is rarely known that typo-morphology was first introduced in China from the 1990s by a group of excellent scholars with an international educational background (Zhu, 1992). Scholars tried to summarize the history and branches of this western-born theory (Wang and Shu, 2005). Professor Duan from Southeast University presented the evolution of the urban morphology as well as of the typology concept from a historian's point of view and pointed out the possible developing trend (Duan and Qiu, 2008). Furthermore, Professor Tian from the South China University of Technology noted that it is necessary to adopt urban morphology and architectural typology analysis to conservation planning Chinese cities (Tian et al., 2010a). Instead, Professor Zhou from Tongji University focused more on the practical way of typo-morphology approach by utilizing and examining it in a case study in Shanghai (Zhou and Chen, 2007).

Although there are abundant studies on typo-morphology by Chinese scholars, it is rarely introduced to the global academic field. Thus, a contribution to understanding the development and spreading pattern of typo-morphology studies in China is urgently needed to fill this research gap, so as to offer a reference to the following studies.

METHODOLOGY

This research is based on a series of selected articles from two databases: Web of Science (WoS) is defined as the main one; China National Knowledge Infrastructure (CNKI) is defined as the supplementary one. The main reasons are as follows: firstly, the database of WoS contains the most influential academic research achievements in the word which can typically show the history,

status, and trends of academic research in some specific research fields; secondly, unlike the literature exportation format of other literature databases such as Springer, Google Scholar, Scopus and etc, the literature information in WoS contains co-citation information which can be well-compatibly and accurately analyzed and visualized by CiteSpace without any format conversion; thirdly, in order to include more researches of Chinese scholars, CNKI as the most authoritative literature and knowledge information resource base in China is considered to be another literature collection platform.

Based on the research object, we identified a series of keywords: China, Chinese, architecture, urban, city, town, typo-morphology, form, morphology. In the retrieval of literature information in WoS core collection, the search string was finalized as "TS=((architectur* OR urban* OR cit* OR town*) AND (morpholog* OR form) AND (typology OR typo OR type) AND Chin*)" and the number of collected documents is 1514. For further refining the retrieval results, we took a series of refining measures as shown in Figure 1, and finally obtained 37 publications. The retrieved result shows that the earliest study about Typo-morphology in the Chinese context began in 2007 and the number of publications each year can be shown in the table of Figure 1. A text file containing titles, authors, abstracts, keywords, cited references, publishers, and other information about documents was exported and prepared for analysis and visualization. After this step, a graphic of the co-citation network is generated by CiteSpace to demonstrate the citation frequency and the linkage among those authors.

Step	*Publication Number*	*Process*
1	1514	Publications obtained by advanced search with search string on WoS core collection
2	457	Publications retained after 7 categories were refined: ENVIRONMENTAL SCIENCES, ENVIRONMENTAL STUDIES, URBAN STUDIES, REGIONAL URBAN PLANNING, CONSTRUCTION BUILDING TECHNOLOGY, ARCHITECTURE, DEVELOPMENT STUDIES
3	320	Publications retained after 35 irrelevant categories were excluded: ENERGY FUELS, METEOROLOGY ATMOSPHERIC SCIENCES, GEOSCIENCES MULTIDISCIPLINARY, WATER RESOURCES, etc
4	45	Publications retained after 275 irrelevant-topic research were excluded manually
5	37	Publications retained after 8 not related to China or not Chinese scholars were excluded manually

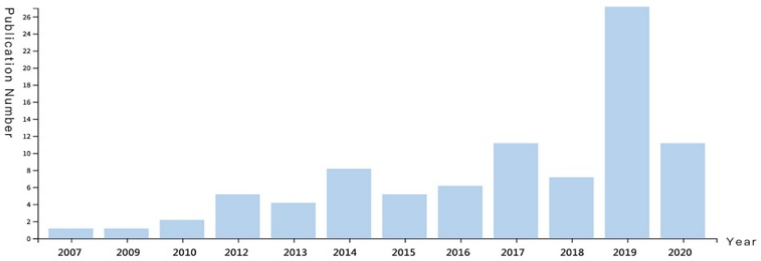


Figure 1. Publication selecting progress on WoS and the number of selected documents every year

