

The Chinese Space Programme in the Public Conversation About Space

Andrew Thomas

BA, MA, FBIS

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Department of Politics, People and Place

Faculty of Business and Law

De Montfort University

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Abstract

This study is the product of a long view of space exploration and the conversations about space in China. It locates the multiple conversations about space exploration and utilisation as they are in the Peoples' Republic of China (PRC), within other conversations about space culture in the world. China is viewed by Western researchers through many lenses which are examined here critically. In previous studies, writers explain away China's space programme with the easy answers of a "Space Race" and a "China Threat", in which the space programme is seen as merely an example of global competition, or threat, but this thesis challenges those barriers to Western understanding of the Chinese public conversation of space culture. In this study, critical theory and an underlying epistemology within a post-Enlightenment cultural frame are applied to official, archival and ephemeral texts and images. The manner of the critical application is distinguished from derivative techniques operationalised as Open Source Intelligence. The concept of Place, and within that, Foucault's linguistic concept of "Heterotopia", is significant both in understanding the Chinese overseas space bases on Earth and the temporal and spatial dislocations experienced in space missions. In acknowledging the interpretative approach, an empirical study, a "Q-sort" has been carried out, which demonstrates that the key factor in the Chinese conversation is Science, within the context of modernisation, tempered by Chinese cultural affirmation and international co-operation. The thesis concludes by providing general principles in future work for successful research into the popular culture of space exploration.

Keywords: China, space policy, OSINT, public conversation, Q-Sort

List of Relevant Published Works

(with reference in the text).

Peer-review

Thomas, A (2017b). The Astronautical discourse in an English primary school during the Principia ESA mission: A Critical Analysis. *Space Policy* 41 pp. 27-35

Editorial Review

Thomas, A (2015): *Popular Participation in Space Exploration in Russia and China and its transmission to Soft Power*. Poster and Abstract presented at the British Association of Chinese Studies Conference, 2015.

Thomas, A (2016a). Popular Symbols and Rituals in Space Exploration in China and their Mediation to Soft Power: Notes from a presentation at POLITSCI-15, Istanbul, Turkey, 11 December 2015. *Go Taikonauts!* E-Magazine issue # 18 - January 2016 pp24-26. (Original paper available on e-book published by DAKAM: *Politsci'15:3rd International Political Science Conference Proceedings*. ISBN 9-786059-207195).

Thomas, A (2017a): Popular Participation in Space Exploration in China and its Mediation to Soft Power. *Space Chronicle* 70 pp 9-16.

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Literary Criticism

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<https://writingchinese.leeds.ac.uk/profiles/andy-thomas/>

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1. Introduction: Space Policy with Chinese Characteristics

Towns and cities honour those of their own, who have gone out into the world and become famous through national or international achievement.

In Húludǎo (葫芦岛), a coastal city in the People's Republic of China, (PRC), I crossed streams of fast traffic to a roundabout in the centre of a busy square. Sculpture on the roundabout included a statue on a plinth, a representation of a space capsule burnt and dented on its return journey, steps, bushes and flowers, and a semicircle of pink marble pillars, their engraved script sparkling in the autumnal sunshine.

Hángtiān yuán (航天员, Astronaut) Yang Li Wei was the first Chinese national to fly into space, in the Shenzhou-6 mission of 2003. He made China the third country in the world to conquer crewed (manned) space flight. It is his statue that greets the traffic in Húludǎo. It is a statue of a man in a space helmet and visor, carrying a ventilation box, atop a plinth, with large trails of the letter 飞 (Fēi) behind him in bright colours, lit at night.

The foreman of the municipal team, which was cleaning the vegetation around the plinth before winter, came up to me.

Gesturing to the statue, he said to me in Mandarin I could just understand. "A Húludǎo man."

"Yes, he is very famous," I replied.

"Certainly. Where are you from?"

"England."

"Ah, England." He nodded slowly, then left me to return to his team, who were now leaning on their shovels and hoes, watching us, waiting for the report.

The striking sculpture is discussed in detail in a later Chapter of this thesis. But my host gave Yang Li Wei a different story.

I had thought that I had seen the flying apsaras of the Mogao caves represented in the sculpture by the large coloured trails, and said so.

“Painted ladies?” He snorted in derision. “We say that as you drive up to the statue you see first the three bananas, then a boy with a bag of grenades.”

And I experience a complex web of narratives and counter-narratives in the conversations about space exploration in China. This thesis explores that web.

Approaching the Chinese conversations

The challenge of exploring the popular conversation about space travel is that it starts from a preliminary position that some observers may decide is self-evident: depending on a binary opinion, space travel is a waste of time, or it is not. Certainly, travel in outer space, its exploration, and utilisation, is a new phenomenon in itself, but the cosmos has been discussed in myth and by virtue of Galileo and Bruno for example, in the foundations of science. Therefore, whatever side is taken on the merits of contemporary space travel, its narrative is important in itself.

When studying a society outside one’s own, on the one hand alienation allows for an easier reflection on what is found, but on the other, barriers of language and culture intrude. To begin the journey through this thesis, then, I would like to set out some preliminary statements about my position as a critical researcher, the use of languages, particularly the Chinese language, and the ethical background of this research.

In this thesis, the example of Yanow is followed, as she writes (1998, p.234) :“The author who is writing about experience-near research needs to show that he or she was, in fact, close to the experience, whether as observer or participant. The focus of interpretive research is on meaning to the actor in the situation, and the researcher as participant stands in for that actor to some extent. Although this might seem to require first-person narration and even a confessional mode, it can be accomplished otherwise through third-person thick description, the layering of interwoven and interrelated material that characterizes ethnographic research”.

As Almond and Connolly argue (2019, p.2): “acquiring in-depth knowledge of relevant local social settings on a comparative basis requires processes which are much more encompassing than what happens in formal research processes such as interviews, and much more iterative than standard expositions of methodology would allow. This tends to mean that slow comparative research is difficult to evaluate according to the

norms of positive science, as data is gathered in relatively idiosyncratic ways”. Therefore an explanation of the researcher’s position and the research strategy chosen is important to this thesis.

Position

My own background embraces cultural diversity and its affirmation in an atmosphere of mutual tolerance. We are all, to a greater or lesser extent, prisoners of our upbringing, but I adopt and propose ways in which we can reach an understanding of conversations within cultures different from our own.

The task is not easy: we bring a Western epistemology to it. Mazrui (1967), contemporary to Foucault in his “modes of reasoning” (Mamdani, 2018, p. 31/2), is forceful when he writes, in the post-colonialist context of Tanganyika/Tanzania and of Julius Nyerere (1967 p. 21), that: “No amount of radicalism in a Western-trained person can eliminate the western-style of analysis which he acquires.” He continues his argument by saying that “French Marxists are still French in their intellectual style.... in style of reasoning and in the idiom of his thought”. Mazrui takes the view that that this school of philosophy is rooted in post-Enlightenment European thought. In comments particularly apposite to the *Tel quel* movement, he asserts that “French Marxists have more in common with a French liberal than with fellow communists in China and Korea. And that is why a French intellectual who is a Marxist can more easily cease to be a Marxist than he can cease to be a French intellectual”.

China is a country without participation in the European Enlightenment, a country which considers itself to have been humiliated in modern times, and is now a nation attempting to reach an international position which is greater than at present.

With Western eyes and a mind-set of mutual respect, I have developed a research strategy of critical research into space exploration as it is experienced and expressed in non-Western cultures of the world. I include in this strategy deep engagement in the subject of space travel, through prior reading in astronomy to undergraduate certificate level and amateur practice in satellite technology, and I rely on my learning of languages and the introduction to culture they bring. To this thesis I bring seven years’ instruction into the Chinese language, mostly in England, but also at university in

Shanghai. It follows instruction and qualification at University level in Russian, German and French.

Research strategy

New arrivals in China may well face public presentations about the Chinese space programme in a variety of ways. For me, this process started on a business visit to Jinan (近岸, Jìn àn), where I encountered a shop selling school prizes, such as cups and medals, some of which had space motifs and emblems. On that same trip in a Beijing stopover the hotel TV showed a news programme about China's then proposed first voyage to the Moon.

The gestation for this thesis was therefore long and slow. Almond and Connolly (2019, p.9) advocate a "slow research strategy" which in their terms "places value on time spent in the societies under study to acquire local meanings". This means that informal conversations, serendipitous journeys and casual readings are as important in understanding narratives in China as are formal interviews.

Nonetheless I acknowledge a professional distance between researcher and China. To some extent this works to my disadvantage, in that particular challenges are seen to be posed to a non-Chinese person conducting fieldwork in China (Heimer and Thogersen, 2006, p.4): "Doing fieldwork inside the People's Republic of China is an eye-opening but sometimes also deeply frustrating experience". I have tempered this disadvantage by language and cultural learning, both formal and informal, but retained a critical distance from earlier studies and become aware of both official narratives and lay conversations.

Without going too far in treating China as a special case for study, it has also been commented that the challenges that European researchers in mainland China face include the fact that designs proposed as an ideal in the abstract are often unachievable in delivery. Accreditation to a Chinese University would make a random survey across China possible in theory, but in such a large country, stratification by gender, age and ethnic origin would be difficult in practice, and would require a large team with quality control to conduct it. Official documents or interviews may be forthcoming after accreditation but without unrestricted access to an archive may have been selected beforehand.

Rather than attempting badly to survey opinion, this thesis adopts a technique to examine the factors of a discourse, using written texts ordered by priority and analysed by underlying factor. This reveals meaning which is close to text and image. Further, the design chosen in the Q Sort exercise, which was conducted largely in mainland China, follows a strategy of “one case, many field-sites”, as presented by Heimer (2006, p. 62) , and discussed in detail in Chapter 11 below. Such a design prefers the common narrative of a nation, rather than drilling down into regional, local or ethnic differences within it.

Welcoming new data as it came to me, serendipity undoubtedly played a part in the finding of data. I found such items wherever people congregate: parks, museums and galleries; the post office; shops and markets; restaurants and coffee bars; and special events and festivals. In places where I encountered street artists I would commission a drawing from them about their interpretation of “Your country and space travel”, gaining insight into perceptions of space within their local culture. I read the Chinese press by keyword search in English and retro-searched using a Chinese-origin internet search engine. Under my strategy of iteration my collection of items became a set of data. In this thesis I used such serendipitous items as a spur to revisit items and evolve their meaning iteratively.

The gradual revelation of the conversation in this way is acceptable. As Becker (2009, p545), in his study of the interpretative technique, points out, “... successful qualitative research is an iterative process, one in which the data gathered at t1 [the first time period] inform data gathering operations conducted at t2 [the second time period]. Successful researchers recognise that they begin their work knowing very little about their object of study, and that they use what they learn from day to day to guide their subsequent decisions about what to observe, who to interview, what to look for, and what to ask about. They interpret data as they get it, over periods of months or years, not waiting (in the fashion of survey analysis, for instance) until they have it all to start seeing what it means. They make preliminary interpretations, raise the questions those interpretations suggest as crucial tests of those ideas, and return to the field to gather the data that will make those tests possible”

No index is available of ephemeral material, because no such index is possible. The data studied are not and cannot be statistically representative of another, larger set of data behind it. But this is not a problem in itself. The acclaimed American biographer of former President Lyndon B. Johnson, Robert A. Caro, recounts an early maxim he was taught as a young newspaper reporter confronting archives : “Turn every page” (Caro, 2019, p. 11). But confronted with tens of millions of documents in the Presidential archive he realised it was not physically possible to do this. Instead, his working method was to find a pivot point or event and use it as an incisive tool with which to interrogate the remainder of the documents (Caro, 2019, p. 84ff.). In this thesis, such a “pivot point” may be that flash of insight or serendipitous point made in informal conversation. Thus, the point of archival work is not to summarise and reflect the archives as a whole, but to generate a theory, a narrative, that is contained within them.

To develop an interpretative account, the various critical applications are, in this paper, applied on a “grounded” basis. It is necessary to consider these raw items individually and together in a repeated process of analysis and synthesis, and revisiting them as a fuller conversation is discerned. In this way, Suchar (1997) proposes that after visiting displays in a gallery for the first time, it is necessary to review the visit, prepare a “shooting script” and return to the scene of the gallery with it to investigate matters which reflection suggests may be relevant, to discover either their presence or absence. This “revisiting” is the principle of retroduction and is applied here to all data that has been obtained, which is considered and re-considered continually. Belfrage and Hauf (2015) promote “Critical Grounded Theory” (CGT) to evaluate and understand the data in this way. In their method, a theory is developed having been grounded in an initial categorisation, refined by an iteration through the data, then returned in a process of retroduction to a further iteration of the data.

But this thesis does not rely fully on literary, artistic or personal interpretation, however it may be grounded and re-visited. A major source of material to be interpreted has been a field study carried out within a standard practice (the Q sort methodology) and a social network analysis to accepted methodological standards. The results of these studies are brought into the argument of the thesis.

Finally, this research strategy has tested its preliminary results in academic discourse by presentation at conferences in Europe, China and Turkey and early publication (as in the List of Relevant Published Works).

Ethical position

I seek to discover stories which have been told to me by real people and with them to understand better their conversation about space travel. I wish, too, to present my understanding to a world which in many ways is not sympathetic, or is even hostile, to them. In this difficult area, the University requires compliance with ethical structures that I have adopted and which have been approved. Generally, data protection, informed consent and interviewee anonymity are at the forefront of these requirements. For this reason I have been unable to thank personally in this thesis the many Chinese people who have helped me. Particular ethical approval was given for the social network analysis and the exercise in a British school, and reviewed for the Q-sort.

In the preparation of the Q sort conducted in Chapter 11 of this thesis, I took early advice from expert Sinologists into how feasible it was to carry out a Q sort in a Chinese city. I was advised to secure ethical approval (my ethical approval included interviews), to carry an identification and explanation in English and Chinese (see Appendix 1), and, specifically to China:

“Chinese students don't do a lot of this sort of fieldwork, so people might be confused about your status.

You'll probably find it all goes smoothly, but the usual advice should anyone object or officialdom take too much of an interest is smile, apologise, and find another venue. Good luck!”

Here we see the special conditions applicable to all research in the field inside China.

Translation and terminology

All translations given with source in this thesis are my own. From written Chinese I am supported strongly by machine character recognition, but temper this in translation with my own knowledge of Mandarin in simplified characters and grammar. The phonetic

system used in this thesis is the modern system of Romanisation for standard Mandarin, Pinyin, although with reference to the 1970s I have occasionally repeated the then contemporary style of Wade-Giles. For translations from Russian, French and German I have used my own knowledge of grammar and the use of dictionaries, with more occasional use of preliminary translation by machine. I thank all those teachers and first-language speakers who have helped me over the years; far from fluent, I acknowledge that all mistakes in translation are solely my own responsibility

In line with what I believe to be contemporary Chinese practice, I use the term “Hángtiān yuán 航天员” rather than “Tàikōng yuán 太空员” to refer to a Chinese voyager in space, although the latter term, with its implication of the high sky, is still present informally. The important part of the term is the suffix “yuan” 员, which refers to a team player. In contrast, a professional person, such as an Astronomer “Tiānwénxué jiā 天文学家” has the suffix “jiā” 家. Publications originating or facing the West sometimes uses the expression “Taikonaut” in comparison to “Astronaut” (American) or “Cosmonaut” (Russian).

Overview of thesis

This thesis sets space travel primarily in the programme of modern China (PRC). It begins by recognising a fundamental problem: that easy answers offer a poorer explanation. It argues that commentators and researchers, particularly from the West, view China through different “lenses”, which shape what is seen. These lenses do not distort the image of China but set its perceived depth of field, movement and colour. From “high data” (as defined below) published officially the thesis introduces cultural products to the field of vision. The thesis uses an iterative, interpretative methodology, identifies an understanding or interpretation, and then summarises the multiplicity of narrative and counter-narrative.

A key principle in this thesis is to consider the “intertextual chains or networks of texts and events” (Fairclough, 2010, p. 420), which form and reflect the popular conversation about space. When this principle is applied here to ephemeral images (such as advertisements in the metro system) its contribution to interpretation can be seen readily. But consider some of the archival documents used. Where, using the

Freedom of Information Act, archival documents from the 1960s to the 1980s about China's launches into space have been produced from the US Central Intelligence Agency (CIA), the remarks that may be embedded or explicit about the nature of China are also subject to the principle of Intertextuality.

Adopting intertextuality allows for other views of China, such as science fiction, to provide a context for these documents of American origin. Here, we use the term "China" as if the country to which it applies were a single coherent mass, as it presents itself on the world stage. Another view, which is implicit in this thesis, cracks the shell of this homogeneity. Indeed, other views of that period are possible. Looking back on that time, the chimera being challenged by the CIA in its analysis of China's space programme was of a conflict of economic values – against communism – not of tangible assets in space, such as minerals being mined from the Moon or asteroids or planets being occupied. Conflict with China was not a necessary condition. The Peoples' Republic of China was only eight years old at the time of the first Sputnik, and its temporary close alliance with the USSR was to end a few years later, an epoch known as the "Sino-Soviet split". But for a brief period under Nixon and Carter the USA embraced China and its space programme more warmly, and this served to assist the introduction of the Reform period promoted by Deng Xiaoping.

This time was known generally in the European Space Agency's description as "Space 2.0", actual exploration following cosmic speculation, leading to the era of international co-operation that exists at the time of writing, which they term Space 3.0. Although the USA ended its temporary period of space co-operation with China, the ESA and European countries did not. Chinese co-operation with European research institutes is now extensive. Hamilton and Joske (2018) view similar co-operation with Australia as a threat. This is one of the easy answers discussed below.

There is, of course, a large amount of literature giving easier answers. This thesis does not seek to replicate this work but to review it and to offer an argued alternative. The contribution which this thesis makes is to interpret cultural products as data expressing a public conversation within China and between Chinese people, rather than to choose between theories based in Western political anxieties.

The answers which the thesis provides can be summarised as follows: the thesis concludes with the confirmation that China sees space exploration as a matter of high science and technology in the country's continuing search for modernisation. On the one hand, China speaks of itself as a nation of ethnic groups, some clearly minorities, seen to be present in the government. On the other hand, in practice China uses cultural products to cement the nation together by adopting the legends and history of the dominant (Han) ethnic group. China is also keen to work with international partners in its development of this science and technology, though some international partners find this threatening.

A level of abstraction is employed such that the thesis can meet analysts of military intelligence on their own ground. This is done by adopting those techniques of critical methodology which have been adopted by "Open Source Intelligence (OSINT)", but articulating its underlying ontology and epistemology.

Outline of the thesis

This thesis drives a path through this jungle of public conversation. Not only is the Peoples' Republic of China (PRC) the third nation to have developed a crewed (manned) space programme. The nation has landed its technology on the Moon and is continuing its exploration and utilisation of near and outer space. These plans and activities offer the opportunity seized by this thesis to consider what is variously described as the narrative or conversation, the framework, setting or policy of space exploration and utilisation ("space policy"), with an emphasis on the specifically Chinese dimension, or the "Chinese Characteristics" of it, as in a term used by President Xi Jinping and the Chinese Communist Party.

In the first half of this thesis we shall briefly describe the state of the Chinese Space programme as it is at the time of writing, by comparative reference to its own account of its antecedents, achievements and consequences, and shall establish the frameworks and settings in which it is viewed in other countries.

Whilst China's "Belt and Road" initiative will extend China's influence through Africa and Europe, China's space programme is considered first within its own hemisphere. This has a regional emphasis but extends southwards to Australia and North-Westwards to Russia. Often, China is not viewed positively outside its borders, and its

space programme is no exception. As shown in later pages, China has appeared in recent years as a threat to world interests established after the 1945 war.

Thus, the nature of the dominant framework “the Space Race” is examined in this hemispheric context. Australia’s experience of the Soviet Union, and the consequent portrayal of communist villains in boys’ fiction, led the country to experience the launch of Sputnik in 1957 as a popular sensation and its conflict with anti-communism. In that sense, Australia provides a coherent account of the origin of the sensation. But in subsequent years China inherited the role of target for this anti-communist suspicion. It can be shown that not only is the term “space race” now applied to the USA, and China, but also to China and India. This thesis argues throughout that there is an alternative way of seeing.

Perhaps it was Jules Verne who, in *Adventures in Southern Africa* (Verne, 1872): first showed that the exploration of matters celestial from Earth cannot proceed without the effect on international borders and alliances between or war amongst individual nations. The perception that Earth is a planet in space leads to the conclusion that certain places on the surface of this planet are relevant to particular factors in space travel. Inevitably, China’s celestial needs as a space-faring nation relate to the national governments occupying these places, but it is not inevitable that this is a cause international threat and friction. The thesis explores the importance of “place”, and the necessary dislocation of space and time in space travel are derived from experiences across the Earth, and discussed with particular reference to China.

Moving further towards the “Chinese characteristics”, the thesis explores China’s own ambition to “modernise”, and what this means for its space programme. Some words have a peculiar resonance within China. The “modernisation” programme is shown to be rooted in science and technology, and the primary driver of the Chinese characteristic conversation is “Science”, in the context of this “Modernisation”. The ideological imperatives are described and considered, and other drivers include the international nature of space exploration. As in the West, China promotes space travel in its school classrooms, but, as is shown, the outcomes are different from the Western in many ways.

Another “easy answer” is that the “Confucian” nature of modern China might apply to the popular conversation about space. At the behest of the state, its people are striving, by hard work, duty and diligence, to achieve modernity and international standing. But this thesis disposes of that myth, and recognises that the ethos of hardship and dedication within the Chinese space programme is located firmly within the state apparatus of the PRC.

Western preconceptions of China are located within popular science fiction, in the same way that they were expressed about the Soviet Union in the early days of the “space race”, as shown later to be present particularly in Australia.

To tackle this difference of cultures, an epistemology based on material cultural artefacts is described, and a critical methodology is applied to it in an iterative manner. The Intelligence Community of the West accepts this methodology uncritically under the name of “Open Source Intelligence (OSINT)”. It is an intention of this thesis that using their own descriptive language in applying OSINT techniques to the problem, Western governments can meet this different expression of the Chinese space programme, and thereby understand it better.

Faced with a significant, continuing and increasing cooperation between Europe and China on space exploration, the public understanding in China of space exploration may be of considerable interest to ESA and European national space agencies. Therefore, although the official or deliberative reading is important, the mass or popular conversation has the potential for improving relationships between Europe and China in this area, and a mutual understanding of each other’s aspirations and objectives can only be beneficial.

A unique body of work, as indexed in the frontispiece of this thesis, has already been published. Publication has contributed to developers of space policy and to sinologists. This thesis organises and structures this body of work into a coherent framework, rather than simply to summarise the content of each publication. It is organised as follows. Chapter 2 introduces the “lenses” by which the two topics, China, and Space travel, are often concerned. In Chapter 3, the methodology is discussed, and its underlying ontology and epistemology outlined. Data is divided into “High data” (official statements and archives) – and “low data” (cultural products), which form the majority

of this study (Weldes, 2014)¹. Whilst “high data” archives are narrow in scope and capable of being indexed, the cultural products of “low data” are a broader collection of texts and images, often ephemeral, but essential to map the social conversation. Chapter 4 presents the “High data” in a literature review of official and archival sources, leading on to the “Low data” of cultural products. The following Chapters (5 to 7) first consider space exploration in general as settings in which to consider the Chinese programme in particular in the later chapters. In Chapters 8 to 10, key characteristics attributed to the Chinese programme are set out together with the role of the Chinese state in promoting them. Chapter 11 derives key statements to span the range of conversations, which are presented empirically in a field exercise, where Chinese people are asked to give priority to statements relative to each other. Finally, in Chapter 12, the overall argument and data are reviewed and discussed. The thesis concludes that under the ideological direction of the Chinese Communist Party, the popular narrative of space travel is promoted as demonstrating the importance of science in the modernisation of China, and consequently its enhanced international role.

¹ I do not allow the distinction between “High” and “Low” to reflect any value judgement other than a binary division.

2: Viewing the Chinese space programme through different lenses

Two themes to this enquiry

This thesis is predominantly about the space programme of the Peoples' Republic of China, not the technological progress of that country (rockets and satellites) *per se* but the social meaning of it within and around that country. It is framed within the imperative to voyage into outer space, and the different motivations which individuals, business and countries may have to do so. This Chapter has to respond to questions about China, and will do so next, but equally, the public understanding of space travel within language and society will be examined.

China

Many answers have already been given to the question “Why does China have a space programme”. There is continual background noise on the international stage of the USA and its allies which reflects a deep distrust of China. Within that background noise, the answer would be already understood, as military and competitive: a “space race” between the USA or India and China, and/or a threat to the national security of the USA and its allies, or to a Western post-war regulated consensus in general. But in adopting these easy answers uncritically, these commentators take no account of the lens between them and the question. These lenses will be reviewed in this Chapter.

Visible Phenomena within Chinese society

A visitor to China might experience the popular conversation of space exploration in China in a cultural expression that embraces Chinese science and thereby this modern Chinese identity. At first experience, the names given to Chinese space missions make official references to Chinese civilizational culture. The missions to the Moon are in a series called after the legend of Chang'e (嫦娥) and the tiny rover is called after her Jade rabbit, Yùtù (玉兔). An experimental satellite was named after the monkey Wùkōng (悟空), another legend made famous in a Shanghai television series. The crew of the Shénzhōu (神舟) 10 mission celebrated the Dragon Boat Festival by being seen on public TV eating the appropriate food, sticky rice dumplings stuffed with sweet red beans and wrapped in green leaves, usually known as “zongzi” (粽子). Because of the cost per gram of flying the food by rocket into space, it is evident that the choice was deliberate. And the Chinese Space Station is named Heavenly Palace,

Tiāngōng (天宫), a reference which points to the Temple of Heaven (天壇; *Tiāntán*) in Beijing).

Chinese government sources in English refer to cultural activities about space travel within China. The Paper "China's Space Activities in 2016" (Information Office of the Space Council of the PRC, 2016) notes that dissemination of knowledge about space science has included: "'China Space Day", "World Space Week" and "Science and Technology Week" to disseminate knowledge and culture about space, promote the "Spirit of the manned Space program," inspire the nation, especially its young people, to develop an interest in space, explore the unknown, and attract more people into China's space industry." (ibid.).

President Xi Jinping's comments about China's space programme were gathered by Xinhua in 2017 into a background file (Xinhua, 2017a). With reference to the contemporary period (centred on 2013), he has commented that Space is "an important field of scientific and technological progress and innovation", adding that "achievements in this regard are also important symbols of a country's scientific and technological strength." (Xinhua, 2017a). Chinese astronauts "carry the space dream of the Chinese nation and represent the lofty aspirations of the Chinese people to explore space." Three factors can be disentangled from this presentation: Science, the "Chinese characteristics" of art and science in China, and the relations of China with the rest of the world. "Chinese characteristics" are addressed specifically in Chapter 9 of this thesis. The role and meaning of Science, and the international relations of China are discussed in chapter 12.

"Soft power" as an easy answer

The term "soft power" may be asserted as a shorthand answer. Nye (2004), in his classic analysis of "Soft power" notes explicitly that "China's investment in manned space flight also helps to increase its prestige and attraction" (p. 88) (emphasis supplied). But Nye offers no evidence for this.

Caldero et al (2008) offer a judgement that China is neither honest nor transparent about its intentions. Ever suspicious, he writes that "Even when taking seemingly

offensive actions in regional events, the Chinese perceive their military stance as peaceful.”

Caldero then considers why China may behave in this way. He writes that their behaviour” demonstrates Confucian ideals of pacifism and harmony, but also involves psychological tactics and a lack of transparency to gain a strategic advantage.”

Thus, while “Some schools of thought state that the Chinese consider themselves insecure and fearful of other states’ aggressions”, he writes, “it also might be the case that the Chinese enforce this perception so that they are consistently underestimated by other countries ignorant of their rapid rise. A lack of transparency, partly fuelled by Xinhua, the Chinese news agency run by the Chinese Communist Party (CCP), only compounds the problem.”

An alternative to this distrust of China is to consider the country as a special case. Former Secretary of State Henry Kissinger approached his analysis of China through his perception of its cultural history and considered *inter alia* that (Kissinger, 2011, p. 22) as “The Chinese have been shrewd practitioners of Realpolitik and students of a strategic doctrine distinctly different from the strategy and diplomacy that found favour in the West.”

Caldaro et al (2008) continues with the analysis to offers a cultural view of Chinese space exploration. In his view, “Chinese cultural history exerts a substantial impact on China’s political and strategic actions as well as how the Chinese perceive international policies. Overall, the Chinese ideal is for China to become a prosperous global power prepared to rival the U.S. in its power and prestige while simultaneously maintaining cultural heritage and beliefs.”

“*Soft power*” is a form of power and as such lies behind this popular conversation. Edkins (1999) notes (p. 12) Derrida’s account that in discourse, power is implicated but concealed. Edkins (1999, p. 3) calls into a question of political philosophy “the conditions of possibility that produced or made conceivable this particular representation of power”.

Considering how soft power might be conveyed, Harman (on p. 33) notes that for Latour all related objects require a mediator (Latour, Harman and Edelyi, 2011 p. 33); therefore there is a mediator between the conversation and political power. Latour is “a philosopher of actors and networks” (ibid. p34) and so we are led to consider how networks and nodes within them function in this activity of exacting power.

Foucault introduces the concept of a network or capillary of power between the linguistic sites of processes. He considers (trans. 1977, p. 138) that “a multiplicity of often minor processes, of different origin and scattered location, which overlap, repeat, or imitate one another, support one another, distinguish themselves from one another according to their domain of application, converge and gradually produce the blueprint of a general method”. Commentators Schwan and Shapiro, explain (2011, p. 102): that “...we are held in place by a capillary network of multiple small nodes, each of which contributes to our subordination, but which can also be compensated for if one fails or is dismantled.

In contemporaneous work (Foucault 1976, p.34) he writes that the proper study of power should not be based on “juridical” expressions but oriented toward “material operations, forms of subjugation, and the connections among and the uses made of the local systems of subjugation on the one hand, and the apparatuses of knowledge on the other”. We therefore seek networks of connections by which power is expressed and maintained.

There are many definitions of the word “NETWORK”; for example, the definition in computer terms by OSI [Open Systems Interconnection] distinguishes several layers between the physical connection of cables and the application which sits at the very top for humans to use. Social Network Analysis is a technique to show by a graphic the interactions of individuals or transactions with each other; there is a developing science on the topic (see for example Easley & Kleinberg, 2010). In Chapter 9 it is used to describe a network of aerospace workers in China who, with the active encouragement of state corporations, are engaged in a social practice of commemoration and celebration.

Such networks link the “soft resources” (Guen, 2008, p6) – symbolic resources exercised “to exert influence upon others” - which are available to “soft power”. This diversion from soft resource to soft power “involves three stages: (1) application of soft resources; (2) cognitive processes of the recipients; (3) soft power production” (Guen, 2008, p. 8).

Based in East Asia, Guen (2008)’s first three categories of soft power (p125-7) include:

1. To improve an external security environment by projecting peaceful and attractive images of a country;
2. To mobilize other countries’ support for one’s foreign and security policies;
3. To manipulate other countries’ way of thinking and preferences.

Guen’s (2008) fourth category of soft power is “to maintain unity of a community or community of countries” (p. 125) and is required by “the maintenance of a large political economic unit” (Guen, 2008 p. 126). The EU’s efforts to establish a common European constitution and other institutions as well as symbols can be understood within Guen’s framework as its attempt to create the fourth category of soft power over its member countries (p. 126/7).

An epistemology based on communication is applied in this thesis, and this serves relationships including international relationships well. Thus, materials opened up by Derrida’s analysis of the Logocentric (such as postage stamps of the artist Qi Bai-Shi issued by the USSR in 1957 and Ghana in 2014) as communication media convey meaning about these international relationships. The importance of Derrida’s account of communication will be considered in Chapter 3 below.

Indeed, Jang & Paik (2012, p. 197) consider that, as a precursor to soft power, “complex interdependence gets its driving force with the advent of network society”; a statement that simultaneously refers back to Foucault’s conception of networks, and Poster (1990) who refers electronic communication to Derrida’s *The Post Card*.

Guen's (2009) fifth category of soft power is "geared towards a domestic audience rather than an international one", raising the question of the audience for the cultural expressions within the space programme. Guen does however continue by saying that "without an international dimension this category could not exist", acknowledging thereby that the international dimension, in his opinion, is ever present. In support, Sheehan (2013) challenges what he calls the 'China threat' school of thought" and proposes that China's space programme is "overwhelmingly driven by domestic rather than international considerations".

Domestic considerations are evident and are discussed in terms of ideology in Chapter 9. For example, in 2014 the Chinese government conducted a mass consultation by internet on the name to be given to the lunar lander accompanying Chang'e 3. These names were published by individuals who had registered their identity on the web page. The day after an editorial in the state-run newspaper, Global Times (2015), commented "The disturbing thing is that the Chinese public does not have a strong will to catch up with the US in space exploration...Perhaps it is time China sets up a special organisation for space exploration", a second activity was established to name the Chinese research satellite that will investigate "Dark matter" (Chinese Academy of Sciences, 2015). In these examples, electronic communication conveys messages, intentional and unintentional, about science, civilization and culture, and popular participation

Guen also speaks of a "soft power Balance of between the US and China" (Guen 2010) p2. The Chinese analysis of soft power is analysed by Young & Jong (2008) who warn (ibid., p. 455) that "there is currently no consensus on the definition of soft power in China". They note (ibid., p. 415) that in its application it "rests on three resources: culture, political values and ideas, and foreign policies" and discussions in China fall under national development strategy and foreign policy.

Mahbubani (2018), in his "provocation", argues that the West – by which he means Europe and the USA – have lost their geostrategic *savoir-faire* at a time when Asian countries, predominantly China and India, are ascending in relative world economic power. In earlier work (Mahbubani, 2005) he argues that the US view of China, which

he says is erroneous, is that “the current Chinese government is a relic of the communist era, a piece of history that has mostly vanished” (p. 51). Referring to new dynamics, an interview with him is reported in China Daily with the sub-heading “Asian intellectual says the West must come to terms with a multipolar world” (Moody, 2019, p.31). *Multi*-polarity, a challenge to the *uni*-polarity of American hegemony, gives one context to consider China’s action in space.

In practical terms, considering the relation of India and China, Baru (2015) considers both countries to be “civilizational states” *and* that “multipolarity or polycentric dispersal of power and prosperity defines the normal state of the world.”

Significantly, competition in space exploration between India and China is prominent in the work of Bagla and Menon (2014). Thus the authors refer to a *realpolitik* (p49): “. the dream [of going to Mars] picked up steam with the loss of the Chinese mission in November 2011 and ... this was like a door being opened for ISRO [India Space Research Organisation] to sneak in a proposal for Mars exploration.”

In the case of the Russian Federation, Lavrov (2011) asserted that a strong national identity is the basis of soft power, seeking “the affirmation of our country as one of the leading states of the modern world — as befits and follows from its history of many hundreds of years.”

Andreev (2014) added that “By its nature, national identity has clear international dimensions. First, national identity is evaluated by public opinion and elites around the world. This is the matter for soft power. Second, the external environment influences – indirectly or intentionally – the formation or transformation of national identity at home.

Andreev concludes in his paper that “Both factors are closely interconnected. A country that takes a more deliberate approach to formulating a conceptually cohesive identity will be more successful at projecting its image abroad. Conversely, a less cohesive national self-consciousness is more susceptible to outside propaganda and its image is more vulnerable to distortion.”

Makei (2014) comments that “Identity politics” are gaining in importance, or at least, in recognition as important. He considers that “It is becoming vital to all countries, because all of them need to address the causes that give rise to discrimination, aggression, and alienation. They need to do that, first and foremost, for the sake of their own domestic peace and stability.”

In addition to the assertion of identity as a significant factor in our analysis of the soft power relationships between states, and in the power relationships within them, Makarychev (2011) examines “multipolarity” (external and internal). He applies (p3) “the idea of resignification” to trace “the discursive trajectories of the multipolarity concept”, and introduces Polycentrism (Makarychev (2011) p.18). Finding it to be “in tune with Michel Foucault’s (and Gilles Deleuze’s) theorizing of power as a combination of different spaces which may overlap yet preserve their relative autonomy”, he seeks to “single out domains of *political power* with its key holders possessing of vast military resources and securitization abilities; *managerial power* which manifests itself through the instruments of governmentality, including technical (de-politicized) administration and policing; *disciplinary power* that acts in the forms of regulatory mechanisms of constantly – though slowly – evolving norms; and *bio-power* which trans-nationally takes the forms of “responsibility to protect” and “humanitarian interventions”.

Makarychev concludes that “The fragmentation of power relations into spaces/segments, which is at the core of the Foucauldian approach, seems to be quite consonant with the poly-centric worldview, since each of the forms of power presupposes its own key subjects that are in principle unable to balance – in a traditional sense – each other due to different mechanisms, institutions and resources they are based on”.

Lukyanov (2014) introduces, within the world order, “Polycentric Transformation”. He comments that “A new world order, much spoken about at the turn of the 1990s, has never emerged, and attempts to establish it (unipolarity, American leadership) have failed”

We locate, then, a national identity as the root of soft power, within a multipolar world, and a polycentric country. This applies to China as much as to Russia. The action is polycentric, multi-polar and extends upwards into space.

Other easy but non-threatening answers

Commentators have been addressing the imperative for China to have a space programme in formulations alternative to military domination and hegemony. They have considered: prestige; a “place at the table”; science and technology; affirmation of national cultural identity; a national and cultural dream; and/or a threat to the United States.

Sheehan (2013) considers that (p. 111): “One of the key motivations for the Chinese space programme is the pursuit of prestige. Such prestige provides political benefits for the Chinese government and the CCP [Chinese Communist Party], and affirms China’s 21st century status as one of the most important countries in the world”.

Dupas (2010, p.147) in his review of the history of space exploration in China by particular historical reference to the former Soviet Union and to the contemporary Russian Federation (ibid., pp. 233ff), considers that China follows its own path in independence, but without excluding international co-operation. He raises the prospect of a China in co-operation with the world at large.

Kulacki and Lewis (2009, p.30) consider that China is seeking what they call, in metaphor, “A place on the mat”. They observe that during the Cold War there could be only one “first”, only one winner of the “Space race”, in which both sides feared “falling behind” (p.31), but “By contrast, the Chinese metaphor carries the connotation of joining a club, becoming a member”. They distinguish this from other explanations including seeking national prestige or boosting the legitimacy of the controlling regime.

Yao (2010) considers the importance of manned spaceflight to China and highlights “two themes: Science and Technology” and “Chineseness”. These two are interrelated. By “Science and Technology” she refers to “the important role of military, science and technology concerns” in the late Qing dynasty (early twentieth century) and notes that “it [the role] was a product of the national-identity making and a demand

of the national spirit". This point expresses the significance of Chinese characteristics, national direction and historical significance, which continue within the Chinese space programme as institutional reform.

The “China Threat” as an easy answer

A most prominent and easy answer – but not the only one - is that of the “China Threat”. This is an easy answer which is found frequently in proponents of the national security of the USA and its allies. As Roughneen (2018) reports, succinctly, “With the U.S. Government pledging to resume manned missions to the Moon, and eventually send a mission to Mars, Cold-War-style competition over space exploration is re-emerging – between China and the US this time”. Allison (2015) considers that China, as a rising nation, falls into the “Thucydides’ Trap” of unavoidable war with the USA. Considering all the “others” who might threaten the national security of the USA, he writes: “The preeminent geostrategic challenge of this era is not violent Islamic extremists or a resurgent Russia. It is the impact that China’s ascendance will have on the U.S. international order, which has provided unprecedented great-power peace and prosperity for the last 70 years”.

Forden (2008) reviews the likely consequence of a Sino-American war in space, and concludes (p. 151): “The short-term military consequences of an attack by China on U.S. space assets are limited. Even under the worst-case scenario, China could only reduce the use of precision-guided munitions or satellite communications into and out of the theatre of operations. They would not be stopped”. But Wang (2010, p.565) claims that China’s “Intentions can change as capabilities rise”, thus leaving entirely open the possibility that military aggression on the part of the PRC would be intentional and could not be stopped.

Co-operation with China in space technology remains a contentious issue in some quarters. Joske (2018) reports on the Chinese military’s collaboration with foreign universities on such things as the 北斗 Běidǒu navigation system, “risks harming the West’s strategic advantage...Helping a rival military develop its expertise and technology isn’t in the national interest, yet it’s not clear that Western universities and governments are aware of this phenomenon.” Hamilton and Joske (2018) extract the

central information and claims in this report for a public but non-technical audience in Australian news, thus perpetuating the answer in the Western consciousness.

By simply asserting the opposite, the idea of a competition or race between China and the US (or India), or even a threat to the USA from China, does not entirely go away. It is therefore important to broaden the discursive arena and consider if there are any other settings for space policy and the Chinese conversation about it, which might have validity.

The First Lens between Western commentators and China

The Chinese Government is itself promoting a national space culture, which is the object of study in this thesis. This term “space culture” is accepted by Dunnet (2016), concerning the history of the British Interplanetary Society, who writes (p. 17): “we have seen the significance of culture, place and narrative in formulation of this discourse” [the geopolitics of outer space]. It is possible, then to talk of ‘Culture’ as an accepted term not only in the reference to nation or civilisation and this examination also addresses the concept of “Place” (Chapter 6) and the term “narrative”, discussed in Chapter 3.

It is acknowledged that within this culture of China the Chinese Communist Party’s ideology is paramount. The comment made at the lecture to the Shanghai Aurora Vocational College, presided by the Party Secretary of the Shanghai Satellite Engineering Institute, the keynote speaker to an audience including students of the 18th Senior Party School presenting the ideological and political framework of “Chinese Spaceflight Across the World”. (Huang Min, 2017), speaking of “national humiliation” in the twentieth century, is profound. “Humiliation” is a frequent word seen in twentieth century Chinese history.

But it is important to note that this thesis is written in the West. If, in the aerospace spirit, China recovers from this twentieth century humiliation, then it is the culture implicit in the methodology and epistemology of this thesis that has been at least partially responsible for the humiliation.

Schudson (1997) refers to the need for “a normative order that insists on equality and a social order that insists on a certain level of public-ness in talk.” Crucially, looking at the outsider to the public conversation, he writes (p. 306): “Strangers will

miscommunicate because they do not share background knowledge and communicate to common norms”.

For this thesis, while permitting the eclectic use of concepts across twentieth-century analytic thought, while permitting Foucault, Derrida and Habermas to work together, as it were, the use of a critical discourse analysis or OSINT owing to them can avoid neither their own cultural background nor the walls of the Enlightenment, Renaissance and Classical philosophy against which they kick. To acknowledge our differences is a step forward in overcoming them.

The Second Lens on China

Some commentators of the Twentieth century protested that the opprobrium attached to the word “Communist” in relation to the Soviet Union might not or should not apply to the Peoples’ Republic of China. The question about the nature of Chinese communism arose before and after the founding of the People’s Republic, in the 1940s. In a wartime pamphlet, Owen (1942) reports on both Chiang Kai-Shek and Mao Tse-tung (contemporary spelling). Asking “Was it really Communism?” Owen, journalist and former and future Liberal Member of Parliament, draws attention to the rural and peasant origin of the Chinese Communist Party (CCP), and introduces the idea of “Rural equalitarianism” as its root.

Similarly, the respected author on China, Edgar Snow commented that (Snow, 1968, p.219): “Chinese communism as I found it in the Northwest might more accurately be called rural equalitarianism than anything Marx would have found acceptable as a model child of his own.”

John F. Kennedy, later President, referred to this idea in a 1949 speech (Kennedy 1949). In a context of the recent victory over Japan, he wrote, in a rhetorical disagreement: “There were those who claimed, and still claim, that Chinese communism was not really communism at all, but merely an advanced agrarian movement which did not take instructions from Moscow.”

Stormer (1964) followed this line of argument in his claim that the description as “agrarian reformers” was a product of conspiratorial manipulative obfuscation (p.30, 56) and that China was as Communist a state as the Soviet Union, and by implication, the enemy of the USA.

This debate does obscure the origin of the CCP in rural society at a time of lesser urbanisation. This urban /rural split is important in contemporary China. In a review of the Belt and Road Initiative, Wang shows (Wang ,2017, Figure 13 p.116) a geographical split along what he calls the “Hu line”, a diagonal from the North-East to the South West, isolating the rural society of the West of that line from the (mostly coastal) cities to its East. Despite the argument that China may or may not be a fundamental movement proposing rural equalitarianism, following urban migration and the growth of urban areas the Chine Communist Party is faced with a geographical inequality and an adaption to modernity.

The Third Lens on China: ethnic group and regional differences

Within China, not only is seen the split along the Hu line, but also a society which is admitted to be multi-ethnic. How could it be otherwise, when the modern country extends over such a distance to all points of the compass, and dispute continues over lands? Yet, as Lee points out (Lee, 208 p.8) the “West’s experts and specialists” “had long been treating this vast and ethnically, culturally and linguistically complex land as a homogenous entity.” Lee writes that (ibid., p 15): “it is assumed by scholars trained in the dominant tradition of sinology that ‘Han’ is generally equal to ‘Chinese’ – a convention maintained by the current regime.”

The cultural products reviewed in this thesis include references to this ethnic dominance. Astronauts propose a legend from space which can be interpreted as reference to unification of North and south, and cultural items are generated and postmarked from places in Inner Mongolia, Xinjiang and the South China Sea, with the encouragement by the national space programme, as a means of promoting solidarity amongst aerospace workers.

Lee considers that (ibid. p.113): “The old only becomes problematic when aspects of premodern culture are recycled as ideology to justify conservatism and repression of both the individual and society as a whole, as has been the case with Confucianism since the 1990s”. The question arises whether the Chinese use “culture” within its space programme to support the programme or to support a unified Han culture across the PRC. The social construct of Confucianism will be visited later in this thesis (Chapter 9).

Lenses between researchers and space exploration

The fundamental question is to ask why space exploration exists: why, as Kennedy asked, go to the Moon? Arguments by space advocates will be addressed directly in later chapters of the thesis. Here, we shall just establish dominant assumptions which may come between researchers and the phenomenon.

The military/civilian relationship in space activities

Assertions about the relative emphasis of military and other missions described variously as “scientific” “sustainable” “environmental” or “civilian” may seek to distinguish perceptions about missions in space.

Gaubert and Lebeau (2009) give a typology of space activities, although debate about space exploration and utilisation often blurs this typology. They first of all (p. 42) separate the civil from the military, “although both may make use of the same technological base and the same launch methods”. Because some space rockets are also derivative of war missiles, and because some of space policy is oriented towards the military as well as or instead of civilian uses, this distinction is helpful in broad terms. However, one cannot be too precise about this. The American astronauts who went to the Moon were first trained as military pilots, and the Chinese launch infrastructure is not distinct between space and military missions. China refers to its “Two bombs and One satellite” programme of the 1960s - the “Spirit of the “Atomic Bomb, Hydrogen Bomb and Satellite Project” theme (CASC 2016) - in its published accounts of space exploration, and continues to write of its programmes in a military context².

Further, within the civil activities, “the use of space as a tool with which to access new knowledge, especially about the Universe and planet Earth, and its use to provide services which affect the sovereign responsibility of states and especially the security of people and property” is distinguished (ibid. p.42). Here can be seen a distinction between a narrower national interest and a broader interest of humanity.

² I was refused permission to photograph a statue in a school in China on the grounds that the subject, Yang Liwei, was a military pilot, and therefore I was considered to be a spy.

Finally, human spaceflight, a term which includes crewed spaceflight also known as “manned” spaceflight, is considered as a separate category within the typology. This category covers notions of travel in extreme environments, hardship, difficulty and heroism.

Frameworks of Space Exploration and Utilisation

Within contemporary space policy there are currently two main frameworks of conversation about space exploration, each of which provide a lens through which to see the Chinese programme.

The European Space Agency (ESA) identifies four phases of space history: Space 1.0 was the mystical experience of the Cosmos of ancient cultures; Space 2.0 was the so-called “Space Race” between the USA and USSR that led to the Moon landings; Space 3.0 was the beginning of space co-operation, and the International Space Station; and we have now started Space 4.0, a new interaction between governments, the private sector, civil society and politics, with ESA working with the Chinese space agencies in a spirit of international co-operation to tackle the immense problems of human travel to Mars, and other challenges.

In a comment which can be applied to this “Space 1.0”, Macdonald (2007), considers that (p.596): “While it would be unwise to glibly conflate the terms “space” and “heaven”, there is clearly some interesting work that could be done here, remembering that heaven is no less a geographical imaginary than the Orient or Occident”. In this comment he demonstrates clearly that the concept of space, and of its exploration, is a framework amongst other frameworks, and by extension, in need of critical analysis.

There is another framework of thought. In America, some commentators group themselves around the idea of “Space Age 2.0”. They see Space Age 1.0 as having been the successful American space programme up to at least the early 1990s. Space Age 2.0, they say, is an imperative for American values, the American military, and American business. This assertion is fiercely competitive, and challengers are seen to be a national threat.

There are different ways to establish where the Chinese characteristics of space exploration fall. The Chinese government publishes its space policy and programme

in White Papers and in statements to the media. Archives of the American and former Soviet Union governments are now becoming declassified and available to read. These archives have been interpreted by authors from different perspectives, including feminism and post-colonialism. Political geography casts light on the distribution of ships and bases that are dedicated to space exploration and established worldwide. The China Post Office sells models of spacecraft and issues several commemorative postage stamps that people collect. Exhibitions of the current Chinese programme are shown in Chinese museums and galleries, and young adults have their memories of China's first steps in space as they saw them in school. Chapter 3 establishes the principles of epistemology as they apply to cultural items in China about space exploration.

The lens of significance in terms of Expenditure

The budget of China's space programme in comparison with other spacefaring countries could be considered to be an indicator of relative importance (Figure 2.1 below). But it is difficult to compare national expenditures on space exploration, not only because of finding the dollar equivalent, but also because China's centralised planned economy is secretive when it comes to the cost of such things as launch sites. In Figure 2.1, Niall McCarthy, data journalist on the statistical website *Statista*, shows that the USA has overwhelmingly the highest expenditure on space exploration, with China (CNSA) coming in behind NASA, the Russians, the European Space Agency and Japan, but above India (McCarthy, 2014).

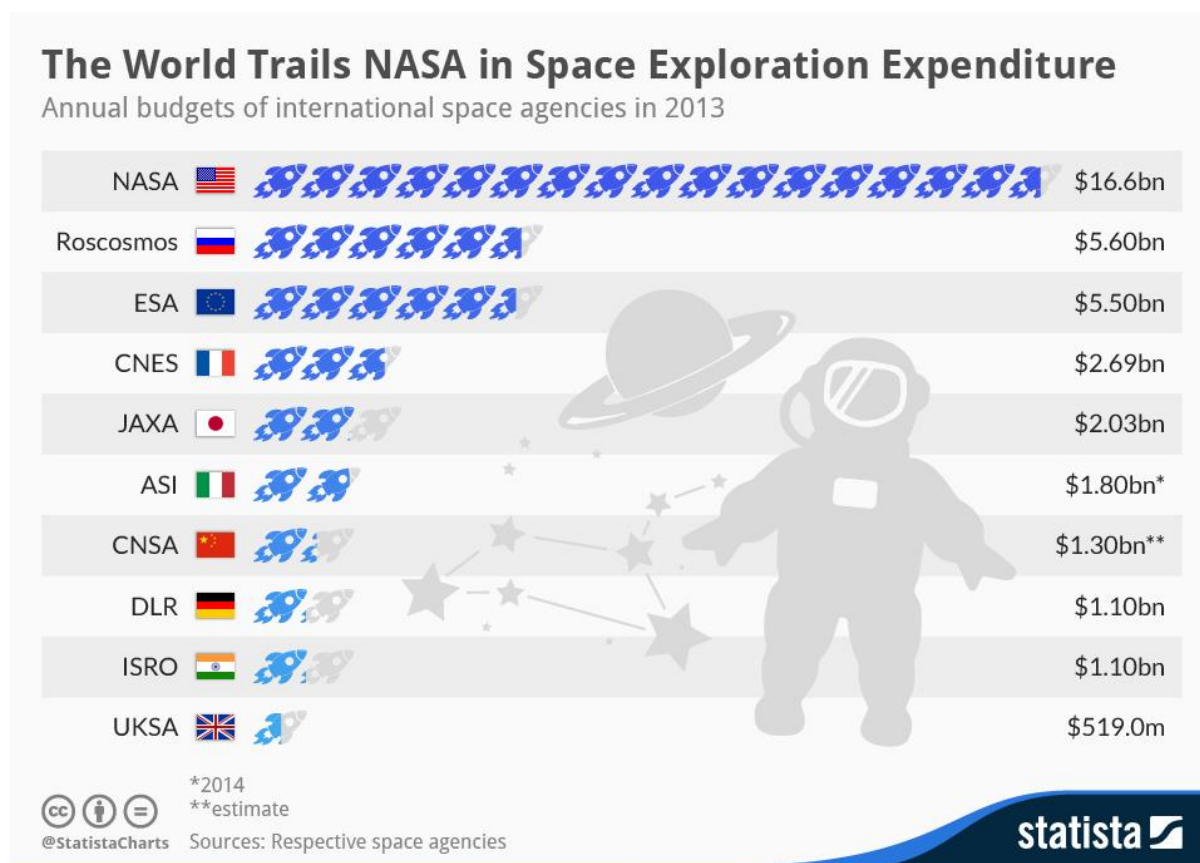


Figure 2.1: World Comparative expenditure on Space Exploration (McCarthy, 2014)

India is a significant nation to compare with China. It is a space-faring nation in its own right, with missions completed to Mars and the Moon; it is located in East Asia; and, unlike Japan, it is not allied to nations of the West. Like China, India has in the past had some support in space exploration from the Soviet Union. The country is highly competitive with neighbouring Pakistan and indeed has had wars with both Pakistan and China. India can therefore be considered as a geo-political rival to China.

Summary: and conclusion to Chapter 2:

In viewing the Chinese space programme it has been demonstrated that there are a number of lenses between China and the Western researcher. Chinese space culture is difficult for the Western researcher to discern. The perception of competition between China and India (or the USA) does not depend on the behaviour of one party and can offer a partial explanation. The “China Threat” might provide at least an answer to those hoping to increase military expenditure in the West. National identity,

dominant culture, “a place on the mat” or “national humiliation” might be found in the “Chinese characteristics” of that space culture. Expenditure on the space programmes of different countries is not really comparable, and the relation between military and civilian objectives remains open.

Within contemporary space policy, the views of the Chinese space programme from key spacefaring countries of the West – Europe, and India – are different again from the views of the USA. China faces Europe in terms of cooperation, but like India, seeks to develop its indigenous capacity for technology. Unlike the USA, Europe cooperates extensively with China in space research. But India and China compete industrially and strategically, with occasional and historic border skirmishes.

This study will now look more closely at the conversations about space exploration within China and between Chinese people. To do so requires not just a methodology. Methods of textual analysis already exist within Open Source Intelligence, but they have been borrowed from critical methodology without consideration of the epistemology and ontology that underlies it. Without prejudging the data and assigning “easy answers” to it prematurely, this thesis now turns to establishing the use of cultural products.

3: Epistemology and Methodology

This study challenges easy answers, seeks to examine anew the discourse of space exploration and utilisation in China as it is expressed in public, and sets out an ontology (about what the institutions are and how they are created, maintained and changed) (Schmidt 2008, p. 313), of this discourse which relies on simple basic texts in the public domain.

The data in public sources at the time of writing are official and archival, or ephemeral, particularly leaflets and advertisements. Websites may not survive and news stories are not always archived. Weldes, (2014, p. 233) considers official and archival text to be “High data”, and the remainder “low data”. Both are valid data sets.

This new approach requires an explicit epistemology (about what we can know about institutions and what makes them continue or change with regard to interests and norms) (Schmidt 2008, p. 313) to lie behind its methodology. This is set out below. To make sense of these texts, this thesis acknowledges their different antecedents (extending to twentieth-century revolutionary slogans) and perspectives (as the thesis is written in a twenty-first century European environment). In its final discussion, the thesis considers how far European critical theory can go in understanding China, and whether there are limits.

Principal Methods

The methodologies used in this thesis are within the domain of critical theory. Held (1980) describes “the motivation for this enterprise [of critical theory]” as, within an interdisciplinary research context, laying the “foundation for an exploration” of questions considering the conditions which make possible the reproduction and transformation of society, the meaning of culture, and the relation between the individual, society and nature.” Here, critical methodology is based on an epistemology and ontology from which meaning can be discerned and derived. The methodology follows the data.

The data which are used are images, photographs, texts and written, as literature, fiction and non-fiction. Considering photographs, Hainge (2008) reviews the photographic image and the work done by it and introduces indexicality, by which he means (p. 716 “an ontological precondition of photography”. Thus, photographs taken in this study are presented through the medium of this thesis and are based on the

existence of things in the real world outside: there is (p. 717): “an indexical relationship between copy and original in the real world”. Ohn (1976, p.6) points out that “as in any communication, the meaning of a photographic statement is socially constructed and contextually bound” and refers to “visual codes” that accompany it.

By analogy, written statements from the outside world, as well as photographic statements, when gathered together, are mediated by this thesis to extract meaning. One process of mediation is the categorisation of statements by subject area. Examples of this categorisation include, in this thesis the indexicality of texts: from Australian newspapers about the early days of space exploration; from contemporary accounts in newspapers of identified places within space exploration; a comprehensive list of international links in space exploration between China and Europe; and an account of places in China which failed to produce a contribution to space education and which now lie derelict.

Accepting, with Hung (1994), Hopf (2002), Wong (2014) and particularly Weldes (1999, 2001, 2003, 2014), that the interpretation of cultural products including fiction (here, science fiction) can be used to hold conversations about China, this thesis relies on this cultural material to study the phenomenon of the Chinese space programme. However, there are two important caveats.

First, in contemporaneous work, Thomas (2018, p. 137) argues that in reading science fiction about China by Chinese authors, although may be possible to discern an underlying coded reference to modern Chinese society, it is not necessary to do that in order to understand the story. This allows for the fact that there can be many different interpretations. Secondly, no researcher can claim that the interpretation of fiction that is offered in her/his work can be definitive. In an ostensive manner, however, it may be that the view through one of the lenses gives a greater insight or prediction of Chinese space policy than another. More likely is that no particular lens gives a full view of the subject.

The interpretation of fiction on its own can be best described as speculative. On the one hand, Wong (2014) introduces a modern political video advertisement entitled *The Chinese Professor* in which China absorbs American debt, is portrayed as a threat to the USA, and links this to novels of the nineteenth century, notably *Looking Further*

Backward by Edward Vinton. He calls this “counterfactual fiction”, meaning that the invasion of the USA by China predicted in 1890 did not happen. But it is not always so clear-cut. For example, two British novels from the beginning of the twentieth century, *The Riddle of the Sands* by Erskine Childers, and *Spies for the Kaiser* by William Le Quex, proposed before 1910 that Germany might invade England by sea and that a war would result. There were, indeed, two major wars between Britain and Germany in subsequent years. William Le Quex’s novels are credited as joining the inspiration to establish the British Security Service MI5 (Andrew, 2009, p.14). It cannot be said that these novels predicted a war erroneously.

In practical terms, the selection of fiction is not comprehensive but relies upon availability. Hopf (2012) considered the social construction of international politics by using cultural products including fiction, and points out that (2002, p.13): “ I selected novels through an informal survey of dozens of booksellers on Moscow’s streets and metro landings, as well as cashiers in several Dom Knigi (House of Books). When I asked what books were selling in late 1998 and early to mid-1999, four novelists came out on top (I chose for purely personal reasons not to read books on the occult).”

In this thesis, no overall epistemology is chosen *a priori* and then applied, better or worse, to the data, but rather, within a framework of critical theory, a specific insight attributed to a particular philosopher is gained in this study when the data show it.

Therefore, the methodology allows for a preliminary understanding to be prepared, then as statements are assigned to this preliminary model, insights allow re-coding and new categories and relationships shown. For this reason the analysis is always moving. Hopf (2002, p.xi), makes implicit his subjectivity in the initial stage: “My first move was toward interpretivism, toward an understanding that the only reality of interest is intersubjective, what humans construct themselves rather than the objective reality assumed, or assigned, by the putatively omniscient observer.”

Defending, he writes that ““As an interpretivist I should have no greater or lesser confidence in the reliability of my findings than any other social scientist using mainstream methods. If I give my list of texts to any other scholar, I expect that she will find the same identities with the same meanings that I did, with three stipulations. First, reliability should be very high in contextualising identities within their sources,

less high when it comes to intertextualising them, and still less high (and perhaps quite low) when aggregating identities into discursive formations. The problem is caused by the increasing level of theoretical priors and idiosyncratic personal expertise involved in synthesising discourse from identities. The ultimate arbiter of this exercise is the reader, who offers alternative readings and so questions the very validity of my own.”

Hopf’s “idiosyncratic personal expertise”, whilst valid, implies that, as Weldes (1999, p. 122) points out “all texts are susceptible to multiple readings”. Her later essay leaves open the question of whether alternative and valid intertextual relations could not be found, that is to say, whether or not any author using that method can give an authoritative answer to such a question in this way.

We note above the problems with alternative “counterfactual” histories – fictional accounts of the present and future that assume that a historical event did not occur, or occurred in a different way. But this thesis has discovered multiple narratives, some in opposition to each other, and so we do not seek to choose a final authoritative answer.

The overall study may extend to making a contribution to a new and developing “discursive formation” of Astrosociology, one of whose sub-studies is the relation of human space travel to “Terrestrial Spacefaring Societies” (Pass, 2014).

Epistemology

De Waal (2015) expresses his concern about understanding Chinese objects, thus: “China brings authenticity up close and personal. How do you read objects where authorship seems so dispersed? What credit do we give and to whom?” Here he is reflecting the intellectual and cultural distance between himself and the origin of the object.

This distance is a particular feature between China and Western researchers. Palmer (2018) laments that “Nobody knows anything about China – Including the Chinese government“. In his view: “We don’t know anything about China because, in ways that have generally not been acknowledged, virtually every piece of information issued from or about the country is unreliable, partial, or distorted”. The United States’ Central Intelligence Agency (1996) has blamed the Chinese themselves, commenting on what they call “the art of China-watching” that it is imprecise “hardly deserves yet to be

called Sinology”. The CIA places the blame for this with “the way the Chinese conduct their affairs”, concluding that “To say the Chinese, have a penchant for secrecy is almost an understatement...” While the problem is acknowledged here, there is no such caveat in the conclusions drawn.

Given these circumstances, a technique of gathering intelligence called “Open Source Intelligence” or OSINT is one technique employed, in which open data are analysed by methods that owe their origins to critical methodology. To use these techniques in this thesis is to meet intelligence analysts on their own ground, but here the need to take time to express the epistemology, as well as the methodology, is distinctive.

The ontology and the account of epistemology that follows in this chapter is as eclectic as the range of antecedents and perspectives are broad. This thesis considers that, individually and in a unique configuration, the metaphysical insights of major philosophers of the twentieth century do root the application of techniques of critical analysis, which were developed in the same time frame of the philosophy, and which are applied here to the phenomena in question.

But this thesis does not bring with these insights an adherence or favour to one thinker’s approach over another, and therefore defies and challenges labelling, whether “post- structuralist” or “post-modern”, and so on. Rather, it is as if we are in a darkened room, and insights periodically flash and illuminate its contents like the flames from flickering matches. We seek to keep this illumination as long as possible, but not to hand over control to one philosopher alone. By embracing this eclectic and pragmatic approach, this thesis will defy any attempt to be classified to a particular school, other than to say it owes its metaphysics to that recent last half of the twentieth century and first quarter of the twenty-first, which is coincident with the building and development of the Chinese space programme. Woods (2009, p.26) flags up the power of Latour in approaching the political history of space exploration. Latour himself (Latour et.al. 2011, p.59) is in sympathy with a pragmatic approach when he writes: “...the opposition between pragmatism that works as a method and not as metaphysics seems to me wrong in a way, because what is so interesting about pragmatism is basically because it allows you to go places. It is a trajectory, a way of doing things.”

Tuan (1991) adopts a similar approach in his review of language and the making of “Place”. He describes three main approaches to the sociolinguistic construction of Place: language at the level of epistemology and at the hermeneutic interpretation of landscape; language in relation to power, which he considers “deals more with techniques of control, social hierarchy and inequality, domination and its contestation, than with the creative acts of making and building” (1991, p. 685); and a “narrative-descriptive” approach (1991, p. 686) which “Draws on the first two approaches, absorbing them into its story line, without pausing for theoretical overviews or going into analytical detail”. Crucially (ibid.), “theories hover supportively in the background, while the complex phenomena themselves occupy the front stage”.

