



Zhang, Li (2022) The Chinese practice of Yi Jing (☯) and its application to animation. Doctoral thesis, UNSPECIFIED.

Downloaded from: <http://sure.sunderland.ac.uk/id/eprint/14724/>

Usage guidelines

Please refer to the usage guidelines at <http://sure.sunderland.ac.uk/policies.html> or alternatively contact sure@sunderland.ac.uk.

The Chinese practice of Yi Jing (意境)
and its application to animation

Li Zhang

A thesis submitted in partial fulfilment of the requirements of the University of Sunderland
for the degree of Doctor of Philosophy

March 2022

Faculty of Arts and Design

University of Sunderland

Abstract

This practice-based research examines the relationship of traditional Chinese ink animation and the philosophical notion of Yi Jing. Traditionally, Yi Jing has been regarded as the aesthetic essence of traditional Chinese art and culture. Within that culture, it is highly regarded that traditional Chinese ink animation is influenced by Chinese ink paintings and the use of Yi Jing, which results in a unique form of animation.

Early Chinese animation successfully presented the use of Yi Jing, but many traditional Chinese animators (Tang, 2011) believe that the excessive dependence on traditional techniques and materials has led to its demise. Over the decades, essential knowledge and skills, such as the use of ink work used in Chinese animation, are not being passed down, and digital media are replacing the use of celluloid and other materials. In some respects, one could argue that traditional Chinese animation is becoming redundant.

This research has specifically analysed and identified the traditional Chinese philosophical notion of Yi Jing and how it is applied to traditional Chinese animation. It includes the analysis of three aesthetic principles that stem from Yi Jing and interpreted its theories into English that might benefit other scholars. These principles are: ‘Tian Ren He Yi’ 天人合一; ‘Yin-Yan’ 阴阳 and ‘Chi-Yuen-Sheng-Tun’ 氣韻生動. In order to illustrate these principles being used in Chinese animation, a new painting software called ‘Expresii’ (Chu, 2015) was used. It replaces the need to use traditional ink on celluloid and at the same time speeds up the process.

The practical research also explores the traditional Chinese techniques of ‘PoMo’ 泼墨 and ‘Rubbing Ink’ 拓墨. These restoration techniques may not be exactly the same as those which are historically documented (historical documents just recorded the existence of these two techniques, without describing the actual processes). This research also applied these two techniques to the background of ink animation. The purpose is not only to enrich the aesthetic forms of traditional Chinese animation, but also to re-discover and re-develop techniques so that they may be disseminated to future generations.

Contents

LIST OF FIGURES	VIII
LIST OF APPENDICES	XII
ACKNOWLEDGEMENTS	XIII
1. CHAPTER 1 – Introduction	1
1.1 Outline	1
1.2 Research background	2
1.3 Origin of research and personal motivation	3
1.4 Research rationale	4
1.5 The uniqueness of Chinese ink animation	5
1.6 The use of Expressii software	5
1.7 The characteristics of Yi Jing	7
1.7.1 The first characteristic — scatter perspective	7
1.7.2 The second characteristic — no outlines	8
1.7.3 The third characteristic — the use of white space	10
1.8 The strands of research	12
1.9 Research questions	12
1.10 Methodology	13
1.10.1 Philosophical methodology	16
1.10.1.1 Contextual research	17
1.10.1.2 Interviews	19
1.10.1.3 Study trips	21
1.10.2 Action research methodology	22
1.10.2.1 Experimental research	25
1.10.2.2 Technical research	28
1.10.2.3 Analysis of Yi Jing and its application to animation	28
1.10.2.4 Use of computer software	29
1.11 The outline of this thesis	29

CHAPTER 2 – Contextual Review	31
2.1 Introduction	31
2.2 The origins of Yi Jing theory	31
2.3 Aesthetics as a philosophical category	33
2.3.1 History of aesthetics	33
2.3.2 The origins of Chinese aesthetics	34
2.3.3 The influence of Taoism and Confucianism	37
2.3.4 Chinese philosophical notion of Yi Jing, with sources from Taoism and Confucianism	39
2.3.5 The writing of Chuang Tzu in Taoism and Yi Jing	42
2.4 The interpretations of the theory of Yi Jing from Chinese artists	44
2.5 The principle of ‘Tian Ren He Yi’ 天人合一(Harmony between Man and Nature)	45
2.5.1 ‘Tian Ren He Yi’ and Chinese ink painting	48
2.5.2 ‘Tian Ren He Yi’ and Chinese ink animation	49
2.6 The principle of ‘Yin Yang’ 阴阳	49
2.6.1 ‘Yin Yang’ and Chinese ink painting	52
2.6.2 ‘Yin Yang’ and Chinese ink animation	54
2.7 The principle of ‘Ch’i Yuen Sheng Tung’ 氣韻生動	55
2.7.1 ‘Ch’i Yuen Sheng Tung’ and Chinese ink painting	58
2.7.2 ‘Ch’i Yuen Sheng Tung’ and Chinese ink animation	61
2.8 The relationship between Chinese painting and calligraphy	62
2.9 Chinese ink painting	65
2.10 Chinese brush painting	65
2.11 Techniques, tools and materials	67
2.11.1 Chinese Brushes	67
2.11.2 Brush types and techniques	67
2.11.3 Brushes used for writing	69
2.11.4 Chinese inks	71
2.11.5 Chinese paper	71
2.11.6 Chinese colour	72
2.11.7 Space and composition	73
2.12 Ink painting with ink animation	80
2.13 The relationship between experimental animation and Yi Jing	82

2.14 The Chinese experimental animation of Yi Jing	84
2.14.1 Dynamic and static picture effects	86
2.14.2 The combination of virtual and real in ink animation (emptiness and fullness)	88
2.15 Conclusion	91

CHAPTER 3 – Limitations of Traditional Chinese Ink Animation and Contemporary Industry Issues and Opportunities **97**

3.1 Traditional Chinese ink animation production problems	97
3.1.1 Lack of high-end Chinese ink animators	98
3.1.2 Problems with Chinese ink animation education	99
3.1.3 Limitation of Chinese ink animation company	100
3.1.4 Limitation of Chinese ink animation age group	102
3.2 The contradictions of Chinese ink animation	103
3.2.1 The contradiction of introspection and entertainment	103
3.2.2 The contradiction between ‘minority’ and ‘mass’	104
3.2.3 The contradiction between ‘slow’ and ‘fast’	105
3.3 Contemporary digital ink animation technology	106
3.3.1 The simulation of 2D ink effect animation	107
3.3.2 The simulation of 3D ink effect animation	109
3.4 The comparison and scope of traditional ink painting and digital ink effects	110
3.5 Conclusion	115

CHAPTER 4 – Technical and Material Tests using Chinese Traditional Animation **119**

4.1 Introduction	119
4.2 The practice of traditional Chinese ink animation	119
4.3 Experimental ink animation using glass and porcelain	120
4.3.1 Comparison tests between glass and porcelain	124
4.3.2 Tests using ink painting on frosted glass	126
4.4 Experimental ink animation using Xuan paper	128
4.5 Experimental ink animation using traditional methods	137
4.6 Conclusion	154

CHAPTER 5 – Development and Demonstration of Creative Chinese

Ink Animation	159
5.1 Introduction	159
5.2 The use of new technology and ‘Expresii’ software	160
5.2.1 What is ‘Expresii’?	161
5.2.2 ‘Expresii’ and ink animation	165
5.2.3 Comparison of ink effects using traditional methods and ‘Expresii’ software	168
5.3 Using the traditional Chinese technique ‘PoMo’ 泼墨	173
5.3.1 Definition/history (About ‘PoMo’ history and who created this method)	173
5.3.2 Development of ‘PoMo’ method 泼墨法	175
5.3.3 Experiment, tests and processes of ‘PoMo’	179
5.4 Using the traditional Chinese technique ‘Rubbing Ink’ 拓墨法	185
5.4.1 Definition/history (About ‘Rubbing Ink’ history and who created this method)	186
5.4.2 Development of ‘Rubbing Ink’ method 拓墨法	187
5.4.3 Experiment, tests and processes of ‘Rubbing Ink’	188
5.5 Case study: The animation work for ‘Buffalo’	195
5.5.1 The story behind the animation	195
5.5.2 The implementation of Yi Jing	197
5.5.2.1 The use of colour	197
5.5.2.2 The composition	201
5.5.2.3 Experimental notion of ‘Tian Ren He Yi’ 天人合一 in the animation	202
5.5.2.4 Experimental notion of ‘Yin Yang’ 阴阳 in the animation	206
5.5.2.5 Experimental notion of ‘Ch’i Yuen Sheng Tung’ 氣韻生動 in the animation	209
5.6 Conclusion	213
CHAPTER 6 – Conclusion	216
6.1 The context of this research	216
6.2 Yi Jing in context	218

6.3 The relationship between the concept of Yi Jing and ‘Tian Ren He Yi’, ‘Yin Yang’ and ‘Ch’i Yuen Sheng Tung’	221
6.4 The limitations of traditional ink animation and issues within the contemporary Chinese animation industry	225
6.5 The production and application of the concept of Yi Jing with traditional Chinese animation	228
6.6 Contribution to knowledge	232
6.7 Recommendations for further research	235
APPENDIX A	237
APPENDIX B	240
APPENDIX C	241
APPENDIX D	242
APPENDIX E	243
APPENDIX F	248
APPENDIX G	252
APPENDIX H	253
APPENDIX I	256
REFERENCES	257

List of Figures

<i>Figure 1. Animation using celluloid (traditional method) from Feelings of Mountains and Waters 山水情 (Shanghai Animation Film Studio, 1988)</i>	6
<i>Figure 2. Animation using Expressii software (Li, 2017)</i>	6
<i>Figure 3. The scatter perspective or moving perspective River During the Qingming Festival 清明上河圖 (Active from 1111-1125 CE), (Zhang Ze Duan 张择端 (1085–1145 CE)</i>	7
<i>Figure 4. The focus perspective or western perspective used in paintings (Barge Haulers in the Volga by Ilya Repin, 1873)</i>	8
<i>Figure 5. Golden Pheasant and cotton Rose Flowers with Butterflies 芙蓉錦雞圖 by Emperor Song Huizong 宋徽宗 (1082-1135 CE, Song Dynasty)</i>	9
<i>Figure 6. Immortal in Splashed Ink 潑墨仙人 by Liang Kai 梁楷, (1140-1210 CE, Song Dynasty)</i>	10
<i>Figure 7. Bird and Rock 鳥石圖 by Bada Shanren 八大山人 (also known as Zhu Da 朱耷), (1626–1705 CE, Qing Dynasty)</i>	11
<i>Figure 8. Diagram showing the multi-method approach used in this research, (Zheng, L, 2017)</i>	14
<i>Figure 9. The Yi Jing animation process (Zhang, 2017)</i>	17
<i>Figure 10. Diagram showing details of the study trips from 2016 to 2018 (Zhang, 2019)</i>	22
<i>Figure 11. Diagram by Marshall, (also used in Tani's PhD thesis 2014, p.40)</i>	23
<i>Figure 12. Diagram of learning Cycle by Zhang (2020)</i>	25
<i>Figure 13. Diagram demonstrating the five stages of animation research (Zhang, 2018)</i>	27
<i>Figure 14. The developmental stages of Chinese aesthetics (Zhang, 2020)</i>	35
<i>Figure 15. White plum blossoms by Bada Shanren 八大山人 (also known as Zhu Da 朱耷) (1659 Qing Dynasty)</i>	60
<i>Figure 16. Oracle bone script (Huang TianShu 黃天樹, 2010)</i>	63
<i>Figure 17. Jian Hao 兼毫 (combination hair brush) (Zhang, 2017)</i>	67
<i>Figure 18. Wolf Brush or Lang Hao 狼毫 (Zhang, 2017)</i>	68
<i>Figure 19. Wool Brush or Yang Hao 羊毫 (Zhang, 2017)</i>	68
<i>Figure 20. Rat Whisker or Shu Hao 鼠毫 (Zhang, 2017)</i>	69
<i>Figure 21. Zi Hao (紫毫) (Zhang, 2017)</i>	69

<i>Figure 22. Shades and textures or ‘Cun Fa’ (皴法) and the dotting method or ‘Dian Fa’ (點法) (Zhang, 2018)</i>	70
<i>Figure 23. Stroll about in spring (游春圖) Zhan Zi Qian 展子虔(545–618 CE)</i>	72
<i>Figure 24. Part of Thousand Li of Rivers and Mountains (千里江山圖局部) (1113CE), Wang Xi Meng 王希孟(1096–1119 CE)</i>	73
<i>Figure 25. Two Birds (雙鳥圖) Bada Shanren 八大山人 (born Zhu da 朱耷 1626–1705 CE)</i>	74
<i>Figure 26. Part of Along the River During the Qingming Festival 清明上河圖局部 (Active from 1111-1125 CE), Zhang Ze Duan 张择端 (1085–1145 CE)</i>	75
<i>Figure 27. Travelers Among Mountains and Streams 溪山行旅圖 by Fan Kuan 范寬 (950–1032 CE) This painting shows the use of the ‘measures of height’ (高遠)</i>	76
<i>Figure 28. The Gully and cliff 萬壑千崖圖(1662CE) by Wang Hui 王翬 (1632–1717 CE) This painting shows the use of ‘measures of depth’ (深遠)</i>	77
<i>Figure 29. Riverside Pavilion and Mountain Hues 容膝齋圖(1372CE) by Ni Zan 倪瓚 (1301–1374 CE) This painting shows the use of ‘measures of horizon’ (平遠)</i>	78
<i>Figure 30. Phoenix and Peony 富貴極品(1946CE) by Shen Yizhai 沈一齋(1891–1955)</i>	79
<i>Figure 31. Five Tints of Ink Colour (墨分五色) (Zhang, 2018)</i>	81
<i>Figure 32. Princess Iron Fan (1941)</i>	83
<i>Figure 33. Havoc in Heaven (1961-1964)</i>	83
<i>Figure 34. Feeling From Mountain and Water concept design, Wu ShanMing (吳山明) and Zuo HeJun(卓鶴君), 1988)</i>	88
<i>Figure 35. Three Monks (Shanghai Animation Film Studio 1981)</i>	90
<i>Figure 36. Havoc in Heaven — seven fairy dances (Shanghai Animation Film Studio, 1964)</i>	91
<i>Figure 37. Chinese and overseas animation box office and releases from 2013-2015 (Xiao and Tian, 2016)</i>	101
<i>Figure 38. The Bilibili age group analysis of 20 million users in 2017</i>	103
<i>Figure 39. A screenshot of the Flash animation, ‘Lotus Pond in Mid-Autumn’ (Gao, 2017)</i>	108

<i>Figure 40. ‘Tadpoles Look for Their Mommy’ from screenshot 1961 (left picture) and Qi Baishi’s ‘Shrimp’ 1947(right picture)</i>	111
<i>Figure 41. 3D ink animation ‘Ode to Summer’ by Xu Yi 許毅 in 2003</i>	114
<i>Figure 42&43. Screenshot of 3D ink animation ‘Ode to Summer’. The top picture demonstrates the 3D model effect, the picture below shows rendering effect of 3D ink animation by Xu Yi 許毅 in 2003</i>	115
<i>Figure 44. Lotus and two geese (Wang Xisan, 1961)</i>	121
<i>Figure 45. ‘The Old Man and the Sea’ by Alexander Petrov in 1999</i>	123
<i>Figure 46. Porcelain plate painting (Zhang, 2002)</i>	124
<i>Figure 47. KLM Royal Dutch Airlines flight safety video, created by painting on porcelain plates in 2015</i>	125
<i>Figure 48. The ‘Chrysanthemum’ Chinese Ink Painting on Glass (Zhang, 2015)</i>	127
<i>Figure 49. Gong Bi painting of Bamboo (Zhang, 2012)</i>	129
<i>Figure 50. The various steps of Gong Bi (painting by Zhang, 2019)</i>	130
<i>Figure 51. ‘Lily’ — frame by frame animation created by using painting on Xuan paper (Zhang, 2016)</i>	131
<i>Figure 52. ‘Fish’(Zhang, 2015)</i>	134
<i>Figure 53. ‘Chrysanthemum’(Zhang, 2016)</i>	134
<i>Figure 54. ‘Peony’(Zhang, 2017)</i>	135
<i>Figure 55. ‘ Goldfish’ (Zhang, 2017)</i>	136
<i>Figure 56. Test showing ‘five tints’ of Chinese ink on Xuan paper (Zhang, 2017)</i>	139
<i>Figure 57. The ratio of water with Chinese ink on celluloid (Zhang, 2017)</i>	139
<i>Figure 58. The ratio of water with Chinese watercolour on celluloid (Zhang, 2017)</i>	140
<i>Figure 59. The ratio of water with Chinese watercolour on celluloid (Zhang, 2017)</i>	141
<i>Figure 60. Frosted celluloid sheet test with Chinese watercolour (Zhang, 2017)</i>	141
<i>Figure 61. Frosted celluloid sheet test with Chinese watercolour (Zhang, 2017)</i>	142
<i>Figure 62. Frosted celluloid sheet test with Chinese watercolour (Zhang, 2017)</i>	142
<i>Figure 63. Celluloid sheet test with Chinese watercolour (Zhang, 2017)</i>	143
<i>Figure 64. Chinese gelatine</i>	145
<i>Figure 65. Celluloid sheet test with Chinese watercolour blended with gelatine (Zhang, 2017)</i>	145
<i>Figure 66. Celluloid sheet test with layered Chinese watercolour blended with gelatine (Zhang, 2017)</i>	146

<i>Figure 67. Draft of the buffalo character (Zhang, 2017)</i>	147
<i>Figure 68 & 69: Draft of the buffalo character with ink (Zhang, 2017)</i>	148
<i>Figure 70. The first layer on the celluloid (Zhang, 2017)</i>	149
<i>Figure 71. The second layer on the celluloid (Zhang, 2017)</i>	149
<i>Figure 72. The third layer on the celluloid (Zhang, 2017)</i>	150
<i>Figure 73. The fourth layer on the celluloid (Zhang, 2017)</i>	150
<i>Figure 74. Camera data (Zhang, 2017)</i>	151
<i>Figure 75. Buffalo character with multiple photography technique (Zhang, 2017)</i>	152
<i>Figure 76. Buffalo character without multiple photography technique (Zhang, 2017)</i>	153
<i>Figure 77. With Expressii software, the brush can simulate the layering of a real brush and ink. (Zhang, 2017)</i>	162
<i>Figure 78. Existing software simulates ink brush strokes using Photoshop, painter and other painting tools (Zhang, 2017)</i>	163
<i>Figure 79. Expressii virtual brush deformation and effects (Chu, 2007)</i>	164
<i>Figure 80. Expressii virtual ink effects, with magnification (Chu, 2007)</i>	164
<i>Figure 81. Buffalo test chart with its engragement without losing detail (Zhang, 2017)</i>	167
<i>Figure 82. Animated character single frame picture (Zhang, 2017)</i>	168
<i>Figure 83. Animated character single frame pictures (Zhang, L. 2017)</i>	169
<i>Figure 84. Animated character single frame pictures (Zhang, 2017)</i>	169
<i>Figure 85. Ink strokes test using traditional Xuan paper (Zhang, 2017)</i>	170
<i>Figure 86. Brush effects tests using the Expressii software (Zhang, 2017)</i>	171
<i>Figure 87. Expressii test Xuan paper mechanism (Zhang, 2017)</i>	171
<i>Figure 88 & 89. Compare the effects of traditional Chinese ink painting (left) and the ink painting made by Expressii (right) (Zhang, 2017)</i>	172
<i>Figure 90. PoMo Painting: Mount Lu (廬山) (1979CE), Zhang Daqian (張大千, 1899–1983)</i>	174
<i>Figure 91. Literati Painting: Rongxi Studio (容膝齋圖) (1372CE), Ni Zan (倪瓚) (1301–1374), Yuan Dynasty</i>	177
<i>Figure 92. First step in the PoMo process (Liu Daoguang, 劉道廣 2017)</i>	179
<i>Figure 93. Second step in the PoMo process (Liu Daoguang, 劉道廣 2017)</i>	179
<i>Figure 94. Third step in the PoMo process (Liu Daoguang, 劉道廣 2017)</i>	180
<i>Figure 95. Fourth step in the PoMo process (Liu Daoguang, 劉道廣 2017)</i>	180

<i>Figure 96. PoMo effect before drying (Zhang, 2019)</i>	181
<i>Figure 97. PoMo effect after drying (aquatic plants) (Zhang, 2019)</i>	181
<i>Figure 98. Aquatic plants and fish (PoMo method) (Zhang, 2019)</i>	182
<i>Figure 99. The effect of two layers of Xuan paper coving the table top (Zhang, 2018)</i>	183
<i>Figure 100. PoMo effects on Xuan paper (Zhang, 2018)</i>	184
<i>Figure 101. Framed art work for PoMo method (Zhang, 2018)</i>	185
<i>Figure 102. An example of Rubbing Ink technique on Xuan paper using only black ink (Zhang, 2017)</i>	189
<i>Figure 103. RubbingInk effects on Xuan paper using Chinese watercolour paint (Zhang, 2017)</i>	190
<i>Figure 104. First step for ‘Rubbing Ink’ process, where Chinese ink is sprinkled on to the surface of the water and stirred (Zhang, 2017)</i>	191
<i>Figure 105. Second step for ‘Rubbing Ink’ process, where the Xuan paper is placed gently onto the water’s surface (Zhang, 2017)</i>	191
<i>Figure 106. The original Rubbing Ink effect on wet Xuan paper (Zhang, 2019)</i>	192
<i>Figure 107. The Rubbing Ink effect after adding details to balance the picture (Zhang, 2019)</i>	193
<i>Figure 108. The same artwork from Figure 106, where colours and additional elements are added to complete the painting (Zhang, 2019)</i>	194
<i>Figure 109. ‘He Ke Yi Ri Wu Ci Jun’ by Qi Gong 啟功, 1981)</i>	198
<i>Figure 110. ‘The Spectacular views of Xiao and Xiang Rivers’ 瀟湘奇觀圖 ‘Mi Youren’ 米有仁 (1074-1153)</i>	199
<i>Figure 111. The background used in the ‘Buffalo’ animation (Zhang, 2018)</i>	200
<i>Figure 112. The landscape scene created by using the ‘Five Tints of Ink Colour’ principle (Zhang, 2018)</i>	201
<i>Figure 113. Three background scenes from the animation ‘Buffalo’ (Zhang, 2018)</i>	205
<i>Figure 114. Ink animation screenshot by Zhang, 2018</i>	209
<i>Figure 115. Experimental animation screenshot from the animation ‘Buffalo’ (Zhang, 2018)</i>	212
<i>Figure 116. This diagram demonstrates the relationship between Yi Jing and Tian Ren He Yi, Yin Yang and Ch’i Yuen Sheng Tung (Zhang, 2020)</i>	225
<i>Figure 117. Colour flat coating for Hayao Miyazaki Animation celluloid sheet. (My Neighbour Totoro, 1988)</i>	226

List of Appendices

APPENDIX A

Chronological Table in China 237

APPENDIX B

Ink Animation YouTube Link 240

APPENDIX C

Framed art work for Rubbing Ink method 241

APPENDIX D

Framed art work for PoMo method 242

APPENDIX E

Practice work for Xie Yi (寫意) 243

APPENDIX F

Practice work for Chinese calligraphy 248

APPENDIX G

Practice work for Chinese calligraphy with Rubbing Ink method 252

APPENDIX H

Practice work for Chinese painting with PoMo method 253

APPENDIX I

Practice work for Gong Bi (工筆畫) 256

Acknowledgements

Foremost, I would like to thank the University of Sunderland for the opportunity to complete this PhD.

