Analysis of Dragon Boat Racing Research Based on CiteSpace

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［**Abstract**］Using the CiteSpace visual literature analysis tool, 802 relevant literature on dragon boat racing research were analyzed to map the knowledge structure of research hotspots, core author groups and research institutions from 1980－2022 in CNKI General Library. The results show that dragon boat racing research has experienced a stagnant period, a recovery period and a rapid development period, and it was expected that after 2023, dragon boat racing research would usher in new development opportunities. Dai Yu, Wang Saishi and Wang Junqi were the main authors of publications, but there was not much cooperation among research authors, mainly relying on academic relationships and not much cross－regional cooperation; Guangxi University for Nationalities, Shanxi Normal University and Minzu University of China were the institutions with more publications, and universities were the foundation of dragon boat culture research. Keyword co－occurrence analysis formed a total of 765 nodes with 1372 connections,（density = 0. 0047）, S = 0. 9124, which was close to 1, indicating that the homogeneity of the network was high and the research perspectives in the field of dragon boat racing tend to be diversified. Analyzed by the time of appearing keywords, dragon boat racing research shows a trend of migrating from cultural research to competitive sports.

1　Introduction

Dragon boat racing has a long history and is a traditional Chinese folk sport activity. From the raft to the boat, from competitive folklore to mass entertainment folklore, from commemorating the sages to competitive sports, the development of dragon boat racing culture is accompanied by the development of human history. At the same time, the historical development and change give the dragon boat racing different cultural connotations, which, according to the literature, can be roughly divided into：the stage of the unconscious racing culture of "boat row ferry" for the needs of production and life, the stage of racing culture of praying for the blessing of the gods to protect the race, the stage of racing culture of commemorating Qu Yuan and other sages, the stage of unconscious racing culture of popular entertainment such as "playing dragon boat" and "visiting relatives by dragon" and the stage of modern racing culture of national spirit. In addition to these five periods of dragon boat racing culture, we also find that dragon boat racing culture is affected by social, economic, political, cultural and other factors in different regions, and shows some differences. Miluo river dragon boat racing culture focuses on reflecting its solemn sacrificial ceremony; Xiangxi Fenghuang Tujia ethnic group wears "dragon boat clothes" and rows "double boat" dragon boats; the dragon boat racing in Jiangsu and Zhejiang areas is mainly to commemorate Goujian "ten years of life

gathered, ten years of lessons" achievements; there is also Qinhuai with its painted boats where dragon boats are used to race and painted boats are used to shuttle around. These all show the different geographical origins and characteristic differences of dragon boat racing. There have been scholars reviewing and synthesising the contents of dragon boat racing, but little research has been reported on the research hotspots and evolution laws in this field. In this paper, we use Citespace software to analyse the quantitative changes of related literature, dissect the developmental patterns, sort out the relationships between researchers and research units, and explore the research patterns and regional integration development trends, with a view to providing references for the subsequent related studies.

2　Materials and methods

2.1 Data source

The data source is chosen from CNKI academic journal database, and the theme of dragon boat racing is selected by "theme name = 'dragon boat' AND (SU % = 'origin' OR SU % = 'beginning') AND (SU % = 'race' OR SU % = 'competition' OR SU % = 'racing')" search formula, spanning the period 1980－2021, retrieved a total of relevant literature.

2.2 Data filtering

In order to ensure maximum credibility and reliability of the study, the search results are screened by selecting journal literature, removing duplicates and irrelevant literature (news articles, book reviews, etc.), and saving the screened literature to be analysed as txt text in refworks format.

2.3 Data analysis

Based on CiteSpace software, the hotspots and development trends in the field of Dragon Boat Racing are visually analysed, and links between core authors and the core structure, especially keywords, are studied in order to explore the paths of dragon boat racing evolution and to analyse the trends of future development of this research.

2.4 Analysis of journal publications

The number of papers in a journal reflects both the strength of research in the field and the importance researchers attach to the field. The CiteSpace tool is used to set the time span from 1980 to 2022 to obtain the research trend according to the number of articles published in each year.

