JOURNAL OF CONTEMPORARY SOCIAL SCIENCES AND HUMANITIES

(Formerly RANGSIT JOURNAL OF SOCIAL SCIENCES AND HUMANITIES)
Available online at https://jcsh.rsu.ac.th

Research Hotspots and Trends in Monuments and Memorials: Visual Analysis Based on Knowledge Graph

Guoxing Chen[1, 2*], Vanvipha Suneta[1]

[1] Faculty of Decorative Arts, Silpakorn University, Bangkok, Thailand
[2] College of Fine Arts, Guangdong Polytechnic Normal University, Guangzhou, China
*Corresponding author, E-mail: chenguoxing@gpnu.edu.cn

Received June 23, 2022 / Revised August 11, 2022 / Accepted date month year / Publish Online May 25, 2023

Abstract

Monuments and memorials have been extensively researched in recent decades, and this overall upward trend is continuing. Effectively identifying the frontier hotspots of this research topic and predicting the future development trend is significant. Using the visualization software CiteSpace, this study analyzes the relevant literature on CNKI and WOS databases from 2012 to 2021. The results reveal the following: (1) The main current themes of the monument and memorial research can be divided into four parts, namely "basic theory, technology, and method", "history, memory, and commemoration", "type of remains, heritage, and dark tourism", and "space environment and art". (2) The relevant themes can be summarized in the evolutionary path of three research directions: "history, memory, and commemoration of the monument and memorials", "tourism development and preservation and/or conservation of monuments and memorials", "artistic design of the space environment of the monuments and memorial". (3) The cross-border disciplines and fields, improvement of basic theory, innovation of technology and methods, and development and criticism of "counter-monuments and anti-memorials" are important concerns for future research on this topic.

Keywords: *Monument, Memorial, CiteSpace, Research hotspots, Research theme*

1. Introduction

As the central object of protection under The Venice Charter passed in 1964, the term "monument" is one of the oldest and most used in the heritage world. In the realm of monument and site protection, although the word has the extended meaning of "monuments" in Chinese, it still firmly retains its original meaning (Lu, 2021). In 1903, Alois Riegl (1981), in his famous "Der Moderne Denkmalkultus: Sein Wesen Und Seine Entstehung", began to describe the meaning of the word monument (Denkmal): "In its oldest and most original sense, a monument is a work erected by man for the specific purpose of keeping particular human deeds or destinies (or a complex accumulation thereof) alive and present in the consciousness of future generations" [1].

In 1982, the aforementioned seminal article by Alois Riegl (1981) was translated into English by Kurt W. Forster and Diane Ghirardo and published in Oppositions, and the number of research papers on monuments and memorials subsequently showed an overall upward trend (Figure 1)[2]. In recent years, there has been an increasing amount of research literature in China and other countries on this topic (Figure 2). Consequently, effectively identifying the research frontiers and hotspots of the topic and predicting its future development trend is very important. Using the CNKI (China National Knowledge Infrastructure) and WOS (Web of Science) databases (2012–2021) as data sources, this study integrates methods such as quantitative analysis and information visualization. Using the analysis results provided by CiteSpace software, this study identifies and explores the research hotspots and trends in monuments and memorials.

2. Objectives

This study uses the knowledge graph method to statistically analyze the data, with the aim of identifying the hotspots at the forefront of research on monuments and memorials to clarify the main current research themes and explore the direction of research and how it has evolved. Based on this, future trends in research on the topic are explored. At the macro level, research can provide decision-making support for the formulation of relevant policies, while from the individual micro point of view, the grasp of research hotspots and trend tracking is of great significance for scientific researchers in improving efficiency and output.

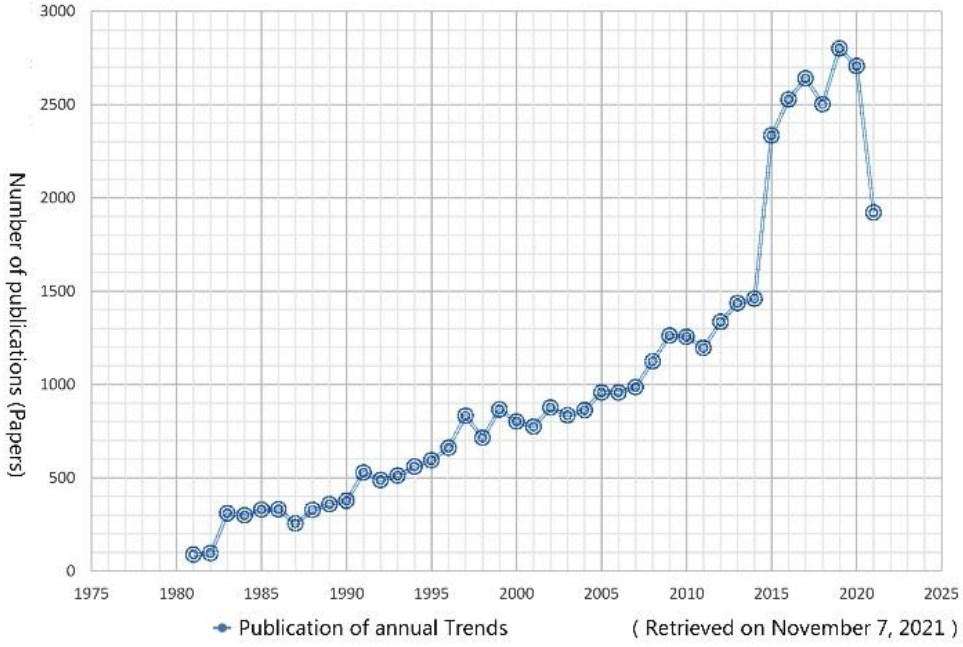

Figure 1 Annual trends of publications under the theme "Monument or Memorial" in the WOS Core Collection (1981–2021)