I sincerely appreciate my Director of Studies, Dr Manny Ling 凌文建, for his continuous support for my research and studies; for his enthusiasm, patience, efficiency and immense knowledge. I have been exceptionally fortunate, for he shows great enthusiasm for my research, and has always responded to my queries and questions promptly. Meanwhile, my sincere gratitude also to my co-supervisor Dr Neil Ewins, who is a great advisor and supported my research.

I would like to thank especially Professor Liu Daoguang 劉道廣, from the School of Art of Southeast University in China. He has assisted me with my early research on traditional Chinese ink animation, and given me advice on the Chinese notion of Yi Jing, which he had fostered through his experience in this field.

I am also grateful to my friends and fellow PhD researchers, Roland Buckingham, Zhou Bin 周斌, Qu Jin 屈金, Guo Jianyong 郭建永, and Jiang Ting 江婷. They are always generous in sharing their ideas and research experiences with me and have broadened my academic horizons.

I would also like to thank my parents in China, who have provided constant financial and emotional support during my studies in the UK. Lastly but not least, I would particularly like to thank my wonderful wife, Luo Ying 羅穎; she is my spiritual pillar and helps me to focus my mind. This PhD would not have been possible without them.

Chapter One: Introduction

1.1 Outline

This research examines the Chinese philosophical notion of Yi Jing 意境 and traditional Chinese ink animation. It analyses the characteristics of Yi Jing and determines how it can be applied to animation. It also places emphasis on the approaches and processes to animation, and the development of new techniques to replace traditional ones, like using ink on celluloid, and to speed up the working process. This is achieved by using a new digital painting software called *Expresii* (developed by a Hong Kong PhD research student, Nelson Chu, 2007) and it is now a commercially available software (www.expresii.com).

With regard to the application of Yi Jing to traditional Chinese animation, three main Chinese principles are identified. These principles are:

- ‘Tian Ren He Yi’ 天人合一 which can be translated as the principle of ‘Harmony between Man and Nature’ as documented in Jiang’s PhD research (2015);
- ‘Yin-Yang’ 阴阳 is the principle of opposites and harmony; and
- ‘Ch’i Yuen Sheng Tung’ 氣韻生動 — the rhythmic vitality of the artistic mark as identified in Ling’s PhD research (2003) and from the writing by Sze in *‘The Way of Chinese Painting’* (1959).

Further details for the application of these principles to traditional Chinese animation will be elaborated in Chapter 5.

The Chinese names used in this thesis adhere to the traditional format, where the surname comes first, followed by the given name(s). Their names in Chinese are also included as it would help to clarify who they are. Also, due to the large number of Chinese terminologies used and because some Chinese words sound similar in English, I have included the Chinese translations of these terms, in order to avoid confusion.

1.2 Research background

Throughout ancient Chinese history to the present day, Chinese culture tends to emphasize the use of natural and subtle language to express the essence of life and the universe. Some of these philosophical concepts (e.g. Yi Jing) are difficult to explain and articulate, but can be felt and understood via prolonged practice of an artistic pursuit, such as painting or calligraphy.

Yi Jing therefore can be described as an embodied philosophy that has entrenched Chinese culture. As early as the Qin Dynasty (905–206 BCE) (For a reference to the different dynasties within Chinese history, please refer to Appendix A), the founder of Taoism ‘Lao Tzu’ 老子 (571–471 BCE), used the term ‘Tao’ to describe the notion of the life of the universe; where the *Book of Changes* (500–200 BCE) and Chuang Tzu 庄子 (369–286 BCE) referred to the terms ‘Yi’ (意) and ‘Jing’ (境). Later on, it is believed that the basic philosophical theory of Yi Jing was established from the Tang Dynasty (618–907 CE) and it is usually expressed through artistic disciplines, such as poetry, painting, calligraphy, architecture, sculpture and so on. Through these artistic practices, the sense of Chinese traditional aesthetics was developed. Furthermore, from the Song to the Qing Dynasty (10th century–18th century), the theory of Yi Jing was further refined and modified. In Peng’s PhD thesis (2008, pp 45–65,) she stated that, during this period, the relationship between ‘Yi’ and ‘Jing’ was extensively explored by numerous scholars, such as Guo Xi 郭熙 (Song Dynasty), Zhu Cunjue 朱存爵 (Ming Dynasty), Wang Guowei 王国维 and Da Zhongguang 笪重光 (both from Qing Dynasty).

As one can recognise, the notion of Yi Jing has a long historical development which has entrenched in all aspects of Chinese art and culture. It is also believed that Yi Jing embraces a sense of aesthetics and philosophical aspects to be brought towards the idea of ‘artistic conception’ when creating artwork.

It is understood that in early examples of traditional Chinese ink animation, elements of Yi Jing are evident in the work. One such example produced by the Shanghai Animation Film Studio is an early animated work called *Baby Tadpoles Look for Their Mother* 小蝌蚪找妈妈 (1960).

This was followed by other notable animations, such as *Lu Ling* 鹿铃 (1982) and *Feelings of Mountains and Waters* 山水情 (1988). Arguably, within this thirty-year span, traditional Chinese ink animation was at its most productive.

From the 1990s onwards, China entered the market economy, but the ‘Chinese school of animation’ (Li, 2011, p6) was still using traditional ink techniques and technology. The production process was usually very complicated, laborious and time-consuming (see chapter 4 for further details of the process). This has made production financially unviable, and although many traditional Chinese animators carried on using this difficult process, some have eventually passed away and have taken their knowledge with them.

The new generation of Chinese animation studios does not want to use a lot of energy and financial resources to study and to continue using the traditional Chinese ink animation process. Also, with the rise of digital animation since 1995, with *Toy Story* being the first computer-animated feature film from the United States, Japan and other countries (Catmull and Wallace, 2014, p.3), have influenced Chinese animators to move away from using traditional Chinese animation techniques. The impact of this has meant that the skills and knowledge of traditional Chinese animation are being lost and gradually being forgotten.

It is deemed necessary in this research, therefore, to re-develop and disseminate the traditional Chinese animation techniques to the new generation of Chinese animators. It is also important to explore ways to encapsulate the notion of Yi Jing within contemporary animation, using digital techniques. Therefore, this research can be regarded as having certain importance, originality and significance.

1.3 Origin of research and personal motivation

This research evolved from my earlier training in traditional Chinese painting and calligraphy in China and my formal education in animation at University of Sunderland (BA and MA) in the UK. From around eight years old, much of my artistic training stemmed from the use of the

Chinese brush and ink. I came to appreciate the subtleties and the expressive power of ink and began to realize this is largely affected by the notion of Yi Jing in ink work. Naturally, as an extension to my artistic practice, I wish to use this research to evaluate and analyse the Chinese notion of Yi Jing and determine how it can be applied to traditional Chinese animation. The purpose is not only to enrich the aesthetic forms of traditional Chinese animation, but also to re-discover and re-develop lost techniques, so that they can be disseminated to future generations. In my research, I initially planned to explore the production methods of traditional Chinese animation via a non-digital route. However, this has proved to be too difficult, as original sources are impossible to find. Despite carrying out numerous primary interviews with Chinese experts in the field and experiments using celluloid, I was not able to replicate authentic traditional Chinese animation (in Chapter 3, I will discuss further the various animation production processes).

During the latter half of my research (2017), I discovered a new digital painting software called *Expresii*, developed by a PhD researcher called Nelson Chu from Hong Kong University of Science and Technology (2007). This software is unique, in that it can digitally replicate the authentic flow of ink on different digital pseudo-surfaces (Xuan paper, canvas, etc). Although this software is primarily used for 2D image making (e.g. Chinese ink painting or calligraphy), I realised it can also be used to create traditional Chinese animation by painting each frame using the digital ink and brush tools in the software. This has, in some ways, replaced the need to use traditional ink on celluloid and at the same time speeded up the process (see chapter 5).

1.4 Research rationale

In terms of artistic and stylistic approaches, I hope to couple traditional Chinese painting and calligraphic techniques and seek new ways in how these approaches can be used to create an animation. Combining this with the notion of Yi Jing, new and innovative animation work has emerged (see Chapter 5).

Initial research reveals that numerous digital animations try to capture the qualities of Chinese ink painting. However, the majority of these works are produced by using 3D or 2D digital software, such as Maya or Flash. It is clear that most of these works are very good, but they look too ‘smooth’ and ‘inauthentic’. They do not seem to be able to replicate the true qualities of ink flow or ink spread on paper. By using the *Expresii* software, however, these subtle qualities of ink in animated sequences can be replicated, where they rely on traditional hand-drawn skills and effects to create the final animation.

1.5 The uniqueness of Chinese ink animation

Traditional Chinese ink animation is a unique animated art form with cultural and ethnic characteristics. It involves using elements from Chinese ink painting to produce the animation. The uniqueness of this research is to explore the use of digital traditional Chinese ink painting techniques to aid animation production. Compared to the digital animations that we see today; ink animation shows fewer contours and outlines. It also replicates the natural rendering of ink and ink flow on Xuan paper (traditional Chinese paper used for painting and calligraphy). One could argue each frame in a traditional Chinese animation is an ink painting in itself.

1.6 The use of Expresii software

Expresii is digital-based media and an advanced digital painting software. It simulates Chinese brushes, ink and other elements, such as paper absorbency and the wetness of the ink or brush. This software uses a hydrodynamic simulation of watercolour and other natural media and has a GPU (Graphics Processing Unit) to accelerate water-based paint and organic brush simulation and provides an ultra-deep zoom function. However, the software is relatively unknown, and the user rate is relatively low. It seems *Expresii* software is mainly used for painting, calligraphy and illustration, but not animation. It is important therefore to stress that *Expresii* is not an animation software and that I have adapted its use specifically for this research, so that animation can be created by painting individual frames to form, in effect, a stop-frame animation.

The use of the *Expresii* software is easier to operate and control than traditional methods. One could compare the effect of traditional ink animation using celluloid and that of using digital software (see figs 1 and 2 for comparison). There will be further discussion of this process in Chapter 4.



Fig 1. Animation using celluloid (traditional method) from Feelings of Mountains and Waters 山水情 (Shanghai Animation Film Studio, 1988)



Fig 2. Animation using Expresii software (Zhang, 2017)

1.7 The characteristics of Yi Jing

It can be argued that the notion of Yi Jing can be difficult to understand, and this research has identified the key characteristics of what Yi Jing is in traditional Chinese animation. The three characteristics identified here are: ‘scatter perspective’, ‘no outlines’ and ‘the use of white space’.

1.7.1 The first characteristic — scatter perspective

The ‘scatter perspective’ 散點透視 is widely used in traditional Chinese ink painting (Yang, 2015). The creators of Chinese painting can use scatter perspective to regulate the size and position of objects. Unlike Western art, there is usually no use of a fixed golden ratio. This is a unique point in Chinese painting. When I analysed famous paintings in the history of China, we can see that many Chinese paintings, such as *River During the Qingming Festival* 清明上河圖 (Northern Song Dynasty 960–1127 CE), use the compositional rules of ‘scatter perspective’ (see Fig 3).

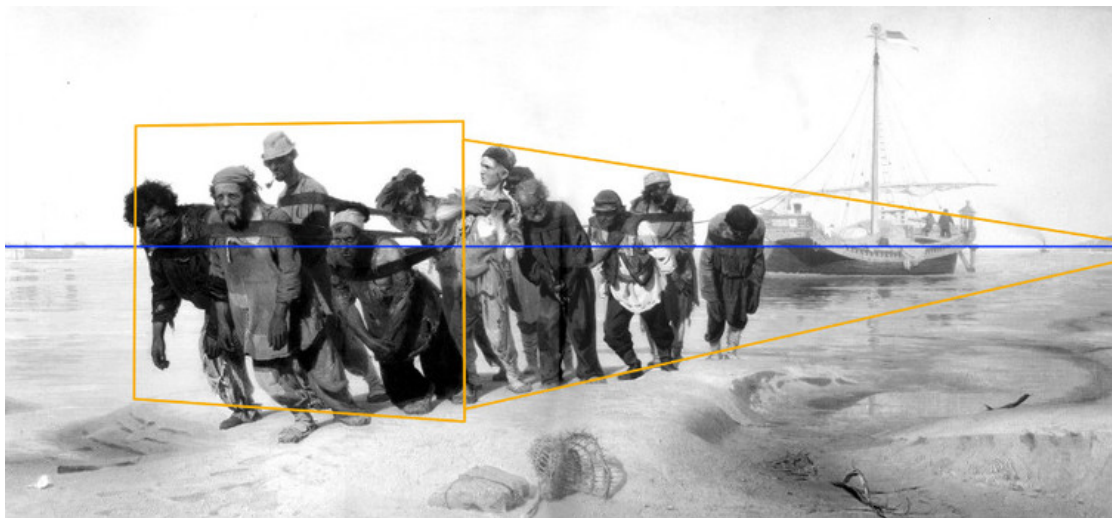


Fig 3. The scatter perspective or moving perspective *River During the Qingming Festival* 清明上河圖
(Active from 1111–1125 CE), (Zhang Ze Duan 张择端 1085–1145 CE)

The traditional Chinese painting of landscape and the painting of long scroll figures are the first two of the traditional four classic categories (Landscape painting/Shan shui, bird and flower painting, figure painting, Jie hua/Architectural painting) of Chinese paintings. The

artist's point of observation is not fixed in one position (March, 1927, p.69), and also it is not limited by a particular viewpoint. This perspective composition is called 'scatter perspective' or 'moving perspective' (Yang, 2015).

In comparison, traditional composition techniques used in Western painting tend to use the 'focus perspective' or 'Western perspective' method of composition (ibid., p.72). This is similarly found in the art of photography, where the picture adopts a fixed viewpoint and expresses the momentary plot. Western artists generally use the golden ratio as the composition method for painting, and the multi-perspective approach adopted by the Chinese is not commonly used (please see figure 4).



*Fig 4. The focus perspective or western perspective used in paintings
(Barge Haulers in the Volga by Ilya Repin, 1873)*

1.7.2 The second characteristic — no outlines

Traditional Chinese ink painting can be divided into two general categories of styles: 'Gongbi' 工筆 and 'Xieyi' 寫意 (Kwo, 1990, p.100). The traditional Gongbi style is usually meticulous in detail and is often referred to as 'court-style' painting. It focuses on drawing and emphasizes the beauty of lines; and it requires close attention to detail and fine brushwork. The Chinese character for 'Gong' (工) literally means 'perfection'; whereas 'Bi' (筆) means 'brushwork'.

The term Gongbi can be loosely interpreted as ‘perfect brushwork’ or ‘fine style’ (please see figure 5).



Fig 5. Golden Pheasant and cotton Rose Flowers with Butterflies 芙蓉錦雞圖
by Emperor Song Huizong 宋徽宗 (1082–1135 CE, Song Dynasty)

The traditional Xieyi 寫意 style is usually executed in a freer manner, It is also termed ‘ink and water’ 水墨. The Chinese character ‘Xie’ 寫 literally means ‘to write’ and ‘Yi’ 意 means ‘idea’ or ‘concept’. This could be loosely translated as ‘to draw your ideas or concept out’.

Xieyi is usually associated with paintings achieved in a simplified and free style. It was developed to liberate artists from the traditional Gongbi method of painting. When artists used the Xieyi technique, they would try to describe exaggerated forms to express their feelings. Differently from Gongbi, Xieyi generalizes shapes and displays rich brushwork and ink techniques, without the use of outlines to define shapes and objects (please see figure 6).



Fig 6. *Immortal in Splashed Ink 潑墨仙人* by Liang Kai 梁楷, (1140–1210 CE, Song Dynasty)

1.7.3 The third characteristic — the use of white space

Usually, when one is asked to paint a bird, one would paint the whole shape and with much detail. In Chinese traditional ink painting, however, one might paint a general line or shape, or

with details missing deliberately, forcing the viewer to fill in the blanks and imagine the bird (see figure 7). This use of ‘white’ space is a unique feature of most Chinese painting.



*Fig 7. Bird and Rock 鳥石圖 by Bada Shanren 八大山人
(also known as Zhu Da 朱耷), (1626–1705 CE, Qing Dynasty)*

With further practice, I have incorporated the above three characteristics into my animation. For example, the ‘scatter perspective’ was used in some larger scenes that require moving the animation background using the camera movement feature. In making an animation character, the ‘no outlines’ feature was used, to make the character more agile and fully demonstrate the characteristic of traditional Chinese ink painting of Yi Jing. The feature of ‘white space’ was used in the overall animation picture, so that the picture can create more space for the imagination. These animation processes and practical works are detailed in Chapter 5.

1.8 The strands of research

This research has four strands:

1. Firstly, I have researched into the Chinese notion of Yi Jing.
2. Secondly, I have analysed philosophical and aesthetic aspects of Yi Jing.
3. Thirdly, based on my findings, I have applied the Chinese notion of Yi Jing to my animation by seeing each frame as a separate painting.
4. Finally, by using this approach, the notion of Yi Jing can then be applied directly to the animation.

1.9 Research questions

Compared to contemporary digital animation, the traditional Chinese can be regarded as unique and as having a place in the field of animation worthy of academic study and analysis. This research also hopes to bridge the gap between the old and the new, so that traditional Chinese animation can be developed further, using digital and contemporary techniques.

The main research questions are:

- i. What are the techniques, materials and approaches used to develop traditional Chinese ink animation?
- ii. How can the Chinese philosophical notion of Yi Jing be articulated through my animation?
- iii. Why might it be beneficial to apply the Chinese philosophical notion of Yi Jing within the contemporary animation industry?

From the above research questions, the research aims are:

- i. To experiment with new materials and techniques to create an ink animation that demonstrates the use of Yi Jing.
- ii. To explore the philosophical notions of Yi Jing and to develop new approaches in how Yi Jing can be used in animation.
- iii. To locate and seek how this new approach might be beneficial to the contemporary

Chinese animation industry.

1.10 Methodology

Methodology is the study of ‘the system of methods and principles used in a particular discipline’ (Gray and Malins, 2004, p.17). Most art and design research use a ‘multi-method technique’, in which the methodologies and methods are ‘tailored to the individual project’ (ibid., p.72).

In terms of the particular ‘requirements’ for this research, a multi-method approach has been adopted. Several PhDs, such as those of Chiu (2005), Yi (2008), Peng (2014), Jiang (2015), Tani (2015), Guo (2016) and Qu (2017), have also used this multi-method approach in their research. Essentially, in this research, two main methodologies are used, namely philosophical and action research methodology. Through philosophical methodology, the Chinese notions of Yi Jing are analysed and themes are developed in order to apply them to a series of practical work, leading to a short animation outcome. An example of this methodology is used in Jiang’s PhD thesis (2015), in which she explored the Chinese notion of ‘Harmony between Man and Nature’ and contemporary jewellery design.

The following diagram identifies the methodologies used, highlighting the various methods and research processes involved (see figure 8 below).

Methodologies

Methodologies	Methods	Content	Processes
<p>Philosophical Research Methodology</p> <p>This methodology is used primarily to analyse and establish the Chinese notion of Yi Jing.</p> <p>It also includes methods and technologies for Chinese traditional ink animation.</p> <p>The Chinese notion of Yi Jing is then applied to animation.</p>	Contextual review	<ul style="list-style-type: none"> Analysing the Chinese philosophical notion of Yi Jing; Evaluating contemporary traditional Chinese ink animation techniques and approaches; Evaluating contemporary Chinese ink animation industry and Western animation (using Chinese elements). 	<ul style="list-style-type: none"> Analysis and review of concepts, philosophical focal elements, mapping, drawing diagrams, taking photography, objects and notes.
	Interviews	<ul style="list-style-type: none"> Primary research involving interviewing Chinese philosophy experts and Chinese traditional ink animation experts. 	<ul style="list-style-type: none"> Recording evidence via photography and sound.
	Study trips	<p>Visits and study trips in both China and UK</p> <ul style="list-style-type: none"> Shanghai Film Museum; Chinese National Film Museum; Zhejiang Art Museum; Lanting Calligraphy Museum; National Art Museum of China; Sichuan Fine Arts Institute Gallery; China Academy of Art Gallery; The Crafts Museum; School of Software and Microelectronics, Peking University (Wuxi) Gallery. 	<ul style="list-style-type: none"> Recording evidence via photography and video; Finding traditional Chinese ink animation studio work and processes.
<p>Action research</p> <p>This primarily involves studio-led practices and experimentations leading to a short piece of</p>	Experimental processes	<ul style="list-style-type: none"> Applying experimental processes to develop my own ink animation design and production; Testing the <i>Expresii</i> software to draw traditional Chinese ink paintings. 	<ul style="list-style-type: none"> Celluloid painting, Chinese traditional ink painting, ink flow recording, photographic exposure techniques.

animation called 'Buffalo'.		<ul style="list-style-type: none"> • Testing ink painting using 'Po Mo' and 'Rubbing Ink' methods. • To practice and improve my understanding of Yi Jing through practical work; • Developing concepts and evaluating the experiential engagement with software and materials, self-observation and developing new technical approaches to produce traditional Chinese ink animation; • Developing using 'PoMo' and 'Rubbing Ink' methods to design animation backgrounds. • Developing ways to store traditional Chinese ink animation visual ideas and techniques. 	
	Technical research	<ul style="list-style-type: none"> • Experimenting with Chinese traditional ink animation of technical approaches and processes. 	<ul style="list-style-type: none"> • Developed ink animation using <i>Expresii</i> software.
	Observing the three characteristics of Yi Jing and applying them to animation	<ul style="list-style-type: none"> • To practice my understanding of Yi Jing through observation and practice painting; • Developing concepts and evaluating the experiential engagement with software and materials, self-observation and developing new techniques and approaches to produce traditional Chinese ink animation; • Developing and using 'PoMo' and 'Rubbing Ink' methods to design animation backgrounds. • Developing ways to store traditional Chinese ink animation visual ideas and techniques. 	<ul style="list-style-type: none"> • Experiencing traditional Chinese ink painting.

