KEYWORDS: *Rock art science – Scientific revolution – Change of paradigm – China*

IS ROCK ART SCIENCE REGIONAL OR UNIVERSAL? A DISCUSSION BASED ON THE DEVELOPMENT OF THE DISCIPLINE IN CHINA

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Abstract. The paper responds to an article entitled 'The Western influence on the study of Chinese rock art'. The term 'Western influence' implies that there must have existed some kind of 'Chinese traditions' or 'Chinese schools' in the field with distinctive theoretical features before the former arrived in the Far East. Unfortunately, such traditions or schools have never been established so far; hence the proposition of Western influence becomes pointless. The misconception about its validity is the consequence of a long period of a pre-paradigm state of the subject and also relates to the residue of patriarchy deep in researchers' cultural psychology. The paper also points out that the only real influence reshaping the study of rock art comes from science, but not the 'West'. Furthermore, the rise of rock art science, a 'scientific revolution' reconstructing the fundamentals of the field, is the most significant achievement made in the past few decades, which will lead the discipline to the transition from pre-paradigm to post-paradigm.

Since the 1990s, stimulated by the increasing government investment in scientific research and education, China's rock art study has experienced rapid development, and many works contributed by Chinese scholars have been published internationally in recent years. However, I have no intention to discuss it in this paper, for it is a common phenomenon that could occur in every scientific field of a rising country like China. What has drawn my attention in this context is that the introduction of scientific methodologies of rock art research into China was a quite recent event of the last few decades. Nevertheless, some researchers in this country are now addicted to certain subjects like 'the Western influence' or 'the Chinese school'[1]. In particular, this paper responds to an article with the title in such a grand narrative style in this journal, 'The western influence on the study of Chinese rock art' by Xu F. (i.e. the preceding article).

The precondition for talking about the topics mentioned above is that everyone in the discussion must accept the facticity of the division in science between the 'East' and the 'West' and has to assume the pre-existence of a 'Chinese tradition' or even a 'Chinese school' in the field of rock art research (so that the 'Western influence' can be real). Surprisingly, some people still believe that the discipline has different 'traditions' or 'schools' relating to scholars' nationalities and cultural backgrounds, even in the 21st century. Then, we must ask ourselves: does such a 'school' or 'tradition' indeed exist?

Bearing this question in mind, the first thing we need to do is look back to the past and compare the timelines of rock art studies in China and the world to see if distinctive differences can be found in each side's history.

The possibly earliest known contemplation of rock art occurred at Cosquer Cave 19 000 years ago (Clottes et al. 1992), yet rock art recording began very late in the 16th century CE, mainly relating to Christian missionaries' activities in Latin America (Brandão 1930). Since the 17th century, with the global expansion of Europeans, written and graphic records have widely come out in Europe, the Americas, Africa and Australia, e.g. some early copies of the Backa rock art (Nordbladh 1981), and the records of the sites at Vallée des Merveilles, Newgrange, in the Yenisei Basin, or of Bushman people (Strahlenberg 1730; Bahn 1998). Roughly with the beginning of the 19th century, there appeared the first concern with rock art as a source of data for scholarly contemplation, manifested by deliberate endeavours to record not only what one thinks one sees on a panel, but also relative relationships, particularly of size and juxtaposition of motifs. This was probably only in part a result of an appreciation that such relationships also need to be considered in interpretation. Developing attention to more objective observations can be seen

1 Promoted by the central authority, "to build Chinese school" is now a strong trend in all social science fields in the country.

in many people's works, e.g. Belzoni's expedition to the petroglyph sites on the upper Nile (Belzoni 1820), Barth's fieldwork in Libya (Barth 1857–58) and Duveyrier's research of Saharan rock art (Duveyrier 1876).

During the last decades of the 19th century, the emerging discipline of archaeology began to take a sustained interest in rock art. The principal tool for archaeologists is typology, classifying rock art motifs into various 'styles' based on their morphological features. This kind of 'stylistic studies' appeared first in Europe, then gradually spread to the rest of the world and persisted for nearly the entire 20th century, honed and refined by generations of archaeologists. However, since the 1970s, many new methods contributed by scientific disciplines have been introduced into the field of rock art study, including a wide range of physical and chemical analyses of rock art and rock art-related materials. Numerous approaches are being developed in the question of the age of rock art. Field microscopy of rock art has been developed for several purposes, including dating, petrography and technical analyses. Replication studies have been attempted at many sites around the world.