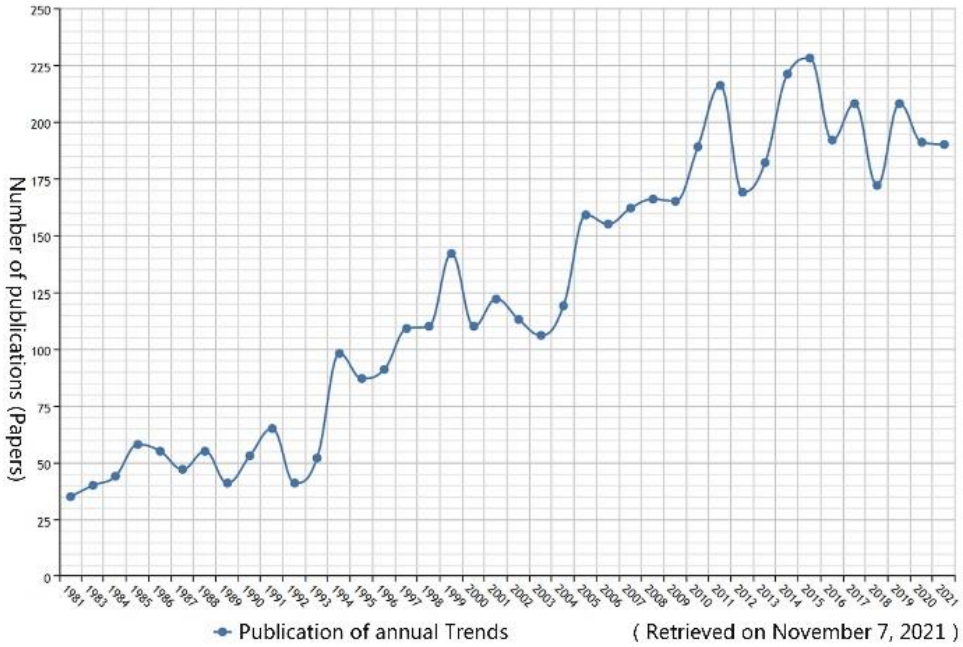

Figure 2 Annual trends of publications under the theme "Monument or Memorial" in the CNKI database (1981–2021)

3. Materials and Methods

This study adheres to the principle of objective and systematic screening, selecting the words "monument or memorial" and "place" to represent the Chinese "纪念碑" (Jinianbei) and "场所" (Changsuo) according to their definitions. In this article, Chinese and English literature data are obtained from CNKI and WOS databases, respectively, from 2012–2021, last updated on November 11, 2021. Each document data

record includes the author, title, abstract, keywords, and citations of the document. In order to ensure the literature sources are as representative and comprehensive as possible, this study only selects the Web of Science Core Collection of SCI-EXPANDED (Science Citation Index Expanded), SSCI (Social Science Citation Index), A&HCI (Arts & Humanities Citation Index), CPCI-S (Conference Proceedings Citation Index - Science), CPCI-SSH (Conference Proceedings Citation Index - Social Sciences & Humanities), and ESCI (Emerging Sources Citation Index) when searching the WOS database. The document types selected are articles and proceedings. The English literature data is limited to the disciplines in Figure 3, with a total of 3067 items of literature data obtained. All journals are in the data source category of Chinese literature, with a total of 17 items obtained. After the software merges and eliminates interviews, book reviews, and duplicate literature, 3032 items of literature data published from 2012–021 were obtained for this study.

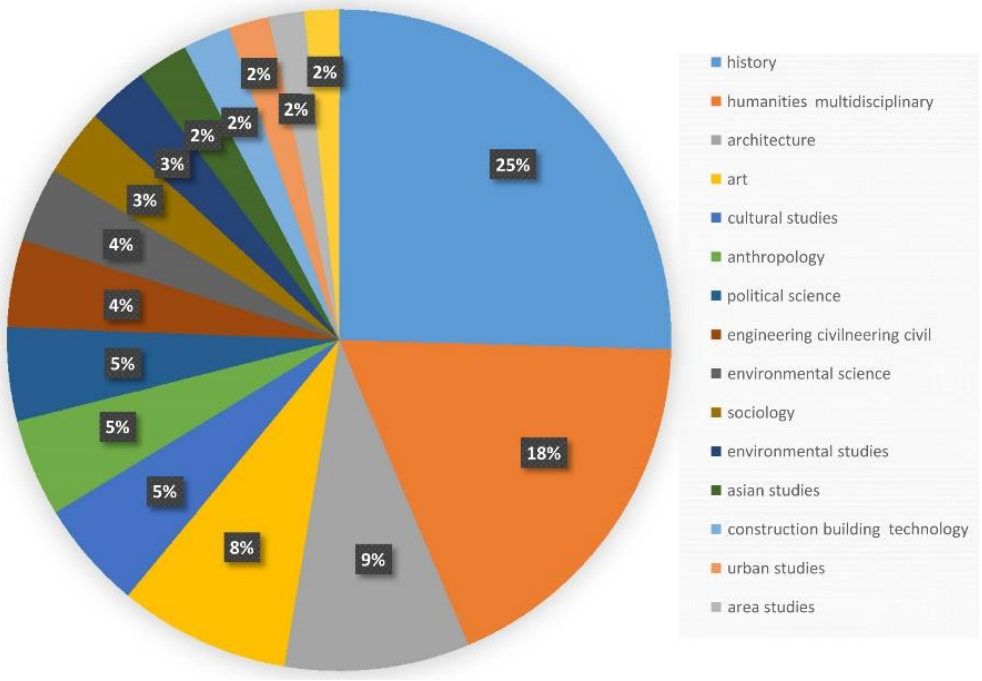

Figure 3 Subject distribution map showing the number of research articles on monument and memorial sites (2012–2021)

In contrast to other common information visualization analysis software, such as ArneMiner, PaperLens and Thomson Data Analysis (TDA), CiteSpace integrates cluster, social network, multi-dimensional scaling, and other analysis methods, focusing on the relationship among the evolution research disciplines and their intellectual bases, and the internal connections between different research fronts (Qin, 2014). Therefore, CiteSpace (5.8.R3) is selected for this study to conduct corresponding data mining and quantitative analysis on the cited literature and citations. The research combines information visualization methods, bibliometric methods, and data mining algorithms with documentary data from the statistical analysis of time characteristics, network distribution characteristics, research hotspots, etc. A visual knowledge graph is provided to show the development process and structural relationships in the analysis of monument and memorial sites. From the perspective of multiple, time-sharing, and dynamic, information mining is carried out on the scientific literature, the research theme of monument and memorial sites analyzed, and the evolutionary path and development trends clarified. Due to data collection limitations, the paper can only reflect the related research on monuments and memorials in the past ten years, while early research in this field requires researchers to collect data separately and conduct comprehensive research.

In the specific operation, the time division boundary is selected as one year, the node type is a keyword, and the threshold value selected as g-index (k value is selected as 20). After running the

visualization software CiteSpace, the keyword co-occurrence network graph containing 303 keyword nodes and 775 connections was obtained; among them, the modularity Q = 0.4798 and the weighted mean silhouette S = 0.7931 are both within a reasonable range.