As the literature related typo-morphology research on CNKI, considering the influence and authority of the documents, we only search information on databases of Core Journal of Peking University (PKU, Science Citation Index (EI), Science Citation Index (SCI), Chinese Social Sciences Citation Index (CSSCI) and Chinese Science Citation Database (CSCD) on CNKI. We determined the search string according to Chinese retrieval requirements and habits as" SU=(architecture + morph) * type + (form + type) * urban AND FT= morphology + typology" and gathered 826 results. Further refinement was conducted as shown in Figure 2 and finally, 99 results

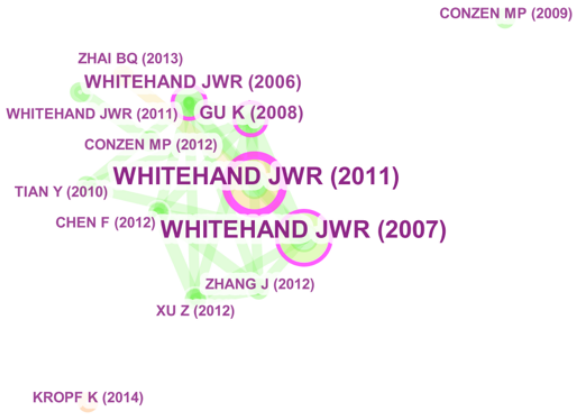
were left. Keywords were ranked and visualized by CiteSpace based on literature retrieval results on CNKI reflecting cores of typo-morphology research in China.

Step	*Publication Number*	*Process*
1	826	Publications obtained by advanced search with search string on databases of core collection, EI, CSSCI and CSCD on CNKI
2	310	Publications retained after 2 categories were refined: GEOGRAPHY, ARCHITECTURAL SCIENCE and ENGINEERING
3	99	Publications retained after 211 irrelevant-topic research were excluded manually

Figure 2. Publication selecting progress on CNKI

FINDINGS

By analyzing 37 documents from WoS by CiteSpace, a co-citation network of 13 nodes is visualized in figure 3. In the network, the size of the nodes is positively correlated with the citation frequency of the selected references， while the citation relation is shown as the linkages in between. By ranking the citation counts, top10 co-cited documents, which is ranked by the citation frequency, on WoS are shown in the table of figure 3. As one of the earliest foreign researchers who studied the typo-morphology in Chinese context, Whitehand JWR is seen as one of the most influential scholars in this field. He mainly contributed to case studies of urban transformation from 1996 to 2006 of Chinese cities and took part in several urban design projects (Whitehand and Gu, 2007; JW Whitehand et al., 2011; Whitehand and Gu, 2006). Chinese scholars, such as professor Gu K (University of Auckland), Chen F (University of Liverpool), and Tian Y (South China University of Technology) made some efforts on introducing this western-born theory to the Chinese community and localizing the typo-morphology approaches in the process of urban heritage conservation in historic cities, such as Guangzhou, Suzhou, Xiamen, etc.



Number	Author	Title	Year	citation counts	Source
1	Whitehand JWR	Extending the compass of plan analysis: A Chinese exploration(Whitehand and Gu, 2007)	2007	5	URBAN MORPHOL
2	Whitehand JWR	Urban morphology and conservation in China	2011	5	CITIES
3	Whitehand JWR	Research on Chinese urban form: retrospect and prospect(Whitehand and Gu, 2006)	2006	3	PROG HUM GEOG
4	Gu K	Residential building types as an evolutionary process: the Guangzhou area, China(Gu et al., 2008)	2008	3	URBAN MORPHOL
5	Kropf K	Ambiguity in the definition of built form	2014	2	URBAN MORPHOL
6	Chen F	Interpreting urban micromorphology in China: case studies from Suzhou(Fei Chen, 2012)	2012	2	URBAN MORPHOL

7	Tian Y	Urban morphology and conservation planning (Tian et al., 2010b)	2010	2	CITY PLANNING REVIEW
8	Zhai BQ	Urban regeneration and social capital in China: A case study of the Drum Tower Muslim District in Xi'an	2013	2	CITIES
9	Conzen MP	Comparing traditional urban form in China and Europe: A fringe-belt approach	2012	2	URBAN GEOGR
10	Whitehand JWR	Fringe belts and socio-economic change in China	2011	2	ENVIRON PLANN B

Figure 3. Co-citation network of typo-morphology based on WoS database and top10 frequent co-cited documents

The annual number of articles that are collected from CNKI is visualized as the upper part of Figure 4. It indicates that typo-morphology was first introduced to China by a group of scholars (represented by Zhu P) in the early 1990s (Zhu, 1992). While from 1992 to 2000, there comes a relevant gradual phase in the figure. The early morphological and typological research in China mainly focused on form studies with architectural scale and small-block scale. While from 2000 to 2020, typo-morphology research starts to attract increasing attention and presents a fluctuating upward trend. The bottom part of Figure 4 adds the number of citation publications which shows a significant increase from 2000 to 2020. Over the past 20 years, the theoretical system of Typo-morphology in China has gradually developed and appeared in the conservation planning of many rural and urban areas. In a word, the typo-morphology studies in China mainly developed from 2000 which is about 70 years later than the Conzenian school and Italian School.