As the epistemology and consequent methodology has developed, in tandem has developed the Chinese space programme. To that extent, this thesis is the application of a rigorous methodology to a social manifestation of science and technology, the application and the manifestation progressing hand-in-hand.

Thus, texts of the great thinkers, including *maîtres à penser* (Venn, 2008 p. 122) are chosen for the illumination they bring as they are placed together in the building blocks of the new argument which now follows.

Edkins (1999, p. 25) described two routes of analysis – from which are found metaphysics - deriving from the linguistic analysis of Saussure. Located along the first route, which she defines as “structuralist”, are Roland Barthes and Claude Levi-Strauss.

A first epistemology follows Barthes’ distinctions between sign, signifier and the signified. Thomas (2010, p29) considered this illumination of the discourse around Soviet era and modern Russian text and images including postage stamps showing the First Cosmonaut Yuri Gagarin. Texts and images are considered able to act as signs which act in signification of something else. This argument can be developed to show (in Thomas, 2010) that Gagarin has become chosen to be a signifier of aspects of contemporary Russian society and politics. It is important to realise that a signifier can be, in Venn’s term “hyper-saturated” (Venn, 2005, p. 122), by which is meant that it has soaked up so many meanings as to have become meaningless in function.

An initial question is the legibility to Westerners of the Chinese language. Despite a common Western misunderstanding of the presence of phoneticization in Chinese written Hanzi 汉字, what matters is neither the written word nor the phoneticization of it, but the communication of meaning that goes with the word. Barthes was fascinated by the image-like nature of Chinese writing and found there a purity of expression of meaning in written image that resonated with Jacques Derrida's own consideration about communication in an ideophonetic script.

In this context Hayot (2012) makes an important observation of the *Tel Quel* group's (including Barthes') infamous misadventure to the People's Republic of China in 1974 (p. 123): "The major characteristic of China as *Tel Quel* understood it had precisely to do with [a] movement between an exotic and ancient culture, disconnected from the political and economic geography of the world, and a powerful, exciting *actual* place able to participate and shape a geopolitical vision. During the years leading up to, and including the trip to China, it is this China – the disjointed and yet intensely real object produced by these two visions – that drives *Tel Quel's* theorizing and its cultural politics, figured in the chimera of a *cultural* revolution" (emphases original).

Pleyne (1974), who was part of that *Tel Quel* visit to the China of the Cultural Revolution, reflected that (p.13): "a book on China justifies itself by bringing an additional knowledge, a privileged approach and therefore more illuminating of the "foreign secret."³ It remains (p.12)⁴: "that Western product that is called a book about China".

As Hayot argues later (2012, p180): "'China' in Western texts is always something that the West makes up for itself, something whose causes lie largely within the demands of Western aesthetics, thought or political economy," and "any ontological construction of China necessarily stems from Western desire rather than from anything in China".

³ " ... Le livre sur la Chine se justifie d'apporter un surcroît de connaissance, une approche privilégiée et donc plus éclairante de la "secrète étrangère""

⁴ ce produit occidental qu'on appelle le livre sur la Chine

The discussion of the China space programme as it is manifested must therefore take place here within these Western constraints, and so it has a silent prefix for any reader, “*It appears to us in the West that...*”

Ephemeral cultural materials

A theoretical approach is sought that can embrace text and image, and move forward with it to gain insight into human space exploration as it is narrated in the discourse of a society. To do this requires a diversity of source material and a broad epistemology.

To Derrida we owe a metaphysics of ontology and epistemology which permit the understanding of thought behind the word, and therefore the use of ephemeral materials as a valid text, including of course (by reference to his eponymous oeuvre) post cards (Derrida, trans Bass, 1987).

Derrida writes in a literary style about philosophical problems of truth and falsehood in communication beyond the script, here in *Les Envois* about post cards. Such post cards and postal ephemera have been used directly to illuminate written and machine-produced communication, falsehood and the ideophonetic Chinese script (Thomas, 2015). In this thesis, discursive cultural materials, including post-cards, sculptures, models, texts and drawings, were obtained or copied from Chinese organisations.

Postal products have been considered as popular and ephemeral materials which offer a simple and obvious analogy with the *Envois* chapter of Derrida’s *The Post Card* (Derrida, 1987 Trans. A Bass). All these items are considered to be texts as supplements to social interaction from which public conversations are created and placed into discourse.

A second epistemology derives from Lévi-Strauss (1965)’s classic text *The Story of Asdiwal*. Lévi-Strauss is concerned with what may be revealed about an underlying social organisation from the presentation of myth within a culture or within variations of that culture. He considers (1965, p.16) the construction of a myth as “a series of impossible mediations between oppositions.” We see this series in the construction of the conversation about the Chinese space programme; it is a recognition that a hyper-

saturated signifier such as “the Space Race” or the “China threat” is inadequate in itself when compared against another.

The approach permitted by Jacques Derrida encourages the validity of ephemeral text and image, and is distinct from that of Jürgen Habermas, representing the Frankfurt School, where critical thought provides what Foucault calls “an ontology of the present” (1983) that is the specificity that comes from techniques of analysis. Michel Foucault (1983) describe a philosophy of general truth, for which we can consider texts from a Derridian school and a school of critical theory to be equivalent. Habermas (2006) is scathing about general texts and prefers a structure of analysis within cultural studies as well as in science. This distinction between Derrida and Habermas (Tully, 1989; Rorty, 2006) is important, because on the one hand we can allow general observations of texts and images, and on the other offer simultaneously a structured, critical analysis. But as Nelson et. al., point out (1987, p.10): “It is not necessary to accept everything that either of these corrosive theorists has said in order to learn from them. What they most obviously teach are the rhetorics of myths and stories. Time and again, these wild men of contemporary “discourse” have provoked starts of recognition by discovering residues of oppressive myths within scholarship itself”,

This application of critical analysis stands above the disciplines of science, culture, or art, but values them equally as analytical disciplines, and allows a composite relationship of discourse between actors to be understood.

Habermas drew attention to the “Public Sphere” of society, whose description he considered “a realm of our social life in which something approaching public opinion can be formed”. (Habermas, Lennox, & Lennox, 1974). This fundamental concept applies here in that it allows the critical study of human collective activities. At an early stage (Habermas, Lennox, & Lennox, 1974, p49) Habermas refers to the role of conversation: “A portion of the public sphere into being in every conversation in which private citizens come together to form a public body”. We shall return to “conversation” later in this Chapter.

Habermas’ (2005) dedication to deliberation and analysis find itself expressed in methods of critical analysis, as promoted by Fairclough (2010), who emphasises the relations between discourse and its social relevance, whether deliberative or

discernible. Critical Discourse Analysis does consider the internal relations of the discourse, but the network of relations extends to the “semantic, conceptual and classificatory” and does not draw networks.

Fairclough (2010, pp 69ff) considers mediated texts and images – texts where there has been “movement and transformation of meaning” (p.28) in social re-contextualisation. His example is the transition of formerly socialist countries, specifically in his example, Romania, towards being market economies and western style democracies.

One of his examples is a leaflet enticing customers of a furniture shop to join a “Golden Club” of repeated or “loyal” customers. He describes the leaflet, emphasises its exhortation to become “privileged” in membership from which economic benefits (discounts) flow. Fairclough conducts a step-by-step analysis showing the significance of the illustrated document and what it can speak of concerning Romania.

We can take his analysis and apply it to the Chinese space programme. Figure 3.1 below is the reverse of a postcard, the blank of which was issued by the dedicated “Space Post Office” in Haidan district of Beijing, a zone where centres of space exploration are located.



Figure 3.1: “Eastern Miles”

Within the general expression of “The blessing from space” (a term discussed later), this particular issue has been overprinted with a text in red (to the left of Figure 3.1) which reads (in pinyin and translation):

太空盛世万里共享

Tàikōng shèngshì wànlǐ gòngxiǎng

Space; prosperity; thousands of miles; share together

神九对接，举国欢庆。

shén jiǔ duìjiē, jǔguó huān qìng.

Shen Zhou Nine Docking, the whole country celebrates it.

“东方万里行”邀您共享此太平盛世，

Dōngfāng wànlǐ xíng” yāo nín gòngxiǎng cǐ tàipíng shèngshì,

“Eastern Miles” invites you to enjoy this peaceful prosperity.

并诚意恭祝您阖家安康，

bìng chéngyì gōng zhù nín hé jiā ānkāng,

And sincerely wish you and your family the best of health,

万事如意！

wànshì rúyì!

Everything goes as you wish!”⁵

⁵ I am grateful to staff at the Confucius institute at De Montfort University for their help in translation, and to a friend in China who gave me the card originally.

Fairclough (2010, p.71) considers the “Golden Club” text in the restrictions and permissions of the structures of the Romanian language. He pays attention to the customer of a “privileged” status and the use of the present tense. Noting the illustrative context (in the Romanian example, of red and gold and a woman’s manicured hand holding the card), he reads this example as “Membership of the ‘club’ is offered not just as a way to get a good deal, but also as a status symbol and marker of distinction for people who are preoccupied with such symbols and markers”.

In this example, on the occasion of the docking of the ShenZhou 9 spacecraft to the Tiangong-1 space station, an invitation is given by China Eastern Airlines to join the national “peaceful prosperity” and corporate good wishes are given to the recipient of the postcard. The invitation also advertises its initiative called “Eastern miles” which is a loyalty scheme for regular travellers on the airline⁶.

Fairclough concludes his analysis of the Romanian invitation leaflet (2010, p.82) that “the discourse of ‘competitive individualism’ is enacted in the practice of the ‘loyalty card’, and inculcated in the identities of members of the economic elite seeking competitive advantage with respect to both material and symbolic goods through membership of the ‘club’. In the Chinese example, it can be seen that similar references to the individualism and the economic elite of China are applied, in the context of a national celebration of an event which is part of the national space programme. Thus, the Chinese Space programme is used here as an illustration of national pride, economic success, prosperity, peace, and individualism, in the corporate atmosphere of a new China.

The loyalty card itself is not present in either the Romanian or Chinese examples, but as Fairclough records: “One might add that it is materialised in the personalised, technologically sophisticated card itself (as one card holder ironically told me, ‘it makes me feel important’.)”

In contrast to more structured critical methodology, the French *maîtres à penser* notably Jacques Derrida and Michel Foucault, describe studies of this human discourse in a way that allows all forms of communication and expression. Habermas’

⁶ See: <https://baike.baidu.com/item/东方万里行/17531517?fr=aladdin>

critical approach contrasts with the ontology owed to Derrida where all texts in international relations or human space travel are equal and interchangeable.

Although, like Derrida, his writing can be rather dense and opaque to read, especially in translation, Foucault draws upon a literary-philosophical heritage (Steiner, 1971), and in many ways acts a bridge between the two ontologies. In defining Structuralism, Foucault wrote: (1986a, p. 22) that it was “the effort to establish, between elements that could have been connected on a temporal axis, an ensemble of relations that makes them appear as juxtaposed, set off against one another, implicated by each other – that makes them appear, in short, as a sort of configuration.”

In his early work, Foucault (trans. 2002, p. 41) went some way towards critical analysis. Calling for implications of language to be brought forward, in considering “a system of dispersion, whenever, between objects, types of statement, concepts, or thematic choices, one can define a regularity (an order, correlations, positions and functionings, transformations)”, he writes that “we are dealing with a discursive formation” and seeks to avoid words “such as ‘science’, ‘ideology’, ‘theory’ or ‘domain of objectivity’.”

Thus Foucault is explicit here that he says he is talking about language and what is conveyed by its use. This point will receive further elaboration below when his concept of “heterotopia” is discussed, by reference to comments by Catherine Malabou.

As he elaborates in *The Order of Things*, within the present-day episteme or paradigm the word is interposed between self and object (Steiner, 1971) so the act of carrying out a categorisation – an act to differentiate – is an action to point a name at an object. At large is the issue of how to point and what the target of the pointing should be.

In relation to politics, he deduces (Foucault, trans. 2002 p. 214) that “One would try to show whether the political behaviour of a society, a group or a class is not shot through with a particular, describable, discursive practice.” Habermas discerns a process of deliberation in his “deliberative democracy”. Democracy exists in China in the sense described by Crick (1962). But Foucault seeks to reveal the structure of “power-knowledge formations” (Habermas, 1992).

The Derridian experience of texts treats them all, whether analytical science or science fiction, whether writing or image, with equivalence. Habermas (2005) uses his analytics to show deliberation within what he calls the “public sphere” and discerns a

political process of “deliberative democracy”. But there is no claim here that democracy exists in China. However, Foucault seeks to see the structure of “power-knowledge formations” (Habermas, 1992 p209) in the discourse. By considering history, Foucault discerns what alternative has already been, and to extend this argument, to consider what could be, within this generality of text that has been granted by Derrida.

This thesis applies semiosis, in Fairclough’s expression (2010, p. 69) in that it refers to language, text and visual modes. Points of grammar are, however, rare, Where the interwoven text is not present but implied, the device of a “lens” is used, by which is meant, an interrupted viewing which unintentionally adds a text to the image and text being read.

The importance of cross-referencing between text and image and culture is considered by Rose (2012, p. 205) who suggests that, through intertextuality, iconography may be a bridge between semiology and discourse analysis. Chinese image icons can be sought in various ephemeral cultural items seen in the summer of 2013 in Shanghai and discussed as preliminary “Chinese Characteristics” in Chapter 8. Their references to structure, text and fable are considered below to have an importance in the public conversations in China about the Chinese space programme.

In later work relevant to this essay, Foucault (trans. Miskowiec 1986) is concerned with sites defined by sets of relations and created a descriptive term, “heterotopia”:

“I am interested in certain ones [sites] that have the curious property of being in relation with all the other sites, but in such a way as to suspect, neutralize, or invent the set of relations that they happen to designate, mirror, or reflect. “

A “heterotopia” is implicit in the discursive language that responds to the question “Where?” and that in the reply is punctuated by a dislocation in place and time. It can be thought of as a place defined not by location but by function and direction, such as a cemetery, a ship, or a honeymoon. Such heterotopia may also be found in space exploration, and the concept of a ship as a heterotopia may be applied to space vehicles in motion. Heterotopia in the exploration of space are discussed later in this thesis.

Perhaps “outer space”, which also contains material objects such as planets and stars and space ships, can be considered as a heterotopia, in that it is a response to the question “where” but cannot be located in itself. In Chapter 7 is shown attempts by young schoolchildren (in China and the UK) to confront this question.

Neo-institutional theory

Wagenaar (2011, p. 10) considers: “Because of its grounding in practical policy work,” he writes, “interpretative policy analysis is both contextual and situated. That is, it proceeds by immersing itself in the concrete problem-solving efforts of ordinary social actors”.

This metaphysical approach is both ontological (about what the various components of the discourse are and how they are created, maintained and changed) and epistemological (about what we can know about them and what makes them continue or change with regard to interests and norms).

Neo-institutionalism (Hasse and Krücken, 1999), also known as “third-phase institutionalism” (Lowndes and Roberts, 2013, p. 54) pays heed to the local social context and offers a theoretical approach to the real-world activity of structured organisations, such as the national and international space agencies, in “the specific *combination* of formal and informal mechanisms that constrain political behaviour in different settings, and which may be both the object and the subject of attempts to change (however imperfect).” (Lowndes and Roberts 2013, p. 54).

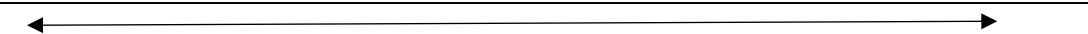
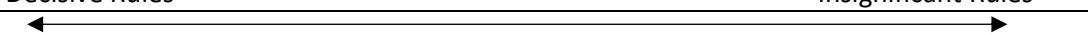
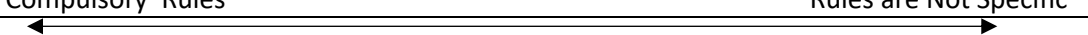
Senge and Hellman (2016, p. 19, translated) consider that “that the influence of institutions leads to an isomorphism between organization and institution or between organization and environment.⁷” They introduce the importance of *process* in neo-institutionalism: “However, the boundary between organization and environment as well as between organization and institution is not to be defined as a rigid and unambiguously definable dividing line, but organizations and society stand in a permanent process of constitutional relation.⁸ (ibid., p. 19, translated).

⁷ “Wichtig ist aber für die neo-institutionalistische Perspektive, dass der Einfluss von Institutionen zu einer Isomorphie zwischen Organisation und Institution bzw. Zwischen Organisation und Umwelt führt”.

⁸ “Die Grenze zwischen Organisation und Gesellschaft stehen in einem dauerhaft prozessualen Konstitutivverhältnis”

In a diagram (ibid.; p. 45, Figure 3.2, translated) Senge further defines “Institution” by introducing Rules. Three types of Institution are considered: factual, social and temporal. Rules for factual institutions flow along a spectrum of “decisive” to/from “insignificant”; for social institutions, along “compulsory” to “not specific”; and for temporal institutions, to and from “long-lasting” and “for the moment”.

Illustration of the Definition “Institution”

Quality	Institution
Factual	
	Decisive Rules Insignificant Rules
Social	
	Compulsory Rules Rules are Not Specific
Temporal	
	Long-lasting Rules Rules for the Moment

After Serge (2016 p. 45): Translated.

Figure 3.2: Illustration of the Definition “Institution” - Translated and adapted from Senge (2016, p. 45)⁹.

Lowndes and Roberts (2013, p. 201) add *Narratives* to Rules and Processes (or Practices) and consider that “while rules, practices and narratives constrain actors in their own right, it is when they work together that they are the most effective.” The principle of effectiveness to joint working applies in this thesis to the categorisation below of Setting, Social Practice and Public Conversation.

Schatzki (2001, p. 3) writes that “Practice theory ... joins a variety of “materialist” approaches in highlighting how bundled activities interweave with ordered constellations of non-human entities...understanding specific practices always

⁹ *Abbildung 1: Illustration der Definition “Institution” (graphic image)*

involves apprehending material configurations". Succinctly, Swidler (2001, p. 80) considers that "Practices ... lie behind every aspect of level of social causation." For Lowndes and Roberts, (ibid., p. 62), "Practices are specific to a particular political setting, recognized and shared within that setting, and are enforceable. As such, they are distinct from actors' personal values or broader cultural or normative tendencies within society".

But in identifying "narratives", some of these practices, expressing the term "...with Chinese characteristics", may be distinctive to China (Thomas, 2017a) and tendencies such as a tension between individualism and collectivism including Confucianism (Hofstede, 1991; Hofstede and Bond, 1988; Mouer and Sugimoto, 1986), or the limited history of science in China (Russell, 1922), should not be overlooked, and are considered further below.

Roe (1994, p. xii) addresses narration and its study. Distinguishing narrative from text, she writes that "Text and reading are core to contemporary literary theory's focus on the narrative, and this theory and focus proves immensely helpful in addressing the major policy issues of the day". Lowndes and Roberts (ibid. p. 63) define as follows: "a narrative comprises several embedded stories, so that while a narrative is an account of the "grand conception" a story is a specific contextualised exemplar which supports and enriches our appreciation of that conception. Narratives embody values, ideas and power". Bal (2017, p. 5) broadly agrees: "A narrative text is a text in which an agent or a subject conveys to an addressee ... a story in a medium". In this thesis, the term "reading" is substituted for this term "narrative text".

Van Eeten (2007, p. 252) introduces the idea of sequence or chronology into the narrative. "Narrative is, generally speaking, the narration of a series of events, where an event is defined as the transition from one state to another". Kaplan (2017, p 180) reads this as a fixed sequence: "...it is hard even to imagine something without at the same time conceptualising it as something that follows one thing is the preamble to something else. What would the experience of going to sleep be if one could not

conceive it as a point on the way to full sleep?” Boswell (2013, p. 622) unambiguously places this sequence in time: “narrative is defined as a chronological account that helps actors to make sense of and argue about a political issue.” Bal (2017, p. 7) concurs: “An event always takes up some *time*. This time is often important for the continuation of the *fabula*” [the *fabula* is the underlying sequential set of events, distinguished from a *plot*, which may be in any order of presentation]. She adds space to time: “Events always occur *somewhere*, be it a place that already exists (Amsterdam) or an imaginary place (CS Lewis’ *Narnia*) [a study in fiction of adventures in an imaginary place].

Brooks, Purser and Warren (1952, 1964) read a literary narrative according to various structural priorities:

- A story with a plot “involving sequence and cause” (pp. 10,11)
- “the order, the pattern is ... the meaning of the story” (p. 12)
- “embodies an interpretation” (p. 15)
- “A certain logic of organisation” (p. 15)
- Evolution of a “conflict that is implicit in the original situation” e.g. “changes of position” (p. 23)
- “a setting implies a certain action” (p. 24)

In so doing, they stress that the relations between texts or readings of texts require a grammar or certain logic of relationships in which certain implications are present.

It is clear that within specific neo-institutionalist theory the use of “narrative” is adduced in relation to “institution”, “rules”, and “practices”, and enjoy meaning specific to that theory. In this thesis a broader vocabulary is developed. “Narratives” are considered here to be close to “public conversations” in which narrative and counter-narrative may mingle freely.

Hoerber (2018) applies a methodology of “framing” to European space policy. He considers that “frames” (p. 2) “make sense of the world, establish interaction in society

and define the limits of social action.” Hoerber also makes a direct connection between frames and neo-institutionalism.

In this thesis, the specific meaning of “Rule” and “Frame” is replaced by the notion of “Settings”, as first they apply to works of fiction, then to written accounts and drawn images, including assertion, polemical statement and point of view, and then applied finally and more generally to ephemeral text and images. Here, written texts and image data are re-assembled through social practices into stories in a public conversation with the characteristic structures discovered through literary criticism. This process of framing or establishing settings offers a preliminary analytical approach to the complexity of the popular public conversation in China.

Therefore in this thesis the specific word and notion of “Narrative” is replaced by “Public Conversation”. Elaborating on the reference in Habermas, Lennox and Lennox above (1974, p 49), Schudson (1997) considers conversation in the public sphere, and identifies what he calls “homogeneous conversation”, in which participants “talk primarily with others who share their values and they expect that conversation will reinforce them in the views they already share” (Schudson, 1997, p.302). Wyatt et al. (2000) develop this idea to distinguish between conversation as “talk for its own sake” and “formal deliberation” which implies an agenda and purposefulness oriented towards decision-making. If this purposeful deliberation is absent from the public conversation in China about space exploration, the settings for the conversation can be established, together with the social practices which maintain it.

The conversation examined by the choice of Derridian materials is a political conversation in that it that reveals relationships of power. A visit to a museum in China (for example, the Industrial Museum in Shenyang) will show that an explanation of space exploration already exists: it is in the context of scientific and technological progress, either in Marxist terms about the inevitable transformation of society from feudalism to socialism, or specifically with reference to the Leadership of the PRC as attributed to meetings of the Party Congress. Thus, an author in the Department of Literature and History in the Communist Party of China’s Central Party School, Cong Zichen (2016) argues that “”science” contains Natural Science and technology, “but at

the same time should include social sciences and humanities – is Marxism not considered scientific in this sense?”

This application of critical analysis stands above the disciplines of science”, “culture”, “and art” etc., values them equally and allows a composite discourse between actors to be understood.

Open Source Intelligence (OSINT)

This thesis appropriates some of the language used in debates about China by speaking of “Intelligence”, which can be considered as information of interest and consequence to the intelligence community of nations. It therefore meets these analyses on their own ground.

Williams and Blum (2018), for the RAND Corporation, describe techniques of analysis which act on public (open source) information to produce “intelligence”. OSINT is defined (2018, p. 8) as “publicly available information that has been discovered, determined to be of intelligence value, and disseminated by a member of the IC [Intelligence Community]. This information predominantly derives from social media published by individuals in personal accounts and comments on the internet, but its origins are more formal published media and propaganda from target nations where access is difficult or denied”. Thus, OSINT uses ephemeral material.

OSINT also acts on so-called “Gray [American spelling] literature”, defined (ibid, p. 11-12) as “content that comes from non-media individuals and organisations, both public and private. It includes material from research establishments, national governments, private publishers, corporations, trade associations and unions, think tanks, and academia”. Williams and Blum note that (ibid. p15): “there are still cases in which a collector is required to physically acquire information in hard copy, particularly in the developing world, where Internet usage by institutions may not be widespread”.

There is therefore no shortcoming in the use of physical ephemeral material materials as such, but as with all such literature it needs to be processed. The first step is validation of the material, including translation, and its contextualisation. Characteristically in second-generation OSINT software packages are used. Within OSINT distinct methodologies derived from critical discourse analysis apply. Three are

considered below: *Sentiment analysis on Social Media*, *Lexical Analysis* and *Social Network Analysis*. In this thesis, all three act upon grey literature.

OSINT: Sentiment Analysis on Social Media.

Neri et al (2012) describe “a burgeoning industry with a plethora of companies offering Sentiment analysis services in social media. Sentiment Analysis and Opinion Mining are established, although nascent, fields of research, development and innovation. The goal is always broadly the same, to know ‘who’ is speaking about ‘what’, ‘when’ and in ‘what sense’.

The authors refer to software used to analyse postings on social media that is (ibid. p. 956) “used by some security sector – related institutions and agencies in Italy”. By implication, they are used in other Western nations.

There are logical components of this software are (ibid. p. 952), which define the operations needed to analyse such social postings and conversations. In iterating Neri et al. below, the components described set out a sequence of analysis which can be conducted outside the use of software:

“A Crawler, an adaptive and selective component that gathers documents from Internet/Intranet or database sources”

“A Semantic Engine, which identifies relevant knowledge in the texts, by detecting semantic relations and facts”

“A Search engine, that enables Natural language, Semantic and Semantic-Rule queries”

“A Machine Translation engine, which enables automatic translation of search results”

“A Geo-referentiation engine, which enables an interactive geographical representation of documents”

“A Classification engine, which classifies search results into clusters and sub-clusters recursively, highlighting meaningful relationships among them, or assigns documents to predefined thematic groups”.

These “engines” in software are better described in methodology as an iterative process of analysis and synthesis, grounded in data.

In a system in the real world, a “Global Bio-event Tracking System, “Global Argus”, is one such automatic system (CIA, 2008a, 2008b). Argus “is based on monitoring social disruption through native language reports in electronic sources around the globe” (CIA, 2008a). It monitors “Direct markers”, that is, reports of disease, and “indirect markers” including: “Demand for medical services; Local perception of threat; Official acknowledgement of threat; Official action against threat; and Integrity of infrastructure. In a case study, a mystery illness in Sichuan province, China, Global Argus captured Chinese electronic media which described an unusual event, and turned to “local sourcing”. Despite bans on reporting and an indication in the English language that the epidemic was declining, Chinese language sources indicated an increase and noted the shipping of vaccine in the province (CIA, 2008b).

From Global Argus it can be learned that access to the electronic media in Chinese can give an accurate account of a phenomenon which is not fully explained in English language media, even after machine translation.

Some of the steps described by Neri and in Global Argus have been applied in this thesis manually in relation to a target website of Chinese social media. A specific website containing public expressions about space exploration has been found (so no need for a Crawler); all comments in a timeframe have been downloaded (the Semantic and Search Engine functions bypassed); a Machine translation engine has been used, supplemented with personal knowledge about the target language (see the Note about translation at the beginning of this work); no geo-referentiation data has been available; and the results have been classified into clusters.

Results of an investigation of a target website (the Crawler function) is described later, in Chapter 8.

OSINT: Lexical Analysis

More complex analyses of Chinese electronic text have been undertaken in this thesis, by capturing text, mostly by machine, and translating it into a linguistic corpus

containing as much of the discourse as is practicable, which is then further analysed as a whole. Two such lexical analyses are conducted in this thesis.

The term “lexical analyses” might be applied more widely in the Chinese social practice of producing commemorative postal products.

OSINT: Social Network Analysis

The third application of OSINT methodology is the Social Network Analysis. This thesis uses the grey literature of postal items sent between individuals self-associated with organisations within China which are active, or likely to be active, in space exploration.

Williams and Blum (2018, p. 27-31) show that the intent of Social Network Analysis is “not to explain the individuals but to understand the network of connected actors”. Here, the focus on the social networks (rather than on the intertextuality) shows a level of meaning extra to the images and texts on the artefacts themselves.

The Social Network Analysis described in Chapter 9 below uses the software programme Gephi to draw sociograms from two-factor relations, the sender and recipient of postal items. Gephi is described by its inventors (Bastian, Heymann and Jacomy, 2009) as “an open-source software for graphs and network analysis...an open source network exploration and manipulation software”. It includes a visualisation module which creates sociograms – diagrams in which relationships between individuals are plotted by line.

In this thesis, the analysis is applied to the discovery of a network engaged in a social practice of exchanging postal products.

Not only do postal products provide a means of communication, they also have a direct reference to Derrida’s epistemology, and they are material items. Materiality acts here to meet the test of authentication. Considering this materiality, Edwards (2012) describes the material nature of processed photographs as objects of affect. She notes that “photographs are objects specifically made to have social biographies (2012, p. 222). She adds that (ibid. p. 223) “photographs have divergent, nonlinear, social biographies spread over divergent multiple material originals and multiple, dispersed and atomized performances”. Here, the material object of a photograph is a participant in a performance. Asking rhetorically (ibid, p. 224) “Why do photographs as “things”

matter for people?” she refers to a model in which the photograph is a set in “a fluid set of productive relationships” in which the “material properties are themselves signifying properties” (ibid p 223-4). A material photograph is therefore a signifier within a network of relationships.

Materiality is not a feature which applies only to printed photographs. Kopytoff (1986), remarking on the “cultural biography of things” notes that “there is clearly a yearning for singularization in complex societies... sometimes the yearning assumes the proportions of a collective hunger...there is a continuing appeal in stamp collecting – where, one may note the stamps are preferably cancelled ones so there is no doubt about their worthlessness in the circle of commodities for which they were originally intended” (Kopytoff page 80). Thus the postal item that has been in circulation has no other postal function, but retains its commemorative and celebratory ones.

But it leaves a trail in which is recorded a network of people who have participated in this commemoration and celebration. This is a social network, a network of people or social actors where individuals are interconnected. According to Wasserman and Faust (1994, p5), in social network analysis “the unit of analysis is not the individual, but an entity consisting of a collection of individuals and the linkages between them”. The connections of individuals may be shown in a sociogram, (ibid. page 74) or like those shown in Chapter 9 below.

Therefore, the analysis examines a social practice, looks at the network revealed by the transfer of the material commemoration through the postal system, but does not consider the content of the text conveyed in the grey literature, except insofar as it categorises the commemoration as being related to Chinese space exploration.



Figure 3.3: A commemorative postcard sent from postal code 214431 to 214433.

Figure 3.3 above is a reproduction of a typical commemorative postcard used in this study. The texts and images include: the choice of postage stamp; the image of the ship (an image of the space programme); the cancellation postmarks of sender and recipient post office; crucially, the date of the cancellation of the origin which shows the event being commemorated; and the postal addresses of sender and recipient. In the Social Network Analyses the last item is considered only. The identity of the recipient (addressee) has been removed from this example, but two postal codes (zip codes) are present. The six digit number on the lower left of the image is the sender's postcode (214431), and the six digit number of the top left is that of the area including the recipient (214433). The study uses faces of approximately 300 postcards and envelopes.

Wang (2019) reports that China intends to enhance and make more accurate its system of postal codes, adding that “they could also be of use to the public security authorities”.

Travers and Milgram (1969), using the postal system, generated “acquaintance chains” between people intermediary to a starting person and a target person, establishing empirically the mean number of link people between any other two people, in what he call the “Small World Problem”. Gransovetter (1973) considers weak ties between individuals, and in responding to comments on his paper he writes (ibid, p 527) “Networks are, of course, only a necessary, rather than a necessary and sufficient, condition for the level of organization needed to achieve some political goal”, and in so doing he shows the importance of these networks to social organisation.

Sociograms showing weak and strong networks between individuals are drawn figures from a technique formerly known as “traffic analysis”. This is a technique used in modern warfare and intelligence to determine a structure, usually that of an enemy army, from the interchange of messages, usually intercepted by radio, without knowledge of the content of the message, which is usually secured by cryptography. Sparrow (1991) calls it “network analysis” and applies it to criminal intelligence by bodies engaged in the enforcement of law. For him, central questions include “who is central in this organization?” and “what role or roles does a specific individual play?” (ibid p 252).

Williams and Blum (2018, Figure 3.2, p. 28) describe a number of sociograms, including: a dyad between two individual nodes; a triad; a star network of contacts radiating from a central node; a line network in which individual nodes are only related to one or two nodes in a linear sequence; and a circle network (a line where both ends are joined). Several of these structures have been identified in this thesis.

As the mathematics of network analysis are able to be applied, a calculation of Density of the network as a whole can be made from which it may be deduced how overt or covert it is; “Between-ness” and “Centrality”, measures of control by or between nodes can be made, by which important players can be identified mathematically; and “Closeness” and dependency of information by which less-informed nodes may also be shown.

To sum up, then, this study uses materials, whose meaning is of commemoration of space exploration, that have been distributed along a social network or networks in China; the distribution has ceased and the trace of the entry and exit points of the act of distribution have been recorded, and will be drawn together in sociograms to show these networks.

Specific Methods of data analysis – Content analysis using N’Vivo

As argued above, “Outer Space” is not a material destination, but contains material destinations within it. One further aspect of this thesis is to examine the naïve meaning of “Space”. This section is grounded in a postulation of human agency in the journey into “Space”, but in an iterative, retroductive approach, extends into considering heterotopia and other notions of agency.

This critical analysis of the work of children in an English primary school (Thomas 2017a) commenced with the categories of space explorers as set out in the key set of categories in the study of human space travel provided by Parkinson (1998). Parkinson writes from the British Interplanetary Society, which is an influential British body of space advocacy. He considers that the rationales of those humans who participate – and there are others who do not – can be grouped into six: *Explorers, Adventurers, Colonizers, Merchants, Profiteers and Technologists*. He summarises the rationales he identified within the astronautics Community in Table 3.1 below:

Group	Comment
Explorers	We need to explore the Universe to discover the answers to fundamental scientific questions. (Changes human perspectives e.g. Apollo 8 photograph of the whole Earth.)
Adventurers	Going somewhere where no-one else has been. (Parkinson specifically refers to comments of children).
Colonizers	We need to colonize space in order to survive and to open up new possibilities.
Technologists	A fascination with the technology of space flight in its own right, and a belief that development of such technology is of general benefit.
Merchants	Ultimately, value can be measured in market terms.
Profiteers	In crude terms, people who find it easier to get money and make profit out of the Government than working in the commercial market place

Table 3. 1: Summary of Rationales Identified within the Astronautics Community (as from Parkinson, 1998, p275-277)

Statements and components of drawings made by students were assigned initially to these categories. The focus of the critical analysis was, properly, the discourse, and not the individual student. A number of ideas developed in the grounding of real data, including Foucault's concept of heterotopia.

A discourse of statements or complete phrases was identified in essays submitted by the two classes of an English school. Using the software package to construct qualitative data content, *N'vivo*, a grounded data model was prepared as shown in Figure 3.4 below. The model is designed to reference data from other studies and not all categories were appropriate to this study. In addition, some new categories became evident while coding, and statements were re-coded as the analysis continued. Typical statements or phrases attributed to each category are summarised below (the statements have not been corrected to Standard English). In the accompanying presentation the contributing images are emphasised.

It should be noted that some statements are coded to more than one category.

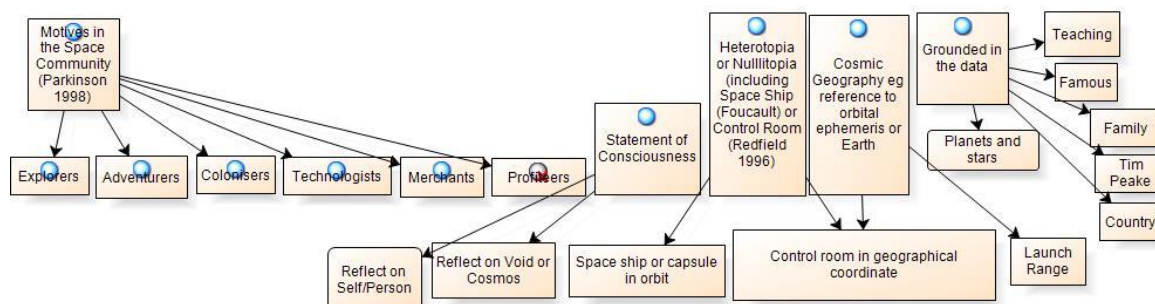


Figure 3.4: The data model prepared in N’vivo 10

After an iterative process of coding, the results of the discovered discourse are summarised in Chapter 7 as “Space Advocates in the Classroom” This shows the data category and one or more texts that have been coded to this category, and which represent either a number of similar expressions or which, in the author’s judgement, illuminate another facet of the discourse.

In the balance of the chapter, these essays and images are compared with equivalent processes in the Chinese classroom, in order to tease out the Chinese characteristics of the discourse in school.

A General Overview of Q-methodology

This thesis, whilst adopting interpretative method, is careful to root itself in an ontology and epistemology. It does not simply use critical methodology, or Open Source Intelligence, in the absence of it. In addition, having argued for the use of cultural items, and presented them in explanation, it tests these conversations in as empirical an analysis as possible. This is where summary texts which have been proposed in earlier chapters will be graded in importance by Chinese people in a “Q sort” exercise.

A “Q-sort” is an empirical and statistical technique to examine the relations of statements in a discourse to each other. Participants sort statements according to their relative perceived importance. The factor analysis of their resulting Q-sort identifies the underlying themes of this mass or popular discourse.

Brown (1986, p73) describes a set of related data elements as a “concourse” of statements and advocated a method of analysis called the “Q sort”. There are a number of classic methodologies for the Q sort exercise (e.g. Müller et al, (2004); McKeown and Thomas, (2013); and Watts and Stenner (2012)) and their application in this study is described below.

All assume a cognitive science of “operant subjectivity” which Brown has described rather vaguely (1986 p73): “the statements of a concourse, like particles in a liquid states, have no predetermined order or importance. That they condense in to a particular order is due to the fact that meaning is projected onto them by a person in the course of Q-sorting... it is the subjective self that is the centre of all meaning.” The phrase “operant subjectivity” is archaic to modern Psychology, but the referent and that of the older phrase “the subjective self” can be replaced with “human information processing” with no damage to the procedure.

Cognitive Psychology considers networks of meaning as the representation of encoded knowledge, and human information processing – one model is Rumelford (et alia, 1986; MacClelland et al, 1986)’s “Parallel Distributed Processing” - allows for this, as found, for example, in the method of social network analysis. A data model can be built in software, whether of a social network (*Gephi*) or more generally (*N’Vivo*) and relationships between data elements shown. The data elements in the network or structure can be taken from the texts.

The method “Q-sort” offers, at least at the initial phase, an empirical test, in which a previously unknown underlying factor might be discovered. The representation of meaning, considered as a network, can be examined empirically.

The Q method is a structured and recorded interaction between a population of people (known as a “P set”) and a set of statements which is designed to encompass the discourse of the topic under discussion (“Q Set”). The records of the statements are then subjected to cross-correlation and factor analysis with the aim of reducing the dimensions of the discourse to a small number of factors (Watts and Stenner, 2012; McKeown and Thomas, 2013).

The rationale for using the technique of “Q-Methodology” is as follows. The methodology of “Q-Sorts” is introduced (van Exel and de Graaf, 2005) as (ibid., p. 1) “a foundation for the systematic study of subjectivity, a person’s viewpoint, opinion, beliefs, attitudes and the like”. Crucially, it is a *systematic* study. Q sorts have been used elsewhere to understand the latent meaning of words or phrases. This work builds upon that tradition. It is necessary to use this method to extend beyond mere correlation, and instead want to know which statements can be interpreted as ‘meaning the same thing’ to people.

Müller and Kals (2004) start with the objective for social researchers to get a sense of measurement of subjective opinions and thoughts. Acknowledging the mainstream quantitative social research techniques, they point to a method called “Q method” in which structures of thought can be discerned, and then in a second stage subjected to a process of inference to meaning. The term “Q” distinguishes it from other quantitative techniques which are increasingly being called “R-method”.

As an example of published work using a Q Sort, van Exel et al (2007) investigated the informal “attitudes” of care givers towards respite care. Other examples include the study of those people affected by airport traffic and noise. In this thesis, the disparate elements of the public discourse about space exploration in China is investigated by means of Q- methodology and a resulting composite popular public conversation is presented.

Conclusion to Chapter 3

This thesis moves away from the “easy answers” and starts with “high” data of official and archival documents. It continues with its particular contribution of the use of the “low” data of ephemeral cultural products. We apply tools of critical methodology to text and image about the Chinese space programme, and note their use in “Open Source Intelligence”. Crucially, however, we seek to explore the ontology and epistemology that underlie them. Using interpretation as a technique is accepted as valid, but, recognising a need to justify a study in terms other than personal idiosyncrasy, a further method, the Q –sort, is outlined.

In the next chapter we consider the “High data”, official and archival literature, in which intertextuality is present, in more detail.

4: Literature review – “High data”, official and archival sources

In this chapter, official sources, both contemporary and archival, are examined in their context. Such data constitutes Weldes' (2014, p. 233) "High data". Open archives of declassified documents give a historical reference to China in an historical context, and official publications which remain extant set out the limits of contemporary debate about space exploration and its occurrence in China. In the archival set of documents, the American perspective of their cold war with the USSR is described as it is relevant to China in the same period. The latter half of this chapter reviews documents which show a framework for relations about space technology between China and Europe. Finally, Western, Chinese and Indian accounts of China's space programme are given to show comparative perspectives.

Kulacki and Lewis (2009) concerned themselves with an apparent lack of understanding, particularly in the United States of America, about the nature and objectives of China's space programme, aiming to demonstrate "how the available history can help foreign observers better understand Chinese intentions" (p. 4). In these terms, their study has a direct benefit to practitioners in politics and particularly within space policy. They use sources published in the Chinese language to achieve their aims. As noted earlier, following Caro (2019, p. 84), the account taken below from archives is not presented as a full account or bibliography of the archive itself, but as establishing a heuristic by which conversations may be interpreted iteratively. The choice of sources, in terms of hard data, is critical to the success of this study. This thesis continues to use Weldes' "low data" but reflects on the following account.

Identity

Earlier it was noted that national identity can be taken as a key factor in the formulation of national policy. Can Space exploration play a part in this process of asserting identity? Other countries than China have considered how space exploration can contribute to national identity. In the case of the European exploration of space, Blamont (2009) describes how a European identity is asserted by its space programme:

- “Europe is made of a number of States. Its identity is a specific relationship between differences which gets stabilized. It is a process, a passage, a milieu.
- Different definitions: geographical, historical, political (EU, ESA, Council of Europe), conceptual (tradition since the Antiquity).
- Major concepts: rationality as a paradigm and unifying heritage, citizenships law, enlightenment, culture, justice, trade; idea of universalism.
- Culture of freedom.
- Culture of innovation, progress, welfare, conflict management, focus on practical applications of science to be integrated.
- Transgressing frontiers. There is a European concept of peace, conceived not only as the absence of war, but a condition for opening out for men, a desire to move from fear to hope.
- Long history of partnership inside and outside Europe, among Member States and with the whole world.
- Biggest aid distributor (52% of world total development assistance), largest trading block, signatory to numerous multilateral environmental agreements, carries out conflict prevention and crisis management missions throughout the world.
- Major problem: identity. We have Europe, now we need Europeans¹⁰”

• ¹⁰ Attributed by Blamont to (*B. Geremek*)

Blamont continues in his paper to consider, from a perspective of European Space Policy, the issues directly relevant to space exploration:

“Then what connection between identity and space?

- Europe must have robust and effective space capacities because of their importance in economy, defence, communications. Without a space policy, Europe could become irrelevant.
- But this necessity is not recognized. Only 20% of Europeans consider space activity as very important, 40% important (the “very important” is a criterion for a real contribution to the identity)
- Space in Europe has to have a unified voice
- Europe has to create projects in space as a good servant instead of a bad master, and these projects have to become known and cherished by the public. “

Blamont therefore establishes the importance of space exploration to European identity. In this light, such names within the European programmes as “Copernicus” and “Galileo” refer to a pan-European cultural identity which is used to assert a pan-European identity of the countries participating in the political structure. Thus, the name in the programme promotes an identity directly. However, when in China reference is made to “Chang’e” for example, it is promoting just one cultural identity, the dominance of the Han: there are no cultural references to Inner Mongolia, Xinjiang Tibet or Islam. By extension, these factors based on identity which can be considered within the setting or framework of popular participation in space exploration in China, and its transmission to soft power, may be similar in appearance, but different in application.

The setting for archived and declassified reports

The “Space Race”, that “hyper-saturated” signifier, is the setting in which official documents, now in archives, were written, with the implied action of the setting. In the following chapter the thesis will return to what the “Space race” meant in popular conversation in the hemisphere which includes China.

Declassified and published state documents from Russia and the USA set out the sequence of events which initiated a so-called “Space Race” between the two countries with special reference to China.

The Wilson Digital Archive (Protocol No. 1, 1957) records a meeting in Moscow on September 11th 1957 between the Soviet Ministry of Defence Industry and representatives of the Chinese Peoples’ Republic, led by Qián Xuésēn. The Russian side was headed by Deputy Minister of Defence Industry Domarachev and included Deputies Zverev and Rudnev. In this first meeting the Chinese delegation sought assistance from Russia in the production of guided missiles.

The Chinese team identified their “preparation of cadres” at the Beijing Aviation Institute, the Xian Aviation Institute, the Nanjing Aviation Institute, the Chengdu Institute of Communications, the Beijing Polytechnical institute, the Polytechnical Institute of North China, the Military-Engineering Academy, and the Engineering Academy of Communications.

Three institutions of higher education were identified separately: Qinghua Academy, Jiatong University and Harbin University.

After discussion, Domarachev summed up by agreeing to present the USSR’s view on the Chinese agreements, and to consider the request to transfer models of the R2 rocket.

The minutes of the next meeting are not available at this source. On September 23rd the Domarachev and Qián delegations met again (Report on Meetings, 1957). The record also refers to agreement on 13th September that China would establish two

separate new research institutes. At a further meeting on 16 September 1957 (recorded on the 23 September) China pointedly asked “What technical help will be provided by the Soviet Union?”

The next day Rudnev, the Chief Engineers, Designers and Constructors of the space programme, Korolev, Keldish and Semenov, penned a note to the Central Party of the USSR on the orbital space research work under way (Записки В. М. Рябикова 1957) 2008, p 72-4):

“... according to the decision of the Central Committee of the Communist Party of the Soviet Union, adopted in February 1957, two trial launches of simplified artificial satellites of the Earth (objects PS) should be carried out with the use of the R-7 rockets with minimal alteration as the carrier to the range of these targets.

At present, the basic work on the union of the first two objects of the PS is completed”¹¹.

The letter continued to describe Sputnik-1.

On September 25th the Chinese and Russian delegations met again. Qián’s delegation established that the Chinese could only afford two research institutes. Domarachev outlined the costs of planning and technical documentation of the two new institutes and the cost of rockets to be purchased (Report on Meetings, 1957).

Subsequently on 4th October the USSR launched the first ever Earth orbiting satellite, Sputnik-1. The first USA satellite was launched on 31 January 1958. On 6 June 1958 the CIA’s Office of National Estimates sent a memorandum to the Director entitled “Possibility of an earth satellite being launched from Communist China”. The document argued in summary (CIA, 1958b):

“1. Communist China cannot itself launch an earth satellite in the near future. However the USSR probably has the capability at present to place in orbit from

¹¹ My translation of “в первую очередь по решению ЦК КПСС в феврале 1957 года должны быть произведены два пробных пуска упрощенных искусственных спутников Земли (объектов ПС) с использованием для этих целей в качестве носителей ракет Р-7 минимальной их переделкой.

в настоящее время основные работы по созданию первых двух объектов “ПС” закончены.

Chinese Communist territory a Soviet earth satellite of up to 500 pounds in size. As an ad hoc operation, this could be done at any time on short notice (about six months from initiation of the project), at relatively little cost, and probably without prior detection by US intelligence. With direct Soviet assistance in providing vehicles and equipment and in the training of Chinese personnel, the Chinese Communists could probably perform a successful earth satellite launching, under Soviet guidance and direction, in about one or two years from the initiation of the project.

“2. Should the USSR and Communist China launch an earth satellite from Chinese territory, considerable propaganda advantage would accrue to them even though most informed world opinion would appreciate that the launching had been largely a Soviet show. We have no evidence concerning either such a Sino-Soviet policy decision, the construction of a launching site in Communist China, or the imminence of an attempted launching”.

An earlier draft of the first sentence had read “Contrary to the implication of its recent public statements, Communist China does not itself have the capability to launch an earth satellite in the near future”. (CIA, 1958a)

In the Discussion, the paper notes:

“6. Should the primary Communist consideration be the psychological effect of launching an ostensibly Chinese earth satellite at the earliest practicable date, the USSR could launch a satellite from Communist Chinese territory at any time with relatively short preparation (about six months from the initiation of the project) and at relatively little cost.....An operation of this type could probably be accomplished without prior detection by US intelligence, especially if the launching occurred in Sinkiang or Northwest China. We presently have no evidence that such an attempt is planned or is imminent.

“7. The USSR and Communist China would almost certainly consider that they could not palm off such an undertaking to the world as being “Chinese” at any time in the near future. Rather, their intent would probably be to (a) dupe those whom they could; (b) highlight Chinese participation in the project and the developing potential of Chinese Communist science and weaponry; and (c) stress the generosity of the USSR’s assistance to its friends. Such an undertaking would result in considerable psychological benefit to the USSR and Communist China.

“8. While such a launching will remain a constant possibility, it is also possible that the emphasis of Sino-Soviet policy may be, instead, to develop a broader Chinese Communist program over the longer term which combines space research with an emerging missile capability. We presently have no evidence as to which, if either, of these courses has been, or will be, adopted.”

On 7 June 1958 Allen Dulles, Director of the CIA, forwarded the report on behalf of the Board of National Estimates to the Under-secretary of State. (CIA, 1958c).

On September 3rd 1958 a draft memorandum from the Assistant Director of Research and Reports to the Deputy Director of Intelligence quoted a report (the source is redacted) of 29 July that the “First Secretary of the Soviet Embassy, Mexico, said, with Soviet help, China is preparing to launch a satellite.” (CIA, 1958d) Another report from the US ambassador to Tokyo on 13 August said that “the Japanese Foreign Office had been advised that final arrangements had been made during the Khrushchev-Mao meeting for launching a satellite from communist China this 1 October”. (CIA, 1958e). In the final version of the Memorandum the reference to the Mexico report has been redacted (CIA1958f).

Both memoranda speculate on the “Possible location for Satellite launching site in Communist China”, the title of the memoranda, and after evaluation consider the most likely site would be “the Mongolian steppe northwest of Peiping” (CIA, 1958f). No such launch occurred.

Clearly the CIA was correct in linking the practical arrangements for China to launch a satellite to the technical prowess of the USSR. But the Wilson archive’s documents can be read to suggest that the primary aim of China was technological development, not a challenge to the West.

Acknowledging the national independence of China after the “Sino-Soviet split”, the CIA continued to be interested in the “third nation” to go to space. On 23 July 1965 the Office of Scientific Intelligence, itself part of the Office of Current Intelligence, circulated a report entitled “The Race to be Third in Space”. (CIA, 1965). The report considered France, Japan and Communist China. The report considered that “In 1957, Communist China and the Soviet Union concluded an agreement which probably provided both for the supply of Soviet missiles to China and for the creation of a native missile development capability in China. This resulted in the construction of a missile

test range in western China and a missile development center near Peiping...
[Contemporary Romanisation of “Beijing”]”

Concerning space satellites, the report notes: “The Chinese Communist leaders almost certainly would like to orbit an earth satellite as early as possible and probably would be willing to adapt any MRBM [Medium Range Ballistic Missile] to achieve this...they are probably capable of producing the guidance and other equipment necessary for putting a satellite into orbit.[redacted] the Chinese plan to orbit a satellite and one specifies the date as 1 October 1965 –National Day, China’s principal political holiday. Thus, even though the evidence is fragmentary, China should be regarded as another country which might orbit a satellite within the next two years.” ”. (CIA, 1965). However, the report gives no concrete evidence of a space programme in China at that time.

The view from the USA, India and Europe

Relevant American archives of the Cold War are presented above. But not only has the Central Intelligence Agency (CIA) archived their involvement with Chinese space exploration. Soviet documents, now translated and open, show discussions between the Chinese delegation of 1957 and the Soviet Defence Ministry about the transfer of rocket technology to China. In America, as shown above, the CIA continued to be very concerned that China might also become a Space Power, and devoted some flights of its aircraft, and later, satellite, surveillance to find Chinese space-related bases.

This continued throughout the 1960s. But after 1972, when Nixon had brought a satellite terminal to Beijing for his meeting with Mao Zhedong, American policy towards China thawed.

Diplomacy by President Richard Nixon and Secretary of State Henry Kissinger in the early 1970s led to recognition of the People’s Republic of China by the Carter administration in 1979. In preliminary diplomatic negotiations, the President’s National security Adviser, Zbigniew “Zbig” Brzezinski met with Chinese Vice-Premier Deng Xiaoping in Beijing in May 1978 (Department of State, 1978). Tellingly, in the early fourth paragraph of his introduction, Brzezinski said “Finally I am inside China. I feel a

little bit like the American astronauts before landing on the moon. They went around it many times and in the end they landed.”

Back in Washington Brzezinski indicated he was not impressed by Deng. Admiral Stansfield Turner, then director of the CIA recorded that Brzezinski has said of Deng that he as “A little man like Napoleon in that he stood only 5’ 2” and acted like a very small man frequently does” (Turner, 1978).

In 1978/9 President Jimmy Carter invited this “very small man”, Deng Xiaoping, to America, the American Space Agency NASA welcomed the Chinese Vice-Premier to the Johnson Space Centre in Texas, and brought Deng to the simulator of the Space Shuttle, where he “flew” the American space vehicle. This was the high point of USA-China relations in space.

The picture below (Figure 4.2) is from NASA’s archives and shows Deng Xiaoping at the NASA base in early 1979.



Figure 4.2: Deng Xiaoping at the Johnson Space Centre (NASA Archives)

By the end of 1978, Chinese scientists had arrived in NASA, and in February 1979 Deng Xiaoping himself arrived at the Johnson Space Center in Houston, Texas, “for briefings on the U.S. manned space programme (NASA, 1979a).

Using the then (Wade-Giles) Romanised spelling, the report on ““Teng Hsiao-Ping””s (Deng Xiaoping)’s visit in *The New York Times* (Lelyveld, 1979) said that he was “using his trip to the United States to dramatise China’s eagerness for advanced technology”. He “climbed into the cockpit of a space shuttle simulator...to discover what it would be

like to land this newest American spacecraft from an altitude of 100,000 feet". The report concluded that "China's senior Deputy Prime Minister seemed to be so fascinated by the experience that he went through a second landing and even then seemed to be reluctant to leave the simulator, which is designed to reproduce the sights and sounds of space flight".

At his visit, Deng agreed with Carter a statement on US- China co-operation "in the peaceful utilization of space technology" (Nasa 1979b). But the position of the USA changed after events within China led to a decision by Congress to ban certain government agencies from continuing the relationship (Reddy, 2017).

Deng Xiaoping was responsible for the "Modernisation" of China and its "opening-Up", two phrases which resonate in modern literature about China. Essentially they refer to institutional changes, as in Table 4.2 below; the application of science to technology, and thereby to society; and the growing internationalisation of China, as seen particularly in its space programme.

Contemporary records are re-interpreted in a supporting theme today. In the December 1981 edition of its publication *人民画报 Rénmín huàbào (People's Pictorial)*, China noted that it had launched eleven individual satellites since 1970, and that a new success had been achieved, the launch on 20th September 1981 of three satellites in one launch (of its Fengbao-1 rocket). In 2016, in a special edition of China Space News co-incident with the Zhuhai air show, historic events were revisited. The same event was interpreted as China becoming "the fourth country in the world to master the "one Rocket and many satellites" technology after the Soviet Union, the United States and the European Space Agency" (China Space News, 2016 p.29). In this retrospective account, whilst the technological achievement continues to be recognised, the comparison with other spacefaring nations is emphasised.

In 1986 the CIA reviewed developments in China's space programme as they were affecting the USA. The review concluded that China entered the space launch market because it was motivated "to take advantage of excess capacity", and "accelerated their efforts shortly after the Challenger disaster" (the Challenger disaster was a catastrophic failure of an American Space Shuttle at launch, resulting in the loss of life). In these two motivations, the CIA judged China to have both economic and

aggressive motivations. A sub-heading in a version of the report ten days later emphasised that China was “Capitalising on NASA’s problems”. (CIA, 1986)

The study concluded that there were “few dangers of technology leakage” and that “hard currency earnings from Beijing’s space marketing campaign will probably help underwrite improvements in China’s ballistic missiles”, although no evidence of this was given and the mechanism to be used was not stated.

Subsequent archives of the CIA have not yet been released¹². China launched its first astronaut into space in 2003. NASA archives show that NASA Administrator Michael Griffin, accompanied by Chinese-born US Astronaut Shannon Lucid, visited China in September 2006 (Nasa 2006). He commented: “One of the points I tried to announce over and over again to our meetings with various groups of people was to welcome China to the rank of space-faring nations by virtue of their ability to put people into orbit entirely on their own resources. That is a milestone accomplishment and it is to be proud of.”

International cooperation with China: the Case of Europe and “Space 4.0”

As Joske argues, there is substantial co-operation between China and Europe on space technology and research. As demonstrated below in this Chapter, China has developed a large number of institutional arrangements with national governments across Europe, and with the European Space Agency (ESA) itself. But apart from this account below, and in Thomas (2019b), no other comprehensive account of this collaboration has yet been published.

The European Commission noted in 2018 that “Space cooperation between Europe and China is growing rapidly”, paying particular attention to radio frequency co-ordination between the European and Chinese satellite navigation projects, but also noting Chinese participation in two space research projects under the Horizon 2020 funding stream (European Commission, 2018, p. 9).

¹² A FOIA request for documents about the launch of Dongfanghong was made to the CIA in 2017 but has been denied in its entirety on grounds of [USA] national security.

European co-operation with China in space falls primarily under the direction followed by the European Space Agency as it is summed up in its document “Sustainable development – 2013-4 report” (ESA, 2014a). Lengthy quotations of these source documents provides the setting in which institutional co-operation takes place.

In the 2014 “Resolution on Europe’s space exploration strategy” (ESA, 2014b), ESA formally:

“RECALL[s] the instruments concluded with international partners for the implementation of ESA’s space exploration programmes (...Agreements with Chinese agencies – CAS, CMSA¹³ – under the ESA China Cooperation Agreement...)

Chapter III Global cooperation through flexible partnerships

5. EXPRESSES its determination to follow up and expand as far as possible, in the frame of ... global multilateral coordination and cooperation, on the existing cooperation projects concluded with the United States, Russia and China...”

And

“Chapter VII: ESA’s relations with non-European states

20 RECALLS the partnerships established by ESA with the space agencies of the major space faring nations for the conduct of specific programmes and projects on a bilateral and multilateral basis, and stresses the interest of member States in seizing future cooperation opportunities offered by different partners being:

...

(b) space powers, with three strategic partners, the United States, Russia and China for primarily scientific and exploration missions, including human space flights, not preventing cooperation with others on an opportunity basis; ...”

Building on the 2014 resolution, ESA has proposed an alternative formulation of space exploration to the “Space race”. In preparation for the Ministerial Council of 2016, ESA proposed splitting the periods of space exploration as follows:

“The first era of space, ‘Space 1.0’, can be considered to be the early study of astronomy (and even astrology). The next era, ‘Space 2.0’, came about with spacefaring nations engaging in a space race that led to the Apollo moon landings. The third era, ‘Space 3.0’, with the conception of the International

¹³ Chinese Academy of Science, China Manned Space Agency

Space Station, showed that we understood and valued space as the next frontier for cooperation and exploitation.

“This Ministerial meeting takes place in the advent of the Space 4.0 era, a time when space is evolving from being the preserve of the governments of a few spacefaring nations to a situation in which there is the increased number of diverse space actors around the world, including the emergence of private companies, participation with academia, industry and citizens, digitalisation and global interaction.

“Space 4.0 represents the evolution of the space sector into a new era, characterised by a new playing field. This era is unfolding through interaction between governments, private sector, society and politics. Space 4.0 is analogous to, and is intertwined with, Industry 4.0, which is considered as the unfolding fourth industrial revolution of manufacturing and services.” (ESA, 2016b)

While Space 4.0 also has explicit reference in the 2016 resolutions as an objective to improve ESA’s corporate governance (*III-An optimised ESA for space 4.0*).

Zeng (2017, p.10) points out that the Chinese government does not always distinguish, within “Europe” between the supranational institution of the European Union and of individual member countries located on the continent of Europe. At both international level (the European Space Agency) and at national levels, European reports of cooperation with China are many and varied. Pletser et al (2015) describe European parabolic flights training China’s astronauts. Pletser is himself located at the Chinese Academy of Sciences¹⁴.

The report “Chinese Space Activities in 2011” (Information Office of the Space Council of the PRC, 2011), gives a comprehensive framework of the past and projected five year plans from an overall governmental perspective. There are several key messages relevant to this study. The fourth of four objectives includes “to improve the scientific and cultural knowledge of the Chinese people”; and bilateral cooperation in the form of Treaties are noted with the ESA, France, Britain and Germany.

Further bilateral cooperation, including that between China, and ESA, Britain, France, Italy and Germany, is described (Information Office of the Space Council of the PRC, 2011). In contrast the United States does not at the time of writing co-operate with China on this topic.

¹⁴ Personal communication

Details of these agreements is limited and in the following account reference is made only to press releases as further enquiries within Europe have usually been met by walls of silence. The notable exception has been the UK space agency under Freedom of Information legislation and the French space agency CNES who give an account as follows: The founding inter-governmental accord between France and the PRC was signed in 1997¹⁵. It envisages cooperation in the following domains (Article 2)¹⁶:

- Satellite of application and scientific satellites, including associated facilities on the ground;
- scientific experience in microgravity;
- scientific experiments in deep space;
- commercial launches;
- And indeed anything else agreed between the Parties.

CNES also provided the following Statement (translated: Original text is in Appendix 2):

“Franco-Chinese space cooperation is governed by an intergovernmental agreement on cooperation in the field of the study and peaceful use of outer space, signed in 1997.

“In the industrial field, French industry supplies embedded equipment for civil satellites of CAST and SAST, two subsidiaries of the CCAC¹⁷. Thales Alenia Space (TAS) has also provided telecommunications satellites to China Satcom.

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<https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000000202547&categorieLien=id>

¹⁶ 2. La coopération définie dans le cadre du présent Accord peut intervenir dans les domaines suivants :

- les satellites d'application et les segments sol associés ;
- les satellites scientifiques et les segments sol associés ;
- les expériences scientifiques en microgravité ;
- les études scientifiques de l'espace extra-atmosphérique ;
- les services de lancement commerciaux ;
- tout autre domaine défini et arrêté d'un commun accord par les Parties.

¹⁷ China Aerospace and Technology Corporation, Shanghai Academy of Spaceflight Technology, China Commercial Aerospace Company.

“In the scientific field, cooperation was established in oceanography with the signing of an agreement between CNES and CNSA¹⁸ in 2010, which allowed Thales Airborne Systems (TSA) to supply a Doris instrument¹⁹ for the oceanographic satellite Chinese HY-2A, launched in 2011 and the integration of its data by CNES in the French multi-mission altimetry data processing system, which serves the main centers of oceanography and climate prediction in the world. In 2016, China decided to supply a new Doris for HY-2C to TSA, which motivated, in 2017, a new agreement between CNES and CNSA extending cooperation in oceanography to the entire HY-2C program. 2. In 2017, China also acquired a Doris for HY-2D.

“Chinese manned flights also represent opportunities for CNES to conduct experiments in real-life flight conditions. The joint space medicine project, Cardiospace, has produced space equipment that studies the adaptation of the cardiovascular system to microgravity. Embarked on TianGong-2, Cardiospace was used in 2016 during the ShenZhou-11 mission. Phase B of a Cardiospace-2 mission for the Chinese space station ends at CNES and a new cooperation agreement on this theme is under discussion.