2.5 Analysis of core authors

According to the formula of Laplace's law $M \approx 0.749\sqrt{N_{max}}$ (M represents the number of papers, and N represents the number of papers of the most prolific authors in the years counted), authors with more than M publications are identified as the core authors of the dragon boat racing study. The CiteSpace tool is used to set the time span from 1980 to 2022, and the node type is selected for authors to obtain the visualised author relationships and analyse the collaboration between core authors and researchers.

2.6 Analysis of research institutions

According to the formula of Laplace's law $M \approx 0.749\sqrt{N_{max}}$ (M represents the number of papers, and N represents the number of papers of the most prolific institutions in the years counted), the institutions with more than M papers issued are identified as the core institutions of dragon boat racing research. The CiteSpace tool is used to set the time span from 1980 to 2022, and the node type is selected as research institutions to analyse the cooperation between the core research institutions and the research institutions.

2.7 Keywords analysis

Keywords are a summary of the topic of the paper, and the analysis of keywords in the literature can be used to dig deeper into the research hotspots in the field. Centrality refers to the degree of association in the regional

context. The CiteSpace tool is used to set the time span from 1980 to 2022, and the node type is selected as keywords to analyse the importance of nodes (centrality) in the network.

3　Results and analyses

3.1 Initial filtering results of literature

A total of 911 pieces of literature related to dragon boat racing are retrieved through CNKI academic journals. After removing non-research literature such as book reviews, news reports and other repetitive or irrelevant literature, 802 literatures remained, with a retention rate of 88.04%.

3.2 Influence of journal publication volume on research trend

The research trend in the field of dragon boat racing research can be seen from the amount of literature issued in the past years. The research in the field of domestic dragon boat racing shows a wave-like upward trend, with a slow development in the early stage and a low amount of relevant literature until 2016, when the amount of literature reached a maximum value of 55, and then tend to stabilise. Its development can be roughly divided into three periods: stagnation period (1980-1987), recovery period (1987-2004), and rapid development period (2004-present). The stagnation period was after China's reform and opening up, and the research related to dragon boat racing developed slowly due to the influence of economic and cultural level. In the recovery period, the Chinese Dragon Boat Association was established in 1985, the International Dragon Boat Association was established in Hong Kong in 1991, and the Dragon Boat Racing Rules and Dragon Boat Referee Laws were revised in 1993 and 2003 respectively, which shows that dragon boat racing as a sport has been paid attention to and valued, and the research on dragon boat racing has been gradually resumed. Rapid development period in 2005, the Ministry of Education approved 10 colleges and universities for dragon boat high-level sports team pilot. In 2010, under the application of the China Dragon Boat Association, dragon boat racing officially became an Asian Games project … colleges and universities inject new strength into the development of dragon boats, and education and competitive sports support the rapid development of dragon boat racing. Although the research on dragon boat racing declined after 2019 due to the impact of COVID-19, the number of articles issued still remained at a high level. During the Tokyo Olympics, Chinese dragon boats were displayed at the Uminomori Aquatic Arena, and the IOC and FISA are working together to promote the "Dragon Boat in the Olympics" project and have commissioned the China Canoe and Kayak Association to design and develop a new competitive type of dragon boat on the basis of the traditional dragon boat. It is expected that after 2023, dragon boat racing research will usher in a new opportunity for development. This shows that the study of dragon boat racing has been paid attention to by a wide range of scholars, and is a research project with deep research heritage and rich potential.

3.3 Influence of core authors on research patterns

According to the formula of Laplace's law, the value of N is 8, obtaining $M \approx 2.12$, and taking the integer 3, it can be seen that there are 22 core authors of the research in the field of dragon boat racing with the number of publications reaching 3 or more. The total number of publications of the core authors accounts for 10.72 % of the total number of papers, indicating that a group of high-yield authors has not been formed, and the researchers in this field are relatively dispersed. Among the core authors, Dai Yu tops the list with 8 papers issued, and among his 8 documents, 3 are CSSCI journals and 3 Peking University core journals published between 2016 and 2022, indicating that Dai Yu is the most important scholar in the study of dragon boat racing in this period. Wang Saishi and Wang Junqi follow with 5 documents, and their published documents also include articles with CSSCI or Peking University core sources, but Wang Saishi's publication time is concentrated in the 1980s ~ 1990s, and Wang Junqi's publication time is 1998 ~ 2003, which suggests that these two authors are core authors in different periods.