4. Results and Discussion

Research hotspots can be explored using a certain number of related article combinations; it is mainly determined by high-frequency keywords and noun phrases selected from the paper. "Keywords are highly-refined summaries of the core content of the article, reflecting its research value and direction; the correlation between keywords can reflect the internal connection of knowledge in various disciplines to a certain extent along with the distribution and evolution of the research theme. It can more intuitively reflect the changes in the research hotspots, research methods, and research directions in different periods" (Zhang et al., 2021). Therefore, the relevant visualization graphs and data tables for this study have been obtained through the relevant analysis function of the visualization software CiteSpace. This research adopts the analysis method of the keyword co-occurrence network to analyze the research hotspots and development directions of the research on monument and memorial sites in the past decade.

4.1 Identification of the Research Theme

The centrality concept of CiteSpace software is mainly used to measure the strength of the network nodes in the graph structure; the higher the centrality of a node, the stronger its importance and influence on the entire graph (nodes with a centrality exceeding 0.1 are called key nodes), and the more likely it is to establish a co-occurrence relationship with other nodes. This research uses the relevant analysis function of the visualization software CiteSpace to construct a keyword co-occurrence network. It obtains the keyword co-occurrence graph of the monument site research (Figure 4) and the top 20 keywords in the centrality ranking (Table 1).

Table 1 Top 20 keywords for centrality value

Sequence Number	Keyword	Centrality	Frequency	Year
1	Collective memory	0.12	77	2012
2	Memory	0.10	71	2012
3	Politics	0.09	61	2012
4	History	0.20	59	2012
5	Historical memory	0.12	50	2015
6	Cultural heritage	0.06	41	2013
7	Monument	0.16	37	2012
8	Place	0.07	30	2012
9	Identity	0.07	29	2013
10	War memorial	0.06	29	2012
11	Sepulchral monument	0.10	28	2013
12	Public space	0.04	26	2014
13	Dark tourism	0.03	24	2012
14	Heritage	0.08	24	2014
15	War	0.07	23	2013
16	First world war	0.13	21	2012
17	Memorial museum	0.04	20	2017
18	Landscape	0.01	19	2013
19	National identity	0.04	19	2013
20	Death	0.05	17	2014

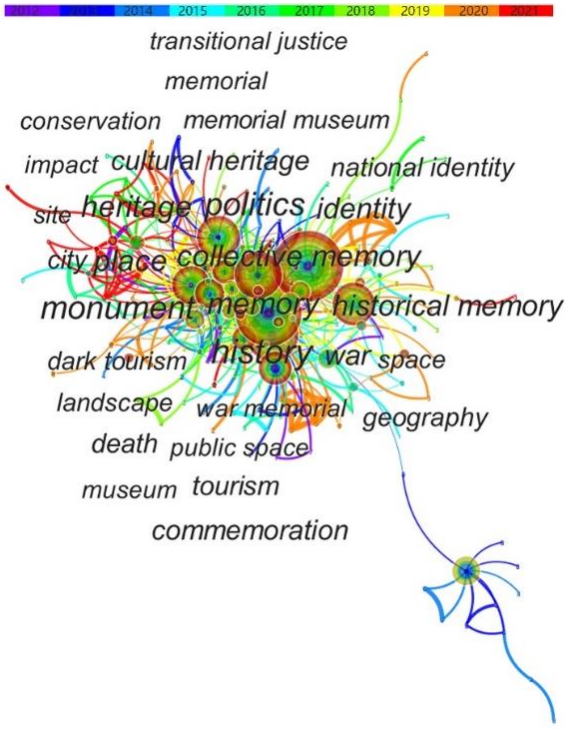

Figure 4 Keyword co-occurrence views for research on monument and memorial sites

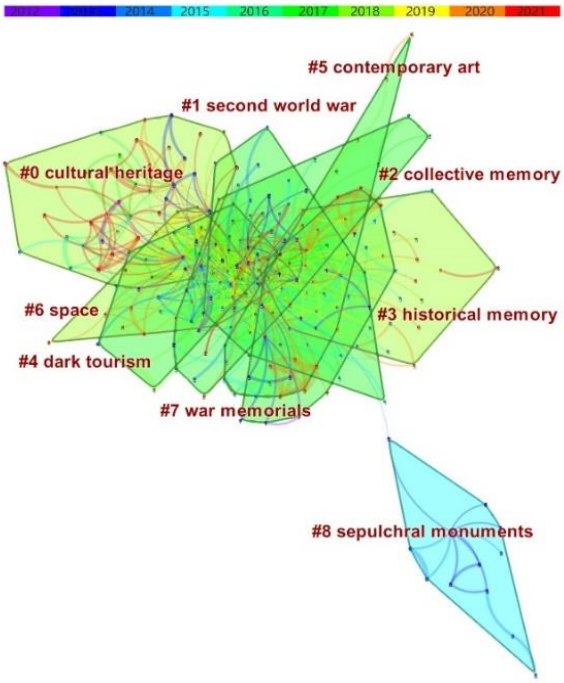

Figure 5 Keyword co-occurrence views for research on monument and memorial sites

Since the size of a node in the graph depends on its frequency value, the keywords in Table 1 are sorted by frequency level. In the table, “collective memory”, “memory”, and “historical memory” are related to memory (Centrality being 0.12, 0.10, 0.12, respectively), and “history”, “sepulchral monument” and “first

world war" (Centrality being 0.20, 0.10, 0.13, respectively), and "monument" (Centrality of 0.16), are search bases and the key nodes of this graph. They are an important intellectual base in the research specialty of monument and memorial sites and most closely related to other keywords. The different colors in Figure 4 represent different years, and the color change of the node circle layer from purple to red represents the time transition from 2012 to 2021. In this study, "collective memory" has the highest frequency (77 times) and the most significant impact; correspondingly, it has the most prominent nodes and circles in the graph. In addition, "memory", "politics", "history", "historical memory", "monument", "sepulchral monument", "heritage", and "first world war" exhibit frequencies of 71, 61, 59, 50, 41, 37, 28, 21, respectively. While forming nodes, they are closely connected with "collective memory", which is the main issue with research in this field.

Table 2 Keyword co-occurrence network cluster table for research on monument and memorial sites (Words related to coverage are sorted from high to low according to their influence on the cluster.)