“At the political level, space is one of the subjects dealt with in the Franco-Chinese strategic dialogue. In 2006, France and China signed two memoranda with the aim of jointly developing two satellites:

- CFOSat (Chinese French Oceanic Satellite), for the observation of the oceans with the provision by CNES of an instrument and equipment developed by TAS, to be integrated on a Chinese platform.
- Space Variable Objects Monitoring (SVOM), a scientific astrophysics mission including CNES providing two instruments on a Chinese platform.

“After a difficult start, linked both to the evolution of US regulations for the export of space components and to the specificities of cooperation with China, these two missions were relaunched by a joint declaration between CNES and CNSA, signed during the visit of President Xi Jinping, in Paris in 2014. For SVOM, this made it possible to clarify the division of responsibilities and allow its launch in 2021. For CFOSat, the development schedule was refined with a view to launch in 2018 and its essential role in monitoring climate change was reaffirmed. In 2017, the 11th Joint French-Chinese Space Committee was a great success and identified two priorities: the study of climate change and exploration.

“All of these topics were reviewed during the visit to China of the President of the Republic, from 8 to 10 January 2018, during which a memorandum was signed

¹⁸ China National Space Agency

¹⁹ **Doppler Orbitography and Radio-positioning Integrated by Satellite** (DORIS), https://www.nasa.gov/mission_pages/ostm/spacecraft/index.html

between CNES and CNSA, to boost cooperation climate change and exploration, with China's strong support for the Climate Observatory (SCO) proposed at the One Planet Summit. The Head of State also visited the technical center of the CNSA where he was able to observe the CFOSat satellite whose launch is planned for the last quarter of 2018.

“In the short term, the Franco-Chinese space relationship is set to increase, with the signing of an agreement to strengthen the partnership with the CNSA for the implementation of the SCO, during the Prime Minister's visit to China in June 2018. In addition, the CNES provides for agreements to cooperate more closely with the CAS and the CMSA, respectively in space sciences and human spaceflight. Finally, China will be the guest of honor at the next Toulouse Space Show, from June 26 to 28.”

The progress of this co-operation is reported in various public sources: Ambafrance, (2006); Guillermand (2014); CNES (2015, 2016, and 2018).

The United Kingdom Space Agency responded to a request under the Freedom of Information Act 2000 to provide “Any Agreements, Treaties, Memoranda of Agreement, heads of agreement. or similar, between the UK Space Agency and China, Chinese corporations or agencies or companies, relating to space exploration, travel or utilisation, including for example satellites, earth observation, rockets, launches, manned space flight, telemetry tracking etc.” In reply, the agency pointed to the “ Memorandum of Understanding with the China National Space Administration (CNSA) signed in December 2013.²⁰”

By this Memorandum of Understanding, “co-operation is agreed in the following areas:

- Research and development is science and application satellites
- Deep space exploration
- Earth observation
- Space science research
- Satellite application and data sharing
- Research, manufacture, utilisation and manufacture of satellite ground systems
- Satellite launch services
- Education and training activities

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<https://www.gov.uk/government/publications/memoranda-of-understanding-international>

- Any other area agreed by the Participants.”

In comparison between France (CNES) and (UKSA) the following points distinguish China’s relations with France or the UK on space exploration:

- France explicitly permits ground station support to satellite missions; the UK strengthens this to include “Research, manufacture, utilisation and manufacture of satellite ground systems”;
- France co-operates on “scientific experience in microgravity” whereas the UK has not mentioned this;
- France co-operates on “scientific experiments in deep space”, whereas the UK co-operates on “deep space exploration”;
- The UK makes explicit reference to co-operation on Earth observation;
- The UK co-operates on “data sharing” in the context of satellite applications;
- The UK co-operates on “satellite launch services”; France co-operates on “commercial launches”;
- The UK co-operates on “Education and training activities” and France does not mention this.

The “US regulations”, are relevant not only as declared by France, but also in the study (Zakirov, et.al, 2017) of the possibility of using a Chinese launcher for the UK’s space port.

In a covering letter answering the legal request UKSA wrote that “The UKSA facilitates relationships between UK entities and China but does not generally seek to be a signatory in these relationships. Additionally, while the UKSA attends, and may organise, events to which Chinese entities are invited, it does not enter into any agreements such as your request [as above] describes in order do so.”

As noted above, the British Government agency Innovate-UK, under its heading “Global Co-operation Feasibility Studies”, has funded a private company, Commercial Space Technologies, to consider importing a small Chinese launcher [rocket] to operate from the UK (UK Innovation, 2016; Webb & Zakirov, 2017). The “China-UK Crop Pests and Disease Forecasting & Management Joint laboratory” was established

in December 2016 (RADI, 2016a). In Cambridge, England a private company, Delta-T, supplied to the Tiangong-2 space station a sensor which facilitated plant growth (Delta-T, 2017). In England, the Chinese Vice-Premier has visited the Surrey Satellite Technology (SSTL) facility in Surrey (Surrey Satellite Technology, 2016). The Prime Minister of the United Kingdom and the Premier of China witnessed the signing of a contract between Surrey Satellite Technology and a Beijing imaging company (Surrey Satellite Technology, 2017).

These contacts between commercial entities in the UK and China may be examples of the new “Space Age 2.0” or “New Space” in that the UKSA allows for or tolerates the contact, or perhaps even enables it.

Chinese co-operation with national space agencies can be compared to give some idea of a “shopping list” of Chinese needs and demands. Further examples exist from Press and public statements of the relevant agencies as set out below:

ESA issued in 2017 a call for proposals for joint work with the CMSA on the International Space Station and the Chinese Space Station (ESA, 2017a). ESA has announced co-operation with China on a geo-sounder imager to target typhoons (ESA, 2018).

With Italy, ASI’s co-operation in space exploration is also formal (Agenzia Spaziale Italiana, 2014; 2015; 2017; 2018; AvioNews 2017; Research Italy, 2017; China Academy of Sciences, 2017).

Following a Memorandum of Understanding signed in 2017 between the Chinese Institute of Remote Sensing and Digital Earth (RADI) of the Chinese Academy of Sciences and the Finnish Meteorological Institute (RADI, 2017), the parties have signed a treaty to establish a joint research centre for Arctic space observation (RADI, 2018).

A delegation from RADI continued to visit Sweden and the Netherlands (RADI, 2017). ASTRON, the Netherlands Institute for radio astronomy, and two other Dutch partners have provided a radio antenna for the Chang’e 4 mission to the Moon (Netherlands Research School for Astronomy, 2018)

In Germany, joint research has been carried out more formally since a strategy review (Seidler, 2014). Finally, Russia is considering formal cooperation with China's space programme (Sputnik, 2017b).

ESA astronauts are learning the language of Mandarin Chinese (Ruff, 2012). ESA astronaut training has include a Chinese astronaut (Ecns, 2016; ESA, 2016b), and Chinese training has included ESA astronauts (Xinhuanet, 2017; ESA, 2017b).

China has joined the European Very Long Base Interferometry network (EVN), dedicating radio telescopes at Mi Yun, Kunming, Shashen and Urumqi to satellites in deep space (Long-Fei Hao et al., 2010, p810). The Institute of Remote Sensing and Digital Earth of the Chinese Academy of Sciences (RADI) has opened a ground station near Kiruna, Sweden (RADI, 2016). Billig et al. (2012) describe the joint operations of the European Space Operations Centre, Darmstadt and the Beijing Aerospace Control Centre, Beijing.

Anselmo (2009) describes the Italian Space Agency's tracking of the Shenzhou 7 space mission; there is evidence that space tracking stations in Issus-Assaguel, and the Kerguelen Islands, France, have also assisted in tracking Shenzhou-7.

In Germany, joint research has been carried out at the *Institut für Materialphysik im Weltraum* (DLR, 2009); at the Fallturm in Bremen (DLR, 2016) and within biochemistry, Heister (2011) and Preu and Braun (2013) describe a German experiment carried on Chinese mission Shenzhou-8. German cooperation in lunar exploration is also described (Sputnik, 2017a).

In Austria, the Austrian Academy of Sciences and the University of Vienna are running the Chinese *Micius* satellite's European receiving stations (Advantage Austria, 2016; Austrian Academy of Sciences, 2017).

Given the extent of co-operation between China and European space agencies in space exploration, it can be considered that international co-operation may be a substantial component of the discourse of space exploration as it is seen in China. Because of this, the self-imposed isolation of the USA from this extensive activity might be seen as harming the understanding of America about the Chinese space programme.

Alternatively, those who are committed to the view that the Chinese space programme is a potential or actual threat to the national security of the USA, may view this co-operation between European space agencies with dismay, and even seek to frustrate it. The French statement above hints at this: "...a difficult start, linked both to the evolution of US regulations for the export of space components and to the specificities of cooperation with China".

Summary: European- Chinese co-operation on space technology

The extent of co-operation between Europe and China is great, and takes place between institutions in a setting established formally by treaty and agreements between institutions. Inevitably, the people who form the exchange of personnel are social partners with their foreign colleagues and join social practices. Thus, as reported, the promotional jetsam of European space ventures – badges, stickers and the like – is snapped up by Chinese workers who are in Chinese social networks relating to space. In addition, European workers' publications are translated into Chinese or they write scientific papers together. By these means, from Europe and China, each become aware of the others' public conversations of space. Thus, while we can accept Joski's account that there is a significant amount of joint work, we do not have to choose to see it as a threat to Western strategic interests.

Chronologies of the Chinese space programme seen from Europe and India

There is no unanimity in describing the chronology of the contemporary Chinese space programme but the examples which follow below include perspectives of: the development of space hardware; the stated intentions of the Chinese Five Year plans; and the reform of Chinese space institutions.

Thus, In Table 4.1 below, a German account of the Chinese space programme is given, which follows these conventions usually found in Western accounts of space exploration. It is a chronology of technological achievement Hallmann and Sistemich (2018, p. 36, translated). This is an account which describes the increasing complexity of the technology developed, without carrying with it an implication of the inevitability of scientific and social progress.

Table 4.1:

Year	Milestone
1956	The national defence ministry formed an institute for rocket development.
1960	February: the first self-developed high altitude research rocket type T-7M launched successfully. In November another successful launch of the first test missile.
1964	29 June: China earned a successful launch of the first missile.
1965	The Chinese Academy of Sciences drew up lavish feasibility studies to form the basis of plans for the development of satellites.
1970	30 January: A Chinese Long distance flight rocket launched successfully. 24 April: First rocket launch with a rocket of type Long March 1 (Chang Zheng, CZ-1). The satellite had a mass of 173 kilograms.
1971	3 March: with "Shijian 1 (Practice 1) an experimental scientific satellite was launched successfully and for eight years sent scientific data from space.
1975	26 November: A remote-controlled re-usable satellite was launched. This ability is at that time of great military importance. China was thus able to recover film cassettes with strategically important footage.
1980	10 May: A carrier rocket flies from the mainland to the South Pacific. It serves as the basis for telecommunication satellites.
1990	7 April: The first commercial satellite launch with the telecommunications satellite Asiasat-1 is successful from the Xichang launch centre also with a carrier rocket type CZ-3.
1993	Founding of the National Chinese Space Organisation "China National Space Administration (CNSA)" as successor to the ministries of aero- and Space Industry. The CNSA is responsible for the civil space programme.
1995	25 January: First Chinese rocket type CZ-2E plunges at the launch. Debris kill 20 residents of one village.
1996	15 February: Immediately after the launch from Xichang cosmodrome the fully-fuelled CZ-3B with a commercial Intelsat communications satellite deviated to near a village. Chinese official Press accounts spoke of six dead, unofficial accounts gave 500 dead. In October the 47 th International Astronomical Federation (IAF) Congress took place in Beijing.
1999	20 November: the unmanned space ship "Shenzhou" (Magic Ship) was put into orbit by a LM-2F rocket. After 14 orbits it landed again in Mongolia. The CNSA had flown with the Shenzhou mission a monkey,




	a rabbit, and a snake into a short space journey, which nevertheless they survived.
2003	15 October: China succeeded its first independent transport of a human, Taikonaut Yang Li Wei, into space.
2007	27 October: With Chang'e-1 the peoples' republic sent its own probe to the Moon, which they examined from orbit for months.
2011	29 September: The small space station "Tiangong-1" was launched. It succeeded in five couplings, a multitude of course corrections as well as several days' stay by two three-person crews, each of which included a woman.
2013	China launched "Kuaizhou", a carrier rocket exclusively solid fuelled. With Chang'e 3, China's first space vehicle with a rover landed on the Moon.
2016	China sent two taikonauts to the new Chinese mini=space station, "Tiangong-2". It is China's sixth manned space flight and another milestone for the far-reaching plans of the Peoples' republic.
2018	In spring the Chinese space station "Tiangong 1" fell to the earth uncontrolled. Contact had been lost in 2016.
From 2022	China plans its own large manned permanent space station, also missions to the Moon and Mars are future objectives of the Chinese.



Table 4.1: A German summary of China's Milestones in Space Travel.

Source: Hallmann and Sistemich (2018, p. 36, translated)

Then in Table 4.2 a Chinese account sourced from a public museum gallery in Beijing in 2016 is given. This Table 4.2 below reproduces a large display panel at a temporary exhibition on public display at gallery in the National Museum of Science and Technology, Beijing in October 2016. It was photographed in detail and all text has been reproduced and translated in the Table.

中国航天工业历史沿革 History of China's aerospace industry		
<p>上世纪 50 年代, 中华民族之内心的姿态一夜在世界民族之林. 就在新中国百废待兴, 百兴待举的艰苦起步时, 党中央, 国务院, 中央军委从国家长远发展战略考虑, 毅然做出了发展航天事业的决策. 从此, 中国拉开了探索太空的帷幕, 中国航天以坚实步伐放飞中国梦</p> <p>In the 1950s, the heart of the Chinese nation was in the night among the nations of the world. Just as the new China was in ruins and the arduous start of “Baixing” [the people], the Party Central Committee, the State Council, and the Central Military Commission considered the long-term development strategy of the country and resolutely made the decision to develop the space industry. Since then, China has opened the curtain of exploring space, and China Aerospace has released its Chinese dream at a solid pace.</p>		
Time period in Chinese Museum display 2016	Chinese label for time period	Events
1956.10-1964.11 	国防部第五研究院部时期 Period of the Fifth Ministry of Defense	1956 年 10 月 8 日, 我国第一个身弹研究机构国防部第五研究院正式成立. 8 October 1956, China's first body bomb research institute-The Fifth Research of the Ministry of National Defense was formally established.

<p>1965.1-1982.4</p> 	<p>第七机械工业部 时期 Seventh Machinery Industry Period</p>	<p>1964年12月26日, 三届全国人大一次会议通过层里第七机械工业部的决议. 26 December 1964, The Third Session of the National People's Congress passed the resolution of the Seventh Ministry of Machinery Industry.</p>
<p>1982.4-1988.7</p> 	<p>航天工业部时期 Period of the aerospace industry</p>	<p>1982年3月8日, 五届全国人大常委全第22次全体会议通过关于国务院机构改革问题的决议, 第七机械工业部改称为航天工业部. 8 March 1982, The 22nd National Committee of the NPC Standing Committee passed the resolution on the institutional reform of the State Council. The Ministry of Machinery Industry was renamed the Ministry of Aerospace Industry.</p>
<p>1988.7-1993.6</p> 	<p>航空航天工业部 时期 Period of the aero- and - space industry</p>	<p>1988年4月9日, 七届全国人大一次会议通过国务院机构该方案, 决定撤销航空工业部和航天工业部, 组建航空航天工业部. 9 April 1988, The first session of the Seventh National People's Congress passed the program of the State Council,</p>

		<p>and decided to write off the Ministry of Aviation Industry and the Ministry of Aerospace Industry to form the Ministry of Aerospace Industry.</p>
<p>1993.6-1999.7</p> 	<p>中国航天工业总公司 China Aerospace Industry Corporation</p>	<p>1993年3月22日,八届全国人大一次会议批准撤销航空航天工业部,分别成立中国航空工业总公司,22 March 1993, The 8th National People's Congress approved the sale of the Ministry of Aeronautics and Astronautics, respectively, to establish China Aviation Industry Corporation, and China Aerospace Industry Corporation (National Space Agency) 1993年6月,中国航天工业总公司(国家航天局)正式成立 June 1993, China Aerospace Industry Corporation (National Space Administration) established in China</p>
<p>1999.7 -</p> 	<p>中国航天科技集团公司 China Aerospace Science and Technology Corporation</p>	<p>1999年7月1日,根据九届全国人大一次会议精神,经国务院批准,中国航天工业总公司分为航天科技和航天机电(后改为航天科工)两大集团公司.</p>

		<p>1 July 1997, According to the spirit of the First Session of the Ninth National People's Congress, approved by the State Council, China Aerospace Industry Corporation is divided into aerospace technology and aerospace electromechanical (After changed to aerospace science and engineering) two major group companies.</p>
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Table 4.2: The history of China's Aerospace Industry (from a museum display in Beijing, 2016).

Comparing the two, it can be seen that, whilst both show a progress in history:

- Both accounts show the military origin of the space programme.
- The German account refers to specific missions.
- The German account refers to launch failures and catastrophes.
- The Chinese account refers not to missions but to institutions.
- The Chinese account in its display uses non-attributed photographs of launches, a satellite and key political figures.
- The Chinese display gave an account of the early years of the programme, in preparation for the remainder of the exhibition which showed recent manned and robotic exploration.

Even at this early stage, then, the account given by the Chinese gallery follows a different formula from that expected in Western discourse. It is rich in images, it enjoys different emphases, and it simply does not include some aspects (such as mission failures) which would be not thought in the West to be unusual.

In particular, the Chinese exhibition highlights institutional change over time. This demonstrates the approach of the Party and the Government to space exploration. It shows the consolidation of former military laboratories into civilian-facing state institutions, and it gives a history of it which is mostly in the modernisation initiative and “opening up” of China brought in by Deng Xiaoping.

A third summary of Chinese Space achievements is provided in the Indian Institute for Defence Studies and Analysis (Lele and Singh, 2012, p. 5). After a Table showing the plans published in China’s Space “White Papers” of 2000, 2006, and 2011, (Information Office of the Space Council of the PRC, 2011) the achievements are brought together as in Table 4.3, below.

A chronology is embedded in the Table, and cumulatively, the three columns of the five-year summaries show some expression of the developing achievement and value of the programme.

White Paper (2000)	White Paper (2006)	White Paper (2011)
<p>1. China has developed four types of satellites: recoverable, remote sensing satellites Dongfanghong (DFH), telecommunications satellites Fengyun (FY), meteorological satellites, and Shijian (SJ) scientific research and technological experiments satellites.</p> <p>2. First man-made satellite Dongfanghong-I was launched in April 1970.</p> <p>3. By the year 2000, China had launched 47 satellites of various types. Developed the Long March rockets independently; China conducted 63 launches and 21 consecutive successful flights between 1996 and 2000.</p> <p>5. Launched and recovered the first unmanned experimental spacecraft ‘Shenzhou’ in 1999.</p> <p>6. China explored the upper atmosphere with the help of rockets and balloons from the 1960s.</p> <p>7. By the mid-1980s, China began to utilise</p>	<p>1. China added Earth resource satellites, Ziyuan (ZY) and Navigation and positioning satellites, Beidou.</p> <p>2. Developed and launched 22 different types of satellites.</p> <p>3. Long March rockets made 24 consecutive successful flights.</p> <p>4. Research and development of the 120 tonne-thrust liquid/kerosene engine while the development of the 50 tonne-thrust hydrogen-oxygen engine is in progress.</p> <p>5. Construction of three launching sites at Jiuquan, Xichang and Taiyuan made progress.</p> <p>6. Research into space environment and also observation, reduction and forecasting of Space debris; and has developed the capability to forecast the Space environment.</p>	<p>1. Long March series of rocket launchers undertook with 67 successful launches sending 79 spacecraft into planned orbit.</p> <p>2. Developed the Fengyun (Wind and Cloud), Haiyang (Ocean), Ziyuan (resource), Yaogan (Remote sensing) and Tianhui (Space mapping) satellites.</p> <p>3. Initiated the development of a high-resolution Earth Observation system.</p> <p>4. Launched 10 satellites for the Beidou system and provided services to the Asia-Pacific region.</p> <p>5. Launched and developed the Shijian (Practice) satellites and small as well as micro satellites.</p> <p>6. Launched the manned spaceship and also achieved Space docking between Shenzhou VIII and Tiangong 1, paving the way for the establishment of the Space Laboratory and Space Station.</p> <p>7. Launched the first lunar probe Chang’e-2</p>

<p>domestic and foreign telecommunications satellites and developed related technologies. It also began using navigation satellites of other countries.</p>		<p>8. Building a new launch site at Hainan. 9. Monitored Space debris and provided early warning against them. 10. Removed aging GEO satellites out of orbit. 11. Working on protecting manned spaceflight from Space debris.</p>
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Table 4.3: Achievements of the Chinese Space programme, 2000-2011 (source: Lele and Singh, 2012)

To these accounts can be added perhaps three new developments:

- Exploration of deep space; China is planning four deep space explorations before 2030, planning to go to Mars, Jupiter and asteroids (Xinhua, 2018)
- A new orbital Space Station, and an international invitation to researchers, made via the United nations (United Nations, 2018)
- China continues with experiments concerning the DNA mutilation of seeds in microgravity, which were initiated on board the Russian Soviet-era space station *Mir* (Lu et al, 2012)

Summary: “High data” from archives and government sources

Archival data from Russia and the USA point to different motivations on the part of China in the acquisition of space technology. From the early 1950s the Central Intelligence Agency viewed China through the lens of anti-communism and considered China to be a threat to their national security. Chinese motivation, on the other hand, pointed towards the acquisition of technological competence, the modernisation of the country and the reform of its institutions.

After a programme interrupted by the Cultural Revolution, with the early support of the USA Chinese state planning in the form of five-year plans has produced such achievement in space utilisation. Within (to use ESA’s term) Space 4.0, the Chinese space programme nowadays is ambitious; but it is problematic in many ways. First,

why has China (PRC) established a programme to explore outer space? Utilisation of the space environment of Earth orbit may give immediately tangible benefits such as weather prediction, navigation, telecommunications and land use, but its components in outer space, such as lunar and Mars exploration, and crewed spaceflight give no such immediate and obvious benefit.

Other questions follow. Is there a specifically Chinese character to the Chinese space programme, so called “Chinese characteristics”, and if so, what are these characteristics? From the perspective of the Chinese Communist party (CCP), what is the ideological imperative of the programme? Reference has already been made to “Two Bombs and One satellite” as a driver to modernisation, and later in this thesis references within China to the “Aerospace Spirit” and its promotion will be considered. Finally, what is the global and international impact of this programme? To offer a comparison “foil”, this thesis now gives an account of the hyper-saturated signifier, the “Space race”, as it developed in the Chinese hemisphere, notably in Australia in the late 1950s.

To these fundamental questions, this thesis adds a further question: What is the mass or popular public conversation of space exploration in China and amongst Chinese people? To answer this question is to explain the phenomenon of space travel as it appears on modern cultural items in circulation within China. Therefore later chapters will consider cultural products.

CHAPTER 5: “The Space Race” in China’s Hemisphere

In this Chapter we examine first of all the standard geography of the Chinese space programme as it is reflected in the location of China. This established that the hemisphere containing China extends to its compass points – the Mandarin expression 中国 Zhōngguó, or “Middle Country”. Taking the Southern extension of this geography from China, we arrive on the continent of Australia. It is here that we study the early history of what became known as the “Space Race”. In this section, aware of intertextuality, we are concerned with contemporary texts in newspapers, and the hidden texts implied and interwoven in them.

It is instructive to consider the Earth globe of China and Australia (Figure 4.1, below), which could be called the “The Chinese Hemisphere”.

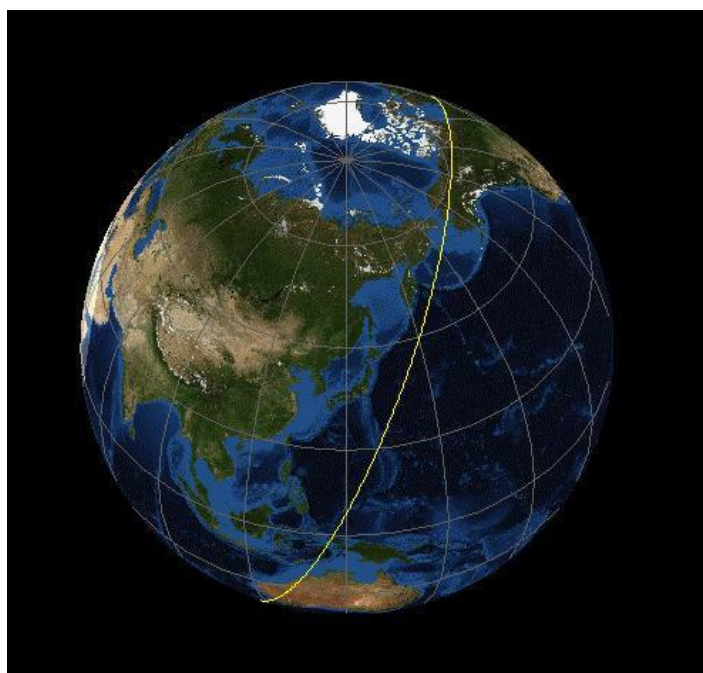


Figure 4.1: The “Chinese Hemisphere”. The yellow line is the ground track of a polar-orbiting satellite.

This geographical space can be considered as if it were expressed as Braudel’s “World-economy” as if the Mediterranean (Braudel, trans. 1984) or Wallerstein (2004)’s “World System” – a large scale and coherent geographical area, based on

trade, with a degree of cultural hegemony from a dominant trading partner, and the presence of a significant city

Whereas Braudel considers (p. 25/6) world-economy to be defined by a line boundary, a single centre city and dominant type of capitalism, and a hierarchy of economies, the Chinese Hemisphere differs only by a tension between trading cities on the periphery of the country and other heartland cities in China. The Chinese Hemisphere can be seen to extend into outer space by the geostationary satellites at the positions allocated to nations on the equatorial line.

A development of immediate interest to space exploration is the Meridian Space Weather Monitoring Project²¹. Wu, Wang and Fan (2006) and Wang (2010) describe – in a Mercator projection – this project of the Chinese National Space Science Centre²² to establish space weather monitoring. It is of particular interest because it is located by definition along the meridians of latitude 30 degrees North and

²¹ http://www.spaceweather.ac.cn/~qlfan/files/FAN_SWS2006b.pdf

²² <http://english.cssar.cas.cn/op/mp> accessed 19/5/15

longitude 120 degrees East; as Figure 4.2 (below)²³ shows:

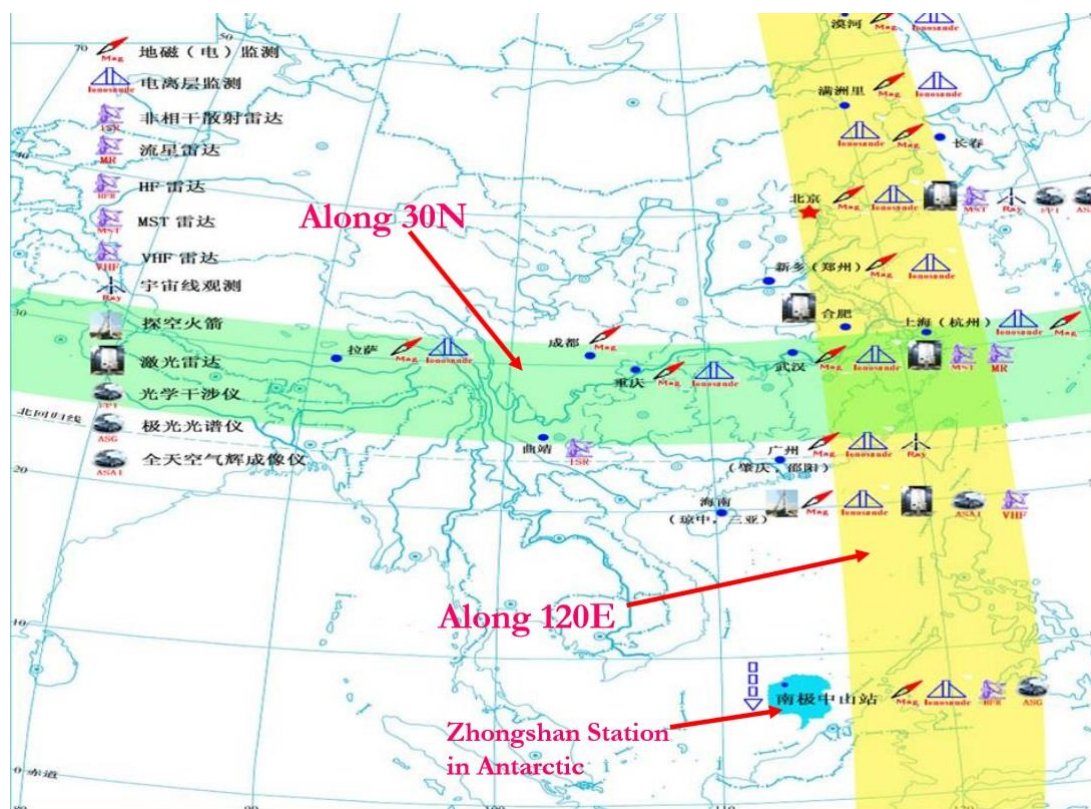


Figure 4.2: Meridian Space Weather Monitoring Project of the Chinese Space programme

In other networks, China's reach is global, and in its travel in space its reach is yet beyond. For example, in Kashgar (喀什市 • ىرھەش رەقشەق) a radio station controls the Nigerian telecommunications satellite NigComSat 1-R, which was built in China to Chinese design and launched from there too. Arguably, the use by Kashgar to control NigComSat 1-R and to transmit digital data to an outpost in the Wakhan valley in Afghanistan is an expression of how the interconnectivity of the Belt and Road Initiative extends China's geostrategic interests.

Therefore two elements are raised here: interconnectivity, and the locations expressed in spherical and celestial coordinates, as it is not immediately obvious using Mercator projection why the Nigerian satellite can benefit China in this way.

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[http://www.bu.edu/cawses/documents/3rd CAWSWS meeting files/Feng CAWSWS Chinese SW Beijing_2006.pdf](http://www.bu.edu/cawses/documents/3rd_CAWSWS_meeting_files/Feng_CAWSWS_Chinese_SW_Beijing_2006.pdf)

Redfield (2002, p807) considers that Outer space is comprised of “far-flung, shifting networks”. To extend this description, the architecture of space exploration comprises locations on Earth and in Outer Space which are nodes on a network, a term not restricted to those networks explicit in telecommunications (telecommunications stations on earth and satellites in orbits around the solar system), but including sites and installations of space research set aside from local communities, their location on Earth or in orbit around it being chosen as an expression of this network. We shall return to the importance of celestial coordinates in considering the role of “Place”.

Implied Texts in Australia

McLean (1990) considered the policies of Australia and the USA during the “Asian Cold War”. He writes (p. 34) there existed a “distorted interpretation of Asian affairs”, which was that “it overstated the extent of Moscow’s and Beijing’s influence over Asian communism and greatly exaggerated the role of ideologically-driven expansionism in Chinese and Vietnamese communism, it underestimated the nationalist character of Asian communist parties, and it overestimated the Western powers’ ability to influence the course of events in Asia”. McClean argues: “That such a distorted interpretation of Asian affairs exercised a powerful influence over American Australian policymakers and their advisers can be explained by looking at the values and beliefs of these officials”.

In a different account, Jones and Smith (2000) comment that in the years of the Cold war, considering Australia’s “forward defence” strategy which included its participation in the Vietnam War, “In fact, the non-communist countries in South-East Asia encouraged Australia’s forward defence posture. Most of these vulnerable young states were fearful for their own security and welcomed Australian military engagement. The threat of communist insurrection was neither a Cold war nor a ‘racist’ illusion. The influence of China in particular was seen to be at work behind violent subversion in Indonesia and Malaya.” (p. 395).

Certainly the defection to Australia of an intelligence operative from the Soviet Union in 1954 became instrumental in the subsequent Federal election and led to splits in

the Australian Labor Party (see Biologuski (1955), especially the last chapter, and Manne (1985), especially the Preface and Chapter 8).

These events brought the global competition between the USA and the USSR to the continent to the south of China's hemisphere, Australia. The "Space Race" of the 1950s and 1960s was experienced by the international and global general public in various ways including reading magazines or newspapers and watching television or listening to broadcast radio programmes. In some areas of the world, the public participated in this exploration of space by carrying out various activities related to the phenomenon of space travel that was being reported.

In Australia, texts about "communism" are seen in a military context intertwined with texts directly addressing space travel.

Australian Public Conversations before the "Space Race" started

Jones (2004) surveyed the changes in the way space exploration was treated in popular culture in the 1950s and 1960s by concentrating on British feature films of that period. He finds (p. 47) an "arc" or "sequence" of changes in attitudes from a starting point of "expectation/apprehension", that "in the 1950s, the conquest of space was treated as an heroic quest into the unknown, possibly beset by dangers from technical barriers and alien life-forms. Interest in space travel was largely confined to a specialist audience".

In considering this "prehistory" of space exploration as it applies to the Chinese hemisphere, then, it is useful to survey materials of popular culture in Australia from this period, as below.

Schudson (1997) comments that conversations of the day are given by printed newspapers. He writes specifically that "what democratic conversations are *about* [emphasis original] comes from public sources. The newspaper is the historically central source of democratic conversation- the newspaper, the law, the public world" (Schudson, 1997, p. 305).

Newspaper text from this period (1950s-1960s) is available in libraries and in the State Archives of Western Australia (Perth) and South Australia (Adelaide), which were

consulted in this study. They provide an indication of how the “Space race” setting was constructed.

As Schudson also comments, and certainly when newsprint was a primary sources of information, “Democracies require public memories: writing greatly enhances the capacity of public memory. So talk in democracy is civil, public and, and oriented to the explicit, available, transferable communications found in print and broadcasting rather than in face-to-face conversation” (ibid., p 305). Thus, the setting is found in the literature which form the public memory.

McMullen (2013), in reviewing Australian Science Fiction in the 1960s, comments in introduction that “Australia was largely isolated from American science fiction for nearly two decades... By 1960, Australia had neither specialist SF [Science Fiction] magazines nor publishers. Science Fiction was under considerable stress at the time. By 1961, the USSR and America were putting men in space...” (p. 73).

What Australia did experience in the 1950s, however, were radio plays of science fiction and adventure stories for boys. In the setting of these stories, issues of interpretation of the world, the logic of organisation that follows this interpretation, and implied actions, can be identified.

Lees and Senyard (1983) reviewed a dozen children’s books of Australia in the 1950s, “all designed for a male audience, all relating to an adventure involving issues of the 1950s: space technology, nuclear resources and communist spy rings”.

Many of these texts referred in some way to the isolated base at Woomera and thereby planted it firmly into the Australian psyche about space. Woomera is a special place within the history of space exploration and will be discussed in greater detail in the next chapter. It also carries a connotation of being military in function.

In 1952 a radio play, *Spaceways* was broadcast in England and in Australia (Maine, 1953). In this play, and later a novel, “The scene is an isolated research station in Nevada where a group of scientists and engineers are building a specially designed instrument-carrying rocket intended to ascend to an altitude of about 22,000 miles above the earth’s surface, where it will remain for ever rotating around our planet” (ibid., rear cover).

In the same year, a boys' adventure novel, *Simon Black in Space* (Southall, 1952) dealt with interplanetary flight. A male and authority figure named "Mac", who "was a legend, the mysterious figure few people ever saw, valued friend of diplomats and generals, statesman and admirals" inducted the boy hero into some secrets: "... he took up his cane [and] slammed the point of it down on South Australia. "That", he said, "is the Woomera rocket range, and now we begin to get involved." (p. 22).

The next story in the series of boys' fiction, *Simon Black in China*, (Southall, 1954) takes the "secret agents" to a part of China that is neither Communist nor Nationalist in control, but rather, of "The Ancient", an elderly, wise but evil Chinese man. Statements about China follow stereotypes of: the laundry; selling bananas; names such as "Dong Dong" and "One Bung Lung"; mandarins; inscrutable expression; and the "Oriental mind".

In the year of Sputnik, 1957, the boys' adventure *Mettle at Woomera* (MacNeill, 1957) again used a male authority figure who, taking a map, "laid the stem of his pipe upon a point above Spencer Gulf in South Australia. "Woomera rocket range is sited here – about one hundred and fifty miles North West of Port Augustus, at the head of Spencer Gulf. It's pretty savage country – rocks, salt-bed, mulga scrub desert. But just about perfect for the work in hand" (p14).

In the same year, *Moon Ahead* (Greener and Hutchinson, 1951: 1957) told the story of a rocket launched from the middle of Australia. A male Professor, as authority, explained to the boys "We got it [the rocket] here without attracting attention by pretending it was equipment for the British Rocket research station in central Australia".

Considering that "The genre of boys' adventure stories, as it developed, concentrated on high adventure with the world divided into 'goodies' and 'baddies'", Lees and Senyard (1983) concluded that "It is clear...that the genre was particularly well-suited to the portrayal of the political concerns of the period. The anti-communist, anti-working class and racist bias of the Menzies Cold War government is in complete harmony with the tradition. All that was needed was to adapt the stereotypes". Hence, the fiction prepared the setting in Australia for the real events of 1957 and 1961 when

they were reported. These adventure stories serve as texts which are intertwined with the newspaper accounts, to which we now turn.

The start of the “Space Race” seen from Australia

The Newspaper Press coverage in Western and Southern Australia of the space events of 1957 and 1961 was a mixture of international reporting (from English newspapers and The Associated Press) and local or regional stories. This latter reporting records to some degree how the Australian population reacted to the events.

Newspapers examined were: *Daily News* and *The West Australian* (Perth), and *The News* and *The Advertiser* (Adelaide). The periods studied were the two weeks following the launch of Sputnik-1 (4 October 1957) and the flight of Yuri Gagarin (12 April 1961).

Van Dijk (1988) describes the social rhetoric of news stories as replete with “strategic devices that enhance truthfulness, plausibility, correctness, precision [and] credibility” (ibid. p93). Brooks, Purser and Warren (1952, 1964) considered literature in similar terms, as above.

Three main types of stories about public participation are considered, and their strategic devices are examined, below. First of all, two sets of practices are given, viz., the acts of observation of Sputnik-1 visually or by radio, and social incidents, including hoaxes or other humorous or bizarre, relating to space travel, and including advertising. Finally, early statements in public conversation as local expressions of commentary and opinion are given.

This section references within the full flow of the text a number of short extracts from Australian newspapers, whose generic references are: *The West Australian*, *The Daily News*, *The Advertiser* or *The News*, all of the years 1957 or 1961.

Practices of Public Observation of Sputnik-1 in Australia

In Perth, Western Australia, *The West Australian* reported on its front page of 7th October 1957 that the “Soviet Satellite is seen in Hobart”. The newspaper reported the (named, male) official in charge of the Hobart coastal station of the Overseas Telecommunications Administration, confirmed by their Chief Engineer, and by the reception of the satellite’s radio beacon.

Another edition of the newspaper on the same day reported on its front page, under the headline “Radio Men Get Satellite Signal”, that a telecommunications technician at the Post Master General’s ABC monitoring site was “The first Perth man to pick up the signals”. Three (male) radio amateurs were also credited by name with having heard the signal from a street in a Perth suburb. A “Western Australian Astronomical Society team” were, at the same time, “scanning it with a telescope”.

But “No elaborate equipment is needed to receive the signals from the satellite”, the paper reported on an inner page. “The signal was heard strongly four times over the weekend on a domestic dual-wave receiver in West Perth”.

“Perth May Sight It Tonight”, *The West Australian* reported on 7th October 1957, citing the West Australian Government Astronomer. “With a clear sky, he said, the satellite might be glimpsed through good field glasses or a telescope”.

“Mass of SA [South Australia] reports”, claimed *The Advertiser* in Adelaide on 7th October, citing Australian observations from New South Wales, Victoria, Queensland, Tasmania, and from America. “The first person in SA [believed] to hear the satellite’s signals...” was named. *The News* also reported on him and another amateur radio operator who “already have picked up signals from the Russian ‘moon’”.

Under a column subheading “Volunteers”, *The Advertiser* reported: “Emergency moves to bring the SA Moon Watch into action this week to observe the Russian satellite with makeshift binoculars and telescopes will be discussed tonight at a special meeting of the watch’s technical committee”. The acting coordinator of the Australian Moon Watch told *The News* on 7th October that the satellite “had not been sighted in SA yet, to his knowledge”.

The next day in Adelaide, *The News* of 8 October 1957 carried a front page report of “When to see it” gave “two good chances” and said that “A pinpoint of red light, reflected from the sun, will identify the satellite”.

It was reported that the “top Woomera scientist” said that “what people thought was the satellite last night, in reports of visual sightings, was probably the final stage rocket which carried the satellite aloft. This final stage was considerably bigger than the satellite itself. It was following the satellite at a distance of about 700 miles”.

On 8th October 1957, *The Advertiser* of Adelaide reported, perhaps with some hyperbole, that “In Victoria [state] ... thousands of people saw the satellite for the first time... People in hundreds of thousands of Victorian homes stood in the back-yards watching it with telescopes and binoculars. Thousands saw it with the naked eye”.

On the same day *The News* carried on its front page “Look for the Red satellite at these times (cloud permitting)” and drew the ground track across an outline map of Australia. A time exposure of the trail of the orbiting object was also shown on the front page under the heading “Satellite first picture”. A physics lecturer (named, male) from Adelaide University reported that the satellite orbited at “exactly 15 rotations every 24 hours”, which “was an extraordinary fluke”.

The next day, 9th October, *The Advertiser* reported on its front page lead story that “A wide bank of cirrus cloud spoilt the chances of thousands of South Australians seeing the Russian satellite, which has been named Sputnik, last night. Sightings were reported from several country towns in SA [South Australia]. Hundreds of Victorians [state] are reported to have watched the progress of Sputnik across a cloudless sky”.

The Daily News from Perth of October 9th showed a “camera view of “Moon” : “Daily News men set up their cameras on a hill 12 miles east of southern Cross last night to get this shot of Russia’s satellite-rocket”. Their photographer said: “It was a reddish orange colour and was in view from when it came out of the cloud bank to within 20 degrees of the moon”.

“Brilliant Sight of Sputnik In SA” read the front page of *The Advertiser* on 10th October 1957, the next day. “Dead on time at 7.9 last night, Sputnik’s rocket casing as brilliant as a 1 ½ magnitude star streaked across the sky as thousands of South Australians watched”. An “unretouched picture of the track of the Russian satellite” was reproduced at the bottom of the page.

On 11 October *The News*’ front page banner headline was “Satellite signals recorded in South Australia” with a horizontal graphic (cut to fit) of “BEEP.. BEEP..BEEP.. . . .” presented as a chart recording from the “Weapons Research Establishment’s electronics department”.

In inner pages it was reported that “The crew of an aircraft... had reason to appreciate Sputnik’s speed” as they viewed the satellite when the aircraft left, and again at its

destination, “it having in the meantime travelled around the world”. Suburban “Residents” their observation and that “the newer object was a smaller edition of the first”.

But the next day, 12 October, *The News* reported “‘Carcase’ of satellite To Move From our Sky” as “South Australians have perhaps only two or three nights to see Sputnik’s ‘carcase’ before it disappears from the evening sky, not to appear again for something like 3 ½ months. If it is still in orbit, it may be visible in the mornings in about six weeks”.

Social incidents related to Sputnik-1

On 10 October Perth’s *The Daily News* showed, under the headline, “And one from WA? [Western Australia] a photograph captioned “Typist [name, female, age] 19, inspects a “thing she found... Actually, it’s the ball part of a hi-ball scrub machine” that had been inscribed in chalk with slogans including “Moon satellite a W.A. Product”, “DAILY TRIPS”, “Bookings at the Tourist Board” and the outlines of entry and exit doors.

The next day, 11 October, *The Daily News* reported on the front page that “University Hoaxers ‘Explode’ the Moon”. According to the article, “Hundreds of people were alarmed last night when a mock satellite sailed high over Hobart and exploded in a brilliant shower of sparks... Near-hysterical men and women flooded newspaper and radio offices with frantic reports of the progress of the missile as it floated lazily down to the ground. At the same time the Russian moon was moving across the western sky”. The report was also carried on the front page of *The Advertiser* in Adelaide.

Perth’s *The Daily News* of 12 October contained on its front page a headline “It’s In My Mattress, That Pip, Pip, Pip” which reported uncritically that “the wife of a Sydney physics teacher says she has been getting signals from Russia’s satellite in her inner-spring mattress... ‘I woke my husband a couple of times, but he was too sleepy to listen. I don’t think he was very interested. He didn’t say I was nuts, because he knows better’ ”. *The Advertiser* of Adelaide gave the story equivalent prominence, with the additional description of the woman as a “housewife” and comment that “It definitely wasn’t the springs of the mattress because they go ‘bong’, sort of”.

The Advertiser of that date also reported on a concert the previous evening as “In the Town Hall last night, while man’s first experimental contribution to the starry host was hurtling round the earth 300 miles, overhead, ...the Adelaide Philharmonic did their best to keep things in proper perspective with a tremendous shout at “The heavens are telling the glory of God, the wonder of His works, displays the firmament”.

An advertisement carried in *The Advertiser* of 14th October carried a graphic drawing of the Sputnik radiating the word “Save”. Accompanying text read that the company “solve the space problem (for incoming Christmas stocks) with a fantastic launching of astronomical savings”.

Under the headline “Fun in the Sun with Sputnik” the paper reported that at a day for old scholars of a local school “Space-minded girl students rigged up their own Sputnik with a glass lampshade and twisted wire, for the decorated classroom competition...”

Stories: Local expressions of commentary and opinion

“It gave them a queer feeling” reported *The News* (Adelaide) on October 10th 1957, reporting of “Adelaide people who saw the satellite’s rocket casing travel across the eastern sky at 7.9 last night”. Eight people are named and identified as a Mr or Mrs, and their comments recorded as below:

- “It was amazingly clear, and it made you imagine all sorts of things. It was thrilling” (Mr)
- “It was brilliant, wonderful, but to think it came all the way from Russia makes you wonder” (Mrs).
- “I experienced a very unusual, hard-to-describe feeling when I saw it clearly”. (Mrs)
- “It travelled much faster than I expected, well above the moon, which was well down” (Mrs).
- “It was just like a star, travelling about the speed a plane usually goes over, and there seemed a sort of reflection behind it” (Mrs).
- “I’ve always thought it might be a fraud, but after last night, seeing is believing” (Mrs).
- “It was most awe-inspiring. You feel you must take your hat off to the scientists who invented it” (Mr).
- “It sent me all queer, just watching it go by: what’ll they come at next.” (Mr).

Earlier in the same issue, *The News* published a commentator's column asking the Acting Co-ordinator of the Australian Moon Watch Committee "What do Mr. and Mrs. Adelaide stand to gain through the scientific knowledge gleaned from Russia's first satellite, and the others to follow?" In his reply: "I don't see how the satellite is going to shorten the working week or put more money in the pockets of future generations. But...in short, through the satellites we should be able to get a picture of the world from the outside looking in".

Yuri Gagarin's flight of April 1961

Whilst the Australian newspapers again carried copy from international sources there was far less reported from within Australia. *The Advertiser* (Perth) reported on 13 April that "Woomera tracking station did not track the manned Russian satellite. " The next day *The Advertiser* reported from United Press International, New York, that an American astronaut would be stationed at Woomera "when America sends its first man into orbit".

Rival newspaper *The News* asked on 13 April 1961: "Did others die in space? Reports doubt date of trip". Scepticism was a recurring feature of the reports of Yuri Gagarin's flight. According to *The News* of April 13 1961, the director of the Research School of Physical Sciences at the Australian National University of Canberra described the flight as "a bit of a stunt." Elsewhere in the edition, the President of the Australian Academy of Science said in Adelaide that "space travel solved no problems for human beings on this earth. It never would be possible to colonise other planets from the earth".

The Australian Space Race

The passage of the satellite Sputnik-1 through the clear night sky was periodically visible to ground observers when the Sun was below the horizon to either the West (late evening) or East (early morning). The angle of observations between the observer, the satellite and the Sun could, for these limited times, show a brightness of the reflected sun, and a time of viewing could be predicted once the characteristics of the orbit were known. If the total time of the orbit around the Earth was not a fixed divisor of the 24 hours of a day, the time of observation would vary slightly from day to day, and because of the Eastwards movement of the earth under the orbit, and an

observer on the ground might see the orbit more or less directly above the Zenith, or to the East or West of that position.

There is some dispute as to whether Sputnik-1 was in fact seen, or whether it was the larger second stage of the carrier rocket, but it is evident that something was seen in a predictable manner, and the population of the world believed it to be Sputnik-1.

Three of van Dijk's features of persuasive content (1988, pp 84-85) are clearly present in these accounts:

- a) *Emphasize the factual nature of events* – in these accounts, direct descriptions are given, from eyewitnesses, using evidence from authorities including respectable or professional people, and signs of precision and exactness such as times, numbers of persons ages ;
- b) *A strong relational structure for facts* – Mentioning previous events as conditions or causes and predicting the next events, and inserting facts into well-known models (e.g. the Woomera site) ;
- c) *Provide information that also has attitudinal and emotional dimensions* – the reports of comments made by individual “Adelaide people” and the reference to “Mr and Mrs Adelaide”.

Van Dijk also comments (1988, p69) that “Much like other discourse types, news leaves many things unsaid. These must either be inferred for full comprehension or more particular taken-for-granted information.” In these accounts from 1957 Australia, the authority figures are all male. Women are identified variously as: an unmarried young typist facing a wrecking ball decorated as if it were a satellite; a married woman and housewife who heard Sputnik noises from the mattress of her marital bed; and five out of eight comments from local residents – describing a feeling, a wonder, an expectation, an impression, and a belief.

What was the “Space Race?”

An international but competitive engineering effort of considerable expenditure and cultural significance took place between approximately the late 1950s and the early 1970s. A key characteristic setting of inter-national behaviour at that time was the rivalry between the United States and the USSR. These two world powers were characterised as being as opposite “poles”. The “Space Race” occurred primarily

between these two countries and was most evident in the start of the exploration of the Moon, a contest set and won by the United States with its Apollo programme.

This series of events is so powerful within recent memory that its traces can still be found whenever space exploration, Russia, the USA, or any combination of these factors, is mentioned. As argued below, it also extends to discussions about space exploration, the USA and China.

But Foucault (1972 translation, p. 24) cautions against such simplistic assumptions behind power relationships and advocates looking beyond them. He seeks to “avoid those ready-made syntheses, those groupings that we normally accept before any examination, those links whose validity is recognized from the outset”. This validity is an illusion of presupposition that can obscure the discourse. Therefore, we seek to review the origins of the “Space Race”, acknowledging the existence of the term, but reflecting on it.

Looking beyond the space programme, the roots of the “Space Race” lie in an economic and political competition. In Moscow in 1959 and conversations between Vice president of the USA Richard Nixon and President of the Supreme Soviet Nikita Khrushchev. The specific occasion is the demonstration of the American style of domestic kitchen to the Russian public at a pavilion in Moscow.

Salisbury (1959) records an exchange between the opposing world leaders:

‘He (Nixon) added that Americans were interested in making life easier for their women. Mr Khrushchev remarked that, in the Soviet Union they did not have “the capitalist attitude towards women.”

Nixon: “I think that this attitude toward women is universal. What we want to do is make easier the life of our housewives.” ‘

This exchange demonstrates differences between the two leaders upon the role of women in their respective societies, and arguably on behalf of Nixon an inability to understand that within the Soviet Union. This is a debate about a power relationship within the two societies. Foucault (1980, p.104ff) might describe this power relationship as “a new mechanism of power...possessed of highly specific procedural techniques ... which permits time and labour, rather than wealth and commodities, to be extracted from bodies.”

Reid (2008) refers to this incident and comments that "...cornered in the American kitchen [Khrushchev] was forced to defend the Socialist system against claims for Capitalism on the terms set by his hosts..." To jog Khrushchev into a competition that made him uncomfortable on his competitor's terms came to be the dominant reason for the space race. In support of this economic perspective, Nelson (2009) p160 commented that "The at times pugnacious Kennedy had ultimately arrived at his decision on Apollo by realizing that there were three avenues of competition possible between Russia and America: war, business, and technology".

The challenge to go to the Moon was another challenge established on American terms. Kennedy's justification at Rice University in 1962 emphasised free choice, the national organisation of assets and production, and an intention to win a competition of his own choice (Kennedy, 1962). It does no harm to revisit his famous speech with that expression of free choice in mind:

"We choose to go to the Moon. We choose to go to the Moon in this decade and do the other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win, and the others, too."

As de Groot puts it, there was no other, deeper motive, or cosmological significance to his exercise of choice and challenge (de Groot, 2007, p. 152). He writes that "Thanks to Kennedy, Americans were on their way to the Moon. But the reasons they were going were not those of dreamers like Tsiolkovsky. Going to the Moon had nothing to do with exploring the cosmos or understanding the origins of the universe. The decision was made not on science, but on cold hard politics."

A study of contemporary American mass publications acts as a check to the proposition that the "Space Race" was fundamentally concerned with power relationships. In fact, the relationships exhibited by the "space race" are not only those between the USSR and the USA, but also within both the American and Soviet societies at that time.

The cover of the May 18th 1962 edition of *Life* magazine portrays an American astronaut, as yet unflown in space, Scott Carpenter, next to the woman to whom he is married and by whom they have several children. Their heads are together and they

are smiling. His hand rests on her shoulder. Their skin complexion is obvious. The photograph is decorated with the captions “The Loner Who found Himself. New Hero for Orbit. Astronaut Scott Carpenter and His Wife Rene”.

This issue is one of a series of issues of Life magazine in which the astronauts (all of whom were male) and wives were contracted to the magazine to tell their stories. Koppel, 2013 (p44) describes the function, if not the explicit intention, of the series, for American housewives, who “opened their glossy Life magazine and saw seven glorious women they could look up to and emulate...”

Rose (2012, p. 115) offers a checklist for examining published photographs in categories of: representations of: bodies (age, gender, race, hair, body, size, looks); manner (expression, eye contact, pose); activity (touch, body movement, positional communication); and props and settings.

Returning to the Carpenter family, under the caption “CARPENTER CLUTCH. As the girls (above) tease Rene (“Mrs. Kennedy’s prettier than *you* are!”), the boys taunt Scott into a spirited romp – “Aw, you’re getting to be an old man!”, their photograph in Life magazine can be seen to reinforce the gender stereotypes of the American way of life in the early 1960s, in that the girls are with their Mother in the kitchen, while the boys are romping with their Father in the living area.

Feminist studies draw attention to the expression of “Space Race” as promoting the value of competitive men (Penley, 1974; Koppel, 2013; Bryld and Lykke, 1999) and taking no account of the role of women within the society, Soviet or American, at that time.

This lends weight to the idea that the genesis of the USA-USSR Space Race was a “kitchen sink” competition, a clash of economic systems, between Kennedy and Khrushchev.

Similar pressures can be discerned within the publicity given in the state-controlled newspapers of the Soviet Union. Previous work (Thomas 2010) identified a distinct Russian hegemony of space exploration based around Konstantin Tsiolkovsky and, later, Yuri Gagarin. Within the Soviet Union, contemporary newspapers show how the

imperative of creating *Our Union*²⁴, led to the portrayal of these Space events within distinct territories and economic sectors. In an extract from the Kiev evening newspaper *вечірній київ* in 1961. Khrushchev is flanked by Cosmonauts Titov and Gagarin – but the language used is Ukrainian. Similarly, the state run newspaper in Sevastopol, Crimea, *Слава Севастополь*²⁵ “Slava Sevastopol” recorded how its citizens received the news of Gagarin’s flight, later listened to the celebrations relayed by radio from Moscow and welcomed him on holiday. The language used was Russian.

Throughout the “Space Race”, similar publicity was organised by newspapers addressing different economic and social sectors across the USSR, including the teachers’ newspaper *Учительская газета* and the newspaper for young people organised as Young Pioneers, *пионерская правда*.

This continual re-expression within the USSR of space exploration as an achievement of the Union as a whole appears to fulfil a need of unified expression across the many and varied languages and sectors of the Union. It suggests that the central power of Russia within the USSR was something that had to be continuously promoted.

If the phrase “Space Race” is applied uncritically to the Chinese Space Programme follows a knee-jerk anti-communist line and focuses on the rule and misrule of the China Communist Party (see for example (Wolton, 2007), it can offer only a limited explanation of the phenomenon of space exploration by China.

Writing generally about interrelations of foreign affairs between sovereign states, Hansen (2006, p. 6) identifies the (National) Self in terms of the (National) Other (as if, in the Space Race, Kennedy and Khrushchev needed each other to define themselves). She explains that “The conceptualization of identity as discursive, political, relational and social implies that foreign policy discourse always articulates a Self and a series of Others.”

²⁴ I first heard this phrase, “*наш Союз*”, in Crimea, when I was travelling in Ukraine.

²⁵ As preserved and inspected in the local archives of Sevastopol.

This is distinction, between the nation that is the subject and that which is the object, is a human emotion that describes division if not competition. In public conversation, it is not necessarily only an abstract expression. Moisi acknowledges a place for a national emotion within the methodology. “By focussing on emotions,” he writes, “I am emphasizing a new reality that can be summarised in very simple terms: *in the age of globalization the relationship with the Other has become more fundamental than ever.*”(emphasis original: p20). He continues (p.21): “In the age of globalization, relations with the other have become so central that we are forced to redefine our own essence. Who are we? What makes us so special and different?”

Hansen, L (2006, p. 7) returns to this theme of identity, and finds that constructions of identity “can take on different degrees of “otherness”, ranging from fundamental difference between self and Other to constructions of less than radical difference, and the Other can be constituted through geographical representations as well as political representations such as ‘civilizations’, ‘nations’, ‘tribes’, ‘terrorists’, ‘women’, ‘civilians’, or humanity’. Geographical and political constructions of identity are usually articulated with a particular temporal indemnity through themes of repetition, progress, transformation, backwardness, or development...”

In acknowledging our twin themes above – power relationships within the family and the non-monolithic nature of the USSR, we can explore further the extent to which national identity is important in the assertion of soft power by a country.

China in Space during the 1950s and 1960s

Old ephemeral documents and images are re-presented in modern China and although it is possible to find original examples in many cases images are presented anew and support a reconstructed account of the country’s history.

Modern Chinese documents venerate Qián Xuésēn, 钱学森, who is understood in the West to have been a Chinese engineer educated in the USA but expelled after the Second World War for falling foul of McCarthyism, and now credited with the development of modern Chinese rocketry (the story is told in English by Chang, 1996). Kulacki and Lewis (2009, p.20) caution that “American myths about Qián reflect views of “great men” in history, as well as the debates about McCarthyism, not Qián’s role in China’s space program”.

A photograph of Qián with Mao Zhedong (Figure 4.3 below) is reproduced frequently, e.g. it is on display in a wall panel at the China Science and Technology Museum in Beijing (2014 visit), where the date of October 1955 is prominent: the date of his return to China. It is also reproduced in a brochure of the China Academy of Space Technology (CAST, 2014), who refer to their foundation on 20 February 1968.



Figure 4.3: Qián Xuésēn (left) in 1956. Source: People's Network 人民网

These images and explanations are retrospective, not contemporary to Qián. But within China at least, they serve to show a longevity to the Chinese space programme, and overtones of Chinese characteristics, and of loyalty.

This retrospective view is not a complete picture of Qián Xuésēn. The North-East University in Shenyang notes his many achievements (Northeastern University, 2011), in particular Qián's contribution to "Engineering Cybernetics", a development of control logic which handles uncertainties well (Gao, 2014) and may be applicable in social circumstances, for example, teaching reform (Northeastern University, 2012). Finally, the CIA recorded and translated published bulletins about Qián's involvement in research into "Somatic Science" which they called "Human Paranormal Activities" (CIA, 1991) at the time of their own research into the same subject area, the STARGATE investigation of "Remote Viewing" (CIA 1995).

Items found in the antique market in Shanghai in 2013 include this gaudy plaster reproduction of two passengers sitting aside a grey rocket (Figure 4.4 below). The rocket is marked “China rocket” but of interest is the statement on the orange scroll falling horizontally.



Figure 4.4: A gaudy plaster reproduction of a rocket

The scroll reads. "赶美超英", *gǎn měi chāo yīng*. It was proposed by Chairman Mao around 1958, and refers to the production of steel in China which should exceed that of the UK and the USA: it is a description of economic progress, not of space.

The China Science and Technology Museum in Beijing (2014 visit) also referred in its display panels to the launch of China’s first rocket on 19 February 1960. China Daily (2003) reconsidered this launch in an account of the successful crewed flight entitled “launching success bases on previous trials”.

In an echo of the Russian Space Dogs *белка* and *стрелка* (known in English as “Belka and Strelka, meaning “Little Whitey and “Little Arrow”) the Chinese in 1966 launched 小宝 *Xiǎo bǎo* and 珊珊 *shān shān* (Little Treasure, and “Sparkling”) into

sub-orbital flight (Jones, 2018). Their feat is also commemorated by a panel in the China Science and Technology Museum.

Finally, 1970 saw the launch of 东方红 *Dōngfāng hóng* satellite (The East is Red) and the panel shows a crowd of excited women workers standing together and pointing up to the sky. The name continues in a series of Chinese geostationary satellites and their electronic control system (the DFH “bus”).

Conclusions

Because of its position in the same global hemisphere as China, but in post-colonial allegiance with Western liberal democracy, Australia provides a rich source of written text about the origin of the “Space race” and this text benefits from an intertextual study.

In themselves, the newspaper texts are written in a patrician sense which reflects the male authority figures of boys’ adventure stories. This is also reflected in American accounts of their astronauts in *Life* magazine.

Intertextuality also demonstrates the attribution of anti-communism and militarism to the signifier, placing the Soviet achievements of 1957 and 1961 as objects of competition and perceived threat between the two economic systems.

The facility and town of Woomera in South Australia, together with fictional accounts of isolated research towns and bases, represent a new phenomenon, a dislocation of space by reference to function. Further, the global (spherical) and Mercator projections which have been used in this hemispheric study, may also be considered within celestial coordinates, that is, the importance of the location on the globe being expressed in terms of its relations in outer space. Chapter 5 explores both these dislocated places both in terms of their celestial location and theoretically in the light of Foucault’s representation of language in the expression of power.

6: The significance of Location, the sense of “Place” and the derivation of Heterotopia

The Chinese space programme in spatial, temporal and ethical constructions

This Chapter considers the notion of “place” as it applies to China, its bases in the world, and the application of “place” to “space travel”.

Hansen (2016, p. 47) writes that “to understand identity as *spatially* constructed is to reiterate that identity is relationally constituted and always involves the construction of boundaries and thereby the delineation of space. In foreign policy discourse this delineation has historically centred on the nation state, abstractedly through the privilege granted to national security discourse, and concretely through the construction of boundaries and thereby the delineation of space”. [Here, in the phrase “spatially constructed” the author does not refer to “outer space” but to position on land as if shown on a map].

“Place”, or the “spatial” construction in Hansen’s term is relationally constructed, and it offers a partial answer to the national security concerns articulated by nation states who place themselves in opposition to China and who are outside its national boundaries.

Such values and beliefs may be found expressed in some texts of fiction found in the West in which a popular discussion about China is presented. In the same way as Australian boys’ fiction was reviewed by Lees and Senyard (1983), depictions of China in the Western popular culture of science fiction may be considered to be “settings” for the policy towards China. Here, evidence of territoriality, national security, time, and ethical behaviour may be contested.

Science Fiction in Genre and Narrative

Specific texts are written as novels within the genre of science fiction, either fiction in which China plays a part or fiction originating from China (this may be translated into English).

Based on his own experiences as a reader and writer of science fiction, C. S. Lewis tried to describe a “sub-species” of the genre in his 1975 essay “On Science Fiction”. He categorises it variously as: a leap forward into an imagined future when planetary, sidereal or galactic travel has become common; satiric or prophetic criticism of

tendencies in the present by imagining them carried out to their logical limit; the real possibilities of as yet undiscovered engineering or scientific techniques in the actual universe; speculative science in an imaginary environment as experienced by an ordinary person; the ultimate destiny of the human species; and finally, stories about gods, ghosts, demons, fairies, monsters and so on.