	Use of Computer software	<ul style="list-style-type: none"> • Comparing and contrasting different software and finding suitable software for the ink animation; • Experimenting with ink flow to create the effect of Yi Jing. 	<ul style="list-style-type: none"> • Software: <i>Expresii,</i> <i>Adobe Photoshop,</i> <i>Adobe After Effects.</i>
--	--------------------------	---	--

Fig 8: Diagram showing the multi-method approach used in this research, (Zhang, 2017)

1.10.1 Philosophical methodology

The philosophical breadth of good art and design inquiry can be seen as a powerful methodological tool in itself, with — if recognised — an already established philosophical canon (Macleod and Holdridge, 2006, p.169). Philosophical methodology is a ‘classic’ research methodology which has been strictly defined and is accepted and recognised in a wide range of research areas (Gray and Malins, 1993, p.11).

In regards to my philosophical research methodology, it responds to theoretical context and the preparation of design ideas, to provide an analysis supporting an understanding of the notion of aesthetics within Yi Jing, in order to assist the analysis of my own practice. Through further research, I have adopted multiple methods to support this mode of inquiry, such as contextual review, interview and study trips, to fully analyse and explore the concept of Yi Jing, and to identify its three key principles (sections 2.5, 2.6 and 2.7). The study trips included field visits to prominent libraries in China (Hangzhou, Chongqing, Wuxi and Beijing); and also interviews with the last surviving Chinese ink animation artists who used to work in the traditional methods (Kang in 2016 and Zuo in 2017).

However, the philosophical research was not able to identify a direct connection between Yi Jing and animation. Therefore, the theoretical analysis for both Yi Jing and animation were conducted separately. The theory of Yi Jing first appeared in literary creation and literary criticism (Hai-feng, 2005), and was cited in Chinese ink painting and other fields. With the development of Chinese landscape painting in the Tang dynasty (618–907 CE), the theory of

Yi Jing began to be applied to paintings. In the course of continuous development throughout the millennia, painting has been fully promoted in different artistic fields, such as literature, poetry and calligraphy, etc., thus enriching the connotations of Yi Jing. With the development of Chinese art history, the theory of Yi Jing has been under continuous improvement. Throughout the different historical periods, artists and scholars have continued to integrate their understanding of Yi Jing into existing knowledge and practices, so as to enable others to have a self-understanding of Yi Jing at different levels.

Once the theoretical and philosophical basis are analysed and understood, the findings are then applied to my studio practice via paintings, calligraphy and animation (see sections 5.3–5.5 for more detail).

1.10.1.1 Contextual research

Contextual research indicates theoretical approaches to the research objectives. Here, it started with literature surveys, including an historical overview; approaches; and conceptual and cultural reviews. The literature search used various information sources, including books, databases, journals and the internet to understand in more depth the philosophical notion of Yi Jing. This process eventually led to the conclusion that Yi Jing has three main principles or themes. Namely, they are ‘Tian Ren He Yi’ 天人合一, ‘Yin-Yang’ 阴阳 and ‘Ch’i Yuen Sheng Tung’ 氣韻生動. The diagram below (see figure 9) illustrates my approaches and processes for this research.

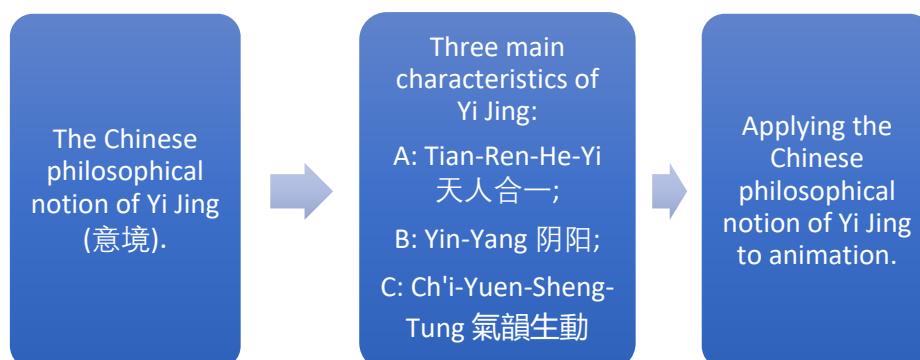


Fig 9: The Yi Jing animation process (Zhang, 2017)

The literature surveys include both Chinese and English texts. The information was mainly gathered from various libraries: at the University of Sunderland in the UK; and the Zhejiang Library, Shanghai Library and Chongqing Library in China. The University of Sunderland's Libraries, Zhejiang Library and Chongqing Library were used to search for information in terms of Yi Jing concepts and relevant reference sources. Most of the Chinese traditional ink animation technical information was gathered from the Shanghai Library.

Additionally, internet searches included the use of search engines such as *Google* and its Chinese equivalent *Baidu* 百度. The keywords used in the initial search were 'Chinese philosophical notion of Yi Jing'; 'Yi Jing and ink animation'; 'Chinese traditional ink animation' and 'Chinese traditional ink animation technique'. In the process of data collection, I found that there is not much comprehensive literature or many documents concerning the combination of Yi Jing and animation, either in the library or online searches; they mostly concentrated on a unitary topic, such as animation, Yi Jing, or ink animation. Simultaneously, it is found that there is a lack of information about Chinese traditional ink animation and Yi Jing in English literature. There are also difficulties in translating related Yi Jing documents in Chinese literature, the main reason being that relevant Yi Jing literature and documents are written in ancient Chinese, which is difficult to understand and translate.

The concept of Yi Jing is a traditional Chinese philosophy, which covers a variety of aesthetic theories, such as art, poetry, literature, architecture, and sculpture, etc. However, there are relatively fewer relevant English sources that are directly related to this topic. In the exploration and analysis of the literature review, I first considered Chinese literature with an English translation; and I have also chosen English articles or books written by overseas Chinese, for example Fung Yulan's *A Short History of Chinese Philosophy* (2012), and articles by Chinese scholars with overseas study experience. For instance, in 1920, Feng Youlan 馮友蘭 entered the Philosophy Department of Columbia University in New York and received his doctorate in

1924. Zong Baihua 宗白華 studied Philosophy and Aesthetics at Frankfurt University and Berlin University in Germany in 1920. Zhu Guangqian 朱光潛 studied English Literature, Philosophy, European Ancient History and Art History at the University of Edinburgh and University College, London in 1925. This is so as to ensure that the relevant theoretical knowledge has a corresponding academic and lexical accuracy in English, such as Sze Mai Mai's *The Way of Chinese Painting* (1956). I have also explored literature related to Chinese art and culture written by Western scholars, to gather a different perspective and vision for understanding Chinese art and theory. For instance, Thorp and Richard Vinograd's *Chinese Art and Culture* (2014) proved to be very enlightening. This made me realize that studying the traditional Chinese philosophical conception of Yi Jing cannot be limited to the study of philosophy and aesthetics, but also needs to be combined with Chinese art and culture. The study of aesthetics is entered from an open perspective, combining many disciplines to form an open research. Simultaneously, this book made me notice that the combination of the history of Chinese aesthetics and the formation of Chinese Yi Jing aesthetics is synchronised with the development of Chinese culture; and it is clearly visible in the context of Chinese history (see figure 14). Lastly, numerous PhD theses from Chinese scholars who studied in the west revealed many examples of cross-cultural research and artistic endeavours that use Yi Jing. These theses (mainly from the University of Sunderland) include Ling (2008), Peng (2014), Jiang (2015) and Guo (2016).

1.10.1.2 Interviews

Interviews were undertaken with experts and scholars from the UK and China, where I used the semi-structured method as suggested by Oppenheim (1992, pp6–67) to allow the interviewees a free flow of thoughts beyond responding to just the questions directly. The interviews are a significant part of the research, as they helped me to understand the Chinese

philosophical notion of Yi Jing; the approaches of Chinese traditional ink painting and calligraphy; and Chinese traditional ink animation techniques and production processes. The following describes the interview details briefly but will be elaborated in Chapters 4 and 5:

- **Interviews 1** (March 2015 & December 2017) were held with my Chinese ink painting tutor Fang Benyou 方本幼 in Shaoxing, China. The main focus of the interviews was discussions on different characteristics, layout and perspectives used in Chinese ink landscape painting. He also explained the principle of ‘Tian Ren He Yi’ expression used in Chinese ink painting. At the same time, he also taught me some Chinese traditional ink painting techniques, such as the ‘PoMo’ and ‘Rubbing Ink’ methods.
- **Interview 2** (March 2015) was carried out with the Chinese calligrapher Dr. He Laisheng 何來勝 in Hangzhou, China. We discussed the Chinese philosophical notion of Yi Jing in calligraphy, and how to control the flow of ink when writing. The interview was important in elucidating aspects of how to express the principle of Ch’i Yuen Sheng Tung 氣韻生動 through calligraphy.
- **Interview 3** (March 2015) was carried out with Professor Chen Dazhong 陳大中 from the China Academy of Art in Hangzhou, China. He revealed his understanding of Yi Jing and the notion of ‘artistic conception’, and how these can be expressed in artworks. Furthermore, he also explained the concept of ‘Yin-Yang’ 陰陽 and the principle of ‘Ch’i Yuen Sheng Tung’ 氣韻生動 and its relationship to Chinese traditional ink painting and calligraphy.
- **Interviews 4** (March 2015 & December 2017) were with Professor Liu Daoguang 劉道廣, in Wuxi, China. He is a Professor in the School of Software and Microelectronics in both Peking University and Northeast University. I first visited him during March 2015, and we discussed how to express and perform the notion of Yi Jing in Chinese ink animation. He further explained what the sense of Yi Jing is for Chinese art and

what are the main differences between Chinese and Western aesthetics and art. The second interview with him was carried out during December 2017, when we talked about the difficulties in the production methods of Chinese traditional ink animation, such as the use of traditional celluloid and the number of exposures used when shooting film.

- **Interview 5** (June 2016) was with Chiu Chun-Chao 邱俊肇 in Newcastle, UK. Chiu is a paperwork technician at Northumbria University. I discussed with him his personal understanding of Yi Jing and relevant research areas; and its importance in Chinese art.
- **Interview 6** (January 2018) was with Zhuo Hejun 卓鹤君 in Hangzhou, China. Zhuo is an artist who was involved in the making of the traditional ink animation *Feeling from Mountain and Water* 山水情, (1988). I asked him about the difficulties of Chinese traditional ink animation techniques, such as how to paint Chinese ink onto celluloid and what kind of blending agent can be mixed with Chinese watercolour to adhere the paint onto the celluloid. We also discussed how to use digital technology to better assist the development of Chinese traditional ink for the future.

Prior to each interview, the intentions and purpose of the research were explained to all the subjects in which they have all granted their consents to reproduce their comments for this thesis.

1.10.1.3 Study trips

Study trips were significant components in supporting my understanding of the Chinese philosophical notion of Yi Jing and Chinese traditional ink animation techniques and production processes. The table below (figure 10) illustrates the detail:

Name	Date	Location	Content
Shanghai Film Museum	Jun 2015	Shanghai, China	Learned about Chinese ink animation development and history, and understanding the four Chinese traditional ink animations' production process, which are 'Feeling from Mountain and Water' 山水情, 'Baby Tadpoles Look for Their Mother' 小蝌蚪找媽媽, 'The Deer's Bell' 鹿铃 and 'The Cowboy's Flute' 牧笛. I have taken photographs of the original drawings and background images of the Chinese ink animation.
Chinese National Film Museum	December 2017	Beijing, China	Explored the origins of Chinese ink animation, the famous ink animation director in each period and the development of the 'Chinese school'. Learned characteristic of Chinese animation in each period and understanding the rise and fall of the Chinese ink animation industry.
Zhejiang Art Museum	July 2015	Hangzhou, China	Discovered the history and development of Chinese traditional ink painting and the characteristics and painting style in each period. Learned the Chinese painting techniques and understanding the significance of Chinese aesthetics for Chinese ink painting.
LanTing Calligraphy Museum	January 2018	Shaoxing, China	Explored the history of calligraphy development. Learned the characteristics of calligraphy in each period and how to express Yi Jing in Chinese calligraphy.
National Art Museum of China	December 2017	Beijing, China	Discovered the development of traditional Chinese ink painting. Learned the Chinese painting style in different periods and the techniques of traditional Chinese ink painting.
Sichuan Fine Arts Institute Gallery	January 2016	Chongqing, China	Visited gallery showing students artwork.
China Academy of Art Gallery and the Crafts Museum	February 2016	Hangzhou, China	Explored the influence of arts and crafts on Chinese arts, and the understanding of the Yi Jing aesthetics applied in arts and crafts.
School of Software and Microelectronics, Peking University (Wuxi) Gallery	February 2016	Wuxi, China	Explored the development of animation in each period. Visited the artworks for ink animation students.

Fig.10. Diagram showing details of the study trips from 2016 to 2018 (Zhang, 2019)

1.10.2 Action research methodology

'Action research is research done by the practitioner in order to improve his/her working conditions or efficacy. The purpose of the research is to solve

a problem the worker/practitioner is having or to investigate a phenomenon he/she has noticed in the course of his/her working life.’ (Carl, 2012)

Through my practical research, an action research methodology is used to combine my theoretical thinking (reflection); and how to apply Yi Jing into traditional Chinese ink animation (intention) and working out how to do this (action). This approach is reflected in the diagram below (figure 11), used by Marshall (1999, p.600)

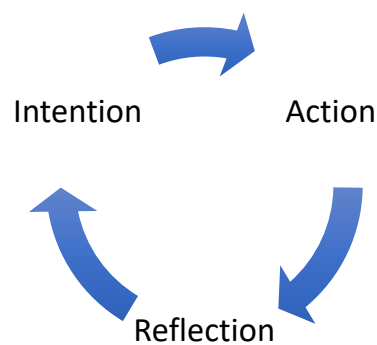


Fig. 11. Diagram by Marshall, (also used in Tani’s PhD thesis 2014, p.40)

The philosopher, psychologist and education reformer John Dewey defined reflection as a purposeful way of thinking, a process of examining past experiences and improving learning behaviour (1933). In his 1910 masterwork *How we think* (2009 edition), he proposed. “What it takes to train ourselves into mastering the art of thinking, and how we can channel our natural curiosity in a productive way when confronted with an overflow of information.”

In 1983, Donald Schön promoted the concept of reflection on the basis of John Dewey’s ideas. He proposed the concept of reflective practice, defined the relationship between reflection and action, and explained how to use reflection to improve professional ability. Therefore, he proposed two different approaches, ‘reflection-in-action’ and ‘reflection-on-action’ (Donald, S, 1983):

- ‘Reflection-in-action’ refers to the act of reflection in the course of action, by constantly

reviewing itself, its behavioural status and performance, and correcting the behaviour in a timely manner, so as to learn how to achieve the goal and considering about solving problems in the process.

- ‘Reflection-on-action’ refers to the behaviour of reflection after an action, by thinking about past experiences, reflecting on past performance, developing new plans for the points that need improvement, and improving the entire learning process.

In the process of these two concepts, if you add your own attention, a loop is formed: this is Kolb’s “Learning Cycle” (1984). Kolb constructed a famous cyclic theory of empirical learning, emphasizing that individuals can learn through experience and practice. One example of this is ‘concrete experience’, where I searched for artists and literature; learned traditional Chinese animation production technology; and summed up the advantages and disadvantages of traditional ink animation technology, based on previous experiences and foundations and developing new experiences or re-explained past experiences. Moreover, ‘Active Experimentation’ is through actual active operation, so as to facilitate the use and practice of learned knowledge. With this approach, I practiced the techniques of traditional Chinese painting, to verify the advantages and disadvantages of the performance of traditional ink animation production techniques. Furthermore, through ‘Abstract Conceptualization’ and thinking and analysis, I systematically convert experience and materials into concepts, and build new knowledge. In this case, based on the concept analysis of whether the *Expresii* software is helpful for making ink animation; what are the advantages and disadvantages and whether it can replace the traditional ink animation production method; and whether it needs improvements (see figure 12 below)?

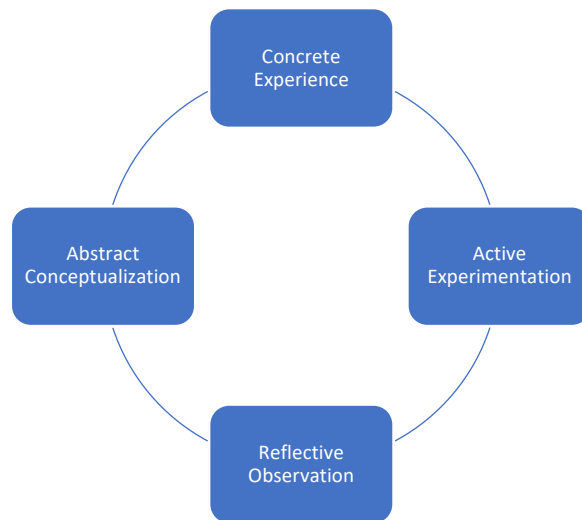


Fig.12. Diagram of Learning Cycle by Zhang (2020)

1.10.2.1 Experimental research

For my Action research methodology, I initially conducted practical experiments to explore the application of Yi Jing to traditional Chinese art, such as painting and calligraphy.

Chinese painting and calligraphy are the two main artistic disciplines that practice the theory of Yi Jing. As the core of traditional Chinese aesthetics, Yi Jing has gone through a long and complicated development process over the millennia. Yi Jing has the nature of modelling, emotion and imagination, which gives Chinese painting a dual structure in aesthetic consciousness. One could describe the parts as the artistic reproduction of objective things and the expression of subjective spirit, and the combination of these two constitute Yi Jing in Chinese art. Yi Jing can in fact be described as the soul of traditional Chinese painting, which objectively can include factors such as composition, abstraction, modelling, brushwork, technique and colouring.

I have also tried traditional Chinese paintings with different principles, in order to separate the Yi Jing into its different elements, i.e. ‘Tian Ren He Yi’, ‘Yin-Yang’ and ‘Ch’i Yuen Sheng Tung’. The actual objective expression and subjective emotional projection make the scenes in

the painting dynamic and static; the expressions are lively and vivid. The creation of Yi Jing in painting is manifested in various aspects, such as line changes, colour levels, and the appearance of scenery and so on, leaving spaces for viewers to imagine, and at the same time incorporating one's emotions when painting.

Yi Jing is also a reflection of the artist's sense of aesthetics, where it relates not only to the beauty of the painting, but also expresses the emotion of the painter. It is a refined concentration of objective things, coupled with the combination of human thoughts and emotions. It is a state of art expressed through a higher degree of artistic processing, to achieve feeling and setting blended harmoniously together. (Worldlee Gallery, 2017)

During the research I intended to re-discover the lost techniques of traditional Chinese animation, but this has proved very difficult and I decided to use the *Expresii* Software instead to speed up the process. Through studio tests, I compared the effects of *Expresii* digital simulation of ink painting and traditional Chinese ink painting on material simulation and picture effect simulation. From this experimentation, I found two significant features:

- *Expresii* uses digital simulation of materials used in Chinese ink painting and painting processes. It can reproduce realistic digital simulation of brush strokes, different densities and opacity of Xuan paper materials, and painting methods. Some of the main unique features include the simulation of the angle of the brush strokes, the wetness of the brush and the splaying of the brush bristles to transcribe texture onto the page.
- The other main feature of the *Expresii* software is its ability to simulate the spread and smudge of ink on Xuan paper. This virtual simulation is very close to the real thing, showing a sense of flow, layering and dynamism.

Based on the two points raised above, the principle technical characteristics focus on 'drawing' animation, rather than 'making' the animation (which modern animation studios focus on). In

this regard, it is more in line with the characteristics of traditional Chinese ink animation production.

Once I had established a working method, a short piece of animation entitled *Buffalo* (2017) was created to test out the software. There are five stages to this research process, which are outlined below (see figure 13):

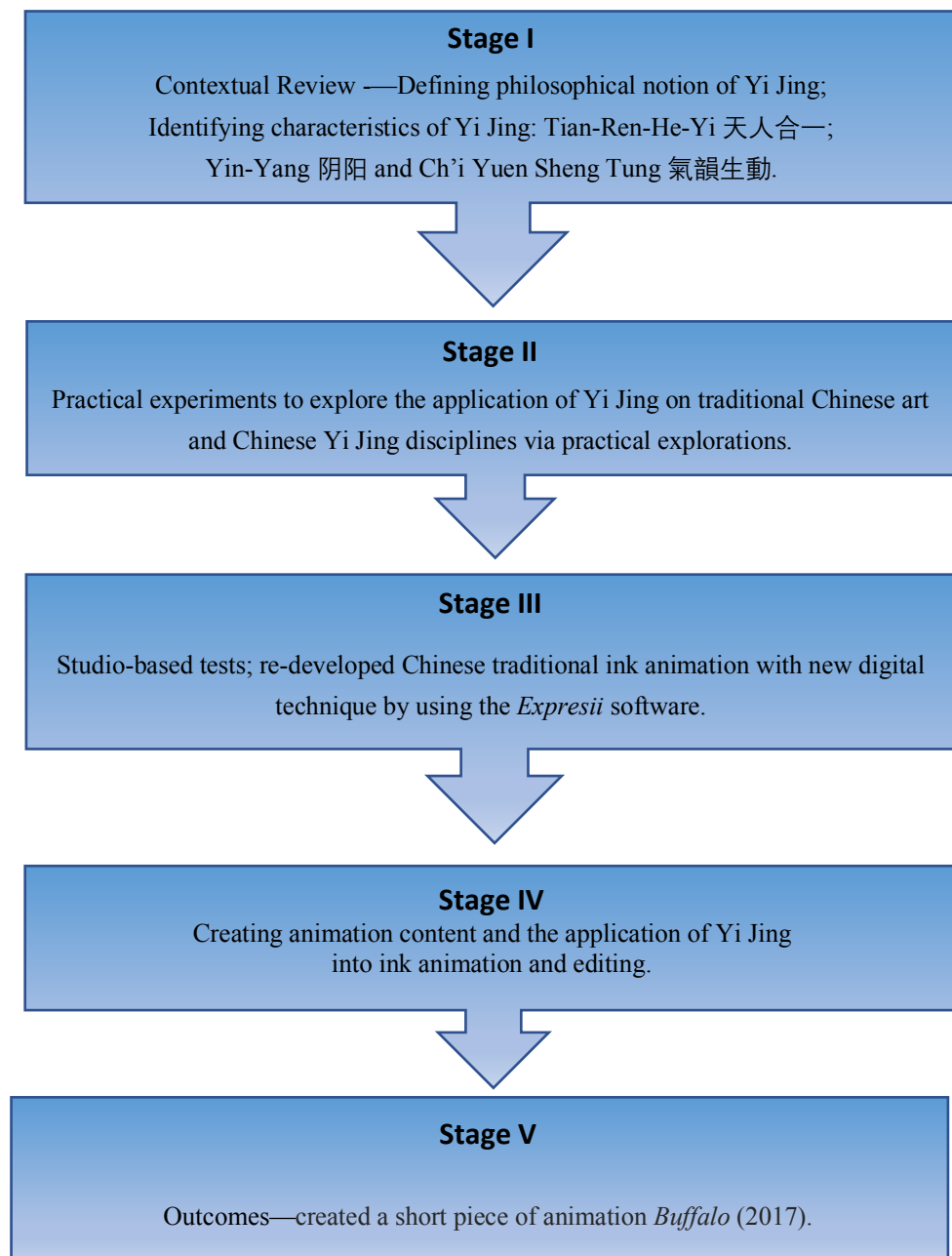


Fig. 13. Diagram demonstrating the five stages of animation research (Zhang, 2018)

Throughout my experimental research, the advantages and disadvantages of different materials and medium were analysed and recorded. A comparison test was also conducted (see chapter 4) to test the production time for traditional methods and that of using the *Expresii* software.