Cluster ID	Size	Coverage	Silhouette	Mean Year	Begin Year	End Year
#0	41	cultural heritage; numerical simulation; conservation; biodeterioration; stone conservation	0.833	2017	2012	2021
#1	38	second world war; remembrance; historical memory; first world war; World War Ⅰ	0.692	2015	2012	2019
#2	30	collective memory; public space; place of memory; transitional justice; historical memory	0.754	2015	2012	2021
#3	28	historical memory; culture memory; civil war; memory studies; places of memory	0.743	2017	2015	2021
#4	26	dark tourism; tourism; dark heritage; pilgrimage; historical memory	0.788	2015	2012	2021
#5	19	contemporary art; Khmer rouge; human rights; statistical data; educational institutions	0.847	2017	2012	2020
#6	17	space; city; nature conservation; open cast mining; underground mining	0.823	2018	2013	2020
#7	13	war memorials; World War Ⅱ; morale; taste; stress	0.89	2016	2012	2020
#8	12	sepulchral monuments; Bohemia; Moravia; epigraphy of Rosenberg	0.972	2013	2013	2014

4.2 Hotspot Theme Analysis

In this study, the "LLR log-likelihood algorithm" is used to perform cluster analysis on keywords, with a keyword cluster knowledge graph generated in Figure 5[3]. From the description of modularity (Q value) and weighted mean silhouette (S value) in the aforementioned research methods, it can be seen that their values are all within a reasonable range, indicating that the research cluster has a significant effect. These clusters reflect the current development status and hotspot issues in the research specialty of monument and memorial sites, including "cultural heritage", "second world war", "collective memory", "historical memory", "dark tourism", "contemporary", "space", "sepulchral monument", etc. (74 cluster tags). When

performing keyword cluster analysis with CiteSpace software, "Summary Table/Whitelists" should be selected in the "clusters" menu bar and the cluster timeline combined to obtain a keyword co-occurrence network cluster table (Table 2). In addition, because the number of members in some cluster groups are too low, the significance of the analysis is relatively small; the eight cluster groups shown in Table 2 are automatically generated under the default settings of the CiteSpace software, and the researcher does not need to list the remaining cluster groups in detail.

It can be seen from Table 2 that the S values of the other cluster groups except #1 are all above 0.7, indicating a high-quality cluster [4]. The mean year represents the timeliness of the cluster, while the earliest appearance of keywords began between 2012 and 2021 (due to the year intervals of the sample data, the most influential keywords in the cluster group may also be earlier than the Begin year in related research). For example, the mean year of the "cultural heritage" in the cluster #0 group is 2017, and the Begin year 2012; specifically, the most influential keywords in the cluster group from 2012 to 2021 first appeared in 2012, and then other members continued to develop, making its theme one of the research hotspots around 2017.

By analyzing the cluster situation of the keyword co-occurrence network cluster in Figure 5 and Table 2, except for the cluster #8 group, the research contents of other cluster groups overlap. Therefore, research on monument and memorial sites can be summarized into four themes: "basic theory, technology and method", "history, commemoration, and memory", "remains-type heritage and dark tourism", and "space environment art". The specific contents are as follows: Firstly, research on basic theory, technology, and method. In recent years, some researchers have focused on basic theoretical research on monument and memorial sites from the perspective of imaginary, symbolic, identity, effect, and experience (e.g., Stańczyk, 2013; Savenije & Bruijn, 2017; Farrelly, 2019); In terms of technology and method, some researchers use visualization, X-ray and spatial analysis techniques (Panou et al., 2018; Buccolieri, 2016; Gizzi et al., 2016), as well as new analysis methods such as CO_2 isotope ratios to carry out related research on monument and memorial sites (e.g., Pironti et al., 2022). These methods not only enrich the basic theory of this type of research but also provide more powerful theoretical and technical support for the design practice of monument and memorial sites. The continuous updating of research methods is conducive to the researcher's understanding of research objects from different aspects—an in-depth exploration of characteristics and development value. Thus, the diversified presentation of relevant research results can be promoted.

Stańczyk (2013) explored the reshaping of national identity in post-communist Poland through an analysis of urban spaces with the aid of two controversial monuments in an attempt to unravel the complexities of communalization and state-building in the country after the fall of communism. Savenije and Bruijn (2017) used the concept of historical empathy, combining contextualization and affective engagement, to investigate the ongoing interplay between cognitive and affective dimensions of historical learning in museums. Farrelly (2019) used the experiments of three memorial sites to develop the tourists' understanding of the experience by theoretically imagining the nature of the community and its role in establishing the relevant theory of the memorial experience. Panou et al. (2018) used augmented reality (AR) technology on three monuments in the ancient city of Chania in Crete, Greece, combining virtual reality with location awareness, gamification, and social aspects. The past state of the monuments is displayed and superimposed on the real world. When users visit these monuments, they can see their past and present state, thus enhancing the interaction of tourists with the cultural remains (Panou et al., 2018). Buccolieri's (2016) study analyzed the patina on outdoor bronze monuments in a completely non-invasive manner with the help of portable energy dispersive X-ray fluorescence (EDXRF) equipment and obtained helpful information as well as providing a theoretical reference for the future monitoring and restoration of such monuments and statues. The research of Gizzi et al. (2016) is based on a new method of spatial analysis techniques. On a regional scale, he analyzed the correlation between the weathering patterns observed on buildings and typical microclimate factors of the region (especially sunlight and wind) through on-site assessments and discussions on the conservation status of residential sites, revealing the effects of wind, rain, and sunlight on well-protected building stone. Concetta Pironti's (2022) research shows that a new analytical method for CO_2 isotope ratios is an effective tool and non-invasive marker for monitoring environmental pollution in museums and cultural heritage sites.

It can be seen from the relevant research that the use of new theories, digital technologies, and media offers a future development direction in conducting cross-border research on issues relating to monument and

memorial sites. The relevant fundamental theories, technologies, and methods currently used in monument site research are still in the process of continuous exploration, and the relevant research is constantly developing on the basis of learning from the knowledge of related disciplines. However, a complete targeted theoretical system has not yet been formed, with technology development and method experience still in progress. Secondly, research on history, memory, and commemoration. People regard this public place as "milieux de mémoire" through the commemorative act of building the monument or memorial site. The purpose of these places is to evoke the memory of the historical content while simultaneously shaping it and inducing the emotional experience and resonance of the visitors. In specific research, "collective memory", "memory", "history", "historical memory", "sites of memory", "cultural memory", "memory study", "war memorials", "sepulchral monument", "war" and so on, have become essential keywords or theoretical concepts. It can also be observed from Table 2 that "collective memory", "memory", and "history" are ranked second and fourth for centrality. In the co-occurrence graph, there is a close, overlapping relationship between memory and history.