Berger (1996) describes “conventions” in this genre as in Table 6.1 below:

<i>Element</i>	<i>Science fiction</i>
Time	Future
Place	Space
Hero	Spaceman
Heroine	Spacegal
Villains	Aliens
Plot	Repel aliens
Theme	Save World
Costume	High-tech clothes
Locomotion	Spaceship
Weapon	Ray Gun

Table 6.1: commonly used conventions in the “Science Fiction” genre (after Table 9.1 in Berger (1996, p. 127).

Examples of science fiction and adventure from the 1950s are given in the following Chapters to illustrate the portrayal of China and Chinese people within or close to Lewis’ type: “satiric or prophetic criticism of tendencies in the present”. In China, Ren Dongmei (2018), in an application of “Science Fiction Realism” within modern Chinese

science fiction (including that which has been translated into English), considers stories in science fiction where descriptions of a society appear to be, in Lewis' term, "carried out to their logical limit".

Although she argues that "One of the most important functions of sci-fi realism is to reveal and critique reality, and to expose conflicts and problems in society (Ren Dongmei, 2018 p.55) it is important to note that it is not essential to the genre of science fiction to assume there is always negative criticism of the present social order embedded in it, although it can be found, if sought. The society described in a story of the genre "Science Fiction" might be entirely imaginary. Berger (1996, p. 54) writes of stereotypes as "ideas people share about what various groups or categories of people are like...although stereotyping is simplistic and often dangerous, it is a part of our everyday illogical and uncritical thinking". He concludes that "Despite its illogicality, stereotyping is often used in narrative texts because it allows authors to provide motivations and to characterize people very quickly and economically". The comments or descriptions made of China, the Chinese characters, or Chinese society, reveal the casual attitudes of the time the story is written in its origin.

Land on Earth: China as depicted in Western Science Fiction

The image of China which has been popularised within science fiction of the twentieth and twenty-first centuries is largely negative. It is instructive to review this as an implied text in consideration about the role of China in the world. This exercise is similar to the grounding of "the space race" in popular science fiction in Australia described earlier.

Wheatley sets the tone of territoriality in his novel *The Island Where Time Stands Still* (1954), set in an isolated and secret island in the South China Sea inhabited by a mysterious but fraudulent Chinese population. Hersey's 1965 novel *White Lotus* expresses China as a victorious nation enslaving white Americans, and as Deakin (1966) comments in review, he is "elucidating by means of an elaborate allegory" the contemporary racial inequality in America and its origin in the African maritime slave trade. Robert Heinlein in 1941 (prior to Pearl Harbour) wrote in *Sixth Column* (later entitled *The Day after Tomorrow*) of war between America and the "Pan-Asiatics", who

were neither solely Japanese nor Chinese but represented both. Heinlein, in *Tunnel in the Sky* of 1965 also describes the annexation of Australia by “His Majesty Chairman Fung Chee Mu of the Australasian Republic”. In a similar vein of territoriality, in Australian fiction for young adults, John Marsden in *Tomorrow when the War Began* (1993) describes a modern, foreign invasion of Australia, in which the invader is never named but the children “can understand why they have invaded but I don’t like what they’re doing and I don’ think there’s anything very moral about it”. Whilst this could be taken to the original colonisation of Australia by European settlers, in conversations it has also been considered to be a reference to populous China (or Indonesia) needing and therefore taking territory. The Chinese writer of science fiction Cixin Liu turns this around when he writes in *Death’s End* (2010) of “The Great Resettlement of Humanity to Australia” for extinction.

Williamson and Gunn (1955:2014) in their joint futuristic novel *Star Bridge* have a Chinese man as a central character, who is both an active interlocutor in the plot and an historian. On initial encounter the character speaks in a Pidgin English to present himself as the owner of an intergalactic Chinese laundry, but in the Epilogue he acts as the historian, and “...picked up the top sheet of manuscript. The ancient Chinese characters marched in columns across the page from right to left. He read the last sentence once more, picked up the brush, and added a final chapter”. Here, the Chinese man overcomes his classification as a speaker of Pidgin English and adds longevity and civilization to the story.

While Isaac Asimov, in his 1989 novel *Nemesis* gives a positive role to his character Chao-Li Wu for inventing “superliminal travel”, such accolades are rare. In *Time Enough For Love* of 1974, Heinlein writes casually that “[there was] political restraint against migrating from China; the few Chinese who did reach the stars seem always to be winners, I suspect that the Chinese average smarter than the rest of Earth’s spawn. Not that slant of eye or colour of skin matters today...” In the short story by D.A D’Amico *Point of Ascension* (2014), “since the Chinese ascension, the rules had gotten a bit murky”. In the plot, “The Chinese were pushing to replace the old United Nations space agreements with accords benefitting nations currently engaged in off-planet activities and heavily favour Chinese interests. Their government still held a grudge with the Americans over the Japanese war a few years back. This was a

chance to teach some lessons.” Only by extreme personal effort was the plot to exclude America overcome. Finally, Choi, in *Fixer Upper* (2017) describes the purchase of the International Space Station and its subsequent command by “Shenyang Mission Control” and on board by “Commander Yuan Lixie”.

Timmerman (2000) takes science fiction tropes to a party political aim, in his reports which claimed that American satellite technology was permitted by the Clinton administration to be exported to China. He uses the words “corruption” and “treason” in this context, and reports that he “set aside my journalists’ pen for six months to run for public office” on this matter. He ends his introduction with the words “Resistance is *not* futile”. As Hayot (2008) explains (2008, p. 5): this phrase “gets its rhetorical punch via its reference to another punch in popular culture at the time, this one uttered as part of the science-fictional universe of “*Star Trek*”. Hayot concludes (ibid) that: “Timmerman’s ‘resistance is not futile’ thus explicitly connects his own global agenda of anti-Chinese nationalism to a familiar, post-global narrative that makes resistance a matter of species-level survival”. Here, the Chinese are not considered to be of the human species.

Such stereotypes in science fiction reinforce the attributions of alienation, territoriality and deceitfulness ascribed to China. Identity of one nation is established by the juxtaposition of signs of unequal value between two countries. In making sense of China in this way, the authors assert their own identity rather than write about China itself.

Celestial Co-ordinates and the construction of Space-related sites

In 2013, in a translation provided by the Union of Concerned Scientists (Kulacki, 2013), China looks for a salutatory leap in scientific development from its space-based fundamental research, and envisages additional telemetry stations to be built within the arctic circle (Kulacki, 2013 pages 6,10 and 14). Jakobson (2010 and 2012) notes Chinese preparation for “an Ice-Free Arctic” in terms of research and institutional membership. Brady (2012) notes the same phenomenon and questions intentions. Higgins (2013 and 2014) for the New York Times reports on “Worry in Norway” and a land purchase that “baffles Iceland”.

Space exploration requires the construction or adaptation of dedicated sites for launching, testing and research. Aside from technical issues such as the availability of water and power, and celestial issues such as the position of the site on the surface of the Earth, the creation of these sites raises issues of identity, international or geopolitical relations. This applies to the location of Chinese facilities including tracking stations at Swakopmund in Namibia, arrangements with other nations such as Australia (News.com.au, 2011) and on the Xi Sha (Paracel) islands in the China Sea in the same way as it applies to the sites of other spacefaring nations.

The European scientific Enlightenment saw expeditions to resolve principles of the earth's geometry by reference to its celestial position. Cosgrave (2010:2012 p. 205) noted that "The French Scientific Academy's expeditions to Lapland and to Peru in 1735 and 1736, intended to resolve the dispute between [Isaac] Newton and Jacques Cassini ...by measuring the length of an arc of longitude". Orcheton (2004) describes the 1769 expedition of Captain James Cook to Tahiti to take measurements of the Transit of Venus²⁶ across the Sun, a phenomenon which was "ideal" to "attack that fundamental yardstick of solar system astronomy: the value of the solar parallax and hence the astronomical unit." (p. 52). He notes that whilst there was war in 1761, by 1769 "what better way of 'competing for peace' than through scientific supremacy?"

Sheldon (1967) saw Australia's provision of bases to the American space exploration venture in the same terms as Captain Cook's voyages (p.12): "These are slender threads of history and geography linking the English sailor's visual probe into space on his way to explore unknown Australia and modern Australia's part in the fantastic space adventure of America's astronauts to explore the unknown moon".

²⁶ I am grateful to the Jeremiah Horrocks Institute For Mathematics, Physics and Astronomy, of the University of Central Lancashire, who taught me to see the Transit of Venus in 2004 and 2012.

This celestial aspect of international relations inspired Jules Verne, who, in his fiction “Adventures in Southern Africa” (1872) wrote an early description of the Earth in which two nations separated by distance, borders and international relations, were united by the longitudinal meridian. In this story, simultaneous expeditions in Russia and South Africa calculated the arc of longitude by reference to celestial bodies, thus considering the Earth as a planet in space. International events- the Crimea war – intruded. The significance of this work lies in its mix of international politics and Earth co-ordinates expressed in cosmic positions.

Tuan (1991, p. 693) asks, in relation to named entities, regions and fields: “Do these entities exist independently of the geographer’s (as it were) formal pronouncements – official baptism?” Noting that public consciousness of these entities might be enhanced if the perceiver is aware of the construction, he answers his rhetorical question: “I would say that we are dealing with degrees of perceptual presence...if geographers are eloquent enough they can persuade other people to accept these entities, with possible political consequences”.

Cosgrove (2008, p.203) describes the Equator and its significance in these terms: “A dimensionless line girding the midriff bulge of an oblate globe, the 40,070km Equator serves as a primary cosmographic trace marking geographical differentiation on the earthly sphere”. He continues (ibid. p. 204) “[the equatorial line] attains greater cosmographic – and environmental – significance from the geometrical relations between terrestrial and celestial motions. The night sky appears to the naked eye as a hemispheric dome slowly pivoting around us in the course of a year. Geocentrism, that intuitive belief in the cosmic centrality of the earth, projects the earthly poles, Equator and hemispheres onto the celestial sphere. The 23.5 degree angle between the earth’s axis of diurnal rotation and that of its annual rotation around the sun produces a line called the ecliptic. The ecliptic contains the zodiacal band in the heavens, defines the tropic lines of Cancer and Capricorn, and intersects the Equator at midday on the vernal and autumnal equinoxes.”

China’s space programme extends outside China’s borders in both latitude and longitude. China has built its own tracking base by lawful treaty in Swakopmund, Namibia, and has made other arrangements in Kenya, Pakistan, Argentina, and other parts of the world. Swakopmund is used for the Shénzhōu (神舟) manned space

missions which fly overhead, but its location at latitude 23 degrees South is also sufficiently close to the ecliptic to make it suitable for tracking missions to Mars and other planets.

African countries which lie between 42.8 degrees latitude North and South are under the ground track of the orbiting station Tiangong-1 China has established a tracking station in Namibia²⁷. Figure 6.1 shows part of the ground track²⁸ of Tiangong-1 at its most northerly extent of the descending node, the ground track extending to cover most of Africa...



Figure 6.1: Ground track¹ of the descending node from 42.8 degrees North of the Tiangong-1 Space Station. The Southerly extent is 42.8 degrees South, thereby covering the continent of Africa.

²⁷ <http://www.globalsecurity.org/space/world/china/swakopmund.htm>

²⁸ Calculated from the orbital two-line elements (TLEs) at <http://www.n2yo.com>

One such node or centre is the Chinese Telemetry, Tracking and Communication (TT&C) station established at Swakopmund, Namibia. This is built within the range of Latitudes 42 North and South which (Figure 6.1, above) are the limits of the ground track for the Tiangong-1 space station.

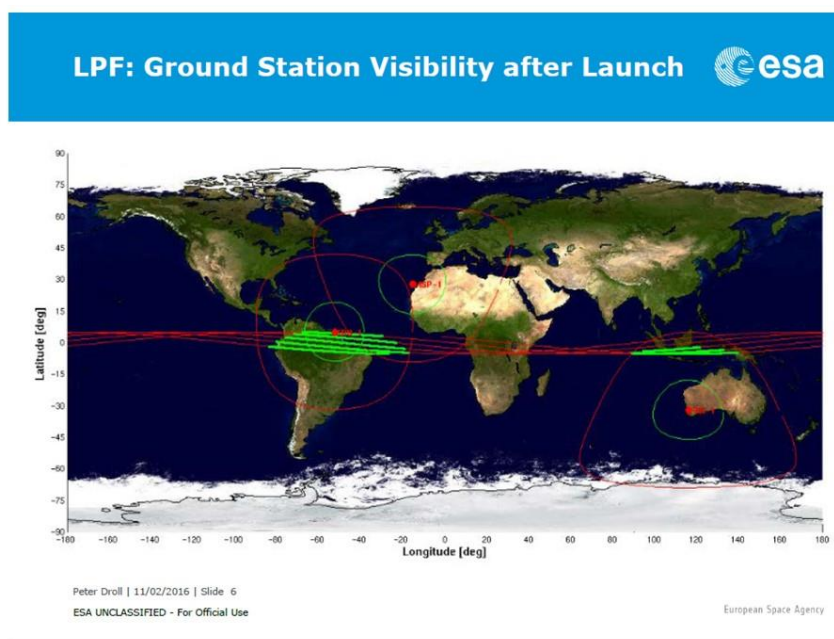


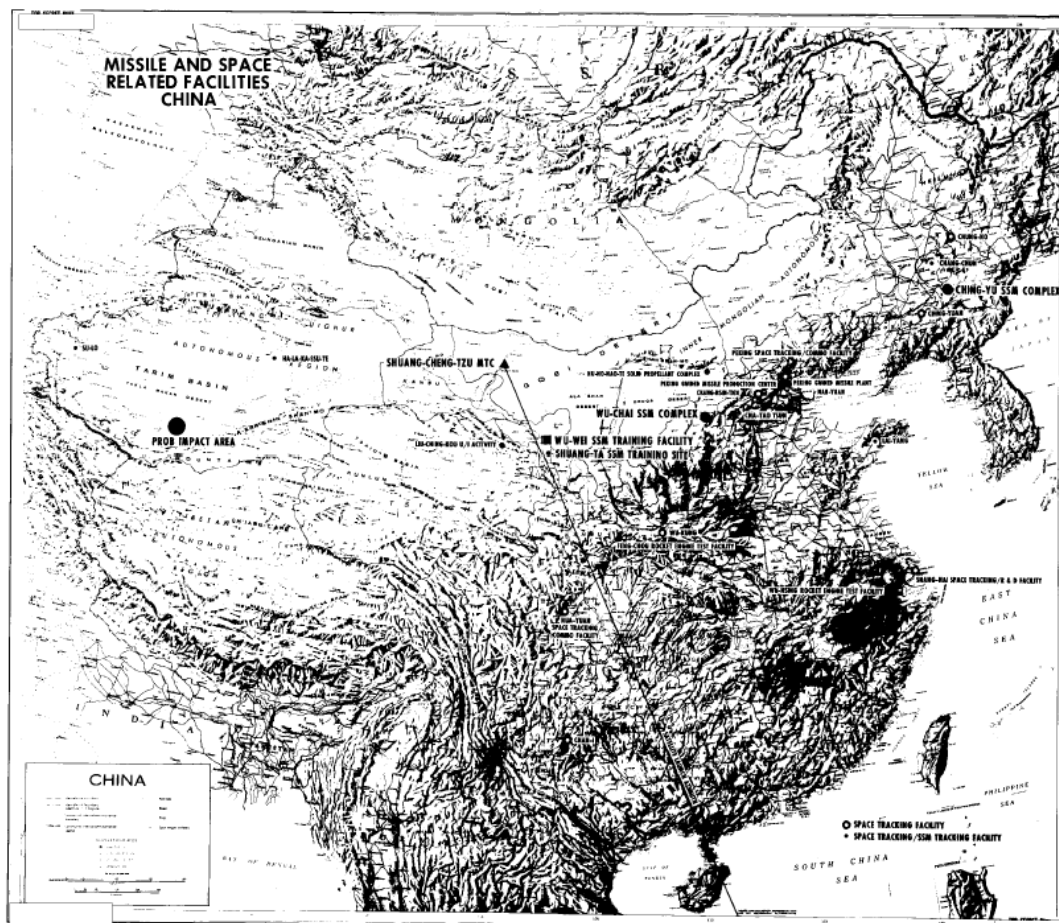
Figure 6.2: The Visibility to Earth Stations of the interplanetary probe “Lisa Pathfinder” (credit: Peter Droll, ESA, Presentation at New Norcia, 2016).

At its latitude of approximately 22.6 degrees, Swakopmund is also close to both the planetary ecliptic, allowing for easy communication with deep space probes to the Moon and Mars, and as Figure 5.2 above shows, the equatorial orbits adopted for such missions, in this case the orbit of the European Space Agency’s “Lisa Pathfinder” interplanetary probe.

Looking now at the location of Chinese launch facilities, the direction that the rocket takes from Jiuquan was known to CIA in 1971 to cross Hainan Island in a trajectory that continued over the South China Sea (CIA, 1971). Flights for the new launch site at Wenchang, Hainan Island, are also southbound over the disputed territory of the

Spratley and Paracel Islands of the South China Sea., where a tracking station has been built.

Approved For Release 2009/06/18 : CIA-RDP78T05929A004500090001-2



25X1

25X1
25X1

Approved For Release 2009/06/18 : CIA-RDP78T05929A004500090001-2

Table 6.3: CIA declassified map showing the trajectory (drawn as a line) of a satellite launch from Jiuquan over Hainan Island into the South China Sea. (CIA, 1971).

A Japanese article (Yoshiko Sakurai, 2016) quotes the point of view of a Fellow at the International Assessment and Strategy Centre (USA), that he “believes that the Wenchang launch center, operational since earlier this year, will become an extremely important hub for China to control the Earth-Moon system, noting: “This is where China will launch its Moon, Mars, and deep space missions. This will be the most important base for the projection to control the Earth/Moon system...This is one of the reasons why China wants to control the South China Sea and is working very hard to do so.”

He sees the establishment of Chinese space bases worldwide as “preparing to control the Earth-Moon system”.

In another account, efforts are made by the Chinese authorities to bring benefit to the host country. Town-twinning is attempted between Swakopmund and Chinese cities²⁹. Swakopmund receives delegations from China, including Baoshan District and Yunnan Province, at the delegations’ expense (Municipality of Swakopmund, Council Minutes, 28 July 2011). Kisting (2012) also reports on the associated education opportunities newly presented to Namibian students as a result of the creation of this station on Namibian soil. But the relation of this Chinese community to the established community within Africa can be contentious locally. There is also a new uranium mine further outside Swakopmund which is 90% owned by a Chinese company. Chinese merchants are also present in Namibian towns. While Schiller, Basch and Blanc (1995) may distinguish members of this community as “sojourners” rather than “immigrants” the community as a whole has been established as a Chinese centre of operation.

Dobler (2005, p.707) reports that “varied as cities on the African continent are, a new common feature has emerged over the last ten years: in every large or small African town, there is at least one shop owned by a Chinese migrant.” In common with all migrant or immigrant communities in the world, as indeed in the unfavourable reference to the import of “Strangers...now part of the community” (Cumberland News, June 10th 1966) to Spadeadam, Chinese individuals and companies in Namibia are the subject of unfavourable report and comment in the Press and social media, of such things as non-compliance with local labour regulations, land-grabbing, exporting local resources for their own use, preferential treatment by the authorities, corrupt practices, and unwholesome activities involving food and native animals³⁰. Optimistically Dobler argues (2005, p. 718-9): “the friction between hosts and migrants paradoxically

²⁹ See: *Swakop gets Chinese twin*. <http://www.informate.web.na/node/2704> ; Tjatindi, C (2008): *Swakop on Hunt for More twin towns* <https://allafrica.com/200809050768.html> (subscription required)

³⁰ See: *Coastal Businessman arrested with Chinese co-accused on multibillion money laundering scheme* (Readers’ comments namib times Facebook) : https://issu.com/namibtimes/docs/06_january_namib_times_e-edition ;Smith, JM:(2017): *Outjo protests donkey abbatoir*: Namibian Sun, 6 March 2017 ; *Faces behind namibia’s donkey abbatoirs*: <https://oxpeckers.org/2017/12/faces-behind-namibias-donkey-abbatoirs> ; *Swakopmund Land invasion Reaches Cul-de sac*: namib times 17 March 2015 ; *Chinese road builder accommodates workers illegally at construction camp*: namib times 2 june 2017; Kaure, A (2017): *Swakopmund: SU employees voice displeasure* <http://www.erongo.com.na/news/su-employees-voice-displeasure2017-11-17> (subscription required) .

increases the level of integration of the more successful migrants into the host economy. The ability to maintain links with key people in the host society increasingly turns into a precondition for migrants' economic success. This gives some members of the host society access to rents from patronage and might in the future increase investment partnerships and joint ventures". However the two communities relate, the issue remains as described by Hansen (2006, p. 41) as a "differentiation" of identities.

Thus, the importance of ground tracks and the ecliptic is present only in the consciousness of those who bring it to their particular setting. Evidently it is possible to define a world-system as a space where power is exercised, defined around a geographical reference; this reference can resonate in to popular culture; and is capable of extension into outer space.

The term *Astropolitik* has been applied (Dolman, 2002) to a competition or race between nations to gain ascendancy over the other in the control of land (by reference to celestial coordinates), technology and weaponry that may have some strategic value in any aggressive conflict between them.

An internet blog by Davis (2018) refers to Hong in "The Daily Beast"³¹ of July 26th 2018: "There is one Party official who is extremely outspoken about China's astral aspirations: Ye Peijian is a 73-year-old aerospace engineer and head of the Chinese lunar exploration program. While fielding scripted questions from a reporter at the CCP's annual plenary sessions in Beijing last year, he left quite an impression. When asked why China is going to the moon, Ye said, "The universe is an ocean, the moon is the Diaoyu Islands, Mars is Huangyan Island. If we don't go there now even though we're capable of doing so, then we will be blamed by our descendants. If others go there, then they will take over, and you won't be able to go even if you want to. This is reason enough." Davis considers this to evidence enough to suggest that "China sees space in terms of astrostrategic terrain: the moon and Mars are places of astropolitical importance, rather than simply the focus of scientific exploration. Just as China sees control of the 'first island chain' in East Asia as vital to its maritime security, Ye's

³¹ Hong, B: China's Looming Land Grab in Outer Space. <https://www.thedailybeast.com/chinas-looming-land-grab-in-outer-space>.

comment suggests that these high grounds in space will bear directly on Chinese strategic interests in the coming decades.”

Hickman (2012) continues in this vein when he considers the plausibility of Chinese “annexation of Territory on the Moon”. In a “challenge to the United States to a twentieth-century space race” he considers the annexation of lunar surface around China’s manned Moon base (which is not yet built!) as sovereign national territory to be “plausible” (ibid., p. 84). Wishik (2012) interviews a researcher, Durnin, under the title “Space, China’s Tactical Frontier”, and reports Chinese satellite capacity in terms of competition between the two countries.

Macdonald (2007’s criticism of *Astropolitik* includes an observation about China (p. 609). Quoting Dolan, (2002 p. 27), he writes “Astropolitik mobilises an unquestioned ethnocentrism. Implicit in this ideology is the notion that America must beat China into space because ‘they’ are not like ‘us’.

Spadeadam, Cumbria, England

The British post-war rocket and missile development programme centred on a rocket called the “Blue Streak”, which was initiated in 1954 (Technical Editor, 1960). Until the programme was cancelled, engine test facilities, which were primarily based at the launch site in Woomera, Australia, were constructed at a remote, virgin site called “Spadeadam Rise” (pronounced “Spade-Adam”) in Cumberland, now Cumbria, in North-West England³². No rockets were launched from this site.

Brander (1964) describes, from the perspective of a rambler or hill-walker, how the facility was seen within the local landscape (p. 178-9): “Looking northward we noticed several monstrous erections against the skyline. Studying them through binoculars, we came to the conclusion they could be nothing but rockets. We decided to investigate them closer and drove to Spadeadam farm which seemed the most likely approach on the map. There was a fine fighting cock strutting proudly around the yard but no one at home. We withdrew to Gilsland and found a signpost “To Spadeadam

³² I would like to thank the RAF Base Commander for his hospitality and for permitting the British Interplanetary Society to tour this historic site in 2017. All interpretations and errors are my own responsibility.

Rocket establishment". Beside it was another which read incongruously "To Moscow ½ mile". Further on a larger notice read intimidatingly "No unauthorised person allowed beyond this point. By Order. Air Ministry property". (Gilsland and Moscow are local villages).

Flight magazine (Technical editor, 1960) reported that: "When construction started in 1957 Spadeadam was truly a waste: there were no essential services of any kind and the builders even had to construct a road in order to bring in the labour force and the many thousand tons of material – ranging from bulk cement to the most delicate instrumentation. Peak labour force was rather more than 2,000, largely housed in a hutted camp on the site."

The programme suffered fits of doubt before being finally terminated. The Cumberland Evening News of 20 April 1960 reported: "About 300 men employed at the Spadeadam Rocket engine site were paid off yesterday. They were mainly of the "pick and shovel" brigade... this total of 300 includes a fair proportion of local men". They "included some fitters, fitters' mates, scaffolders and a few painters". The company managing the site on behalf of the Government, Rolls Royce, was quoted in the same paper on 18th June 1960: that "We are arranging for the transfer to other factories of a large number of Spadeadam employees, but inevitably some employees will be declared redundant." Brampton Parish council, the smallest unit of government in the immediate vicinity of the site, noted in the same newspaper of 29th June 1960 that they faced a "prospect in the near future of 200 local people out of employment- mainly through the gradually close down of Spadeadam Rocket Station". This unemployment followed an assessment that a local tax on the base, the business rate, would be lost, to a considerably adverse effect on the rates of the county of Cumberland" (Cumberland News, 6 May 1960).

The local newspapers continued to chronicle "Open Days" and test firings at the site, attended by senior figures from the Government, whose policy declared the launcher engine to be part of the rocket developed by ELDO. But the Cumberland News reported on June 10th 1966 that "News that the Government were going to withdraw from the European Launcher Development Organisation makes the future of Spadeadam as bleak as the barren waste it is built on." Local politicians stated that the "Axe decision would hit the County" and it "could be a disaster for Brampton and

Cumberland”. The newspaper reported “But it is not just the work and money that will affect the town. The majority of those living in the 250 houses arrived as strangers, and are now part of the community, having joined all the local organisations, and brought new interests to the area”. Local conversation in 2016 referred to the hobby-sport of go-karting being integral to the community associated with the Spadeadam site. The site eventually closed as a rocket engine test area, and is now used as an Electronic Warfare test range for fast jet aircraft of the Royal Air Force.

This short social history of Spadeadam demonstrates three things: that a new site can be constructed for several thousand people on virgin land and given a name, thus making a place; that despite its isolation it becomes an integral part of the local economic and political life of its location; and that adverse implication can arise from the closure of the site. These are the three factors identified by Hansen (2007, p. 47): spatial, temporal and ethical.

Kourou and Woomera

Southall (1962, p.99), the writer of boys’ fiction, notes in his account of the real-life rocket base Woomera that the Australian Security and Intelligence Organisation ASIO “handled the Petrov defection in 1954”. It was an important organisation as it “grew up at the time of Woomera....in terms of security, Australia’s stocks on the world market were low, and her hopes that Woomera might grow into something great depended on her ability to protect the secrets they shared with others. Britain and America both made it clear that unless Australia developed a sense of security at least equal to their own, no military and scientific secrets of theirs would be entrusted to her.” Woomera was therefore an important symbol of Australia’s commitment to the UK and USA in its role of rocketry and space utilisation.

The European Space Agency’s control centre at Kourou, identical by its function to other control centres all over the world, might be considered as one of Augés “non-Places” (Augé, 1995). Identified by Redfield from its picture post card (Redfield, 1996, p252)), the control centre at Kourou is located within a région of France, French Guiana, under the political control and military protection of its nation state; and is in a specific location because of its astro-geographical function (launches into the Atlantic Ocean).

Carlier and Gilli (1994) report (trans. 1994, p.280) that during 1964 the French Space Agency CNES studied thirteen potential sites in the world according to the following several criteria:

- The possibility of polar and equatorial launches
- The proximity of the Equator
- Sufficient size to ensure launch safety
- The existence of a deep port with sufficient handling facilities
- The existence of a nearby aerodrome capable of accommodating long-haul aircraft (runway of 3000 metres)
- The distance (short as possible) between the launching base and Europe
- “A stable political situation, so as not to be affected by local political contingencies.”

These criteria mix celestial and terrestrial criteria with the provisions of facilities, but equally, the “stable political situation” is required. In relation to former colonial powers, this raises inevitably the question of colonialization. In the case of China, it raises the question of expansionism and the “China Threat”.

Gorman (2009, pp 132-145; 2011, pp163-4) notes that “From 1936 to 2006, a body of material culture related to the exploration of space has grown both on Earth and in space. These sites and objects include rocket ranges and launch facilities, research, development and manufacture sites, and ground stations on Earth; space stations; satellites, upper rocket stages and debris in earth orbit; lunar landing sites and lunar orbiting material; and satellites, probes and landers on and around nearly every other body in the solar system”. Her work refers to, in particular, the rocket range built after World War II in Woomera, Australia, and its consideration within the context of de-colonialisation and coterminous “Conquest of Space” (ibid, p166). Redfield also notes “colonial processes at work in the growth of the space industry” (Redfield, 2002, p157).

Gorman (2007) compares Kourou with Woomera, built in the gibber desert from 1947 as a rocket range for the testing of rockets and the launch of satellites to the North West from a purpose-built settlement of the same name. But the connotation of Woomera with rocketry and therefore space exploration may not be the full text. In a

conversation in Perth, Western Australia, in 2016, an informal interviewee said “about Woomera: “Went to a wedding there when I was, oh, 23. A friend in the Air Force married an American girl. All military”. To the prompt about space, the interviewee shook his head.

The Royal Australian Air Force opened a new base at Woomera in 2015 (Gibber Gabber, 2015d, p4 et seq.). Woomera village now “sits as a part of the Woomera Range Complex and is garrison support for the Department of Defence’s activities within the WRC” (Gibber Gabber, 2015c, p3). The population of Woomera “fluctuates constantly, depending on factors such as when tourists, contractors and travellers visit” (ibid) and In September 2015 was 136, rising to 148 on 4 November 2015. It is subjected to periodic “Base Audible alert” drills. In an open letter (Gibber Gabber, 2015b p. 5) a departed contractor thanked the community for their hospitality and commented on “the almost complete absence of traffic...a cheap , large and almost completely empty swimming pool...you have more than twenty carefully marked bus stops and no buses whatsoever”. There is a Community Board which advises “the Base Strategic Support Operations Manager on matters relating to the welfare of the people of Woomera” (Gibber Gabber, 2015b, p3).

The road northwards to Roxby Downs is part of the Woomera Prohibited Area and a Range Activity Notice in July 2015 (Gibber Gabber 2015a, p4) reminded drivers of the prohibition to leave the road into the gibber desert and the danger of unexploded rocket ordnance.

The town is therefore considered as an adjunct to the Range from which it derives its significance. In that respect it is similar to an extra-terrestrial community adjacent to a mining facility on a planetary body. However, locally it is known as a “rocket town” as distinct from the “mining town” of Roxby Downs (terms used in conversation locally in 2016) to the North.

New Norcia: Ritual and the creation of Identity

Describing the location “Woomera”, the defining name arises from the Range, but may be extended to include the town. In the official history of Woomera, Morton (1989,

p117) comments that “At first the intention was that Woomera should be the name only of the town, not the Range as well, but this distinction quickly disappeared. On occasions when the people living there need to distinguish the town from the range, they call it ‘the village’”.

Naming is a factor in the identification of the new function of the previously barren location. A human meaning has been given to a similar space related “non-place” located at the ESA tracking station at New Norcia, in Western Australia. Tuan (1991) refers to the “ritual creation of place” by Columbus and his crew at their first landing in what was to become ‘America’. Columbus’ ritual included royal and Christian elements and symbols. Figure 6.4 below is a photograph taken the opening of the ancillary tracking antenna at New Norcia, Western Australia, in 2016. At this “ritual creation of place”, a traditional Aboriginal greeting of “Welcome to the Land” was made, followed by a Christian blessing and service conducted by the Benedictine monks of the nearby Order.³³



Figure 6.4: The “ritual creation of place” at New Norcia, Western Australia, 2016
(photo: author)

³³ I am grateful to #SocialSpace at ESA who invited me to the ceremony.

Space archaeology in China

Gorman's space archaeology (2011, p. 173-4) has a more subtle application in China. Chen Xi (2019) comments on a "booming space-themed travel" within China, including tourism trips to astronomical observatories, radio telescopes and the Beijing planetarium. This development is said to "further push forward national space development and cultivate young peoples' interest in space exploration."

But in the West, some sites once dedicated to space are now derelict. In the USA, control centres for Apollo and launch pads at the Kennedy Space Centre lie empty, unused, and in decay. The British site at Spadeadam has been dismantled with only the huge concrete test chamber for engines remaining. Much of Woomera has been replaced by a newer, secret, military training programme.

Harris (2009) advocates proposals for "space theme parks" in the USA in the light of those he says are planned for China, concluding that "now is the moment for space planners from both the private and public sectors to form joint ventures that help citizens to understand why investment in outer space exploration and development offer tremendous return on investment". It is evident that return on investment is the priority for space exploration in his eyes.

With reference to a planned park on Hainan Island, he writes in conclusion: "it is appropriate to emulate the Chinese and their plans for a space theme park". However, this park was not open to foreign visitors in 2016, and on examination the record of Chinese space-themed parks is varied.

In Shanghai in 2013, the metro map showed the concluding southerly station on line 8 was the "航天博物馆 (Space Museum). But on the arrival at the station there was no space museum there, and local enquiries received the explanation that whilst one had been planned it had never been built. Figure 6.5 Left shows the metro map as it was in 2013; the station (Figure 6.5 Right) has now been renamed and the line extended.



Figure 6.5 Left and Right: Metro Line 8 in Shanghai ended in 2013 at the non-existent Space Museum 航天博物馆

Similarly in 2016 the “Space Flight Spectacle” in Guangzhou, with its special bus stop (Figure 6.6 Left) had closed, and only a derelict site of a space-themed fairground (Figure 6.6 Right) and some tall structures (Figure 6.6 Below) were visible above fencing behind open areas now dedicated to a car repair workshop and a parking area for taxis.



Figure 6.6: Left: The Space Flight Spectacle bus stop in Guangzhou, 2016; Right; the space fairground; Below: the view over the car repair shop

According to signs still visible within the closed workshop area, the Guangzhou site had been funded by state agencies promoting science.

Chinese development sites promoting space exploration do, however, continue to open. A new Discovery Centre has opened in Chengyi near Xiamen and celebratory postcards show its display of the astronaut theme (Figure 6.7 below).



Figure 6.7: The astronaut theme (to the left) at the new Chengyi Discovery Centre, in an advertising postcard.

And in Harbin the regional science museum of Heilongjiang contained in 2016 not only an area dedicated to space exploration but also illustrations hanging in date sequence showing the progress of it, including in a spirit of optimism (Figure 6.8

below) a Chinese space station that has not yet been built.



Figure 6.8: The Chinese Space Station of 2020, photographed in Heilongjiang, 2016.

It seems, in conclusion, that some sites in China which promote space exploration are optimistic, speculative and consequently ephemeral, and so China may not offer the exemplary model to the USA that Harris (2009) seeks.

Heterotopia in Space Exploration

A strong alternative to *Astropolitik* as an explanation for space sites lies in what Foucault called a “heterotopia”, which can be thought of as a place defined not by location but by function and direction; he gives the examples of a cemetery, a ship, or a honeymoon (Foucault, 1986). Essentially the term “heterotopia” is applied to the location of a variety of activities around a common defining purpose. Such

heterotopias may also be found in space exploration, and the concept of a ship as a heterotopia is applied in particular to a space vehicle in motion. The term emphasises a dislocation, a jolt of recognition that this place is somehow different from another.

“Outer Space” is a complex term, and to explain and use it inevitably implies international activity on this planet, Earth. The “easy answer” called “the Space Race” has been shown to be embedded in a particular historical epoch and its use as a signifier for China has little to offer. Outer Space has no materiality but contains material objects and is therefore a special answer to the question “where”. This thesis has explored how naïve children have tried to reach an answer to this question. It raises issues of meaning and its expression in language. Such expression, after Foucault, links location and “place” with social organisation and power. The expression of “science” is also intertwined in this narrative.

Malabou (2008) considers, from a structuralist perspective, social and economic organisation in terms of “plasticity”, the neurological term describing the capacity of the human brain to adapt, within limits, to development and trauma. She speaks of plasticity in the brain and of social organisation in the same voice (p.9): “As though neuronal function were confounded with the natural operation of the world, as though neuronal plasticity anchored biologically and therefore justified- a certain type of political and social organisation.” In application, Malabou sees (p.10) ...and immediate, daily experience of the neuronal form of political and social functioning...”

Foucault’s jarring displacement of space and time, characteristic of his application of the term “heterotopia”, may be present in the experience and ability of space travellers in micro-gravity, found, as Malabou might expect, in neurological studies. Clément (2018) is conducting an experiment on board the International Space Station which examines time perception in orbit. His justification is as follows: “Results of ground-based studies in healthy subjects and patients support the existence of an overlapping perception of time and space. The representations of space and time share the same metrics and cortical network, presumably located in the right parietal cortex. It is known that the representation of space is altered during spaceflight (e.g. distances are underestimated), and that this alteration carries over to the early post flight period.

“The goal of the Time Perception in Microgravity experiment is to investigate something that has not been studied during long-duration spaceflight – the perception of time to crew members aboard the International Space Station (ISS). It has been found that:

- The speed of the body’s movement may affect time perception:
- Crew members’ motions are slow at the beginning of the flight, and then increase in speed as the flight progresses.
- It takes about 50% more time in orbit to execute the same experimental procedures as on Earth.
- Lack of sleep, disrupted circadian rhythms, stress related to workload, and high performance expectations may affect time perception.
- Scale of time on board the ISS is confusing: GMT, Houston time, Moscow time, MET, OSTPV (red bar)³⁴.”

In this formulation, the dislocation of time and space attributed to the heterotopia maps in some way onto a neurological basis in humans. Tackling the ancient mind/body problem, as Malabou (2008, p. 81): puts it: “the transition from a purely biological entity to a mental entity takes place in the struggle of the one against the other, producing the truth of their relation”.

The lesson from Malabou is her reference to philosophers “Walking on the same ground” as scientists, but not necessarily being recognised as such³⁵. Similarly, de Bressey (2016) comments that in her notion of “plasticity”, she is “attempting to fuse two branches of intellectual endeavour that have been scornful enemies for a century and more”. Thus, Foucault’s term “heterotopia” as applied here is a linguistic expression that shows what is inherent in considering the orbiting space craft and the dedicated bases at particular celestial co-ordinates on Earth. It is a powerful phrase for what Malabou calls (p. 61) the “transition from the neuronal to the mental”.

³⁴ “On Board Short term Plan Viewer”

³⁵ Public Meeting, London, January 2019

Therefore, in the account of “ephemeral settlements“ (Hersey’s phrase (1965 p. 484)), sites of function determined by celestial coordinates, such as the Chinese space tracking station at Swakopmund in Namibia described below, are described using Foucault’s term “heterotopia”, to emphasise their ephemeral and functional nature arising from celestial position.

It is not the case that there exist such heterotopia, but that the application of the term “heterotopia” draws attention to the dislocation in time and place, the sense of unease, which is implicit and known but hidden by everyday language.

In an alternative description, the joint operation of the American “Mars Explorer Rovers” on the surface of Mars and their earthbound control centre is described (Clancey, 2012, p224) as an “exploration system”, in which a sociotechnical system (Trist, 1981) places technical actions within a setting of human social relations. The setting may contain “distributed meetings”. Here, the sense of alienation is also present.

On Earth, an example of a heterotopia could be the French-Italian research station *Concordia* located in the Antarctic, or indeed the British station *Halley VI*. These are single-function locations isolated in place but not in time. Healey (2016), who conducted experiments on *Concordia* for ESA, wrote³⁶: “Without the sun, Concordia really did feel like a different planet, “White Mars” as it is often called, or perhaps one should say “Dark Mars”. In some way the sun had made me feel connected to the outside world. The sun, at least, was the same as back home, and this gave me a sense of familiarity. Losing that made me feel cut off, in a different world”.

Johnson (2013) considers further the geographies of heterotopia. He gives (p. 790) the wider context of Foucault’s “marginal” thoughts: “Foucault’s outlines of heterotopia attempt to explain principles and features of a range of cultural, institutional and discursive spaces that are somehow ‘different’: disturbing, intense, incompatible, contradictory and transforming”. In his various works Foucault identifies the possibility of the brothel, the cemetery, the garden, the rest home, the festival, the magic carpet,

³⁶ <http://blogs.esa.int/concordia/2016/06/04/part-4-dark-mars/>

Masonic Lodges, and so on (ibid.). Johnson gives a working definition: “Heterotopias are defined as sites which are embedded in aspects and stages of our lives and which somehow mirror and at the same time distort, unsettle or invert other spaces”. Quinn and Wilks (2016) argue that (p. 35), in two rural settlements, “the spatial and temporal interruptions caused by two festivals temporarily transform the social order” and can also be referred to as heterotopia. As noted earlier, Hansen is also concerned about the temporal relations in the formation of the identity of place.

Deng Xiaoping’s visit to the Johnson Space Centre in 1979 gives some flavour of space travel dislocated from time and known places. Stewart (2001) captured “Cowboy Deng” (p.13) ‘s enthusiasm for his simulated flight in his opening chapter: “We’re at three times the speed of sound’, US astronaut Fred Haise told Deng Xiaoping, China’s vice premier. Deng hunched excitedly over the control panel inside a space ship simulator.

“On February 2, 1979, at the Lyndon B. Johnson Space Center in Houston, Texas, seventy-four-year-old Deng Xiaoping took off on his second simulated spaceflight. He peered through the cockpit window as astronaut Haise pointed out the simulated sights one hundred thousand feet below. The Pacific Coast, glittering Las Vegas, and Edwards air force base in California were projected onto a television screen. Finally Deng pushed the button to lower the ship’s landing gear, and raising both arms in the air, he smiled as his ship neared the runway.

Deng was having fun on the sixth day of his tour of the United States, and he wasn’t concerned about time. When his escorts announced he was behind schedule, Deng reluctantly quit before his third flight and climbed out of the spaceship.” (Schell, 1980)

This and other actions of Deng Xiaoping were acts seen as carrying a clear political message between China and the USA. Schell (1980) describes the next scene at a Texas rodeo (p. 124):

“...a young girl on horseback gallops up and presents him with a ten-gallon hat of his own.

“The whistling, cheering crowd watches with delight as Deng theatrically dons his new hat. And in this one simple gesture, Deng seems not only to end thirty years of acrimony between China and America, but to give his own people permission to join him in imbibing American life and culture.

“But in the gesture, there is also an implicit suggestion of surrender, an abrupt arresting of China’s historic resistance to the West. This one stark act seems to reverse the momentum of China’s long-standing struggle of who will yield to whom...”

Scene and Place are significant to this statement of rapprochement between China and America. Both an actual scene (the rodeo) and a simulated scene (the space shuttle) were used by Deng Xiaoping in this way. The definition given by Quinn and Wilks (2016, p. 35) might include both the rodeo (a festival) and the simulated mission (another displacement of space and time) as heterotopia.

It is also useful to consider Kourou, and places like it, as a heterotopia related to the architecture and archaeology of space exploration. The CNES control centre at Kourou (Redfield, 1996) can be considered as both a heterotopia and as a political astro-geographical and astro-political asset. Additionally, if according to Damjanov (2013), “one can consider the Moon as a heterotopic space” (and a fortiori a lunar cemetery, as she describes) in that “it is the principal light in the night sky, visible from every location on the planet [Earth] and shared within cultural imaginations”, by these criteria of function, one could also include those planets and stars (including the Sun) visible to the naked eye.

MacRae (2011) “explores the potential of the heterotopia as a way to point us to think differently about children’s’ art making.” She considers explicitly that because a heterotopia is neither representative nor interpretative but stands in its own right, there is no requirement to perform an action of representation or interpretation of a child’s art object.

Similarly, to consider the International Space Station (or the Tiangong space station) as a heterotopia allows it to be a ship in motion operating under its own rules, while it has a political expression as well as a spatial one in any particular moment. A travelling heterotopia has a distinct and special property.

As an example, consider the a Japanese legend of the Edo period depicted on a scroll, the Ise Monogatari, (Mostow and Tyler, 2010, p35) : the scrolled image at the end of Episode 9, read as it unfolds from right to left, shows first the ferryman (without whom the boat cannot move) with his oar, at the rear of the boat, then the commanding person who had commissioned him, followed by the rest of the party looking in the direction of travel, and only then the birds whose novelty depicts a stage in the legend. Thus, an embedded (political) power structure can be discerned in the heterotopia which takes the form of a ship.

If dedicated sites and moving ships may be properly described as heterotopia, then in considering the temporal, space events are by their very nature displacements of space and time. The launch quickly changes the position of the space craft in space, particularly in the motion in orbit which is never above one point of the Earth's geography for more than an infinitely small increment of time. Such is the definition of time, it is never within the same time experienced by humans at all or any points of the Earth; for this reason, crewed space vessels adopt a standard time such as Eastern Daily Time, Moscow Time, Greenwich Mean Time (Universal Time) or Beijing Time. The spacecraft in its journey is a displacement of space and time and it is difficult to comprehend on Earth.

Edkins (1999, p. 3) calls into a question of political philosophy “the conditions of possibility that produced or made conceivable this particular representation of power”. Harman (p. 33) notes that for Latour all related objects require a mediator (Latour, Hardman and Edelyi (2011) p33); therefore there is a mediator between the objects of discourse and political power. Latour is “a philosopher of actors and networks” (ibid., p. 34); heterotopia have that mediating function of exacting power.in the networks and distributed nodes of space exploration. This polycentric activity is *transnational* – with “connections and interactions linking communities across the borders of nation states” Jung (2009) (p70).

On Earthbound nodes, and in future extra-terrestrial communities, the political power in the function of the node, which defines the heterotopia, is embedded in the Range

or Control Centre which is the node on the Outer Space network, and to the colony or garrison town which accompanies it in a separate, familiar process of colonisation. Both Kourou and Woomera have factors in common: they house activities around a common purpose; they are chosen in reference to astronomical significance; they act as a node on a purposed network; they have a distinct identity on that network different from its physical location; and they can be considered as an expression of colonialist imperatives leading to the displacement of the local populations.

Conclusion: “Place” and location

Taking a Mercator projection, the many Chinese bases in other countries are considered as a political expression in which China is extending its influence worldwide. Foucault’s term “heterotopia” captures the oddity of these bases. The example of New Norcia shows that a ceremony changes a location into a place.

This earth-oriented geography takes no account of a spherical location, and so some aspects of these bases are thereby missed. Further, locating these bases in celestial references – the term “cosmic geography” has been used here by Cosgrove – demonstrates that they are better understood as the expression of China with reference to outer space.

Considering also the notion of connectivity, it can also be seen that the interconnections of the Belt and Road Initiative also extend into outer space.

7: Space Advocacy in the Classroom³⁷

³⁷ This Chapter builds on and reworks some content from Thomas, 2017b, of which I am the sole author.

The Public Conversation about Space occurs not only within China, and about the Chinese space programme, but in many world communities. ESA's Space 1.0 described early pre-Enlightenment descriptions of the cosmic scale and the position of humankind within it. In this chapter, within the frame of Space 4.0, attention is turned to present-day naïve descriptions of space and travel within it.

This is a contested area in that many space agencies in the world are rediscovering their public persona by means of outreach work to the school classroom. A brief overview follows.

A “passion and interest for space” and “great creativity and ingenuity” were found in a competition for schoolchildren sponsored by the European Space Agency (ESA, 2016a). Schoolchildren drew “a variety of cosmic settings” in the context of drawings to be engraved on two plaques to be mounted on board the ESA spacecraft CHEOPS, a satellite applied to astronomy.

In the same vein, the Asia-Pacific Regional Space Agency Forum (sponsored by JAXA, the Japanese Space Agency) announced its Poster contest calendar for 2017 showing drawings and paintings of children under the theme “My Dream Planet.” Their Space Education working Group “encourages the use of space materials to enhance education for young people, and aims to stimulate intellectual curiosity and passion of young people through their involvement in space activities.” (Aprsaf, 2016).

In the United States, NASA invites young school students to “illustrate their version of the future in aeronautics, exploration and earth science” by submitting their student art (NASA, 2018). The coordinator describes the contest as “intended to illustrate how NASA research and innovation are propelling science forward to new discoveries, and to highlight how exploration helps create a better world – one full of opportunities, technologies, and new ways of understanding our home planet”.

Similarly, an initiative produced postcards drawn by children hospitalised in nine countries – Bosnia, Canada, Croatia, Ecuador, Germany, Pakistan, Russia, Uganda

and the USA – and sent by digital means to the International Space Station (Stott, 2018). The programme is supported by a former NASA astronaut, Nicole Stott. It was part of the Mission of the “Space For Art Foundation” who write of it “Space for art projects are designed to ignite the strength and vision of the children who create them; to draw inspiration from the audacity and ingenuity of space exploration; and to nurture the dreams that all of the children have for a happy and healthy future for themselves and those around them”.

Such initiatives demonstrate how the public conversation about space exploration is being discovered by national space agencies through a free-ranging artistic exercise with children and young people. Clearly some intellectual weight is attached to these initiatives: they are seen to be “worthwhile” and attract a lot of work. However, although images from children have been sought, they have not been analysed for their content. Therefore an exercise was conducted with British schoolchildren to explore what their learning about space had accomplished (Thomas, 2017b, pp 27-35.), and to compare with the experience discerned in China

During 2017, the European Space Agency (ESA) and the UK Space Agency went to considerable efforts to promote the *Principia* mission of Astronaut Tim Peake to school children in the United Kingdom. This chapter, based as it is on (Thomas, 2017b, pp 27-35), describes a “Space Day” at an English primary school run by a Local Authority in England attended by Year 4/5 school students (aged 10 to 11 years old), at the mid-point of ESA’s *Principia* mission to the International Space Station.

A “Space Day” is an educational event in a school which sits at the culmination of teaching about the solar system and space exploration, often with an encouragement of learning in science, technology, engineering and mathematics (STEM).

In preparing this analysis, the chapter (based on Thomas, 2017b) adopts as critical methodology a theoretical perspective grounded in some categories which are then applied iteratively to the data to reveal the nature of space travel. The “Space Day” event is then considered as a gallery in which the material studied here is shown.

Written and visual data obtained are reported and discussed by reference to the grounded categories, and the data are studied again through a process of retroduction.

The methodology allows for a preliminary model to be prepared, then as statements are assigned to this preliminary model, insights allow re-coding and new categories and relationships shown. Although, in its base in England and the *Principia* mission, the study offers a particular insight into the discourse by reference to country and age, relevant to the agencies sponsoring space travel from England as well as to the educational authorities there, more generally, the exercise as a whole contributes to preparation for a critical analysis of discourse about human space travel, which will be drawn upon later in this thesis.

“Space Day”

(Bennett, 1995) offers the term “gallery” and by so doing draws attention to the arena in which the event was held. This was the environment where content, authorities, roles of attendees and procedure of this “gallery” followed the function of the school classroom.

On arrival to the classroom one January morning the rear of the classroom showed traces of previous work done about astronomy and space travel, in that a display board had been made showing pictures of planets and stars and statements in “speech bubbles” were shown. Books selected on this theme were available for the school students to borrow, and there was a large poster showing the solar system.

Before a presentation, the sides of the classroom, and the front area occupied by the teacher, which the students faced, was modified by adding to the walls a selection of planetary posters provided by ESA at Open Days at the European Space Technical Centre (ESTEC), and a very large poster of Astronaut Tim Peake and the *Principia* mission, including the mission logo, which had been downloaded from the website of the United Kingdom Space Agency and the European Space Agency³⁸.

³⁸ <http://www.principia.org.uk> Accessed 25 July 2016

Up to about fifty students attended a presentation downloaded from the official website. The presentation was modified as permission was given on the site to do so (*“Please feel free to use and adapt the slides as you wish. Don’t feel you have to get through them all!”*) The modifications included references to amateur satellites and included this the presenter’s unique pictures and resources, including a time exposure photograph of the transit of the International Space Station at dusk, and a demonstration of voice relay by radio through a 1:1 model satellite, known by its small and regular dimensions as a “Cubesat”, using a hand held co-axial dual polarised VHF/UHF satellite antenna known to the ham radio community as an “Arrow” antenna, and photographs broadcast over ham radio from the Mir space station and the International Space Station between 1998 and 2016.. The photographs in this instance had been recorded in and transmitted from the space vessel.

In the concluding minutes of the lesson the students asked their own questions. In reply the presentation drew on materials referenced in the Frequently Asked Question (FAQ) sheet from the Principia website, including videos of how hair is washed and the toilet used in space. They also asked original questions such as the recycling and consumption of drinking water, and eating chocolate in space.

After a mid-morning break two classes returned to address a question: “I want to be an astronaut because...” or “I don’t want to be an Astronaut because....” Some students declared “I’m in the middle” and wrote accordingly. School students could choose which of the three to address.

Data was made available from two classes. Each student produced a short essay; in the one class this was generally less than a page of A4 in handwriting, and in the other class this was written on the cut-out format of an astronaut. The students of the first enumerated class also drew pictures following their essay and free expression was encouraged. At the conclusion of the morning all school students were thanked and told that their work was appreciated and would be taken away and shown to people in the space community who would find it interesting. Teachers later gave the school children some authentic gifts about space exploration (promotional stickers and badges which had been gathered previously at ESA’s open days at ESTEC).

A preliminary structured context

Whilst text and image are permitted in this study, a mere catalogue of gathered data amounts to little more than an ordering of description. To extract predictive meaning, capable of generalisation, requires a structured, critical analysis. Belfrage and Hauf (2015) tackle this dilemma of expression by promoting “Critical Grounded Theory” (CGT) to evaluate and understand the data. In this method, a theory is developed having been grounded in an initial categorisation, refined by an iteration through the data, then returned in a process of retroduction to a further iteration of the data. This process is empirical in its source data and grounded in established theory, but progresses the analysis to a further level.

At the outset, the context stands aside from Gorman’s (2011, p164) description: “the dominant interpretation of space material has been what I call the Space Race model”. She challenges this model, which was discussed in Chapter 4 above, and proposes that it masks “the really interesting questions about space technology” (ibid, p165). In this dominant interpretation, references also abound to the “Right Stuff” of which astronauts are said to be made.

Ormrod (2009) considers the centrality of fantasy within the “pro-space” movement, and by so doing seeks to “demonstrate the usefulness of a psychoanalytic approach to fantasy when studying social movements”. Whilst not seeking to pathologise the discourse of the movement, he identifies three dominant themes in “pro-space fantasy”: which he iterates as (2009, p. 119):

- “Trips, often just into Earth’s orbit, in which the activist experiences the pleasure of floating around in zero gravity”;
- “Seeing the Earth from space as a unified (and in many accounts insignificant) whole”; and
- “The development and settlement of other planets, the Moon and asteroids”.

Therefore, because it is a wider set than the “Space Race” and the “Right Stuff”, this analysis chose to start with a key set of categories in the study of human space travel, rooted in human agency, as provided by Parkinson (1998). These categories can be considered to have the “pro-space movement” as their origin. He considers that the rationales of those humans who participate – and there are others who do not – can

be grouped into six: *Explorers, Adventurers, Colonizers, Merchants, Profiteers and Technologists*.

Parkinson's categories of data serve this study as a preliminary ordering of the texts and drawings produced by the school students, as given in the Part 1 of Table 7.1 below. In Part 2, a first iteration of the data is carried out. This adds three categories – two expressions of consciousness, the self and the void (perhaps Sartre's "*L'Être et le Néant*"), and Foucault's heterotopia. In Part 3 of this Table, after a second iteration of the data, six other categories become evident: "my family"; "fame"; "Planets and stars"; "Astronaut Tim Peake"; "Teaching"; and "My country".

The data

This critical analysis commenced with the categories of persons defined above, and statements and components of drawings made by students were assigned to them. The focus of the critical analysis was, properly, the discourse, and not the individual student. A discourse of statements or complete phrases was identified in essays submitted by the two classes. Using the software package for qualitative data analysis N'vivo, a grounded data model was prepared. In addition, some new categories became evident while coding, and statements were re-coded as the analysis continued.

A re-iteration of the data suggests expressions of the self and of the void of the cosmos, and introduces Foucault's linguistic concept of "heterotopia" that has been discussed earlier in concepts of place. This iteration acts as a linguistic bridge between agency categories of persons (Parkinson) and the person-centred expressions of the children.

Typical statements or phrases attributed to each category are summarised below in Table 7.1 which is a re-expression of Thomas (2017b, specifically Table 2 on page 31). Here the expressions are organised after the iterative process of coding, (the statements have not been corrected to Standard English). It should be noted that some statements are coded to more than one category.

PART 1: Children's expressions (right) against Parkinson's categories of human agency (left).

Explorers □	I think it would be a good idea to become an astronaut because you will see unique things.
Adventurers □	<ul style="list-style-type: none"> • I would be the first child in space because no children have been in space and I would be the first what an excitement • imagine being the only child in space
Colonisers	Also when you go to the moon you need to be quick or you mite lose the Space Ship and need to stay their for a while until another space
Technologists	<ul style="list-style-type: none"> • I think it will be a bad idea because ther is no shower • And you have to drink your own wee after it's been cleaned.
Profiteers	<ul style="list-style-type: none"> • I wold like to be an astronaut because you can become famous and earn a lot of money for your family • An astronaut gets paid a lot so it will be enough to provide for your family.
Part 2: First Iteration	
Expressions of Consciousness -Self	<ul style="list-style-type: none"> • well like we always say we have one life so use it right. • The reason why I wouldn't like to go to space is because I'm staying away from family so long and I'd be homesick. therefore I'd be unhappy to risk my life. • On the other hand I don't want to blast off because there's a 100% of dying; I don't want to die. • and I get travel sick most of the time

<p>Expressions of Consciousness – Cosmos or the Void</p>	<ul style="list-style-type: none"> • NO GRAVITY? How cool is that? Being able to float around isn't anything you can do in everyday life. The views of Earth, the planets and stars also more is once of a lifetime opportunity, it would be like I'm a bird looking down seeing a view that people don't have a chance to see. • The reason why I don't want to be an astronaut is because it's dangerous and I'm terrified of just floating away • Also it would be astonishing floating around the ISS • I wouldn't want to go to Space: <ul style="list-style-type: none"> • Because I don't want to die • Because of all the darkness • I wouldn't like to go to space because I don't want to be in all of the darkness. • I don't want to be astronaut because I am very Scared of how high the sky is.
<p>Heterotopia – The International space station</p>	<ul style="list-style-type: none"> • Also another reason why I don't want to be an astronaut is becaws you don't have a big bathroom or toilet. • I will not be an astronaut because when you go up in to space it is scary because you might crash into something • I would have to go outsid which is really exited. I would have done backflips and front flips • If I got a chance to go to space I would go to see all the earth , ISS and planets. • My last reason is When you look down, I would feel as if I am falling down.
<p>Part 3: Second Iteration</p>	
<p>Grounded data; My family</p>	<ul style="list-style-type: none"> • The reason why I wouldn't like to go to space is because I'm staying away from family so long and I'd be homesick. Therefore I'd be unhappy to risk my life. P.S. I would take my

	<p>teddy and friends with me. OH and my mum. The reason I would take my teddy is to sleep with.</p> <ul style="list-style-type: none"> • I would take my friends to stay and keep me company. Also I would take my mum to do everything for me. • It is a big decision to leave your family and friends, but if it's your dream, follow it and be grateful for having a chance to go because not everybody is able to
<p>Grounded data; Fame</p>	<ul style="list-style-type: none"> • And I would get to be richer than any one and famouser than like Ronaldo • You can discover fascinating facts noting you down in history, with a chance to see what you always wanted to see in person
<p>Grounded data: Planets and stars</p>	<ul style="list-style-type: none"> • Seeing the planets and milkyways would be great. • In the ISS I would have a great view of the earth and other planets. Then I would know that all the planets are spherical. • Space is an amazing place to visit because of the wonderful view of the atmosphere • On the other hand, space would be an amazing place to go because of the surroundings, other stations in the Solar system and earth below. • All of the surroundings would be cool to see because of the Solar system. <p>To see planet right in front of your eyes would be amazing. Also, stations would be floating around in the atmosphere and to see them would be unbelievable!</p>
<p>Grounded data – Tim Peake</p>	<ul style="list-style-type: none"> • The reason why I would like to be an astronaut is because I find Space really interesting and exciting to learn about. I am also very Inspired by Tim Peake and his amazing performance.

<p>Grounded data - teaching</p>	<ul style="list-style-type: none"> • However if I wanted to visit space it would not be for my fun but for experiment to help the people find more knowledge about space; even take people to space
<p>Grounded data - Country</p>	<ul style="list-style-type: none"> • Also it would be my dream to become the 2nd Afghani to visit space and be in peoples minds. • On the one hand I'd want to be an astronote thus I'd make history (being the first Yemenie).

Table 7.1: Summary of Results (texts). Note that there has not been any correction to Standard English. (Based on: Thomas, 2017b, specifically Table 2 on page 31).

Some school students produced drawings and they are reproduced in full or part form below in Figures 7.1 to 7.7, with an accompanying commentary.



Figure 7.1: “Earthrise” in Blue and Green (Thomas, 2017b, p.32, Fig 2)

This is one of the “fantasy” themes referred to by Ormrod (2009, p. 119). In Figure 7.1 (left) the child artist has drawn a Planet Earth in the two colours of blue (sea) and green (land), a discovery which has been made explicit by the Apollo 8 “Earthrise”

photograph taken from Apollo 8. In the second image (Thomas, 2017b, p.32, Fig 2) continents are defined and named, although their relative position may be incorrect, but giving a presumed location to the space craft (the ISS) overhead.

Beaver (2016) refers to the gain of a global perspective and worldview by such space-based imagery as "the Overview Effect". He considers that the space-induced shift in worldview enhances planetary awareness and assists the move to seek solutions to our concerns for the future of the world.

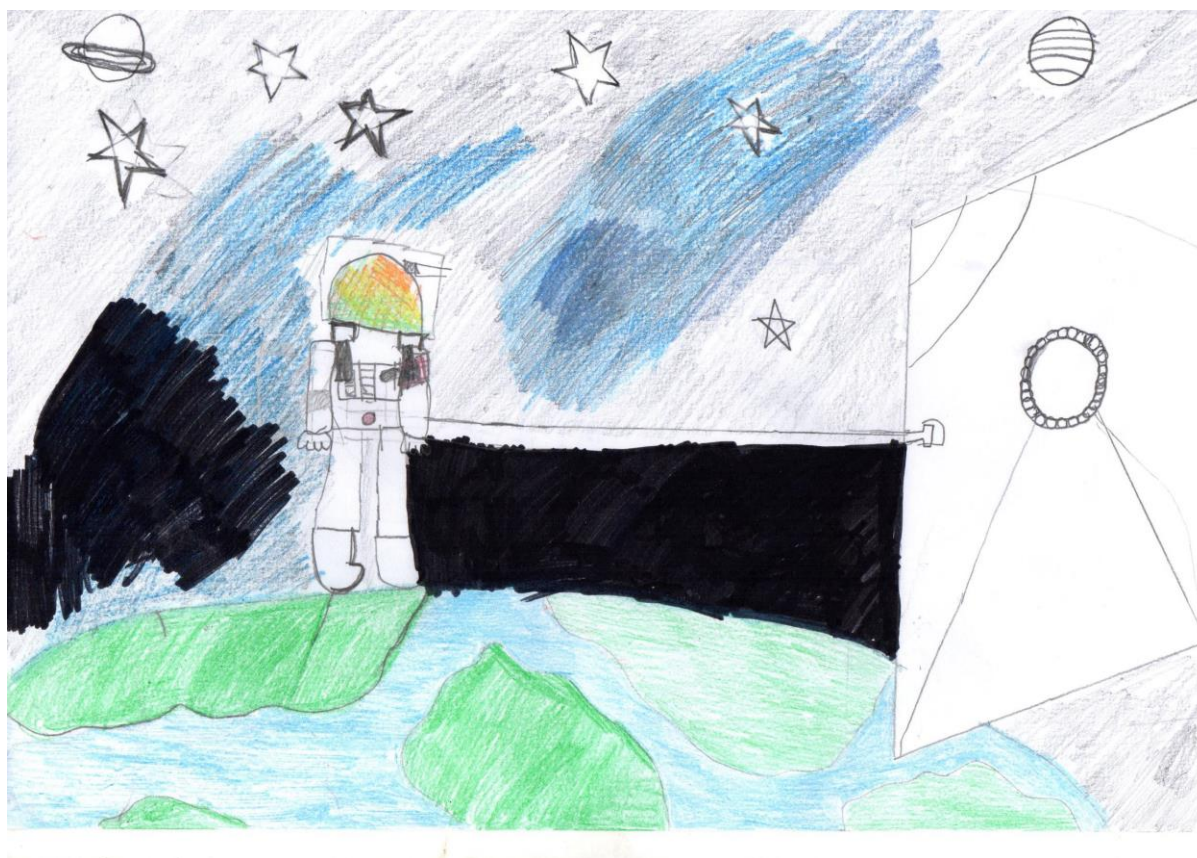


Figure 7.2: Planets and Stars

Although the International Space Station is in orbit around the earth, the majority of experiments, and all visual windows, face the surface of the Earth, limiting the prospect of viewing stars and planets. Astronaut Tim Peake confirmed this by radio in an Amateur radio contact with the ISS (ARISS) contact on 18 April 2016, in reply to "We see the wonderful time lapse images of the ISS orbiting the Earth, but what I like looking at are the stars and making out the constellations. Do you do any astronomical research on the ISS?" Opportunities to view the planets from the ISS are limited

severely by the lack of windows facing away from planet Earth, although some planetary conjunctions and Moon rise can sometimes be seen.