Analysed by the authors' cooperation network, a total of 619 nodes and 214 connections were formed, (Density＝0.011), the font of the authors' names and the size of the nodes were positively correlated with the volume of the number of articles issued, and the connections between the nodes represented the cooperation between the authors. The author co-operation network of this field of research is relatively thin, and the connection between authors is not strong, mainly forming three groups of research co-operation networks：the team of Sang Jun-Lu Yang, Dai Yu-Zhang Li, and Zhang Weihua-Zhang Fengqin-Yang Shengzhi. The authors' cooperation is divided into two types of relationships：the "academic relationship" between supervisors and students and the "geographical relationship" across regions. After analysing, these three groups of research cooperation are dominated by the "academic relationship", which shows that there is little cooperation among the authors of dragon boat racing research in China, and attention should be paid to the cross-regional exchange and cooperation among scholars.

3.4 Relationship between research organisations and regional integration and development

The research results in the field of dragon boat racing have an obvious clustering effect, concentrating on a few research structures. According to the formula of Laplace's Law, the highest number of publications is 12, and the calculation can get the M value of about 3.46, taking the integer 4, that is, the 28 institutions with the number of publications up to 4 are the core institutions. In terms of literature attribution, most of them are originated from teacher training, physical education, ethnic colleges and universities and the physical education colleges of some universities, among which Guangxi Minzu University has the highest frequency of issuing articles, reaching 12 times, which indicates that the university has outstanding research results in this field to a certain extent. The analysis finds that Guangxi Minzu University has masters or PhDs involved in the research in this field from 2010 to 2021, and the research results are remarkable. Other universities with more than 10 times of publications include Shanxi Normal University and Minzu University of China. Colleges and universities are the backbone of dragon boat culture research, and most of the institutions with a high number of publications are concentrated in colleges and universities along the riverside areas where dragon boat culture is prevalent. These studies have put forward targeted measures and suggestions for promoting the integration and development of dragon boat racing and localities.

3.5 Keyword mapping disciplinary intersections

3.5.1 Keyword co-occurrence analysis

The keyword analysis of dragon boat racing research shows that the keyword co-occurrence analysis formed a total of 765 nodes and 1,372 connections, (Density＝0.0047), S＝0.9124, which is close to 1, indicating that the network is highly homogeneous, and the clustering results have a high degree of confidence, and Q＝0.7155, which is greater than 0.3 indicating that the clustering of associations has a significant structure. The ecological framework constituted by dragon boat racing, dragon boat culture, Dragon Boat Festival, origin, development, and inheritance is branched out with strong association. Combined with the data of cited frequency, the hotspots of dragon boat racing can be identified and the vein of dragon boat racing development can be sorted out. The study of dragon boat racing culture is a hot issue in recent years, mainly focusing on the study of the origin, development and inheritance of dragon boat culture, reflecting the folklore nature of the dragon boat project. The research on the sports attributes of dragon boat racing mainly focuses on water competition and mathematical modelling. It can be seen that the research perspectives in the field of dragon boat racing tend to be diversified and show a strong trend of cross-discipline.

3.5.2 Analysis of keyword co-occurrence time

It can be seen from the co-occurrence time of keywords that dragon boat racing appeared for the first time in

1980, Qu Yuan, dragon boat culture, racing, development, origin, etc. appeared one after another between 1985 -1995, and after 2000, the Dragon Boat Festival, dragon boat, inheritance, physical culture, folklore and sports and other branches of multiple categories are more prominent.