As early as 500 BC, the ancient Greek poet Simonides used the spatial arrangements in buildings to construct contrived memory (Solso, 2000). As an essential concept in the humanities and social sciences, "memory" began in the 1970s and 1980s and originated from the "memory research fever" in Europe (Alings, 1996). At present, related research on memory is continuously being published in the journal "Memory Research". As one of its representatives, "Rethinking France: Lieux de mémoire" edited by Pierre Nora (2020), a well-known French expert on social memory chose to go back into cultural-social history. By analyzing the role of palaces, churches, and other memorial sites such as "Lieux de mémoire" in the construction of nations and states, the memory that shapes the French "national consciousness" can be explored. Wakao (2010) discussed the formation, background and process of monuments, cemeteries, and historical relics in the United States, Britain, France, Germany, Eastern Europe, Northern Europe, and other countries and regions. He analyzed the complex social-mechanical relationships that emerge, since they are created as the image objects and passed on, erased, or forgotten (Wakao, 2010). In addition, some researchers have questioned and criticized the concept of a monument, arguing that it was based entirely on the physical form without preserving public memory. According to Pierre Nora (1989), "The fewer memorials that are created from within, the more forms of memorials are created from the outside". While Huyssen (1984) points out that "in an era of markedly increased public commemoration, the need for remembrance of the past and the thinking and study of remembrance today appear to be inversely related".

Existing research shows that relevant historical, memory, and memorial research is a substantial knowledge base for monument research, and these knowledge theories are conducive to the expansion of such research from different perspectives, promoting the diversified presentation of the results.

The third is research on remains-type heritage and dark tourism. Places, where black events such as death, disasters, evil, brutality, and massacres have occurred, are increasingly becoming tourist attractions. They and "historical monuments" are a kind of precious cultural heritage in human society. They have become important physical places of remembrance, history, and record, demonstrating demand but also composing remembrance, historical reference, narrative heritage, and populist heritage sites. In fact, heritage is a controversial concept, and the quest for historical "accuracy" has always favored a compromise between conflicting ideologies, interpretations, and funding. The outbreak of heritage manifests in the rise of the secularization and democratization of commemoration. It is also the product of the politicization of commemoration, completely changing the commemorative system and ultimately leading to the proliferation of commemoration (Nora, 2020). As we all know, these heritages are multivalent because they not only provide a visual, perceptual channel but also a way of remembering and forgetting, or even a theater of memory (Welch, 2016). Research in this area can be divided into two directions: remains conservation and tourism. In specific research, keywords such as "cultural heritage", "dark heritage", "dark tourism", "pilgrimage", "tourism", "World War II", "World War I", and "conservation" are usually used.

The term "dark tourism" was first coined in 1996 by Foley and Lennon (1996; 2001). The term "encompasses the presentation and consumption (by visitors) of real and commodified death and disaster sites". Lennon has made an important contribution to interpretive issues, selective commemoration, and the interpretation of scholarly debates in the field of "dark tourism". As a professional researcher specializing in tourism, Golańska (2015) has undertaken a philosophical inquiry into "dark attractions" inspired by the

aesthetics of Deleuze and Guattari, aiming to separate the term "dark tourism" from its typically negative values. Unlike previous studies on dark tourism, which were biased toward theoretical papers and qualitative methods, Dimitrovski et al. (2017) used a relatively rare quantitative modeling approach to explore the behavior of tourists who visit dark sites or participate in such activities.

The relevant research reveals that dark tourism sites are not only part of our cultural heritage and worthy of utilization, preservation, and/or conservation by human society but also monumental places with a humanized function. From the perspective of remains and heritage, research on certain monument sites is conducive to enhancing their unique value, such as by reflecting and recalling history.

Fourthly, research on the space environment and art. In order to set off the environmental atmosphere and infect visitors with a more intuitive artistic image, many monuments and memorials of commemorative significance are often visual art images such as intuitive and figurative single or group statues and relief or complex sculptures. These visual art images make monuments a vital art type in the history of human art, reflecting the spiritual outlook and temperament of an era and even considered to be historical images of an era. By interpreting them, we can peek into that era's ideology and general political landscape. In specific research, "space", "public space", "memorial museum", "architecture", "landscape", "contemporary art", "public art", "statue", "monumental sculpture", and so on have become important keywords.

Starting from the differences in periods and spirit of the times, Jianqun Li (2021) believes that a monumental sculpture, as an art form carrying social politics, religion, and culture, is an image of the history in an era, reflecting its spirit and temperament. Schütz (2020) looks at the cities of Bristol and Marseille, analyzing how their dynamic commemorations combine heritage and aesthetics with protest and draw attention to the artist's ability to challenge existing civic narratives. Drawing on the case of Jochen Gerz, a German conceptual artist known for his innovative monuments, Yang (2013) introduces six unprecedented ways to build monuments. On the basis of analyzing the rise of abstract sculpture and its influence on monumental sculpture, Tan (2021) discusses the similarities and differences between Chinese and Western abstract monumental sculptures in terms of content and form. Through a collection of images and texts, Yoon (2019) explores the visual rhetoric and symbolism of statues in public spaces, deciphering their language, objectivity, and materiality, as well as their role as media icons and voices in political debate.

Judging from the relevant research articles retrieved, monumental sculpture art presents two forms of figurative and imagery at the same time. Most of their research starts with the theme, image, form, etc., and then interprets the symbolic meaning behind them, the spirit of the times, and the political identity they reflect.

4.3 Hotspot Theme Evolutionary Path

The timeline views generated by CiteSpace software can intuitively show the activity and persistence of each cluster keyword in the research topic simultaneously with the evolution and development of each cluster keyword and the closeness of the relationship between clusters. As can be seen from Figure 6, the keywords of the eight groups of clusters #0 to #7 have a certain temporal relationship and mutual connection with each other, indicating that their research popularity has a certain continuity and relevance. The keywords of cluster #8 do not form a clear timeline between each other, and the time relationship is weak. The start and end times of the cluster are 2013 and 2014, indicating that its research topic keywords are only periodic research hotspots with poor persistence. The three groups of clusters #0, #2, and #4 cover the time span from 2012 to 2021, indicating that their research topic keywords have the highest activity and strongest research continuity. From the timeline of each cluster, the earliest keywords in the six groups of clusters #0~#2, #4, #5, and #7 all appear in 2012. However, the development speed and ending time of each cluster are different. Taking cluster #2 as an example, "collective memory" is located at the far left of the timeline, and the earliest keyword in the cluster. Its appearance means that cluster #2 starts to form gradually, while other keywords in the cluster change with time. The transitions appear one after another, such as war (2013), public space (2014), body (2015), commemoration (2016), holocaust (2017), Central Asia (2018), Europe (2019), king (2020), art (2021), and so on. The cluster develops rapidly from 2012 to 2017, slowing down after 2017, but from the overall perspective, the development of cluster #2 is relatively stable, with new keyword members appearing every year. Cluster #2 is also relatively compact, and society has been deeply concerned about it for many years, which may explain why its research popularity has continued for such a long time.