Additionally, in my experimental research I conducted practical work to develop the ‘PoMo’ and ‘Rubbing Ink’ methods for the designing of the background for the animation, instead of using a traditional ink animation background.

1.10.2.2 Technical research

Technical research was conducted to test Chinese traditional ink animation. The experiments were used to test the adhesive qualities of Chinese ink and Chinese watercolour on celluloid and other materials. Notably, the studio-based work also experimented with the video recording of the flow of ink, which enabled the expression of ‘Ch’i Yuen Sheng Tung’ and essential studio practice to explore Chinese traditional ink animation, using photographic exposure techniques (see chapter 4 for further detail).

1.10.2.3 Analysis of Yi Jing and its application to animation

This research evaluates and analyses the Chinese philosophical notion of Yi Jing and its application to animation. The initial stage involves analysing Yi Jing and its philosophical concepts and characteristics. During this stage the analysis helps to prepare the research ideas. The second stage is to conduct experiments to determine how Yi Jing can be expressed via ink painting on different surfaces, such as celluloid, glass, plastic, Xuan paper, Korean paper, etc. The third stage involves experimenting with traditional Chinese ink animation methods and the use of different software to evaluate the best approach to develop Chinese ink animation. The fourth stage entails experimenting with the ‘PoMo’ and ‘Rubbing Ink’ methods to design the background for the animation. The final stage analyses and reflects upon the findings, which are then developed into Chinese ink animation (for details of the tests, see Chapters 3 and 4).

1.10.2.4 Use of computer software

The experimentation with computer software contains two stages. The initial stage involves using digital software and processes to replicate traditional Chinese ink animation techniques. *Photoshop* software was used to cut out images (painted background or animated characters) and to make adjustments. Also, an experiment was conducted to produce a short video through using the software *After Effects*. For the second stage, as explained above, I used the painting software called *Expresii* (Chu, 2015). This programme can digitally replicate authentic flow of ink on different pseudo-surfaces (digital paper, canvas, etc), which also speeds up the animation process.

As mentioned above, this research relies on using *Expresii* to create the ink animation. The technical characteristics focus on ‘drawing’ the animation, not the ‘making’ of animation that modern animation studios focus on. In other words, using this software with traditional Chinese painting techniques would better express the diverse characteristics of ink painting under the premise of digitization. This is unmatched by ordinary digital software like *Photoshop*, *Flash* or *Toon Boom* (2D animation software). Traditional Chinese ink painting techniques can better express the artist’s emotions through brush strokes, and the expression of emotions is an important aspect in the formation of Yi Jing in artistic works. In my opinion, using traditional Chinese ink painting techniques is more in keeping with the characteristics of traditional ink animation. For further information on this discourse, please refer to Chapter 5.

1.11 The outline of this thesis

Chapter 1 introduces the research background, research motivation and research rationale, the research aims and objectives, and the research methodologies.

Chapter 2 presents the contextual review of Yi Jing, which includes its origins and historical background, principles, characteristics and relevant cultural contexts identified from the research. Additionally, it contains the explanation of the Chinese philosophical notion of Yi Jing and its relationship to Chinese traditional ink animation.

Chapter 3 documents traditional Chinese ink animation to determine its limits and identify examples of good practice. Comparisons of various characteristics of digital media and traditional ink animation approaches are also conducted. Issues concerning the Chinese animation industry and potential opportunities are also analysed.

Chapter 4 explores and interprets Chinese traditional ink animation techniques, materials and processes. In addition, practical work is carried out with different materials to draw Chinese ink paintings for analysis and evaluation. The practical work also seeks and identifies the Chinese notion of Yi Jing in Chinese ink painting and ink animation.

Chapter 5 describes my exploration of Chinese traditional ink painting, using the ‘PoMo’ and ‘Rubbing Ink’ methods. These experiments led to the development of new styles of ‘PoMo’ and ‘Rubbing Ink’ for ink animation backgrounds. This chapter also outlines my experimentation with the painting software *Expresii*, and how I have created new approaches to develop Chinese traditional ink animation from it.

Chapter 6 is the Conclusion chapter, which summarises the findings and outcomes of this thesis and states my contribution to knowledge and ideas for further research.

Chapter Two: Contextual Review

2.1 Introduction

This chapter provides an overview and focuses upon the Chinese philosophical notion of Yi Jing theory combined with Taoism and Confucianism, to provide a tool with which to investigate aspects of Chinese traditional aesthetic concepts. It is significant, firstly therefore, to analyse the context of the Chinese notion of Yi Jing and to provide a working definition.

This research seeks to present and explain key elements of Yi Jing theory so as to develop a terminology that relates strongly to Chinese cultural and historical contexts of Chinese ink painting, calligraphy and Chinese traditional ink animation.

2.2 The origins of Yi Jing theory

In Chao Chun's PhD Research, he wrote that "the Yi Jing theory is a widespread and common aesthetic system which permeates the traditional Chinese aesthetics and Chinese cultural background" (p11, 2005). This implies that Yi Jing is a universal concept and typically it can be found in Chinese ink painting, calligraphy, poetry, opera, garden design, rock carvings, etc. The concept of Yi Jing facilitates the artist or artisan in expressing personal emotions through their artwork. In addition, Yi Jing can also be used to measure or ascertain the standard of the artists or artisans, and the quality and beauty of their creation. Historically, the theory of Yi Jing originated from the Taoist philosophical theory of the pre-Qin 先秦 period (770–221 BCE). With the development of Buddhism in the Wei-Ch'ing 魏晉 Dynasties (265–420 CE), the Chinese Yi Jing theory incorporates some of the concepts of Buddhism. Then, in the Tang 唐 Dynasty (618–907 CE), Yi Jing theory begins to appear in artistic conception and poetry. After the Song 宋 Dynasty (960–1279 CE), the concept of Yi Jing in Chinese aesthetics gradually

matured. When it comes to the Ming 明 dynasty (1368–1644 CE) and the Qing 清 dynasty (1636–1912 CE), the development of Yi Jing has matured and established itself as a symbolic and specific feature in Chinese art and culture.

As we can see, the formation and development of Yi Jing has gone through a very long and complicated evolution and process. On the basis of my research into the development of ancient Chinese literary theory, Yi Jing can be divided into three major periods of evolution.

In its earliest form, Yi Jing is an embodied philosophy. The founder of Taoism, Lao Tzu 老子 (approximately 571-471 BCE), has portrayed ‘Tao’ as the life of the universe. The *Book of Changes* (10th–4th century BCE) and the philosopher Zhuang Tzu 庄子 (approximately 369–286 BCE) discussed the terms ‘Yi’ (意) and ‘Jing’ (境), which laid out the philosophical theory and basis of Yi Jing. The ancient Chinese ideologists and philosophers generally emphasized the use of natural and subtle language to express the essence of the universe and life, and emphasised the use of scenes (either virtual or real) to create artistic expressions in art.

In the Tang Dynasty, the theory of Yi Jing was officially formed, expressed via poetry, ink painting, calligraphy, sculpture and so on. From the Song to Qing Dynasties, Yi Jing developed into a mature theory. During this period, many scholars extensively explored the relationship between ‘Yi’ and ‘Jing’ as a form of expression through the use of artistic endeavours (Liu and Li 1987).

In recent times, the concept of Yi Jing has not been explored in depth and most artists would simply translate Yi Jing as ‘artistic conception’ without a knowledgeable basis or understanding. This suggests a lack of philosophical vision or depth of analysis and questioning

of the philosophical ontology and the demarcation of aesthetics. Furthermore, the concept of Yi Jing is subject to an individual's response to their own understanding, and how in term, they can express their philosophical understanding in their art. This suggests Yi Jing is a manifestation of aesthetics, limited to personal experience. It is a profound concept, and many would say you can see it, but cannot touch it, and you may have feelings for it but would find it difficult to articulate it (Zong 1981, reprinted 2007). If the artist can create work that has a sense of Yi Jing, the viewer can also sense it by looking at it. In short, the limitation is up to one's own interpretation of what Yi Jing might be.

2.3 Aesthetics as a philosophical category

2.3.1 History of aesthetics

Western and Chinese aesthetics have a history of development of more than two thousand years. It is generally believed that the history of Western aesthetics began with Socrates (470–399 BCE) and Plato (427–347 BCE), although before them, Pythagoras (570–495 BCE) and others had begun to discuss the notion of a sense of beauty. Likewise, in Chinese history, the philosophy of aesthetic theories can also be traced back to the times of Lao Tzu (571–471 BCE), Confucius 孔子 (551–479 BCE) and Zhuangzi 莊子 (369–286 BCE).

In 1750, the German philosopher Alexander Gottlieb Baumgarten (1714–1762 CE) first proposed the concept of aesthetics in his book *Aesthetica*, arguing that it is necessary to give art an appropriate place in the philosophical system to address the philosophy of beauty, and as an independent field in theoretical research.

Therefore, one could say that the study of aesthetic theory is a branch of philosophy, and the research object is the world of human life. Similarly, aesthetics is an experience, a spiritual

enjoyment that occurs when all things in the world are regarded as a part of the self — a super-utilitarian spiritual pleasure. Aesthetics and art, psychology, linguistics, anthropology, mythology, sociology, folklore and cultural history are all closely linked. Aesthetics can satisfy people's sense of beauty, allowing them to access a state of happiness and a spiritual realm, promoting the improvement of human nature and enhancing personal cultivation, so as to pursue a more meaningful, more valuable and more interesting life (Ye, 2005).

2.3.2 The origins of Chinese aesthetics

The basis of Chinese aesthetics was developed from Taoism, which was founded by Lao Tzu and is centred on the concept of 'Tao' or 'the way' or 'the path'. It focuses on the 'Yin' and 'Yang', the principles of nature — the positive and negative forces of the universe. One cannot exist without the other. Taoism believes the 'Tao' is the origin of the universe and creates all living beings. Taoism also encourages people to live in harmony with nature, instead of against it, and understands nature as constantly changing. (Feng, 2012)

Lao Tzu proposed a series of categories related to aesthetics, such as 'Tao' 道, which means road, path, way; method, standard, or doctrine; 'Ch'i' 氣, which means spirit, vapor, breath, air, manner, influence or weather; 'Xiang' 象, meaning likeness or symbol; 'You' 有, meaning to have; 'Wu' 無, meaning none or emptiness; 'Xu' 虛, virtual or imaginary; 'Shi' 實, meaning reality: solid, actual, real, true or authentic; 'Miao' 妙, meaning wonderful; and 'Zi-ran' 自然, meaning naturalness, spontaneity and spontaneity. These concepts have had a huge influence on the formation of Chinese classical aesthetics, and also constituted the basic elements of Chinese classical aesthetics. The concepts of 'Tian Ren He Yi' (the harmony of man and nature), 'Yin-Yang', and 'Ch'i Yuen Sheng Tung' (rhythmic vitality) in Chinese classical aesthetics are also extended and developed by philosophers and aestheticians in different

periods of history. For example, the concepts of Ch'i Yuen Sheng Tung and Tian Ren He Yi are developed through elements such as 'Tao' and 'Ch'i'. The concept of Yin Yang is developed through some of the elements mentioned above, such as 'have', 'none', 'virtual' and 'reality'.

It can be regarded that classical Chinese aesthetics came from Lao Tzu's philosophy and doctrine, which pushed forward the comprehensive concept of Yi Jing, as well as Ch'i Yuen Sheng Tung, Ying Yang and so on. Therefore, whether from a historical or a logical perspective, Lao Tzu's aesthetics can be regarded as the starting point of the history of Chinese aesthetics and its origin. In the table below (figure 14) I have outlined the specific development stages of Chinese aesthetics.

The development stage of Chinese aesthetics	Period	Status	Overview
The beginning of Chinese classical aesthetics	The Spring and Autumn period (770–221BCE)	The first golden age in the history of Chinese aesthetics.	<p>There has been emancipation of the mind, the contention of a 'Hundred Schools of Thought' for philosophical theories, and theoretical thinking is very active.</p> <p>In this period: Lao Tzu 老子 (ca.571–471 BCE), Confucius 孔子 (ca.551–479BCE), Zhuangzi 莊子 (ca.369–286 BCE), Xunzi 荀子 (ca.313–238 BCE) and other great philosophers developed aesthetics as part of their philosophical system.</p> <p>This is the beginning of the development of Chinese aesthetics. During this period, people generally paid attention to the aesthetic concept of Confucius. However, from the perspective of historical influence, Lao Tzu and Zhuangzi are also important.</p>
	Western and Eastern Han Dynasty (202 BCE–220 CE.)	Aesthetics in the Han Dynasty was a transitional form between the pre-Qin aesthetics and the Wei, Jin, Southern and Northern Dynasties. It was developed and summarized on the basis of pre-Qin aesthetics, with an obvious transitional nature.	

The development of Chinese ancient aesthetics	Wei, Jin, Southern and Northern Dynasties to Ming Dynasty (220–1644 CE)	The second golden period in the history of Chinese aesthetics	The Wei, Jin, and Northern and Southern Dynasties were an era of major social and economic changes, but also of political turmoil. During this period, there was again a situation of ideological emancipation. This is the second time since the pre-Qin Dynasty that there has been the contention of a ‘Hundred Schools of Thought’ for philosophical theories.
			During the Tang and Song Dynasties, China's politics, economy and culture gained a high degree of prosperity. This period has an important position in the history of Chinese aesthetics. Aesthetics began to form a standard paradigm during this period, with academic features, which move closer to the aesthetic needs of life and sentiment.
			In the late Ming Dynasty, the thought trend appeared in Li Zhi's 李贄 (1527–1602 CE) philosophy. His philosophy includes aesthetic theories and categories, which expanded the theoretical horizon of aesthetics during this period.
Summary of Chinese classical aesthetics	Late Ming Dynasty to Early Qing Dynasty (1636–1722 CE)	The third golden period in the history of Chinese aesthetics	At the end of the Ming Dynasty, Wang Fuzi 王夫之 (1619–1692 CE) and Ye Xie 葉燮 (1627–1703 CE) expanded on the system of aesthetics. Meanwhile, Shi Tao 石濤 (1642–1708 CE) wrote <i>The Treatise on the Philosophy of Painting—Hua Yu Lu</i> 畫語錄 and Liu Zizai 劉熙載 (1813–1881 CE) wrote the <i>The Generalisation of Art—Yi Gai</i> 藝概 which are both summaries of Chinese classical aesthetics.
Modern Chinese Aesthetics	From the late Qing Dynasty to the period of the Republic of China	This period was a summary and criticism of Chinese classical aesthetics, and simultaneously, imported and introduced Western aesthetic ideas. It is a period of innovation for classical aesthetics	The development of modern Chinese aesthetics can be attributed to: Liang Qichao 梁啟超 (1873–1929 CE) and Wang Guowe 王國維 (1877–1927 CE). They both introduced Western aesthetics and tried to combine it with Chinese aesthetics. In the same period, Lu Xu 魯迅 (1881–1936 CE), Cai Yuanpei 蔡元培 (1868–1940 CE) and Li Dazhao 李大釗 (1889–1927 CE) and others put forward corresponding aesthetic viewpoints in literature, education, and materialism.

Fig. 14. The developmental stages of Chinese aesthetics (Zhang, 2020)

2.3.3 The influence of Taoism and Confucianism

Aesthetic theories can have an immense influence on artistic creation. There have been numerous Chinese aesthetic theories throughout Chinese history, and they have formed a unique artistic style of Chinese paintings; among them, Confucianism and Taoism have had the most impact.

The Confucianism represented by Confucius (551–479 BCE) and Mencius (372–289 BCE), and the Taoism represented by Lao Tzu and Chuang Tzu, have jointly laid the foundation of traditional Chinese thoughts and culture. As the two main schools of thought in ancient China, there are obvious differences in ideology between them. However, these differences are not diametrically opposed and can be merged with each other, which does not constitute a direct conflict. (Ma, 2010)

The Confucian school (Confucius and Mencius) believe that ‘beauty’ comes from the ‘Xin’ 心. The direct translation of ‘xin’ is the heart (as in the organ), but sometimes it can also be interpreted as the ‘mind’. The ancient Chinese believed that the heart is at the centre of human cognition. Therefore, ‘xin’ can also be interpreted as ‘heart-mind’.

Aesthetics and art play a special role in people’s subjective cultivation to reach the spiritual realm of ‘benevolence’ (Ye, 2005, p.42), which is a cultivation of subjective consciousness that originates from the ‘xin’ or ‘heart-mind’. Confucius maintained that, in order for art to produce positive works in society, art itself must be regulated. He believed that art must reach the requirements of ‘benevolence’ and include moral content, which in turn suggests the unity of ‘beauty’ and ‘goodness’.

Mencius's aesthetic theory points out two significant factors that lead to the creation of art: the first is the exposition on the beauty of personality, and the second is on the commonality of beauty. That is to say, Confucian theories are highly concerned with the role of human heart-mind in the process of art production and emphasize that artworks should truly reflect the creator's meta-spiritual world or 'self-being' (Ling, 2008)

The Taoist school argues that 'beauty' originated from 'Tao', which points out that 'beauty' is not an essential category in Lao Tzu's aesthetics. They believe beauty belongs to the inter-related categories of 'Tao' 道, 'Ch'i' 氣 and 'Xiang' 象 (Ye, 2005, p.24), which originated in a natural way following the laws of the universe. Lao Tzu believes that 'Tao' is a meta-spirit that is invisible, inaudible and untouchable. All the things of noumenon and life are known as 'Ch'i', which is also the 'Tao'. Everything contains the two opposite aspects of 'Yin' and 'Yang', which are unified in Ch'i, and the 'Xiang' refers to the shape of the objects. If the object is separated from the Tao and Ch'i (noumenon and life), it will turn into a meaningless body. This is the original concept of 'Tian Ren He Yi' 天人合一 and 'Ch'i Yuen' 氣韻. After them, the aestheticians in the Wei, Jin, Southern and Northern Dynasties put forward the proposition of 'Ch'i Yuen Sheng Tung' 氣韻生动, which would indicate that the artist must express the noumenon and life of the universe (Tao and Ch'i) in their artwork (Ye, 2005, p.27). Therefore, the Taoist school believes that art is the highest and most beautiful state only if one can achieve a way with 'Tao'. From the perspective of artistic creation, the creative psychology of Taoism is 'Wu Wei' 無為 (meaning inaction): to achieve harmony in the purification of the individual's mind, removing the distractions of the inner-self and observing the universe.

The Taoist school's theory does not deny that 'beauty' is created by the human heart-mind (Xin), which maintains the mind is ultimately a manifestation of the way of nature and an

intermediary between man and nature. It can be seen that the views of Taoism and Confucianism on the ultimate roots of ‘beauty’ are only different in emphasis; Confucianism focuses on people’s heart-mind, and Taoism focuses on the way of nature.

Confucianism and Taoism not only influence the artist’s understanding of ‘beauty’, but also point out the qualities the artist needs. Taoism and Confucianism are combined and integrated, and the fusion of different ideas allows the artist to gain balance and strength. In 1781, the artist Shen Tsung-Ch’ien 沈宗騫 wrote *Chieh Chou’s Learning on Painting*, (*Chieh Chou Hsueh Hua Pien*) 芥舟學畫篇, which points out four noble qualities that artists should possess:

“To purify your heart in order to eliminate vulgar worries,
To read books widely in order to understand the realm of the principles,
To renounce early reputation in order to become far-reaching,
To associate with cultivated people in order to rectify your style.”

(Rowley, 1974, p.13)

The first and third sentences are Taoist theories, and the second and fourth sentences are Confucian theories. Therefore, Confucianism and Taoism are inter-twined in Chinese artistic theory. It affects not only the ‘beauty’ of art, but also the artist’s own ‘beauty’ in terms of their character, personality and morality.

2.3.4 Chinese philosophical notion of Yi Jing, with sources from Taoism and Confucianism

Yi Jing is the most vital category of aesthetics in ancient Chinese culture. Throughout Chinese history, the axis for the development of aesthetics is predominantly based on the relationship

between man and nature; and it is on this axis that the Yi Jing category and theory were formed (Gu, 2001, p.2). This is a cultural and historical phenomenon formed with Chinese characteristics and it is also a traditional social and cultural mindset of Chinese people.

The notion of Yi Jing is sourced from ancient Chinese philosophical theories, which originated from ancient Chinese understanding of the cosmic life of consciousness. As described by the Chinese philosopher Zong Baihua (1981, p.70), the foundation of Yi Jing theories is developed from a combination of philosophical influences from Confucianism, Taoism, and Buddhism. The beliefs of Confucianism, Taoism and Buddhism prepared the basic philosophical theory for Yi Jing's aesthetic ideology. Zong considers that the conception of Yi Jing is a manifestation of the sentiment of human life; growth in nature, with countless changes, and it is an aesthetic category that has a profound perception of cosmic life.