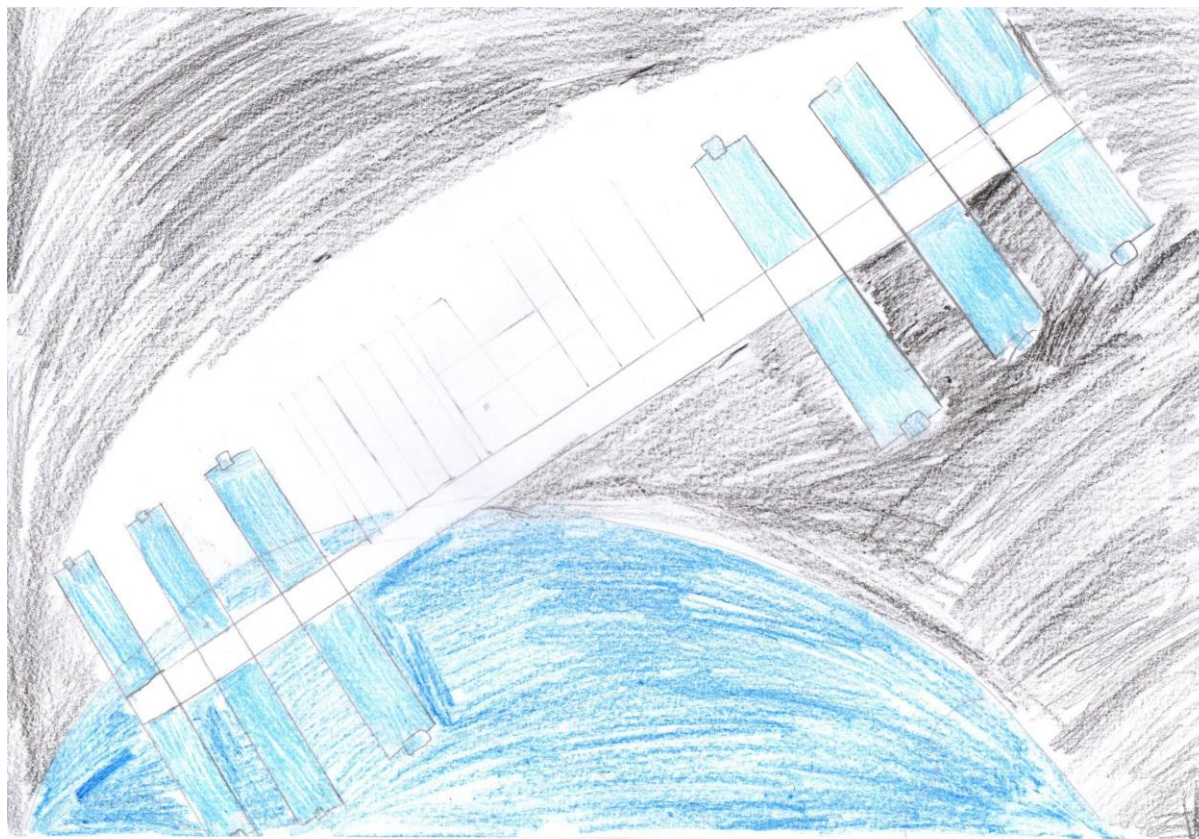


Figure 7.3: The regularity of the ISS against the void of space

Here (Thomas, 2017b, p.33, Fig 4) the child artist has chosen to define the ISS as a stream of rectangles with hard corners seen against a backdrop of black space and blue earth. An alternative choice might have been the view inside, which would have emphasised the circular and softer edges of the living quarters and modules which comprise the bulk of the spaceship.

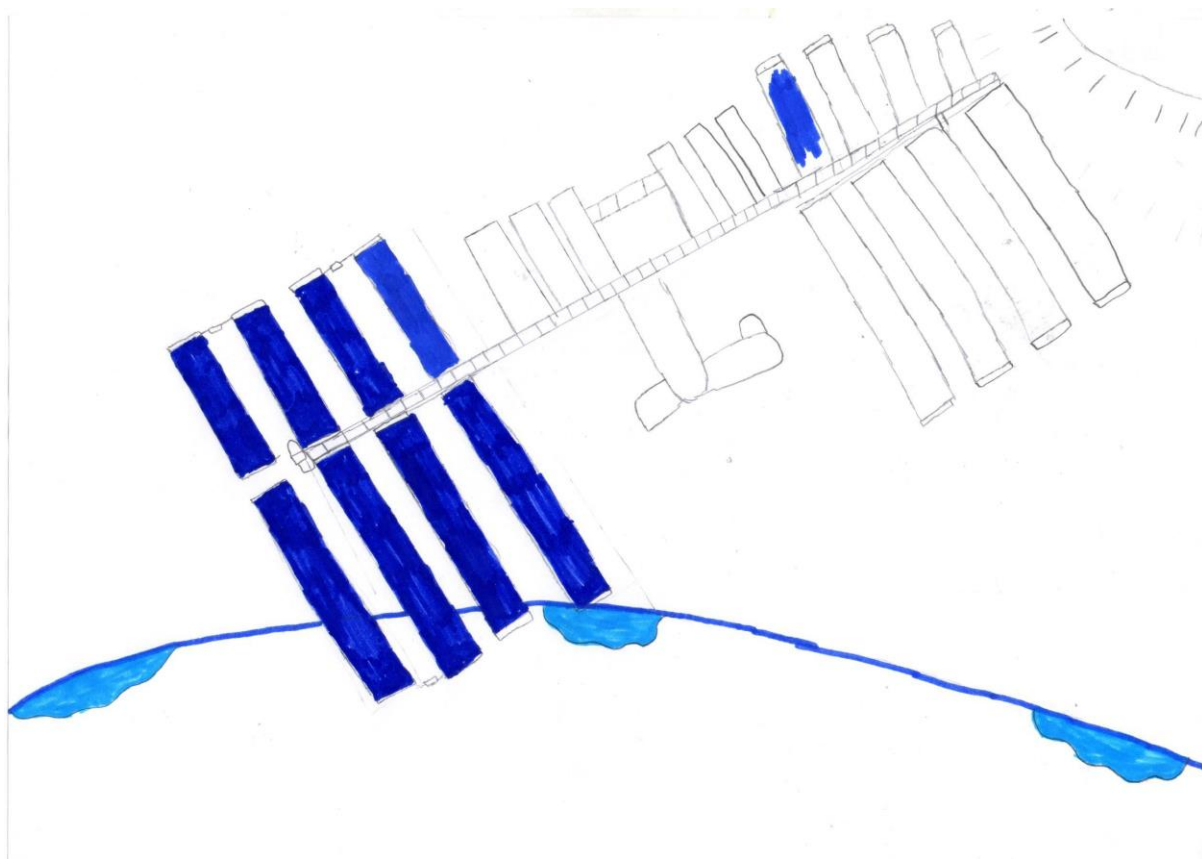


Figure 7.4: Anchoring the Space station as a Heterotopia against Earth.

Here, and in a slightly different drawing in (Thomas, 2017b, p.33, Fig 5), the child artist is anchoring a harsh, rectangular ISS against the Earth below. Although there is no specific location given to the Earth, and in the drawing it is hardly coloured, the ISS is not travelling alone through space, but flies by reference to the Earth behind it.

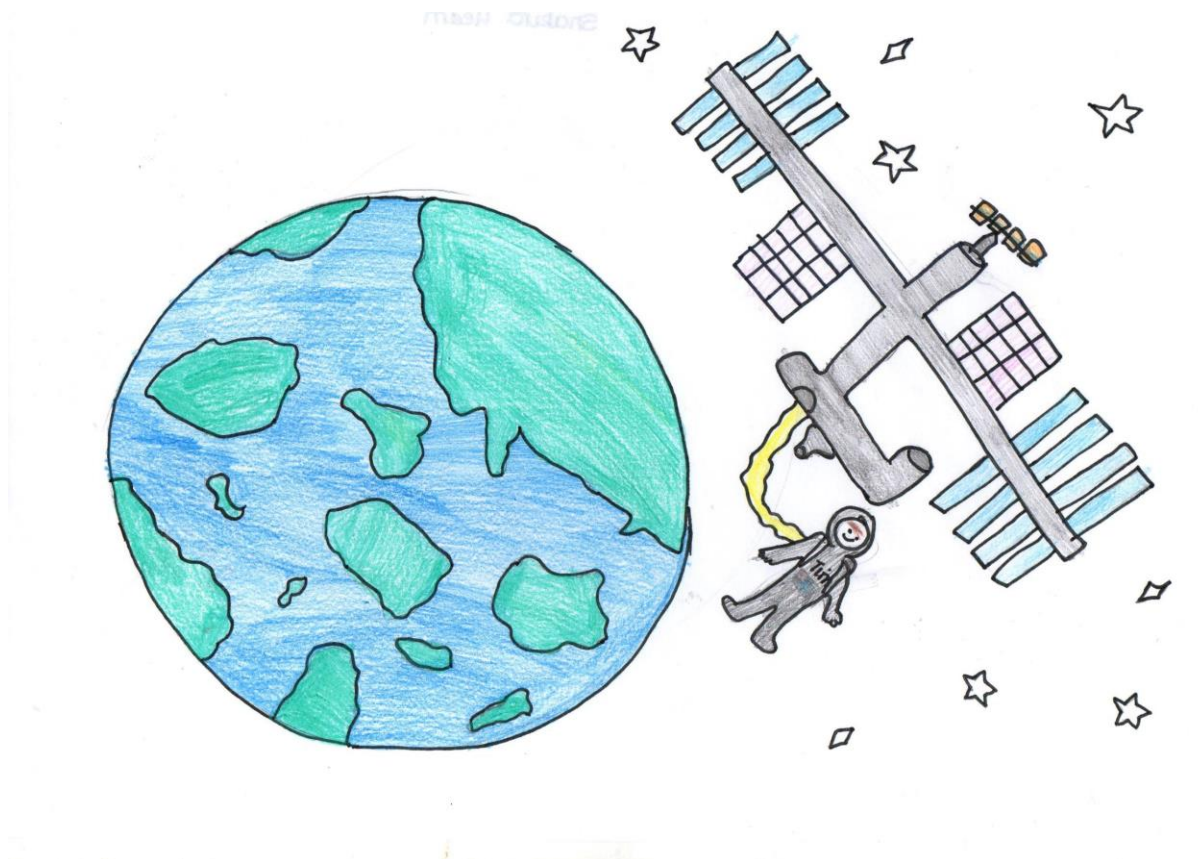


Figure 7.5: Locating the ISS as a heterotopia against Earth and Tim Peake

In Figure 7.5 (Thomas, 2017b, p.34, Fig 6) the ISS is a heterotopia anchored to the Astronaut who is labelled “Tim”, and flies next to, but not above, the Earth.

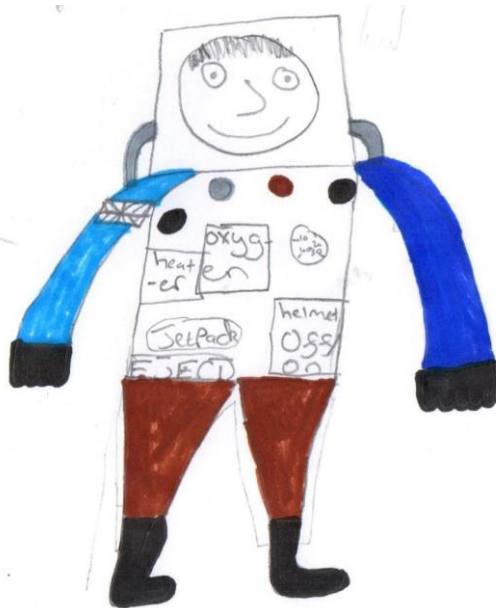


Figure 7.6: The Union Jack, (British flag) (Thomas, 2017b, p.34, Fig 7)

The national origin of the astronaut is acknowledged in this and other drawings by a reference to the national flag (the Union Jack) on his shoulder. Contrary to Blamont (2009), the mission was not seen in this English school for its European heritage. This and the comments from the children in the classroom who were of Afghani and Yemeni heritage raise the question of identity in the form of national or ethnic affirmation.

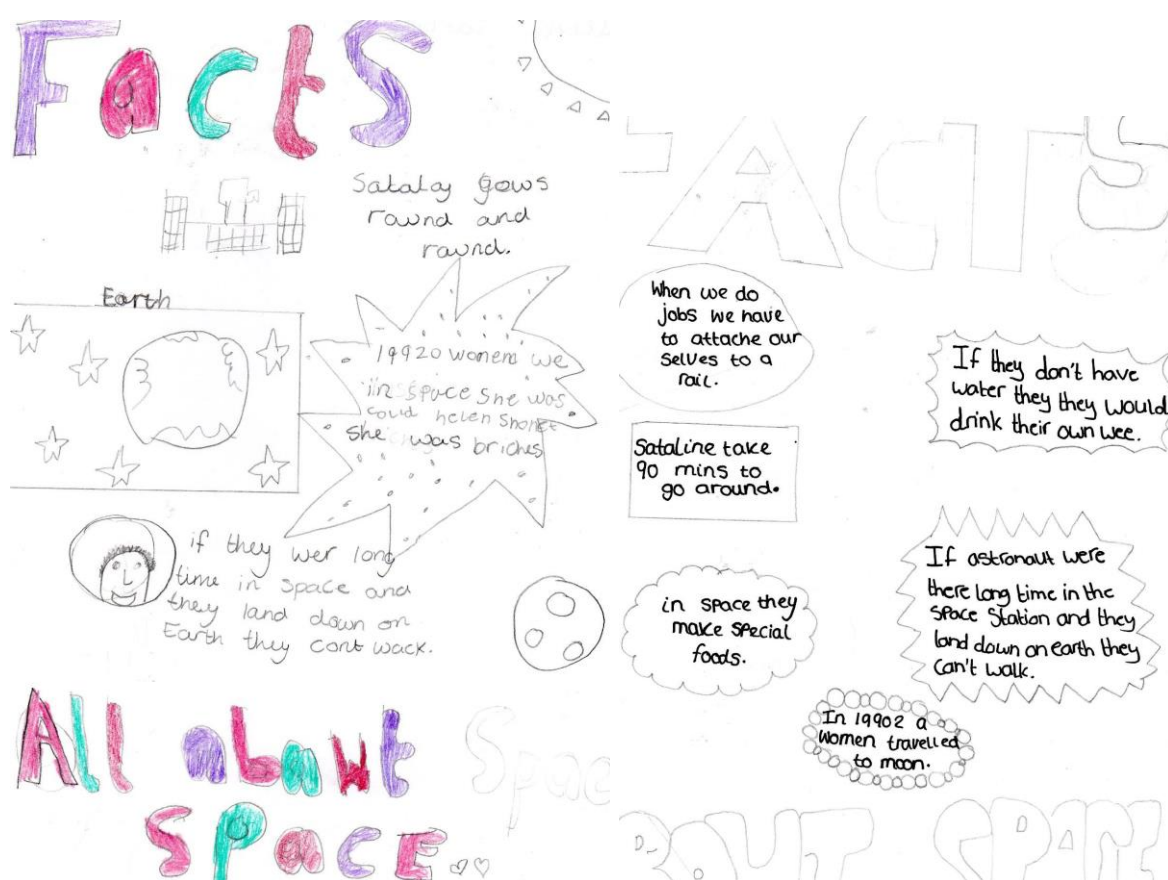


Figure 7.7: “Facts about Space”

In two drawings or “fact sheets”, including the above and that of Thomas (2017b, p.34, Fig 8), school students gave the facts about space travel as they understood them (spelling as original). Here, it is not true that a woman went to the Moon in 1992, although students treat the statement as if it were true. Here can be seen “facts” which are firmly believed as if they were true. It is important to note that these stories are not

distinguished from narratives which are true as being incorrect and therefore undesirable in themselves, but rather that they represent a counter-narrative to the main narrative, in the sense that even if they are untrue, they in some sense ought to be true, and thereby add a dimension to the truth by contesting it.

Discussion of results

This is essentially an account of a public conversation, what Habermas might call the deliberation, about space, as a process within democracy. Foucault would wish to discern a structure of power within the discourse.

Undoubtedly the children were engaged with the “Space Day” as a pleasurable activity and presented their understanding as having many facets. This level of engagement does not imply a position for or against space travel, but some of the points raised are found in these debates.

There was little that was restricted to the Principia mission and Tim Peake, but several references to the Union Jack (British flag) and other countries present in the classroom by the ethnic or national origin of the children. It demonstrates that the children identified to a national origin, either of the Astronaut or of themselves. The implication of this identification may be that in European missions the national origin of the astronaut continues to be important although the mission itself is transnational and international in nature. In other countries’ spacefaring, perhaps achievement in space was a unifying force within the Soviet Union, and remains a unifying force between the divisions of China.

There was a great deal expressed about the technological items on board the International Space station. Students were particularly interested in the technology of everyday life such as washing and the toilet. The rocket of the Principia emblem appeared in the drawings, and rockets were referred to in the texts.

School students identified with space exploration by expressing awareness of microgravity, food, family, toilet, washing, risk, fame and fortune, as they might experience it. They did not express the view that it was un-achievable.

There was reference to planets, the Moon, the Sun, and stars, particularly in drawing. These could be considered as heterotopic spaces. But it is worth noting that this interest arose despite reference from the space agencies themselves, who are focussed on portraying the earth below the orbiting vehicle. Perhaps this offers the agencies of the International Space Station a new direction for outreach work

The International Space Station was characterised in drawing by the rectangular structure of its solar panels, not by the cylindrical structure of its quarters. There are many ways to draw the Station; its dimensions are now so large that it could appear foreshortened as it approaches the viewer or viewed from beneath rather than from above.

The famous “Blue Planet” of the Apollo 8 photograph, repeated in the Principia emblem, was influential in drawings of the planet Earth, in the choice in drawing of green continents and blue water. This represents “Planetary Awareness” as Beaver has described it.

The International Space Station as a heterotopia (a ship with its own rules on a journey) was captured in drawing by anchoring it either to the Earth below or, in one case, to Tim Peake. In another case the detail of names was given to the continents as the ISS was present above. This is in contrast to another view where the ISS has been drawn against a void, or against a void and unlabelled earth.

The statement that a woman went to the Moon in 1992 may be a reference to the first British cosmonaut, Helen Sharman, who flew to the Mir space station in 1991, but did not go to the Moon. No woman has been to the Moon. A conversation about power relationships can be constructed around this account.

Conclusion

Thomas (2017b, p.32-35) concluded that:

“This was a study designed within Critical Grounded Theory to present a discourse about human space travel at the opportunity of the Principia mission and its interest in the United Kingdom. It demonstrates how school students aged ten or eleven years old accept and envisage their participation in space travel. Some aspects of their understanding, such as photographs of space taken from the International Space Station, have been derived from their own learning and not provided by the Space Agencies themselves.²

“Children were not confined to Parkinson’s categories in their descriptions of space exploration. They also projected themselves in space, writing of the void of space, and considered space exploration within familiar surroundings (home, family and friends), personal fame and consequent financial benefit, and familiar experiences (including washing, recycling of urine, and eating food and sweets). They aspired to educate and to promote their own national identity.

“Astronaut Tim Peake’s space flight took place in an international context in which many, but not all, space-faring nations co-operated, in individual and joint expression. Yet it remained the expression of the child’s own perceived national origin, whether reported as British, Yemeni or Afghan. There was no perception of Europe as a distinct space-farer.

“Children drew planets and stars within space exploration, yet few such images are available from the International Space Station. The station is considered as an artefact with technological regularity, not soft domesticity. It is drawn in relation to the world beneath it, perhaps a specified part of the world, or tethered to an Astronaut of a particular nationality.

Foucault’s linguistic concept of heterotopia can be applied usefully to the architecture of installations of space exploration, on Earth and in outer space, which can be seen to be joined together as nodes on a network, a structure with embedded power.

By his conclusion (Ormrod 2009, p127-8) Ormrod suggested that the conflict the movement addresses is one between late-modern capitalism’s continuation of modern practices of reification, communication and imperialism, and post-modernity’s cultural critique of progress, growth and imperial legitimacy. Outer Space becomes simply one arena in which such contradictions can be contested.” In this study, however, Outer Space has discovered Self and Void, and this second iteration may be the abstract

link between pro-space (the first iteration) and personal expressions (the third iteration).

Another direction for future theoretical work may lie in the application of Habermas' (1975) critique of historical materialism to those museums and galleries in China which exhibit the history of space exploration, for example, the Museum of Industry in Shenyang can be considered as a heterotopia where the categorisation of objects makes explicit public reference to progressive phases of development in the Marxist tradition.

School drawings in China

The question now arises of what sort of drawings Chinese children might create. Winner (1989) reported that Chinese children learned drawing by two techniques, a traditional Chinese technique of ink painting and Western-style watercolour based on cartoon characters. "Children [in China] are not ever expected to figure out by themselves how draw something new; instead they are shown how to draw images step by step, line by line" (p. 423). She comments: "In China, the act of painting is like performing a piece of music written by someone else" (p. 434). Looking "behind the scenes" she adds that "The Chinese educational system is governed by a uniform curriculum and national textbooks which all teachers, including art teachers, are required to use" (p424). This system becomes, effectively, a practice of cultural transmission, in which, Winner writes "When I describe a particular class, the observations can be generalised to other classes (at least in urban schools) all over China." (p. 424). This observation is essentially the research paradigm for "one issue, many sites" described later (Heimer and Thogersen (2006), p. 62)

Social practices of Cultural Transmission in Chinese schools

The power of images together as montage is described in these terms (Huttenen, 2008 p. 4-5): "a reader who actively participates in a work's preparation, as if he or she were part of a collective art work, is easier to direct than a passive reader, who takes a part from an already given whole." Huttenen's observation of the additional strength given

to montage images by active participation can be found in three mechanisms of cultural transmission which use drawing and newspaper text in different ways³⁹:

The ***Jian Bao (剪报)*** is, literally, cutting from newspapers, the cuttings being pasted into a book, and so resembles the former Soviet practice of *альбом для наклеивания вырезок* (a special scrapbook). An interviewee described it in these terms: “Jianbao is a personal collection. You make it merely out of interest. When you read something you like in the newspaper, you cut it and stick it in the notebook. My fellow pupils would collect the pictures of their favorite cartoon character. I collected fairy tales. The elders would collect healthcare tips. Lots of the elders were taught to love their country when they grew up, so they collected the covers about Chinese grand events as well.” Such “grand events” can and do⁴⁰ include Chinese events in space.

Another felt it was a practice of the older generations: “Many senior citizens aged over 80 have the habit of making a Jian Bao in their 60s. The aim is to collect the information what they are interested in, put it together, and make it as a manual book. The basic method to make Jian Bao is to buy a notebook first, cut down the articles that they are interested in and stick them on the notebook. As for the themes, it depends on the personal interest.”

But a young interviewee reflected: “I am sorry I did not find any jianbao about it (Shenzhou 5) at home, because I moved when I was in my middle school.”

Some news stories published in China show Jian Bao as a sort of community repository of knowledge, in that a person collects and records newspaper accounts of regulations or car mechanics (as examples)⁴¹ and is known within that community for their record of this knowledge.

³⁹ This account follows the publication in Thomas (2017a).

⁴⁰ An informal interviewee in Shenyang told me of his grandfather who had such an album about space.

⁴¹ See: http://sztqb.sznews.com/html/2012-03/14/content_1961727.htm ; <http://news.163.com/11/0512/18/73SF5E5900014JB6.html> ; http://hebei.hebnews.cn/2011-06/30/content_2114179.htm

Shǒu chāo bào (手抄报) :

Two interviewees described the use of Shǒu chāo bào in their schools:

“Shǒu chāo bào is mostly the schoolwork of the students and is more public. The teacher asked you to introduce something in both pictures and words. Then you tried to present your subject in an attractive and creative way. The subject of Shǒu chāo bào could be anything, such as the achievement of great figures, the history of Christmas and the conventional food of the Mid-Autumn Festival, etc. It was not the contents that mattered. The Shǒu chāo bào with the most beautiful design won. Imagine Madam Curie knew that the pupils introduced her in such a colorful way!”

“We made it once in a term, which is named as the name of the class [1]. The head office of the primary school will give us a theme in late October and we need hand in the Shǒu chāo bào to the head office in late December. We usually made it on a A3 size paper, and drew some beautiful patterns at each edge of the paper with water-colour pens. We chose the pattern from the painting textbooks or a book called "How to make a beautiful Shǒu chāo bào ". As for the text, we usually found it in the book through the library of the school. After handing in the work, the officer of the head office would make a comparison with each other, and then they would choose the top 3 from around 24 works in total. The top 3 works would be displayed on the wall of the hall for a week.

Note [1]: In China, we share some fixed class in the same classroom with the same classmates and each group has a different name, such as 0602 means Class 2 Grade 6.”

A typical Shǒu chāo bào with a space theme is in Figure 7.8 below. Note that in this example a text is provided with this classroom formula. School pupils would copy out both the drawing and the associated text. This use of handwriting in publication is reminiscent of the times of the Cultural Revolution when hand-copied texts of foreign literature circulated in a clandestine manner (with perhaps astrology and erotica) reminiscent of the Soviet-era “Samizdat”.



Figure 7.8: typical Shǒu chāo bào with a space theme

Hēibǎn bào (黑板报) :

This use of image and associated text in the classroom is described by two students as: “It usually exists in the classroom of a primary school or a middle school. In China, there are usually two blackboards in a classroom, one in the front of the room and the other at the back. The front one is normally used by teachers on the purpose of writing notes for study, while the art monitor of the class usually write some information related to the society and local news on the other blackboard, which is known as Hēibǎn bào. In my primary school, we usually change the theme of Hēibǎn bào once a month, and the themes contain any category, from local festivals to space and universes. We students took the Hēibǎn bào as a source for knowing what happened in the world at that time, because there were not search engines in my primary school 12 years ago. Nowadays, however, Hēibǎn bào has lost the value of information transformation with the development of Internet Technology. We just take it as a graffiti display board now.”

Another memory: “Hēibǎn bào is more formal and public than Shouchaobao. It was a part of the class evaluation system. The class got the lowest mark would be criticized (humiliated) in front of the whole school. So Hēibǎn bào was always produced by the pupils with the best painting skills. In my class, it changed weekly to get a high mark. Important Chinese events or incoming festivals were the subjects of Hēibǎn bào. Most of the time, we cannot find anything worthy of saying, so we presented some stories telling the importance to work hard. In phase test time, it would show the rankings of the students’ grades. That was really bad memory.”

Hēibǎn bào from the Beijing University of Aeronautics and Astronautics show a chalk montage including a Hángtiān yuán (astronaut) in space walk around a spacecraft, a whimsical flying machine, a vehicle-borne missile silo and a smaller montage of aircraft and missiles.

Figure 7.9 below shows a Hēibǎn bào published as a formula for teachers in 2016. The drawing shows some compulsory graphics to be drawn with white chalk, but leaves three large areas of the blackboard to engage with contemporary text from newspapers or textbooks. This merges text and image into the same board.

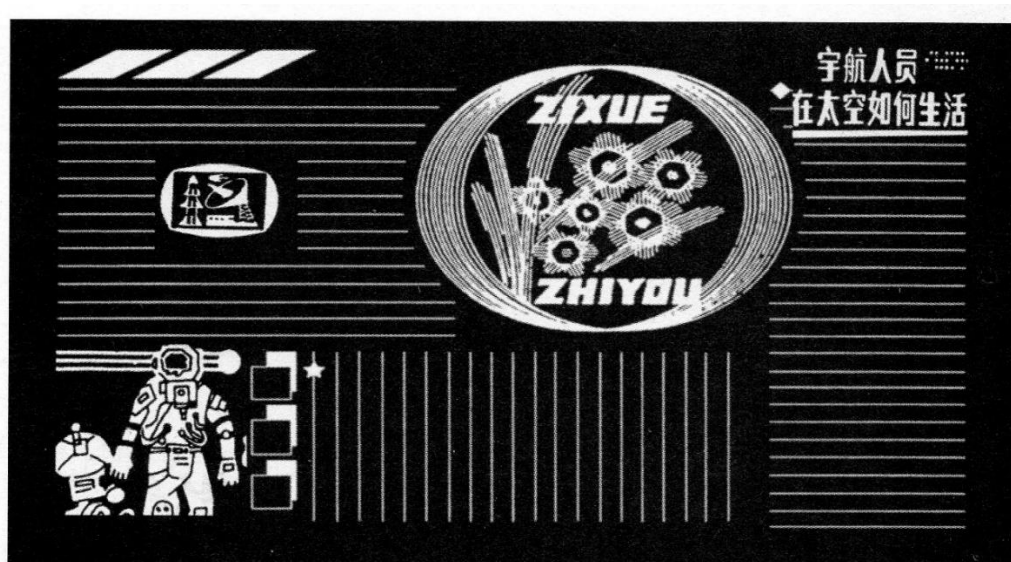


Figure 7.9: Blank Hēibǎn bào formula⁴²

⁴² from *Hēibǎn bào banshi Sheji Yu Tuli*, Blue Sky Press 2010.

In archive Figure 7.10 below, in 1959 the flight of Soviet rocket “Lunik 1” was described to Chinese students using the complex drawing of figures on a school blackboard. As it shows, the practice of *Hēibǎn bào*, which was in use with the interviewees, is a long standing rhetorical practice which originated from the Soviet Union.



Figure 7.10: the 1959 flight of Soviet rocket “Lunik 1” (archive: New China News agency)

Results of these social practices in China

Cox et al. (1999) examined the drawings of over 900 children aged between 6 and 13 in the UK and China, recording that that the art curriculum in China focusses on techniques and skill building. They summarise Winner (1989) by writing “the art curriculum [in China] is largely concerned with training children to copy 2-D models from the text book or from the blackboard. Copying in this way is antithetical to the spirit of art teaching in the West on the grounds that it may lead to a reliance on adult-generated and ‘wooden’ images” (Cox et al., 1999, p. 174). They set their research subjects the task (p. 175) of drawing an outdoor scene, under the instructions “I would like you to draw the sun shining in the sky, birds flying, and a house on a hill with a garden that has trees and flowers growing in it”.

It might be considered that the house and the garden would be almost entirely imaginary to the children of an urban school in China, as imaginary as any drawing of outer space.

After an evaluation of the drawings by a panel of art advisors Cox et al. (1999) concluded (p.178) that “the scene drawings produced by ordinary Chinese school children and those in the UK are not markedly different in standard”.

Taking into account the exercises by the Japanese, European and American space agencies, other international initiatives, and the comment of Cox et al. (1999), it is likely that Chinese school children, if asked, could produce similar images to those of their British counterparts. As further evidence of this, in 2018 the Chinese Aerospace Science and Technology Corporation reported on such an exercise, shown in Figure 7.11 below. Children were asked to draw to the specification “Good wishes from space”⁴³ (China Aerospace News, 2018) As the Figure shows, they responded with a mixture of text and image, as might be expected from their classroom experience.

⁴³ This phrase, 航天的祝福, hángtiān de zhùfú, is often mistranslated by machine as “Space Blessings” but has no religious connotation.



Figure 7.11: “Good Wishes from Space” drawn by Chinese Children.

Official drawing competitions for children in China have also produced children’s art of space exploration. Figure 7.12 below is a postage stamp from 2009⁴⁴. The stamp has been used in a social network of Chapter 9, this one originating from Xichang.

This stamp appears in the general heading of “Blessing the Motherland” in which “this set of stamps uses children’s paintings to show the children’s good wishes for blessing the motherland”.

⁴⁴ http://blog.sina.com.cn/s/blog_4fc0cc650102dwob.html



Figure 7.12: “Love science from childhood 1.20 yuan”

Many of the features identified earlier in the drawings of British children are present here. First, in keeping with the overall theme is the presence of the national flag. Then, the space station is curvy and bendy, rather than rectilinear; stars and other worlds are present in the image; and the green and blue Earth acts as a reference point to the heterotopic space station. Perhaps, too, the *Hángtiān yuán* 航天员 is female.

The gender of the space explorer was referenced in the empirical study described in detail at Chapter 10, and the meaning of the word “science” is discussed in Chapter 9.

Figure 7.13 below shows a published design by a child of 12 years to explore the solar system (太阳系探测计划图), although in English the reference (Lu Jiaming, 2017) replaces “Solar System” with, simply, “Space”. The design as a whole contains several elements: rockets and rocket engines in perspective to a vanishing point; suited astronauts without faces; a reusable space-ship in section; and an emphasised cut-out module. In the original publication of the drawing, much of the handwriting is difficult to read.

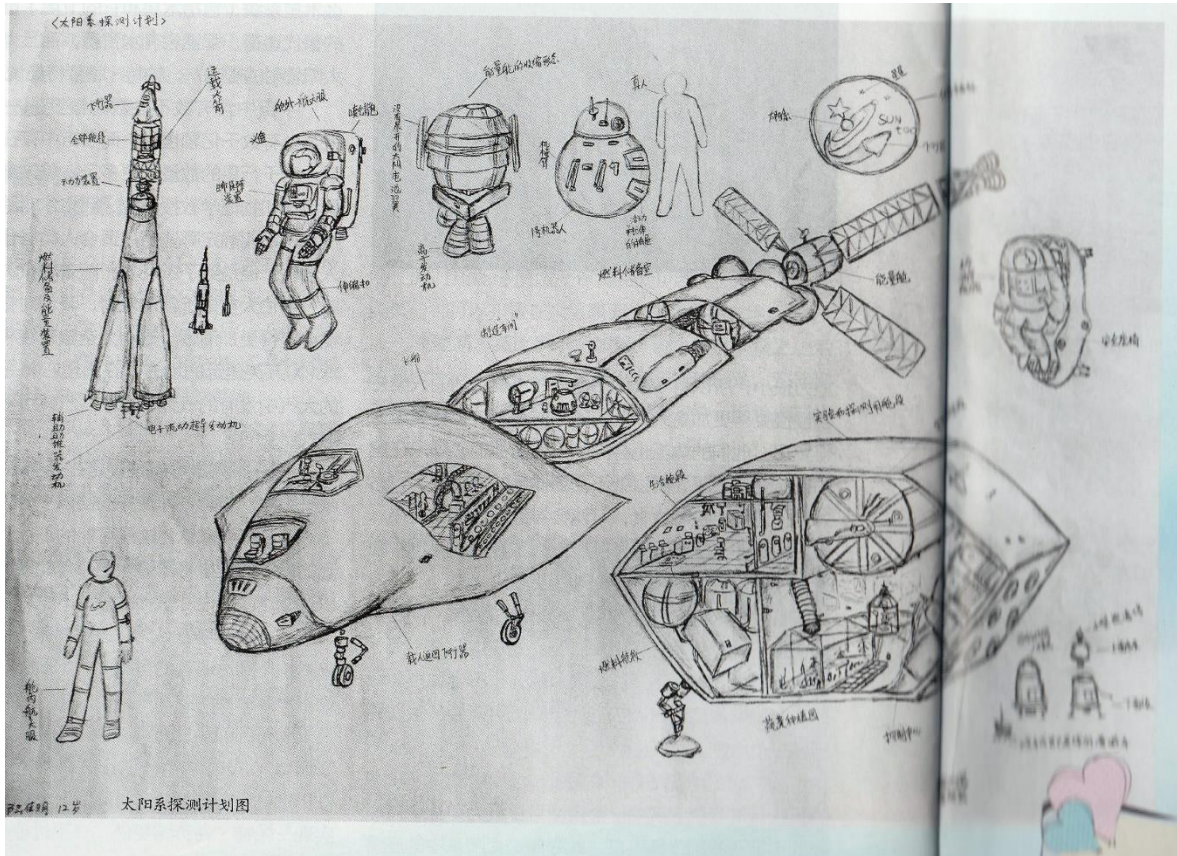


Figure 7.13: A Chinese Young Person's Design for Exploring the Solar System (Lu Jiaming, 2017)

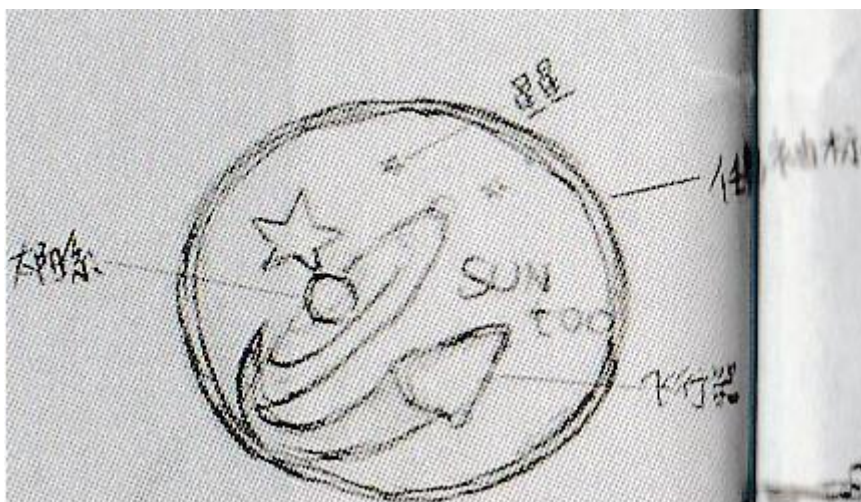


Figure 7.14: Close-up of the Solar System

At the vanishing point in the overall drawing is contained the drawing enlarged in Figure 7.14 above. This show, within a circle (perhaps a porthole view), stars 星星, and the solar system 太阳系 around the Sun. An arrow rises out of the paper from orbit around the Sun. It seems that this child designer is concerned with stars and interstellar flight.

The rocket itself is of interest because it is not a design used in the Chinese rocket diagram. Figure 7.15 below (left) is the design enlarged, in which two out of four rocket boosters are shown mounted onto the body of the central core of the rocket, but as the image on the right shows, Chinese rockets (this model was described earlier) have boosters mounted aside and rigid.

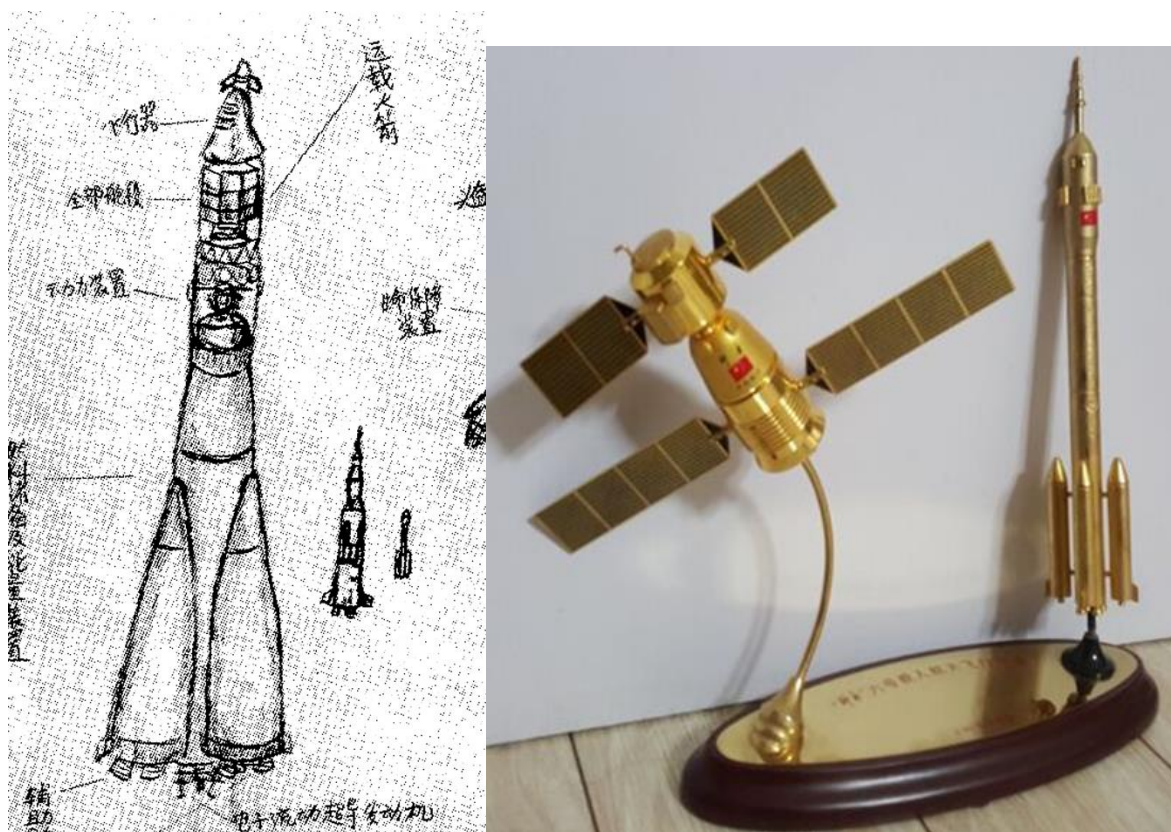


Figure 7.15: (Left): Drawing of “Solar System” rocket. (Right) Chinese model of rocket

This design of booster rockets is also present in public play equipment as in Figure 7.16 below, seen in Shanghai in 2013, and in Húludǎo in 2016.



Figure 7.16: Play equipment in a Park in (Left) Shanghai, 2013, (Right) Húludǎo, 2016 (Photos: Author)

Clearly the young designer has broken away from the design that is readily available in the Chinese conversation about space exploration. In fact the design in Figure 7.15 (Left) shows a design very similar to the Russian R7 rocket, developed by Korolev and used as the mainstay of rocket design in the Soviet Union and Russia, although six booster engines were employed in the R7, not 4. But the similarity in design suggests some Russian influence on the young designer.

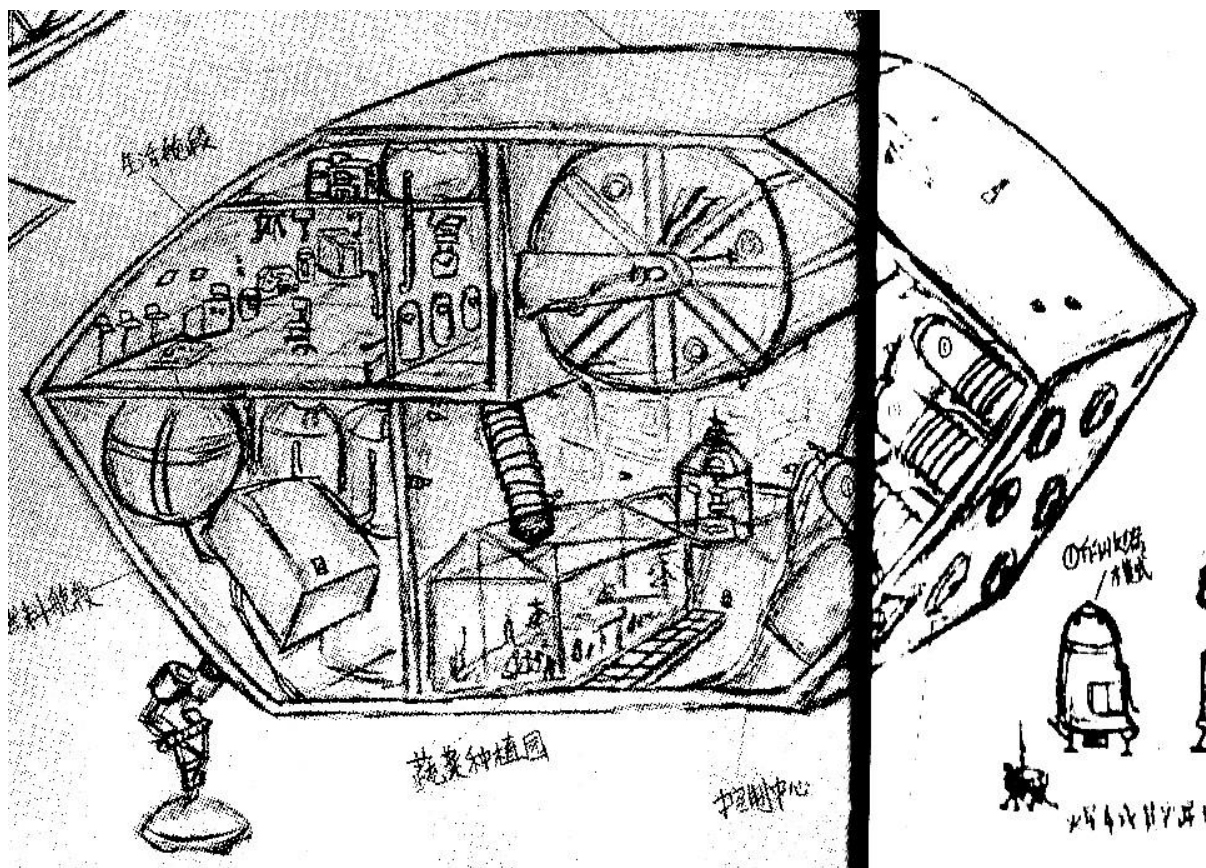


Figure 7.17: Module with living accommodation and greenhouse, manufacturing workshop and fuel storage area

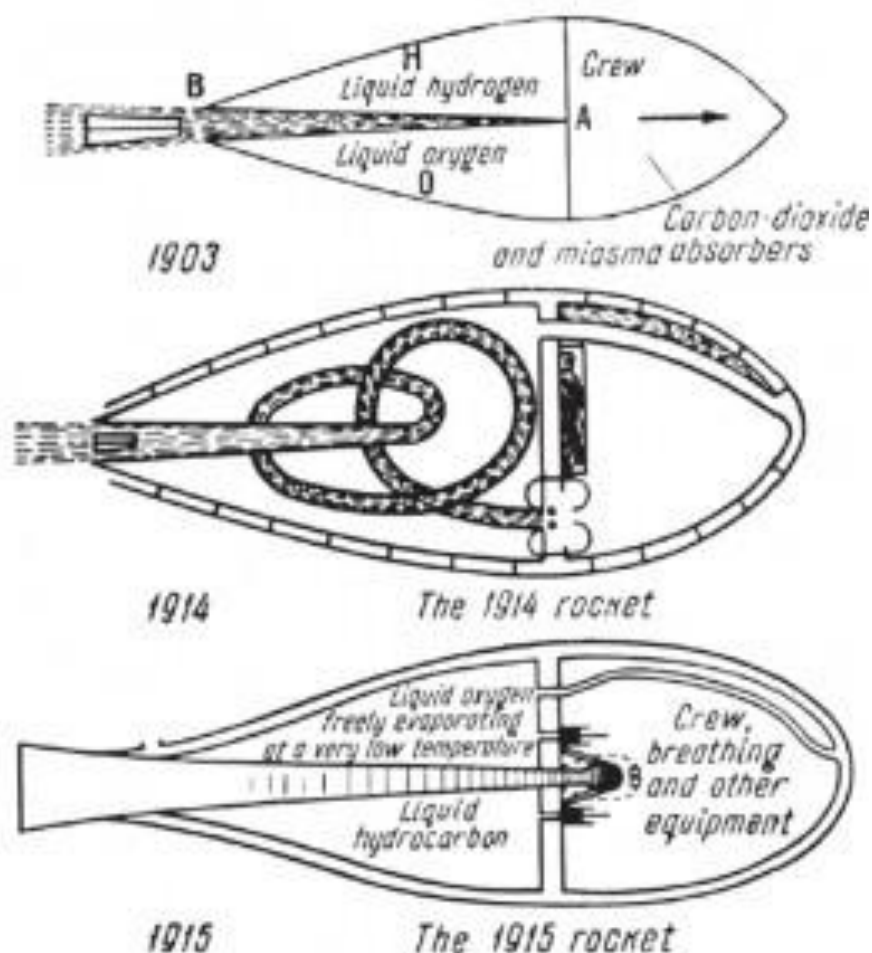


Figure 7.18: Tsiolkovsky Rocket Concept Illustration.

<http://blogs.esa.int/rocketscience/2012/10/14/a-man-and-an-equation/>

Equally, the cut-out module (Figure 7.17) in its compartmentalisation suggests an evolution of design which was started by the Russian Cosmist and pioneer designer Konstantin Tsiolkovsky (Figure 7.18).

Oher Space activities in Chinese schools

In common with other space-faring nations, China's astronauts give inspirational visits to schools. An example is in Zhuhai on November 1st 2016, after attending the Zhuhai

Air show. The local newspaper⁴⁵ reported “Zhuhai, [middle school number] One is boiling today is because of the arrival of this person”⁴⁶ and explained that “Today, Shenzhou No. 7 hero astronaut Liu Boming visited Zhuhai No.1 Middle School”. His key message was this: he “ talked about the hardships and gains of aerospace life, and encourage students to cherish learning opportunities, work hard to lay a good foundation, and pursue higher dreams. ” (machine translations: original text below⁴⁷). Such visits are not far removed from British and European encouragement of young students to take part in STEM (science, technology, engineering and mathematics) studies.

Commenting on this visit to a Chinese school, a European Astronaut gave this observation⁴⁸ from his position embedded within the Chinese space programme: “I think that those students who have the chance to attend good schools and good universities are very interested by science and technology, and therefore by space as well. In addition, “taikonauts” are also very highly regarded upon, as national heroes. So, whenever one of them is giving a conference or a presentation, it triggers a lot of attention and the crowd reacts very much positively to his/her presence. I never attended such presentations or conferences but I think that they are more oriented toward STEM subjects.”

The Space Camp of 2013

Between 2010 and 2013 young school students in Hong Kong were able to apply to attend a “space camp” at space launch facilities in mainland China. In some years, an account was given in the “grey literature” of booklets unpublished but circulated to participating families and, available to interested researchers from the Hong Kong Space Museum⁴⁹.

⁴⁵ <http://v1.hizh.cn/yaowen/370971.jhtml>. Downloaded August 2018.

⁴⁶ 今天，神舟七号英雄航天员刘伯明到访珠海一中

⁴⁷ 畅谈了航天人生的艰辛和收获·并勉励学子们珍惜学习机会·努力打好基础·追逐更高远的梦想。

⁴⁸ Personal communication

⁴⁹ I am grateful to the staff of the Hong Kong Space Museum for this information and for providing me with a poster and some of the booklets. Video compilations of some camps is available at: https://www.youtube.com/watch?v=Jz5d7Vm_ar4&index=58&list=UUFlkqSDkFUAKiMGLX7KiD2A

Practice changed in 2013 and essays from school students who had returned from space camp were no longer published in book form but published on the internet (site deleted in 2018)⁵⁰. For publication in this way, all parents signed a consent form under Hong Kong privacy law.

Using a technique from Open Source Intelligence (Lexical Analysis) the essays were all downloaded to form a linguistic corpus, which was translated by machine into English. Whilst the total corpus at less than 25,000 words would not support significance testing, frequency of words and collocated word phrases were examined by frequency count.

Two analyses were done. In Figure 7.19 below the computer programme “Wordle” shows graphically how some individual words were used more often than others. “Astronauts” and “Training” are the most prominent in this image and are therefore to be considered as the most frequent.

https://www.youtube.com/watch?v=qWnCWnNzUz8&list=UUFlkqSDkFUAKiMGLX7KiD2A&feature=s_hare

⁵⁰ <http://www.lcsd.gov.hk/CE/Museum/Space/YATC/YATCDVD/sharings.htm> ACCESSED August 12th 2014

No of times	Phrase
2	to endure hardship to fight to research in particular can
2	the opportunity to participate in the young astronaut training camp
2	special ability to endure hardship to fight to research to
2	Kong space museum and the Chinese general chamber of commerce
2	Hong Kong space museum and the Chinese general chamber of
2	Beijing aerospace city unhung mogao grottoes the jiuquan satellite launch
2	aerospace city dunhuang mogao grottoes the jiuquan satellite launch center
2	able to endure hardship to fight to research to dedicate
2	ability to endure hardship to fight to research to dedicate

Figure 7.120: Collocated words in the Corpus of essays from the Hong Kong students' space camp of 2013.

These contained three sets of phrases: References to “enduring hardship” - 8 phrases; References to the organisers - 6 phrases; and References to places visited - 4 phrases. Taking away the references one might expect such as the places visited and the people who organised the event, it is clear that a dominant message in the corpus of essays by these students is “enduring hardship”.

Conclusion

Space Agencies across the world interact with children and young people to teach, learn and understand space travel. Drawing on research in a British school, it seems that the link between categories of human agency and personal categories such as “my family” or personal national identity is an expression of Self and the Void. Another category that can be seen here clearly is the dislocation of space and objects in it, described as heterotopia.

Artistic expression in the Chinese classroom is formalised and includes both image and text in characters. The inclusion of Chinese text is interesting. Both Derrida and Barthes were fascinated by the extension of hermeneutics as applied to Chinese characters (Han-Liang, n.d.). It is an important caveat that Chinese characters, which contain graphic, phonetic and semantic elements, may extend the written text by assonance and association of image. The further examination of “Chinese characteristics” in Chapter 8 will therefore consider text and image together.

State authorities in Hong Kong and China offer younger students experience within the structure of the space programme, where key social messages are transmitted and received. These preview the chapter on Ideology (Chapter 9).

8: “New Space” and the Youth Cohort

In the previous Chapter the importance of the vision of space exploration to children was discussed. In postage stamps, sponsored drawing competitions and meetings with Chinese astronauts, some social processes exist in China to encourage, stimulate and develop the new generation of rising space workers.

As described in this Chapter, the age cohort of space workers is an indicator of the society in which they have grown up. China responds to this new environment by using the youth of new workers to stimulate the development of “New Space”. This new term “New Space” has a contested meaning. This term emphasises the role of an aggressive private sector in the USA as it impacts on the space industry. It may be used to assert an ideological superiority in economic system. In response, China’s policy of institutional reform contains reference to newer Chinese companies said to be in the private sector. Both the USA and China seek to present themselves in a positive light emphasising the new, young and therefore exciting nature of the term.

Díaz (2018, p. 159), in introducing and assessing “New Space”, pleads: “Was the civic dream of space exploration and colonization merely a by-product of the Cold War, an endeavour to dominate the skies as a strategic military space? Is it now defunct?”

The concept of the original space race between the USA and the USSR has been wrapped up in the phrase “Space Age 1.0” (Bank of America & Merrill Lynch 2017, p. 10). Here, “Space Age 1.0” is subtitled “Sixty years since Sputnik”, and now, “We are on the cusp of [a] new Space Age where we expect there to be more advances in the next few decades than the 560 humans that [who] have ever been beyond the Karman line throughout history” (ibid., p. 8).

For “Space Age 2”, the financial stakes are high. Sheetz (2018a) reports that “the space industry will be worth nearly \$3 trillion in 30 years”. Space Age 2.0 is summarised in Figure 8.1 below from the Bank of America and Merrill Lynch.

Exhibit 1: Space Age 2.0 in a nutshell



Figure 8.1: Space Age 2.0

This is a new setting for space exploration, one which is commercial and capitalist in nature. According to the Bank of America & Merrill Lynch Study (2017, p. 29): “While the 20th century Space Race was all about national space agencies, Space 2.0 will be driven by a combination of factors including military, defense and private company innovation”. This is an interesting comment: it refers back to the argument advocated earlier that the “Space Race” was a competition between economic systems and powers.

Martin (2014, 2017) therefore asks rhetorically “What should the role of government be in opening the space frontier?” In reply he claims that:

- “Commercial companies must be competitive and governments have other priorities (safety, jobs etc.)”;
- “Conflicting goals – Congress focused on jobs in their districts.”

In his advocacy, one Government agency, the Federal Aviation Administration, including the Office of Commercial Space Transportation, which is banned from contact with China, should

- “Regulate the commercial space transportation industry, only to the extent necessary”;
- “Encourage, facilitate, and promote commercial space launches by the private sector”;
- “recommend appropriate changes in Federal statutes, treaties, regulations, policies, plans and procedures”; and
- “Facilitate the strengthening and expansion of the U.S space transportation infrastructure”.

The U.S. commercial space sector should share costs with the government and retain the intellectual property.

The Bank of America/Merrill Lynch study (2017, p. 56) considers China to be an “emerging space power”. It notes that the increasing rate of rocket launches to space has overtaken both Europe and Russia to put them into the second position worldwide behind the USA. Here one can recall the assessment by the CIA in the 1980s that China might use its commercial space sector as an earner of foreign currency to support its development of military missiles.

One Chinese institution draws heavily on the title of the US company called *SpaceX*, founded by the US entrepreneur Elon Musk. The 航天科工火箭技术有限公司 (Hángtiān kē gōng huǒjiàn jìshù yǒuxiàn gōngsī, Aerospace Science and Technology Rocket Technology Co., Ltd.) claims to be a “subsidiary” of the China Aerospace Science and Industry Corporation, a large corporation of the Chinese state. It markets the rockets “Kuài zhóu (快轴, fast vessel)” under the trading name of “Expac Technology Co., Ltd”, under the rubric 快人一步 - 梦想之舟 (Kuài rén yībù - mèngxiǎng zhī zhōu - Step by step - the boat of dreams).

Another Chinese institution equipped with launchers is “Blue Arrow”, 蓝箭, who trade in English as Land Space. This is a partial pun on the pinyin of 蓝箭, *Lán Jiàn*, which is itself an ironic reference to the “Blue Origin” company of Amazon founder Jeff Bezos. Land Space “is China’s most leading edge aerospace start-up and has been dubbed the “SpaceX of China” (Bank of America, 2017, p. 57), a reference to the company owned by entrepreneur Elon Musk.

The British government has funded (to the extent of £20,000) an investigation into the purchase of rockets made by Blue Arrow in order to accelerate a British capability to launch into space from the UK (UK innovation, 2017). Brand et al. (2018) considered that a market case could be made for a British capability to launch small satellites from the UK if one assumed a modest Investment rate of Return and that the market was sustained for at least ten years. When published, the study of the suitability of the Land Space rocket (Zakirov, et.al, 2017) found that the venture would be commercially viable if a certain number of satellites within the weight capacity of the launcher were to be available annually. However, importation would meet a major legislative hurdle in that because of the launch rocket’s pedigree as a military missile it would be subject to import prohibitions adhered to by both the UK and US governments, both of which would have to agree to a waiver, itself an unlikely scenario.

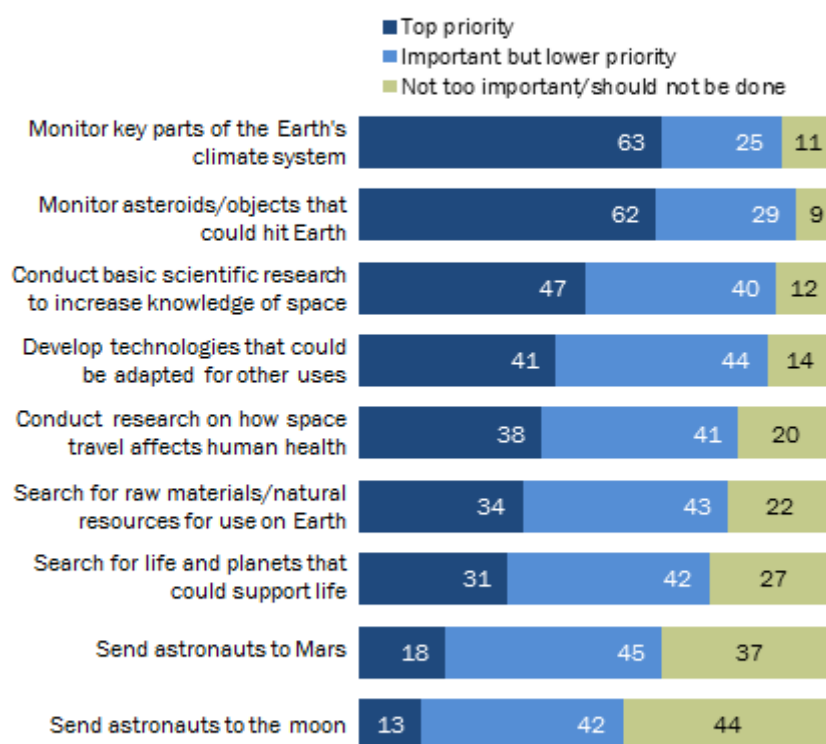
Dillow (2017) considers that “China is increasingly looking to its burgeoning space sector to rival U.S companies like Jeff Bezos’ Blue Origin and Elon Musk’s SpaceX”. Faced with this commercial exploitation, other commentators in US media are less enthusiastic about China; for example, in this commentary, the author moves from considering the American self to the questions raised by the presence of the foreign Other (Elkins-Tandon, 2017):

“Americans have been thrilled by our Apollo successes. For 47 years, we have been the only nation to put a person on another celestial body, and we have been resting on that glory all that time. But that is about to change. The Chinese have an ambitious, progressive plan for landers, humans and finally a colony on the moon. Multiple private companies, from the United States, India, and elsewhere, have lunar plans. What is going to happen to the American psyche when the Chinese, the Indians, and the European Union put people on the moon, and we are no longer the only ones? How will we react if other nations beat us to Mars?”

One answer has been given to this rhetorical question by the Pew Research Centre. According to their survey, the “majority of Americans believe it is essential that the US remain a global in space” and “despite the increasing role of private companies in space exploration, most believe NASA’s role is still vital for the future” (Funk and Strauss, 2018). Crucially, as Figure 8.2 below shows, missions to Mars and the Moon, where completion with China might be seen, are seen by the American public as less important than missions to address climate and other environmental issues.

More Americans view monitoring climate or asteroids as top NASA priorities than do so for sending astronauts to the moon or Mars

% of U.S. adults who say each of the following should be a top priority for NASA



Note: Respondents who did not give an answer are not shown.
 Source: Survey conducted March 27-April 9, 2018.
 "Majority of Americans Believe It Is Essential That the U.S. Remain a Global Leader in Space"
 PEW RESEARCH CENTER

Figure 8.2: Survey results, Pew Research Centre. (Funk and Strauss, 2018)

Sheetz (2017b) quotes US Air Force Lieutenant General Kwast: “In my best military judgement, China is on a 10-year journey to operationalize space. We’re on a 50-year journey”. Evidently, the Lieutenant General fears Chinese hegemony in space: to him, and others, the new “Space Race” is between the USA and China. This includes China’s civilian flights to the Moon: Tucker (2018) quotes a senior intelligence engineer, “one of the military’s top experts on space threats” as saying that “China’s lunar probes may one day threaten critical US space satellites”. As Whittington (2018) comments, in reference to “New Space”: “a number of policy decisions undertaken by the United States very likely means that China has already lost the second race to the moon. The reason the Chinese are almost certain to fall short is that they are following the old Soviet playbook for conducting space exploration. It is government-centric and somewhat limited in its potential to benefit China’s economy.”

