

Statistical Analysis of Humanities and Social Sciences Collaboration Research in China

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Abstract With the development of humanities and social sciences, research collaboration becomes more and more important. This article studies collaboration phenomena of seventeen kinds of journals' from 1995-2004 in China. According to statistical data, some characteristics are disclosed, and some tested explanations are given. This article makes a comparison of research collaboration between China and other country, and some differences are studied. A lot of differences of research collaboration among humanities sciences, social sciences and natural sciences are also pointed out.

Key words: humanities and social sciences; research collaboration; proportion of collaboration

Introduction

Science research collaboration has spread out all kinds of level which is one of the importance signs of modern science that is changing from little science to big science. Collaboration research has been improving the organization, increasing the publication, enhancing the productivity. Coauthored papers become more and more popular and scale of collaboration turns bigger, especially in nature science. According to H·Zuckerman's studies, there are 286 scientists' won the Nobel Prizes from 1901 to 1972 and 185 of them collaborated with others. The meaning and function of collaboration is studied in a lot of documents. These articles mainly concentrated on collaboration in nature science and mentioned little in humanities and social sciences. Even if in social sciences, this study is limited in some special subjects and some special age. Recently, some scholars have explored and forecasted the collaboration trend in humanities and social science in China, but these researches can't reveal some characteristics and give some reasonable explanations for collaboration of China. We try to descriptive the character of collaboration scale, collaboration organization, collaboration region, collaboration trend and give some reasons.

Sample and Data

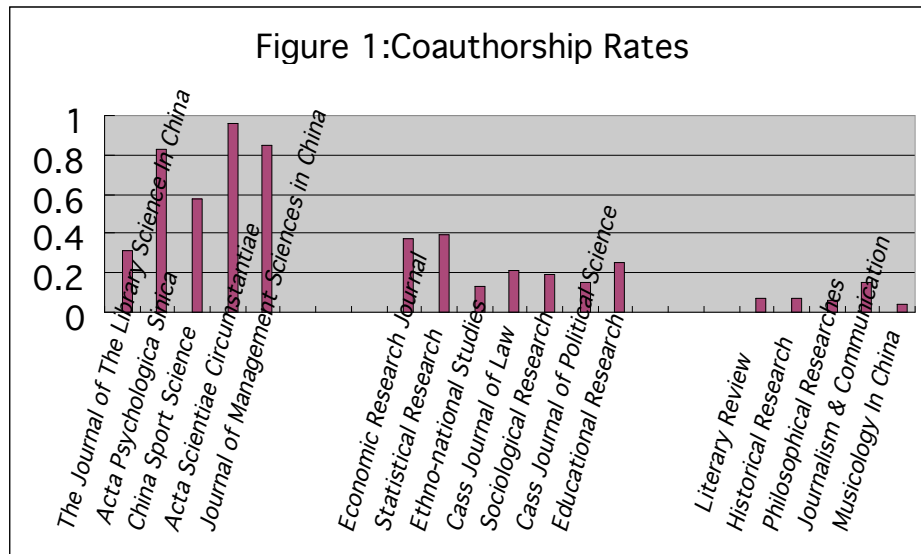
Paper is one of the important research output. Co-authored paper can reflect the contribution and honor of collaborators. We make hypothesis that co-authored papers of different special journal represent the phenomena of corresponding humanities and social science. In order to be popular and typical, seventeen kinds of important journals in China from 1995 to 2004 are selected as samples which included Philosophical Researches, Economic Research Journal, Cass Journal of Law, Historical Research, Literary Review, Journalism & Communication, Journal of Management Sciences in China, Cass Journal of Political Science, Sociological Research, Statistical Research, Educational Research, The Journal of The Library Science In China, Acta Scientiae Circumstantiae, Ethno-national Studies, Acta Psychologica Sinica, Musicology In China, China Sport Science. The statistical data include only research papers. The total number of paper is 18561, and 6320 co-authored papers are identified. Proportion of collaboration (co-authored papers divided by total papers) is 34%.