When Yi Jing is analysed from a theoretical viewpoint, it is usually judged in terms of categories such as poetics, literature, art and aesthetics. It is a concept of synchronism, with the theoretical concepts of elasticity and tension, and there are no fixed parameters. From the perspective of historical development, Yi Jing first appeared in the field of poetry during the Tang and Song Dynasties. After the Yuan and Ming Dynasties, the concept and theory of Yi Jing gradually developed into other literary categories. Since modern times, with the introduction of Western aesthetics and the construction of the Chinese aesthetic system, Yi Jing has become an aesthetic category. It is important to highlight that the value and range of Yi Jing is not limited to just the historical context, but it also plays an important role in the development of Chinese aesthetics (Feng, p.27)

It is for precisely these reasons that the attributes of Yi Jing in Chinese traditional aesthetics have become more prominent, where it draws from the following points:

- a) **Polysemy and ambiguity.** Most of the Yi Jing categories from ancient Chinese artists or philosophers did not provide clear definitions and boundaries, hence causing a variety of meanings and interpretations.
- b) **Inheritance and variability.** The theory of Yi Jing is not limited to a certain school. Confucianism, the Taoist school and Buddhism all have their concepts of Yi Jing and inheriting the spirit and value of Yi Jing has become a common category during the past dynasties. However, in the process of inheritance, the connotation of the category has undergone historical changes, and the connotation has become diverse.
- c) **Continuity and interoperability.** The concept category of Yi Jing in ancient Chinese aesthetics is coherent and is inter-linked to all the artistic activities. For instance, the category of ‘Ch’i’ belongs to art creation and appreciation activities, the artwork and the artists themselves.
- d) **Intuition and integrity.** Many categories of Yi Jing rely on intuition and conceptual thinking about the processes and the end product. The connotation of the aesthetics can only be felt, but is difficult to describe or articulate. For example, in the category of ‘Miao’ 妙 (wonderful), it is hard to describe what kind of artwork is ‘Miao’ and how to appreciate the wonder of the work. This is largely dependent on how each person understands the Yi Jing in the work. It is almost impossible to refer to it in words, but it is based on a kind of intuition and without necessarily an intellectual analysis — it must be grasped as a whole.
- e) **Flexibility and arbitrariness.** Ancient Chinese aesthetics used the flexibility of words, phrases or terminology to create or describe many new aesthetic categories, such as the addition of ‘Ch’i’ and ‘Yuen’ to form the word ‘Ch’i Yuen Sheng Tung’; the ‘Man’ and

‘Nature’ combined into ‘Tian-Ren-He-Yi’; and ‘Virtual’ and ‘Reality’ constitute ‘Yin and Yang’. Hence, a main aesthetics category can breed a huge series of sub-categories.

Zong Baihua 宗白華 mentioned in his book *Strolling in Aesthetics* 美學散步 (1981, reprinted 2007) the concept of Yi Jing and that there are five levels of contact between people and the world due to different levels of relationship:

- i. To meet physical material needs, and have a utilitarian state;
- ii. There is an ethical realm due to the interdependence of the crowd and mutual love;
- iii. There is a political realm because of the mutual restraint of the crowd association;
- iv. There is an academic realm because of the pursuit of wisdom;
- v. There is a religious realm because of the pursuit of spiritual practice and sentiment (return to nature).

It can be argued that the utilitarian realm is profit, the ethical realm is love, the political realm is power, the academic realm is truth, and the religious realm is with God. Between the academic and the religious realms there is the cosmic life of the object; where one can explore the inner reflection of the self. This transforms the physical scene into a virtual scene and creates an expression of an image in the heart-mind — this is the Yi Jing, and it is humanity’s highest expression of beauty (p.69).

2.3.5 The writing of Chuang Tzu in Taoism and Yi Jing

Chuang Tzu (369–286BCE) is an important scholar in Taoism, and his aesthetic theories concentrate on the discussion of the concepts of “freedom”, “beauty” and “aesthetics”. He proclaimed there are two meanings in the history of Chinese aesthetics: one is the establishment of a theory of the aesthetic mind and the other is ‘freedom’, which is an aesthetic realm (Ye,

2005 p106). Simultaneously, these aesthetic theories also play an important role in Chinese artistic creation, mainly reflected in the pattern of artistic creation, the artist's spiritual realm and creation (Wang, 2019).

Chuang Tzu believes that Tao is the noumenon of the universe and is the highest and absolute beauty. However, in the Chinese classical aesthetic system, 'beauty' and 'ugliness' are not the highest categories, they belong to a relatively low category. For a natural thing or an artwork, people focus on expressing the vitality of 'Ch'i' in the universe, rather than 'beauty' and 'ugliness'. As long as it can express vitality, 'ugliness' also can become 'beautiful'; this is a kind of freedom of the spiritual realm in the definition of the aesthetic relationship between 'beauty' and 'ugliness'.

Paradoxically, the aesthetic feeling of this spiritual realm is beyond description in words. Chuang Tzu maintains that aesthetics are different from learning knowledge; whereas knowledge can be realized and grasped with the support of language, aesthetics must be felt by oneself and experienced by the soul. That is to say, aesthetics is an individual spiritual activity and a way of feeling Yi Jing, without necessarily having to talk about it (Chen, 1998, p153). In Chapter 26 of Lao Tzu's *External Things* (translated by Burton Watson in 1969) it says: "The fish trap exists because of the fish. Once you've gotten the fish, you can forget the trap. The rabbit snare exists because of the rabbit; once you've gotten the rabbit, you can forget the snare. Words exist because of the meaning. Once you've gotten the meaning, you can forget the words. Where can I find a man who has forgotten words, so I can have a word with him?"

Quoting Chuang Tzu's statement is a significant proposition and particularly relevant to artistic appreciation. Any artwork must rely to a certain extent on inter-mediality: literature must use

language for expression; painting needs colour and line for display and music relies on musical tones for communication. For art appreciation, familiarity and grasp of the material medium that constitutes the artistic image is not the ultimate goal. The purpose is to better understand and comprehend the artistic image, and therefore, in the realms of aesthetics, one can ‘forget’ the material medium that conveys the artistic image, the form and content of the art. One can be completely immersed in the overall realm depicted by the artistic image and this can be considered the highest level of aesthetics, which in itself is Yi Jing.

Lao Tzu also attached importance to the natural beauty of life, supposing that both life and art advocate the true state of life and nature. He emphasised ‘harmony’ and ‘unity’ which came from the philosophical notion of ‘Tian Ren He Yi’, the ‘harmony between Man and Nature’, a term developed in the Song Dynasty. The idea of Tian Ren He Yi during this period was not perfect from a philosophical point of view; Lao Tzu insisted that all human lives are determined by God’s will, in that ‘Man’ cannot change the heavens, but should obey it. From an aesthetic point of view, this is a kind of aesthetic interest of the highest personal ideal and life status.

2.4 The interpretation of the theory of Yi Jing from Chinese artists

The Chinese ancient philosophy of Yi Jing has undergone a long and complicated development. Although Yi Jing is the core category of Chinese classical literary theory and Chinese traditional aesthetics, there is no doubt that its development was enhanced and further developed by other artists throughout the centuries.

In the late Qing Dynasty, the scholar Wang Guowei 王國維 (1909) wrote a book on Chinese aesthetics called *Poetic Remark on the Human World* 人間詞話, where he mentions the ‘Jing Jie Theory’ 境界說. He explains that Yi Jing ‘denotes a perfect aesthetic fusion of artistic idea

(or feeling) with a concrete scene’ (Pohl, 2009). Wang emphasises the emotional expression in the artists’ creation and he is a significant scholar in developing a more modern interpretation of Yi Jing from its ancient basis.

Zhu Guangqian 朱光潜 introduces psychology into the study of Yi Jing (1932). On the basis of Wang’s earlier theory, Zhu introduces the ‘Conformity Theory’ 契合说, which suggests that Yi Jing is the combination of ‘emotion’ 情趣 and ‘imagery’ 意象. He refers to Yi Jing as intuition, emphasizing its subjectivity. He advocates the creative skill of ‘subject empathy in the scene’ and thinks the image and emotions of life are created by the artist.

For the general theory of Yi Jing, the aesthetician and philosopher Zong Baihua 宗白华 incorporated Yi Jing into Chinese literature and art. He believes that Yi Jing is a ‘combination of virtual and reality’ 虚与实的结合, and further clarifies that the essential feature of Yi Jing is not limited to the combination of ‘emotion’ and ‘imagery’, but a multiple combination of artists’ personality and the ‘Taoism’ 道 of the universal life.

The author Ye Lang 叶朗 has a more modern interpretation of the theory of Yi Jing where he suggests its cultural context is varied and is not limited to the ‘Tao’ or ‘Ch’an’ (禅) (the earlier form of Zen), affirming Yi Jing as a category of universal aesthetics (Ye, 2005, pp 2–5).

2.5 The principle of ‘Tian Ren He Yi’ 天人合一(Harmony between Man and Nature)

‘Tian Ren He Yi’ is the philosophical basis of Chinese classical aesthetics, and is also an aesthetic proposition. Tian Ren He Yi is based on the theory of ‘mind-nature’ (the essence of human heart). Chen (1998), in his journal *The Aesthetic Meaning of Tian Ren He Yi* mentioned that ‘Tian’ is human emotion by nature, transformed ‘human emotions’ to human feelings, and combined the human emotions and human feelings into one, thus constituting the

aesthetic imagery. The Tian Ren He Yi is therefore a mode of life, which takes ‘life’ as the root and the connection between life and nature as the highest level: it is an aesthetic realm beyond our understanding.

Moreover, in traditional Chinese philosophy, the concept of Tian Ren He Yi has profound influence on Chinese culture. It is usually interpreted as ‘harmony between man and nature’ and pursues the unity of man and the world. It involves the ideas of ‘integration of knowledge and practice’ (Tang and Li, 2004, p.13) and the ‘integration of feeling and scenery’ (Tang, 1991 p.204), and also includes the creation and appreciation of works of art.

The concepts of ‘Tian’ 天 and ‘Ren’ 人, are differently interpreted by the different philosophers of Confucianism and Taoism. It is generally maintained that ‘Way of Heaven’ 天道 refers to the universe or the foundation of the universe; and the ‘Way of Man’ 人道 usually refers to human beings or human society; the relationship between ‘Heaven’ and ‘Man’ has been a continuous subject studied by Chinese scholars for hundreds years.

In ancient China, the idea of Tian Ren He Yi occupies an essential position in Chinese traditional culture. Historically, the theory of Tian Ren He Yi has gone through three stages of development: pre-Qin/early Western Han; Song Dynasty; to Ming Dynasty, by which time the theory of Tian Ren He Yi began to have a profound impact on all aspects of Chinese traditional culture, such as science, ethics, morality, aesthetic consciousness and so on.

The Confucian’s interpretation of ‘Tian’ (Heaven) contains a moral meaning — where ‘Tian’ regulates human personality and morality, and obedience is necessary for an orderly society, the achievement of which will lead ‘Tian’ to pay back to its people; otherwise, ‘Tian’ will

punish them. Therefore, it can be concluded that the relationship between ‘Tian’ and ‘Ren’ (Heaven and Man) involves a kind of spiritual relationship between God and man, where ‘Tian’ has moral attributes.

By contrast, in Taoism, the interpretation of ‘Tian’ is nature itself and has no moral connotations. Consequently, one can denote that Tian Ren He Yi in Confucianism is basically the unification of man and God, and the act of social morality in a person. Tian Ren He Yi in Taoism, on the other hand, is more concerned with a harmonious unity between man and nature.

From an aesthetic point of view, Taoism’s interpretation of Tian Ren He Yi is perhaps more significant. Lao Tzu said: ‘The ways of men are conditioned by those of earth. The ways of earth, by those of heaven. The ways of heaven by those of Tao, and the ways of Tao by the Self-so’ (translated by Waley, 1934). Lao Tzu believes that the integration of Man’s nature is ‘Tao’, which is the highest principle; people must be in awe and follow nature. On the basis of Lao Tzu and Chuang Tzu’s doctrine, they refer to people’s spiritual realm. The latter said in the self-titled *Chuang Tzu* (莊子) that ‘Heaven and Earth were born at the same time I was, and the ten thousand things are one with me’ 天地與我並生，而萬物與我為一 (translated by Watson, 1968, p.43). This suggests a spiritual connotation, where ‘Tian’ refers to nature, the man, heaven and earth all being integrated into one unity. This ideological concept of ‘Tian Ren He Yi’ is clearly defined by Chuang Tzu and has profoundly influenced Chinese cultural thinking and how the natural world is integrated with both man and spirit inseparable, to become a unified whole.

In the Han dynasty, the philosopher Dong Zhongshu 董仲舒 (179–104 BCE) pushed the concept of Tian Ren He Yi into the direction of theology. He believes that ‘Tian’ controls the

will and the attributes of reward and punishment, and the ‘Tian’ and ‘Ren’ interact with each other; hence, humans’ morality or immorality will be rewarded and punished by ‘Tian’. In a sense, Dong’s interpretation of ‘Tian Ren He Yi’ is to lead humans to humility and kindness (Zhang, 2007).

In the period from the Song Dynasty to the Ming Dynasty, the integration of the theory Tian Ren He Yi matured, laying a solid philosophical foundation for Chinese classical aesthetics, and the spiritual essence in this period led to the growth of Chinese aesthetics. The philosophers of this period considered that the human heart (as in ‘heart-mind’) is the heart of all things in the world, and the human heart makes all things have meaning. If one departs from the human heart, all things have no meaning. The philosopher Wang Yangming said: ‘‘Tian Ren He Yi’ theory has brought humans and the world into a more integrated state. Heaven, earth, and man were originally one unity, and connected to a whole by ‘heart’’ (Chen, 1998).

In traditional Chinese philosophy and aesthetics, the realm of Tian Ren He Yi is regarded as the highest realm of life. It is a realm of feeling goodness and beauty from the spiritual level, beyond utilitarian and secular constructs.

2.5.1 ‘Tian Ren He Yi’ and Chinese ink painting

The profound influence of the concept of Tian Ren He Yi on Chinese traditional art is most evident in the field of painting. In particular, traditional Chinese landscape painting pursues the beauty of the heavens and the earth, focusing on the vitality of the world, the vitality of the mountains and the water, and the expression of a life spirit of the universe. Therefore, the creative enthusiasm of the artist in his works must also blend the spirit of heaven and earth, and the soul of nature must have a spiritual character. Under the influence of this concept,

Chinese traditional landscape painting pays more attention to the subjective consciousness of the human being, and advocates the high integration of the subject and the object, so that the painting transcends the depiction of the object, thus showing the inner spirit of the subject and pursuing the concept of the Yi Jing.

2.5.2 ‘Tian Ren He Yi’ and Chinese ink animation

The context of incorporating the expression of ink painting into animation is an important process for this research. The main challenge is to develop a process to express the beauty of heaven and earth based on one’s understanding of Yi Jing. The process is not simply painting or imitating a natural scenery, but the natural scenes that are observed are integrated into the artist’s emotions and spiritual concept, and then expressed through the artwork. This reflects the traces of ink left behind by the natural mountains and rivers and the artist’s thoughts and feelings. All these indicate that the creation of traditional Chinese ink painting is not only the simple reproduction of nature, but also the expression of the artist’s own aesthetic ideal in the expression of nature and true beauty. This process is the spiritual unity between man and nature in order to achieve artistic and aesthetic ideals.

For the context of this research, each frame for the animation is in effect a painting. Each painting in the sequence is created digitally by the *Expresii* software. Another challenge for this research is learning how to translate authentically the notion of Yi Jing into the digital marks that I make. Further details of this process will be elaborated in Chapter 5.

2.6 The principle of ‘Yin Yang’ 阴阳

The concept of ‘Yin Yang’ first appeared in the book *Yi Jing* 易經 (as in the *Book of Change*, not to be confused with the philosophical notion of Yi Jing 意境, where it shares the same

pronunciation but totally different Chinese characters). Later on, during the Warring States Period (c.480–222BCE), the book *Yi Zhuan* 易傳 put forward this proposition: ‘Tao means the combination of Yin and Yang (一陰一陽謂之道)’ (Liu and Wang, 2015 p.29). Lao Tzu’s *Tao Te Ching* 道德經 explained the relationship between ‘Tao’ and ‘Yin Yang’; he proposes that ‘These ten thousand creatures cannot turn their backs to the shade without having the sun on their bellies, and it is on this blending of the breaths that their harmony depends’ (Chapter 42, translated by Waley 1934, reprinted 2005).

Ancient Chinese philosophy believes that all things on earth have ‘Ch’i’, which is always divided into Yin and Yang aspects. These two aspects depend and interact on each other, but cannot exist in isolation from each other (Yang, 2017).

The duality of Yin Yang derived from ancient Chinese philosophy. In ancient China, the phenomenon of opposite but interconnected things were called ‘Yin’ and ‘Yang’. For example: heaven and earth, sun and moon, day and night, cold and heat, up and down, left and right, black and white. The Yin Yang philosophy itself has three characteristics: unity, opposition and indivisibility. The traditional concept holds that Yin Yang represents the most basic opposing relationship of everything. It is the objective law of nature, the origin of the change of the movement of all things, and the basic law of human understanding of things. Yin Yang theory has been integrated into traditional Chinese culture, including the calendar, astronomy, meteorology, Chinese medicine, martial arts, calligraphy, painting, architecture, religion, feng shui, divination, etc. It is an important part of Chinese traditional cultural consciousness.

The literal meaning of the character ‘Yang’ 陽 means sunlight, or anything related to the sun. By contrast, the character for ‘Yin’ 陰 refers to the shadow and darkness, without sunlight. Their meanings gradually developed into two opposing forces in the universe. ‘Yang’

representing male, active, hot, bright, dry, hard, etc, and ‘Yin’ meaning female, passive, cold, dark, moist, soft, etc. In a way, all phenomena in the universe are produced by the interaction of these two forces, which forms the basis for the concept of ‘Yin Yang’. (Feng, 1966)

In terms of ancient Chinese traditional aesthetics, ‘Yin Yang’ is also an essential concept, which always runs through the process of Chinese art creation. The performance in traditional Chinese painting and calligraphy is particularly prominent, especially in landscape painting. The Northern Song Dynasty painter Guo Xi 郭熙 (1020–1090 CE) wrote in the *Lofty message of forest and streams* 林泉高致 that, in landscape painting, the mountains and water complement each other, mountains have breath because of water, and water has spirit. It is the harmony between Yin and Yang, which is indispensable. Lao Tzu also proclaimed: ‘He who knows the white, yet cleaves to the black, becomes the standard by which all things are tested’ 知其白，守其黑，為天下式 (Chapter 28, translated by Waley 1934, reprinted 2005). The terms ‘white’ and ‘black’ refer to the spatial elements on a page, as well as the elements of Yin and Yang.

The Yin Yang concept illustrates the characteristics of traditional Chinese painting (which is also known as ink painting), and usually the painting is dominated by black and white elements. The distribution of the black and white, as the two sides of ‘Yin’ and ‘Yang’, coexists in harmony, hence increasing the sense of hierarchy and rhythm. George Rowley (1959) wrote in his book *Principles of Chinese Painting* that:

The Yin Yang relation was supposed to set up tensions throughout the universe, between the great and the small, heaven and earth, male and female, and so on. The Tao resides in tension. Landscape itself is a mountain-water picture in which the

opposites need one another for completion. How often-western landscapes have been exclusively studies of sky, sea, woods, meadows or other dominate feature. Everywhere the Chinese have applied this principle of the resolution of opposites to their painting, in the laws of growth, in the layout of a composition, in the creative process itself, and even in the estimate of artistic values. (Rowley, 1959, p.8)

On the whole, the relationship between thick and thin, black and white, dry and wet, virtual and real, density and variable, curved and straight in traditional Chinese painting are all summarised in the category of Yin Yang. These relationships are interdependent and opposite, but also constitute a unified system. It is a balance between the two sides, it constitutes a harmonious beauty, in order to make the painting look dynamic and vivid. (Liu and Wang, 2015)

2.6.1 ‘Yin Yang’ and Chinese ink painting

Chinese traditional paintings focus on the Yin Yang relationships rather than ‘light and shadow’ relationships, and do not focus on perspective or three-dimensional effects, and so are different from Western painting concepts. This poses the question, how does the ‘Yin Yang’ in Chinese traditional paintings manifest itself?

According to the *Tao Te Ching* by Lao Tzu, ‘Tao gives birth to one. One gives birth to two. Two gives birth to three. Three gives birth to three. Three gives birth to all things and all beings. All beings bear the negative physical form, which is represented by Yin, and embrace the positive true nature which is represented by Yang’ (Chapter 42, translated by Waley 1934, reprinted 2005). From the above doctrine, we can associate Yin and Yang as opposing elements, but, when mixed together, they form a unified whole. This relationship between Yin and Yang is usually reflected in Chinese paintings. The first refers to real materials: ‘heaven’, ‘mountain’,

and 'sun' are considered to be 'Yang'; 'earth', 'water' and 'moon', on the other hand, are considered to be 'Ying'. The second refers to the relationships of the contrasting strokes that make up the painting. These strokes can be categorised: 'ink strokes', 'long strokes', 'thick strokes' and 'real strokes' are 'Yang', whereas 'white space', 'short strokes', 'light strokes' and 'virtual' are 'Yin'.

Once again, the concept of Yin and Yang is a contrasting relationship for Chinese painting, but at the same time it is inter-related. Without Yin and Yang, there is no life. Without comparison and contrast, there is no picture. For a traditional Chinese painting, the picture should have the aspects of 'Yin Yang', whereby the painting shows elements that are opposite and unified, dynamic and harmonious.

The materials used in traditional Chinese ink paintings are special and relate to the interesting relationship between the black and white elements. This is also an intuitive expression of Yin Yang. Chinese painting uses brush and ink, and water as a diluting medium to paint onto Chinese Xuan paper, thus producing a variety of tones. This black-and-white relationship between Xuan paper and ink is the foundation of Chinese painting and calligraphy, and it is unique to the Chinese culture (before it spread to other countries, such as Japan, Korea, Vietnam, etc.)

The ink is black, and the Xuan paper is usually white. This 'white' is called 'white space' in Chinese painting techniques (or negative space in the West). Chinese traditional ink paintings pay attention to white space, and there is an inseparable relationship between 'with ink' and 'without ink'. Hua Lin 華琳, a painter of the Qing Dynasty, believed that although the white element in the picture is the colour of the Xuan paper itself, it has the function of forming the

image of the picture and expressing the Yi Jing of the painting, which plays a role in the composition of the space and structure. This means the ‘white space’ or areas that are deliberately not painted, form an integral part of the picture.

2.6.2 ‘Yin Yang’ and Chinese ink animation

The relationship between animation and the concept of Yin Yang at first glance seems not to have any clear connection. However, as discussed in section 2.6.1, we understand that Yi Jing is an integral part of traditional Chinese ink painting. It also suggests that Yin Yang influenced all aspects of Chinese painting and other forms of art. Since Chinese animation is created by using series of individual painted frames (in effect, each frame is a Chinese painting), then one could argue that it also processes aspects of Yi Jing and Yin Yang. Therefore, one can analyse and explore the relationship of Yin Yang and traditional Chinese ink animation from this perspective.

For the perspective of Chinese animators’ definition of animation, they perceive it as the exploration of the art form of painting, reflecting the familiarity and relationship between animation and art. These animators firmly believe that Chinese ink animation is developed from the art forms of ink painting (Wang, 2009)

In addition, Yin Yang appears as ‘black and white’ 黑白, ‘virtual and real’ 虛實 and ‘dense and sparse’ 疏密 in traditional Chinese painting, and when we apply these elements to animation, it will create memorable work. (Zhou, 2015) To test whether these elements will work on Chinese ink animation, I created a short experimental animation called *Buffalo* (2017) to test out this theory. In the scene, the buffalo is half immersed in the river. I created the sense that the buffalo is in the water by using the ‘yin’ element of painting, by using the ‘white space’

to suggest water. I deliberately painted only half of the buffalo's body, leaving the rest unpainted, to suggest the flow of the river and the movement of the water. We can see from this simple example that ink animation can inherit the elements of Yin Yang and Yi Jing.

