The Present of Environmental Psychology Researches in China: Base on the Bibliometric Analysis and Knowledge Mapping

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Abstract. Environmental psychology is an interdisciplinary field that focuses on the interplay between individuals and their surroundings. Chinese researchers conducted extensive research on the field and produced a wealth of academic achievements, especially on the application of environmental psychology, such as the protection of minority towns and villages and the prevention and solution of air pollution. To reveal the current situation of the researches in China, 388 related papers from the China National Knowledge Infrastructure (CNKI) were analyzed by bibliometric and Knowledge Mapping. The results show that: (1) these studies stared since 1982 and demonstrated a year-on-year growth trend since 2001, which reaches a historical peak in 2016. Peiwen Zhan, Hu Zhao and Xiaofeng Lu top the list with a total of eighteen articles and Heilongjiang University is the best performer among the contributing organizations. (2) “Environmental Psychology” is the most frequently cited keywords and “Environmental perception”, “Physical environment” and “living environment” have the longest span of the bursts, the top seven largest clusters, which were environment, surroundings, application, privacy, environmental perception environmental art and physical environment.

1. Introduction
As one of the emerging research approaches, Environmental psychology is an interdisciplinary field that focuses on the interplay between individuals and their surroundings [1]. The establishing of "Journal of Environmental Psychology" marks the birth of Environmental Psychology, which was created by Canter in 1979 [2]. Subsequently, Western researchers from various disciplines started the study of environmental psychology, posting a lot of important theory and model, such as the theory of person-environment congruence, ecological theory of perception, modes of human-environment transaction, and so on [3].

Chinese researchers focus on environmental psychology is relatively late, and related research has been published until the eighties of last century [4]. However, in the ensuing decades, Chinese researchers conducted extensive research on the field and produced a wealth of academic achievements (e.g., ‘[5-13]’). Among these achievements, Chinese researchers especially focused on the application of environmental psychology, such as the design of urban commercial street (e.g., ‘[9]’) and park (e.g., ‘[8]’), the protection of minority towns and villages (e.g., ‘[11]’), and the prevention and cure of air pollution (e.g., ‘[11]’) from the perspective of environmental psychology, et cetera. As
mentioned above, in the past 35 years, Chinese researchers have achieved fruitful achievements in the field of environmental psychology, however, a thorough quantitative analysis to objectively identify influential authors and organizations as well as the emergent research trends and topics has not been completed. To fill this gap and in order to better promote the development of environmental psychology in China, this paper presents a quantitative review of Environmental Psychology studies in China base on the bibliometric analysis and knowledge mapping with the help of the CiteSpace II.

2. Methodology

2.1. data sources
The source and cited papers for analysis was from the of China National Knowledge Infrastructure (CKNI), which is the largest Chinese journal database and has collected 10,116 Chinese journals. The search conducted in the CNKI collection yielded 392 papers of all types published under the heading “environmental psychology”. The initial search attempt resulted in a total of 388 papers excluding the irrelevant articles, which contains 319 journal articles, 54 Dissertation and 15 conference papers.

2.2 data processing
388 papers were saved in RIS format which includes the crucial information, such as titles, authors’ names and affiliations, abstract and keywords. The bibliometric analyses and knowledge mapping were conducted with Java CiteSpace II software [14-17], which supports the construction and visualization of bibliographic record networks and is suitable for visualizing relative small ones [18].

3. Results

3.1 Bibliometric analysis results

3.1.1 Chronology statistics. Base on the yearly analysis, the annual number of studies from 1982 to 2017 in China is shown in Fig. 1. Studies of Environmental Psychology in China stared since 1982 and demonstrated a year-on-year growth trend since 2001, which reached a historical peak in 2016.

![Fig 1. The annual number of the studies published in China (1982-2017).](image)

3.1.2. Author statistics. Table 1 outlines the top 10 contributing authors and number of their published papers in China. As indicated, we discover that Peiwen Zhan, Hu Zhao and Xiaofeng Lu top the list with a total of eighteen articles, followed by Yanshuan Li, Chaohai Ou, Lin Wu, and others, each of which has more than five articles.

| Rank | Author         | Frequency |
|------|----------------|-----------|
| 1    | Peiwen Zhan    | 18        |
| 2    | Hu Zhao        | 18        |
| 3    | Xiaofeng Lu    | 18        |
| 4    | Yanshuan Li    | 13        |
| 5    | Chaohai Ou     | 10        |
3.1.3. Affiliation statistics. Table 2 depicts the top 10 organizations contributing to the studies on Environmental Psychology in China. As seen, Heilongjiang University is the best performer, followed by Hubei University of Technology, Taiyuan University of Technology, Jilin University, Wuhan University, and others. Not surprising, all of the top 10 contributing organizations are University, which can provide researchers with more favorable conditions.

| Rank | Author                                      | Frequency |
|------|----------------------------------------------|-----------|
| 1    | Heilongjiang University                      | 22        |
| 2    | Hubei University of Technology               | 18        |
| 3    | Taiyuan University of Technology             | 10        |
| 4    | Jilin University                             | 8         |
| 5    | Wuhan University                             | 8         |
| 6    | Fujian Normal University                     | 7         |
| 7    | Northwest Minzu University                   | 6         |
| 8    | China University of Mining and Technology    | 5         |
| 9    | Hunan University of Technology               | 5         |
| 10   | Fujian Agriculture and Forestry University   | 4         |

3.2. Knowledge mapping results
3.2.1. High frequency keywords. Table 3 includes the top 10 keywords of studies on Environmental Psychology in China, as well as their frequencies. As shown, “Interior design” is the most frequently cited keywords except the subject keywords “Environmental Psychology”. Additionally, “Environment”, “Application”, “Privacy” and “Design” are positioned in the 3rd, 4th and 5th places on the list respectively except the subject keywords. It is indicated that the current researchers concern on the application of environmental psychology.