The answer to this challenge may lie in the age cohorts present in the workers of the aerospace industry in China. The newspapers reviewed above appeal to audiences of different age groups, and increasingly, the mass adoption of the smart cell-phone has meant that information is distributed more often by this medium exclusively, using applications such as *WeChat* and *lilibili*. Younger people may hold the key to space exploration in China, and their electronic media may be the source of a distinct public conversation about it.

Table 8.1 below shows how the age cohort of the Chinese population is reflected in the characteristic space age, from Table 4.2.

Age Cohort in 2017 (From Solomone (2013, table 5.1, p44))		Cohort age in 2018	Space age (from Table 1.2)
Age cohort	Years born		
1	1890-1911		
2	1900-1920		
3	1920s-1930s		
4	1940s		
5	Early to mid-1950s	63 +/- (retired)	Period of the Fifth Ministry of Defense
6	Early to mid-1960s	53 +/-	Seventh Machinery Industry Period
7	1970-1976	42-48	
8	1980s-1990	28-38	Period of the aerospace industry; Period of the aero- and -space industry
9	Mid 1990s-2000	18-23	China Aerospace Industry Corporation; China Aerospace Science and Technology Corporation

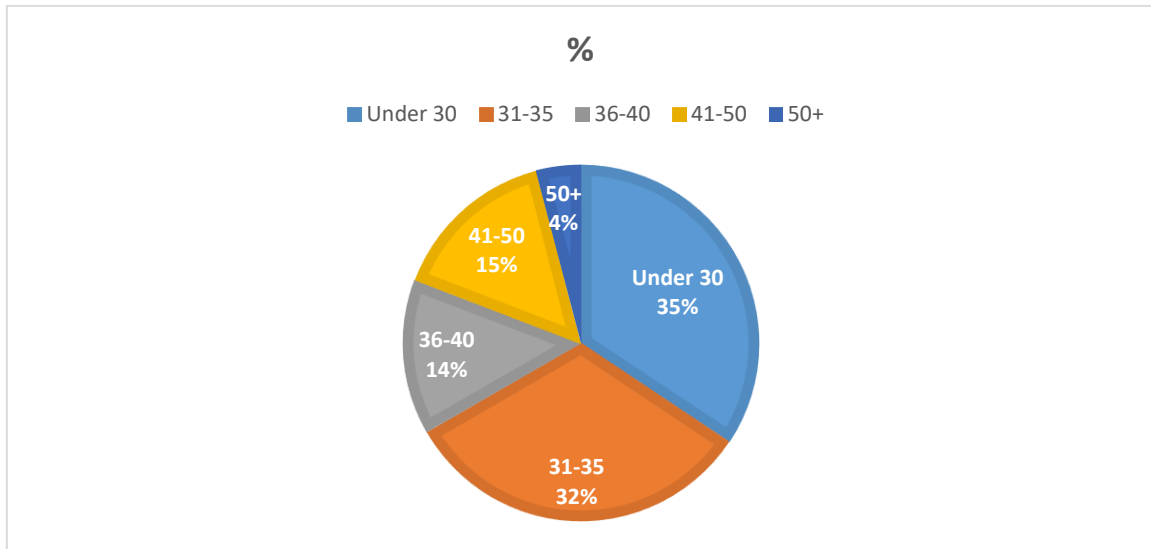
Table 8.1: the age cohort of the Chinese population is reflected in the characteristic space age.

As Table 8.1 above shows, the cohort presently (2018) in their forties have experience of the growth of Chinese space exploration as an industry, whereas the younger cohort, including those now leaving university, have only experience of the large state corporations. It is this latter cohort who, as children and young adults, have seen the words of space exploration reflected into common usage, as the Table above shows.

This segmentation of audience is also found in Russia where age cohorts are an indication of the education or experience of the former Soviet Union.

Figure 8.3 below shows the age cohorts of the 500 employees of a “subordinated” company to the China Academy of Space technology (CAST), the Dong Fang Hong satellite Company (DFH satellite Company, 2016). This company specialises in “small satellites”. The document claims (page 01) that 60% of the employees are younger than 35 years old. In 2014, the company gave a fuller breakdown of employee age cohorts as in Figure 9.3 below:

Age:



Expressed as Year of Birth:

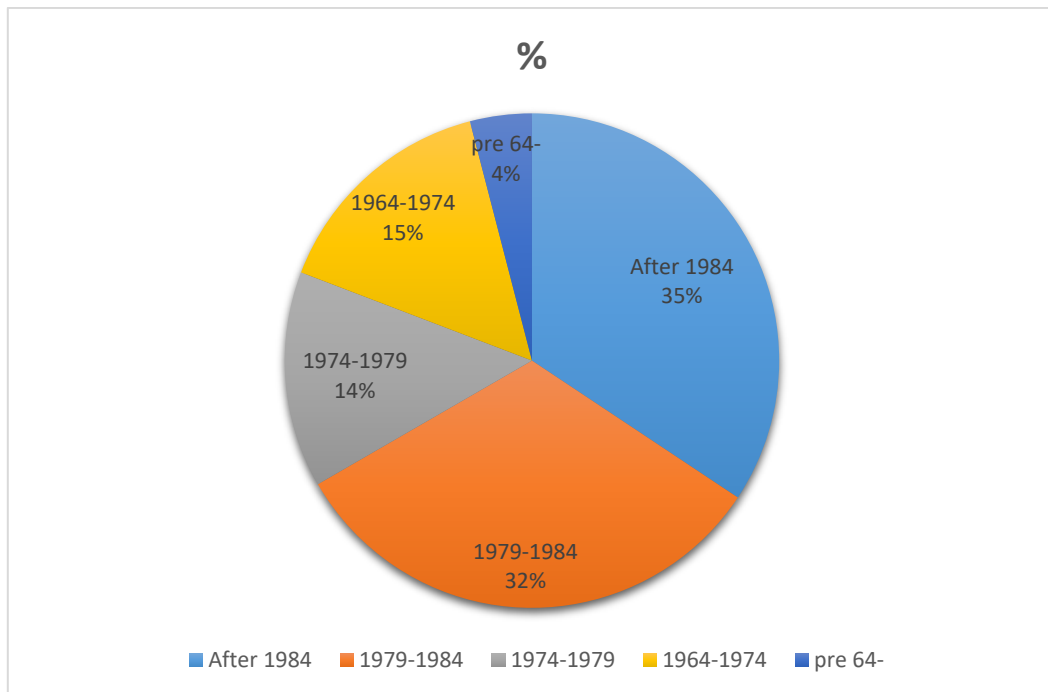


Figure 8.3: Age Composition of Dongfangheng Satellite Company (DFH satellite Co., 2014: Chapter 3: Human resources)

Figure 8.3 shows that the majority of the employees of the Dongfangheng Satellite Company were born after the modernisation of Deng Xiaoping began, and therefore know personally of no other China than that opened up by his initiative.

Hu Min (2013), in a series of articles about the “China Dream”, identifies the generation born in the 1980s as “Little emperors,” who were the first to be born under the national one-child policy, and the first to be influenced by Deng Xiaoping’s economic reforms.

Wang Yanlin (2013) in the same series considers that Chinese people born in the 1990s landed in a golden year for dreaming. “They know nothing but a prospering China that has surrounded them with a dazzling array of consumer goods, family cars, buzzing entertainment venues, mobile communications and holidays to exotic destinations never before possible.”

These younger people are building China’s smaller and more innovative satellites. Space Works Enterprise (SEI, 2016) estimated that in 2017 some 13 % of all small satellites launched in 2016 were the responsibility of China, whereas 63% were the responsibility of the USA. Dillow (2017) continues: “President Xi Jinping’s government is also considering ways to direct spending that will push Chinese tech companies toward breakthroughs in downstream technologies like...aerospace...and other 21st century technologies”. This is the continuation of the institutional modernization shown in Table 4.2 above. Leng (2016) reports on a new “commercial space enterprise” which is “set up to develop [the] space economy”. The news story explains that, in China: “The commercialization of rocket launches will boost the industry by bringing space tourism income and attracting private investment, experts said.” Feng and Xin (2016) report on a 34 year old “CEO” (Chief Executive) of a company “said to be the country’s first privately funded satellite company”. He “quit his job last year and brought together a group of people, with an average age younger than 30, who boasted similar career backgrounds and had shared goals”. In this way, China’s conversation about space culture includes an element that younger people (of around 30, born therefore after 1984, who have only known the Modernisation age) are developing new satellites that are characteristically, in the title of the news story, “Space tech ‘sexy’ for engineer”.

But 'New Space' overall exhibits a clash of values in the West. Whittington (2018) concludes: "The United States is unleashing the forces of free-market capitalism to return to the moon. By so doing, NASA's new coalition is likely to run rings around China. When the Chinese eventually land on the moon, Americans and their allies may well be there to greet them." By contrast, Díaz concludes (2018, p. 159): "Acceptance of the inevitability of poverty and inequality on earth, coupled with the vast expense of astronomical techniques, encourages a logic of competitive survival in New Space rhetoric. Access to outer space becomes another scarce resource unequally distributed"

The overall figures - up to \$3 trillion of investment value – may be largely illusory. A senior consultant in the space industry, who asked to remain anonymous⁵³, advised that "investors are viewing more of the application of space products and the view of technology valuations for their IRR [Investment Rate of Return] and business cases. Nations and governments are addressing the needs differently from a pure business calculation and adjust their valuations." In evaluating the potential investment value of the future space industry, therefore, it is important to distinguish between three figures representing "investment value": the potential value of a service to government users in cash terms; the requirement of governments to produce services irrespective of cash cost; and the potential for profit to the commercial sector. It is also true that the market is highly segmented; for example revenue from telecommunications satellites is easier to obtain than revenue from deep space missions.

But disguised as investment potential, these illusory trillions may serve to disguise considerable expenditure by a few wealthy individuals by presenting it as if it were an investment. Equally, as a justification for expenditure, they may disguise the intentions of a nation state in pursuing a particular course of action. Thus, the USA may have a deeper agenda to roll back government regulation and investment and increase the role of the private sector; the UK may wish to argue that it has the capacity to develop an indigenous launch industry; and China may wish to reform or modify its institutions and to launch constellations of smaller satellites for its own purposes, or even to launch southwards from Hainan island (Wenchang launch centre) and thereby justify in some

⁵³ Email exchange following the Farnborough Air Show, 2016

sense its presence in the Paracel Islands of the South China Sea. Space Age 2.0 allows for such motivations to be part of the political package, as indeed did the Space Race.

In China, the age cohort is significant, and the youth cohort is significant in the promotion of “new space” to the international community. Some significant social organisation is described in the following chapter, where the “Aerospace Spirit” or ideology of the Chinese Communist Party will be examined, as it embraces and promotes moral virtues akin and parallel to Confucianism.

Chapter 9: “Chinese Characteristics”

The previous Chapter considered how both text and image reflect together on the Chinese space programme as it is present in the Chinese classroom. This Chapter considers modern and traditional texts, including images, which are mixed in with contemporary accounts of the space programme in China.

Cultural references in the Chang'e series of lunar exploration missions

A current (since 2007) series of lunar exploration missions is known as *Chang'e*. The name *Chang'e* is that of a woman in mythology who travelled to the Moon. Her image is well known in China, by story book and postcard. It is said that every Chinese mother knows the story.

The OSINT technique of “Sentiment analysis” has been applied as follows. From time to time, the Chinese authorities invite the public to submit names for the space missions. The Chinese public were invited in 2013 to name the lunar rover within the Chang'e mission via a public website, which has, in 2018, been deleted.

When an attempt was made from the UK to submit a name, however, the website demanded a Chinese mobile telephone number and post code within the registration process. This would enable the website owner to conduct geo-reference and possibly attribution to individuals via indexation of their mobile phone account⁵⁴. These factors may also inhibit some expression within China, such as satirical references. Indeed, informal comments are a point at issue on the internet in China. For example, a discussion on the prospect and consequences of the USA failing to land again on the Moon was criticised by another commentator with the words 别讨论政治 *Bié tāolùn zhèngzhì* – don't discuss politics.

Here, a sample of entries was gathered and saved on a single day in late 2013. The short items of phrasing formed a very small corpus of less than seventy names. This

⁵⁴ 29 “China invites public to name spacecraft” – http://news.xinhuanet.com/english/sci/2013-09/25/c_132749975.htm Downloaded 15 September 2013. (The website address was: <http://act3.news.qq.com/10240/>). Also: Public invited to name China's dark matter explorer. http://news.xinhuanet.com/english/2015-09/29/c_134672117.htm. Downloaded 6 October 2015/

is too small a corpus to be presented as a representative sample. This corpus was then sorted into significant clusters and is used as a heuristic to discover popular themes.

The significant word groupings were:

- **Expressions of nationhood**
- **Expressions of legend**
- **Quest**
- **Monument**
- **The successful name, *Rabbit***
- **Other**

The data are not conclusive but these various themes lie in the background of the development of the Chinese public conversation about space exploration.

There are explicit references to the lady of legend, Chang'e, in newspaper discourses which include the space mission (e.g. Hu 2015).

Poetic references

Images and texts from China resonate within frameworks of meaning, and these cultural meanings may resonate with some audiences and not with others. As an example, the image of the Moon with the Chang'e spacecraft in orbit around it, seen on a postcard of the Chang'e 3 mission, bought in the Space Post office in Beijing, resembles the advertisement for the "China Dream" seen on the Beijing metro in 2015. This advertisement shows a bird flying high against the Moon, with a quotation from Mao's poem "Snow" of 1936 (Figure 9.1).

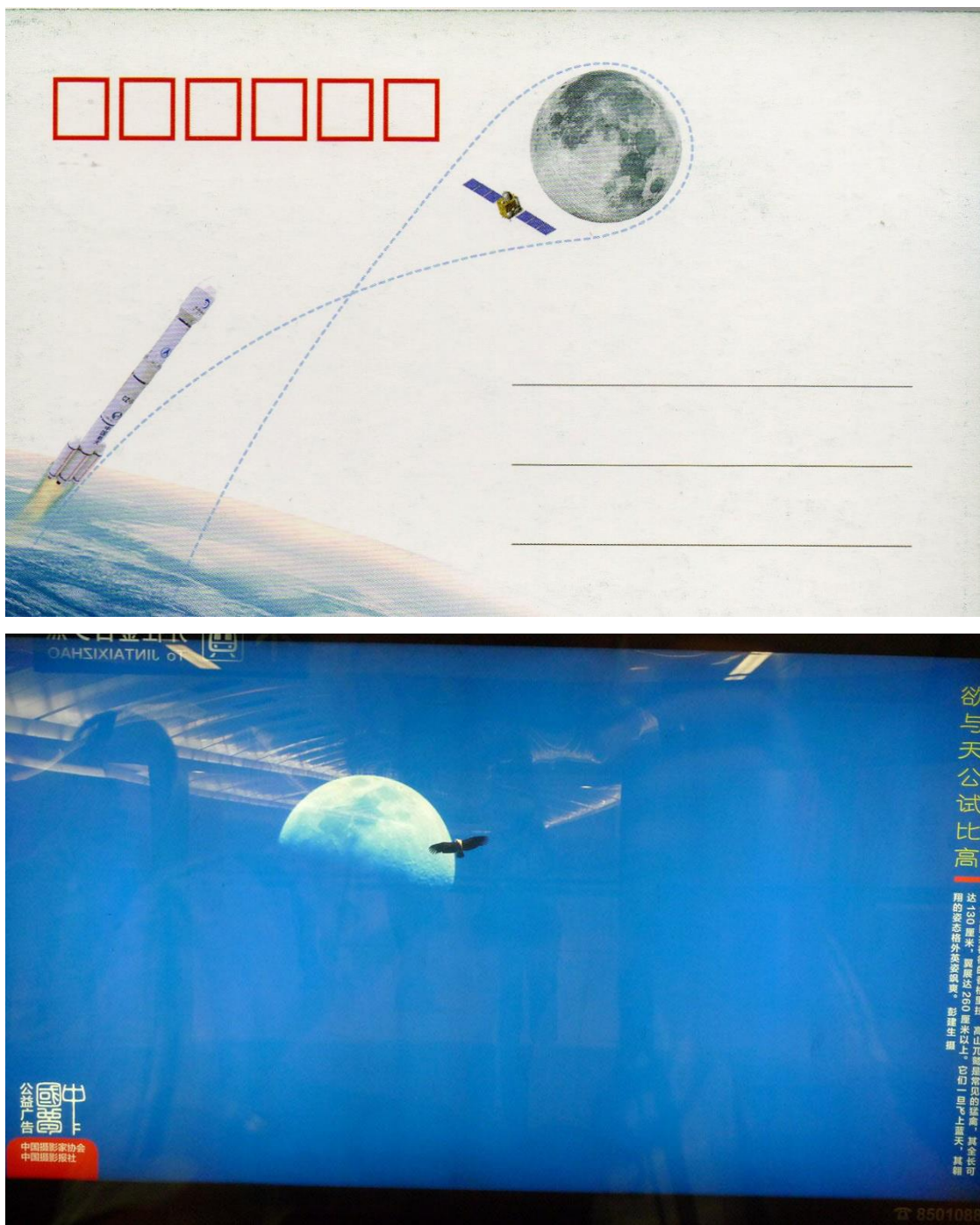


Figure 9.1: Circling the Moon: The satellite *Chang'e* (above) and the aspirational bird in the Metro (below).

The key phrase, which is visible on the metro advertisement, is: 欲與天公試比高. As the line of a poem, this is translated into English⁵⁵ as the third line of the sentence:

The mountains dance like silver snakes

And the highlands charge like wax-hued elephants,

Vying with heaven in stature.

Lee (2018, p 36) considers that in this poem Mao “placed the present, and himself, above the past”. An interpretation of the Metro phrase within China might be understood to refer to aspiration and aiming high in modernity.

At a second level, this can be stretched in an international context, first by an explicit reference in European literature, and secondly to a reference within the International Space Station (from which China is excluded).

The German playwright Bertolt Brecht (1898-1856) is acknowledged as using Chinese Opera in an “avant-garde” attempt to “break the hold of realism within Western theatre” (Dutton, 2004, p.744). He took inspiration from Chinese poetry and re-presented it as his own translations. In inspiration for his poem *Gedanken bei einem flug über die Grosse Mauer (1950)* (Literally, *Thoughts on a flight over the Great Wall*) part of his *Chinesische Gedichte* series, Bertolt Brecht revisited Mao’s poem “Snow” of 1936, and without naming him, imagined Mao writing the poem as if in a flight overhead.

*Below me the picture of the Northern landscape.
Ten thousand miles of winged snow.
motionless
the Yellow River, from such height
no longer tearing. Between him and us
Delicate cloud bundles of white and purple.
Pasture land and fields on both sides*

⁵⁵ <https://www.marxists.org/reference/archive/mao/selected-works/poems/poems18.htm>

*The Great Wall, How many suitors already
Bowed to them!*⁵⁶

Tatlow (1973, p. 154) commented: ⁵⁷ “One does not know how much he has simply misunderstood, but the fact that he omits the names of the emperors, that he intended a translation easily understandable to a European. His translation is based on the false assumption that Mao wrote the poem on the plane. In this way the discrepancy in the illustration of the landscape, which becomes even more obvious in Brecht's account because he possessed a precise spatial imagination, becomes untenable (translation).”

Landscapes and Montages

Landscapes are more complex images and require a process of viewer interaction to read them. Huttenen, T (2008, p 4-5) states that “A work of art is always a process between the author and the reader. “ Westerners may be reminded that landscapes can resemble scrolls, which are read “...from right to left...” (Delbanco, 2008). Specific artistic techniques, unique to China are applied (Bearden 1969): “...the techniques which enable Chinese painters to organise their large areas, for example: the device of the open corner to allow the observer a standing point in encompassing the entire painting; the subtle ways of shifting balance and emphasis; and the use of voids, or negative areas, as sections of pacivity⁵⁸ and as a means of projecting the big shapes.”

⁵⁶ Unter mir das Bild der nördlichen Landschaft.
Zehntausend Meilen geflügelter Schnee.
unbeweglich
der Gelbe Fluss, von solcher Höhe
nicht mehr reissend. Zwischen ihm und uns
Hauchzarte Wolkenbündel aus Weiss und aus Purpur.
Weidland und Äcker zu beiden Seiten
Der Grossen Mauer, Wie viele Freier schon
Sich vor ihnen verbeugten!

⁵⁷ Man weiss nicht, wieviel er einfach missverstanden hat, aber die Tatsache, dass er die Namen der Kaiser auslässt, dass er eine eine Europäer leicht verstatabdliche Übersetzung beabsichtigte. Seine Übersetzung geht von der falschen annahme aus, dass Mao das Gedicht im Flugzeug verfässt habe. dadurch erlart sich die Diskrepanz in der Veranschaulichung der Landschaft, die in Brechts Darstellung noch offetnsichtlicher wird, weil er uber eine präzisere raumliche Phantasie verfügte.

⁵⁸Probably a mis-spelling of “passivity”.

In the process of reading an image such as the advertisement seen on the Shanghai metro in 2013, the complex montage of landscape is drawn from right to left, with the space rocket filling the void at the rear of the left, and the young man, beneficiary of the advertised product, at the end of the story, and therefore located on the left of the picture.

The complexity of this landscape picture leads to the further consideration of the technique of montage.

Chuang-hua

In the Chinese tradition of *chuang-hua* (窗花) images are formed by cutting shapes from red tissue paper and mounting the result in a frame or on a window against the light. Some modern examples of *chuang-hua* (窗花) dealing with space travel have been located by using Chinese internet search engines.⁵⁹

These images show: vehicles travelling in space above Earth (in one case, above a landmark, the Great Wall); one or more *Hángtiān yuán* waving the left or right hand; and perhaps the national flag, the background colour of the whole work being, of course, red, with the connotations of wealth and power that are implied in the colour

Brecht's interpretation of Mao's classic poem can also be seen in this paper cutting entitled "Shenzhou Flying Dream"⁶⁰ by artist Xu Ruifen (Figure 9.2). Wu (2015, p. 33) notes that "paper-cuts are a symbol of prosperity, modernity and the better lives of the masses under CCP [Chinese Communist Party] rule". In this image, which Winner (1989) might characterise as having both the elements of Chinese-style ink drawings, and of Western-style cartoon simplicity, the Great Wall is to the lower left, and the spacecraft to the upper right. Her image has been granted a State Intellectual Property design patent by the Guizhou State Intellectual Property Office.

⁵⁹ <http://news.qq.com/a/20070731/001557.htm>;
<http://news.enorth.com.cn/system/2013/06/28/011105709.shtml> ; <http://news.sina.com.cn/s/2003-10-29/11061016770s.shtml>

⁶⁰ <http://news.qq.com/a/20070731/001557.htm> <http://news.QQ.com> 2007年07月31日08:59
[金黔在线](#) 张义 车善红 贾华 [Photo] "Flying" paper-cut patent



Figure 9.2: Pictured Xu Ruifen with her "Divine dream of flying." (Jinqianzaixian - Guizhou Metropolis Daily)

The newspaper notes "the majestic Great Wall, the flag fluttering in the wind, flying in space Shenzhou V spacecraft, space hero Yang Li Wei" and the Moon.

It also worth noting that in her picture the Shenzhou space craft is shown by reference to earthbound installations including the Wall, as if it is necessary to locate a flying vessel (as discussed below, Foucault described a ship as a heterotopia) by reference to known points on Earth.

Yang Li Wei was asked on his return whether he could see the Great Wall from space; His reply was reported across the world – as in England (Adam, 2003): "The scenery was very beautiful," Yang told Chinese TV when he returned to Earth last week. "But I didn't see the Great Wall."

NASA was later to claim that an American-Chinese astronaut did in fact see the wall from the American quarters of the International Space Station (Nasa, 2005). NASA claims: "The photos by [Leroy] Chiao, commander and NASA ISS science officer of the 10th Station crew, were greeted with relief and rejoicing by the Chinese". Whether or not the Great wall can be seen from space, this debate demonstrates that the Wall serves as a well-known and Chinese reference on the ground for space flight. It is set

within a wider debate over the meaning that can be deduced from imagery of ascent and flight.

It is possible, therefore, to deconstruct several layers of meaning that have been intertwined in the images of the Chang'e lunar exploration mission:

- Science, and the development or progress of science
- Chinese tradition
- The “China Dream” -
- Mao

Key questions must arise: to what extent can cultural references within China's space programme be understood, and to what extent are these references within the culture of the beholder?

The special context of Science, including the exploration of Space, in China

It is not contentious to argue that the route of the development of “Science” within China is different from that which was followed in the Enlightenment in Europe. In China, it is closely intertwined with explanations given by Western missionaries, a technological advantage held by the West in maritime warfare, and the occupation of regions of mainland China which prompted alliances with the Western Allies in the First World War.

Wang Hui (2011) describes the formation of concept of “Science “ in modern Chinese thought from four perspectives: the Japanese origin (from the 1870s) of the concept of science through the late Qing period; the connection between the concepts of modern science and the fusion of nature, morality and politics, and the Confucian world-view (early twentieth century); the systematization of scientific research in China from about 1900 to 1919; and the debate about East-West relations after 1919 with the re-division of the field of knowledge as its focus.

It was a time of massive change in China. Writing retrospectively about the time of the Republic, Lee (2012, p. 30) draws attention to the fervent need seen by the young writers of the May 4th Movement to “save” China, particularly following the betrayal of China at the Versailles Peace Conference (French, 2014, passim). A new literature

“was established at the height of the Nietzsche fever in China” (ibid, p. 31), seeing in *Zarathustra* resonances in traditional Chinese literature (ibid, p. 31) “and because it was seen as modern and Western”. Nietzsche was seen by Western commentators as an opposition to Confucian thought (Findeisen (1997)) which was “then regarded as the most impeding obstacle to any social modernization” (ibid p 76).

Needham (1954) raises the question of the absence of Science from China until the beginning of the twentieth century. To temper this, he notes that (p. 239): “Broadly speaking, Chinese science, for two millennia before the coming of the Jesuits, and in spite of intellectual intercourse much greater than has often been pictured, had very little in common with the West...But Chinese technology and inventions poured into Europe in a continuous stream during the first thirteen centuries of the Christian era, just as later the technological current flowed the other way.”

Lee (2018, p.9) points out the distorting lens, that where Needham writes “Chinese” he refers to the ethnic majority: “Needham seems to understand ‘the Chinese’, both rulers and the ruled, in racial, or ethnic terms; presumably as Han.”

Dimaculigan (2014) considers that “The Needham Question” is how such an ancient civilisation became technologically inferior to the West. “The Chinese saw themselves as the preservers of culture and considered all other people as “barbarians”. If this is true, why then did the Chinese not lead the way to an industrial Revolution that would pave the way towards the modernity in which we now live? What factors contributed to China’s declined international influence causing the “great divergence” that allowed the European West to dominate world affairs?” (2014, p. 106)”

Russell (1922, p. 216-7) considers that Chinese education at that time could be considered to be classical (“the existence of specialists having this type of knowledge is highly desirable, but that the ordinary curriculum for the average educated person should take more account of modern needs, and give more instruction in science, modern languages, and contemporary international relations”); that “initiated by the missionaries, and now almost entirely in the hands of the Americans” which he considers “on the whole admirable, [but] nothing directed by foreigners can adequately satisfy the needs of the country. The Chinese have a civilization and a national

temperament in many ways superior to those of white men [Russell's term]". He concludes "It is only where progressive Chinese themselves are in control that there is scope for the renaissance spirit of the younger students, and for that free spirit of sceptical inquiry by which they are seeking to build a new civilization as splendid as their old civilization in its best days" (p.225-5).

These civilizational constructs are at the heart of the contemporary Chinese understanding of science, and therefore at the heart of the technological process of the exploration of space. As a visual expression, in Figure 8.3 is a drawing by a street artist in Guangzhou who was commissioned to draw "China and Space" in her interpretation.



Figure 9.3: "China and Space" as drawn by a street artist in Guangzhou in 2016.

In Figure 9.3, not only is there a modern satellite with a "Nǐ hǎo" (你好) greeting; a Chinese dragon descends through the clouds of Earth. But there is no national flag,

as might have been expected, nor any map showing the location of China on the surface of the world. Both the national flag and the map had been present in a picture commissioned in the same way from a homeless street artist in Perth, Western Australia (Figure 9.4 below) , and the Union Jack had been present in British children’s drawings of space (Figure 7.6).

Perhaps, in the Guangzhou artist’s conception, the expression of a unified nation of Han dominance was less relevant, and her expression of choice was from another time: the satellite clashes with tradition here.



Figure 9.4: ‘Australia and Space’ commissioned from a homeless street artist in Perth, Western Australia.

Russell (1922, p. 198) commented that “I have no doubt that if the Chinese could get a stable government and sufficient funds, they would, within the next thirty years, begin to produce remarkable work in science”. Some thirty-odd years later, as mentioned above, the CIA were concerned about an extension of the “Space race” from Russia

to China. In the intervening period the first Chinese satellite had been built and launched, as Needham (1986, p. 370) “from the rocket’s very homeland, since when there have been at least eight more... So in spite of all the perils of guided rocket missiles still impending, those Chinese who first experimented successfully with ‘flying meteoric ground-rats’, though we may never know their names, have been extraordinary benefactors of humanity, and citizens of no mean city”.

Western science has only been established in China within the twentieth century, and is established with a distinctive Chinese root. Russell (1922, p.81) commented “It is science that that makes the difference between our intellectual outlook and that of the Chinese intelligentsia. The Chinese, even the most modern, look to the white nations [Russell is using the language of his time] , especially America, for moral maxims to replace those of Confucius...What we have to teach the Chinese is not morals, or ethical maxims about government, but science and technical skill.”

Russell does not seek to place science in contradiction to Confucianism: “This is the aim which Young China should set before itself: the preservation of the urbanity and courtesy, the candour and the temper, which are characteristic of the Chinese nation, together with a knowledge of Western science and an application of it to the practical problems of China. Of such practical problems there are two kinds: one due to the internal condition of China, and the other to its international situation.Both classes of problems demand Western science. But they do not demand the Western philosophy of life”. (1922, p. 250-251).

The theme of scientific progress and development is best illustrated in an image of the spacecraft shown on Chinese national television in November 2007. In this presentation, a satellite, with reference to China is shown landing on the Moon. This is a concept of engineering and science. It is a powerful construct in its own right. A further development of this approach is in the Industrial Museum at Shenyang, which is a heterotopia where space missions are shown with reference to a time line expressing progress and economic development. Reference is also made to the name given to the satellite.

Yet Western science does not fully explain the Chinese picture of space technology, which is always accompanied by a civilizational or political context. For example, in establishing the category “Expressions of nationhood” the DVD *Dong Fang Shen Zhou* showed exhortations (slogans) in factories and referred to a monument to those who died on the space programme and to personal stories of sacrifice.

Understanding Confucius in modern China

A special case in considering civilizational values is Confucianism. Hansen (2007) comments extensively on the transcript between astronaut Yang Li Wei and his family, which is reproduced in English, as Box 9.1 below:

Box 9.1: Conversation with Yang Liwei

The following is a live outer-space-earth conversation at 7:58 pm last night between taikonaut Yang Li Wei and his wife Zhang Yumei and son Yang Ningkang.
Yang: “I promise to fulfil this mission smoothly. Wait for my good news.”
Wife: “So proud of you, hubby. Our parents, your son and I are looking at you now. What does the outside of the module look like?”
Yang: “Splendid! And space looks extremely splendid around here. I can see our beautiful home planet. The inner environment of the craft is very good.”
Son: “Dear Daddy, how are you? Have you written diaries? What did you eat?”
Yang: “Thank you, my dear son. The condition of my body is pretty good. I have written down everything about the work here and what I saw. I ate the space food in the module.”
Son: “I wish you smooth sailing and I’ll see you tomorrow.”
China Daily 16 Oct 2003, p1

“What the Chinese people seem to have appreciated most during the flight of Shenzhou V Were Yang Li Wei’s communications with his 8-year old son, Ningkong. In a Confucian society (which, of course, China has remained despite its communism), the father-son relationship is fundamental not only for the family but for all society and politics (references). Whereas in the US the most memorable in-flight comments from America’s astronauts have rarely had much to do with children or family, in China a great emphasis was placed on Yang talking lovingly in space to his “dear wife” and “dear son.” (Hansen, 2007).

This reference to the Confucian tradition is a common belief and is attached to the “civilizational” concept.

The construct of “Confucian values” including sacrifice and dedication to a cause is present in the story of Grandma Chagan who was moved off her ancestral land for the construction of the Jluquan Space Centre. “I realised that we have contributed greatly to the space exploration despite experiencing so many hardships. I felt comforted,” she said (Shaoting, 2011)

Caldaro et al (2008) comment: “Marketing research literature provides a solid foundation for understanding cultural differences. The importance of Chinese culture in negotiation strategies can assist recommendations for improving U.S.-China relations in space. For example, research shows that East Asian cultures score much lower on individualism indices than Western cultures, especially the U.S.”

They refer to the work of Hofstede (1991) and Hofstede and Bond (1988), who identified a cultural dimension they labelled “Confucian Dynamism”. They attributed the following elements of this dynamism to economic growth:

- * Persistence/Perseverance
- * Ordering relationships by Status and observing this order
- * Thrift; and
- * Having a sense of shame.

They noted that, contained in this dimension but “*relatively unimportant*” to economic growth were:

- * Personal steadiness and stability
- * Protecting your face
- * Respect for tradition; and
- * Reciprocation of greetings, favours and gifts.

Noting “the feudalistic social order espoused by Confucius ...has merely been replaced by the Communist social order...basic Confucian ideals and values have not changed, only altered or adapted to fit the newer model of the political state”, Matthews

(2000) identified cultural traits of “Confucian Ethos”, “Integrity and Tolerance”, “Loyalty to Ideals and Humanity”, and “Moderation and Moral Discipline”.

She located “Respect for Tradition” in the “Confucian Ethos” dimension, together with “Protecting Your ‘face’”. She recalled that “protection of face” and “respect for tradition” (and two others) “advocated checks and distractions at the personal, interpersonal and social levels”. Persistence (perseverance) was located in “Integrity and Tolerance” and patriotism in “Loyalty to Ideals and humanity”.

Both studies (Hofstede 1991 and Mathews 2000) placed the quality of Tradition as being in some sense problematic in its presence.

However, Confucianism as a driving economic force in Asia has been interpreted by Mouer and Sugimoto (1986) as (*passim*) a “social construction”. The term “Confucian values” is considered here to be an explanatory construct used by Chinese and non-Chinese alike, in the sense asserted in another context (Mouer, & Sugimoto 1986) that “the stereotype of the Japanese is generated not only by foreigners, but by the Japanese themselves”.

In China, the disciplines of hard work and social order are promoted conveniently in the applied ideology of the Chinese Communist Party, as in the “Aerospace Spirit” described below.

The Shenzhou manned space missions

It has been shown earlier that Legend is present in the naming of spacecraft. One interviewee explained it thus:

“The names of the spacecrafts have deep meaning in Chinese tradition. Shenzhou is homophonic to the ancient name of China in a 5000-years-old legend. Chang’e is the fairy living on the Moon with a rabbit named Yutu. Tiangong is the name of the palace where Chang’e stays on the moon. Some Chinese are obsessed with the idea that Beauty Chang’e lives with Yutu in Tiangong mourning about her parted lover forever. After lunar rover vehicle Yutu discovered that there was nothing but rock on the Moon, the imaginative Chinese still insisted that Chang’e merely hid {sic} herself. The fairest would never be disturbed by the ordinary, they said. “

It is interesting to note this interviewee's attribution of the name "Tiangong", which is a base in the sky, to the Moon landing site, not to the orbiting space station. In fact the Chinese authorities named the Moon landing site *Guang Han Gong* 广寒宫.

In addition, Yao (2011) reported specific references being made to virtues. At the launch of Shenzhou 5: "...Hu Jintao ...highly praised hardworking, enterprising, serious-minded, innovative, factualistic and cooperative workers and researchers in the manned space program. These characteristics were dubbed the "spaceflight virtues".

At the Launch of Shenzhou 6: "Two themes were apparent in Hu's speech, the manned spaceflight virtues and "Chineseness". As a result, a neutral technology was tainted by certain identity that was not neutral any more. The manned spaceflight was first of all marked by a nationality-Chinese. Then it became the embodiment of certain virtues – hardworking, innovative, cooperation, united, enterprising, serious-minded and factual, etc. Combining the two, Chinese leaders endowed the concrete space technology with a new meaning, an embodiment of the national identity which is flawless, inspiring and honourable". (Yao, 2011)

A deconstruction of legend in the Shenzhou programme can be made with the reference to a legendary figure, Qu Yuan made by the Shenzhou-10 manned space mission in June 2015. As with Asdiwal, one story of China in multiple editions is that of the writer and philosopher Qu Yuan, and the commemoration of his death in Dragon Boat races.

The ancient historical text giving the traditional story is that of Sima Qian, who in the Burton Watson translation gives his biography as an "Eminent Official" in *Shi ji* 84 pp 435 - 452(Sima Qian, trans. Watson 1961 and 1963).

A significant cosmic-oriented work by Qu Yuan is the *Tian Wen* in which he asks questions of Chinese astronomy (Qu Yuan, trans. Field, 1986).

Qu Yuan's death by suicide following Court intrigue and corruption is associated with commemoration by the "Dragon Boat races" conducted annually on the fifth day of the fifth Lunar Month. In assessing the value of the legend for the China of different epochs, Schneider (1980) describes the importance of Ch'ü Yüan as that "each age has the

problem of how to relate its educated elite to political power, to ultimate values, to art and literature” (p202).

He draws attention (p161-162) to the postage stamp issue of 1953 in which the poet is portrayed as one of “Four Giants of World Culture” – the others being Copernicus, Rabelais and José Martí

Historical drama, used as a “relatively safe channel for concealing political criticism within literary devices” (Hung, 1994, p.84), was a characteristic of wartime drama in China. A Communist- authored play about Qu Yuan, written in 1942 whilst at the headquarters of the Chinese forces in Chungking, followed this convention, pointing out the inadequacies of the Kuo Ming Tang (partners to the Communist Party forces at his time), whilst writing about infighting within the Warring States period of Chinese history.

A theatrical drama by Kuo-Mo-Jo entitled “Chu Yuan” was also published in 1953 and republished in 1978 (Kuo-Mo-Jo, 1953). An interpretation of the act of reference from the spacecraft is that which Schneider (1980) describes, as far as modernity goes, (p14) as the “embodiment of a cultural history that divides Chinese civilization into a northern and southern branch. The dialectical play of the two produces the special qualities of Chinese national culture. In this scheme, the persona of Ch’ü Yüan becomes secondary to the character of southern culture. Through him, southern culture is said to have first interacted with northern culture; and first through him the South gave full expression to its visionary, artistic spirit, and its unbridled, passionate individualism”.

Qu Yuan remains an icon in Chinese cultural expression, in that as Schneider (1980, p.176) points out, memorial structures exist, for example the temple complex in Hubei. A legend arose from the death by suicide of the poet Qu Yuan. It was referenced in a Chinese stamp sequence of 2001 depicting the Dragon Boat races. The time of the races is set to be the fifth day of the fifth lunar month. In 2009, reference to the Dragon Boat races commemorating Qu Yuan by the crew of space craft Shenzhou 10.

Astronauts in the Tiangong-1 module appeared in front of cameras and held up a handwritten message “端午节快乐”; *Dragon Boat Festival Greetings*⁶¹

The presentation of Qu Yuan in these editions raises questions of social organisation within China. Various structures can be seen: the unification of the North/South split in China; the fight against corruption; longevity; or civilizational reference. Certainly the choice of the Qu Yuan activity on the mission was deliberate and was fitted around other constraints. After analysing the complexities of the Shenzhou-10 mission in terms of the position of the Sun at critical phases of the flight, Christy (2015) concluded that suitable landing dates of the 15-day mission ranged only between June 22nd 2013 and June 26th, before waiting another four weeks. He added a second “rule”, namely that the President of China had to be present at the time of the launch, and noted Xi’s return from California on June 9th. (Xinhua, 2013). Therefore, June 11th was chosen. The Dragon Boat festival was on June 12th and the Chinese astronauts were in orbit but had not reached the space station Tiangong-1.

An earlier launch would have allowed for the celebration to take place from the station; a later launch would not have allowed the celebration to take place from space at all. Thus, the launch date was the last possible date to commemorate the death of Qu Yuan from space during that mission. Food suitable for the celebration had been loaded on board.

Clearly, the legend of Qu Yuan, honoured in various interpretations by the postal system and in literature, is represented in the Chinese space programme. Its presence there promotes cultural values across the whole country and to the diaspora. It is the cultural values that are being promoted here.

⁶¹ http://www.chinadaily.com.cn/china/2012-06/23/content_15519420.htm ; <http://bbs.chinadaily.com.cn/thread-755333-1-1.html>

Such civilization name selection is found in other countries' space programmes, but its function may differ. As argued in Chapter 4, the European Space Agency, in naming its global navigation satellite system (GNSS) after Galileo, supports a pan-European political identity. So the cultural reference in European programmes promotes identity directly. However, in India, according to Bagla and Menon (2014), Hindu astrology and the influence of Mars on birth date to the superstitious and traditional aspects of India are significant in this society. Rakesh Sharma's mission to space and India's Moon and Mars expeditions refer to "Chariots", (Chandrayaan, and Mangalyaan) as in the epic myth of the Ramayana⁶². Here, the unity of "All-India" is derived from reference in space to a dominant cultural myth. The space programme is propping up the dominant culture; it is not the other way around.

Consumer goods

Solomone (2013, p. 69) illustrates with her own photograph a "Chocolate-flavoured candy for sale" which incorporates an astronaut motif on its label. She derives from it that "marketing of human spaceflight images has been very effective to help turn out profits for businesses that have no direct connection to actual space endeavours". This marketing tactic ebbs and flows with each successful human spaceflight, resulting in an inundation of images post-launch and then those images fading away until a couple of years later, when the next human space flight took place." Personal interaction with these consumer texts serves to add meaning to the Chinese space programme.

Parker (2009) considered the paradox between a utopian projection of the space programme as the harbinger of the future, and its embracing such marketing products, in the American space programme. Are such images merely a marketing tactic, or is there potentially a conversation about them? There is certainly a wide variety of space-themed images in commercial use, and many of the companies are either engaged in technical operations ancillary to the space programme, or have associated themselves

⁶² I once asked Cosmonaut Shukla about the use of the image of three-horse chariot myth on the commemorative philatelic products of the Soviet Union. He dismissed it as "marketing".

with the programme by taking advertising in the public magazine “航天员” (Hángtiān yuán, “Astronaut”), as in some of the examples which follow.

Lee Kum Kee’s association with Shen Zhou 10 in 2013

Lee Kum Kee manufacture and bottle their prepared tasty sauces for home and commercial cooking. The company commented on 10 July 2013: “With the advancement of aerospace technology, astronauts can taste the same menu in space as on earth now. While fried rice, roasted chicken, etc. are available on the menu of Shenzhou 10, astronauts can also enjoy our sauces to serve with their meal in space”. The inverse of this statement is that the consumer can eat the same food as the Chinese astronaut and thus be associated with space travel.

Including the traditional food for the Dragon Boat Festival, the sauce company Lee Kum Kee used the images in its Facebook page during the flight of Shenzhou 10. Lee Kum Kee show the companies’ sauce bottles as rockets. The astronaut is to the far right of the points in the Golden Ratio; the rockets/bottles themselves are in the prime position.

The Chinese Lunar Exploration Programme is sponsored by Yanjian Beer who carry the Programme’s logo on every beer bottle.



Figure 9.5: Advertisement for cooking oil, Shanghai metro, July 2013.

Following Solomone's cue (2013 p. 69), an advertisement was spotted and photographed at a Shanghai metro station in the summer of 2013 and is reproduced above in Figure 9.5. This picture is a landscape and therefore immediately distinguishes itself from modern art on display in Shanghai galleries at that time, hinting at tradition and longevity. The colours are vivid. There are three significant figures – a boy dressed as an “astronaut”, a space rocket and the bottle of cooking oil. These are evidently the subjects of the story in a picture that can be read from right to left as a scroll.

In this advertisement there is a printed exhortation to consume the product. The boy “astronaut” is pointing at the bottle. Sight vectors can be seen between the young “astronaut”, the bottle of cooking oil and the rocket. Drawing a grid of the “Golden ratio” (in horizontal and vertical thirds) discloses that the rocket at the rear of the picture is at the top rear focal point. This could associate the Mandarin for “far” (Yuǎn 远) with the mandarin for the unit of currency (Yuán, 元). The promulgation is at the top sight line. Clearly, the advertisement has been created with a complex structure whose complexity awaits discovery.

Talja (1999, p. 13), describes discourse analysis as it might apply to her field, and notes in particular that in starting this process “Even one interview may suffice to indicate what kinds of interpretation are possible.” Here, we start with one person. Bell (2001) considered a technique of content analysis, which requires precise hypotheses and clearly defined concepts: “categories of (visual) content must be explicitly and unambiguously defined and employed consistently (‘reliably’) to yield meaningful evidence relevant to a hypothesis” (p. 15). In this qualitative analysis, then, the categories of content to be investigated need to be established. To start the analysis of Chinese characteristics, serendipity, in the form of subjective data contributed by a language teacher in China, provides several grounding points of a public conversation about space exploration.

Feld (1976, p. 297) considered that photographs and film are “a valuable resource when contextualized by verbal accounts”. Ohn (1976, p.11) deduces that in this way

photographic statements can be used in ethnomethodological studies to elicit memories or to elicit conceptual categories. In this serendipitous exercise, six photographs were prepared:

- a) The advertisement from a Metro station in Figure 9.5 above;
- b) A photograph of an astronaut's space suit, taken in the Shanghai Museum of Science and Technology
- c) A photo of a commemorative envelope bought from the Philatelic counter in Shanghai post office
- d) A photo of the mythical creature Chang'e, taken from its cultural reference of a panel of paintings in the Space exhibition at the Shanghai Museum of Science and Technology
- e) A photograph of an advertisement on an electric bicycle parked at a roadside in Shanghai (Figure 9.6).



Figure 9.6: Advertisement sticker on an electric bicycle in Shanghai

- f) A photograph of a Lotus flower growing in an exhibition held in a ceremonial park, which was labelled as a seed grown in space.

In this experiment, the subject was an adult woman who is a first language (L1) Mandarin speaker from Northern China. These photographic statements were a first

attempt to index to index the ontology of space exploration media which existed at that time and place. In presenting them for comment, they were mediated by a portable electronic screen, a device which was accepted as being a common medium for viewing. Most of the photographic statements were vertical in the orientation of the photographer.

She agreed to write three or four sentences when shown each of the 6 photographs. A selective summary of her responses is given below.

In her comments on the advertisement in Figure 9.5, the woman did not refer to the space theme at all, writing:

这一个广告

(This is an advertisement)

是关于使用油的广告

(Is advertisement about the use of oil)

这个各广告说这钟油很建健康

(This advertising says this oil is very healthy.)

如果从小吃， 你的孩子会很聪明

(If [eaten] from a snack, your child will be very clever)

Neither did she refer to the space theme in her comments on Figure 9.6.

Two of the four images in which she discerned a “space theme” were photographs of objects from the Shanghai Museum of Space and Technology, the space suit and the panel with the mythical Chang’e. A third was a photograph of an official commemoration from the Post Office, whilst the fourth, the Lotus, was also labelled as a space item.

The interviewee’s comments on the photograph of the commemorative envelope were:

这是一张太空的照片

(This is a space photo)

这张明信片上有一个男人

(There was a man on this postcard)

可能这个男人是第一个上太空的人

(Maybe this man was the first person in space)

为了纪念他做了这样的明信片

(To commemorate him do such a Postcard)

我们应该买留作纪念

(We should buy to keep a souvenir)

The last comment uses the modal verb 应该 (Yīnggāi) which requires some elucidation.

Although it could be read as meaning in this grammatical construction “Should”, that is, indicating an obligation on her part to purchase and keep the commemorative envelope, a better translation would be in the subjunctive, expressing the view that in the circumstances of acquiring a souvenir a purchase of this item might be made. These postal items are analysed closely below.

Chen (2013) considers corpora of texts in English of “China Daily, a newspaper which reflects the opinion of the Chinese government”, and found a significant increase overall in “the deontic modal language of power – expressions such as “You must do such-and such” and “you should/may do so-and-so” from 1998 to 2010, particularly in reported direct speech. She interpreted this as a possible “shift in the social and political climate in China” (p. 81) in that period. The obligation to “buy to keep a souvenir” would match this social convention, but the use of the subjunctive tempers the description of obligation.

When confronted with an image of a space suit the interviewee commented on her inability to see the astronaut's face. In the space suit shown in the picture, the visor is closed and sun shield is in place. To consider this point requires some unpacking.

Erbaugh (2008) reports that: ““Excuse me” is translated as 对不起 *Duìbùqǐ*, literally “[I] cannot rise to face [you]” (a variant of 对不住 *Duì bù zhù*, “[I] cannot remain facing [you]”). These verbal prostrations, like the English “please forgive me,” are restricted to accepting responsibility for a serious error that demands reparations. The addressee must have the status to both merit an apology and grant absolution” (Erbaugh, 2008, p. 634). By Erbaugh, then, “face” is a reference to status.

The researcher observed that the astronaut's face was usually not shown in museums when clothing (including uniform) was presented on mannequins. This may perhaps be seen in the West, but by attributing the same meaning to a similar observation we may be excluding a different explanation, unique to China, which includes this reference to a “face”.

The absence of an astronaut's face was observed in suited model shown in the Shanghai Museum of Science and Technology, but not that in the Hong Kong Space Museum, where the head was removed from the mannequin entirely. Thus in Hong Kong the issue of “face” was avoided. But a further variant was seen in the Science Museum in Macau, where a mannequin of 航天员 *Hángtiān yuán* Yang Li Wei showing his face and wearing a working uniform was modelled, possibly indicating the presence and power of mainland China⁶³. Perhaps here his face added to the authority that came from the mainland. Schneider and Hwang (2014) note the legitimization of Chinese rule through discourse in the aftermath of an unplanned and catastrophic event, the Sichuan earthquake. It is therefore plausible that cultural discourse on the space programme is used here in a similar way, with a key difference being that the events are planned and anticipated.

⁶³ I am grateful to Jinghan Zeng for this comment.

If so, then this particular photographic statement might be more representational in nature than the motorcycle advertisement or the envelope. Here we may see a different function of the photographic statement discerned by the photographer and the viewer of Chinese origin. As in other cross-cultural studies, the latter might see representation where the former sees only indexicality.

Chinese Jokes about the space programme

Berger (1996, p.163-266) draws attention to jokes as narratives. He defines a joke as “a short fictional narrative, meant to amuse others, that ends with a punch line” (p.163). This analysis assumes that the joke is written in a text with a specified structure.

He comments further that “Jokes reveal a great deal about the mind-sets and psychological hang-ups of the people in the societies in which they are told, and so are valuable texts for social sciences” (1996, p165). Berger also includes comic strips, television commercials and dreams in his realm of narratives, and so his idea of a “joke” can easily be extended to include comic images or images used in a jocular way.

Some examples are given below of Chinese written and pictorial jokes about the space
A Chinese joke retained on the internet blog site <http://www.jokeji.cn> reads (in Google translation) as in Box 9.2 below:

Indians: Our space technology is much better than you.
Chinese: How to say?
Indians: We launch satellites and make 104 stars. Can you do that?
Chinese: We can't do it.....We can only do it with a space recycling robot, which receives 104 stars.
Indian:

[印度人：我们的航天科技比你们强多了。#
中国人：怎么说？
印度人：我们发射卫星，一箭 104 星，你们能做到吗？
中国人：我们做不到.....我们能做到的只是附带一个太空垃圾回收机器人，专收 104 星。
印度人：.....]
<http://www.jokeji.cn/yuanchuangxiaohua/jokehtml/xiaohuayoumo/2018060813320238.htm>

Box 9.2: Chinese Space Joke (Hángtiān tiáokǎn 航天调侃)

Two readily available jocular images about the Chinese space programme are described here. The first is an image in which the sender of a post card bends his or her head into the blank frame for a head in the full-size shaped cut-out of an astronaut. In the Zhuhai Air Show of 2014, Figure 9.7 below was prepared by taking a photograph with new technology, the integrated camera on a personal smartphone, and sending it by Bluetooth to the printer at the Post Office stall. The printed output is already stamped for the postal system. It can therefore be considered an “official” joke.



Figure 9.7: An Official Astronaut Jocular Image of the Zhuhai Air Show, 2014.

Placing the face in a cut-out of an anonymous character figure is common in many situations in the West, such as Santa Claus, Disney Characters and indeed at the European Space Agency’s open day at ESTEC in the Netherlands. Its significance in China is not that it is claimed to be unique to China, but that it is an approved form of

humour. Here, the joke forms a part of the official participation in the public conversation about space exploration.

Another visual joke is based on a photograph of the Shenzhou crew immediately after re-0entry and landing. A small boy is illustrated in Figure 9.8 below having won a prize of print of this photograph in a day of studying space travel at a Chinese school (Jingjing campus, 2017).



Figure 9.8: Photograph awarded to school student

But the photograph from the same event is also for sale on a stall in the park in Shenyang, where people can pay the stall-owner to superimpose their picture, by means of mirrors, onto famous places in the world, including the Eiffel tower, the statue of Liberty, Tower Bridge, and Space. Figure 8.9 below shows the picture obtained in this way from a stall in Nanhu Park, Shenyang, in 2015.



Figure 9.9: Permitted counter-narrative of space exploration in China: somebody else is superimposed on the image

Berger also comments (1996, p 165): “But jokes also often counter the power structure and function as a means of resistance”. He applies this specifically to jokes said to have arisen under communism in the Soviet Union and satellite states.

In Húludǎo, a counter narrative was employed in this way to describe the statue of national hero and venerated local hero Yang LiWei, describing him in his spacesuit and portable air conditioning box as a small boy with a box of grenades, and the glorious but bright and gaudy sculpture as a bunch of bananas.

Conclusion

This chapter has introduced sentiment, poetry, humour and counter-narrative, found within Chinese conversations about the space programme. These have been found in the adjunct of text and image.

These conversations are found in everyday life – in the metro, in poetry, in advertisements, in labels for food products, in parks and in commemorations – in many aspects of everyday life in China.

These identified social outcomes are partially explained by activity in the Class room based on technique. Social processes are further considered in the next Chapter.

Chapter 10: The “Aerospace Spirit” and its Promulgation by Social Practice

It is clear that the Chinese space programme is a subject of popular conversation in China. It is present in schools, in products, in advertisements, on the internet, in post offices, and so on.

This Chapter will show how an organised body of thought about the space programme is promoted within China. It shows the basic thought, some official processes of diffusion (including public monuments and social networks), and the importance of Chinese news media, Hong Kong business, and rhetoric.

Settings and ideology

Aggestam (2006, p 494) sets the actions of organisations in “an environment” which contains” a set of powerful instrumental and non-instrumental imperatives” which act “in the process of shaping organisational practices, processes and structures” (ibid.). Taking from literature the word “setting” - a kindred word to “environment”, Brooks et al. (1964, p. 24) note that a setting “invites a course of action”, that is, a setting is almost determinate of the practice. As the primary step in a neo-institutionalist analysis, then, it is necessary to establish the baseline setting or environment in which the Chinese space programme is operated.

Brooks et al (op. cit) also ask “Who tells the story?” They elaborate: “...the question of the point of view is...one on which hinges the problem of the control and arrangement of the material – that is, the very nature of the plot...” A secondary question, then, to the establishment of the baseline setting is the establishment of its agency.

Kubat (2012, p. 225) argues against “a complete exclusion of ideological factors from considerations of the PRC’s post-Cold War strategies. Such an omission can hardly be analytically justified...” In following this direction, this chapter now turns to these ideological imperatives within the PRC as they apply to China’s space programme.

In the journal *Qiushi*, which is the “Organ of the Central Committee of the Communist party of China”, Hu and Wang (2012) declare that “Scientific Development is essential for China’s continued development ... Development is the “master key” to resolving all problems in China” (p. 1). In the same journal, a Xinhua press briefing describes China’s space programme as “From nothing to glory in six decades” (Xinhua, 2016a).

President Xi Jinping's comments about China's space programme were gathered by Xinhua in 2017 into a background file (Xinhua 2017a). With reference to the last period (and since 2013), he has commented that Space is "an important field of scientific and technological progress and innovation", adding that "achievements in this regard are also important symbols of a country's scientific and technological strength." (Xinhua (2017a). Chinese astronauts "carry the space dream of the Chinese nation and represent the lofty aspirations of the Chinese people to explore space." Three factors can be disentangled from this presentation: Science, the "Chinese characteristics" of art and science in China, and the relations of China with the rest of the world.

This phrase, "*Chinese characteristics*" is used frequently in official commentary in China. In one form it is used explicitly to refer to the leadership of the Communist Party of China. Thus, the new "Xi Jinping Thought" written into the Constitution frequently uses the phrase "socialism with Chinese characteristics", and less frequently refers to diplomacy or defence with Chinese characteristics (Xinhua, 2018; Peters, 2017).

At first sight, this explicit formulation fits easily with Johnston's (1995) formulation of "strategic culture". In Johnston's formulation, the question exists whether states', including China's, "historically and culturally rooted notions about the ends and means of war limit the strategic choices of decision-making elites"; or they do not (Johnston, 1995, p. 43).

Space exploration in China is set in an acknowledged background of thought or ideology (思想, *Sīxiǎng*) which is applied to organisations by the Party representatives. Thus, CAST (China Aerospace Science and Technology Corporation) acknowledges the "Aerospace Spirit" as having three components: the "spirit of aerospace tradition", the "two bombs and one star" (machine translation for "Two bombs and one satellite"), and the "spirit of manned space flight". This "spirit of aerospace, is the soul of China's space industry and also the soul of Chinese aerospace corporate culture" (CAST, 2018). In an expression of fealty, Chinese Hángtiān yuán (astronaut) Jing Haipeng is quoted unequivocally in support of the Party in his profession of space exploration (Xinhua, 2017b).

In a lecture to the Shanghai Aurora Vocational College, presided by the Party Secretary of the Shanghai Satellite Engineering Institute, the keynote speaker to an audience including students of the 18th Senior Party School presented the ideological and political framework of “Chinese Spaceflight Across the World”. (Huang Min, 2017). Speaking from a backdrop illustrated in the article of the mythical goddess Chang’e (嫦娥), the legend of Wan Hu (万户) and the real flight of Yáng Lìwěi (杨利伟), the lecture first referred to the “Mythical story of traditional Chinese culture”, then continued through “scrubbing national humiliation and defending national sovereignty” to the same three spirits, whose essence was “patriotism”. The reporter concluded (in a machine translation) that “Not only did we learn about the great China’s space industry, but it was also a profound ideological and political education course in which socialist core values and the rich content of Chinese excellent culture”.

In April 2018 it was reported that “The First Aerospace Spirit Summit Forum was held in Beijing (Lin Hui, 2018). The speech of the Party Committee Secretary, standing Vice Chairman and Chairman of the Aerospace Spirit Research Branch of the China High-tech Industrial Research Society said that the aerospace spirit ‘cannot be confined to military units and the aerospace system. It must go to the market and to society, and it must originate from the military and be applied to the people’”. He added that “...we must be good at combining the aerospace spirit with practical problems such as conflict of interest, job losses, and personnel loss...”, thus linking the spirit or ideology into management issues.

Corporately, the China Aerospace Science and Technology Corporation, which was identified in Table 4.2 above as being the primary civilian satellite agency, conducts exercises within its organisation to address social issues. As an example, forty-one employees attended an “Employees’ Micro-Classroom⁶⁴”, relevant to their work because (in machine translation). “As an aerospace people, how to balance family and work in busy work, and educate outstanding children, is an urgent problem that many young people need to solve”.

⁶⁴ <http://www.spacechina.com/n25/n142/n154/n815956/c1890059/content.html> 作为航天人·如何在繁忙工作中兼顾家庭和工作·教育出优秀的孩子·是许多年轻人迫切需要解决的问题。

In “A Eulogy of Loyalty for Space” the Party Secretary for the Astronaut Centre for China wrote that “the human spaceflight spirit” included being capable of “enduring hardship”, “fighting”, “researching”, and “making dedication”. (Li Xinxue, 2018). He writes: “With the “two bombs and one satellite spirit” as the gene, the soaring spirit “adhere to space flight, research with teamwork, be objective and scientific, pioneering and dedication” was cultured...” The Shanghai Academy for Space Technology (CASC 2016) noted that “our culture” included two “Spirits”:

“Spirits of the “Atomic Bomb, hydrogen Bomb, and satellite project

- Rely on ourselves and work hard
- Cooperate actively and dedicate selflessly
- Focus on practical work
- Get up courage to scale over new height.

Spirits of the ‘Manned Space program’

- Be capable of enduring adversaries
- Be good at fighting battles
- Be tenacious at talking problems
- Be willing to dedicate.”

These “Spirits” recur throughout official commentaries about the Chinese space programme.

Chinese “Space day”

It was reported in 2016 that by a decision of the State Council, henceforth April 24th 2016 would be the first national “Space day” (Information Office of the Space Council of the PRC, 2016). The date was the anniversary of the successful launch of China’s first satellite in 1970.

This date competes with two other space commemorations worldwide. Russia celebrates 12 April as ‘Cosmonautics day’ because it is the date of Yuri Gagarin’s first flight, and the United Nations sponsors “World Space Week” around the 4 October, as this was the launch date of Sputnik-1.

The poster below in Figure 10.1 was designed for China's 2018 theme "Building a New Space for Aerospace". There were 222 competitive entries, and the winning entry was designed by Zheng Shipeng of Beijing Aerospace Co Ltd, was successful. The winning entry was described thus "The theme of the poster is prominent, mainly in warm colours. Through the up-and-down launch vehicle, the Chinese space station on track, the Chang'e 5 and Mars probes, and the city and children's silhouettes, etc., it revealed the "new era of co-building space" and opened the theme of the new journey of space"⁶⁵

One school event celebrating Chinese space day (Jingjing, 2017) to realise "...the persistent pursuit of Chinese astronauts. They are not afraid of hardships, and they deeply feel their deep love and strong sense of responsibility and mission to the motherland" (machine translation).

⁶⁵ <http://www.sastind.gov.cn/n157/c680097/content.html> machine translation. The poster is downloadable from: <http://www.cnsa.gov.cn/n6758823/n6758839/c6800911/content.html>



Figure 10.1: Space Day 2018

The Chinese *Space day* stands separate and isolated from the commemorative *World Space Week* sponsored by the UN.

The local school

The local school was instrumental in the mass participation of school students in space travel. Interviewees described the school in these terms:

“In China, from primary school to senior high school, on each Monday, we hold the national flag raising ceremony in every school in every place. All of the students and the teachers will be in the playground with no one absent. After the students chosen to do the raising raised the flag, each week we have one student or teacher to do a speech. The speeches are often about the big events happening around us and stories that are motivational. During these days, the speeches were all about the Shenzhou no.5 as well as the astronaut Yang Li wei who became the hero and idol of our minds.”

One recalled that on the launch day of Yang Li Wei:

“In 2003, Shenzhou V as the first manned space flight was sent to the space. In China, there was an old saying that the first one to eat crab is a hero. Astronaut Li Wei Yang was a hero. Because he did that dangerous thing alone. I remembered clearly even it was 12 years ago. I was on class in primary school that day. The class was suspended and the school let all the TVs in every class turned on so that all students could see that. When the workers on the ground began to count down, everyone started to nervous. As the number went to “one” the world became silent. We stared at the craft for a really long time and heard a series of “blablabla normal”. Finally it seemed getting onto the right path and we started to have class”.

Another recalled:

“It was a Wednesday but the Education department required the school to give us a day off so everybody could witness the moment.”

But later manned expeditions were less popular:

“Chinese were not so excited when China sent men into the space second time but the school still suspended the class for half a day.”

And

“The third time Chinese went into the space, the school didn’t even suspend classes for it. We watched in our break.”

Perhaps in the same way as Yuri Gagarin represents in his heroism a certain Russian national characteristic, but one no longer Soviet, Yang Li Wei serves as an institutional

or official hero representing the success of the nation, standing next to the national flag.