Analysis of collaboration

Basic collaboration

Seen from chart 1, we can find out that there is much differences proportion of collaboration in different disciplines. Due to every subject has its own character, we can make three classifications. The first is intersection including library science, psychology science, physical science, environment science and management science. The second is social discipline including economics, statistics, ethnology, law science, sociology, politics and education science. The last is humanities discipline including literature, history, philosophy, journalism and arts. We find that proportion of collaboration of intersection is the highest in the three classifications. Proportion of collaboration in four subjects of intersection reached above 55% and environment science is 95%. In social discipline, economics and statistics are more than others which is near to 40% and the others are lower than 25%. The humanities only have 5-6% except for journalism which is the

lowest in three classifications.



Analysis the reason, we know that in big science period, the production of humanities and social science_ appear heterogeneous. Every subject follows its own discipline and has its own trends. It's too difficult for a single person to completed an intersection discipline task that has involved synthesize questions that need description and approaches similar to nature science and need so much data though equipments. The social classification aims to disclose the phenomena and discipline of different systems and levels to social life, so it pay more attention to explain the cause and effect of experiments research of social phenomena, attach important to transplant some conception and methods from nature science, even do some experiments and quantitative research. So the higher proportion of collaboration to economics and statistics is the direct perception of social classification. While humanities classification studies the person's feeling and thought, outstanding one's personality, pays attention to human's value and meaning. It only needs someone's understanding and expression and don't agree with others. Especially philosophy, literature and arts all represent such personality. The topics of this classification are the result from information combined with researchers' feeling. These studies needn't collaborate so it is reasonable for lower proportion of collaboration.

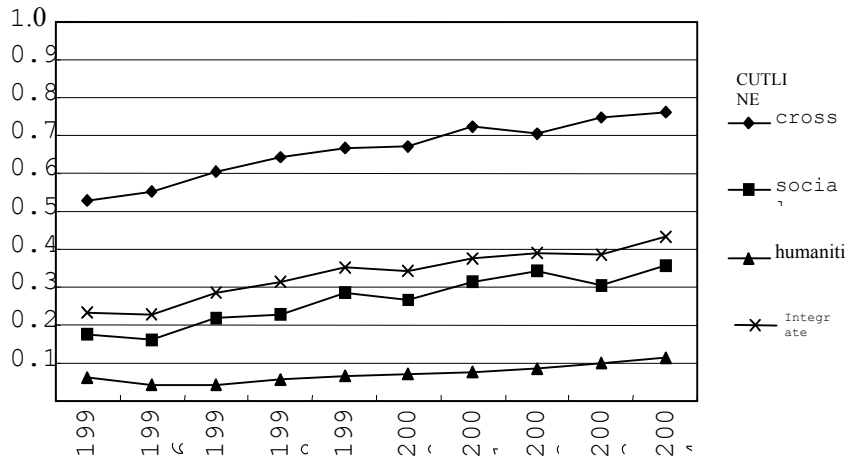


Figure2: Trend of collaboration for discipline classify

Chart 2 gives some information about the trends of collaboration. In general, most of