3.5.3 Keyword clustering analysis

The clustering of keywords can indicate different research concerns in the field. Dragon boat related literature appears 8 keyword clusters in the co-occurrence network. Among them, #1 Origins, #5 Inheritance, #7 History of sports, #2 Racing cross more connections, and #4 Dragon Boat Festival, #6 Traditional sports, #3 Dragon boat culture cross more connections.

3.5.4 Keyword mutation analysis

The study of dragon boat racing obtained a total of 19 emergent words such as paddling dragon boat, dragon culture, private enterprise, China, digital modelling, folklore, origin, development, etc., which are divided into two distinct stages. Among them, "dragon boat rowing", "dragon culture", "China", "folklore", "origin", "development", "Dragon Boat Festival", "sports culture", etc. appear from 1985 to 2011, indicating that the researchers paid attention to the culture of dragon boat racing during this period. With the dragon boat racing officially becoming an Asian Games sport in 2010, dragon boat as a competitive sport has been focused on by researchers, of which "Dragon Boat Race", "Phoenix Boat Race", "Open Race" and "Sports history" has a high rate of emergence from 2012 to 2020.

The keyword co-occurrence, clustering and mutation analyses are combined to classify dragon boat racing into two attributes: folklore and competition. By studying and classifying the papers of core authors and core issuing institutions, two hotspots of dragon boat racing culture and dragon boat competition can be sorted out.

The origin of dragon boat racing is thought to be the water ritual activities of primitive society, that is, the "Soul Boat" ceremony in the south where the souls of the dead were buried in coffins and flown to heaven with the help of the ability of birds to fly. The integration of totem worship from different regions led to the formation of the custom of "entertaining the gods" by seeking rain and offering sacrifices to the sky. After the integration of commemorating heroic figures, the dragon boat racing gradually transformed into competitive "entertainment" activities.

Chu region (mainly refers to Hunan and Hubei regions) is one of the origins of China's dragon boat racing. When it comes to the Chu people's dragon boat racing, it cannot bypass the Chu official Qu Yuan. Qu Yuan cast into Miluo River, Chu people oared to save, combined with eider boat racing folklore, the prototype of dragon boat racing was formed. Sichuan, which borders on Chu region, is characterized by long rivers, with the Jialing River, Tuo River, and Min River in its territory. In the long-term life interactions, there is a common dragon worship psychology of Shu and Chu people's customs encroachment, which is a very natural thing. As a result, many researchers believe that the dragon boat racing folklore of Ba Shu region is spread from Chu region. Jiangxi is located in the south bank of the middle reaches of the Yangtze River where large and small rivers are like a spider's web all over the province, and the unique water resources give birth to the custom of boat travel. After Qu Yuan cast into water, the original customs and the commemoration of Qu Yuan cleverly combined together to form the dragon boat racing customs. Jiangxi's dragon boat race custom is also related to the Chu region. The participants in the race in Tang dynasty is mainly folk people, and local officials would personally watch. Hunan people attach great importance to the activities of the race. Before the training, they would exercise to achieve co-ordination and consistency of movement. "Winning" is the wish of every participant in the race, and there is even a saying that "win or lose, life and death". Song Dynasty is a high period of racing activities. Song Taizong built Jinming pool

for the initial purpose of the exercise of the navy, soon to be replaced by rafting, racing, singing and dancing on the water and other water sports activities. The Ming Dynasty once again carried forward the Tang and Song dragon boat racing activities, and both the construction of the boat, the degree of enthusiasm of the participants and paddling skills have been improved. The crowd is noisy, the scene is fierce and luxurious style, and even the women watching are full of makeup and beautiful clothes, the crowd cheers, and the momentum is overwhelming, forming a beautiful picture of the dragon boat racing together. In the Qing Dynasty, dragon boat racing becomes a source of tension in local governance because of its characteristics such as "gathering crowds" and "competition", so there are "bans" and "prohibitions" of dragon boat racing. In the Republic of China, the dragon boat racing of women's competition appears for the first time, mapping the improvement of the status of women at that time and women's contribution to society has been gradually recognised.