From the perspective of aesthetics, the beauty of life is generated by the concept of 'Yin Yang'; it is the characteristic of 'life aesthetics' of traditional Chinese aesthetics. Furthermore, Zeng Fanren supports the idea that traditional Chinese paintings, calligraphy and other art forms that embody Yin Yang are also endowed with 'life aesthetics'(生命美學). The notion of 'life aesthetics' is also suitable for ink animation, because the concept of Yin Yang generalises the unique laws of artistic creation, and a kind of artistic vitality is naturally produced by the contrasting relationships of 'density and sparseness', 'virtual and real', 'black and white', and 'static and dynamic'. (Zeng, 2016)

2.7 The principle of 'Ch'i Yuen Sheng Tung' 氣韻生動

It is mentioned above (Chapter 2.3.1) that Chinese classical aesthetic theories developed rapidly during the Wei, Jin, and Northern and Southern Dynasties.

If the period of *The Contention of a Hundred Schools of Thought* before the Qin Dynasty was the first golden age in the history of Chinese aesthetics, it could be said that the Wei, Jin, Southern and Northern dynastic period was the second golden age in the history of Chinese aesthetics. For example, the Southern Qi Dynasty produced a number of important books with great aesthetic theoretical value. Among the most notable are Xie He's 謝赫 (unknown date) *Six Principles of Chinese Painting* 古畫品錄, and Liu Xie's 劉勰 (465-521) *The Literary Mind and the Carving of Dragons* 文星雕龍 (translated by Owen, 1992).

The aestheticians of the Wei, Jin, and Northern and Southern Dynasties proposed a great number of aesthetic categories in these books. Categories such as ‘Ch’i’ and ‘Miao’ are further developed from previous theories. Therefore, the term of ‘Ch’i Yuen Sheng Tung’ and the concept of Yi Jing are some of the aesthetic topics mentioned in *Six Principles of Chinese Painting* and *The Literary Mind and the Carving of Dragons* respectively. In the book *Yi Jing Tan Wei* 意境探微 (2001, p.34), the author Gu Feng added that the theoretical foundation of Yi Jing was consolidated and expanded from the book *The Literary Mind and the Carving of Dragons*.

In the book *Six Principles of Chinese Painting*, the term ‘Ch’i Yuen Sheng Tung’ was referred to in the category of art, while Yi Jing was referred to in the art and literature categories in the book *The Literary Mind and the Carving of Dragons*. Although the aesthetics referred to were placed in different categories, the general principles share common grounds. For instance, the painting theory system of “Six Principles” 六法論 proposed by the book *Six Principles of Chinese Painting* contains the concept of Ch’i Yuen Sheng Tung; and the literary appreciation system of “Six Views” 六觀論 proposed by the book *The Literary Mind and the Carving of Dragons* contains the concept of Yi Jing. As mentioned above, in the subsequent development, the aesthetic category of Yi Jing gradually began to expand, which led to the inclusion of categories such as poetics, literary studies and aesthetics.

It is necessary to understand that the ‘Ch’i’ in Ch’i Yuen Sheng Tung is a category transformed from a philosophical notion to an aesthetic theory and Ch’i is perhaps the most significant element in the aesthetic category. It can be defined as:

- I. ‘Ch’i’ is a category that summarises the origin of art. The universe of Ch’i gave birth to the worldly things of life and promotes all the things of change, thus touching the

human spirit, and produced art. Therefore, ancient Chinese artwork would often depict ideas and images of various phenomena, and would often describe the noumenon and the Ch'i of life in the universe.

- II. 'Ch'i' is a category that summarises the artist's vitality and creativity. It contains both physical and psychological aspects, including the human body, human spirit and human wisdom. Ch'i is both the source (theoretical concept) and the activity (bodily movement) that contribute to the making of the artwork. That is to say, it is not only a physical activity, but also a psychological (spiritual) activity. In short, Ch'i is a coordinated activity of the artist's entire body and mind.
- III. 'Ch'i' is a category that reflects the inner self of the artist. Every irritation and idiosyncrasy is reflected in the Ch'i, and hence reflects the persona of the artist.

Similarly, the meaning of 'Yuen' (rhythm or resonance) refers to the transfer of the inner persona, sentiment and aesthetic image of the painting, which express the artist's style and personality (Lang, 2001). In a way, 'Yuen' is determined by 'Ch'i', and the two are inseparable. 'Ch'i' in effect gives 'Yuen' body and life.

Finally, 'Sheng Tung' (vivid or lively) can be understood as vitality. With 'Sheng Tung', the paintings will look naturally vivid. In other words, with the 'Ch'i Yuen' and 'Sheng Tung', the painting will have vitality and life. For the aesthetics of traditional Chinese painting, Ch'i Yuen Sheng Tung is the general principle of painting creation and the transmission of beauty.

However, the concept of Yi Jing proposed by Liu Xie in the book *The Literary Mind and the Carving of Dragons* has similar meanings to that of 'Ch'i Yuen Sheng Tung' in this period. Liu Xie maintains that the poet searches for images and emotions in nature and, as a

consequence injects his own vitality into literary works, where natural scenery is the original source of literary development. The vitality of literary works is generated in the relationship between ‘human and nature, and the resulting ‘Qing’ 情 (emotion) and ‘Xiang’ 象 (image) can further constitute and create an Yi Jing. (Feng, 2001)

2.7.1 ‘Ch’i Yuen Sheng Tung’ and Chinese ink painting

To understand how the principle of Ch’i Yuen Sheng Tung can be applied to ink animation, one needs first to understand how the principle is used in traditional Chinese ink painting. After all, we now understand that ink animation is a continuous expression of single-frame painting.

As early as 1500 years ago, Xie He 謝赫 from the Southern Qi Dynasty 南齊 wrote *Xie He’s Six Principles of painting art* 繪畫六法. The six principles are ‘Ch’i Yuen Sheng Tung’ 氣韻生動, ‘Bone Method’ 骨法用筆, ‘Correspondence to the Object’ 應物形象, ‘Suitability to Type’ 隨類賦彩, ‘Division and Planning’ 經營位置, and ‘Transmission by Copying’ 傳移模寫.

Xie He’s Six Principles of painting art can be summarised thus:

1. ‘Ch’i Yuen Sheng Tung’ refers to the artist transmitting their spirit and energy into the artwork; it requires the artist to infuse spirit and energy into the painting so that it has vitality.
2. ‘Bone Method’ refers to the technique of using brush and ink to create textures and strokes that have personality, and to develop the structural power within each stroke made.
3. ‘Correspondence to the Object’ is in accordance with the original appearance of things and the objectivity that is reflected in the objects depicted.

4. ‘Suitability to Type’ refers to the application of colour according to the different objects, time and locations.
5. ‘Division and Planning’ is the creation of a harmonious painting composition, which leads to the design of the painting exploring the elements of space, structure and depth which contribute to the overall effect of the artwork.
6. ‘Transmission by Copying’ refers to the sketching and copying of classic models. Sketching of realistic objects and copying ancient works are methods of learning for appreciating nature and inheriting tradition.

It is considered that the principle of ‘Ch’i Yuen Sheng Tung’ is the overall requirement of the artwork— the highest realm of art, and also the main principle of appraisal and appreciation of Chinese ink painting. Ch’i Yuen Sheng Tung is also an accurate overview of the characteristics of ink painting, where it is not limited to form, but there is more emphasis on ‘using objects of shape to present spirit and content’ (Zhu, 2018), focusing on the expressive feelings of the creators and the expression of taste. The simplification of the materialized image of the ink painting and the profound bearing of the implication, form an agility and charm in the painting. In ink painting, it is not so much to pursue the shape, but more a case of focusing on the objects of spirit. Where the artist can in a few strokes communicate complex content, therefore, the beauty of ink painting is encapsulated by its sense of simplicity (see figure 15).



Fig. 15. White plum blossoms by Bada Shanren 八大山人 (also known as Zhu Da 朱耷) (1659 Qing Dynasty)

Western scholars have conducted research and discussion on Ch'i Yuen Sheng Tung and interpreted the concept differently. For example, American Sinologist Martin Powers mentioned that contemporary Western painting's respect for 'rhythm', 'stroke', 'posture' and 'expression' was influenced by Chinese painting and painting theory (Powers, 2007). Calligrapher and educator Manny Ling interpreted it as 'rhythmic', 'vitality' (Ling, 2008 p42 and p52) and believes that the characteristic of Ch'i Yuen Sheng Tung can be applied to Western calligraphy where it has the following characteristics:

- i. A natural flow of energy (Ch'i)
- ii. The rhythmic pattern of writing (Yun)
- iii. The vitality of letterforms (Sheng)
- iv. The gestural movement of the calligrapher (Tung), (Ling, 2008 p175)

2.7.2 ‘Ch’i Yuen Sheng Tung’ and Chinese ink animation

As discussed in sections 2.5 and 2.6, we know that aspects of Yi Jing such as Tian Ren He Yi and Yin Yang used in Chinese painting can also be applied to ink animation. In a similar way, the relationship between Ch’i Yuen Sheng Tung and Chinese ink animation can be derived from the same process. Ch’i Yuen Sheng Tung is the highest aesthetic standard of traditional Chinese painting and this kind of connotation expresses the breath of life. It is regarded as the highest realm pursued by Chinese artists, and it is also applicable to traditional Chinese ink animation.

From the perspective of animation, each frame is a painting in itself, hence reflecting the connotation of Ch’i Yuen Sheng Tung. As mentioned earlier, ‘Ch’i-Yuen’ means spiritual breath and one’s persona. It demonstrates a state of expression in the artwork, and a state of spiritual communication between the artists, the artwork, and the audience. This status can be called ‘Sheng Tung’ (vivid and lively), which refers to the vividness and vitality of life, and the dynamic energy found in each frame of the animated sequence. These features match the characteristics of animation, as the moving pictures can directly express the artist’s spirit more than static pictures (Cheng, 2013)

Meanwhile, Ch’i Yuen Sheng Tung is the creative subject of the soul maker for the artworks, and its connection with artworks is multifaceted. Every artwork must embody spiritual quality and aesthetic connotation, which are expressed by ‘Ch’i-Yuen’ and conveyed by ‘Sheng-Tung’. It reflects not only the magnanimity of the created object, but also the spiritual sentiment of the artist.

2.8 The relationship between Chinese painting and calligraphy

Chinese calligraphy and ink painting are the two most important categories of art in China. Both of them maintain relative opposition and are inextricably linked in the development of Chinese art history. Their generation, development, and the formation of philosophy and aesthetic thoughts share the same sources.

The Chinese language (Oracle bone script 甲骨文, see figure 16) can be traced to the Shang Dynasty (1600–1046 BCE), which has a history of 3,600 years. The earliest written words were hieroglyphics, which gradually evolved into abstract structures and lines in subsequent developments, without considering light and dark. The lines, structures and strokes of this form of calligraphy were later applied in a similar way to the development of Chinese painting. Chinese calligraphy and ink painting are derived from ancient Chinese literals, using the same brush pen and ink and the same materials, such as Xuan paper or silk for writing and painting. For ancient Chinese art, calligraphy and ink painting are not independent techniques and artists at that time would generally say ‘writing’ a painting instead of ‘painting’ it. From a technical point of view, the ancient Chinese painters were no different from their calligrapher counterparts in the way they used the brushes and ink. At the same time, the purpose of expressing the aesthetic concept in their work is the same, and Yi Jing and the three principles, the ‘Tian Ren He Yi’, ‘Yin Yang’ and ‘Ch’i Yuen Sheng Tung’, all play a part in expressing the life of emotions through each stroke. The understanding and refinement of these ancient artists have made the whole artistic creation process and their work full of vitality. In some ways, it is the use of brushstrokes to paint calligraphy and ink painting with vitality that is their legacy.

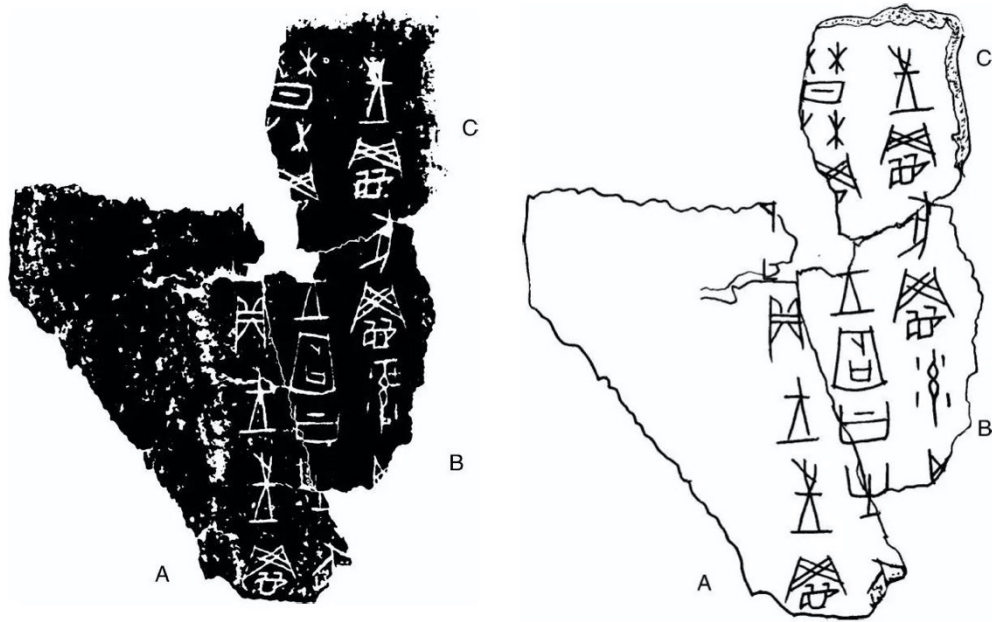


Fig. 16. Oracle bone script (Huang Tian Shu 黄天树, 2010)

Chinese ink painting is essentially an objective expression. Its purpose is not a scientific description, but an observation of natural things through the perspective of personal thoughts, which greatly simplifies the natural things to be expressed. The process of creation of ancient Chinese painters is similar to the process experienced by ancient Chinese calligraphers, in that they observe the surrounding things — natural objects; remember their basic characteristics; refine them; and finally create with as few elements as possible. These approaches follow the principle of simplicity. Hence, the general approach is a simplification of the observed objects. The treatment of brush strokes is the basis of Chinese calligraphy and painting: the painter focuses on the natural formation of the brush strokes and movement, giving the viewer the impression of a sense of vitality. This is the pursuit of aesthetics by ancient Chinese artists.

In the creation of calligraphy, the artist uses these vital strokes to give the abstract lines structure and form. It is the same in the creation of ink paintings, in that they are composed of strokes to create a simplified object conceived in the mind of the painter.

Chinese ink painting has developed for two thousand years and has a wide range of subjects. It is generally divided into three categories: figure painting, landscape painting, flower and bird painting. For each type, one can use two main contrasting techniques of painting: the Gongbi 工筆 (fine strokes) which present the theme with meticulous and delicate strokes. The second is Xieyi 意 (big strokes), where artists use fast and vivid strokes to paint quickly, to capture the essence of the subjects.

Compared with Chinese ink painting, the aesthetic standard of calligraphy matured earlier, constantly influencing the Chinese ink painters. From the earliest printed books *The same painting and calligraphy* 書畫同源 (Zhang, 847, reprinted 2011, translated by Acker 1997) to the *painting in calligraphy, and calligraphy in painting*, (Wang, reprinted 1959) painting and calligraphy were relatively independent but gradually began to merge. In the Tang Dynasty (618–907 CE), the poet Wang Wei first created poetry in painting by combining calligraphy (poetry) and painting. After the Song Dynasty, calligraphy and painting are merged into a complete work. This creative process is called ‘writing’ rather than ‘painting’. It is also the merging of calligraphy and painting that makes the development of Chinese ink painting gradually change from ‘Gongbi’ painting to freehand ‘Xieyi’ brushwork.

Overall, it may be said Chinese calligraphy and Chinese painting are from the same source; but the inner feelings and qualities of the creators are also similar. Chinese calligraphy and ink painting have similarities in the materials used (ink and Xuan paper), expression, the skills of

writing brush and ink, and internal aesthetics. From the expression of ink painting and calligraphy, the latter is a collection of abstract literal symbols whereas ink painting is a composition of figurative shapes. In the historical development, the two are closely related, and this kind of mutual relationship played a pivotal part in developing the sense of Chinese aesthetics.

2.9 Chinese ink painting

The concept of Yi Jing found in Chinese ink painting derives from traditional Chinese culture, which gives Chinese ink painting a unique artistic expression and style. It can be described as having expressed the connotation and inner thoughts of artists, and advocated the idea of ‘Heaven, earth, man’ and the expression ‘Natural and nothingness’ (Li, 1996).

The artistic style of ink animation stemmed from Chinese traditional ink painting, and the style can be described as ‘indifferent, quiet, nothingness, elegant, concise, etherealize’ (Wang, 2011). Chinese landscape painting and figure painting pay attention to the combination of virtual and real, and the image retains the vast amount of ‘white space’ (see section 2.7.2).

2.10 Chinese brush painting

‘Starting around 4000 B.C., Chinese painting has developed continuously over a period of more than six thousand years’ (Cheng, 2013 p1-4). It has inevitably reflected the time and social condition of change with their growth. Especially, in the early stage of development, Chinese painting was closely related with the arts and crafts, from Chinese pottery to bronzes and jade carvings of ornaments.

In the 1st century CE, with the spread of Buddhism from India into China and following the building of temples and the carving of grottoes, the art of painting religious murals gradually appeared.

Until the 4th century CE, landscape painting had become an independent form of expression. Then it gradually developed into ‘ink-and-wash landscape’ 水墨山水 and ‘blue-and-green landscape’ 青綠山水/青碧山水, with two independent styles. The ink-and-wash landscape painting style relies on vivid brushstrokes and varying degrees of ink intensity to express the artist’s perception of nature, as well as his own emotion and personality. The blue-and-green style, on the other hand, uses mineral colours for painting, such as bright blue, red pigment and greens, to create a richly decorated style.

In approximately the 9th century, ‘flower and bird’ paintings are separated from art decoration and gradually form an independent genre. In the Song Dynasty, many artists were interested in this style, and their themes include flowers, birds, fishes, insects and fruits, etc. Many scholars and painters who use ink and brushes aimed for good economical lines. The scholar painters were usually interested in paint, with artworks of plum blossom, orchid, bamboo, chrysanthemum, cypress, pine and buffalo, etc., and used their own themes to reflect their ideals and characters.

With the passing of time, artists would improve on their techniques and would often mix several colours on a brush or mix colours with black ink. As a result, they gained more natural and diverse colours. These skills and techniques were then widely adopted and further developed by subsequent artists.

2.11 Techniques, tools and materials

One of the significant factors that promoted the evolution of the uniqueness of Chinese traditional painting is the close relationship between the techniques, tools and materials used.

2.11.1 Chinese Brushes

The Chinese brush was first used from the Qin Dynasty 221–207 BCE. As opposed to Western watercolour brushes, the Chinese brush has a finer nib that is suitable for handling a wide variety of strokes. Also, it can produce the line variations required for different styles. For calligraphy, the materials used are the same as in painting, and the development of calligraphy techniques and styles can also be used for painting.

2.11.2 Brush types and techniques

The ancients emphasized that brush types and techniques are significant for Chinese ink painting (Zhu, 2013, p12). The types of brushes can be divided into Ruan Hao (軟毫), Ying Hao (硬毫) and Jian Hao (兼毫), a mixed hair brush shown below in figure 17.



Fig. 17. Jian Hao 兼毫 (combination hair brush) (Zhang, 2017)

Chinese brush penholder material tends to be a bamboo tube, and the brush hair (nib) can be made from the hair of babies, wolves, rabbits, deer, badgers, tigers; or from horsehair, chicken feathers, duck feathers, wool, pig hair (bristles) or rat hair (rat's whiskers), etc. The Wolf Brush or Lang Hao 狼毫 (figure 18), is mainly used for painting bamboo and orchids.



Fig. 18. Wolf Brush or Lang Hao 狼毫 (Zhang, 2017)

The Wool Brush or Yang Hao 羊毫 (figure 19) can absorb a large amount of ink and is mainly used for dot painting (such as painting the stamen and pistil of a flower), and painting mountains, stones, flowers and trees in landscape painting.



Fig. 19. Wool Brush or Yang Hao 羊毫 (Zhang, 2017)

The Rat Whisker or Shu Hao 鼠毫 (figure 20) is mainly used for painting lines in freehand landscape and the Gong-bi style of painting 工筆.



Fig.20. Rat Whisker or Shu Hao 鼠毫 (Zhang, 2017)

2.11.3 Brushes used for writing

The nib of the Jian Hao brush is a combination of hard and soft animal hair, normally made up of wool and wolf hair. The softness of the brush is moderate, but relatively easy to control, and suits the demands of Chinese calligraphy.

Zi Hao 紫毫, (figure 21) is a rabbit's hair brush for Chinese writing.



Fig. 21. Zi Hao (紫毫) (Zhang, 2017)

In Chinese ink painting, the brush techniques emphasize line drawing, but also include shade and texture known as ‘Cun Fa’ 皴法, and the dotting methods ‘Dian Fa’ 點法. In figure 22, the examples show that these techniques are mainly used for plants and trees or simple embellishments in landscape paintings.



Fig. 22. Shades and textures or ‘Cun Fa’ (皴法) and the dotting method or ‘Dian Fa’ (點法) (Zhang, 2018)

2.11.4 Chinese inks

Chinese ink is used extensively in Chinese painting and calligraphy, with a history of more than 2000 years. Chinese ink is usually made out of soot and animal glue and moulded into ink cakes or sticks. To use the ink, one needs to grind the ink stick with water by using an ink stone. The amount of fresh water can be varied to produce various consistencies of ink (see section 4.4). When thick ink is applied to Chinese Xuan paper or silk, the ink will look very deep and glossy; whereas, with a more dilute ink, the marks will become translucent and lively. For this reason, Chinese ink paintings can use black ink alone to produce a rhythmic balance between lightness and density, or brightness and darkness, and create an ink painting of colour, texture and weight. It is also worth noting that, depending how the soot is gathered (by burning different types of wood or other materials), the blacks could have a hint of colour in them, such as blue, green, red, brown, etc. Another important feature of Chinese ink is that, once it is applied to the Xuan paper and dried, it will remain permanent and will not shift, even when wetted afterwards. Also, as opposed to western watercolour techniques, the marks that you put down first on the Xuan paper will stay as the top layer: the layering thus works in an opposite way to their western counterparts.