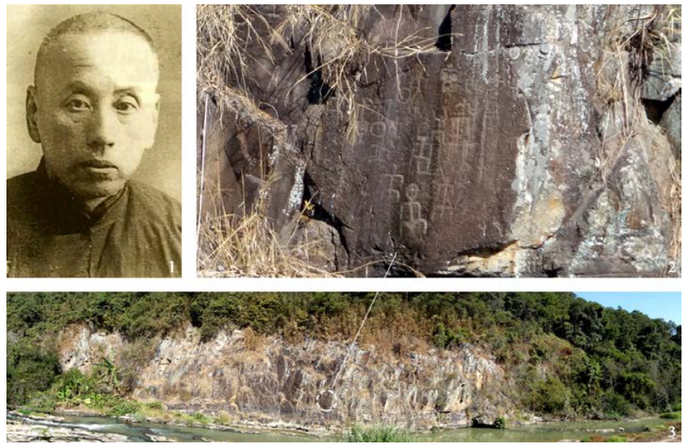

Figure 1. *Huang Zhongqin and the Xianzitan petroglyph site (photo by author).*

Moreover, some related subjects like the psychology of iconicity and its decipherment, the distinction between mental and artistic representations, the relationships between ontogenic and phylogenic development of logic and symbolism, and the more general utilisation of universals have received close attention. The development of taphonomic logic and rigorously framed statistical approaches has greatly enriched researchers' arsenal. It could be argued that in the past half-century, the interpretation through scientific means and the construction of new epistemology, together with the major achievements in the field of palaeoart study and the attention to the constructs of reality of early humans were the most noticeable progress.

The observation of rock art in China has a very long history, e.g. many records can be found in *Shui jing zhu*[2], a book on the geography of the 4th century CE, describing various rock art sites that the author had witnessed during his trips in many provinces of China, like Xinjiang, Gansu, Ningxia, Inner Mongolia, Shanxi, Henan, Shandong, Shaanxi, Anhui, Hubei, Hunan and Guangxi — this is believed to be the world's first record about rock art in written sources[3]. Such records also occurred in later written resources, including local chronicles, encyclopedias and travel notes. With the decay of the last Chinese empire, and with over one century of being invaded and colonised by the 'West', the development of modern science was very slow during a quite long period (from the 19th century to the 1980s), as was the advance in rock art studies.

Since the 20th century, many rock art sites have been found all over the country during the expeditions and journeys of native scholars and foreign adventurers, e.g. the Xianzitan petroglyphs in Fujian Province, reported by Huang Zhongqin[4] in 1915 (Fig. 1); the Buruktag petroglyphs in Xinjiang Uygur Autonomous Region, discovered by Folke Bergmen in 1928 (Bergmen 1945); mural paintings in cliff-tombs[5] in Sichuan Province, recorded by David Crockett Graham in 1936 (Graham 1936); Huashan rock art in Guangxi

2 The book title *Shui jing zhu* means '*Commentary on the waterways classic*'. It was written by the famous geographer and writer Li Daoyuan (469–527 CE) of the Northern Wei Dynasty (386–557 CE). Based on *Shui jing* (*The waterways classic*), a book compiled in the Three Kingdoms period (220–280 CE), Li added commentaries and finished his book some twenty times the size of the original.

3 This is actually controversial. In Han Fei zi, a book written by a philosopher named Han Fei of the 2nd century BCE, there is a record about a falsification event. King Wuling (340–295 BCE, a sovereign living in the late Warring States Period who was famous for conquering the north land controlled by nomadic tribes) of the Zhao Kingdom has ordered a stonemason to carve a footprint 1.2 m long and 0.6 m wide on a boulder at Bowu Mountain and claims that he has once stepped on the surface and has left the mark. Carving giant footprints of legendary heroes prevailed in some parts of China during ancient times, usually driven by political motives, e.g., making the people or the enemies believe that the local ruler or heroes have divine power. Therefore, some researchers accept those prints as rock art, while others tend to regard them as utilitarian anthropic marks.

4 Huang Zhongqin (1884–1942), famous educator, forerunner of the 1911 Revolution, is believed to be the first person in China who conducted an academic investigation at a rock art site in 1915. However, in his report published in Volume 4, Issue 2 of *Lingnan Journal*, he claimed that those anthropomorphous motifs engraved on cliffs are supposed to be unidentified ancient characters.

5 An ancient burial style prevailed in southwest China, especially in provinces like Sichuan, Guizhou and Yunnan. It has two subtypes: hanging-coffin burial and cave burial. The graves mentioned by Graham belonged to the former.

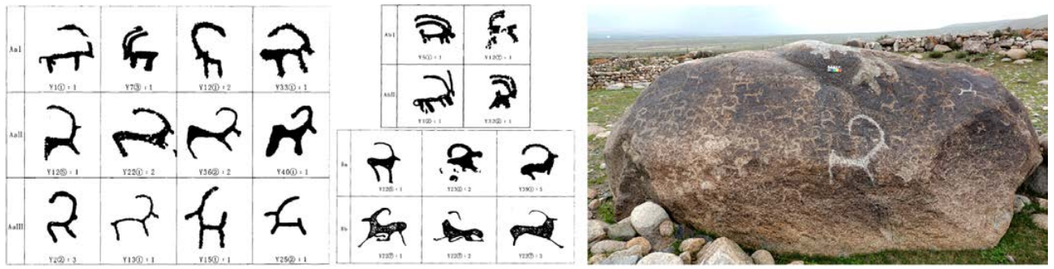

Figure 2. *Left: the classification of the 'Ovis' (bighorn sheep) motifs showing the typology used by archaeologists at Jongkek Petroglyph Site, northern Xinjiang (Wang and He 2006: 50–52). Right: a rock art panel bearing numerous sheep-like motifs in different 'styles' discovered in an adjacent area (photo by author).*