In ancient times, the Wuyue region was an area where bird culture was worshipped, and the "Feathered Man Racing" was originated in the Ningbo area. Zhejiang is considered to be one of the birthplaces of "dragon boat racing" in China. The beginning of the race should be a bird boat and phoenix boat racing, containing or carved phoenix bird-shaped boat, setting totem worship, rituals, athletics, commemorating the sages and so on as the main function of the composite. However, unlike in Chu region, where Qu Yuan is commemorated, the heroic figure commemorated in Wu region is Wu Zixu, and in Yue region, King Goujian is commemorated. In the Tang Dynasty, racing flourished in Yangzhou and Nanjing, with local officials spending large sums of money to organise it. Hangzhou area is often combined with the tide with a strong local colour. In Southern Song Dynasty, the West Lake racing is still active from the first month until late autumn, lasts longer than the Northern Song Dynasty. But at that time, the North was threatened by the Jin soldiers, people do not dare to consume material resources in the playfulness. Compared with the dragon boat of Jinming Pool, the size and shape of the dragon boat in West Lake appear weak.

In Dunhuang Mogao Caves, Yulin Caves and other caves, there are dozens of murals painted with the content of boats. Because most of the western frontier region is the Gobi Desert where water resources and necessary conditions lacks for dragon boat activities, many scholars believe that the Dunhuang murals may reflect the Yuzao Palace, Xin Pool, Xingqing Palace in north Chang'an and the dragon boat racing on Luoshui River in Luoyang. During the Tang Dynasty, dragon boat racing were held in spring and autumn and lasted for many days, culminating in the Dragon Boat Festival. During the reign of Wu Zetian, dragon boat racings were held at the Yuzao Palace, with soldiers from the forbidden army acting as the boats in a lavish and extravagant manner.

The study of dragon boat racing culture accompanies the migration of ancient cultures and the formation of regional cultures, and maps out the national strength and folklore behind the racing culture. From the water burial customs of primitive people to the ritual ceremonies, "phoenix", "snake" and "dragon" totems are incorporated; from the ritual customs of "entertaining the gods" to the ritual customs of "entertaining the gods", it reflects the transfer of the values; from the royal organization of the racing in the Tang and Song dynasties to the ban of dragon boat rowing in the Qing Dynasty, it reflects the transfer of the ruler's will; from the boat's majestic atmosphere in the Northern Song Dynasty to the smallness and delicacy in Southern Song Dynasty, it highlights the differences in the national power and culture...

Competitiveness is another hot spot in the study of dragon boat racing. Dragon boat races are characterised by speed, and the prizes of dragon boat races are called "jackpot" or "trophy", and in some areas, ducks are used as "jackpot". Dozens of dragon boats compete to win the mark. The participants bare shoulders, holding short paddles, and each race boat has a small red flag holding the conductor to call slogans with the members of the team

while paddling, while singing slang songs. Since dragon boat races involve singing slang songs, the boat is equipped with instruments such as paddles, flags, golden drums, as well as bamboo musical instruments (for playing) and drums, etc. The Tang Dynasty racing is generally a boat of fifty people; the boat has a drummer as a command, paddling over a certain distance, and the first to seize the mark is the winner. At this time, the "mark" is a long pole, standing at the end, hanging colors and wrapping brocade. In the Ming Dynasty, the competition in Guangxi region is the most complete in terms of system, with clear requirements on the standard length of dragon boats and the number of participants, as well as the stipulation that fixed drummers and conductors were arranged for each boat. Since the establishment of the National Dragon Boat Association and the implementation of the national unified rules for dragon boat racing, dragon boat racing has entered a period of unprecedented prosperity. As international dragon boat events held in various places and the intervention of modern sports competition, it incorporates the connotation of competition. The International Dragon Boat Federation members have spread to more than 60 countries and regions in the five continents of the world, reflecting the trend of dragon boat competition towards internationalization and modernization. In addition, the competitive nature is also reflected in the use of mathematical models, wearable devices, etc. to assist the training of dragon boat athletes and improve the level of competition.

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