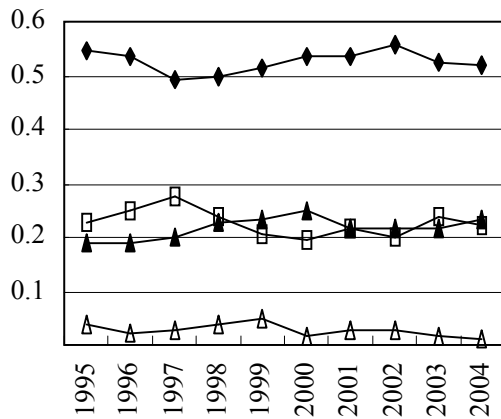


Figure3: Size of Collaboration Trend in Ten Years

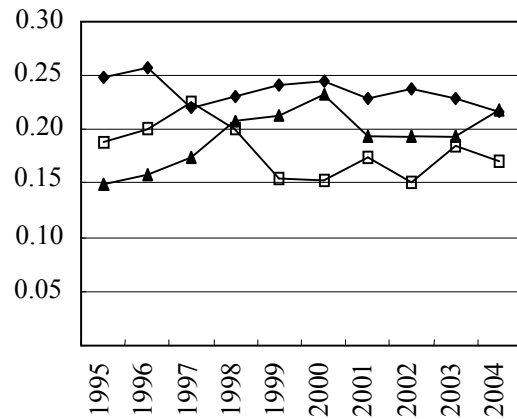


Figure4: Size of Collaboration Trend of Cross in Ten Years

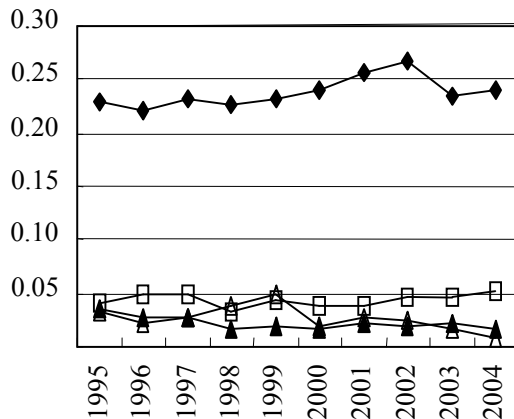


Figure5: Size of Collaboration Trend of Social in Ten Years

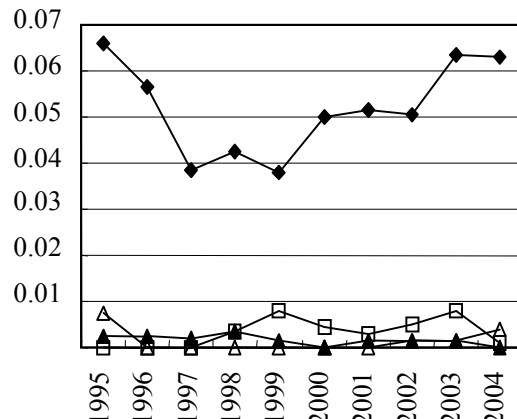


Figure6: Size of Collaboration Trend of Humanities in Ten Years

CUTLINE —◆— Two authors —□— Three authors —▲— Four authors —△— Group

proportion of collaboration is going up. Among them intersection classification increased rather faster and proportion of collaboration is from 53% to 76% in ten years. Social classification is also growing up about 20%. But humanities' ascending hasn't exceeded 5%. The trend can reflect the characteristics of humanities and social science production in China basically.

With the development of economics and culture of China, all kinds of theoretical and practical questions which are originated from the reality can supply abundant question source

fields and plentiful answer ones for humanities and social scholars. The answer can be solved in research paradigm of every subject. As professor named WuTong said, complication has already been as the new paradigm in nature science and is going to be the new paradigm to humanities and social science. Some complicated questions such as human's purpose seeking, interaction, organization, social structure and evolution bind each other which appears more complicated than unprecedented. The extremely complex relationship among people and society and nature system persuades the researchers to surpass the limitation of single person in little science era. So the collaboration research becomes *extensive* and necessary in humanities and social sciences.

As to intersection classification, contrast to higher proportion of collaboration before, environment science has little increasing space ; with the development of society ,more and more complex problems are provided in the management science and psychology, so collaboration must be strengthened, moreover that research tasks seem to be easy and efficient. With the development of people's life , people try their best to keep their body and mental healthy and the changing situation leads more scholars to do their research work from every aspect, such as vigorous, graceful and medical which mingled the knowledge; with the development of information technology, trends of collaboration in library science become more and more obviously. The collaboration in economics grows so fast, and the reason is that the economic system and increasing pattern of China is in the reforming period which need economists make amend for