Province, surveyed and recorded by the investigation team assigned by the Ethnic Affairs Commission of Guangxi in 1956; Cangyuan rock art in Yunnan Province, discovered by Wang Ningsheng (1984) in 1965; Wanshan rock art in Taiwan, surveyed and recorded by Gao Yerong from 1978 to 1984; Ka Ho Bay rock art at Coloane Island in Macao, discovered in 1982 (Chen 2008: 38–72).

With the rapid development of archaeology in China during the last decades of the 20th century, rock art has gradually been regarded as important evidence of the remote past, but only in the last fifteen years have scholars inside and outside the country shown serious interest in such resources. During the 3rd National Cultural Heritage Survey of China (the 3rd NCHS) from 2007 to 2011, many rock art complexes were found all over the country, especially in the north-western and south-western regions. Moreover, some site concentrations have been reported in Suizhou, Hubei Province, central China, and Xianju, Zhejiang Province, eastern China. The most significant discovery of rock art during the 3rd NCHS was in Xinjiang Uygur Autonomous Region. In total, 249 new site complexes, including tens of thousands of rock art panels consisting of millions of motifs in nomadic style, have been found and preliminarily recorded. These are mainly petroglyph sites; very few are shelters with paintings, e.g. Tanblatas, Dunde Bulaq, Dugart. Some complexes are incredibly enormous: for instance, the Shirenzigou site has almost 2500 rocks bearing petroglyphs (Xinjiang Uygur Autonomous Region Bureau of Cultural Heritage 2011: 3).

Rock art research in China used to be dominated by the paradigm of art history before the 21st century, while in the last twenty years, a new trend for the utilisation of archaeological methods such as typology and stratigraphy has appeared and keeps developing, and archaeologists have also stepped into the field of rock art studies. This kind of academic interest can be traced back to archaeological activities conducted around Mt Tianshan in the northern Xinjiang Region about fifteen years ago. Archaeologists from Northwest University made the first attempt in their studies of the Jongkek petroglyph site. They divided all the motifs into two periods based on an analysis of their typological features and super-positional relationships (Fig. 2), then connected each period with a specific adjacent archaeological culture to determine their ages. The petroglyphs of the first period were made 2800–2000 years BP, and those of the second period were made 2000–1700 years BP (Wang and He 2006). These methods were then applied also to the classification and periodisation of the Baqiangzi rock art complex (Pan 2011), of the Shirenzigou rock art complex (Feng 2014) and the entire area of Mt Tianshan and Mt Altay (Wei 2011).

The trend has spread among scholars all over the country. For instance, the specialists at the Museum of Ningxia Hui Autonomous Region have utilised the above methods in their surveys at the Suyukou rock art complex, Helanshan area. In their field report, they point out that the petroglyphs were made in three different ways: abrasion, pounding and scratching, and probably in three periods: some motifs in very simple linear style are the earliest; the second phase consists of outline motifs, and the latest solid infilled outline motifs (Guo and Chen 2015). Similar methodologies can also be seen in the studies of rock art sites like Yushu (Qinghai Province; see Li et al. 2016; Wang and Zhang 2018), Zizirong and Gaize (Tibet Autonomous Region, see He 2018; Zhang et al. 2018), Huangyagou (Gansu Province, see Pang and Li 2018), Arizha and Wenbo (Sichuan Province, see Li et al. 2019), Suizhou (Hubei Province, see He and Zhao 2019).

The second decade of the century was definitely a turning point of the scientific study of rock art in China. A series of international collaborations between domestic institutions and overseas academic entities like the IFRAO has been widely applied. In the summer of 2014, researchers from several domestic universities and IFRAO surveyed three regions of China: Henan, Ningxia and Jiangsu. The team has profitably utilised the country's wealth of rock surfaces suitable for microerosion calibration, especially soundly dated rock inscriptions, and has managed to secure several calibration curves from quartz and feldspar. A total of 27 age estimates have been secured in the field: 14 from Mt Juci and Fangcheng County, Henan Province, ranging from E910+300/-150 to E3170+620/-440 years BP; five from Mt Helanshan, Ningxia Province, all between E1670±150 and E2330+90/-210 years BP; eight from