Collecting postage stamps in China

Like any other social phenomenon in another culture, Westerners need to take care that when evaluating the personal collection of postage stamps in China, and the investment potential of postage stamps there, they do not bring their perceptions of the Western equivalent social process with them. In terms of investment, Huang (2001) reports that (p.1041): “Unlike the international stamp market, Chinese investors are not interested in rare and high value ‘old’ stamps. Rather, investors focus on the market of [a] growing population of young hobbyists”. This perception of a younger person’s interest in stamp collecting in China is at odds with Western prejudices about stamp collecting.

Huang continues (2001, Table 1) to distinguish the average investment returns of stamps issued in five periods, which he names and dates as follows: Economic Recovery, 1949-55; New Socialist Society, 1956-66; Cultural Revolution, 1967-76; Economic Reform, 1977-1984; and Stamp Market Boom, 1985-96. He finds that the most significant rate of return is of the last period given.

Xin and Xian (2012) develop Huang’s thesis. They report that the number of collectors nationwide in China was once up to 20 million people in 1997, and that despite the ebb that followed “the stamp collecting remains the country’s most popular collection activities, and the number of regular collectors is estimated to be around 2 million” (2012, p.352).

Significantly, they report that (p.355) “in recent years the themes on the most significant events of China have enormous influence on stamp collection.” The theme of ‘most significant event’ resonates with the cultural activity described in this thesis of the collection of news stories in the Jian Bao (剪报) activity. Xin and Xian continue (2012, p.3720 that “it is quite a profitable investment to buy stamps ...themed on the most significant events of recent years.” In addition, because the Chinese space programme started effectively with the launch of their first satellite in 1970, the last

three periods of Huang's Table 1 (Cultural Revolution, Economic Reform and Stamp Market Boom), match the production of national commemoration of space events by postage stamp issue.

Propaganda activities – example of Qingdao

Propaganda activities appear to be co-ordinated between the representatives of the Party and the local administration, as the following example shows. According to a press release of the Qingdao municipal government,⁶⁶ the Deputy Director of the Municipal Party Committee Propaganda Department, the Director of the Municipal Post Office, and the Deputy Director of the Municipal Post Office established in 2017 the “National Press Conference on Advanced City Events for Philatelic Culture”. This considers that ““Philatelic culture is an important carrier for promoting advanced culture and promoting social progress. It is an indispensable and important part of urban cultural construction. To promote advanced socialist culture, build philatelic products with distinctive urban brands, enhance the city's reputation and reputation at home and abroad, and promote urban economic development and social progress...”

Its activities are directed to five segments of local society: “Relying on the local economic and social development, the “Five Enters” (entering communities, campuses, commercial buildings, barracks, and villages) activities of philatelic culture was launched.⁶⁷” Philately is therefore allowed and even encouraged in propaganda.

The Chinese Space Philatelist Association (CSPA)⁶⁸

Chinese state space construction corporations carry out many activities for the benefit of the morale of their employees. These include staff children's parties, sports events

⁶⁶ <http://www.qingdao.gov.cn/n172/n9945907/n9945979/101013135928237740.html>

⁶⁷ <http://qdsq.qingdao.gov.cn/n15752132/n20546841/n30973740/n30974000/151215040549466760.html>

⁶⁸ <https://baike.baidu.com/item/远望号测量船/8633606?fr=aladdin>

Article 1

The first name of the association is: China Aerospace Philatelic Association, referred to as: Aerospace Postal Service. English translation: China Aerospace Philatelist Association, abbreviated as: CSPA.

Article 2

The China Aerospace Philatelic Association is a mass philatelic cultural group formed on a voluntary basis by the China Aerospace Science and Technology Corporation (hereinafter referred to as “Aerospace Science and Technology”) and the China Aerospace Science and Industry Corporation (hereinafter referred to as “Astronautics”). It is a corporate legal person registered according to law. It is a non-profit community organization.

Article 3

The purpose of the Association: To hold high the great banner of Deng Xiaoping Theory and the important thinking of the 'Three Represents,' conscientiously implement the scientific development concept, unite the vast space of philatelic lovers and philatelic academic researchers in the space system, and conscientiously abide by the Constitution, laws, regulations, and national policies. We must follow the social morality, develop and prosper the philatelic business with Chinese aerospace characteristics. In order to vigorously promote the spirit of aerospace, the spirit of "two bombs and one star [satellite]" and the spirit of manned space flight, enrich and invigorate the spiritual and cultural life of **workers in the aerospace system**, and promote the building of corporate culture and the construction of socialist spiritual civilization.

Box 10.1: the key Articles of Association of the CSPA.

and so on. In the light of the example quoted from Qingdao, it is perhaps unsurprising that there exists a state-sponsored association for space philatelists. Box 10.1 sets out key articles from this association.

It can be seen that the CSPA has as its purpose the promotion of the “Aerospace spirit” amongst and between the employees. Envelopes are produced to commemorate the launch of space missions and are posted between workers. The social network thus revealed is discussed below.

Guo (2015) commented in an online commentary (blog) that there was a “monopoly rumour” about collectors of such philatelic products, a “near-water platform” 近水楼台 in the system. This idiom, 近水楼台 jìn shuǐ lóu tái, means that “the tower near the water can see the moon first”. The analogy is: given priority because of its proximity, meaning that those within the aerospace system were better placed to collect such items. Thus, it is held that collectors of Chinese space philatelic products, if not working directly in the aerospace system, are very close to it.

A European astronaut embedded in the Chinese space programme comments about these postage stamps, as against other space commemorative ephemera⁶⁹: “I cannot answer specifically for envelopes. I think that my Chinese colleagues are very much into memorabilia and other little souvenirs. I remember when I gave my first conference at the CSU [Technology and Engineering Centre for Space Utilization], I came with several pins and stickers from ESA for distribution and they all went away within minutes.”

Open Source Intelligence: SOCIAL NETWORK Analysis

Another technique of OSINT identified within Chapter 3 of this thesis is the analysis of social networks which are revealed within grey literature.

Various heuristics are applied in this project which have all been granted prior ethical approval to date. This heuristic follows Derrida’s “The Post Card” which establishes an epistemology based on postal materials and a materialistic ontology. Dicati (2017) uses commemorative postal materials to “present hundreds of samples of postal documents...that, since 70 years, tell the history of space exploration”. Thus, he uses postal materials to structure his account of the history of space exploration, i.e. he provides a new set of items for the public conversation.

This application develops Ducati’s approach. The “grey literature” was purchased on an international internet auction site from dealers in China, USA, Italy and other countries. The sellers are dealers in decorative and commemorative stamp envelopes, particularly, those envelopes which have been sent and received through the postal system in China, and subsequently offered for resale.

Open Source Intelligence: SOCIAL NETWORK Analysis

Another technique of OSINT identified within Chapter 3 above is the analysis of social networks which are revealed within “grey literature”, in this case, commemorative

⁶⁹ Personal communication

envelopes and postcards produced by research organisations, corporations and individuals within the Chinese space programme.

One characteristic of these envelopes – this grey literature – is that they frequently constitute a series commemorating individual stages in a space event. For example, a series of 15 envelopes has been produced by the 河南航天集邮研究会 Hénán hángtiān jíyóu yánjiū huì (Henan Aerospace Philatelic Research Association) with different envelopes in the series posted at the launch date, contact with a tracking station, contact with the main control centre, and so on. These envelopes contain text an image, and intertextuality shows the complex references of these commemorative items.

But more information is available from those envelopes which have been sent and received through the Chinese postal system. These envelopes are postmarked on the front of the envelopes by the post office of departure and on the reverse by that of receipt. In addition, they have written on them the postal code (zip code) of the departing postcode and arrival. The area covered by a postcode is smaller than a city but larger than few streets.

By constructing a spreadsheet limited to departing postcode and arriving postcode it is possible to construct a social network analysis using the software “Gephi”. This is an analysis of the social networks operating within and close to the Chinese space programme.

In his oeuvre *Envois*, (within Derrida, *The Post Card*, 1987) Jacques Derrida (1930-2004), considers the act of communication within a postal system of the sending of a postcard. Derrida’s text is notorious for being complex and its arguments occur in displacements of space and time. Helpfully, Miller (2017, p. 40) considers *Envois* a “so-called post-modern novel”, and as such, *Envois* may have another genre to be assigned to it or indeed to any other “text you gloss, teach, read or interpret” (ibid).

Derrida in *Envois* remarks variously on the public nature of the face of a postcard (and therefore of its contents), and considers some messages which were partially destroyed. Miller points out that the postcard itself, which contains a falsehood in its key image, did actually exist, and he reproduces one which Derrida sent him. Derrida thus establishes principles of epistemology to include intentional messages,

falsehoods, and partial messages to be reconstructed, as well as public knowledge of private communication. Set in a context of postal communication he draws on the whole panoply of postal offices, franking machines and delivery agents.

Postcards and envelopes are material things and if commemorative include the reproduction of an image: they resemble a photograph that can be handled. Considering this materiality, Edwards (2012) describes the material nature of processed photographs as objects of affect. She notes that “photographs are objects specifically made to have social biographies (1987, p. 222). She adds that (ibid p. 223) “photographs have divergent, nonlinear, social biographies spread over divergent multiple material originals and multiple, dispersed and atomized performances”. Here, the material object of a photograph is a participant in a performance. Asking rhetorically (ibid, p. 224) “Why do photographs as “things” matter for people?” she refers to a model in which the photograph is a set in “a fluid set of productive relationships” in which the “material properties are themselves signifying properties” (ibid p. 223-4). A material photograph is therefore a signifier within a network of relationships.

A catalogue of Chinese space philately items, presented to the 47th Conference of the International Astronautic Federation held in Beijing in 1996 (Cuī Jiànpíng et.al (1996), p. x) explains that “to propagate our country’s space achievements and commemorate space launching and the great events in connection with aerospace, the competent departments in China have issued many space philatelic items, such as (memorial) cover, cards, aerogram postmark etc, of which quite a few are uniquely designed and exquisitely manufactured and become treasure to philatelists”. Thus, postal items are produced specifically to commemorate space exploration in China and to propagate it.

Dicati (2017) presents a philatelic survey of Earth exploration from space. His raw material is the illustrated commemorative postage stamp and the “cover” - an envelope which has been postmarked on the day of a specific event. His book is not “an atlas of space exploration based on postage stamps instead of the usual illustrations (ibid, page v) but presents “hundreds of samples of postal documents of each category that, since 70 years, tell the history of space exploration” (ibid. p. xxiii). This is not, therefore,

a history of space exploration illustrated by postage material, but a history written by and through the texts and images from the postal system.

Kopytoff (1986), remarking on the “cultural biography of things” notes that “there is clearly a yearning for singularization in complex societies... sometimes the yearning assumes the proportions of a collective hunger...there is a continuing appeal in stamp collecting – where, one may note the stamps are preferably cancelled ones so there is no doubt about their worthlessness in the circle of commodities for which they were originally intended” (Kopytoff page 80). Thus the postal item that has been in circulation has no other postal function, but retains its commemorative and celebratory ones.

The postal item that has been in circulation now leaves a trail in which is recorded a network of people who have participated in this commemoration and celebration. This is a social network, a network of people or social actors where individuals are interconnected. According to Wasserman and Faust (1994, p5), in social network analysis “the unit of analysis is not the individual, but an entity consisting of a collection of individuals and the linkages between them”. The connections of individuals may be shown in a sociogram, (ibid. page 74) or like that below.

Figure 3.4 described earlier a reproduction of a typical commemorative postcard used in this study. To sum up, then, this study uses materials, whose meaning is of commemoration of space exploration, that have been distributed along a social network or networks in China; the distribution has ceased and the trace of the entry and exit points of the act of distribution have been recorded, and will be drawn together in sociograms to show these networks.

Social networks of Space Exploration in China⁷⁰

A total of 265 postcards and covers commemorating events in space exploration, which had been sent and received within China, were offered for sale between September 2017 and January 2018. Two main suppliers sold the items, one based in China and one in the USA. Whilst a sample was purchased from each supplier, their offer for sale included a downloadable photograph of the item where (in most cases)

⁷⁰ This account draws on Thomas (2019b)

both the postal code of origin and of receipt were visible. These items were only one component of the range of philatelic items offered for sale.

Some of the postal items may have been duplicated or re-offered for sale of, but including this repetition would only alter the weight of the connection, not its existence.

A two-column file of Comma Separated Variables (.csv) was prepared and loaded into the free programme Gephi. While column "a" was the sender, and column "b" the recipient, the resulting sociogram does not privilege one of the other.

Figure 9.3 below shows the most complex sociogram obtained. It is difficult to follow the connections between all nodal points in Figure 2, and so, using the graphics device available, smaller networks are drawn where a particular postal code acts as the linking node. Where no code is given the node is not numbered. In these subsequent Figures the analysis of networks looks at the location of the postal code (sender and recipient) in China.

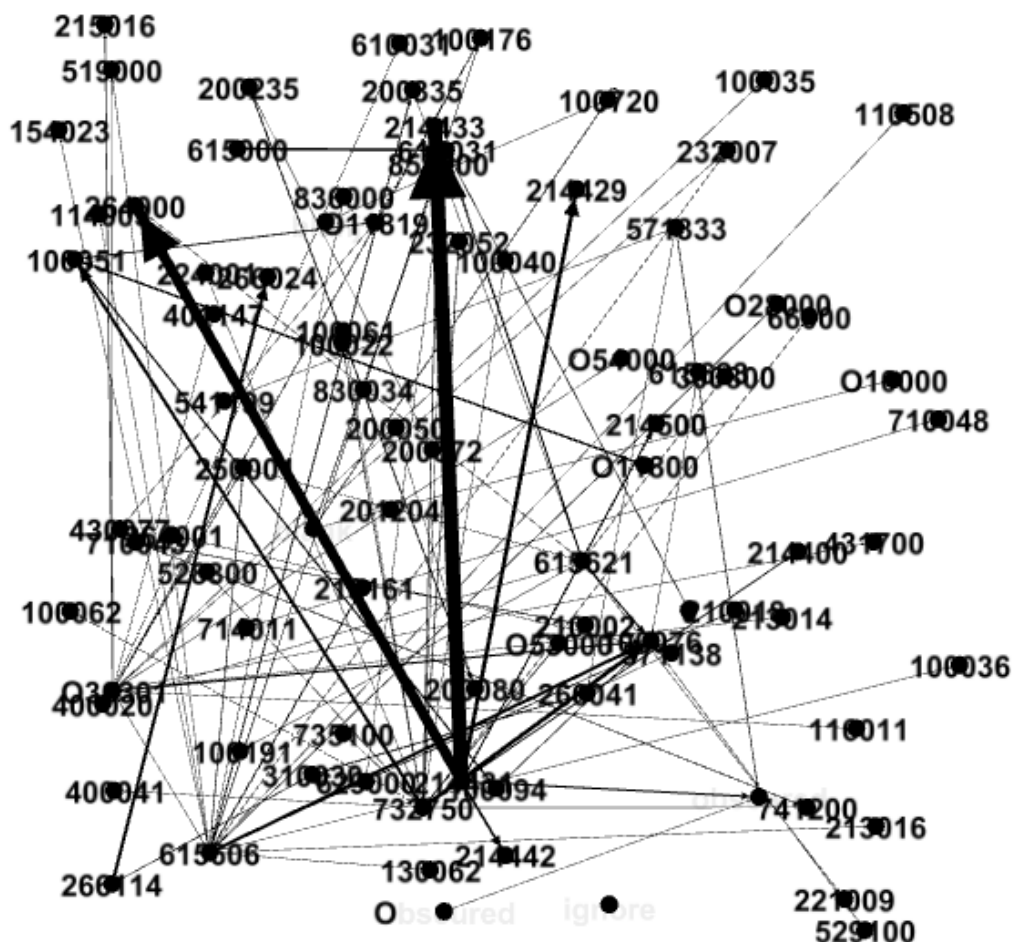


Figure 10.3: Sociogram of Chinese postal codes in the commemoration of Chinese space events. Node numbers are postal codes, and the thickness of lines refers to the frequency of connection.

By a quick look at Figure 10.3 can be seen that there are a few nodes where three or more links are made, and some of these link to secondary nodes of a small number of contacts, but it is not a particularly dense network, with many lines referring back to source nodes. Therefore a set of smaller networks was examined and explained below.

The networks form a web of cultural influence across the country: Inner Mongolia, Xinjiang, Guangzhou; urban and rural; North and South; and across the Wu line.

The first network is Maritime in nature. By consulting the websites of China Post, Node 214429 is discovered to be the postal code of the berth of the Tracking, Telemetry and Control (TT&C) ships at Jiangyin. These are the “Yuangwang” series ships. The United States Government’s Central intelligence Agency (CIA) identified this as the “probable” base of the tracking ships in 1983 (CIA, 1983).

Figure 10.4 shows connections from this node. It is a “star network“(Williams and Blum, 2018, Figure 3.2, p. 28) centred on 214431. No node connects with another node except via 214431.

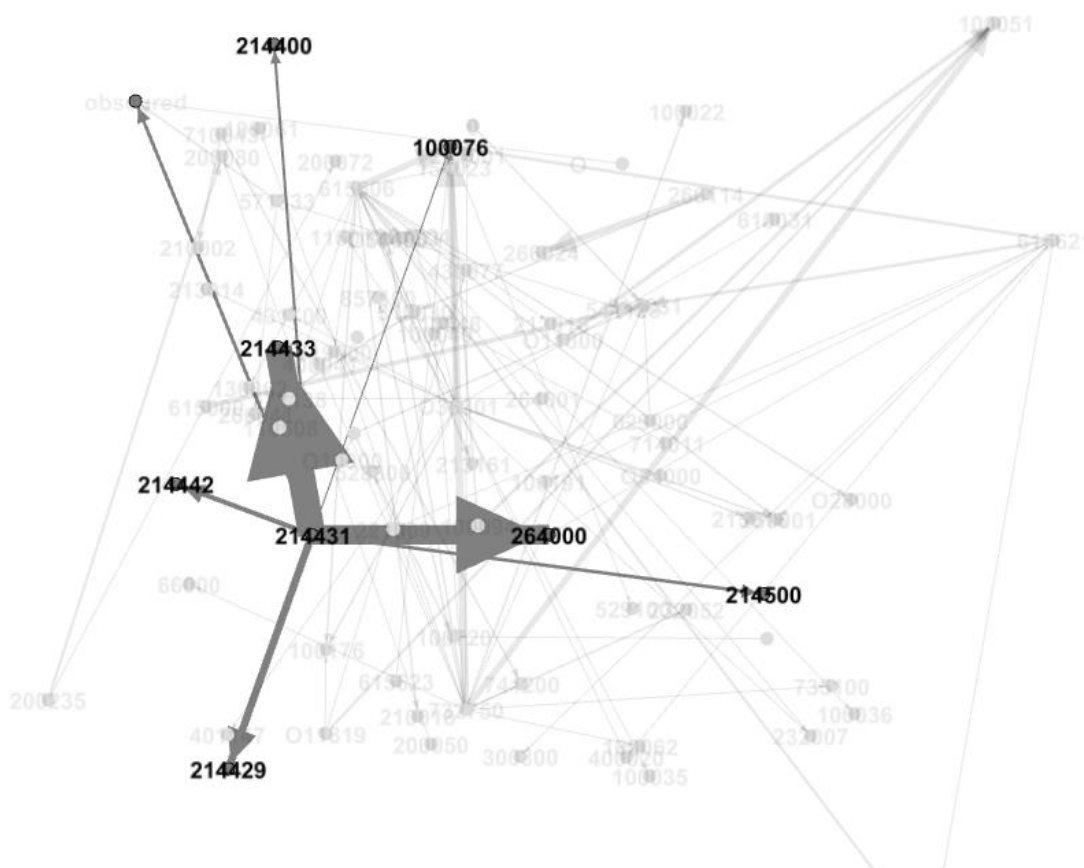


Figure 10.4: Connections from Node 214431, the Yuanwang berth at Jiangyin.

This is the strongest network displayed, in that it has the most examples in the sample. We now seek to contextualise the network (Williams and Blum, 2018 p. 19). According to the sociogram of Figure 10.4, the berth in Jiangyin links to the headquarters of the China Space Maritime Tracking Service in the main port there (214431), to an

industrial estate a few miles south of the port (214442), and also to the Northern port of Yantai where the Northern Fleet of the China Rescue and Salvage organisation is based. During 2017, this fleet was active in the training in sea rescue techniques of astronauts from China and Europe.

The postcard of Figure 10.5 (a) and (b) below emphasises this Maritime nature. Again posted from 214431, it is a postcard in a series of images of cargo ships, which are not in themselves related to space travel. This image is sent from the wharf of the tracking ships to the opposite bank.



Figure 10.5: Part of the Maritime social network

A second small network is that of Figure 10.6 below. This is a small network in Shanghai centred on Node 200235 which is the Post Office on the Hángtiān building (Space building) in Shanghai. This is a “Triad Network” (Williams and Blum, 2018 Figure 3.2, p. 28), although 200235 is the only connection point. This social network extends across the city to postal zones where environmental and meteorological institutes are based.

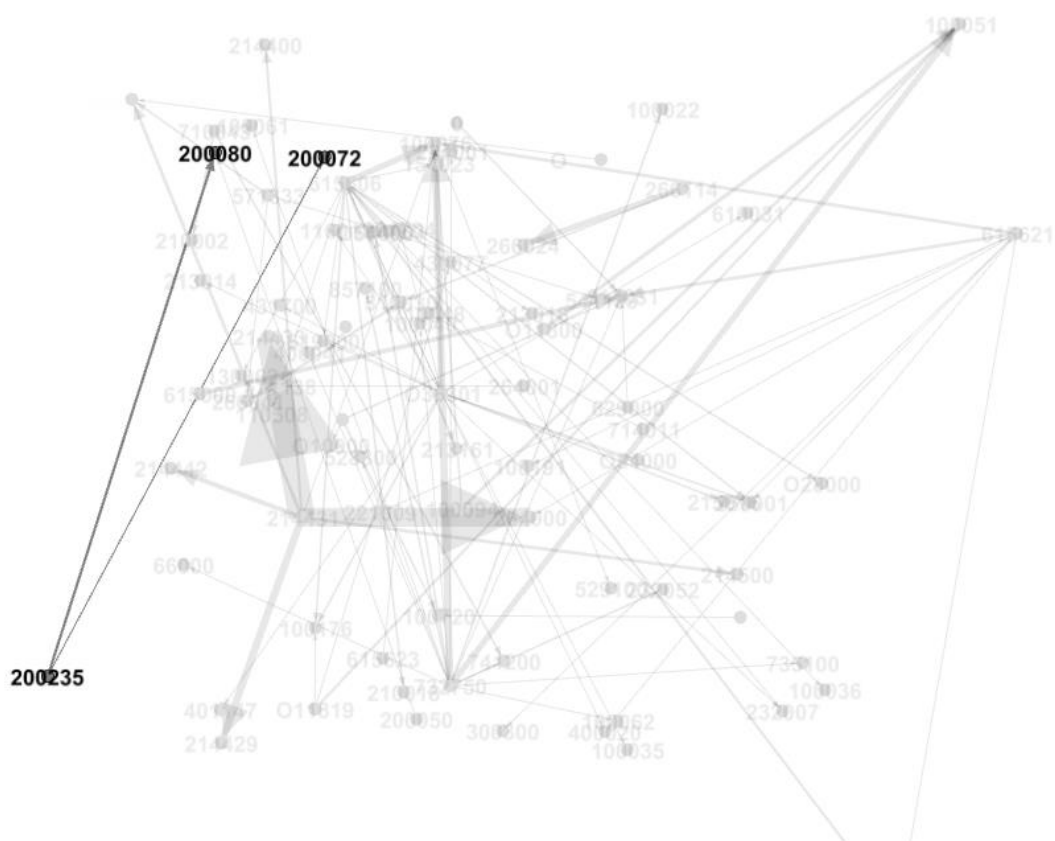


Figure 10.6: Centred on the Hángtiān building, Shanghai.

As capital city, Beijing offers a number of networks. For example, in Figure 10.7 can be seen the links offered to Node 100076, a star network contextualised in Daxing, Beijing, which contains a number of research institutions including the Beijing

Institute of Technology, Aeronautics and Space Science.

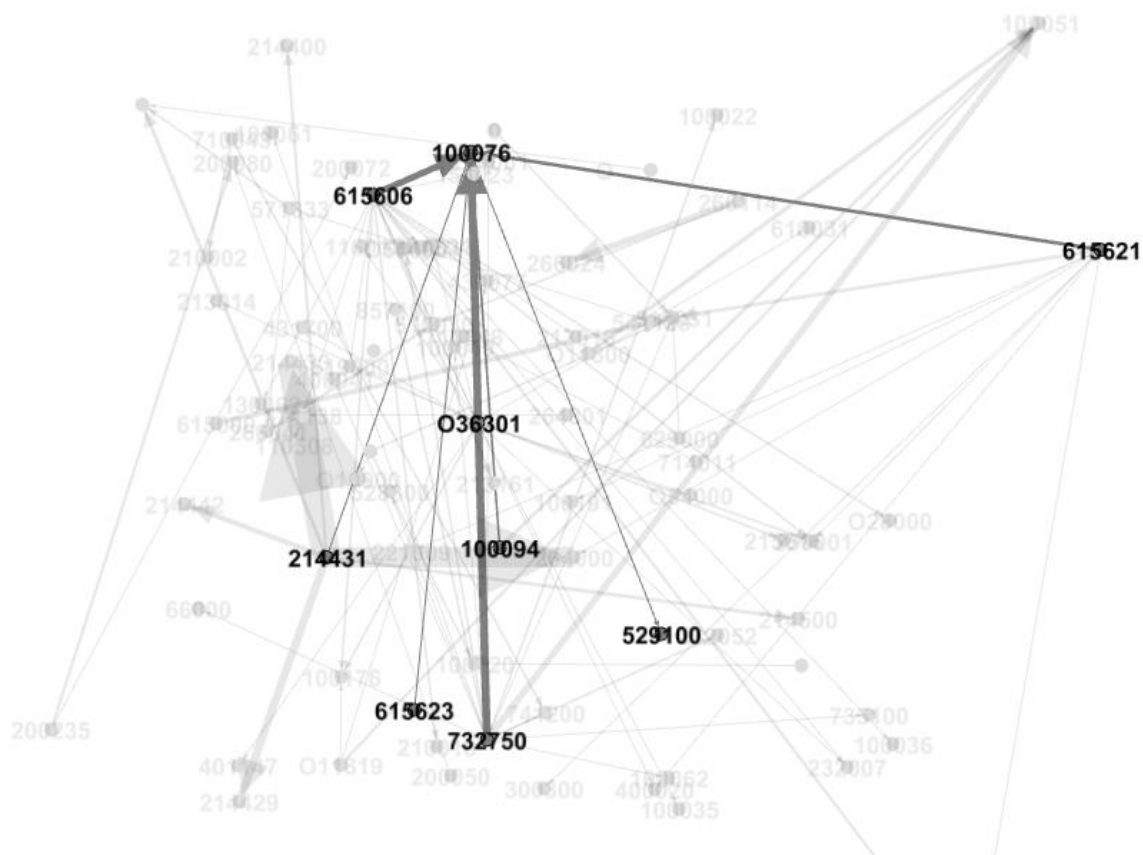


Figure 10.7: Centred on Daxing, Beijing.

In Figure 10.8 below can be seen the various interconnections offered to the Jiuquan launch centre at Node 732750 in a star network. As with each one the diagrams it is possible to use the node number with a keyword such as “Space”, “launch” or “satellite” to discover locations of space research or manufacture in China.

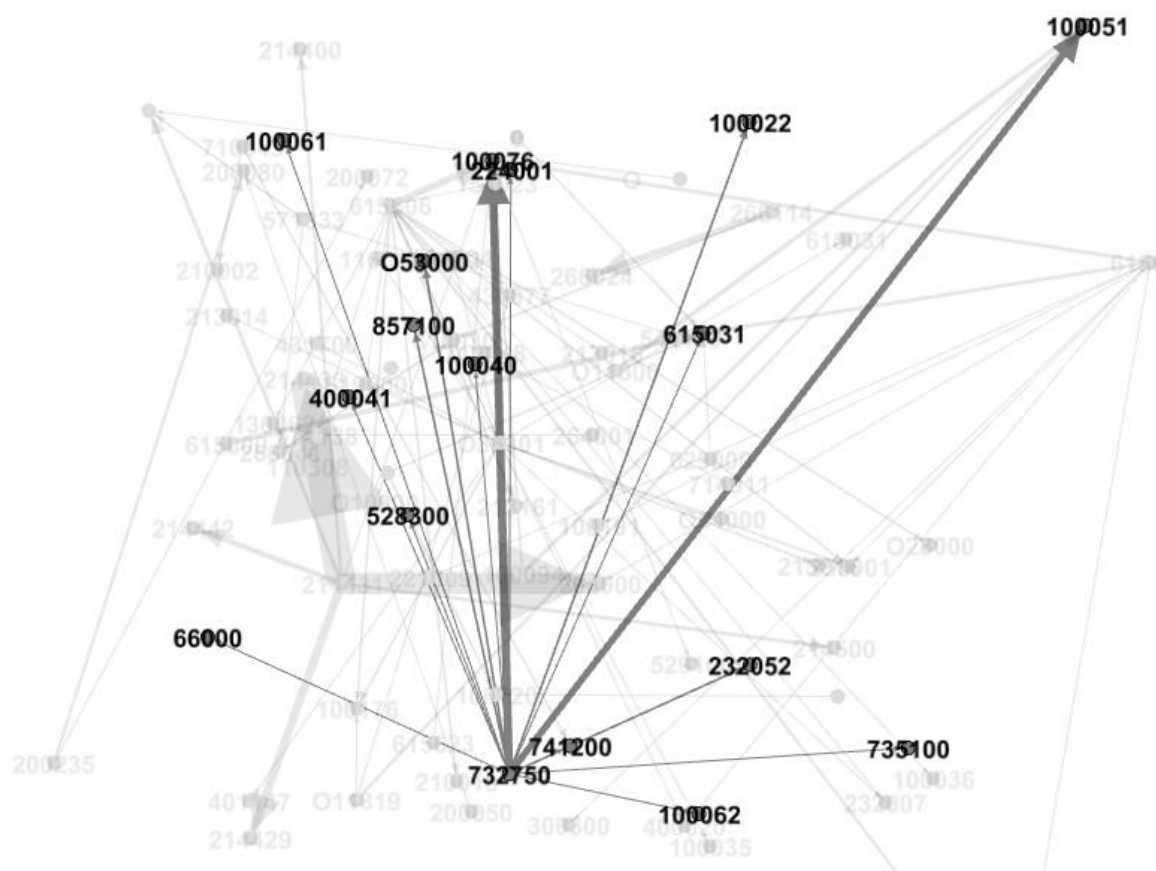


Figure 10.8: Connections to Node 732750, the Jiuquan Launch Centre

In Figure 10.9 can be seen a link between nodes 615031 at Xichang and 830034 outside Wūlǔmùqí (Urumqi). The postmark on the postcard from 830034, a site of a radio-telescope which is part of the Very Long Base Interferometer, is distinctive in that it is written both in the Mandarin characters (Hànzi) and in the Arabic script of the language Uiyghur. It represents Han influence in Xinjiang.

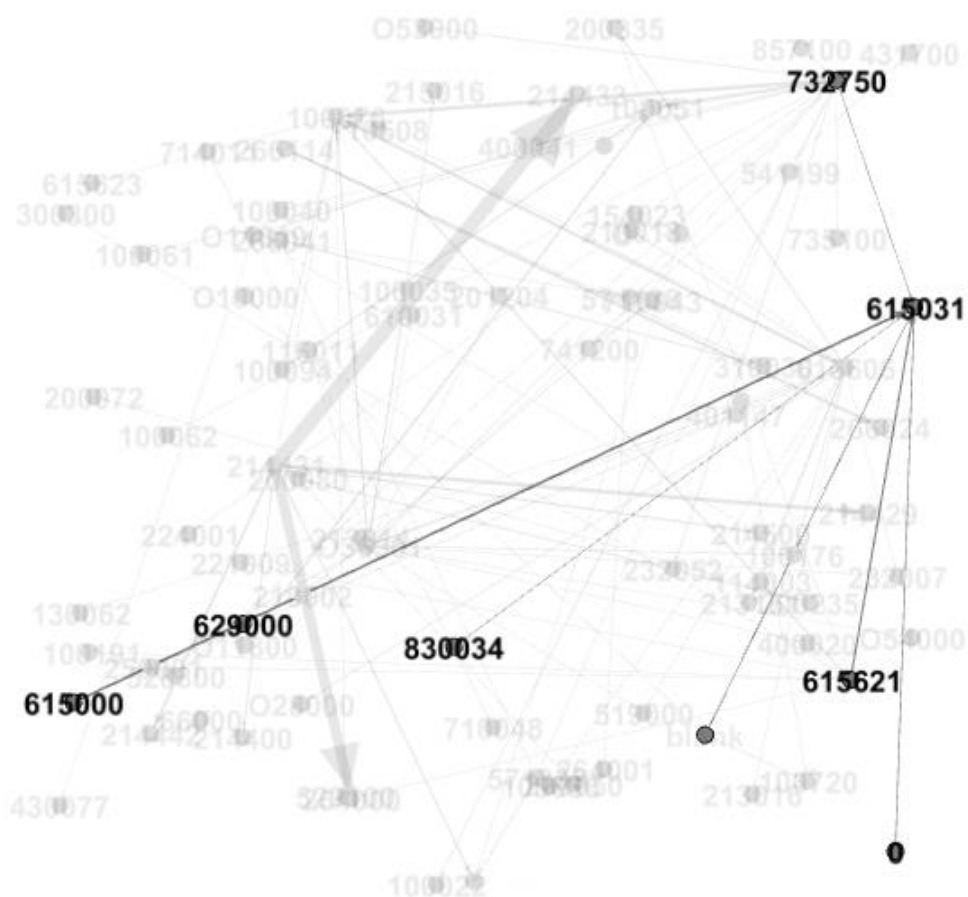


Figure 10.9: Link to Wūlǔmùqí (Urumqi) 830034

Finally, Figure 10.10 shows, within the star network, a connection between Nodes 615606 (the Xichang launch centre) and 836000, which is a new and small city called Beitun in Xinjiang province.

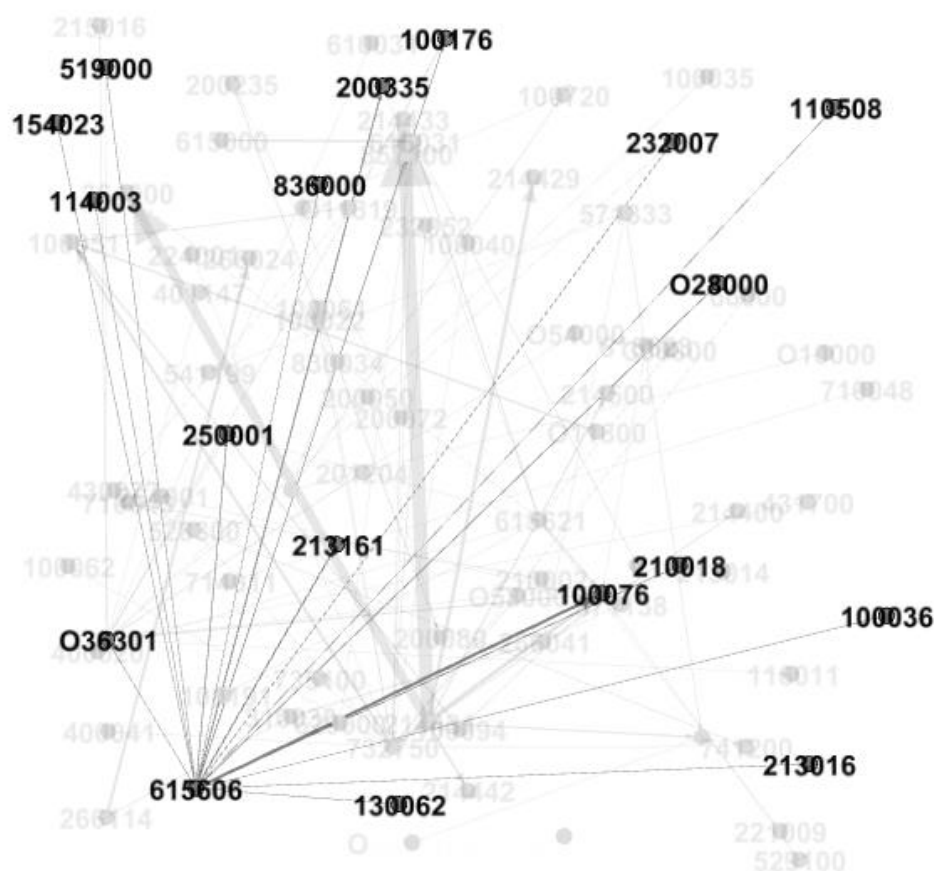


Figure 10.10: Links from the Xichang satellite Launch Centre 615606, including link to Beitun in Xinjiang province, 836000

Discussion

From the connection matrix, which is the CSV file, the full sociogram will yield many examples of networks. In the examples above, connections have been shown between sites known to be within the Chinese space programme and a variety of other installations, doubtless including private residences.

These sociograms can serve as heuristic for new networks within the Chinese space programme. For example, there is an obvious maritime connection between ships at sea tracking satellites, and ships at sea participating in rescue and training missions, but apart from this maritime connection there is no direct industrial connection within

the space programme. Yet as Travis and Milgram's work suggests, it is a small world of acquaintance chains between the berth at Jiangyin and the berth at Yantai.

Equally, small, personal networks exist within cities (Figure 10.6 shows one triad inside Shanghai) and between institutions across the country. We can speculate that some of these links will represent celebrations and commemorations by colleagues within the space programme, perhaps from the launch site to another tracking station or control room, as the postal codes suggest. Some of them may leave the people on the space programme to their friends and relatives at their home or place of work - school or bank or shop.

Finally, the networks show the Chinese space programme at work. The networks extend across China, even into the Northern/Western provinces, where under the "One Belt One Road" programme the Beidou satellite system is to be extended (Xinhua, 2017c). From this network China could recruit new specialists to staff the new space stations (Xinhuanet, 2018).

The Monument to Astronaut Yang Li Wei in Húludǎo (葫芦岛)⁷¹

The task set for this section is to examine the ætherial qualities of a public monument to a living space explorer in his home city, and to extract from a visit the elements of public conversation about space travel. The monument is considered both from the point of view of the agencies who commissioned and built it and of the general public, who take part in this daily conversation, a conversation about space exploration.

Perspective

This monument is described as a physical structure which was visited with some cultural experience and expectations. It is in public space and so it was photographed extensively and in close detail. As sculpture, it is capable of conveying meaning, as a text is "read" into a conversation. This reading is conveyed into a public conversation within that society as people absorb and react to the conveyed meaning.

⁷¹ This follows the account published in Thomas (2018a).

The cultural readings are constructed deliberately to convey a particular set of meanings in to public discourse. There they stand with other readings, such as public statements, news reports, television shows, magazines, model spacecraft, commemorative stamps, and other ephemera, which together form the public discourse of space exploration in Russia and China.

Thus, the monument at Húludǎo (葫芦岛), stands in a complex setting which gives a context to the achievement of the person represented. The monument therefore consists of these two components: a personal reference and its constructed context. This monument is the product of an authoritarian Socialist country and, as mentioned in the Introduction, has a local counter-story.

Methodology

In order to understand these intentional readings, a methodology is required to move from the raw experience of the monument.

It is possible for an interpretative account of public sculpture to be given simply with its authority being *ad hominem* – that is, the account is accepted because of the identity (and by implication, the learning) of its author. But Yanow (1998) considers that “Organizational spaces are significant to human meaning-making and therefore to organizational practices, and interpretive methods provide ways of studying them.”

This approach in summary considers “...built spaces as texts that are read by multiple audiences (readers) who sometimes make meanings of those spaces which were not intended by their organisational or architectural designers.” This gives space for the creation of counter-readings.

Text focuses on hermeneutic processes, that is, what meanings, made by whom, and with what consequences and conflicts. The focus is on the setting that is “read” and on its “writers” and “readers”.

Photographs taken in 2016 are to contribute a “thick description” along the lines set out by Kopytoff (1986, p. 66): “In doing the biography of a thing, one would ask questions similar to those one asks about people: What, sociologically, are the biographical possibilities inherent in its “status” and in the period and culture, and how are these possibilities realized? Where has the thing come from and who made it?

What has been its career so far, and what do people consider to be an ideal career for such things? What are the recognised “ages” or periods in the thing’s “life”, and what are the cultural markers for them? How does the thing’s use change with its age, and what happens to it when it reaches the end of its usefulness?”

Orientation

In the celestial and astropolitical sense, this city is located at position: 40.7110° N, 120.8369° E. Because the inclination of Shenzhou-4 was 42.4 degrees, the monument is approximately at a sub-satellite point slightly North of the spacecraft. It is the home city of China’s first *Hángtiānyuán* (航天员, Yang Li Wei (杨利伟) who flew in this spacecraft.

The monument as a whole is contained within the “Feitian Square” 飞田广场 and forms a complex site at a traffic junction, illuminated at night, as shown in Figure 9.11. It contains a copper sculpture of Yang Li Wei, several brightly-coloured arms set on a master carving granite relief, nine pillars of stone, 14 steps and a 1:1 scale bronze copy of the return capsule model. It was commissioned by the municipality and created by the Chinese Association of Sculpture, lead sculptor being Cheng Yunxian with six other sculptors⁷².

⁷² http://en.artron.net/news/news.php?piecespage=2&newid=37969&column_id=62
<http://www.people.com.cn/GB/keji/1056/2811889.html>

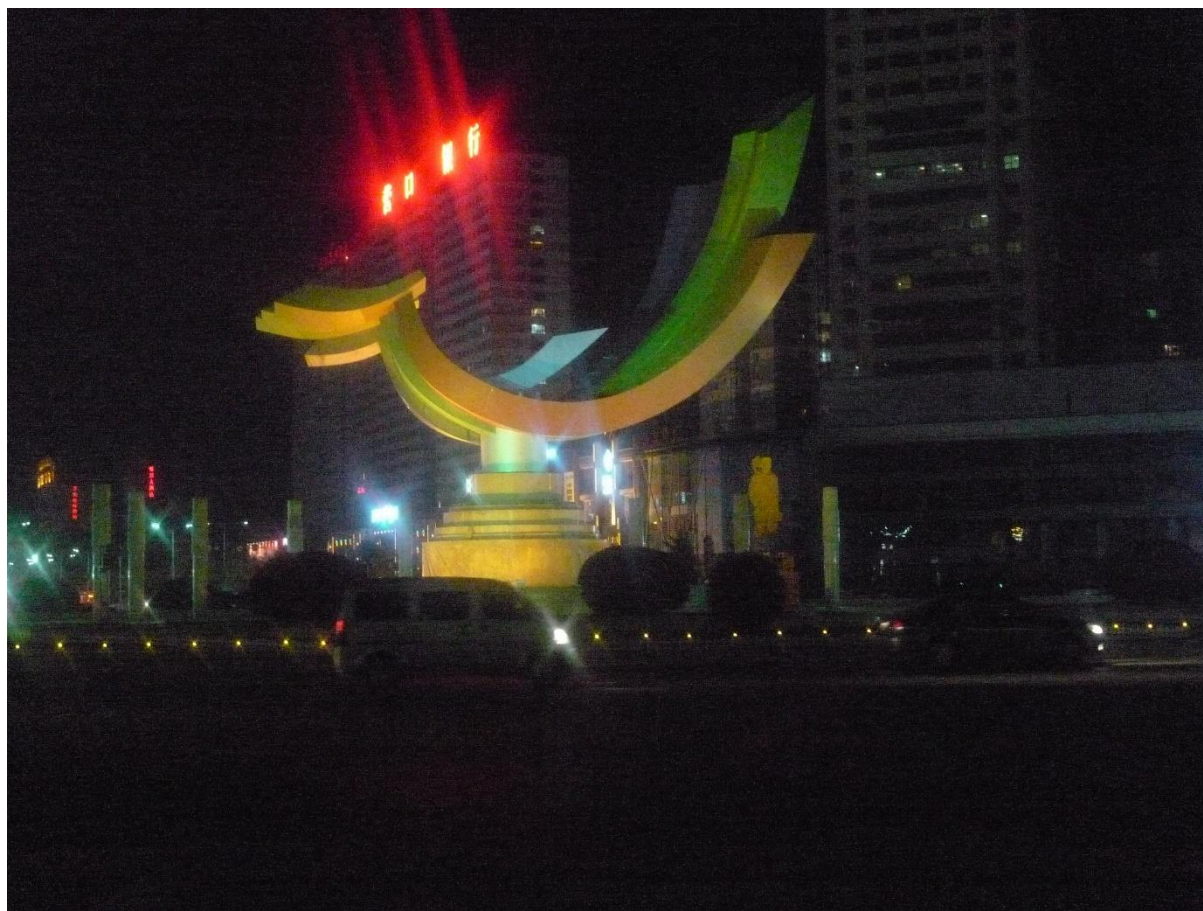


Figure 10.11: Feitian Square at night (Photo: Author).

The coloured arms are striking both in daytime and when illuminated at night (Figure 9.11). They are set in bright standard colours of yellow, red, blue and green. They are said to be in the shape of the character 飞 *fei* 'to fly' but they are elongated and lack the two small strokes to the right of the character. As coloured streamers they could stand for rocket exhaust or convey movement as if they were the peacock decoration or long sleeves and lances in Chinese opera. However, they inspire the first character of 飞天 *feitian* 'apsara', evoking the long scarves of the lady apsaras from Dunhuang.

The *Feitian* monument rewards visitors who cross the roundabout with detail in the scripts which are easily visible from below, but not from the other side of the road from the monument. Both close and distant views are provided by this accessibility.

Embossed on the master carving is “Feitian Square” in Gold traditional Characters and around it are images of flight, astronomy and space travel in China. Around this is a semicircle of tall slim cylinders depicting space events, with texts engraved in Seal, Traditional and Simplified characters, in various fonts. Figure 10.12 shows a tribute to the Apollo 11 mission – “*Moon America Apollo eleven*” (月亮美国阿波罗十一).



Figure 10.12: Tribute to Apollo 11 - “*Moon America Apollo eleven*” (月亮美国阿波罗十一)

The four days of Yang Li Wei's mission are symbolised by the four steps upwards, and 14 sets of steps around the monument symbolize the "Shenzhou" mission around the Earth flying 14 orbits.

Húludǎo (葫芦岛): Stories and counter-stories read into the public conversation

Clunas (2006, p. 216), in his comments about Chinese paintings, notes that: "In considering the increasingly global audiences involved in constructing "Chinese Painting" in the twentieth century, we need also [as well as "the autonomy and expression of the artist's subjectivity] to take into account the visibility of that Chinese painting to, for example, a Soviet audience, as in the major Chinese exhibition at the Tretyakov Gallery in Moscow in autumn 1950, or the Chinese participation in the "Art of Socialist Countries" exhibition held in Moscow in 1958-1959. The official discourse around this very explicitly emphasized the plurality of styles in the "socialist camp", aiming to refute directly accusations from the West that the creativity of the individual and the specifics of national styles were suffering suppression under socialism (Reid, 2000 p. 107).

Wenfang (2015, p.182), in criticising the application of the Frankfurt School's analysis of mass media, seeks a peculiarly Chinese characteristic: "...Chinese scholars should break through what is Western and base themselves on China and the contemporary scene, and particularly China's practical development in the current transitional period. Academically consistent with the practical development of contemporary China is a new three-dimensional spiritual pattern consisting of level of thought, value concepts, and Chinese characteristics".

While it is appropriate to consider the influence of the Socialist style on the monument in Húludǎo (葫芦岛), it is therefore also necessary to be alert for Chinese characteristics.

The roundabout containing the monument includes small beds of flowers and shrubs. As told in the Introduction, a foreman or work unit leader spoke up with pride about the local man.

Looking up at the statue of Yang Li Wei (杨利伟), squinting against a bright sky, his shoulders are surprisingly thin, and his head, not encased in a helmet, quite small. But his boots are prominent, as is the box containing his portable ventilator. This perspective is confirmed by printing a plastic 3-D model from photographs taken below the statue.

The direction faced by Yang Li Wei appears to be towards the ascending node of his spacecraft. From a particular angle, the coloured lengths appear behind the statue of Yang Li Wei as if he were himself an apsara (Figure 10.13).



Figure 10.13: Yang Li Wei as if an Apsara

But, in discounting this allusion to the lady apsara, referring to them disparagingly as “painted ladies”, a counter-story was expressed by a resident of Húludǎo (葫芦岛), who said that as he drove towards the intersection he saw first three large bananas, followed by, as he drew nearer, a statue of a boy with a box of grenades.

In developing the “thick layer” of explanation, Kopytoff (op. cit., p73) generously asks us to be open about cultural bias: ““Behind the extraordinary vehement assertions of aesthetic values may stand conflicts of culture, class and ethnic identity, and the struggle over the power of what one might label the “public institutions of singularisation.”

It appears that the Húludǎo (葫芦岛) monument is not entirely explained by its socialist origins, but requires the thicker description to be more sensitive to the city society in which it is located.

Merging the local identification of the space explorer with the City is not atemporal, but rooted firmly in the present continuous, and therefore in these two cases it is the progress in space exploration, not limited to that progress under Socialism that is being conveyed, not “a stable atemporality” (Yampolsky, op. cit., p. 104). Here we see the affectionate and proud references to the space voyager and to the local space.

The authoritative reading presented by these monuments extends the meaning of the monument from the individual local space traveller to progress in space exploration over time. This is a socialist message, but it is not one of stable atemporality or ahistoricity.

There are also irreverent counter-stories arising from the monument: a space for a set of bananas. These are additional meanings arising from the general public who interact with the official reading and create a conversation.

The interpretive approach continues the development of additional readings by allowing the visitor to see and propose some additional meaning by virtue of their sub-satellite point.

The principles of socialist design show a sensitivity to local circumstances, including an ambiguous if not split collective history and a local pride and affection.

The support of private business

Hong Kong, as a Special Administrative Region of China, retains a private sector of capitalist production. Within Hong Kong SAR it appears that business seeks to

promote and to be seen to promote space science to school students. In 2014 the "Space Science Experiment 50 Design Competition for Hong Kong Secondary School Students"⁷³ was established. An email questionnaire was sent to each participating company.

Only one company, which asked to be anonymous, replied to the questionnaire survey

BUSINESS SURVEY ** A brief introduction to the company – PROMPT: sector, turnover, markets (age), PRC?
[NAME] on a private and confidential basis. We would like to remain anonymous and we would also want to remind you that we have not given you or any third party any permission to mention our company name in any of your research report whether it is published or for private circulation. We have not given you or any third party any permission to use our company's name to solicit information or sponsorship from other third parties. Please observe our privacy. [XX] is a privately owned company incorporated in Hong Kong. It's principle business is in trading of [PRODUCT] and in investment holding. It's subsidiary company in China produces [Product] in China. Our products are sold domestically in China and also around the world.

2. Has your company sponsored other competitions or initiatives similar to this one?
No.
YES – what - details
No – why not/what's original here? No particular reason.

3. What attracted your company to this competition?
Find involving secondary school students in space experiments meaningful.

4. Do you have any other contact with the Chinese space programme (PROMPT e.g. sell products to it) No

5. What is your view of the importance to your brand of this Competition?
Nothing, not important to our brand.

6. What is your view of the importance to your brand of being associated with the Chinese space program?
Nothing, no value to our brand.

7. Why did you decide to be a sponsor?
See it as a meaningful community project that will encourage Hong Kong secondary school children to be interested in space program.

8. What sort of experience is it? Prompt: Good/bad/Why
Good, response very positive.

9. What do you hope to get from it?
Promote and encourage Hong Kong secondary school children to be more interested in space and science experiment.

BOX 10.1: Response of a sponsoring Business

⁷³ http://www.hkpc.org/index.php?option=com_content&view=article&id=5305&catid=152&Itemid=326&lang=en

(See Box 10.1). This limited evidence suggests a motivation that whilst the association by having their name in the competition gives the company no direct marketing advantage, association with the space programme remains a positive aspect. To put this another way, although association with the national space programme might lead to “patriotic purchasing”, it is also important to the company in itself to do what it considers to be the right action to support young people.

Chinese and Diaspora Media

The printed media may still provide a media reference point in this age of internet activity, so an analysis of the readership of the relevant newspapers may yield information about the target audience and of the consequences of the media stories.

Press coverage of the first Chinese manned space flight in the Hong Kong SAR and Beijing Press was found in Chinese dailies on sale in the UK. The announcement of the successful crewed mission of Yang Li Wei appeared prominently on the front pages of:

- ***the Beijing Morning News***

This is a popular/mass newspaper in Beijing but there is little information about its circulation ⁷⁴ .

- ***the Hong Kong Commercial Daily***

Yu et al (2008) describe this newspaper as “Local-cosmopolitan: More than half of the news stories are about local Hong Kong events for all newspapers. “ They continue their description of Hong Kong Newspapers:

“Sing Tao Daily, HK Economic Times and HK Daily News rank top three, while Ta Kung Pao and the two English language newspapers bring up the rear. Newspapers whose coverage of news in mainland China takes up one third include Hong Kong Economic Journal, Wen

⁷⁴“Beijing Morning News prints 180,000 (effectively only 160,000). If it were not for the 130,000 subscriptions, this newspaper would have been out of business. Of the 50,000 retail copies, at least 20,000 were sold by the distribution center director as garbage.” http://www.zonaeuropa.com/20050827_1.htm

Wei Pao, Hong Kong Commercial Daily, Ta Kung Pao and South China Morning Post⁷⁵

Information about the readership profile in the Hong Kong Diaspora in New York is given below. Essentially the evidence is that the paper is a significant one to that diaspora which is aged disproportionately over 50⁷⁶. As argued below, age cohorts in China (and indeed in Russia) demonstrate experience of key political movements in their respective countries, eg the Cultural Revolution or the collapse of the Soviet Union.

⁷⁵ Hong Kong News Media Performance Study

⁷⁶ Sing Tao daily Not only reaches the most, But also reaches
...www.singtao.ca/singtao_east/study/Study2006updateToronto.pdf
Survey period: May 10 to May 21, 2006 (+/-5% at 95% confidence level). Source: Environics 2006 Chinese Newspaper Readership Study. Sing Tao daily.

[PDF]Sing Tao Daily - LocalVox

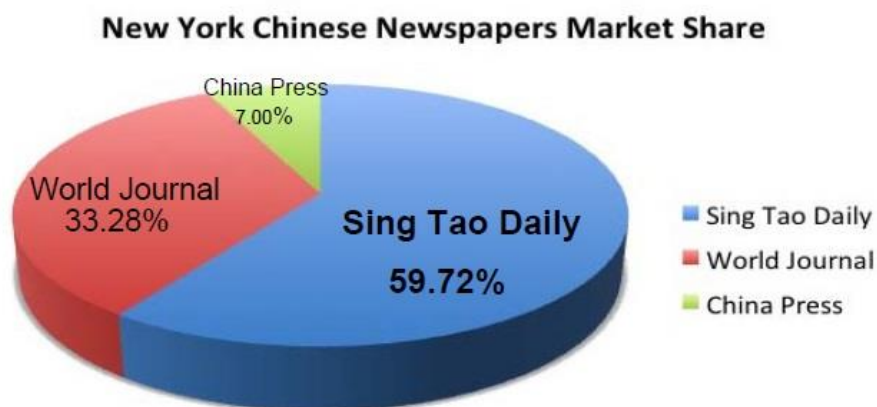
localvox.com/.../Sing-Tao-NY-Media-Showcase-2012-LocalVox-Edit.pd...

53-60. 61-70. 71 or above. Age. *Result obtained from survey done in sampling of Sing Tao Daily's readers in 500 people, as of survey conducted in 2010.

Headline Daily - Wikipedia, the free encyclopedia

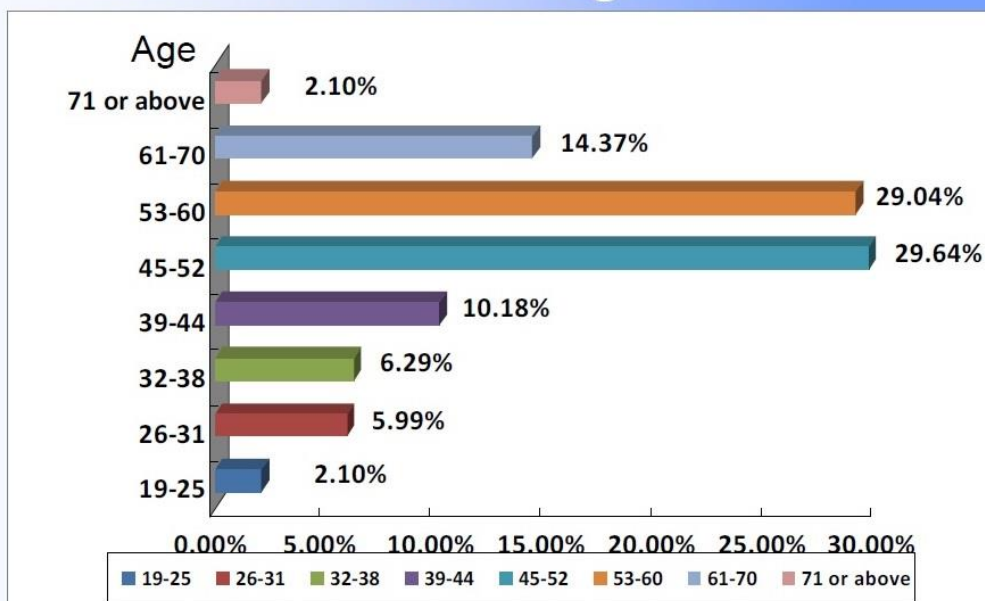
Highest Circulation

Sing Tao Daily *leads all the way*



**Result obtained from actual figures comparison of circulation/distribution from 25 largest newstands/vendors of each borough samplings: Manhattan, Brooklyn & Queens, as of January 2012. Lists of newstands/vendors furnished upon requested.*

Readers Profile - Age



**Result obtained from survey done in sampling of Sing Tao Daily's readers in 500 people, as of survey conducted in 2010.*

Figure 10.14: Sing Tao statistics

- Within the SAR s of Hong Kong and Macau, the English-language Hong Kong edition of China Daily covered the launch of Yang Li-Wei

Here, the age group of the readership is significantly younger (left hand side of below and well educated (right hand side) ⁷⁷.

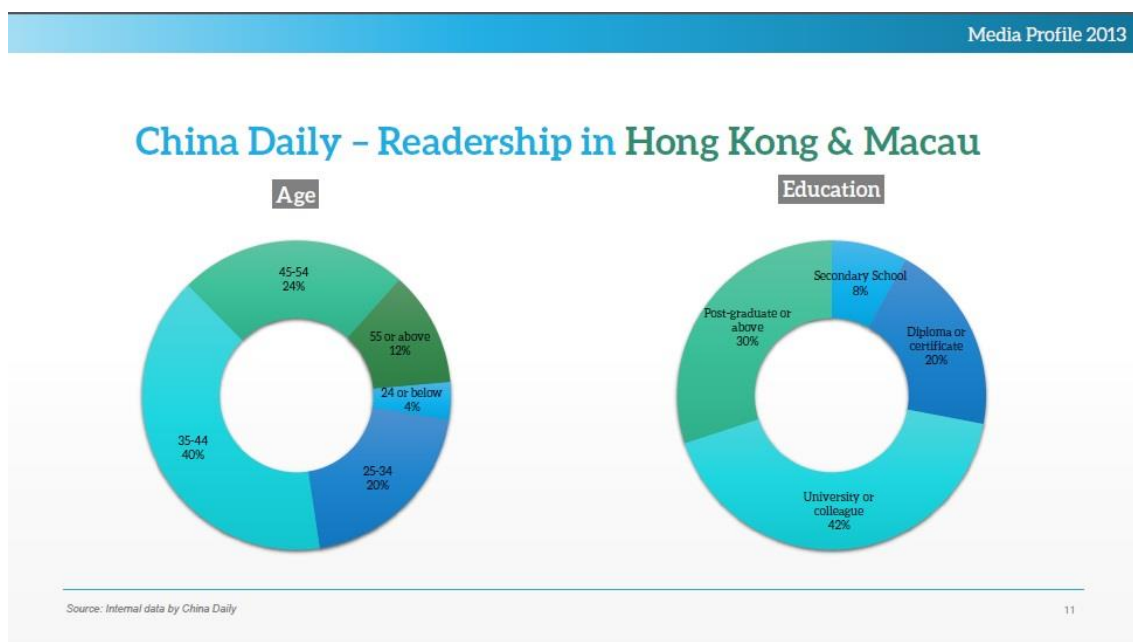


Figure 10.15: China Daily in the Hong Kong and Macau SARs

The readership is segmented between a young population tuned to electronic media and an older one, a cohort still very much in evidence in China’s space programme. Yao Minji (2013), in a series of articles about the “Chinese dream”, quotes a man aged 89 of the “Generation of sacrifices for a better tomorrow”, that “ Qián Xuésēn, the late missile and space program scientist, was his role model...[who] laid the foundation for China’s missile and space programs and became an inspirational figure for his patriotism and sacrifice”.

⁷⁷ Hong Kong Edition - China Daily Asia

www.chinadailyasia.com/about/our-products/HKedition-MediaKit.pdf

4 Nov 2014 - China Daily – A Global Media with an Asia Focus ... Format. Circulation. Chinese Mainland Edition. Daily. Broadsheet. 312,000. Asia Weekly.

As shown in Chapter 4, a temporary exhibition in Beijing portrayed progress in space exploration through the modernisation of the space institutions. Another display rotated pictures and biographies of people associated with the Chinese space programme, and all data were recorded at the visit. Figure 9.16 below shows the birth year of the space personnel who were featured by photograph and short biography, evidently eminent, in 2016, all being still alive, and only one being a woman (1951-60).

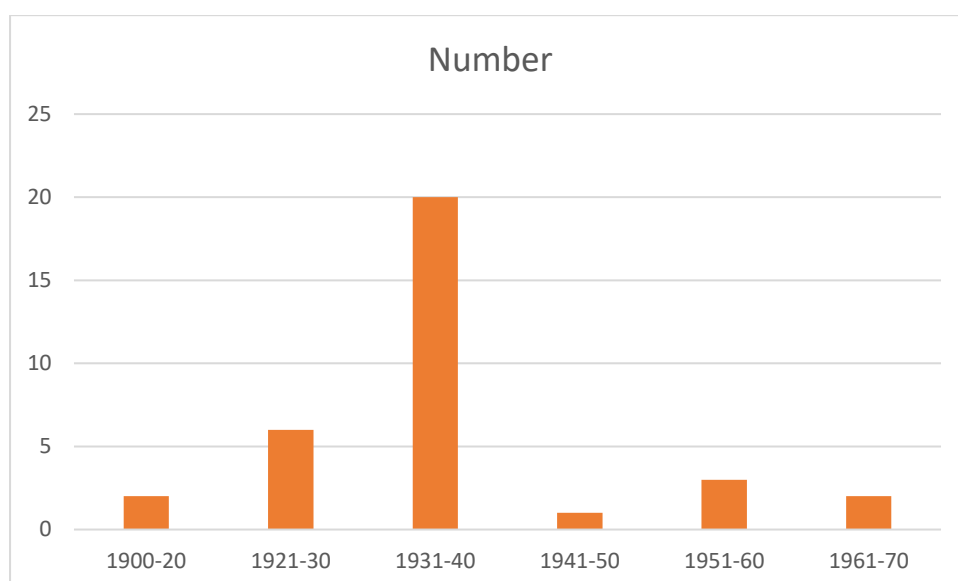


Figure 10.16: Birth year of eminent people associated with the Chinese space programme, alive in 2016

Clearly, older people are given eminence by exposure in this way. However, as argued under “new space” below, the younger people are prominent in the segment of industry developing “small” satellites, which is a new and a key area in space utilisation.

One consequence of media exposure – whether in print or electronic – is that words relating to Chinese space exploration have crept into common usage. The China National Language Resources Monitoring and Research Centre publishes annually the candidates for “words of the year” in a survey in association with the commercial

press, Peoples' daily online, and the state television TV Channel CCTV. In Table 9.1 below, a word relating to space exploration appears in every year since 2011, except for 2015.