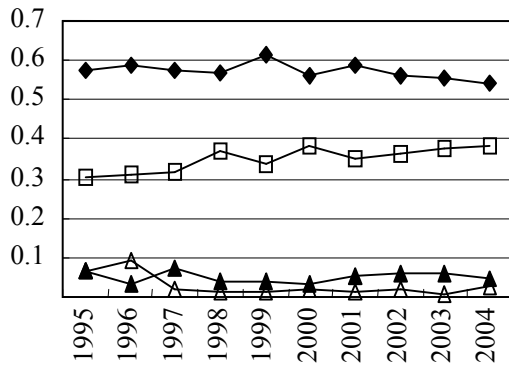


Figure7: Trend of Organization of Collaboration

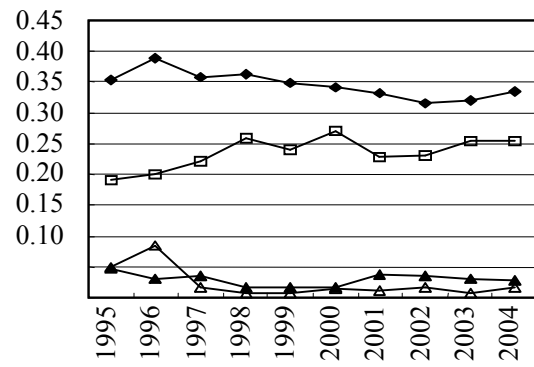


Figure8: Trend of Organization of Collaboration for Cross

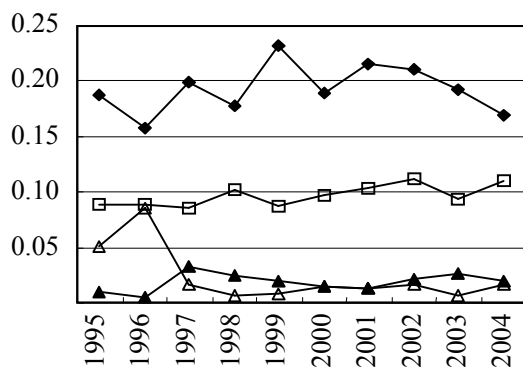


Figure9: Trend of Organization of Collaboration for Social

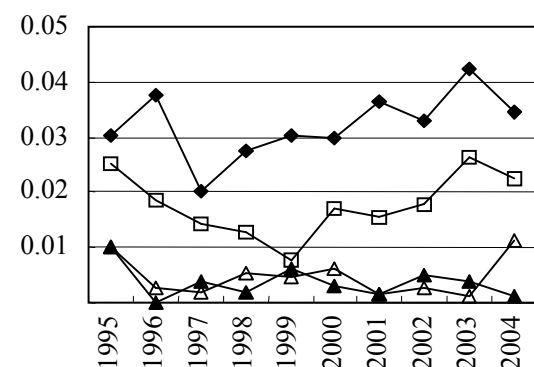


Figure10: Trend of Organization of Collaboration for Humanities

CUTLINE_ ◆ SS □ Different Unit ▲ SN ▲ Not in Datail

their weakness by exploiting their strengths and improve the communication and coordinate of knowledge and methods of different fields. Collaboration in *ethnology* and sociology didn't ascend quickly; because researchers of them prefer to the single research paradigm to some extent. The curves of humanities trend are flat than nature science, and philosophers haven't had the feeling of great cognitive and social pressure, and single person is the best work style choice for them

Scale of collaboration

Scale of collaboration is often regarded as the number of persons who take part in a research.

According to this viewpoint, we consider two authors, three authors, four and more authors and team as different scale. By this research, we tried to find out the member region which has satisfaction relatively and efficient highly in collaboration.

Four and more authors have occupied 54% in environment science. It is reasonable for many cooperators in environment science research because a lot of data and equipment needed, even for working together, two or three persons aren't enough. Physical science is the same as environment science that need more people collaboration than two or three ones. Not only all kinds of research people are necessary but also sportsmen and assistants play a key role. Psychology and management science research depended on many people' collaboration, which three and more authors has surpassed two authors. The reason is that each focus on practice. Two authors is the majority collaboration in library science that has reached 77%. It is confused that there is no team collaboration in intersection science. In social classification, two authors collaboration is the main style, three authors in economics and statistics are higher than others because of subject's synthesis. Statistics, sociology and education science researchers prefer team to others because social studies need some social investigation methods and division of labor and efficient organization are also important. In humanities classification, many people collaboration is very few, and two authors cooperation is the predominant in collaboration study.