Figure 3. *Some of the recent scientific works at rock art sites in China: (1) Jiangjunya site, Lianyungang, Jiangsu Province, 2014 (Tang et al. 2017); (2) Dunde Bulaq site, Altai, Xinjiang Uyghur Autonomous Region, 2015 (photo by Jin Anni); (3) Huai river site, Suizhou, Hubei Province, 2017 (photo by Jin Anni); (4) Wushigou site, Fangcheng, Henan Province, 2018 (photo by author); (5) Hongshankou site, Barkol, Xinjiang Uyghur Autonomous Region, 2020 (photo by author); (6) Xigou site, Barkol, Xinjiang Uyghur Autonomous Region, 2021 (photo by Ren Meng).*

Jiangjunya Site, Lianyungang City, Jiangsu Province, varying between E360+90/-60 and E5380+380/-530 years BP ('BP' refers to 'before 2014 CE') (Tang et al. 2017).

In the winter of the same year, researchers from Nanjing Normal University applied microerosion dating in the survey of Xianju petroglyph sites, Zhejiang Province, east China. One calibration curve from the dated rock inscription Wufubei and 11 age estimates ranging from E1740+590/-580 to E740+70/-160 years BP have been successfully secured from petroglyphs of the Xiaofangyan and Songlongshan sites, which are two of the nine petroglyph sites known in Xianju. It is the first time that Xianju petroglyphs have been subjected to attempts at direct dating (Jin et al. 2016).

In 2015, invited and sponsored by Prof. Wang Jianxin of Northwest University, a large group of Chinese and international investigators visited multiple pictogram sites in the north part of Xinjiang Uyghur Autonomous Region, such as Tanblatas, Dunde Bulaq and Dugart. The purpose of the trip was to assess the sites for uranium-series dating, but the natural environment of the sites was not suitable for such technology. At the Dunde Bulaq site, the team observed a yellowish crust of amorphous silica and oxalates underlying the pigment of almost all the painted motifs and appearing up to 10 mm thick on the floor below the panel. This phenomenon suggested that there might have been quite a wet climate in the remote past. Inspired by this find, the scientists decided to date the rock art through indirect methods. Jiang et al. (2008) had studied the palaeoclimate and palaeoenvironment of Ulungur Lake, which is about 90 km southwest of the Dunde Bulaq site and pointed out that there was a wetter phase in the climate of northern Xinjiang before 5250 years BP. Based on this theory, Taçon et al. (2016) claim that the rock art of northern Xinjiang was made between 5250 and 4000 years ago. Bednarik (2015) had determined that the production of the first phase of rock art was preceded by a wetter climate causing very regular silica skin deposition in distinctive periods, eventually followed by a drier period which still pertains today, suggesting an age of the Dunde Bulaq rock art of <3000 years (see also Tang et al. 2018).

An expedition was conducted in the Daxingan Range (also called Greater Kingan Range), Heilongjiang Province, and in Suizhou County, Hubei Province, in 2017 for rock art dating by some native and foreign scientists. The sites in the Daxingan Range all consist of paintings, so the fieldwork focused on sampling for U–Th analyses. Four samples have been collected from rock art panels at the Mohe Station site and the Yilin site, yielding age estimates of 0–28 ka, 0–32.6 ka, 7.6–20 ka and 0–113 ka (the first two are from Mohe and the latter two from Yilin). These results are regarded as having no efficacy by the investigators (Tang et al. 2020a). The rock art of Suizhou is mainly cupules, so the researchers applied microerosion analysis and have secured nine age estimates from E1270+630/-510 to E650+110/-80 years BP ('BP' refers to 'before 2017 CE') (Tang et al. 2020b).

The first contact between modern science and rock art in China can be traced back to the 1980s[6], but perhaps the year 2014 was a more preferable moment symbolising the first step of the long march of 'rock art science' in the country[7]. However, the studies during

6 In 1986, researchers from Peking University used radiocarbon analysis on some samples of stalactite collected from the Huashan rock art site, and the result suggested that the motifs were made possibly between 2370 and 2115 BP ('BP' refers to 'before 1950 CE'). However, the author also admitted in his paper that some disturbing 'dead carbon' could not be eliminated during the process (Yuan 1986: 27–33). This is regarded as the first attempt at utilising modern science and technology on rock art in China. Then in 1997 and 2005, Tang Huisheng has experimentally applied microerosion dating at three sites in Qinghai Province and at Jiangjunya site in Jiangsu Province (Tang and Gao 2004; Tang and Mei 2008).