Year	Frequent word relating to Space travel	Space Reference
2011	天宫一号	Tiangong-1 (Space station)
2012	神九 (Shén 9)	神舟 Shén Zhōu 9 (crewed space mission)
2013	嫦娥三号	Chang'e 3 (lunar lander)
2014	嫦娥五号	Chang'e 5 (planned lunar mission)
2015	-	
2016	天宫二号	Tiangong-2 (Space station)
2017	天舟一号	Tianzhou-1 (uncrewed cargo mission)

Table 10.1: Frequent words in Chinese media relating to space exploration⁷⁸

Models

Models of space vehicles including the Shenzhou and Tiangong spacecraft are also considered as text in this study. Some were on sale as memorabilia in Chengdu, in Jin'An in shops selling trophies and medals, and in state Post Offices in Shanghai and Beijing. They were also sold by private stallholders in the public area outside the Zhuhai air show in 2014. But the appearance of familiarity may not take with it equivalence of meaning.

⁷⁸ Sources: 2010 <http://media.people.com.cn/GB/40606/13663908.html> ;2011 <http://www.gaokao.com/e2011111215/4ee966f0b6130.shtml> ;2012 http://www.moe.gov.cn/s78/A19/yxs_left/moe_813/s236/201212/t20121221_145993.html ;2013 <http://old.moe.gov.cn/publicfiles/business/htmfiles/moe/s236/201312/161120.html> ; 2014 <http://culture.people.com.cn/n/2014/1219/c87423-26241048.html> ;2015 <http://m.i21st.cn/story/2578.html> ; 2016 http://mews.xinhuanet.com/politics/2016-12/22/c_129415142.htm ;2017 http://www.moe.gov.cn/jyb_xwfb/gzdt/s5987/201712/t20171211_321048.html ; all accessed 12 December 2017.

One interviewee⁷⁹ described her model of Shenzhou 6 and the function it served her:

“When in my junior high, my father brought home a model of Shenzhou Six manned spacecraft; it is a gift from one of my father’s colleagues. The model needed to be assembled, and my father leaved that job to me, because he wanted me to become interested into outer space, into the latest news of China and also he wanted me to not focusing too much on textbooks. I personally quite enjoy the assembling process, as it is like playing a puzzle game. Through this, I did start to get interest into the function of each part of the spacecraft.”

Conclusion

China promotes its “aerospace spirit” of hard work, diligence, and sacrifice, by social processes including propaganda items (commemorative postcards and envelopes, models, monuments, and paper-cuttings). With the support of state corporations, the items are used in social networks which are promoted across China.

The images and written texts are complex in nature and are intertwined with others. This promotional work is supported by business in Hong Kong and China.

The Chinese media (including the Chinese diaspora) are influential in promoting space-related words which occur with high frequency. However, their readership group is proportionately older, and the importance of the age factor was introduced in Chapter 8 above, where “New Space” was considered.

⁷⁹ These short written notes are written by Chinese young people in English and may contain some grammatical errors.

11: The Chinese Public Conversation about Space, examined empirically⁸⁰

⁸⁰ This follows the publication in Thomas (2019a).

Earlier chapters have shown a variety of cultural texts and images which are intertwined with other cultural threads, and which are promoted in various ways by China to the media and public.

The variety of texts and images covers the traditional or cultural, the scientific, and Chinese and international achievement in space.

This chapter examines the importance of these groups of texts and images in relation to each other. A set of statements has been generated and presented to native (Language 1) speakers of Mandarin Chinese and through factor analysis the relative priority of groups of meaning has been established. The results contribute significantly to an understanding of the public narratives of space exploration in China.

An empirical analysis using the technique of “Q-sort”

As described earlier, a Q-Sort is an empirical exercise in which statements are sorted on a grid by people in a subjective process, in this study by reading the statement and judging its priority relative to the whole set of statements given. When taking the totality of the processes, the outcome is a description of the linguistic relation of the statements to each other, where the linguistic relation is the relation that conveys meaning. It shows the structure of the framework in which the popular conversations take place.

The exercise is described in detail below, following a consideration of the particular problems and constraints encountered by the use of the methodology in China.

Constraints and Design:

The first issue faced in this study was the use of the Chinese language, both in written form (the statements to be sorted) and oral. General notes about translation appear in the prefaces to this thesis. The written language used for the statements on the cards was first prepared by this author-researcher whose second language (L2)

Mandarin Chinese was assessed to be approximately at the level of B1 intermediate on the Common European Framework of Reference for Language, and then rewritten following consultation with first language (L1) speakers of Mandarin Chinese. Interviews were administered by this author- researcher in spoken Mandarin with instructions generated spontaneously from a prepared vocabulary.

Particular challenges can be posed to a non-Chinese person conducting fieldwork in China (Heimer and Thogersen, 2006). As discussed in the Foreword, the solution chosen, which is achievable using a Q-Sort, follows a strategy of “one case, many field- sites”, as Heimer (in Heimer and Thogersen (2006), p. 62) comments:

"I went to several places to study one phenomenon in depth. My research design thus relied on the case study method but not on studying variation between a small number of cases... With this design, I was mainly looking for similarities and common denominators across places, and wanted to compare data between places to gain a better understanding of one phenomenon."

Wu (2015, p.29) in her study of cultural politics of China noted that she has “relied on informal interviews and day-to day conversations and my research process was a multi-sited one”.

Therefore this "one topic, many sites" approach was chosen as the foundation of the design. In search of a design that was simple to administer, the consequences were accepted to be:

- The Q Sort exercise would be carried out informally in such places as coffee bars and whilst travelling on trains and ferries, requiring a scripted interaction with the researcher and a small distribution matrix on which to place the cards of the “Q-set”.
- The sample of interviewees (the “P-set”) would be an opportunity sample. However, because the Q Sort exercise took place whilst mass media (national television and newspapers) were reporting the latest Chinese space mission, and the focus of the study is the public understanding of space travel in China, this unstructured population was not considered to be an intrinsic disadvantage.

- The study would not be sensitive to regional differences, and would reflect efforts to unify the nation along a common theme.

“Q Set” design

The set of all possible statements forming a discourse or conversation on a topic is called a “concourse”. The “Q-set” is the set of statements which are derived from the concourse and which are to be reconstructed subjectively in another order in order to discern the structure of the concourse and from that, the structure of the discourse or conversation.

It follows that the composition of a particular Q-set can always be open to challenge if a point of view is taken that other statements would have given a more accurate picture. Therefore, the Q sort exercise is only as good as the statements in its Q set, which should follow the researcher’s best efforts to understand the conversation and convey it in the research.

If the language is a common factor between the concourse and the Q Set then it follows that statements can be captured from the concourse, sorted by linguistic aspects such as agency, ontology, motivation and so on, and re-presented as a Q set. This is the approach used by Dryzek and Berejikian (1993) in an exercise of “reconstructive democratic theory”. However, Brown (1980, p195) notes that “Fundamentally, the Q sort-technique is a modified rank-ordering procedure in which stimuli are placed in an order that is significant from the standpoint of a person operating under specified conditions.” As Dryzek and Berejikian themselves point out, Brown also claims (1986, p73) that “there is no standard Q sample for a concourse. Any suitably comprehensive sample is adequate for purposes of experimentation.”

There is only a special claim for democracy in China (Crick, 1962) and this is not an attempt to elaborate on public deliberation of the law of space policy. It is an attempt to understand the public conversation, or the popular consideration of space culture in china. The reconstruction carried out by the Q sort exercise stands alone as a possible

reconstruction of this conversation or discourse. Precedent about the linguistic aspects of statements need not apply, and indeed allows non-linguistic text including images.

In this study, statements are derived from texts and images which have been found in circulation in China. The texts include statements which refer to items present in Chinese reports of international space events. These texts and images have been identified in previous chapters of this thesis. The “Chinese characteristics” of space culture have been described explicitly in Chapter 9, and are also present in the other chapters.

The Q set consists of positive statements derived from these linguistic texts and images, and in an attempt to avoid shades of meaning which may not transfer equally between the languages, or may be transferred inadvertently in translation between Chinese and English, it was decided to restrict the linguistic set to an assertive expression of (what might be accepted as a) fact, with the subjectivity of the sorter being allowed expression in the sorting of the statements according to his or her perception of the importance of it. In all this, it is acknowledged that the experiment is seeking to understand how meaning is conveyed within language by the relation of statements to each other, and it is not a representative survey of the Chinese population carried out under the R-method .

Chinese references to space exploration are found almost annually since 2006 in the top ten words used each year, according to surveys carried out by the Chinese National Language Monitoring and Research Centre (as noted above). Here the key words are stripped of all other accompanying language. This indicated that references to the space programme made in single words are known with an intrinsic reference.

Looking back on the Chinese texts and images in their international context, two particular dichotomies are proposed to span them. The first one is “Science and Arts”; and the second “China and International”. The first one is about the organisation of knowledge in China, and the second one starts within the country and embraces what is unique to that country, how the country stands against other countries, and how

other countries stand against China. Either or both may turn out to be chimera in practice, and the one dichotomy might be heavily influenced by the other.

The design therefore generated sixteen statements and allocated four statements to each of the following four categories:

- Science/Technology in space;
- Popular art/culture in space;
- International achievement in space;
- Chinese achievement in space.

This pattern of 4 repeated itself in statements numbered below as statements number 1-16. So, statements 1, 5, 9, and 13 are all statements about “Science /Technology in space”. Each statement was printed on a separate card with its number. To avoid an order effect the statement cards were delivered randomly. The process of delivery is described in detail in later paragraphs of this chapter.

5.4 The “Q set” of statements.

As referenced above, Brown (1986, p. 73) described a Q-concourse as having an “order or importance”, and in this study the importance of statement is sought directly. This attribution of importance to a statement relative to another statement is the expression of subjectivity being examined.

The four statements in each category, and their derivative reason for their use, are as follows. The numbers following the statement are the sequential identifiers of it.

Category: Science/Technology in space

“Chang’e Mission explores the science of the Moon”. (1)

This statement reflects on the attribution of the lunar observation and landing programme which is called Chang’e, the name of a woman in Chinese mythology. This myth is shown in a panel in the space exploration section at the Shanghai Museum of

Science and Technology (viewed in 2013). Other panels present included another mythical or historical figure and a contemporary space rocket.

The myth of the woman Chang'e takes various, slightly different, contemporary forms, including Wang Zhuwei (2005) and others summarised on sites on the Internet, some in connection with the Mid-Autumn Festival⁸¹. All versions centre on the woman, Chang'e, and her husband, Hou Yi. In the common formulation of the myth, Hou Yi is the Emperor's best archer; and it is he who wins a pill or tablet, or medicine, which offers immortality. But it is Chang'e who takes the pill, and she floats out of the window of their bedroom to the Moon, where he cannot follow.

The mission Chang'e has generated an atlas of the Moon (Li et al (2016)) and many scientific papers from research institutions in China. China has also proposed international co-operation in its Chang'e 4 probe.⁸²

In the myth, Chang'e was accompanied by her rabbit, and that was the name given to the accompanying rover vehicle after a public consultation (Xinhua, 2013).

“Wukong Mission explores the science of the Universe.” (5)

The Monkey King, Sun wù kōng 孙悟空, is a traditional character whose twentieth century incarnation was, and continues to be, in State-sponsored animation. Hargett (1988) describes the character's popular appeal. Jiang (2014) notes that the animation follows a style of modern folk painting “characterised by exaggeration in realism”, which in turn inherits “the artistic features of the traditional Chinese folk paintings in style.

An image of wù kōng was shown, for example, in the Shanghai Art Museum in 2013. Accompanying text in Chinese and English attributed the image of wù kōng to the Shanghai Animation Film studio in 1964.

⁸¹ For example, Mikkolainen, T (2008): Chang'e ben yue- The lady in the moon. <http://gbtimes.com/life/change-ben-yue-lady-moon>

⁸² A Preliminary Suggestion for International Cooperation of Chang'e 4 Probe. (China National Space Administration). www.unoosa.org/pdf/pres/copuos2015/copuos2015tech08E.pdf downloaded 10 January 2017

The name Wukong was attributed officially to the Dark Matter Particle Explorer (DAMPE) scientific research satellite in 2015, which was launched in 2016. The name followed a competition, said to be international in nature (Xinhuanet, 2015), but in practice⁸³ requiring a China mainland postal code and telephone number.

The exploration of dark matter is seen as part of a quest for a salutatory development in scientific understanding (Kulacki, 2013, p6). This objective is also described in Chinese science fiction (Cixin Liu, 2015)

Xinhua (op.cit.) describes Wukong as “a household name in China” and that:

“The Monkey King had supernatural powers and was responsible for protecting a pilgrim on a journey to retrieve the Buddhist sutras from India. Also, "wu" means comprehension or understanding and "kong" means space, so "Wukong" the satellite has a mission to "understand space," according to the [National Space Science Centre]”.

The Buddhist sutras are found on the Silk Road to India at the Dunhuang caves in Mogao (see statement 6 below).

“There is a new rocket called Long March 7”. (9)

The title of the Long March series of rockets (Chángzhēng, 长征) refers to a period in the history of the Peoples’ Republic of China, instrumental its formation, and therefore well-known. Carrier rocket CZ-7 was first launched in July 2016, approximately four months before the field exercise took place (Zhao Lei, 2016). The rocket is associated with the development of a new launch facility on the edge of the South China Sea at Hainan Island. This new Space Launch Centre includes a visitor centre⁸⁴ and facilities for the promotion of space science to young people (GB Times, 2017).

“There is a Chinese space station called Tiangong”. (13)

The Tiāngōng 天宫 (which means literally “heavenly palace”) space station is in its second iteration, the first station being due for de-orbit. Tiangong-1 was the first Chinese space station and received visits from Chinese astronauts (see statement 10).

⁸³ My experience.

⁸⁴ A travel agent refused to sell me a ticket to the visitor centre because it was “closed to foreigners”.

Tiangong-2 was launched in September 2016 (Xinhua, 2016a, 2016b), a few months before this study took place. Images of it were shown on Chinese TV during the duration of this study, because it was also the venue for Shenzhou-11 astronauts.

Category: China and art/culture

“Astronauts on Shenzhou 10 celebrated the Dragon boat festival”. (2)

In the Shenzhou-10 manned space mission of June 2013, cultural activities of the Chinese astronauts (Hángtiān yuán 航天员) are reported by Xinhuanet in a mixture of statement and commentary:

"We wish all Chinese around the world a happy Dragon Boat Festival," the Astronauts said while holding a banner reading "Happy Dragon Boat Festival"... then entered the craft's orbital module to eat zongzi, or rice dumplings filled with bean paste that are traditionally eaten during the festival." (Xinhuanet, 2013).

“The ancient caves at Mogao show flying creatures”. (6)

The Cave Temples of Mogao are located in North-West China on the fabled Silk Road to the West. They contained extensive written archives and cultural artefacts which were expropriated (if not plundered) by Western expeditions around the turn of the twentieth century, and these archives are at present mostly in the British Museum and other European museums (see for example, Wood (1992,1993).

Frescos on the walls of the cave – still being restored - show distinct patterns, Buddhas and their flying companion Apsaras (Needham, (1954, plate 20); Whitfield, Whitfield and Agnew (2014 2nd edition, esp. pages 94-99)). It is considered⁸⁵ that the Apsaras taken separately do not contain any religious significance and act only as decoration, and indeed images of Dunhuang generally continue to inspire Chinese contemporary Art both within and outside mainland China (Hai & Silbergeld (2013); China Dunhuang Motifs, 2014)).

The Apsaras have been the subject of several issues of postage stamps by the Chinese Post Office, and the images they contain have been discussed above by reference to Feitian Square in the city of Huludao and its sculpture and statue of Yang Li Wei.

⁸⁵ I am grateful to Dr Wood for her personal comment to me.

“Feitian” (飞天) is the common translation of “Apsara”. It is also the name given to the Chinese indigenous space suit for Extra-Vehicular Activity (EVA) space walks (Xinhua, 2008). It is reported here by Xinhua that “Feitian, which literally means flying in the sky, is the name of a legendary Buddhist goddess....There is a small Chinese national flag on the left arm and the Chinese character "Feitian" on the right arm.”

The Mogao caves also received a visit by school students from Hong Kong who attended a Young Astronaut Training Camp in 2013 (Hong Kong Space Museum, 2013). The visit had some impression on the school students as recorded in the essays published on the sponsoring Museum’s website.

Official news reports acknowledge these apsaras, for example:

“Acquiring space docking skills allows China to supply manpower and material to an orbiting module, marking a significant step for China's manned space program that celebrated its 20th anniversary this year.

“More importantly, China's ancient dream of "Flying Apsaras," as enshrined in the frescoes of the Dunhuang Caves, has been realized” (Xinhua, 2012)

“Liu Yang brought a Red Knot to the Tiangong space station”. (10)

The first Chinese female astronaut who flew on mission Shenzhou-9 is associated with the hanging of an embroidered red knot on the interior wall of the first space station Tiangong 1 (Xinhuanet, 2012; Sina, 2012). A red knot is a cultural symbol of the Chinese home. The knot is visible as a flash of red to the left wall in Figure 5 below. A similar knot was displayed at a celebratory museum in Shanghai after the flight (Zhang Yu, 2012).

The Red Knot was also shown on Chinese TV (ecns, 2012): Live television broadcast showed the three astronauts in blue uniform waved to the camera inside the Tiangong-1 cabin against the backdrop of a five-starred national flag and a big red Chinese knot.

“I can eat the same food that Astronauts eat in space”. (14)

Lee Kum Kee, the Chinese, Hong Kong and multinational company producing sauces, is associated with the Shenzhou space flight missions⁸⁶:

“By dint of resolute commitment to quality, Lee Kum Kee sauces passed through stringent tests in respect of quality, safety and flavour, and had been selected for use on the spacecrafts “Shenzhou IX” and “Shenzhou X” for 2 consecutive years since 2012. Besides, Lee Kum Kee has been appointed as the “Official Partner of China Space Industry”.”

Here the association is perceived as bringing quality to the product. Li (2016) reported:

“...some of its top sauces, such as soy sauce, hoisin sauce, XO sauce, and chili sauce are constant table companions in many Chinese households both in China and abroad. They even travelled to the space, after becoming one of a handful of items to accompany Chinese astronauts in the Shenzhou-10 and Shenzhou-9 spacecrafts.”

In its corporate publication (Lee Kum Kee, 2014) the company noted:

“In the Product Display Centre, Mr. Charlie Lee introduced the 6 types of Lee Kum Kee sauce products that went into space on “Shenzhou X”. Mr. Fang Xiaofang was delighted that “Sichuan Hot and Spicy Chili Sauce” was selected for astronauts’ use, and well recognised Lee Kum Kee’s efforts in promoting Sichuan cuisines. With the launch of Sichuan-styled sauce in the mission of “Shenzhou X”, Lee Kum Kee has further enhanced the influence of Sichuan cuisines in the global context through the competitive advantages of its quality and technology.”

Other food manufacturers have also associated their products with space travel, including a brand of Beer promoting the Chinese Lunar Exploration Programme, and the advertisement in a metro station in Shanghai promoting a cooking oil.

Category: International Achievement in Space

The statue complex in Húludǎo refers specifically to the exploits of other nations. On the one hand, this shows that China is not claiming the glory for something another nation has achieved. On the other, it may be claiming its own place in an inevitable

⁸⁶ <http://hkbrand.org/en/gallery/1/brand/33?page=3&activePage=2>

march of progress and international standing. Certainly there is an international reference point, and therefore some statements about it are valid.

“An American astronaut has walked on the Moon”. (3)

The American “Apollo” programme of lunar landing is acknowledged in many places in China. A wall photograph of the Apollo astronauts is exhibited in the Industrial Museum of China at Shenyang (visited in 2015). Reading the panel from right to left, the landings are shown in chronological order from the impact of (Soviet Union) Luna-2 on the Lunar surface on 14 September 1959, through the opening of the Chinese design institute in 1966, and finally to (USA) Apollo 11 in 1969. This is a statement showing Chinese history in the context of progressive achievement of technology.

The Museum’s accompanying caption does attribute the landing specifically to the American Apollo 11 mission. Chinese children are also exposed to the specifically American attribution of the landings. An educative sound file in the “Kaikai Fairyland 科学开开门” (open door) series acknowledges the American presence in file “Space Special 4”, “Who is the first person on the moon?”⁸⁷ which answers the question with a reference to an “American person” 美国人.

“A British astronaut went into space this year”. (7)

This statement represented the most recent manned space mission of the European Space Agency at the time of the investigation. This received extensive coverage in Britain (Thomas 2017b) very near the time of the Q sort field exercise.

“The first person in space was a Russian”. (11)

“The first woman in space was Russian”. (15)

These two statements are represented in popular contemporary Chinese publications about space travel, e.g. there are references in bookshop publications showing both Gagarin and Tereshkova⁸⁸.

⁸⁷<http://kk.cdstm.cn/listen-cover246-2.html> Downloaded 7 January 2016 • 《航天特辑》谁是登月第一人

⁸⁸ Zhōngguó kōngjiān jìshù yuǎnjìn yǔ áng (2003) p120.

Category: Chinese achievement in space

“Yang Li Wei is the first astronaut of China”. (4)

Cosmonaut Yang Li Wei became the first Chinese person in space when he piloted the Shenzhou-5 mission in 2003. Schools in China emphasised to their pupils the importance of his mission (Thomas, 2017a) and there is a large sculpture and statue to him in his home town, Húludǎo 葫芦岛 (Thomas, 2017b). Figure 11.1 below shows Yang Li Wei (Left, front) with Liu Bo Ming, the first Chinese space walker and Liu Yang, all in military uniform, at the Zhuhai Air show in 2016.



Figure 11.1 : Yang Li Wei (Left, front) with Liu Bo Ming the first Chinese space walker and Liu Yang, all in military uniform, at the Zhuhai Air show in 2016 (Author’s photograph).

“The Tiangong space ship flies over the sky of China”. (8)

The drafting of this statement is careful to explore the idea that the Tiangong space station is considered to be a part of China in its incarnation as a station in space. From Chapter 6, Mao Zhedong’s poem, Brecht’s translation, and the three images, are all encompassed in this phrase, which follows previous work (Thomas 2017a, 2017b) which considered space stations in Foucault’s definition as a ship flying as a heterotopia.

“Astronauts can see the Great Wall of China from space”. (12)

Zhou (2005) reported “an urban myth” that the Great Wall of China was a (or the only) man-made artefact visible from space travel, but added that “the truth appears far more complex than a simple yes or no.” Nasa (2005) reported that the wall was generally not visible to the unaided eye in low earth orbit and that “It certainly isn’t visible from the Moon.” Yang Li Wei himself only reported (Xinhua, 2003) that he “did not see the Great Wall from space.”

“Qián was the father of the Chinese Space Programme”. (16)

An accessible biography of Qián xuésēn is contained in Chang (1995) who tells the story of “the brilliant, enigmatic, Chinese-born scientist who helped pioneer the American space age and, when rejected by the nation he sought to adopt as his own, became the undisputed father of the Chinese missile program.” He is also credited with the creation of the concept of “Technological Sciences” around engineering technology in China⁸⁹.

The P set (Participants)

The gender and location of the interviewees who participated in this exercise (the P-set) are described in Table 11.1 below.

Male	Female	Location
1	8	London
6	1	Beijing
4	4	Huludao (including train) Liaoning province
6	4	Zhuhai (including train and ferry to Shenzhen) Guangdong province

⁸⁹ According to the Research Center for the Philosophy of Science and Technology at North-Eastern University, Shenyang, China.

17	17	

Table 11.1: The gender and location of the P-set.

Adopted procedure

The Q-sort process took place in October/early November 2016. During that period, Chinese Astronauts had launched mission Shenzhou 11 to the new space station Tiangong-2, with attendant media publicity; for example, the queue for taxis at Beijing Airport had a live TV signal from the Tiangong-2 space station, and the Chinese language press carried reporting of the mission⁹⁰ on the front and close inner pages.

The Q-sort process was a 1:1 personal interaction, with the researcher administering it, and took place in coffee bars, hotel receptions, trains, ferries etc. Typically, the stranger was greeted, it was explained that the researcher was a research student in England, and the person was asked to help the research for about ten minutes. The back of the sorting base card was then shown, where in Chinese was written the fluent translation of this text⁹¹:

Hello, my name is <given>, I am a PhD Student at de Montfort University, England. My email is <given>. Please help me with my research. Here are 16 statements about CHINA IN SPACE. What is important?

The text included the researcher's passport photograph and the University logo. Two interviewees read the letter from the University establishing bona fides and then went on to do the sort. In the introduction it was said specifically that the sorter's name was not requested, and there was nowhere on the card for it to be recorded. It was never taken.

⁹⁰ See for example: Peoples' Railway Daily, 23 October 2016, page 3: 神舟到底神在哪? which shows the progress of flight Shenzhou-11 to that date. Collected in Huludao during the exercise of the Q sort.

⁹¹ See Appendix 1

If the person agreed then instructions were given in Chinese, to identify the task of receiving 16 cards, and to sort out into, initially, half of “Important” (重要) and half “not Important” (不重要). The choice between “important” and “not important” was taken as a simple equivalent of “significant” and “insignificant” and gives the interviewee the freedom to carry out a personal act of judgement, based on their knowledge, belief and consideration.

This basic dichotomy was chosen as a simple expression of the term in Q Sort which allows the introduction of subjectivity in the form “accords / does not accord with my own point of view”. In this particular study, the form is “is more or less important than in another statement, in my point of view”. This allowed an explanation, if asked, that the focus was on the relation between statements.

In some cases sorters required further instructions in Chinese to sort into two piles of eight cards. Here the Measure word for cards and small pieces of flat paper, “张”, was used.

After this sort, sorters were asked to set out the first row, using a Chinese language construction for “first...next...next...finally.” (先,然后,然后,最后).

In the first row, the sort was requested in the following order: Extremely important (非常重要), very important(很重要), important(重要); and extremely not important (非常不重要), very not important (很不重要), not important (不重要)The centre square was referred to initially as a centre “中” or sometimes “I don’t know” (我不知道). This moved the direction of each sort inwards into the centre.

The task was given in natural language to be started as a positive and to be followed by the negative. It is the inverse of a common analysis but Mckeown and Thomas (2013) p.27 note that “it is immaterial if they are reversed so long as all Q sorts in a study are scored consistently”, a condition complied with.

Comments in the course of the Q-sort included the following:

“You want to survey me?”

“China! China! China!”

“*Very important*” – a woman pointing to the card with statement 15.

难的! (“*This is hard*”) – referring to statement 5: “Wukong Mission explores the science of the Universe”.

“*You are academic?*”

“You are professor?”

“你是老师吗?” (You are a teacher?)

These statements point to interest in the nature and purpose of the questioning, as anticipated in comments referenced above about fieldwork in China. There was also a spontaneous desire to emphasise the perceived national interest and (in statement 15) a woman travelling in the space crew.

A typical question exchange seeking clarification was: (on statement 3: “美国人...” to which was replied 这是你的!” (“American person?”...”That is yours!”), indicating the base card.

The task was not always immediately easy for sorters to do. Interviewees often sought guidance on how exactly to do it; a few used English to clarify but most did not. One refused outright to do the q-sort; another did the first line and then went away. These are not included in the 34 cases analysed

Data transformations

There are effectively three “Methodological transitions” (Watts and Stenner (2012), p180-81) here. First, The 34 Q sorts were inter-correlated and factor analysed using Ken Q as the data analysis software.

The first methodological transition of a Q sort is to isolate the number of factors which exist at the discontinuation point of the gradient of the Scree Plot – in this case, three factors (Figure 10.2).

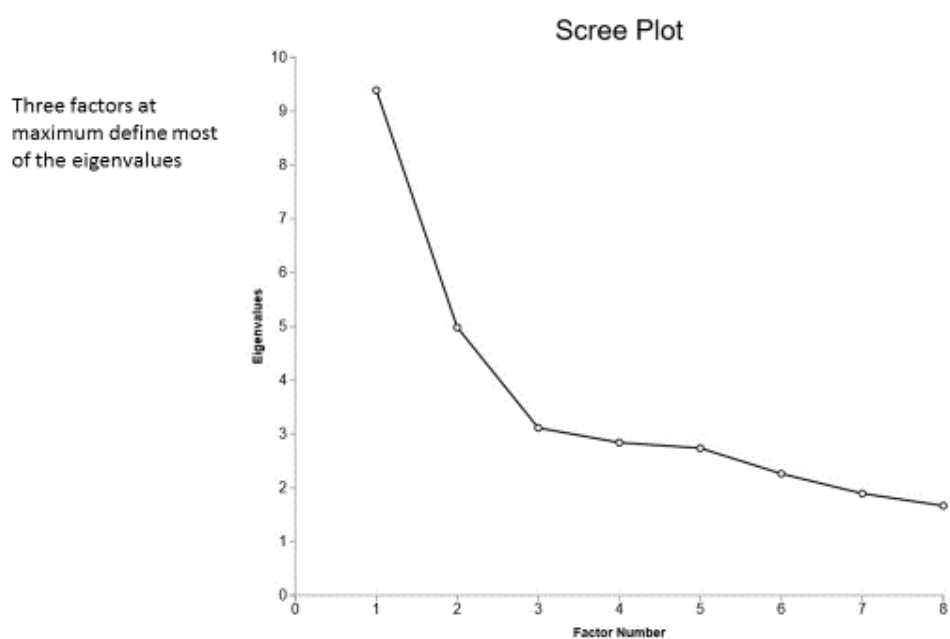


Figure 11.2: The Scree Plot showing the existence of three main factors.

These results show three distinct factors, considered as dimensions of the space of the popular discourse of space exploration in China.

In the second methodological transition, the factor arrays are prepared. These show, for each factor, the allocation by weighted averages of the Q-set statements. Thus, the importance of each statement within each factor is shown, as an idealised ideal-typical Q-sort.

From the consideration of the difference in eigenvalues and the presence of identifying statements, it is evident that there are clear distinctions between the three factors, in that there is a dominant sub-set and two other sets of lesser significance.

Finally, the factor arrays are interpreted in a process of inference. This is a careful and holistic inspection of the patterning of items in the factor array (Watts and Stenner (2012), p181). For each factor, the inferential process starts with a close examination of the factor arrays by laying out each statement into the place given to it on the Q-sort matrix, and proceeds to weight the importance given to statements in one factor against the other. A summary characteristic name is given to each factor.

Results

Table 11.2 shows the Factor Arrays for factors 1, 2 and 3. In each Factor array, the score achieved is shown for each Statement, i.e.: +3 (1 example) ; +2 (2 examples); +1 (3 examples); 0 (4 examples); -1 (3 examples); -2 (2 examples); -3 (1 example). Each statement therefore has a particular score in each of three factors.

Statement	Factor Array 1	Factor Array 2	Factor Array3
1 Chang'e Mission explores the science of the Moon.	3	-2	0
2 Astronauts on Shenzhou 10 celebrated the Dragon boat festival.	-1	1	0
3 An American astronaut has walked on the Moon.	0	0	-2
4 Yang Li Wei is the first astronaut of China.	1	3	3
5 Wukong Mission explores the science of the Universe	1	2	-3
6 "The ancient caves at Mogao show flying creatures".	0	0	0
7 A British astronaut went into space this year.	-1	2	-1
8 The Tiangong space ship flies over the sky of China	0	-1	0
9 There is a new rocket called Long March 7.	1	0	2
10 Liu Yang brought a Red Knot to the Tiangong space station	0	-2	1
11 The first person in space was a Russian.	-1	-1	-1
12 Astronauts can see the Great Wall of China from space.	-2	-1	1
13 There is a Chinese space station called Tiangong.	2	0	1
14 I can eat the same food that Astronauts eat in space.	-3	-3	-1
15 The first woman in space was Russian.	-2	1	-2
16 Qián was the father of the Chinese Space Programme	2	1	2

TABLE 11.2: Factor Arrays for factors 1, 2 and 3.

Further Inference

Table 11.3 shows the arrangement of the statements in the four columns: Science and Technology in space; Popular art or culture in space; International achievement in space; and China achievement in space.

Science and Technology in space	Popular art or culture in space	International achievement in space	China achievement in space
1 Chang'e Mission explores the science of the Moon.	2 Astronauts on Shenzhou 10 celebrated the Dragon boat festival.	3 An American astronaut has walked on the Moon.	4 Yang Li Wei is the first astronaut of China.
5 Wukong Mission explores the science of the Universe	6The ancient caves at Mogao show flying creatures. .	7 A British astronaut went into space this year.	8 The Tiangong space ship flies over the sky of China
9 There is a new rocket called Long March 7.	10 Liu Yang brought a Red Knot to the Tiangong space station.	11 The first person in space was a Russian.	12 Astronauts can see the Great Wall of China from space
13 There is a Chinese space station called Tiangong.	14 I can eat the same food that Astronauts eat in space. .	15 The first woman in space was Russian. .	16 Qián was the father of the Chinese Space Programme

Table 11.3: Statement assignment to the four categories.

These factor arrays are now considered in a process of inference to determine their quality. In Tables 11.4 (a), (b) and (c) below, two heuristics have been applied:

- a) Record of maximum scores (positive or negative); and
- b) Reference to the original four categories, to discern if there was a pattern in the scores which related to the categories as drawn.

These Tables 11.4 (a) to (c) order the statements in lines of four. Each of the four columns then represent the original characteristic intended to be: Science/Technology in space; Popular art or culture in space; International achievement in space; Chinese achievement in space.

Table 11. 4 (a) shows the summary values given to each statement, in vertical order, by category as given in Table 11 (3):

Original category			
Science/ technology in space	Popular art/culture in space	International achievement in space	China achievement in space.
+3,	-1,	0	+1
+1	0	-1	0
+1	0	-1	-2
+2	-3	-2	+2
TOTALS:			
+7	-4	-4	+1

Table 11. 4 (a): Alignment of Array scores of Factor 1 by previous category

Table 11. 4 (b) shows the summary values given to each statement, in vertical order, by category as given in Table 11 (3):

Science/ technology in space	Popular art/ culture in space	International achievement in space	China achievement in space.
-2	+1	0	+3
+2	0	+2	-1
0	-2	-1	-1
0	-3	+1	+1
TOTALS:			
0	-4	+2	+2

Table 11.4 (b): Alignment of Array scores of Factor 2 by previous category

So columns three and four are the only positive rankings and are equivalent in value, and column two has a high negative score.

Table 11. 4 (c)) shows the summary values given to each statement, in vertical order, by category as given in Table 11 (3):

Science/ technology in space	Popular art/ culture in space	International achievement in space	China achievement in space.
0	0	-2	+3
-3	0	-1	0
+2	+1	-1	+1
+1	-1	-2	+2
TOTALS:			
0	0	-6	+6

Table 11. 4 (c): Alignment of Array scores of Factor 3 by previous category

Columns three and four are strikingly the opposite values of each other.

Discussion of the results

In the tables below, the composite Q –sort writes out on the plane of the sorting matrix the Factor array for each factor as given.

Three Factors are identified in Tables 11.5 (Factor 1), 11.7 (Factor 2) and 11.9 (Factor 3). In seeking to interpret them, the discussion will have regard to: the composite Q sort for each factor, in which each statement of the Q set is attributed a weight of importance; and the Statements which distinguish these factors from each other.

Statements which distinguish one factor from another may be considered to be those statements which are significant to the 0.01 level and reverse polarity when they appear in different Factors. They are shown below in Table 11.6 (Factor 1), 11.8 (Factor 2) and 11.10 (Factor 3)

Factor 1

This has the highest eigenvalue and is therefore considered to be the most important factor of the three. This factor has a strong alignment with the original category of “Science and Technology in Space”.

In seeking further interpretation, the factor’s distribution of the importance of the sixteen statements of the Q-set is contained in the composite Q-sort for this factor is shown in Table 10.5 below:

The Chinese Space Programme in the Public Conversation About Space

-3	-2	-1	0	+1	+2	+3
14 I can eat the same food that Astronauts eat in space.	12 Astronauts can see the Great Wall of China from space.	7 A British astronaut went into space this year	3 An American astronaut has walked on the Moon.	6 The ancient caves at Mogao show flying creatures.	5 Wukong Mission explores the science of the Universe.	1 Chang'e Mission explores the science of the Moon.
	15 The first woman in space was Russian.	11 The first person in space was a Russian.	10 Liu Yang brought a Red Knot to the Tiangong space station.	9 There is a new rocket called Long March 7	13 There is a Chinese space station called Tiangong	
		2 Astronauts on Shenzhou 10 celebrated the Dragon boat festival.	8 The Tiangong space ship flies over the sky of China.	16 Qián was the father of the Chinese Space Programme.		
			4 Yang Li Wei is the first astronaut of China.			

Table 11.5: Composite Q-sort of statements in Factor 1

In Table 11.6 below, the statements of the Q set which distinguish Factor 1 from the other two factors are shown. Their measure of significance, in that they are the relatively characteristic of that factor, is also given.

The Chinese Space Programme in the Public Conversation About Space

Statement	factor 1		factor 2		factor 3	
	Z-score	Significance	Z-score	Significance	Z-score	Significance
1. Chang'e Mission explores the science of the Moon.	1.47	*	-0.563		0.708	
13. There is a Chinese space station called Tiangong.	1.32		-0.696		0.76	
9. There is a new rocket called Long March 7.	0.93		-0.339		0.465	
4. Yang Li Wei is the first astronaut of China.	0.31	*	1.204		2.144	
11. The first person in space was a Russian.	-0.7	*	0.155		-1.353	
12. Astronauts can see the Great Wall of China from space.	-1.05	*	-0.308		0.61	

Table 11.6: Z-scores of statements for Factor 1 against Factor 2 and Factor 3

Significant positive z-scores are statements 1 “*Chang’e Mission explores the science of the Moon.*” and 4 “*Yang Li Wei is the first astronaut of China*”. Significant negative z-scores are 11. “*The first person in space was a Russian*” and 12. “*Astronauts can see the Great Wall of China from space*”. Here the highest score in the factor array is achieved by: 1 *Chang’e Mission explores the science of the Moon*

There is a contrast between the Chinese and Russian first people in space, a positive score for the Chang’e mission, which is continuing. The survey was carried out while Chinese astronauts were in orbit inside the Tiangong-2 space station with resulting media coverage. There is no interest in 12. “*Astronauts can see the Great Wall of China from space*” here (but see Factor 3).

This factor addresses **Space Science and Technology**.

Factor 2

As discussed above, the composite q-sort of factor 2 emphasises other nations' space-faring activity as well as Chinese, and also embraces references to Chinese culture, arts and science. Table 11.7 below shows the distribution of importance of the statements in the Q-set for factor 2:

The Chinese Space Programme in the Public Conversation About Space

-3	-2	-1	0	1	2	3
10 Liu Yang brought a Red Knot to the Tiangong space station.	14 I can eat the same food that Astronauts eat in space.	13 There is a Chinese space station called Tiangong	12 Astronauts can see the Great Wall of China from space.	6 The ancient caves at Mogao show flying creatures.	15 The first woman in space was Russian.	5 Wukong Mission explores the science of the Universe.
	8 The Tiangong space ship flies over the sky of China.	1 Chang'e Mission explores the science of the Moon	11 The first person in space was a Russian.	2 Astronauts on Shenzhou 10 celebrated the Dragon boat festival.	4 Yang Li Wei is the first astronaut of China.	
		9 There is a new rocket called Long March 7.	3 An American astronaut has walked on the Moon.	7 A British astronaut went into space this year		
			16 Qián was the father of the Chinese Space Programme.			

Table 11.7: Composite sort of Factor 2

As Table 11.8 below shows, there are significant comparative positive z-scores on factor 2 against Factor 3 (and mostly Factor 1) on: (15) “*The first woman in space was Russian*”; (7) “*A British astronaut went into space this year*”; (2) “*Astronauts on Shenzhou 10 celebrated the Dragon boat festival*”; and (3) “*An American astronaut has walked on the Moon*”.

The Chinese Space Programme in the Public Conversation About Space

Statement	factor 1 Z-	factor 2 Z-	factor 3 Z-
	score	Significance score	Significance score
4. Yang Li Wei is the first astronaut of China.	0.31	1.2 *	2.144
15. The first woman in space was Russian.	-1.05	1.13 *	-0.656
7. A British astronaut went into space this year.	-1.02	0.82 *	-0.61
2. Astronauts on Shenzhou 10 celebrated the Dragon boat festival.	-0.52	0.63 *	-0.502
16. Qián was the father of the Chinese space programme.	1.11	0.37 *	1.484
3. An American astronaut has walked on the Moon.	-0.34	0.33 *	-0.721
11. The first person in space was a Russian.	-0.7	0.16 *	-1.353
12. Astronauts can see the Great Wall of China from space.	-1.05	-0.31 *	0.61

The Chinese Space Programme in the Public Conversation About Space

9. There is a new rocket called Long March 7.	0.93	-0.34 *	0.465
1. Chang'e Mission explores the science of the Moon.	1.47	-0.56 *	0.708
8. The Tiangong space ship flies over the sky of China.	-0.11	-0.7 *	0.321
13. There is a Chinese space station called Tiangong.	1.32	-0.7 *	0.76
10. Liu Yang brought a Red Knot to the Tiangong space station.	-0.29	-1.99 *	-0.253

Table 11.8: Z-scores of statements for Factor 2 against Factor 1 and Factor 3

In the factor array for Factor 2, there is an opposition of the category in column 2 of Table 2 (c) “Popular Art/ Culture in Space” (a score of -4) with a weak affirmation of both “International achievements in space” and “Chinese achievements in space” in columns 3 and 4. The positive or negative attribution of significance does not imply a value judgement but a vector along the factor. This Factor is interpreted as a **bipolar balance between the popularisation of space and the affirmation of achievement in space.**

Factor 3

This factor is distinguished from factors 1 and 2. Its Composite Q-sort, has an orientation towards Science as previously described, but addresses science both as a positive and a negative. The composite Q-sort for this Factor is in Table 11.9 below.

The Chinese Space Programme in the Public Conversation About Space

-3	-2	-1	0	+1	+2	+3
5 Wukong Mission explores the science of the Universe.	11 The first person in space was a Russian.	3 An American astronaut has walked on the Moon.	2 Astronauts on Shenzhou 10 celebrated the Dragon boat festival.	9 There is a new rocket called Long March 7.	13 There is a Chinese space station called Tiangong	4 Yang Li Wei is the first astronaut of China.
	14 I can eat the same food that Astronauts eat in space.	15 The first woman in space was Russian.	10 Liu Yang brought a Red Knot to the Tiangong space station.	12 Astronauts can see the Great Wall of China from space.	16 Qián was the father of the Chinese Space Programme.	
		7 A British astronaut went into space this year	6 The ancient caves at Mogao show flying creatures.	1 Chang'e Mission explores the science of the Moon		
			8 The Tiangong space ship flies over the sky of China.			

Table 11.9: Composite sort of Factor 3

As Table 11.10 below shows, there are significant positive z scores against Factors 1 and 2 in: (1) "*Chang'e Mission explores the science of the Moon*" (Positive to Negative at factor 2); and (12) "*Astronauts can see the Great Wall of China from space*". (Positive to Negative at factors 2 and 1).

There are significant negative z-scores against Factors 2 and 1 in: 11) "*The first person in space was a Russian*" (Negative to positive at factor 2); and (5) "*Wukong Mission explores the science of the Universe*". (Negative to Positive at factors 2 and 1).

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Statement	factor 1		factor 2		factor 3	
	Z-score	Significance	Z-score	Significance	Z-score	Significance
4. Yang Li Wei is the first astronaut of China.	0.31		1.2		2.14 *	
13. There is a Chinese space station called Tiangong.	1.32		-0.7		0.76	
1. Chang'e Mission explores the science of the Moon.	1.47		-0.56		0.71 *	
12. Astronauts can see the Great Wall of China from space.	-1.05		-0.31		0.61 *	
9. There is a new rocket called Long March 7.	0.93		-0.34		0.46	
14. I can eat the same food that astronauts eat in space.	-1.71		-1.87		-0.87 *	
11. The first person in space was a Russian.	-0.7		0.16		-1.35 *	
5. Wukong Mission explores the science of the Universe.	1.3		1.32		-1.49 *	

Table11.10: Z-scores of statements for Factor 3 against Factor 2 and Factor 1.

In Factor 3:

(1) *Chang'e Mission explores the science of the Moon* (positive to Negative at factor 2)

(12) *Astronauts can see the Great Wall of China from space.* (Positive to Negative at factors 2 and 1)

(11) *The first person in space was a Russian* (Negative to positive at factor 2)

(5) *Wukong Mission explores the science of the Universe.* (Negative to Positive at factors 2 and 1)

This is a difficult factor to categorise, and indeed it has the lowest eigenvalue in the analysis, showing that is a residual factor. The positive or negative attribution of significance does not imply a value judgement but a vector along the factor. In the factor array for Factor 3, the total score of column 3 of table 2 (d) “International achievements in space” balances exactly column 4 “Chinese achievements in space”. This is a clear **bipolar balance between the exploration of space by China and by the international community.**

Figure 11. 4 shows in summary the three Factors which were extracted from the Q sort, as three dimensions relative to each other.

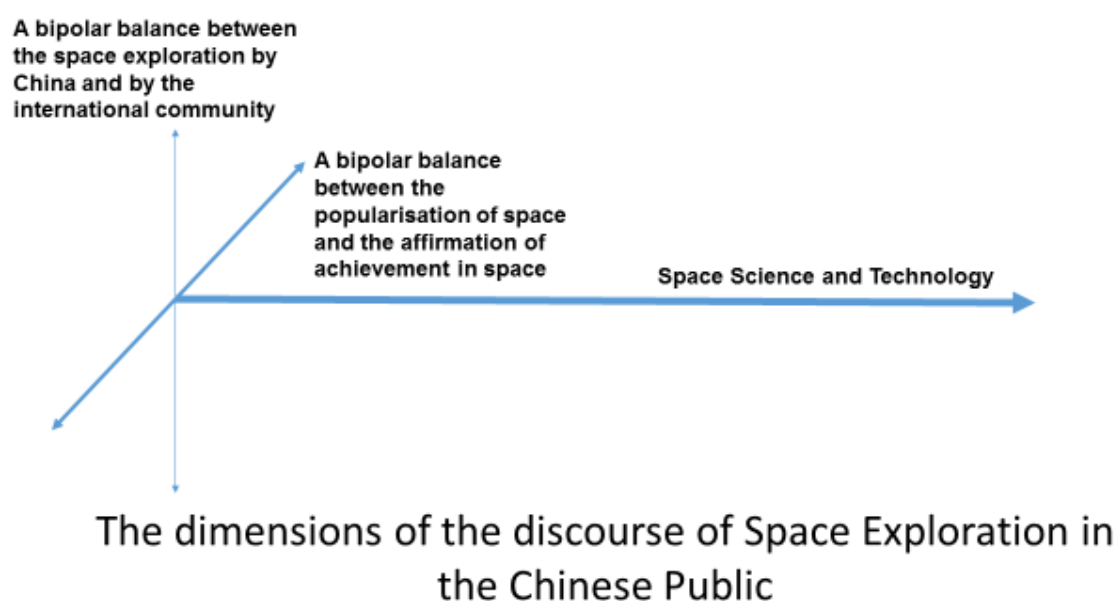


Figure 11.4: A construct of the discourse of Space Exploration in the Chinese Public.

Discussion of results: The three factors inferred

The rationale for using the technique of “Q-Methodology” is as follows. Müller and Kals (2004) start with the objective for social researchers to get a sense of measurement of subjective opinions and thoughts. Acknowledging the mainstream quantitative social research techniques, they point to a method called “Q method” in which structures of thought can be discerned, and then in a second stage subjected to a process of inference to meaning. The term “Q” distinguishes it from other quantitative techniques which are increasingly being called “R-method”. The distinction between the two is considered to be that Q –methodology shows correlation between persons across a set of statements, while standard R-methodology shows correlation between traits across a set of persons (Danielson, 2009, p. 219).

These results are now considered in a process of inference to show meaning. Three distinct factors, considered as dimensions of the space of the popular discourse of space exploration in China, are proposed above.

The most important factor is that of science and technology. This is the dominant expression by the Chinese public of what is important about the Chinese space programme. However, what “science” means here is to be unpacked further. As argued earlier, “Science” in China has long been considered to be an expression of modernisation (parity with the West) and Deng Xiaoping’s reform, expressed and encouraged in his visit to the Johnson Space Center in 1979, continues today in the restructuring of spacefaring institutions in China, as expressed in Table 1.2, and also in China’s response to the “New Space” movement.

Intertwined with this factor is a balance between space “firsts” or achievement by China and space, against more public-focussed ideas such as food or festivals. These populist ideas are not weaker but the other side of the metaphorical coin of achievement. They elaborate the “Chinese characteristics” of their achievement and need to be considered in the civilizational context, promoted as they are by the Han majority (we do not see Tibetan or Inner Mongolian cultural references here, for example) and the Chinese Communist Party.

In this exercise, the appearance of international co-operation in the third factor suggests that, in the absence of the United States of America, European and Russian co-operation is of particular significance to this discourse. This is a bipolar dimension in which the debate extends from international achievement in space to Chinese achievement in space. Bipolar dimensions are simply dimensions where equal strengths oppose each other and connote neither the inferiority nor superiority of one pole to another. In this spirit, the joint participation of China and European countries in space research is not expressed as a threat to the West but as a partnership of equals.

Conclusion

Many if not most conversations about the space programme in China have come together in this Chapter.

The strong preference for “Science and technology” as a priority for the programme needs, however, to be considered as a text intertwined with other texts in China about science and technology, particularly Western science. These texts have developed in China only within the last century, and certainly within the era of space exploration, which started only eight years after the foundation of the Peoples’ Republic.

As outlined earlier, there are also texts originating outside China in which that country and its priorities have been poorly expressed or simply misunderstood.

The next and final chapter will sum up the public conversation about the Chinese space programme.

12: Conclusion: Science, Civilization, Modernisation and International Co-operation

This thesis has laid out an imperative to investigate conversations about the Chinese space programme in its novelty and world position and its context in space culture; a methodology to investigate it; and the epistemology and ontology that underlies the methodology. In an iterative process, publications written and considered in the course of this project (Thomas A, 2015, 2016, 2017a, 2017b, 2018a, 2018b, 2019a, 2019b) have placed these conversations in the appropriate context. The thrust of this final chapter is to review the research overall, and to propose principles for further studies in the future.

Consideration of intertextuality (Fairclough, 2010, p. 69-83) allows that in conversations about “Space”, a number of texts, some implied, are intertwined, and some of these are present simultaneously with the official narrative, such as the space jokes in Chapter 6 and the conversations at and around the monumental statue at Húludǎo.

This thesis has explored text with “lenses” through which China and its space programme are viewed. As Chapter 2 indicated, Western researchers are distant from Chinese society; often attribute an opprobrium to the Communist Party in twentieth century commentators, particularly in the United States; racism against China expressed in science fiction of the time of archival sources; and an assumption in the west that the Han group speaks for all ethnic groups in China, that China is a homogenous entity, and that only the Han culture is relevant, insensitive to regional difference and ethnic dominance within China. They produced “easy answers” to the question “Why does China have a space programme?” including “soft power” and “the China threat” that is frequently set against the assumed national security of the United States.

Often expressed as a “Space Race”, as we show in Chapter 5 which investigates the origins of space travel in the Chinese hemisphere, and in governmental archives, the term applies closest in the particular history of the twentieth century. Other, non-threatening but easy answers are in terms of international or domestic prestige, a “place at the table”, an affirmation of cultural identity, or a civilizational, national or cultural dream.

In addition, perceptions about space are swayed by the military/civilian emphasis, relative national expenditure, and space advocacy. They serve as barriers to the understanding produced here.

But in later chapters, cultural data have shown the complexity of the public conversation about the Chinese space programme. By studying the semiosis of these conversations a subtlety of texture is achieved.

As written by a non-Chinese outsider, this thesis seeks to establish the component of the conversation about space exploration that is characteristic only of China as a nation, under the Chinese Communist Party, or the Chinese people, under the dominance of one ethnic group. Chinese materials are studied to this end. Within China, public expressions of space exploration exist, sometimes in an ephemeral form, sometimes in a commemoration or a celebration. The epistemology and consequent methodology of considering this ephemera – the grey literature examined in Open Source Intelligence – is set out.

While the study in its present form hints at the possibility of regional, economic or ethnic differences, these only became evident during the course of the study, and is too complex to deal with here. The light detail shown in this study offers the opportunity for researchers to drill further into the question of ethnic and regional difference in the narrative.

The results of the Q-sort exercise show three factors intertwined, considered as dimensions of the space of the popular discourse of space exploration in China. The quest for and promotion of science, carrying with it the implications of modernisation and reform, is a recurring and important theme in this study.

Mao Zhedong's poetic dream (1936) of flying high above the Great Wall competes with Deng Xiaoping flying the American Space Shuttle Simulator (1979), in its image of the Chinese aspiration and programme of modernisation. After the 1949 revolution, as Table 4.2 shows, the most important aspect of the Chinese space programme is the institutional reform, the move from military missiles to state corporations, and the hint at the younger and more agile "New Space" sector.

In summary, Chinese achievement is bounded by firsts in space travel and by attempts to popularise it, such as by food and cultural activities in space, but achievement is considered overwhelmingly to lie in science and technology and the modernisation offered. This conversation looks outwards to international cooperation, but it is grounded in national scientific and technical achievement. It acknowledges national cultural or civilizational characteristics in a discussion oriented towards science and technology.

This sits within the ideological framework set by the Chinese Communist Party, in particular the programmes of modernisation established by Mao Zhedong and Deng Xiaoping. The CCP promotes a “spirit” or ideology which speaks of the “humiliation” of China in the twentieth century and exhorts the people to hard work, discipline and sacrifice. In China, the setting for the popular conversation of space exploration is set by the Chinese Communist Party and interpreted by the people.

When considered on Earth, space exploration is geographically a global and international phenomenon. Populations relate the displacement of time and space entailed in space travel to the world they know. Foucault’s concept of heterotopia describes this understanding of space travel by the population, in contrast to an argument that nations only seek an upper hand on Earth by competing within space. Cosmic complexity requires global and international co-operation. Within the European Space Agency’s concept of “Space 4.0”, this co-operation with China exists.

General Principles for further study

The Western researcher approaching a modern programme of space exploration of a nation other than her own may need to reflect on the preliminary explanations that will be offered as a matter of ease and routine. These may well start with an incredulity that the nation in question does indeed have a space programme and a negative comment of the necessity for that nation to have it. This is said within an opinion that the nation is economically backward or has better targets for expenditure than space exploration, such as the fight against poverty and disease in the mass of the population. Such cultural expression may be considered to be a form of arrogance, if

not racism. The researcher needs to adopt some form of post-colonialist humility and openness. She will always be independent of that culture.

Whilst “Open Source Intelligence” adopts methods from critical methodology it leaves unconscious and unspoken the barriers erected by the “easy answers”. OSINT will return easy answers, the perception of threat or competition, if that is the mind-set of the researcher using its techniques. But used as it is here, it will reveal a rich intertextual web, where a full meaning extends from ephemera and phenomena to deeper society and power.

A set of methods would require application to grey (ephemeral but official) literature and to official publications and archives, as well as local explanations and discussions in national fora, including but not limited to electronic social media. There will be important material to be discovered wherever people gather: in galleries, museums or markets, in metro stations, in newspapers, on sweet wrappers, and so on. The text might be written or might be an image, and images gain from applying intertextuality, too.

The rich depth of intertextuality requires some acquisition of language skills and a way to appreciate the layers of meaning and cross-reference by metaphor, saying or proverb, to legend or religion in the original language. This is probably a slow process extending over several years.

The data will not be present on one visit to one location but a design of “many sites” will bring out the common factors, although of course it will not pick out local and/or ethnic differences. The key to this is a process of iteration, a continual programme of expression, comment, criticism, reflection and reconsideration.

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Conventions followed in citing on-line newspaper articles and government documents obtained under the Freedom of Information Acts (whether UK or USA).

Broadly, the citing convention in this thesis follows referencing conventions, taking into account specific requirements to identify source texts, by consulting conventions and as amended below:

1. On-line newspaper articles.

Newspaper articles on-line in the Chinese internet may not attributed to an author, or to be attributed to Xinhua or Xinhuanet (both state information agencies). In addition, such sites are ephemeral in nature and may not exist after a short period of time or exist only partially, e.g. without photographs.

The following conventions are applied in this document:

- a. A document citing an author will be cited as such with the addition of the year, the source, the word “[online]”, and the date of last accession.
- b. A document citing Xinhuanet or Xinhua as the author will be cited as such with the addition of the year, the source, the word [online], and the date of last accession.
- c. A document with no author will be cited by the title of the article [in English], followed by date of publication, the title of the newspaper, the URL and the date of last retrieval. See:

APA 6th Edition Citation Style: Newspaper Article (website) (undated). American University of Sharjah <http://aus.libguides.com/apa/apa-newspaper-web> [online] (Accessed 28 August 2018)

as modified to include date of last retrieval.

2. Extracts from Daily Newspapers in Microfilm Archives: Master Reference

Chapter 3 part [A], The Space Race, refers to a number of extracts from small stories in four Australian newspapers. The Master reference for these newspapers is:

The West Australian, October 1957 and April 1961. Microfilm Reel (monthly), State Archives, Perth, Western Australia (inspected February 2016).

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The News, October 1957 and April 1961. Microfilm Reel (monthly), State Archives, Adelaide, South Australia (inspected February 2016).

Chapter 6, which addresses Location and Place, refers to microfilmed archives of newspapers in the Public Library, Carlisle, Cumbria, UK. The Master reference for these newspapers is:

<newspaper title> <date> Microfilm Reel (monthly) Local Studies section, Public Library, Carlisle, Cumbria, UK (inspected June 2017).

In the flow of text in Chapter 3 [a] and Chapter [4], references are made to the newspaper, date, and title if relevant, as adjuncts to this Master reference.

3. Government Documents Obtained under the Freedom of Information Acts.

Government documents from archive collections are cited in accordance with the conventions at:

How do you cite a document obtained through FOIA? (Undated) Quora.
<https://www.quora.com/How-do-you-cite-a-document-obtained-through-FOIA>
[Online] (Accessed 28 August 2018)

As follows:[Originating agency] [date of creation of document] [Title of document] [Author of Document if known] Partially declassified and released under the Freedom of Information Act (FOIA) to the CIA FOIA Reading Room at <https://www.cia.gov/library/readingroom/home> [online] [Document number].

or by reference to <https://www.whatdotheyknow.com/> if conducted through the UK e.g.

[https://www.whatdotheyknow.com/request/agreements_bewteen_the_uk_space#incoming-1212398]

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These follow the requirements set out in the following style guide:

How to Cite US Government Documents in MLA, APA Citation Style: Foreign Relations of the United States. Cornell University.
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Appendix 1: Q Sort Test grid

你好！

不要写你的名字！我知道我可能会拒绝这样做！

以下是有关中国太空事业的相关表述。什么是重要的？

对我非常重要
八

对我不太重要
八

这一点很重要我 0 这不是对我很重要

--	--	--	--	--	--	--

不要再使用这些语句。

这一点很重要我 0 这不是对我很重要

--	--	--	--	--

不要再使用这些语句。

这一点很重要我 0 这不是对我很重要

--	--	--

不要再使用这些语句。

--

谢谢！



你好

我的名字是 Andrew (安德) Thomas, 我是博士生 de Montfort 大学, 英国.

我的电子邮件地址是<address>@<university domain>

Cards used

<p>1. 嫦娥探月计划.</p>	<p>2. 神州十号宇航员庆祝端午节.</p>	<p>3. 一名美国宇航员已经在月球上行走过.</p>	<p>4. 杨利伟是中国的第一位宇航员.</p>
<p>5. “悟空”使命探索宇宙的科学.</p>	<p>6. 古老的敦煌莫高窟洞穴里有飞行生物的图案.</p>	<p>7. 今年有英国宇航员进入太空</p>	<p>8. 天宫一号飞过中国上方的太空。</p>
<p>9. 有一个叫长征7号中国火箭.</p>	<p>10. 刘洋带着一个中国结进入天宫空间站.</p>	<p>11. 第一个进入太空的是俄罗斯人。</p>	<p>12. 宇航员可以在太空里看到中国的长城.</p>
<p>13. 有一个被称为“天宫”的中国空间站.</p>	<p>14. 我可以和太空中的宇航员吃同样的食物.</p>	<p>15. 进入太空的第一个女人来自俄罗斯.</p>	<p>16. 钱学森是中国太空计划之父.</p>

Appendix 2: Statement provided by CNES to this thesis, August 2018.

“La coopération spatiale franco-chinoise est régie par un accord intergouvernemental relatif à la coopération dans le domaine de l’étude et de l’utilisation pacifique de l’espace extra-atmosphérique, signé en 1997.

Dans le domaine industriel, l’industrie française fournit des équipements embarqués pour des satellites civils de la CAST et de la SAST, deux filiales de la CASC. Thales Alenia Space (TAS) a également fourni des satellites de télécommunications à China Satcom.

Dans le domaine scientifique, une coopération s’est établie en océanographie avec la signature d’un accord entre le CNES et la CNSA en 2010, qui a permis la fourniture par Thales Systèmes Aéroportés (TSA) d’un instrument Doris pour le satellite océanographique chinois HY-2A, lancé en 2011 et l’intégration de ses données par le CNES dans le système français de traitement multi-missions des données altimétriques, qui dessert les principaux centres d’océanographie et de prévision du climat dans le monde. En 2016, la Chine a décidé d’approvisionner un nouveau Doris pour HY-2C auprès de TSA ce qui a motivé, en 2017, un nouvel accord entre le CNES et la CNSA généralisant la coopération en océanographie à l’ensemble du programme HY-2. En 2017, la Chine a également acquis un Doris pour HY-2D.

Les vols habités chinois représentent aussi pour le CNES, des opportunités pour réaliser des expériences dans des conditions de vols réelles. Le projet conjoint de médecine spatiale, Cardiospace, a permis d’obtenir un équipement spatial qui étudie l’adaptation du système cardiovasculaire à la microgravité. Embarqué sur TianGong-2, Cardiospace a été utilisé en 2016 lors de la mission ShenZhou-11. La phase B d’une mission Cardiospace-2 pour la station spatiale chinoise se termine au CNES et un nouvel accord de coopération sur ce thème est en discussion.

Au plan politique, l’espace fait partie des sujets traités au niveau du dialogue stratégique franco-chinois. En 2006, la France et la Chine ont signé deux mémorandums dans le but de développer conjointement deux satellites :

- CFOSat (Chinese French Oceanic satellite), pour l’observation des océans avec la fourniture par le CNES d’un instrument et d’un équipement développés par TAS, à intégrer sur une plateforme chinoise.
- SVOM (Space Variable Objects Monitoring), mission scientifique d’astrophysique comprenant la fourniture par le CNES de deux instruments sur une plateforme chinoise.

Après un démarrage difficile, lié à la fois à l’évolution de la réglementation américaine pour l’exportation des composants spatiaux et aux spécificités de la coopération avec la Chine, ces deux missions ont été relancées par une déclaration conjointe entre le CNES et la CNSA, signée lors de la visite du Président Xi Jinping, à Paris en 2014.

Pour SVOM, cela a permis de préciser le partage des responsabilités et permettre son lancement en 2021. Pour CFOSat, le calendrier de développement a été affiné en vue d'un lancement en 2018 et son rôle essentiel pour le suivi du changement climatique a été réaffirmé. En 2017, la tenue du 11ème comité mixte spatial franco-chinois a été une grande réussite et a identifié deux priorités : l'étude du changement climatique et l'exploration.

L'ensemble de ces sujets a été passé en revue lors de la visite en Chine du Président de la République, du 8 au 10 janvier 2018, au cours de laquelle un mémorandum a été signé entre le CNES et la CNSA, pour amplifier la coopération autour du changement climatique et de l'exploration, avec en particulier le soutien affirmé de la Chine à l'observatoire spatial du climat (SCO) proposé lors du « One Planet Summit ». Le Chef de l'Etat a aussi visité le centre technique de la CNSA où il a pu observer le satellite CFOSat dont le lancement est prévu au dernier trimestre 2018.

A court terme, la relation spatiale franco-chinoise a vocation à s'amplifier, avec la signature d'un accord permettant de renforcer le partenariat avec la CNSA pour la mise en œuvre du SCO, lors de la visite du Premier ministre en Chine en juin 2018. En complément, le CNES prévoit des accords pour coopérer plus étroitement avec la CAS et la CMSA, respectivement en sciences spatiales et sur les vols habités. Enfin, la Chine sera l'invitée d'honneur du prochain Toulouse Space Show, du 26 au 28 juin 2018.”