As can be observed from Figures 6 and 7, the number of keywords generally shows a fluctuating and decreasing trend. In 2012, relatively large numbers of keywords were used in research on monuments and memorials, peaking in the past decade, "collective memory" and "memory" being the most important. From 2013 to 2016, the number of keywords appears to be generally stable, with "cultural heritage", "public space", "historical memory", and "conservation" being the most important in the corresponding years. From 2017 to 2018, the number of related keywords decreased rapidly but rebounded from 2019 to 2020.

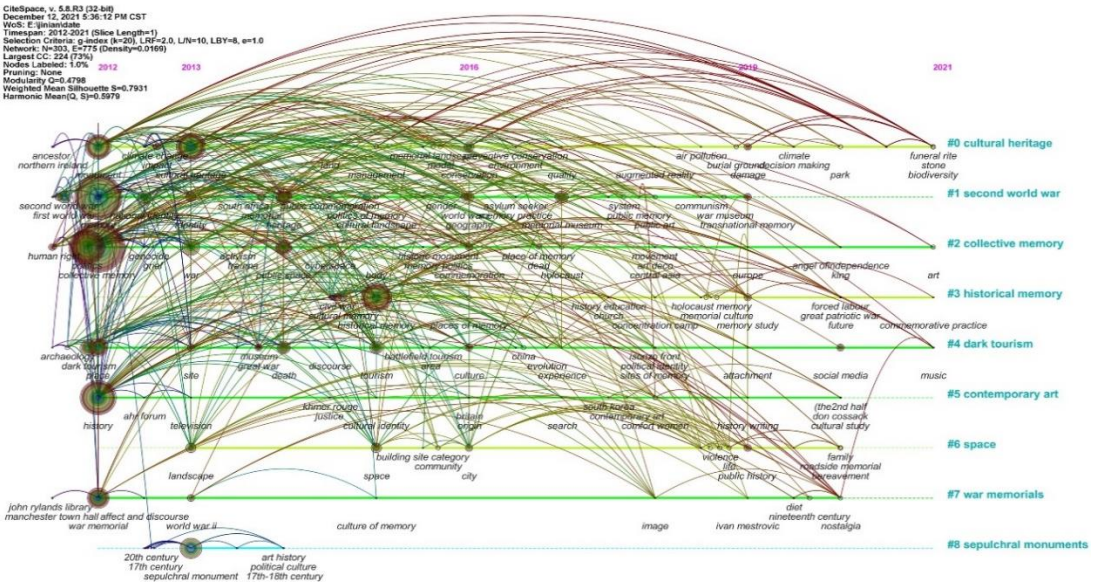

Figure 6 Timeline view of keywords used in research on monuments and memorials

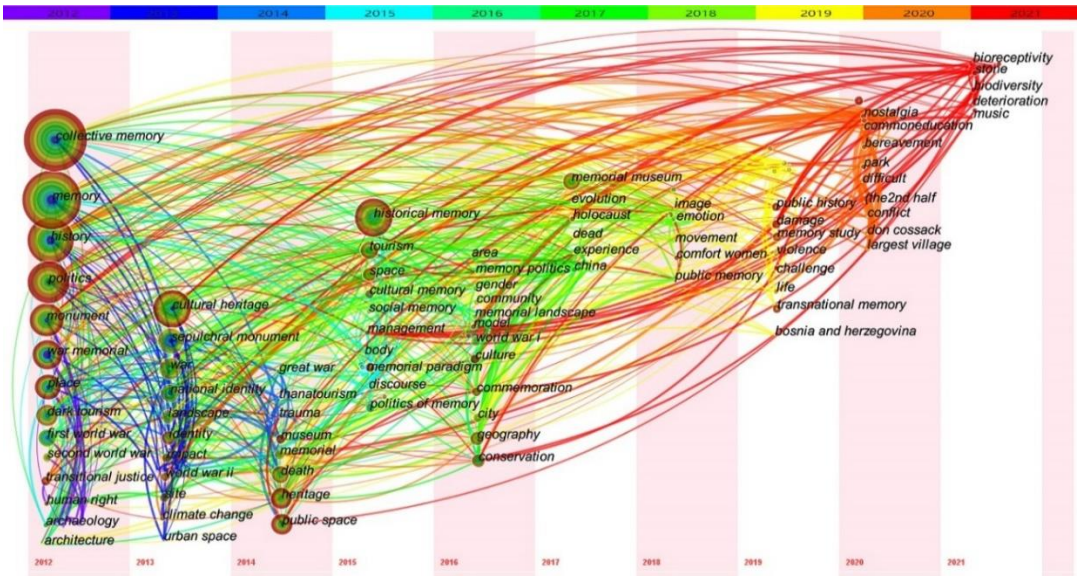

Figure 7 Time-zone view of keywords used in research on monument and memorial sites

Looking at Figures 6 and Figure 7 comprehensively, the term "collective memory" has had the most extensive influence on monument and memorial research in the past decade. During the same period, a vertical differentiation path for "memory → history → politics → architecture → construction → place space → dark tourism" was also formed. Over time, each longitudinal path evolves into a different lateral path. By

synthesizing the horizontal and vertical evolution processes, three important research evolutionary paths can be sorted and summarized.

First is the "history, memory, and commemoration of the monument and memorial sites" research path. Their relationship is both inclusive, mixed, and two-way interactive. In a certain sense, although there are noticeable differences between "memory" and "history", it can also be said that they are the same. Memory is the matrix that constitutes history; history is verified memory and where the relationship with memory begins. As the connection between memory and history, the content and most crucial feature of monument and memorial sites in history is monumentality. While shaping people's memory, memory can, in turn, strengthen monumentality; that is, it can reshape the monument and memorial sites.