Form chart 3, we can see that two authors proportion is steady which is the half of the collaboration. Three authors and four and more authors collaboration is ascending alternately and the result of adding them reaches 50%. Team proportion is very low. Seen from Chart 4 to chart 6 we know that in intersection two and three authors are decreasing year by year, meanwhile four and more authors are vibrating and increasing. In the two other classifications, two authors collaboration is the predominance, and the curve trend looks to be ascending but not in large scale. Three and more authors cooperation can be scarcely recognized.

Organization of collaboration

The purpose to measure the organization of collaboration is to disclose the influence which different organization represents the research pattern to humanities and social science. SS including the same school of a university, the same department, the same institute, teacher and student, superior and lower. Beside above mentioned, we consider the following as the SS, if one author signs two units at the same time and one of the units the same as other author, the same team and the same editorial staff which couldn't distinguish what belongs to, some journals only list first author etc. SN is that authors have the same university or institute but different department or school. Different unit means different university or research units. Those original articles didn't mark authors unit are neglected.

In intersection classification, the proportion of SS collaboration of library science and management science are all above 65%, DU can reach 26%; Environment science and psychology is also the half proportion of SS collaboration. DU has the 37% and 46% respectively. SS of physical science has the same proportion as DU, but the SN is rarely seen. In social classification, SS in economics, statistics, law, political, education science is about 60%, while sociology is 48%, ethnology is only 30%. Proportion of law in DN is 36%, sociology (44%), economics (33%) that are higher than others (below 25%). Except for ethnology (15%), the SN is all under 5%. In humanities classification, proportion of journalism in SS is 67%, other subjects' are between 50% and 60%. The collaboration of philosophy in DU is 42%, history is 35%, the other is floating in 20%. Literature collaboration with DN. is hard to find. Other DN is lower than 10%.

In general, the collaboration of humanities and social science in China are mainly occurred in SS. We can understand it in this way because of lower time cost and communication cost in SS, it is easy to diffuse and assimilate the knowledge. When collaborator can't be found in the nearest space, cooperator in the further are selected. But in intersection, DU collaboration intention is obviously. Due to the character of subjects, the same unit couldn't have the enough talented person s and equipment, so it is economic to strengthen the collaboration of different units. Why philosophy has more DU cooperated than others? It may be that persons far from scientists can supplement the think pattern strongly and it is easier to break out new ideas through communication. From the whole point, DN is the lowest and unpopular, this kind of collaboration is superior to DU in location and SS in subject communication, but why do such situation occur? The reason might be in today's China, schools of an university are separated, even if it is subordinate to the same subject, because traditional organization and performance division policy isn't perfect and the impetus of communication and cooperation in different schools is rather lack,

the effect of 1+1>2 "scientist intelligent group" didn't work adequately.

From chart 7 to chart10, the SS trend of whole humanities and social science has little descending. DU is rising slowly, which only has 7-8%. The DN changes little. As far as intersection classification is concerned, SS is the same as the whole trends, and DU surpassed the whole. Because of low proportion of collaboration, the two other classifications trend seems not obvious. Compared intersection with the two others, DU of intersection is the highest which is 2.8 times than social and 30 times than humanities. It is confirmed that intersection is incline to collaborate strongly than social and humanities classification.

Region collaboration

The region collaboration aims to examine the influence of space or distance to collaboration tendency. We only study authors in the same city or not in same city. The smallest unit of the same city is county. In order to calculate easily, many authors in different cities only count once. Across province collaboration means that collaboration between China's provinces or collaborated with other region which including Macau, Hong Kong, Taiwan. On the base of different cities, many authors count only once.