2.11.5 Chinese paper

Chinese paper was first used in approximately 100 CE. It was made from a variety of materials, such as bark, pulp and old fishing net. It is classified into different degrees of weight, size and quality, depending on the final application. In China, this type of paper used for painting or calligraphy is usually termed 'Xuan' paper. There are different types of Xuan paper that can create different effects. For example, the rough surface of some Xuan paper absorbs ink like a sponge, while some have smoother surfaces that can resist ink.

2.11.6 Chinese colour

Chinese colours — usually mineral-based — are specially used for Chinese ink painting. Similar to western colours, the paint can be diluted to various consistencies. One feature that is very different to its western counterpart is that, once the paint is dried (similar to Chinese ink), the pigment is permanent and will not shift if wetted. This is why it is possible to wet-mount Chinese paintings without damaging the original quality of the artwork.

Comparing Chinese ink painting and western painting, there are many differences in the use of colour. The main one is that Chinese ink paintings tend to express and characterise the elements like the weather, grass, rocks, trees, moss leaves, etc with splashes of colour, and quite often it can look quite abstract, but at the same time easily translatable to the audience (see figures 23 & 24).



Fig 23. *Stroll about in spring* (游春圖) Zhan Zi Qian 展子虔 (545–618 CE)

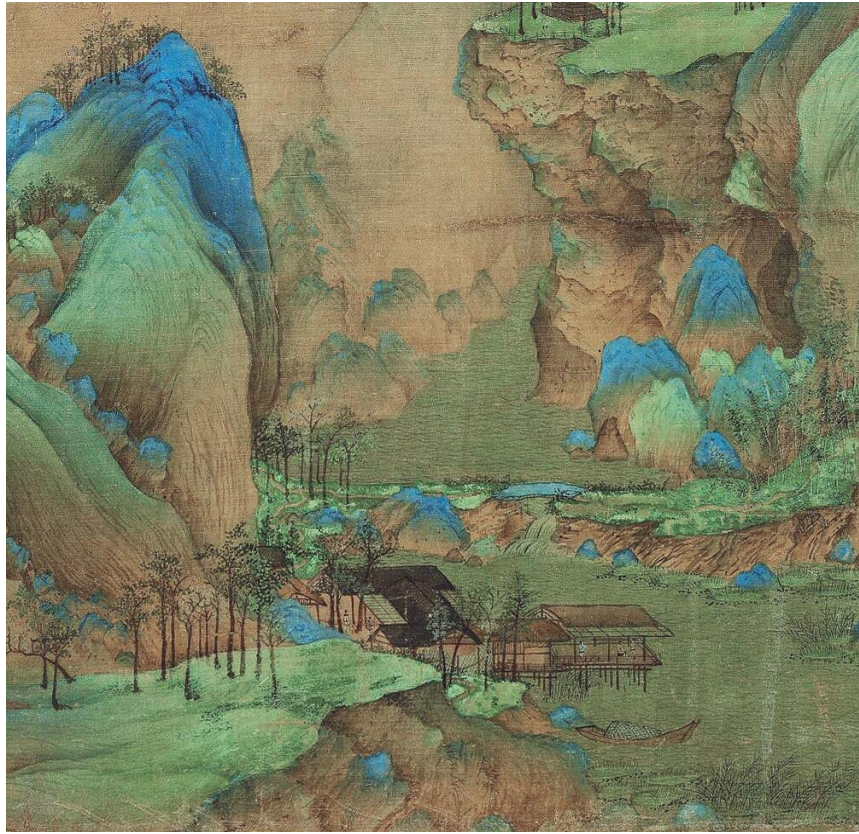


Fig.24. Part of Thousand Li of Rivers and Mountains (千里江山圖局部) (1113CE),

Wang Xi Meng 王希孟(1096–1119 CE)

2.11.7 Space and composition

Finally, for Chinese ink paintings, there are no requirements for particular sources of light or angles of view and therefore the painter has absolute freedom with their artistic conception. These characteristics are reflected in the method of expression and structural composition. Normally, the painter would completely omit the background or simply leave it blank, especially in figure, flower or bird painting.



Fig.25. *Two Birds* (雙鳥圖) *Bada Shanren* 八大山人 (born *Zhu da* 朱耷 1626–1705 CE)

With the absence of a painted background, the emptiness can create variety and imagination and can be filled by the viewer's own interpretations. By controlling the shapes and sizes of the painted elements and the empty space (figure 25), the painter can create a full picture without having to paint every detail or fill up the whole canvas. Furthermore, the painting can be enriched by the insertion of a Chinese poem, inscriptions or seals into the empty space, in order to balance the composition.

For some Chinese landscape paintings, the artist needs an informed understanding of rivers and mountains and the laws of nature and of how to compose their artistic conception to structure an ink painting. Some Chinese landscape paintings adopt the 45 to 60 degree bird's-eye angle perspective with a viewpoint high in the air. As mentioned earlier in section 1.7.1, this

technique is often referred to as ‘scattering perspective’, or ‘moving perspective’ (Zong, reprinted 2016) The concept of scattered perspective was first discussed in the *Preface of the Landscape Painting* 畫山水序 by Zong Bing 宗炳 (375–443) during the Southern and Northern Dynasties (420–589). It was refined by Wang Wei 王維 in the landscape theory during the Tang Dynasty. The concept was mentioned in the *Chinesische Landschaftsmalerei* (1921, reprinted 2014) by the German Otto Fischer; and later Zong Baihua 宗白華 integrated the concept of Western painting perspective and gave it a formal name: the ‘scattered perspective’.

The use of scattering perspectives is quite common in panoramic landscapes, such as the painting *River During the Qingming Festival* 清明上河圖 where it depicts a busy scene of a town along a river during the Qingming Festival. This painting is set in a scroll format in which the viewer’s eyes traverse across the landscape by revealing the scroll one small part at a time.



Fig 26. Part of *Along the River During the Qingming Festival* 清明上河圖局部 (Active from 1111–1125 CE),

Zhang Ze Duan 张择端 (1085–1145 CE)

One of the famous Song Dynasty scholar and artist, Guo Xi 郭熙 (1020–1090 CE), explained this in *Lin Quan Gao Zhi* 林泉高致 (*The lofty message of forest and streams*) (Guo, reprinted 2010), which refers to the cultural reflection of the *Three Ways of Perspectives* (三遠法), i.e. the three measures of ‘height’, ‘depth’, and ‘horizon’ (高遠、深遠、平遠). We can see in figures 27 to 29 that all three perspectives can be integrated into one scene.



Fig.27. *Travelers Among Mountains and Streams* 溪山行旅圖 by Fan Kuan 范寬 (950–1032 CE).

This painting shows the use of the ‘measures of height’ (高遠)



Fig.28. *The Gully and cliff* 萬壑千崖圖 (1662CE) by Wang Hui 王翬 (1632–1717 CE).

This painting shows the use of 'measures of depth' (深遠)



Fig. 29. Riverside Pavilion and Mountain Hues 容膝齋圖 (1372CE) by Ni Zan 倪瓚 (1301–1374 CE).

This painting shows the use of 'measures of horizon' (平遠)

In Chinese flower and bird paintings, the natural laws of these objects would come second to the requirements of artistic creation. Sometimes, the painters would rearrange the different seasons of plants and flowers appearing together; or a single flower hang in suspended space. The Ming Dynasty painter Wang Fu 王甫(1362–1416) describes these Chinese ink paintings as ‘likeness and unlikeness’ (Baofu, 2007). In addition, the painters might sometimes show animals that are not real, but based on folklore or mythical creatures, such as the Chinese phoenix (figure 30).



Fig.30. Phoenix and Peony 富貴極品 (1946CE) by Shen Yizhai 沈一齋 (1891–1955)

The famous Chinese painter Qi Baishi 齊白石(1863–1957) once said ‘a good painting lies in its being alike and unlike the subject, and this is the Chinese ink painting of Yi Jing. (Baofu, 2007)

2.12 Ink painting with ink animation

With the combination of ink painting and ink animation, the first thing to consider is the beauty of Yi Jing. The introduction of this Yi Jing is not simply a matter of integrating one or two ink strokes using the Flash software or 3D ink animation. One should visualise deep questions relating to both the object’s shape and spirit. Therefore, when inheriting the ink element, it cannot be copied superficially. It is necessary to understand deeply the spiritual connotation of modern graphic design and select the ink elements that can be matched with it to make breakthroughs and innovations.

In addition, it is necessary to consider the ink strokes, the ratio of water to ink and variations of light and shade. It is understood that Chinese black ink has five colours 墨分五色 (see figure 31) or tints of colour, such as: charred black 焦, heavy black 浓, strong black 重, light black 淡, and pale black 清. Traditional Chinese ink painting techniques make good use this feature. In Chinese painting, ‘ink’ is not just black, and a single brushstroke can contain multiple colours, making the colour change, in order to demonstrate the relationship between virtual and real, and far and close. These are significant features of Chinese painting, and are also especially important for ink animations.

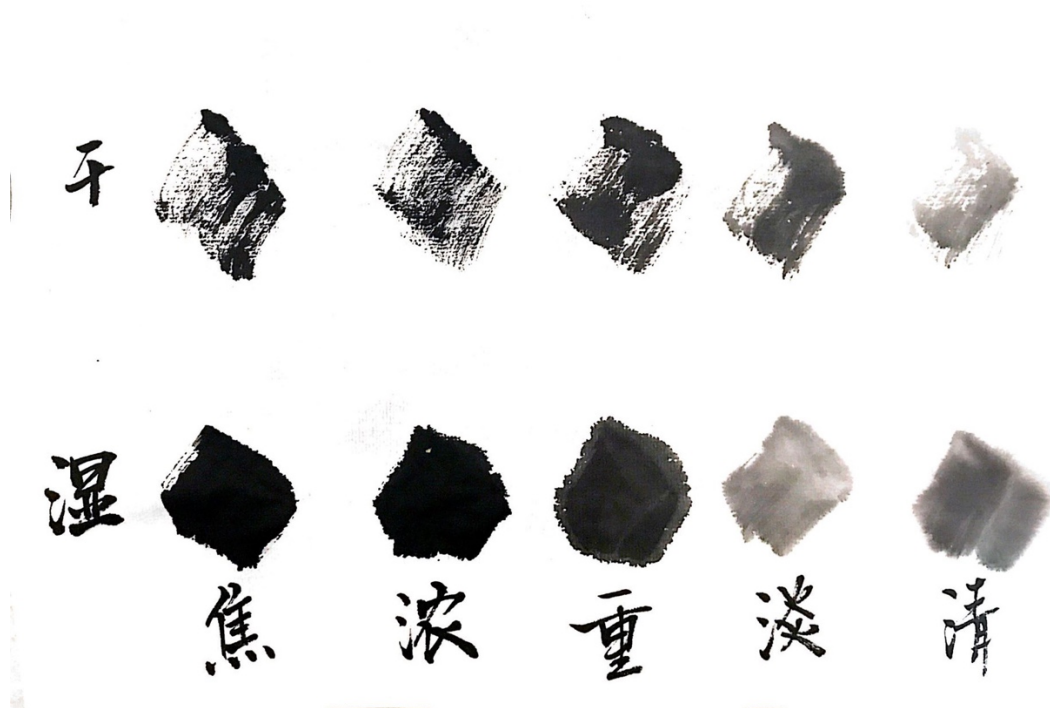


Fig. 31. Five Tints of Ink Colour (墨分五色) (Zhang, 2018)

While using the ink effect, it is necessary to consider the technique of composition. The reason why the ink painting can break through the two-dimensional boundary is mainly because it pays great attention to the technique of layering. The ink colour is closely related to the object, and the spatial level processing very significant. Ink animation can draw on ink painting techniques in terms of space utilization. The scatter perspective principle of traditional ink painting and the use of colour shades are important methods for modern ink animation to break the boundaries of space.

The aesthetic element of ink has deep cultural implications, including philosophical thoughts, and can pin the creator's sentiment and feelings. Therefore, when creating ink strokes, it is necessary to deeply analyse the essential meaning of each mark that one makes, so that the element can be accurately combined with the theme to impart the information that is to be conveyed by the animation work.

2.13 The relationship between experimental animation and Yi Jing

Yi Jing is the distinctive feature of Chinese ink animation. At the beginning of its development, it displayed a powerful explorative spirit of Yi Jing. The national characteristics, profound connotation and unique expression techniques are the conscious pursuit of Chinese artists. This began with China's first animated feature film *Princess Iron Fan* 鐵扇公主 (1941) (Sun, 2011 p33) (see figure 32), where the older generation of animated artists moved Chinese landscape paintings onto the screen, allowing the most artistically meaningful Chinese landscape paintings to move. The Chinese classic animation *Havoc in Heaven* 大鬧天空 (1961–1964) (Sun 2011, p106) (see figure 33) is another historical milestone for Chinese animation. The film creates a mythical and magical story with a variety of images, magnificent colours and unique film techniques. The design of the scene is always consistent with the theme of the film, the characters and the storyline. For example, the sky presents different visual effects according to different plots. When the main character Sun Wukong 孫悟空 (The Monkey King) flies up to Heaven, the colour is mostly warm and soft, but during the battlefield scenes, the sky is cold and dense — showing a strong sense of oppression. Every scenic design in the film paves the way for the promotion and creation of the whole story, thus forming a mythical fantasy atmosphere. At the same time, the film uses virtual and real drawing methods in the processing of the scenes. The clouds sometimes move, and sometimes the jade bridge looms, which not only helps the creation of the strange illusion but also the characters and palaces. The style adds to the layering and three-dimensionality of the picture, which strongly highlights the illusion of Yi Jing.

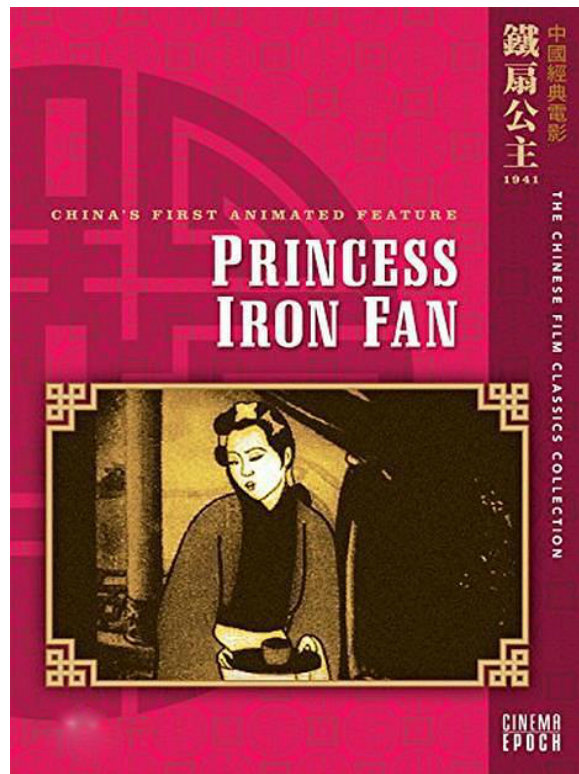


Fig.32. Princess Iron Fan (1941)



Fig.33. Havoc in Heaven (1961–1964)

In addition, other famous animated films like *Nezha Conquers the Dragon King* 哪吒鬧海, (1971), *The Story of the Three Monks* 三個和尚 (1980), *The Cowboy's Flute* 牧笛 (1963), *Feeling from Mountain and Water* 山水情 (1988), *The Monkeys and the Moon* 猴子撈月 (1981) and *The Butterfly Spring* 蝴蝶泉 (1983) all have their unique characteristics in performance techniques, art style, character designs and music scores. These films were innovative for their time. The fine tradition of absorbing folk art has stimulated the subjective imagination of the creators. Colourful national expressions are used to present the beauty of Yi Jing through different forms of animation, which makes the works very attractive and charming. It is noted that Chinese animation in this period was experimenting with different story subjects and different styles of artistic expression. Looking back on the history of Chinese animation, it can be said that all forms are developed from 'experimental animation'. This refers to animation that is exploratory and experimental in terms of artistic concept, artistic medium and language (Russett and Starr, 1988, p14, 45). It is easy to find that Chinese animation in this period often uses traditional Chinese stories for themes such as love, friendship and resistance to fate. The forms of animation are various: traditional celluloid, ink, paper-cut, puppets and shadow puppets. Chinese animation has shown a strong spirit of exploration since its beginnings, and artists have focused on traditional Chinese national culture and achieved an animation style with distinctive Chinese characteristics. From this perspective, I believe Yi Jing is Chinese traditional culture; it is not just a philosophical and aesthetic meaning, but represents a cultural expression and the expression of traditional art forms, based on traditional Chinese culture and presented through different forms of experimental animation.

2.14 The Chinese experimental animation of Yi Jing

'Animation of Yi Jing' is a kind of aesthetic form that is formed by the combination of subjective thoughts and emotions and objective animated elements. It inspires the audiences'

associations and imaginations, thus transcending the specific image into a wider art, time and space. As mentioned in the previous section, Yi Jing is the expression of Chinese traditional culture and art forms, culture is a significant factor in determining the style of Chinese experimental animation, and the earliest Chinese experimental animations are successful expressions of national culture. One of the characteristics of Chinese experimental animation is to explore various forms of artistic expression. There are various types of traditional Chinese art form, which provide a wide range of Yi Jing experiments for experimental animation. Early Chinese animation learned a great deal from paintings, shadow puppets, paper-cutting, etc., showing unique forms of artistic expression with national characteristics. The successful presentation of the Yi Jing in animation is mainly due to the potential influence of Chinese culture on the animations' creators and audiences.

Moreover, most of the artistic style of Chinese animation comes from traditional ink painting, especially in ink animation. As the basis of ink animation creation, Chinese ink painting itself is a process of deep creation, which is not simply satisfied with the reproduction of natural things: to achieve a development 'from intuitively copying natural things, to conveying the vitality of natural things, and to demonstrating natural things and the spiritual realm of the artist (the artist's worldview)' (Zong, 1981, reprinted 2007), this state is approached step by step, giving it the language characteristics of Chinese ink painting, such as Ch'i Yuen Sheng Tung, tranquil mind, misty and sparse. Chinese ink animation also grasps the language of traditional Chinese painting, and applies the deepest artistic spirit of Chinese painting to the animation, in order to demonstrate the beauty of the Yi Jing. In the presentation of Chinese ink animation, it also pursues the highest goals and a state of Ch'i Yuen Sheng Tung. First of all, each individual picture in the animation is full of life and, when viewed continuously, the 'rhythm of life' is fully reflected. In the overall aspect of ink animation, which also combines the Chinese painting

of the virtual and the real, they are normally reflected in the designs of animation characters, scenic and action designs, etc (see 2.14.2).

2.14.1 Dynamic and static picture effects

Dynamic and static picture effects are an important category in Chinese philosophy. They relate to ancient Chinese dialectical thought. In the late Ming and early Qing dynasties, the thinker Wang Fuzhi (王夫之) summarized the relationship between the dynamic and the static as ‘movement is static, stillness is dynamic. The static needs movement, and movement cannot exist without static.’ (Ye, 2005, p.451). This process of interdependence and mutual transformation is in harmony with the process of artistic creation and appreciation. Therefore, the early animated short films inherited from traditional Chinese art, whether lyrical, narrative or subtle, can be euphemistically expressed through the idea that ‘the dynamic and the static are living together’ (Ye, 2005, p.479).

First of all, traditional Chinese art pursues the beauty of ‘being static and dynamic’, and the artist’s understanding of the vitality of the heavens and the earth is expressed in the artistic image with a certain form, and thus makes this static artistic image ‘live’. Animation is different from traditional, static art. It is a series of continuous static frames, which is a dynamic image of art through time. Every quintessential image in Chinese experimental animation should form an illuminating movement, which can be filled with the movement of life — ‘Ch’i Yun Sheng Tung’ (氣韻生動); and then the flying objects in the frame form a virtual rhythm of full flow, making each static frame in the animation full of the inner momentum that is ready to be passed on; that is there to convey the ‘moving and organized life sentiment’ (Zong, 1987); and the animation as the art of time, its frame and the motion between the frames continues the

movement of the objects in the single frame, thus allowing the Yi Jing of the animation to continue.

At the same time, the ancients believed that the whole universe was moving endlessly, and the universe running according to the laws of nature was ‘being moved but static’. The artists are the same, so art works that are united with the natural spirit are also ‘being moved but static’. The spirit of China’s deepest artistic soul is a kind of ‘deep silence and this infinite nature, the infinite space melts and fits into one’, and the artistic spirit of ‘Tian Ren He Yi’ (天人合一) ensures the animated involvement of dynamic and static is balanced, free, harmonious, and intimately integrated in nature. The ‘Ch’i Yuen Sheng Tung’ of animation works like a small universe that fits the natural law. There is a deep silence in the passage of time. It is the flowers, birds and fishes in the picture. It is a static method to represent the dynamic things in nature, but it can be felt as dynamic life in a static picture. Using this static method to show vitality—this is Yi Jing conveyed by the picture. This also reflects the Chinese aesthetic concept and the humanistic concept of the static as movement (the dynamic).

If the Yi Jing can be presented in the experimental animation, the effect of the picture must be infinitely deep and silent, and at the same time it is a life movement that is endless, suggesting the life spirit of the whole universe naturally ‘dynamic and static living together’ (Ye, 2005, p.479). For example, each frame of the ink animation *Feeling from Mountain and Water* (1988) is in effect a beautiful ink painting (see figure 34). The creator’s emotional ‘movement’ is hidden in the deep and silent scenes of the animation. The audience is immersed in the vast space of the universe, and at the same time can truly feel the life spirit of nature.



*Fig.34. Feeling From Mountain and Water concept design,
Wu ShanMing (吳山明) and Zuo HeJun (卓鶴君), 1988)*

2.14.2 The combination of virtual and real in ink animation (emptiness and fullness)

‘In Chinese thinking, the depths of the universe are invisible, colourless and virtual; and the virtual is the source of all things and of an inexhaustible creativity: Lao Tzu and Chuang Tzu’s philosophy of Tao, meaning ‘nature’ and ‘nothingness’; and the Confucian concept of ‘sky’— all these things come from emptiness and return to emptiness.’ (Ma and Wang, 2014). Therefore, Chinese ink painting uses white space (blank) as the background, which is the infinite space and also the flowing place of Ch’i Yuen Sheng Tung. In addition, the painter randomly places objects in white space, which can stimulate the viewer’s transcendent imagination, and then integrates it with the artwork.

The creation of Yi Jing is manifested in the combination of virtual and real. The first, ‘virtual’, layer of expression comes from the artist’s heart with breadth and inner rhythm. And the first layer of the ‘real’ is the character created by the artist who draws the content onto the paper.

When the audience watches the picture, their feelings and imagination will be the second layer of 'virtual'. After the audience watches the picture, their feelings being expressed in joy, anger, sorrow and happiness, it is the second layer of 'real'.