This research path can be branched into three aspects: history, memory, and commemoration. Among them, the historical evolutionary path can be divided into two branches: theoretical discussion and war reflection. The evolutionary path of "history → historical memory → public history" theoretically mixes history and memory, reflecting the different emphasis placed on the historical theory of the intellectual base of monument and memorial sites in different times. The evolutionary path of "war → painful experience → holocaust → life" reflects the content construction of the monument and memorial sites. For example, "war remains" needs to reflect the harm caused by war to people, and reverence for life. The evolutionary path of "memory → collective memory → cultural memory, social memory → public memory" reflects the different perspectives of memory theory on the intellectual base of monument and memorial sites at different times. The evolutionary path of "commemoration → model → image → social media", reflects the differences in the way monument and memorial sites are commemorated and visually represented at different times, such as the encrypted monument presented in Zhao (2020).

Second is the research path "Tourism development and preservation and/or the conservation of monument and memorial sites". Monument and memorial sites often have historical, artistic, economic, and research value. They also carry rich historical memory, cultural spirit, and social identity, promoting the protection and dissemination of remains-type heritage and transforming tangible assets into an actual cultural tourism economy on the premise of preservation and/or conservation.

In order to better reflect the role of tourism development in monument and memorial sites, the research path can be divided into two branches: emotional experience and protection/utilization. The evolution process of "dark tourism → commemoration → impact → emotion → common education" reflects the significance of dark tourism development in monument and memorial sites. Through highly creative commemorative facilities and scenes, deceased people, events, and things can be commemorated while simultaneously touching people's hearts and mobilizing the emotions of tourists, making them feel the "trauma" and awakening the "respect" and "humane" aspects of life and goodwill, thereby inspiring a deeper level of interest, learning, experience, and exploration of the relevant content. The evolution process of "archaeology → culture heritage → management → evolution → conservation" indicates the direction of how best to protect and utilize monument and memorial sites. For the remains-type monument and memorial sites, history is annotated through archaeological excavations, while at the same time, the research, protection, and utilization of cultural relics not only promotes people's understanding, appreciation, and participation in history, but also contributes to the sustainability of the site.

The third research path is the "artistic design of the space environment for the monument and memorial sites". Compared with ordinary places, monuments often have memorials carrying commemorative significance. At contemporary monument sites, the settings and meaning of memorials have changed. For instance, by expressing monumentality in the form of a monumental "environment" rather than a single sculpture (Lin & Fu, 2007). Therefore, in contemporary times, the artistic design of the space environment of monument and memorial sites is different from the past.

This research path can be branched into three levels: planning, space, and memorials. The evolution process of "landscape → area → geography → park → biodiversity" reflects the design considerations of the monument and memorial sites from the planning level. The evolution of the research process "site → urban space → public space → memorial museum" reflects the different spatial emphasis of the monument and memorial sites. "Monument → memorial paradigm → challenge → art" reflects the discussion of memorials carrying commemorative significance from the perspective of artistic creation.

5. Conclusions and Research Trends and Prospects

5.1 Conclusion

This research uses information visualization software to analyze the development status and hotspots of articles on monument and memorial sites on the WOS and CNKI databases from 2012 to 2021. The following results are revealed:

(1) The hotspot keywords of the monument and memorial site research mainly include “collective memory”, “memory”, “politics”, “history”, “historical memory”, “cultural heritage”, etc. These fall mainly into three cluster groups, summarized into four research themes: “basic theory, technology and method”, “history, memory and commemoration”, “remains-type heritage and dark tourism”, and “space environment and art”.

(2) The relevant themes of monument and memorial site research can be summarized into three evolutionary paths: “history, memory, commemoration of the monument and memorial sites”, “tourism development and preservation and/or conservation of monument and memorial sites”, “artistic design of the space environment of monument and memorial sites”.

5.2 Research Trends and Prospects

This research uses the keywords co-citation, co-occurrence network, centrality, cluster, and Burst Terms generated by CiteSpace software to vividly display the research status, research hotspot, and development direction of the issue through analysis. In order to promote more scientific and effective research on the issue of the monument and memorial sites, it is recommended that future research focus on the following aspects:

The first is the cross-border between disciplines and fields. The study of monument and memorial sites requires the joint participation of multiple disciplines and fields. In the past decade, the related research has involved history, archaeology, architecture, and art, and this cross-border cooperation is likely to continue in the future. This will ensure that the research into the issue continues to deepen and diversify while promoting the extension of research specialties and opening up more related research branches.

The second is the improvement of essential theory and the innovation of technology and methods. Although research on monument and memorial sites has received significant attention from academic circles, its fundamental theories are based primarily on history, philosophy, environmental science and engineering, architecture, and art, with its knowledge points being relatively scattered, demonstrating the characteristics of fragmentation. The basic theory needs to be continuously integrated and improved. Therefore, it is necessary to strengthen the construction of theoretical research to form a systematic system. At the same time, it is also necessary to ensure the continuous innovation of research techniques and methods to improve the quality and enhance the value of scientific research.

Third, the development and criticism of “counter-monuments and anti-memorials”. As an emerging theory and design practice, it has independent significance and characteristics and is still growing and developing. On the one hand, it counters traditional monuments in spiritual and material expressions, aiming to remodel collective memory while revitalizing memorial activities and memorial spaces. On the other hand, because it is mainly aimed at specific objects in the memorial space, its inherent antagonism, even subjectivity, brings limitations to its theoretical and practical research.

6. Acknowledgments

This research was supported by the Doctor of Philosophy Program in Design, Faculty of Decorative Arts, Silpakorn University. This paper and the research behind it would not have been possible without the support of Asst. Prof. Vanvipha Suneta (Ph.D.). Her enthusiasm, knowledge, and attention to detail have been an inspiration and kept my work on track. I am also grateful to Asst. Prof. Watanapun Krutasaen (Ph.D.) for his support in my research work.

7. Notes

[1] Alois Riegl' original paper in German: Unter Denkmal im ältesten und ursprünglichsten Sinne versteht man ein Werk von Menschenhand, errichtet zu dem bestimmten Zwecke, um einzelne menschliche Taten

oder Geschicke (oder Komplexe mehrerer solcher) im Bewußtsein der nachlebenden Generationen stets gegenwärtig und lebendig zu erhalten.

[2] Oppositions was an architectural journal produced by the Institute for Architecture and Urban Studies from 1973 to 1984. Many of its articles contributed to advancing architectural theory and many of its contributors became distinguished practitioners in the field of architecture. Twenty-six issues were produced during its eleven years of existence. See Hays, K. M. (1998). Oppositions Reader: Selected Essays 1973-1984. Princeton Architectural Press.

[3] The words in Figure 4 are single keywords. Among them, the circle size represents the frequency of keywords, and the greater the frequency, the larger the circle; the lines represent the connection between keywords. Closely linked keywords will form a small group (i.e., closely related keywords will be clustered). Figure 5 shows the keyword clustering of these small groups; the most representative keywords indicate the clusters' names.