In whole point of view, the same city collaborations is the majority in humanities and social science. According to data, different cities collaboration of psychology, physical, environment near to 30%, sociology (33%) is the highest in social classification, history and philosophy also reached 25-26%, arts is the lowest only 8%. The same city collaboration in others is 70-80%. From the chart 11, we can get the trend of region collaboration that the same city is descending which different city increasing year by year. Among them the intersection has largest contribution for the different city and the two others have little change.

On the base of different cities, across province collaboration has its own character. Generally, the percent of collaboration become higher and higher. The trend of intersection has little change but have higher percent. Social classification grows obviously in ten years that from 56% to 92%. The humanities has huge fluctuated, in some years it changed form 0 to 100%, it appear the tendency in humanities that once authors chose collaborate across province is the best choice for them.

Science studies have no national boundaries. In big science period, humanities and social research in China has broke out the limitation of ideas and cooperated with other counties and regions efficiently. Our studies show that Chinese humanities and social scholars have cooperated with other countries and regions such as the US, England, Japan, France, German, Singapore, Australia, Canada, Sweden, Italia, Croatia, Netherland, Belgium, Israel, Marco, Hong Kong and Taiwan. The international papers are only 5% of the total collaboration papers. The main

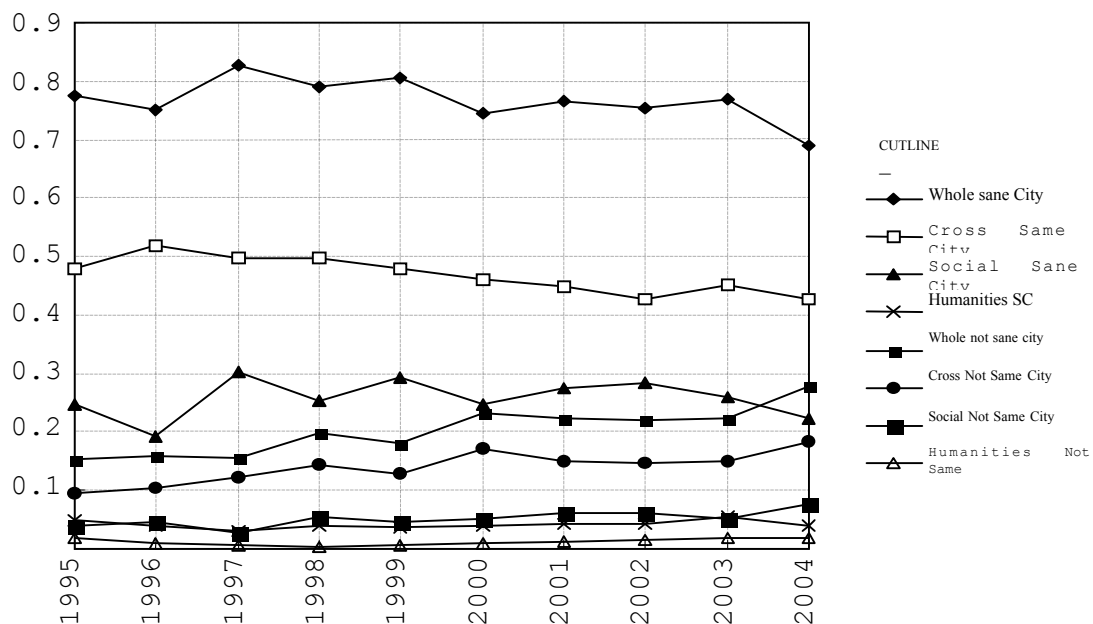


Figure11: Trend of Region Collaboration in Ten Years

collaborators are the US (33%) and Hong Kong (26%).

According to our data, the intersection collaboration is higher than the two others. The international collaboration mainly happened in psychology (10%), economics (14%) and sociology (23%). For advanced methods are applied for these fields in US, highest research level in the world is inevitable. Cooperation with other countries and regions in library, law, political, education and literature field is not positive. It may be in these subjects Chinese scholars have their own special paradigm or appreciated themselves that can't break out the circle. It needs us think ourselves. History research has a little highly collaboration. It is very interesting that philosophy has much collaboration with Germany. The reason is philosophy of Germany has the great influence to the philosophy all over world and the development of human being culture. We have already realized that it is helpful to enter international mainstream network and to enhance the admit research accomplishment through collaboration.