| Rank | Keywords                        | Frequency |
|------|---------------------------------|-----------|
| 1    | Environmental Psychology        | 569       |
| 2    | Interior design                 | 66        |
| 3    | Environment                     | 38        |
| 4    | Application                     | 33        |
| 5    | Privacy                         | 26        |
| 6    | Design                          | 25        |
| 7    | Landscape design                | 23        |
| 8    | Psychology                      | 22        |
| 9    | mind                            | 20        |
| 10   | Environmental mentality         | 20        |
3.2.2. **Popular research trends.** To explore the Popular research trends, we form an analysis on keywords with citation burst. Fig 2 shows the top sixteen keywords with the strongest citation bursts. As indicated, we discover that “Environmental perception”, “Physical environment” and “living environment” have the longest span, each of which has more than eighteen years. Additionally, the topic of “modern interior design” is one of the typical recent research frontiers, which stared since 2013 and continue for 2017.

### Top 16 Keywords with the Strongest Citation Bursts

| Keywords                               | Year Range | Strength | Begin | End |
|----------------------------------------|------------|----------|-------|-----|
| Environmental perception               | 1982       | 4.1442   | 1982  | 2001|
| Physical environment                   | 1982       | 3.8002   | 1982  | 2002|
| Surroundings                           | 1982       | 3.7767   | 1989  | 1996|
| Living environment                     | 1982       | 4.4932   | 1989  | 2006|
| Three conditions coincide              | 1982       | 3.7953   | 2000  | 2003|
| Environmental advantages               | 1982       | 3.7953   | 2000  | 2003|
| Music                                    | 1982       | 3.7953   | 2000  | 2003|
| Environment                             | 1982       | 3.6137   | 2003  | 2005|
| Cognitive map                           | 1982       | 3.6151   | 2004  | 2005|
| Garden plant configuration             | 1982       | 3.7358   | 2004  | 2005|
| Environment mentality                   | 1982       | 4.2187   | 2008  | 2013|
| Behavior                                | 1982       | 4.4274   | 2012  | 2015|
| Psychological needs                     | 1982       | 4.9179   | 2013  | 2015|
| Environmental psychology                | 1982       | 18.1220  | 2013  | 2014|
| Modern interior design                  | 1982       | 4.1296   | 2013  | 2017|
| Ornamental plant landscape              | 1982       | 4.4076   | 2013  | 2014|

*Fig 2. Top sixteen keywords with the strongest citation bursts.*

3.2.3. **Popular research topics.** To explore the Popular research topic, we form an analysis on keywords with clusters. After running CiteSpace, we get 71 clusters with Modularity $Q$ is 0.892 and the Mean Silhouette is 0.825. Fig 3 shows the top seven largest clusters, which were environment, surroundings, application, privacy, environmental perception environmental art and physical environment. As shows, the largest cluster is Environment (#0), which contains 46 articles and its Silhouette is 0.926. The high frequency keywords of this cluster contain “interior design”, “environment”, “environment mentality” and “influences”. The second largest cluster is Application (#2), which contains 32 articles and its Silhouette is 0.946. The high frequency keywords of this cluster contain “application”, “landscape design”, “environment perception” and “psychological needs”.

*Fig 3. Clusters of the current research.*
4. Conclusions and further research

During past thirty-five years, many papers on environmental psychology have been published in China, but a thorough quantitative analysis to objectively identify influential authors and organizations as well as the emergent research trends and topics has not been completed. To fill this gap, this paper presents a quantitative review of Environmental Psychology research in China base on the bibliometric analysis and knowledge mapping with the help of the CiteSpace II. In the bibliometric analysis section, we present the chronology, author and affiliation statistics. The results show that studies of environmental psychology in China stared since 1982 and demonstrated a year-on-year growth trend since 2001, and reached a historical peak in 2016. Peiwen Zhan, Hu Zhao and Xiaofeng Lu top the list with a total of eighteen articles and Heilongjiang University is the best performer among the contributing organizations. Additionally, we discover that all of the top 10 contributing organizations are universities, indicating that university researchers are the main force in this field, because universities can provide researchers with more favorable conditions to conduct related studies contrast to other researchers and organizations.

In the section of Knowledge mapping analysis, we first obtain the high frequency keywords. As shown in table 3, “interior design”, “environment”, “application”, “privacy” and “design” are the most frequently cited keywords except the subject keywords “environmental psychology”, indicating that Chinese researchers concern on the application of environmental psychology. Most importantly, the major popular research trends and topics in the field of environmental psychology in China are discovered through keywords bursting and clustering. Fig 2 shows the top sixteen keywords with the strongest citation bursts, and we discover that “environmental perception”, “physical environment” and “living environment” have the longest span, indicating that the three topics are the major popular research trends. Fig 3 depicts the top seven largest clusters. The largest cluster is Environment (#0), which contains 46 articles and several high frequency keywords, such as “interior design”, “environment”, “environment mentality”, “influences”, and so on. The second largest cluster is Application (#0), which contains 32 articles and several high frequency keywords, such as “application”, “landscape design”, “environment perception”, “psychological needs” and so on. It implies that the current studies focus on environmental psychology and its application.

Certainly, there are still some limitations in our study. Firstly, the database we employed is form the China National Knowledge Infrastructure (CNKI), which only recruits Chinese papers and lack references of studies for a co-citation analyzing. A co-citation analysis of references could be helpful in determining the most influential article in a specific field. Secondly, timeline analysis of the field may help presenting the research topics by years and provide new insights. Finally, content analysis of influential articles may help further identify research gaps and directions.

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