[4] In general, the number of cluster members determines its representativeness. The more members, the greater the representativeness; the size of the weighted mean silhouette (S value) of the cluster indicates the quality of the cluster; the S value will approach infinitely but will not exceed 1.

8. References

Alings, R. (1996). *Monument und nation: Das bild vom nationalstaat im medium denkmal - zum verhältnis von nation und staat im deutschen kaiserreich 1871-1918*. Berlin, Germany: De Gruyter.

Buccolieri, A., Buccolieri, G., Castellano, A., & Marabelli, M. (2016). X-ray fluorescence for the study of the patinas on an outdoor bronze monument. *International Journal of Conservation Science, 7*(4), 1009-1022. https://doi.org/10.3390/heritage4040170

Dimitrovski, D., Senić V., Marić D., & Marinković V. (2017).Commemorative events at destination memorials - a dark (heritage) tourism context. *International Journal of Heritage Studies*, *23*(8), 695-708. https://doi.org/10.1080/13527258.2017.1317645

Farrelly, F. (2019).Revealing the memorial experience through the tourist-led construction of imagined communities. *Tourism Management, 75*(12), 13-21. https://doi.org/10.1016/j.tourman.2019.04.031

Foley, M., & Lennon, J. J. (1996). JFK and dark tourism: A fascination with assassination. *International Journal of Heritage Studies, 2* (4), 198-211. https://doi.org/10.1080/13527259608722175

Gizzi, F. T., Sileo, M., Biscione, M., Danese, M., & de Buergo, M.A. (2016). The conservation state of the Sassi of Matera site (Southern Italy) and its correlation with the environmental conditions analysed through spatial analysis techniques. *Journal of Cultural Heritage*, *17*, 61-74. https://doi.org/10.1016/j.culher.2015.05.002

Golańska, D. (2015). Affective spaces, sensuous engagements: in quest of a synaesthetic approach to 'dark memorials'. *International Journal of Heritage Studies*, *21*(8), 773-790. https://doi.org/10.1080/13527258.2015.1020960

Huyssen, A. (1984). Mapping the postmodern. *New German Critique, 33*, 5-52. https://doi.org/10.2307/488352

Lennon, J. J., & Foley, M. (2001). *Dark tourism: The attraction of death and disaster*. Massachusetts, US: Cengage.

Li, J.Q. (2021). Monumental sculpture and the spirit of the times: An example of the history of western fine art. *Art Magazine, 9*, 12-16+21. https://doi.org/10.13864/j.cnki.cn11-1311/j.006487

Lin, H.-W., & Fu, C.-C. (2007).A study on the differences between the significance of war memorial: Based on the purpose of monuments erected in Kinmen and Gettysburg, U.S.A. *Journal of Architecture, 62*(12), 23-48.

Lu, D. (2021). Monument de jinianbei hanyi jiqi dui buke yidong wenhua yichan baohu de yingxiang [The monument meaning of monument and its impact on the protection of immovable cultural heritage]. *China Cultural Heritage, 3*, 33-44.

Nora, P. (1989). Between memory and history: Les lieux de mémoire. *Representations*, *26*, 7-24. https://doi.org/10.2307/2928520

Nora, P. (2020). *Field of memory: Cultural and social history of french national consciousness*. Nanjing University Press.

Panou, C., Ragia, L., Dimelli, D., & Mania, K. (2018, Mar 17-19). Outdoors mobile augmented reality application visualizing 3D reconstructed historical monuments. In *4th International Conference on Geographical Information Systems Theory, Applications and Management (GISTAM)*, Funchal, Portugal.

Pironti, C., Ricciardi, M., Proto, A., Cucciniello, R., Fiorentino, A., Fiorillo, R., & Motta, O. (2022). New analytical approach to monitoring air quality in historical monuments through the isotopic ratio of CO_2. *Environmental Science and Pollution Research International*, *29*(20), 29385-29390. https://doi.org/ 10.1007/s11356-020-12215-8

Qin, X. N., Lu, X. L., & Wu, C. Y. (2014). The knowledge mapping of domestic ecological security research: Bibliometric analysis based on CiteSpace. *Acta Ecologica Sinica, 34*(13), 3693-3703.

Riegl, A. (1981). *Der moderne denkmalkultus: Sein wesen und seine entstehung*. Universitats-Bibliothek, Germany.

Savenije, G. M., & de Bruijn, P. (2017). Historical empathy in a museum: Uniting contextualisation and emotional engagement. *International Journal of Heritage Studies, 23*(9), 832-845. https://doi.org/10.1080/13527258.2017.1339108

Schütz, M. (2020). Rewriting colonial heritage in Bristol and Marseille: Contemporary artworks as decolonial interventions. *Heritage and Society, 13*(1-2), 53-74. https://doi.org/10.1080/2159032X.2021.1914298

Solso, R. L. (2000).*Cognitive psychology*. Boston, US: Allyn & Bacon.

Stańczyk, E. (2013). Remaking national identity: Two contested monuments in post-communist Poland. *Central Europe, 11*(2), 127-142. https://doi.org/10.1179/1479096313Z.00000000015

Tan, Y. L. (2021). Emergence and exploration of abstract monumental sculpture. *Art Magazine, 9*, 17-21. https://doi.org/10.13864/j.cnki.cn11-1311/j.006488

Wakao, Y., & Wada, M. (2010). *Rekishi no ba: Shiseki, kinenhi, kioku*. Kyoto, Japan: Mineruva Shobō.

Welch, M. (2016). Political imprisonment and the sanctity of death: Performing heritage in "troubled" Ireland. *International Journal of Heritage Studies, 22* (9), 664-678. https://doi.org/10.1080 / 13527258.2016.1184702

Yang, Z. (2013). Jinianbei de liuzhong xinjianfa Deguo gonggong yishujia Jochen Gerz jieshao chang [The six new construction methods of monument German public artist Jochen Gerz introduction course]. *Sculpture*, 4, 74-75.

Yoon, T. H. (2019). *Decoding dictatorial statues*. Onomatopee.

Zhang, E. X., Tan, Y., Zhang, W., & Qin, X. N. (2021). Research hotspots and trends of domestic ecotourism economy: Visualization analysis based on knowledge map. *Ecological Economy, 37*(06), 124-133.

Zhao, B., & Huang, X. (2020). Encrypted monument: The birth of crypto place on the blockchain. *Geoforum, 116*, 149-152. https://doi.org/10.1016/j.geoforum.2020.08.011