7 Strictly, almost all the early scientific dating practices

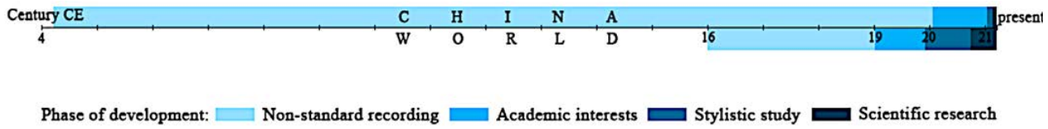

Figure 4. *The timelines showing the evolutionary routes of the world's and China's rock art study since the 4th century CE.*

this phase based on international collaboration were somehow limited by various factors: (a) the expeditions were mainly government-sponsored; thus, the interests of local authorities often played a key role in the decision of schedule arrangement, routes selection, length of working time at each site etc. Scientists were marginalised in the design and organisation of the expeditions, and they were always taken to the sites which the locals thought 'important'. (b) All the expeditions had to concentrate on dating because the dates of rock art production are always the only facts the locals care about. (c) The length of such an international collaborative expedition depends highly on China's visa policy (the limit of stay for foreigners is usually less than a month); therefore, no long-term work can be done in this circumstance. Being aware of this problem, some researchers have already conducted self-funded and thus self-determined programs to obviate external intervention so that the integrity of scientific studies could be preserved to the utmost. For instance, Jin and Chao have conducted surveys on the cupule sites in China since 2018. So far, the two scientists have visited over 20 rock art site complexes in Henan, Jiangsu, Hubei, Liaoning and Fujian Provinces and have systematically studied more than 1800 cupules on 70 panels. The research consists of recording, spatial distribution, classification, 3D scans, microerosion dating based on field microscopy, and replication experiments. A total of 28 age estimates have been secured by using microerosion analysis: nine from Fangcheng County, Henan Province, ranging from E4730+570/-180 to E1450+70/-240 years BP ('BP' refers to 'before 2018 CE'); two from Suizhou City, Hubei Province, which are E1930+340/-410 and E1700+420/-490 years BP; five from Anshan City, Liaoning Province, between E2180+570/-680 and E1220+280/-220 years BP; thirteen from Lianyungang City, Jiangsu Province, from E2020+220/-180 to E710+210/200 years BP (Jin and Chao 2019, 2020, 2021). Furthermore, in the summer of 2020, the two scientists initiated a regional study program focusing on the tremendous number of petroglyph sites along the eastern Tianshan Mountains in Xinjiang Uyghur Autonomous Region and have studied hundreds of sites up to the present. During these self-funded programs, the researchers could make decisions purely according to the needs of science, and the only things that might change their minds are the professional suggestions from other members of the academic community. Such efforts have shown a possible way for future rock art study in the country: to let the scientific works return to being scholar-determined activities.

Comparing the two timelines for China and the rest of the world (Fig. 4) shows that both have experienced an evolutionary sequence following this order: simple observation — non-standard recording — academic interests — stylistic study (mainly archaeology) — scientific research. Two minor differences can be noticed: (a) China was obviously slower than the world in the last three stages of development; (b) in China, the phase of scientific research was led first by governments but recently has begun to convert to scholar-oriented work. Nevertheless, the differences are not evident enough to foster an independent 'tradition' exclusively belonging to the 'East'. In common sense, an academic tradition or a 'school' can be widely accepted only if one of the following two preconditions is true: great contribution to fundamental theories of the discipline was made, or a group of talented scientists used to work at the same institution, like the Göttingen School and the Moscow School of mathematics. Unfortunately, neither of them can be seen in the history of China's rock art study. At least up to the present moment, China's rock art study seems no different to other countries', and, in China or other countries, the interpretations of rock art always derive from direct impressions or primitive imaginations. For instance, there are numerous explanations offered for cupules; Bednarik has collected some dozens of them grouped in eleven classes from existing literature, mainly in European languages (Bednarik 2016: 83–86), and I have listed them in the table below in comparison with those I collected from Chinese literature. They look apparently the same, i.e. rock art researchers think alike (Table 1). Therefore, no tradition or school has been established during the development of China's rock art study.

If the above judgement is true, a new question comes to mind: why are there still some scholars believing in 'schools' or regional research traditions in the discipline of rock art study? The answer may be complicated. First, it relates to the development level of people's cognition. The core of 'school' is nothing

were not well-recorded, e.g. in most of the reports, only rough descriptions about age estimates are provided, but more detailed information like data analyses or illustrations and tables demonstrating the processes of sampling and experiments are rare. This means that researchers of later generations can hardly repeat or verify these early works. Another difference between the earlier scientific attempts and the 2014 expeditions is that the former focused on acquiring age data through specific means, while the latter made efforts to build well-framed epistemology and methodology, so in this sense, the latter marks the beginning of China's rock art science.