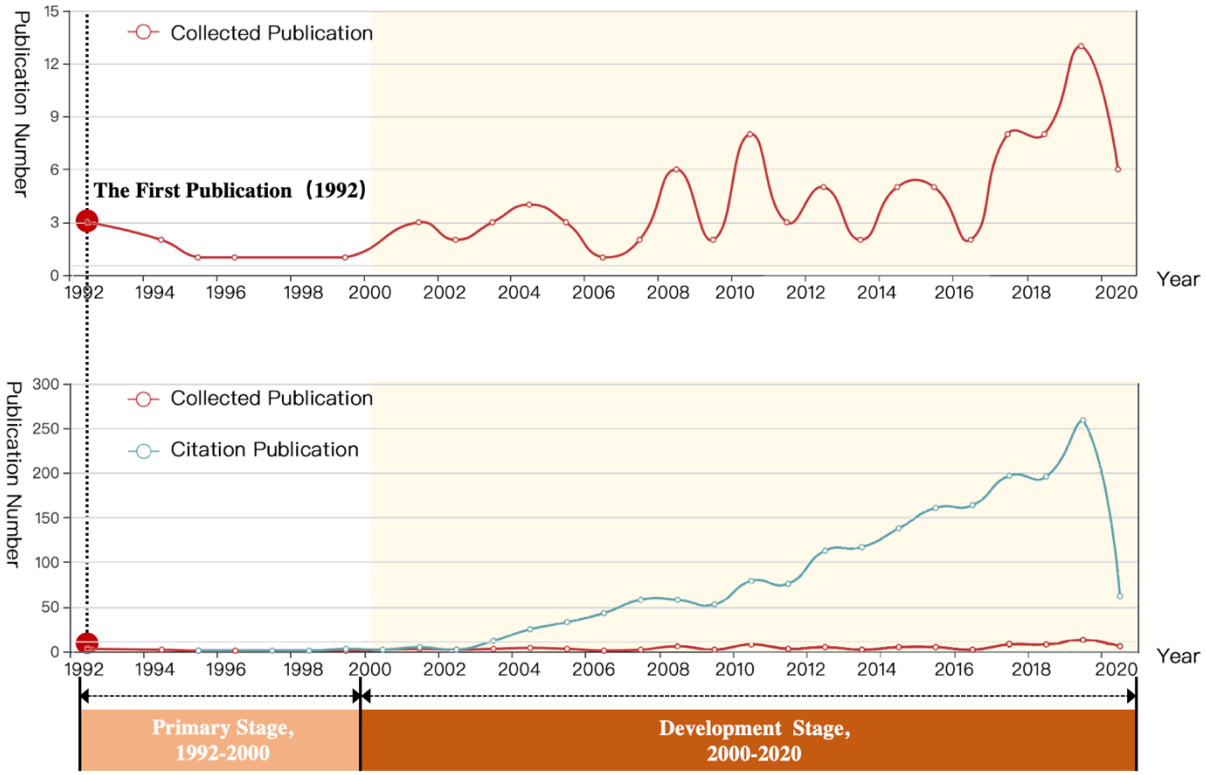
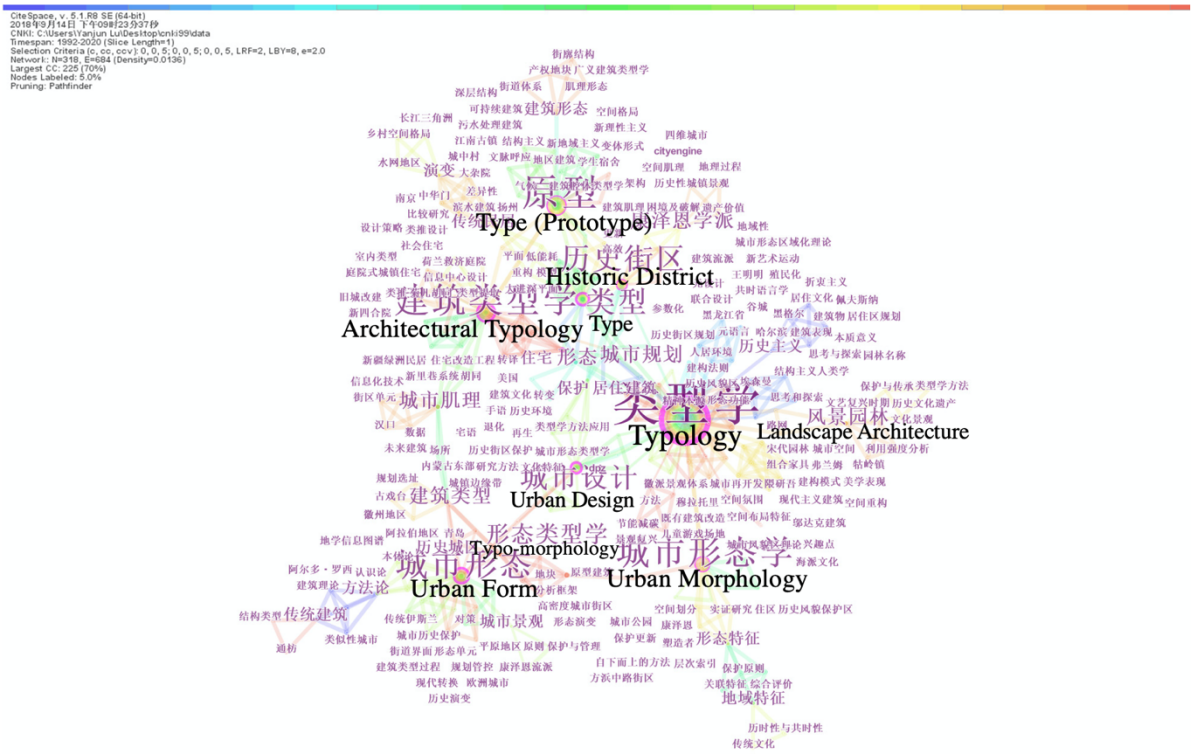