Compared to nature science and foreign humanities and social research

According to Chinese annual report of science and technology information paper, The average number of authors of each papers including in CSTPCD from 1992 to 2003 is 2.63 to 3.39. The proportion of collaboration increases from 67.8% to 85.7%. In 2003, collaboration in the same unit is 67.1%(divided by total collaboration papers), the proportion in the same province is 17.2%, the different provinces is 13.9%. There are 49785 papers which Chinese authors had take part in and 11739 international collaboration papers in SCI in 2003, the percentage is 23.6% which is higher 2.2% than 2002. The numbers of papers which Chinese author as the first author papers that collaborated with others is US (1856), Japan (1127), Hong Kong (1066) and German (504) in turn. This point is the similar to humanities and social science confirmed that strong-strong collaboration is also the main stream in nature science and humanities and social science.

James Moody's(2004)'study appeared that the average proportion of collaboration in foreign to humanities and social science from1963 to 1999 is 33.2%, it is near to 34% in China present. From the develop trends, it is ascending not only in China but also in foreign countries. The percent of authors with only one publication has dropped from 71% in the 75-85 periods to 67% in the 89-99 periods. For size of organization, 22%(66% of coauthored papers) have only 2 authors in foreign countries that are higher than China 17.9%. It is confirmed that in social science, two authors is the major pattern.

Table1: Foreign Coauthored Rates by Specialty divided by China

	History	Language and Arts	Political	Economic Development	Social Development &Control	Education	Environmental Interactions	Social Psychology
Foreign	12.9	17.8	18.1	20.5	56.3	31.2	32.1	44.2
China	7.5	10.1	15.4	37.8	19.5	25.4	95.8	82.9
Foreign/China	1.72	1.76	1.18	0.54	2.89	1.23	0.34	0.53

Specially, because our study hasn't included all kinds of social sciences and didn't have the same standard classification as foreign countries, so we only compare some similarly subject. The table 1 lists the proportion of collaboration of China and foreign countries. In general, we get that the proportion of foreign countries mainly are higher than China and the sociology proportion is 2.88 times than China. But in environment, psychology, economics is lower than China.

CONCLUSION

In general, the proportion of collaboration in China is about 34%. There is big difference in every subject. The intersection, social, humanities classification has their owns character. In the point of view to trends, the percent of collaboration mainly ascending. Intersection has great changes but the two others steadily even some subject is descending.

From the scale of organization, two authors collaboration is the major pattern. In intersection, the much people authors collaboration increasing year by year and there team in social classification. It is hardly see much people collaboration in humanities.

Seeing organization collaboration, we know proportion of different organizations collaboration in intersection is higher than other two and rate of increasing is also fast. The times of same organization collaboration is very few.

Same city collaboration is main pattern, and different provinces collaboration is more and more popular. Recently China is inclined to cooperate with other countries and regions. Although almost 14 ones became china's partner, proportion is only 5%, and USA and HK shared a large

part of international collaboration.

Despite proportion of social sciences and humanities collaboration research is lower than some countries, the trends of collaboration is similar. As to a certain subject, differences are exist, reasons for it will be further discussed.

Forecast

Because of different data and method, this study may have some different conclusion with other studies. But it reflects some characters of collaboration in humanities and social sciences in China. Through above investigation, we find that some pitfall in China's journals formalization, for example, some journals couldn't supply the information about authors (age, unit, title etc.). So we can't discuss deeply only by these data.

Humanities and social sciences involve many kinds of subjects and subfields. This study couldn't explain the patterns and developing trend from the mechanism of knowledge production and only doing some quality analysis and hypothesis. In addition, if we study common journals that academy influences is very weak, what the indicator of the collaboration will be? If collaboration in humanities and social sciences research can improve the productivities and academy influences? How can we make the best choice for collaboration according to different knowledge background? All will be the topics for our next study.

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