EXPLANATIONS IN THE WORLD (Bednarik 2016)	EXPLANATIONS IN CHINA
Unspecified or specified cultic or magic rituals	Use for praying / divination (Li 1994; Li and Gu 2012; Li 2014; Nima 2016)
Utilitarian preparation of substances	Production of medicines of mineral (Cao 2007)
Mnemonic or record-keeping devices	Mnemonic or record-keeping devices (Sun 2010; Zhou 2010; Li and Gu 2012; Sun 2015)
Elements of belief systems	Communication with heavenly gods (Tang 2011)
Depiction of heavenly bodies	Depiction of star constellations (Lin 1996; Li and Gu 2012; Li 2014)
Depiction of topographic elements	Elements of pre-Historic maps (Li 1994; Yang 2010)
Board games	Board games (Chen 2010; Yang 2014)
Symbolisms that are no longer recoverable	Unidentified marks
Receptacles for offerings	Receptacles for offerings (Sun 2010; Li 2014)
Specific symbolisms	Symbols of phallicism (Li 1994; Wang 1995; Lin 1996; Gai 2004; Liu 2015; Nima 2016)
Other purely utilitarian purposes	Use as lithophones (Nima 2016)

Table 1. *The explanations for cupules collected from China and elsewhere, showing a startling likeness.*

but a belief system, which takes root in the divergence appearing during the construction of reality in human consciousness. In the remote past, when people faced natural phenomena far beyond their knowledge, they might connect them to specific figures or objects in their imagination. For example, in different mythical systems, lightning could be connected to Zeus's javelin, Odin's spear, Indra's arrows, Perun's stones, Dianmu's mirrors[8], and Huracan's or Mamaragan's superpower, and could be produced by the blinks of thunderbird or by the scratches of Raiju[9], just depending on which corner of the world the observer lived in. This was probably a primitive version of the differentiation of 'schools', which could be regarded in essence the same as the divergence among academic schools, e.g. the conflicting opinions about the 'origin of the world' among the philosophical schools of Ancient Greece — the Ionians, the Milesians, the Ephesians, the Eleatics, the Pythagoreans, the Sophists, the Cyrenaics, the Epicureans etc. On the contrary, we can hardly hear that scientists are divided into schools according to their nationalities or working locations in modern scientific disciplines. For instance, no one would be interested in studying 'Chinese physics' or 'Chinese mathematics', just as we have never heard a discussion about the Western influence on Chinese molecular microbiology/geochemistry/quantum mechanics. Obviously, a discipline is in a very primitive stage of development (or of 'pre-science') when scholars still are, or even feel proud of, being classified into different schools according to their belief systems or nationalities, just like the 'Golden Age' of 'A Hundred Schools' during the Spring and Autumn and the Warring States Periods over 2000 years ago in ancient China. As a result, the discipline has experienced a great diversity of research approaches and terminologies, reflected in a multitude of idiosyncratic constructs, sequences, chronologies, names and definitions.

Then, it has a connection with the servility deeply hiding in individual scholars' subconsciousness. In the childhood of humanity, our ancestors had limited knowledge about the world around them, so they prayed and even begged for protection or forgiveness from many kinds of invisible supernatural powers because of indescribable fears. Moreover, the fear from which worships and rituals originated always seduces people into irrationally devaluing themselves and bending their knees before divine and temporal powers, self-suggesting that they have been 'blessed' or 'taken care of'. Although the value of humans has been carved out during the Renaissance and the Enlightenment, such subconsciousness of servility is still prevalent in all fields of society, especially in the field of academic activities. For instance, people always talk with keen interest about how significant the contributions to human knowledge made by the 'Einsteins' could be but ignore the fact that the 'Einsteins' could not have had any success without the endeavour of the entire scientific community. Such obsessions of superman worship or heroism have greatly improved some academic stars' status, and sometimes the importance of their achievements has been exaggerated to a ridiculous extent during this modern idol-making movement in the name of science. In China, some scholars of this kind have made deals with political power to accelerate the aforementioned process and have gradually

8 The Chinese goddess of lightning, Leigong's (the god of thunder) wife, is said to have used flashing mirrors to send bolts of lightning across the sky.

9 Raiju means 'thunder beast', a legendary creature from Japanese mythology, appearing in the form of a wolf or dog most of the time.

become so-called '*xue fa*' (means 'academic lords' in Chinese). Although today, one of the strongest, if still unwritten, rules of scientific life is the prohibition of appeals to heads of state or to the populace at large in matters scientific, the combination between knowledge and power used to be regarded as a righteous way for a long time in ancient China. According to Confucian ethics, intellects must shoulder two glorious missions during their whole lives, which are serving the emperor with their knowledge in governing the country and establishing their own schools. The first maxim that children were given at the beginning of their career as a Confucian was: 'Even if someone is your teacher for only a day, you should regard him as your father for the rest of your life'. Hence a link between 'schools' and patriarchy was thereupon forged in the deep of their minds, from which an ambivalent relationship between 'academic lords' and their followers has derived: on the one hand, in order to build their academic kingdoms, the 'lords' need to exploit their followers or students in deceitful ways; on the other hand, the followers or students have to accept such a slavery system consciously or unconsciously just because they want to keep the sadly tiny alms given by their 'lords'. As a possible result (if such a circumstance keeps developing arbitrarily), there would be only two types of people left in the end within the academic community: a small number of dominators and millions of self-deceivers suffering the Stockholm Syndrome who are in fact enslaved by the former. It seems that a fragile balance has been established and carefully maintained by the demands of both sides. And in this sense, the truth of 'school' is probably a derivative or variation of 'clan'[10].