Figure 4. Yearly statistics of collected publications from CNKI (top) and yearly statistics of citation publications (bottom)

CiteSpace is applied to map the keyword co-occurrence network based on the data gathered from CNKI as shown in Figure 5. In this graphic, keywords are positioned as the point of intersection.

The frequency of the keywords is proportional related to the size of the nodes and the fonts. It is helpful to recognize and identify the most frequently mentioned academic keywords and their related field. In line with it, the top 10 keywords are listed in the table of Figure 5. Those keywords could be identified as three main categories: architectural typology, urban morphology, and typo-morphology. In which, "Architectural Typology" (No.=11) and "Urban Morphology" (No.=10) show a higher occurrence frequency, while "Typo-morphology" only presents 4 times and takes up about 4% of the publications. Among those keywords, "Typology" and "Type (Prototype)" rank the first 2 places, accounting for over 40% of selected publications.



No.	Keywords	Freq.	No.	Keywords	Freq.
1	Typology	30	6	Type	7
2	Type (Prototype)	13	7	Historic District	7
3	Architectural Typology	11	8	Urban Design	6
4	Urban Morphology	10	9	Typo-morphology	4
5	Urban Form	9	10	Architecture Landscape	3

Figure 5. Keyword co-occurrence network and top 20 keywords with their frequencies

CONCLUSIONS

After analyzing and visualizing research status of typo-morphology in China based on both WoS and CNKI, we can sketch the contours of dissemination patterns in how typo-morphology spreads and develops in China. There are two stages in typo-morphology studies history in China. In the primary stage, Chinese scholars absorbed and introduced the typology theory from Italy and France. In the development stage, few foreign scholars and an increasing number of Chinese local scholars applied the theory and design methods of Typo-morphology in Chinese Historic District conservation and urban planning.

Although the studies of typo-morphology in China started relatively late compared with the west, an increasing number of Chinese scholars started paying attention to typo-morphology studies. The keyword co-occurrence network based on the database of CNKI demonstrates that typology has been widely used in the subject fields of architecture, urban planning, and architecture landscape. However, compared with the wide-spreading of urban morphology and architectural typology, the studies on the Italian school's typo-morphology methodology are apparently limited and is waiting for further exploration and discussion.

The contribution of this paper is to draw a dissemination map for typo-morphology in China, in the hope to offer a quantitative reference to latter researches.

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