Moreover, the term 'Western influence' itself reflects a corrupted Eurocentric dualism inherited from the times of colonisation (even much worse than the term 'Silk Roads'), with the subtext of discrimination. In such a binary confrontation, the West always represents keywords like advance, civilisation and justice, while the East is usually labelled with ignorance, savageness and evilness, so the latter needs to be 'saved' by the former — I have no interest in pointing out how ridiculous this stereotype is, but I would like to suggest the ones who have faith in it to ask themselves the following questions: does science differ in the 'West' and the 'East'? Do 'Eastern' scientists think differently from their colleagues in the 'Western world', or do they use some kind of 'mysterious Eastern logic' to solve scientific issues? The answer is indubitably self-evident. It is ironic that a Chinese researcher still uses a concept imposed by the colonists of the 'West' over a hundred years ago to underline the importance and uniqueness of the contribution made by his/her native peers nowadays.

According to the above, it is evident that such a 'Chinese tradition' or 'Chinese school' does not exist historically or logically in the study of rock art. Even if it does, its only 'contribution' in modern society is probably a monopoly on academic resources, strangling creativity and impeding the development of science.

So, what has been left for rock art study after tearing away the labels of 'the East', 'the West', 'schools' or 'traditions'? There is no other option except 'science'. What is the essence of the occurrence of scientific study in the discipline? Furthermore, what is the significance? This relates to an essential but long-ignored point about the truth of the rise of rock art science: a scientific revolution. As Thomas S. Kuhn (1970) proposed in his famous work *The structure of scientific revolutions*, the evolution of science is pushed forward by a series of 'scientific revolutions', and its core mechanics is a 'change of paradigm', in which a new one completely or partially replaces the old paradigm. New paradigms can be established only by replacement, not by improving the old ones because there is an incommensurability between the old and the new. The transition from an old paradigm to a new one from which a new tradition of 'normal science' can emerge is far from a cumulative process, achieved by an articulation or extension of the old paradigm. Instead, it is a reconstruction of the field from new fundamentals, a reconstruction that changes some of the field's most elementary theoretical generalisations as well as many of its paradigm methods and applications. For example, today, people are told that light is photons, i.e. quantum-mechanical entities that exhibit some characteristics of waves and some of particles. Such a characterisation of light is, however, scarcely a century old. Before it was developed by Planck, Einstein and others early in the last century, light was believed to be transverse wave motion, a conception rooted in a paradigm derived ultimately from Young and Fresnel's works in the early 19th century. Nor was the wave theory the first to be embraced by almost all practitioners of optical science. During the 18th century, the paradigm for this field was provided by Newton's *Opticks*, in which he claimed that light was material corpuscles. These transformations of the paradigms of physical optics are scientific revolutions, and the successive transition from one paradigm to another via revolution is the usual developmental pattern of mature science. However, no period between remote antiquity and the end of the 17th century exhibited a single generally accepted view about the nature of light. Instead, there were several competing schools and sub-schools, most of them espousing one variant or another of Epicurean, Aristotelian or Platonic theory. Each of the corresponding schools derived strength from its relation to some particular metaphysic.

In much the same way, the occurrence of rock art science represents that the discipline has been experiencing a scientific revolution. However, it was caused by construction but not by paradigm change, for it is the first revolution in the field that has been leading the discipline from a pre-paradigm period to a post-paradigm period. Before it occurred, several individual ideas (again, there were no schools in rock art study, but only personal views) competed to dominate the field. Afterwards, in the wake of some notable scientific achievements, the number of ideas will be greatly reduced, probably to one at last, and a more efficient mode of scientific practice will begin.

China's rock art study is still transitioning from quasi-paradigm (archaeology) to paradigm (rock art science). Archaeology is regarded as a quasi-paradigm for rock art study because it is not thoroughly scientific (lacking falsifiability and repeatability), though it has a methodology based on positivism well-accepted by the members of its research community. In the field of rock art research, the occurrence of a true paradigm or the scientific revolution is caused by a growing sense felt by a small number of members of the scientific community that archaeological methods have ceased to function adequately in the explanation of rock art. Such a sense of crisis based on the malfunction of current methodology is the prerequisite to revolution, just like Galileo's contributions to the study of motion depended closely upon difficulties discovered in Aristotle's theory by scholastic critics.

Moreover, such a revolution is, in essence, a change of researchers' world views. For instance, archaeologists and art historians mainly focus on the styles or types of rock art motifs, but in the eyes of rock art scientists, the production of rock art was one of the many events that rock surface has experienced for millions of years, and therefore their mission is to reconstruct the sequence of those taphonomic events. This is obviously an altered way to observe the world. Though the world does not change with a paradigm change, the scientists afterwards respond to a different world. However, in China, only very few scholars have realised how great such a complete change of cognition would be, and in fact, most Chinese rock art researchers are not familiar with the term 'rock art science' — probably there are no more than five people in the country who have framed knowledge about it. Nevertheless, in recent years, there have been some positive changes: (a) the Chinese edition of *Rock art science: the scientific study of palaeoart* written by Prof. Robert G. Bednarik and translated by Dr Jin Anni, which has included recent critical progress made in the field since the publication of its second edition in 2007, was published with all images colour-printed last year by Xinhua Publishing House, one of the largest publishers in China, and as far as I know, it has already aroused much scholarly interest; (b) as mentioned previously, some systematic research programs (e.g. the cupule sites program, the eastern Mt Tianshan program) completely using IFRAO standards have been started up; (c) some scientists have introduced the basic principles and methodology of rock art science to local researchers on various occasions.

It should be of more than a little concern to us that a great deal of what has been presented in the name of 'rock art research' over the past centuries has consisted to a great extent of people's self-conscious responses to rock art: a creation of modern rock art mythology, and essentially the kind of scholarship so far presented in this field. Therefore, the occurrence of rock art science as a scientific revolution in a discipline resembling a 'Tower of Babel' has for the first time created effective communication. Scholars of different backgrounds worldwide have been sharing a universal system of terminology and methodology, aiming at puzzle-solving instead of mythmaking, based on falsifiability and repeatability, the cornerstones of modern science. Furthermore, the discipline has long suffered the pain of academic separation — individual rock art researchers operated largely without being aware of the work conducted in other parts of the world, sometimes even in their own country or region of activity. 'Communication is limited, and where it did occur it often led to misunderstandings, and clarifications sometimes led to academic feuds' (Bednarik 2007: 12). Thanks to the revolution of rock art science, a unified scientific community has been organised in the last decades, i.e. the IFRAO, and such a scientific community is an immensely efficient instrument for solving the problems or puzzles that its paradigms define. The result of solving those problems must inevitably be progress. It is quite clear to see that the connection between archaeology and rock art science has been becoming weaker and weaker since the scientific revolution began, and this is probably an irreversible trend that may lead to a final parting. It does not mean that archaeology has no further role to play in the discipline; however, archaeologists need to adjust their mentality gradually, adapt their work to the new scenario, and get used to collaborating with scientists.

In conclusion, this paper is composed around a question 'Does a Chinese tradition/school exist in rock art study?', extracted from the core arguments of the article by Xu F. In his work, to support the validity of the proposed concept 'Western influence', the author has no other choice but to assume that an Eastern or Chinese tradition of rock art study had already existed before the so-called 'Western tradition' arrived in China. Unfortunately, such dualism between the East and the West in the field of China's rock art research is probably that author's personal illusion. China does have the oldest records of rock art discoveries, but none of those can be regarded as serious research, especially from an academic perspective. In China, rock art studies in the modern sense appeared in the last decades of the 20th century; scholars began to use archaeological or ethnological means to record and interpret rock art. As we know, most of the modern disciplines of science were formed in Europe, such as archaeology, ethnology and art history. All those disciplines involved in rock art research inevitably originate in the West, so we can make a somewhat awkward but very likely true judgment following the author's way of thinking that China's rock art research is of 'Western' roots (and so are most of the modern disciplines including

10 Especially in China, students being labelled with their professors' family names is a common phenomenon, while ironically, quite a few of them even feel 'honoured' to be called a member of someone's clan.

archaeology). It seems that the 'Eastern tradition' has never existed, the 'Western influence' neither. Dualism or contradiction does exist in rock art research, but it is nothing about the East or the West: the real issues are between science and superstition, modernity and pre-modernity, academic monopoly and free research, privilege and equality. 'The western influence on China's rock art study' is more likely a pseudo-subject on both logical and practical levels because no one would describe a science with the words 'Western influence', just like in common sense, no people have an interest in talking about 'Western influence on physics' or 'Western influence on mathematics'. Rock art study should definitely be a universal discipline if we regard it as a science; meanwhile, there are no differences in basic epistemology and methodology, just depending on which 'world' scholars belong to. Therefore, *the truth is quite simply that the only influence changing China's rock art research is not from the 'West' but from 'science'*. The modernisation of the discipline was the most significant achievement made by our scientific community in the past few decades. However, the process is an ongoing transition consisting of the reconstruction of basic epistemology, methodology, standards for evaluation, management mechanism, and most importantly, the cognition of every community member. We all witness that remarkable progress has been made in China's rock art research in recent years, particularly with the help of IFRAO, but the whole discipline is still at the very beginning of becoming a science. Our Chinese colleagues still have countless difficulties in mastering basic science, and evaluating the regional development of the discipline should be our last concern — especially when we have just left the starting point, yet the finish line is still thousands of miles ahead.

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