In Chinese ink animation, the creation of the 'real' world is expressed in the animation design of character, scene, action, sound, and so on; while the creation of 'virtual' is normally expressed in white space, which demonstrates the animation of Yi Jing, and this white space can stimulate the audience's unlimited imagination, so as to exceed the image itself and enter into a broader time and space, forming a feeling and setting blended in harmony and the interrelations between the virtual and real of Yi Jing (Ma and Wang, 2014).

In Chinese ink animation the use of white space is the virtual scene. However, just relying on this virtual scene is not enough on its own to arouse the viewer's imagination. It also needs to cooperate through the real scene or the objects, characters and scenes in the animation. The object of shape and dynamics causes audiences to connect to their self-experience, feeling and understanding the white space. Just as with the principle of Gestalt psychology (Koffka, 2013) (emerged in the early 20th century as a school of psychology), it believes that any 'shape' comes from an intuition of organization or construction of result or function, rather than from the object itself. The audience's associating and abstracting the white space, which will expand into the virtual environment in animation, also brings the Yi Jing of the virtual and reality of beauty into Chinese traditional ink animation.

In general, Chinese traditional ink animation relies on the wonderful delineation of character to match the animation white space to form an imaginary scene. For instance, in the animated film *Three Monks*, the scene design and space conversion are a completely blank (white)

background to emphasise the core characters. The scene where the monks pick up the water to go down the mountain is represented by the movement and the turning of their shoulders (see figure 35). The movements of the monks make the white space instantly three-dimensional. Although the background is blank, it can still remind the audiences that it represents a bumpy and tortuous mountain road. In addition, in the *Three Monks* there is a temple and a mountain, with the sun rising, making the background not only performative of the white space technique in Chinese ink painting, but it also has a narrative function, which is the unique charm of the animated white space.

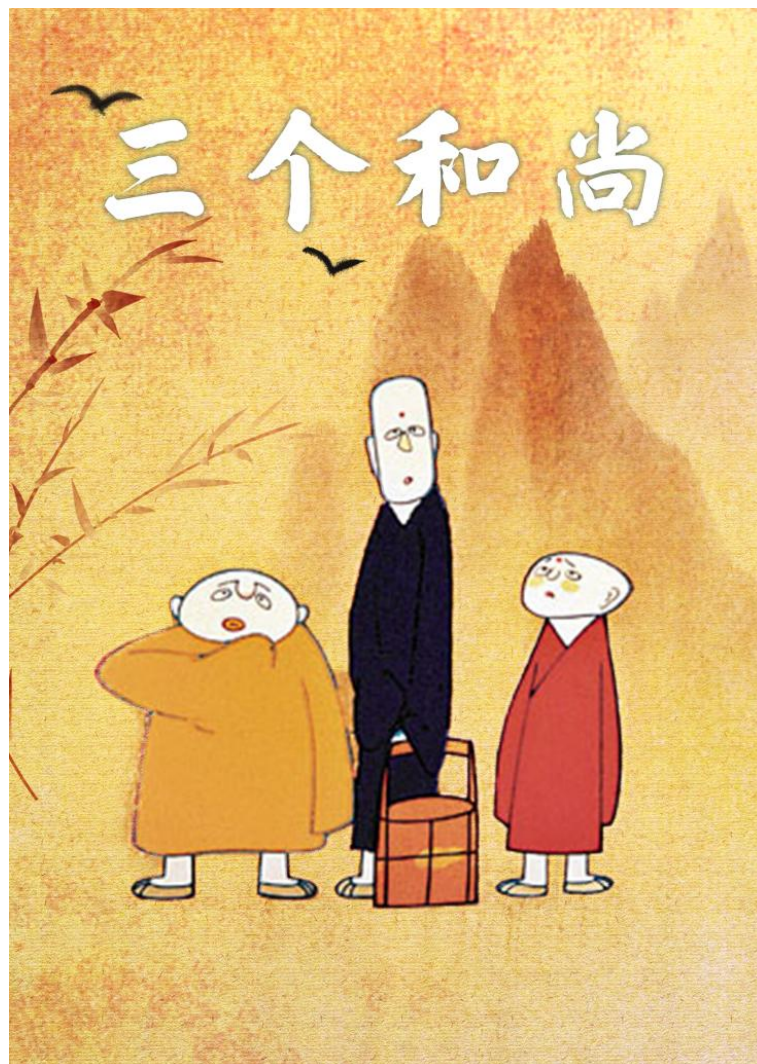


Fig.35. *Three Monks* (Shanghai Animation Film Studio, 1981)

In addition to the role performances, the shape and dynamics of the scenes are also significant components of early experimental animation to create Yi Jing with blank space. For example, the plot of the Seven Fairies in *Havoc in Heaven* (1961–1964) (Sun, 2011, p106), in which the Taoyuan Garden shows a beautiful and ethereal mythical illusion. The seven fairy dances gracefully shuttle through the clouds (see figure 36). The background of the film does not draw a specific scene. Instead, the colour of the film is used to create a fantasy atmosphere. The depiction of the clouds along the way matches the virtual and real changes of the picture. The clouds sometimes follow the fairy migration. Sometimes the fairy is hidden. The movement and static, imaginary and real character of the clouds in this scene not only enhance the depth and dimensionality of the picture, but also successfully create a very mythical scene.



Fig.36. Havoc in Heaven — Seven Fairies dance (Shanghai Animation Film Studio, 1964)

2.15 Conclusion

This literature survey is separated into three areas: the origin and definition of Yi Jing; the definition of ‘Tian Ren He Yi’, ‘Yin Yang’ and ‘Ch’i Yuen Sheng Tung’; and the relationship between these concepts and traditional Chinese painting and traditional ink animation. From the perspective of the research process, there are relevant literatures in each field, but there are

also some issues. Firstly, there are few relevant sources in English; secondly, the materials in each field are relatively independent of each other, and there is a lack of comprehensive literature materials — an overview. In order to overcome this limitation, the research had to be broadened to include philosophical literature and some ancient Chinese literature. It also includes theoretical research on art critics, so as to analyse and adapt to their theories and methods, then integrate the various concepts together. When researching ancient Chinese literature, it was found that some concepts of traditional Chinese aesthetics are difficult to translate, with many ancient Chinese words not having corresponding individual English meanings or concepts; therefore, I had to rely on combination of words to illustrate its meanings. The survey also determined the relationship between the concept of Yi Jing and Chinese traditional ink animation, but there is similarly a lack of literature on the theory of Yi Jing in traditional Chinese ink animation. In order to overcome this difficulty, I expanded the scope of my research and began to examine the theory of Yi Jing and its relationship with traditional Chinese painting. The research found that traditional ink animation is a derivative of traditional Chinese ink painting. From this perspective, if Yi Jing theory can be applied to traditional Chinese painting, it is also applicable to traditional Chinese ink animation.

In the early stage of researching the theory of Yi Jing, I read a great deal from the literature on the concept of Chinese philosophical aesthetics, and found that the Yi Jing is normally aligned with the content of Chinese traditional art and culture. After reading the book *Chinese Art and Culture* (2006) by Robert L. Thorp and Richard Ellis Vinograd, I was convinced that traditional Chinese culture is a propagator of the development of art, art as a carrier, and the connotation of traditional culture. The concept of Yi Jing, as a philosophical construct of Chinese traditional culture, becomes the soul of art and imbues Chinese traditional art with vitality. Therefore, I conclude that traditional Chinese culture has nurtured traditional Chinese aesthetic thought and

developed Chinese art. This aesthetic thought gives art vitality, so that the audience can feel the spirit and energy within the artwork.

Further research began to concentrate on the connection between traditional Chinese culture and Chinese aesthetic thought. I first analysed the history of Chinese culture and aesthetics, and explored the development of the concept of Yi Jing, its history, interpretations and meanings. The most useful literature on Chinese aesthetics is Ye Lang's book *Outline History of Chinese Aesthetics* (2005 edition). In his book, he suggested Lao Tzu proposed the Chinese concept of aesthetics, and following him, Confucius, Mencius and Chuang Tzu respectively incorporated the ideas of native Chinese Taoism, Confucianism and Buddhism, so that the concept of Chinese aesthetics underwent a long historical development. After the development and summary of different dynasties and scholars, Chinese aesthetics began to form a unique system. This Chinese aesthetic system has become a representative statement of the various concepts, such as 'Tian Ren He Yi', 'Yin Yang' and 'Ch'i Yuen Sheng Tung', etc., and given life and vitality in different fields of art. In modern times, scholars such as Wang Guowei 王國維 and Zong Baihua 宗白華 were inspired by the Western philosophical system and wished to establish a Chinese aesthetic system, proposing the theory of Yi Jing to comment on art. As a result of this in-depth analysis and research, I have come to understand that the idea of Yi Jing can be subdivided into concepts such as the Tian Ren He Yi, Yin Yang and Ch'i Yuen Sheng Tung, and I learned that these concepts can be equal or can intersect each other.

In the process of studying the concepts of Yi Jing, Tian Ren He Yi, Yin Yang and Ch'i Yuen Sheng Tung, I also examined the art-form through which these concepts were expressed. As seen in the book *Yi Jing Tan Wei 意境探微* (2001), these concepts were expressed in ancient China and in various forms, including poetry, literature, painting, calligraphy and even

gardening (*Yi Jing Tan Wei*, 2001 p.27). This research focuses on traditional Chinese ink painting and calligraphy, which are closely related to traditional Chinese ink painting, based on the fact that Chinese ink painting and calligraphy use the same materials and techniques, as well as on the book '*Notes of Past Famous Paintings* 歷代名畫記' by Zhang Yan Yuan in the Tang Dynasty (translated by Acker 1954, reprinted in 1997), which regarding 'The same source of painting and calligraphy'. In Mai Mai Sze's '*The Way of Chinese Painting*' (1956) and George Rowley's '*Principles of Chinese Painting*' (1974), both referred to the relationship between the concepts of Tian Ren He Yi, Yin Yang and Ch'i Yuen Sheng Tung and Chinese painting and calligraphy. Sze said 'This concept of the Ch'i in action governs all the principles and every work of art, down to each brushstroke' (*The Way of Chinese Painting*, 1956, p.59). Rowley translates 'Ch'i Yuen' as spirit-resonance and 'Sheng Tung' as life-movement. He believes 'Ch'i Yuen was the source, and Sheng Tung was the result.' (Rowley, 1974 p.40). Ch'i Yuen Sheng Tung is the highest level of Chinese painting and calligraphy, which is the creative power of the artist and the performance of the vitality of the artwork. For the concept of Tian Ren He Yi, Rowley explains that 'The Chinese usually tried to intimate man's experience of nature rather than his domination of it' (p.20). The scholar Yijie Tang, in his book '*Coufucianism, Buddhism, Daoism, Christianity and Chinese Culture*' (1991) called it 'integration of feeling with scenery' (1991, p.204). From an artistic point of view, the Tian Ren He Yi is a process in which man experiences nature and then integrates his own emotions with nature to express them. Ancient Chinese artists insist that neither painting nor calligraphy could be created without the feeling of natural things, because man also belongs to the natural world. In the section on Yin Yang theory, Rowley states that 'the relationship of Yin and Yang was the most basic single principle in Chinese design' (p.50). In ancient Chinese philosophy and aesthetic concepts, Yin Yang is the basic composition of all things. From the perspective of art,

Yin and Yang are the main performance elements constituting artworks, and no form of art can be separated from the basic element of Yin and Yang.

My research into the conduits of Chinese aesthetic expression mainly focused on traditional Chinese ink paintings and calligraphy. Both traditional ink painting and calligraphy, as uniquely Chinese art forms, differ from the materials used in Western painting. Chinese materials have their own characteristics, such as the flexibility and expressive versatility of the brush, the absorption of water and ink by Xuan paper, the variability of Chinese ink, and the specificity of the colours of Chinese pigments. In terms of perspective and painting structure, Chinese painting has no scientific requirements for light source or perspective, and landscape painting normally adopts the ‘scattering’ or ‘moving’ perspective. The structure of composition also tends to be an artist’s free emotional expression, often using white space as an imaginary background.

In order to investigate the relationship between traditional Chinese ink painting and ink animation, the research is first focused on early Chinese experimental animation. Chinese culture has created a diversity of traditional art forms, which provides a broad space for experimental animations and expressions. Early Chinese animation draws on traditional art forms, such as painting, shadow puppetry and paper-cutting, and in the process of the production and development of these experimental animations, demonstrates the unique national aesthetic taste. In these various experimental animation themes, ink animation is particularly prominent; ink animation is based on Chinese traditional ink paintings, using dynamic forms, while more intuitively expressing the aesthetic meaning of Chinese traditional painting.

In terms of the relationship between painting and animation, the research shows that painting is the modelling basis of animation, and animation is the derivation of painting. Chinese traditional ink animation is an art form developed from Chinese traditional ink painting, and there is a close relationship between them. Therefore, it is my contention that the aesthetics of Yi Jing, Tian Ren He Yi, Yin Yang and Ch'i Yuen Sheng Tung can be applied to traditional Chinese ink animation, as well as to painting.

The research highlighted in this chapter is a step-by-step demonstration, starting with traditional Chinese philosophical aesthetic theory, progressing through traditional Chinese ink painting as vehicle for this aesthetic theory, then discussing the relationship between traditional painting and ink animation, to argue that the aesthetic theory identified in Chinese painting is also applicable to traditional Chinese ink animation. This chapter has also investigated the materials and theory of traditional Chinese painting, and the theoretical basis for subsequent research into the technology of traditional ink animation production and of innovation in Chinese traditional ink animation.

Chapter Three: Limitations of Traditional Chinese Ink

Animation and Contemporary Industry Issues and Opportunities

Chinese ink animation can be considered to have a significant contribution to the world animation industry and has made brilliant achievements. However, in the face of a cultural invasion and market capture by foreign animation, the situation and development of China's ink animation have encountered unprecedented difficulties and challenges (Wu, 2018 pp1–4). With further development, the suitability of digital software for Chinese ink animation could be increased in the future.

3.1 Traditional Chinese ink animation production problems

Unique production methods are currently a hindrance to the development of Chinese ink animation. Initially produced as a two-dimensional painting, ink animation had two peaks in the 1960s and 1980s (Wu, 2018, p. 45). However, the production process of Chinese traditional ink animation is very tedious. The process of hand-drawing and shooting on celluloid film requires the breaking down, tracing, layering and colouring of each picture, which will then be repeatedly fixed for shooting on a photographic platform and then edited and synthesized. The time required for filming a Chinese traditional ink animation is five times longer than that of other animations of the same duration. At present, with the development of digital computer technology, more and more animations are completed by using 3D animation software. However, digital versions of Chinese traditional ink animation cannot express its unique visual language; neither the sense of reality, depth and nimbleness, nor the visual aesthetic elegance and stunning natural artistic effect. At present, many animators in China have tried to change this situation by using a 'shader ball' in 3D animation software to simulate the ink effect. This method has a good effect when the lens is fixed, but once the lens moves, various elements in

the picture will be stiff, lacking the nimbleness of ink. Other people have tried to use post-production effects software to layer image sequences. The ink effect produced this way performs well with the same static or pan lenses, but it is still limited with the perspective changes associated with moving lenses.

The difference between ink animation and general animation is that ink animation breaks the constraint of general animation lines and flat colours, and uses the freehand methods of traditional Chinese ink painting to simulate ink animations, without outlines but with ink animation of each individual frame, like the ink rendered naturally on Xuan paper (Sun, 2011, p.95).

The traditional animation technique is to use lines and flat colours. Usually, the production staff draw the animations on celluloid to outline the front side of the cels and colour the back, in order to ensure uniform colouring. The cels are then shot frame by frame to achieve the 24 frames per second in order to produce the film. With analogue ink painting however, the drawing is painted on very strong absorbent Xuan paper; its characteristics are not lines and uniform colouring, but rely on different proportions of water with ink to express the object. Producing digital ink animation also needs to maintain this characteristic and in addition, it must break through the original traditional ink animation drawing process, which contains the mystery of traditional ink animation production, a process which can be both tedious and time-consuming.

3.1.1 Lack of high-end Chinese ink animators

A further difficulty is that highly-skilled Chinese traditional ink animators are scarce. Since the animation industry has been praised as one of the most promising industries in the 21st century,

Chinese animation as a specialism has been on the rise in many universities. However, there is still a shortage of excellent animators. The teaching of animation in universities is still in its infancy. There is generally a lack of professional expertise which led to a lack of systematic study of animation scriptwriting, character design, scene design, software production, post-production, dubbing, management or marketing. Besides, many colleges and universities focus mostly on only a few computer graphics programmes or on basic methods and techniques of Western animation. As a result, students are not qualified after graduation for the actual production of high-level and high-quality animations, especially the production of ink animations with advanced difficulty and requirements. Compared with other types of animation production, ink animation usually requires higher-skilled animators, and several necessary conditions need to be met. Firstly, animators need to have a certain knowledge and foundation in traditional Chinese painting, an understanding of the ink painting process, and some general knowledge of the use of ink and water. For instance, black ink can be divided into five colours, etc. (see section 2.12). Secondly, one has to understand the forms of expression of Chinese painting, such as Xie Yi (freehand), Gongbi (detail) painting, etc. This is the key to understanding the relationship between ‘likeness and unlikeness’ in Chinese ink painting and thirdly, they need to understand the expression of Yi Jing in Chinese painting, as well as the principles regarding the use of space and perspective.

3.1.2 Problems with Chinese ink animation education

In the final analysis, the biggest dilemma is the insularity of Chinese ink animation education. In addition to the curriculum issues outlined above, there is a general emphasis on skills over innovation, which is actually the biggest problem for the development of Chinese ink animation. The craft of traditional ink animation has become part of our history, while modern ink animation production entirely relies on foreign software. However, the research and

development for foreign software is designed to meet their own market requirements and is not suitable to meet the particular and very specific needs of Chinese ink animation. At present, there is no better choice for Chinese ink animators but to use software from abroad. If animators want to fundamentally improve the production level of Chinese ink animation, the key is to innovate at home or improve existing software to make it suitable for Chinese ink animation. The contemporary animation industries of Europe, America, Japan and other countries, with their high-speed development, all have their own artistic characteristics. Chinese ink animation is a unique form of artistic expression, which also plays an essential role in the world history of animation and thus it should be similarly supported. At the same time, appropriate animation production software should be developed, according to the characteristics of traditional Chinese ink animation.

Another hindrance to innovation lies in the script content of Chinese ink animation, which has always been attached to ancient classics, such as *Journey to the West* or the *Uproar in Heaven*. The constant re-shooting of these subjects for TV plays and animations has drained the audience's interest (Li, 2011).

3.1.3 Limitation of Chinese ink animation company

The themes of traditional Chinese ink animation tend to be conservative and focus mainly on fairy tales, usually for children's education; the themes are thus relatively simple, and the audience is also relatively homogeneous. In the era of modern animation, this has diminished its appeal to youths and adults. At the same time, the rhythm of traditional ink animation is relatively slow, for commercial animation has been unable to adapt to the requirements of young people, who are keen to watch fast-paced action, with many plot twists. Since 2000, only a few short films produced and financed by small teams and individuals have occasionally

been available. In the early days, under the state-owned system, an animation company could take several years — even more than ten sometimes — to create a high-quality Chinese ink animation. However, in the current market economy, with the phenomenon of ‘cultural fast food’, Chinese animators can only follow the same rules as foreign animation houses (Li, 2011). They cannot compete with the huge foreign animators (e.g. Disney, Pixar, DreamWorks) with only individuals and small companies.

The potential of the Chinese market for animation houses from other countries was reported through an analysis of box office data (see figure 37). In the report *The Chinese animation industry contemporary status and challenges* shows the Chinese animations compared with those from overseas from 2013 to 2015 (Xiao and Tian, 2016). The bar chart on the left shows the ratios for the total box office from animations; the ratio for Chinese animations in 2015 was much higher than in the previous two years. This is in contrast to overseas animations, whose popularity declined, at the same time as Chinese animations became more and more popular. At the same time, from the chart on the right one can see there was sustained growth in the number of Chinese animations released.

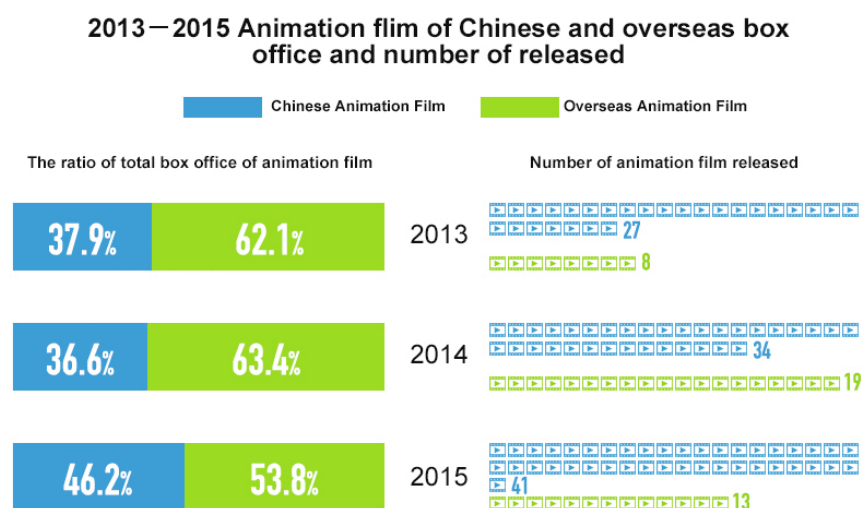


Fig.37. Chinese and overseas animation box office and releases from 2013–2015 (Xiao and Tian, 2016)

The above charts show that there is potential growth for Chinese animations in China. Therefore, animations with Chinese ethnic characteristics are an appropriate development area for the Chinese animation industry.

3.1.4 Limitation of Chinese ink animation age group

Chinese mainstream animation has long targeted the under-13 audience, so the function of animations has been limited to educating children. This limited audience positioning has caused it to remain relatively naïve conceptually and in terms of creativity and production values, which has seriously affected its growth (Liu, 2013). Currently however, animation is increasingly becoming an adult entertainment product. Adults' aesthetic requirements are much more sophisticated than conventional visual enjoyment and humour. They want animation to transcend the merely visual and offer a philosophical world-view. This is the modern connotation of animation. In other words, animations should have the intriguing beauty of the *Yi Jing* to capture the adult market.

According to data released by China's National Radio and Television Administration (NRTA) in the 12 months (between 2016 to 2017) of the TV animation filing programme, education accounts for 12.61%, and fairy tales account for 51.35%. Statistically, animations for children are still the mainstream of TV animation. Animated films aimed at children also accounted for a large proportion of the 39 released in 2017 (NRTA, 2017). Moreover, user age data from *Bilibili* — the most comprehensive broadcast platform for online animation in China — shows that in early 2016 users were mainly those born between 1993 and 2000 (see figure 38 below),

that is around 15-22 years old, and their age was progressively becoming lower (Endata, 2017).

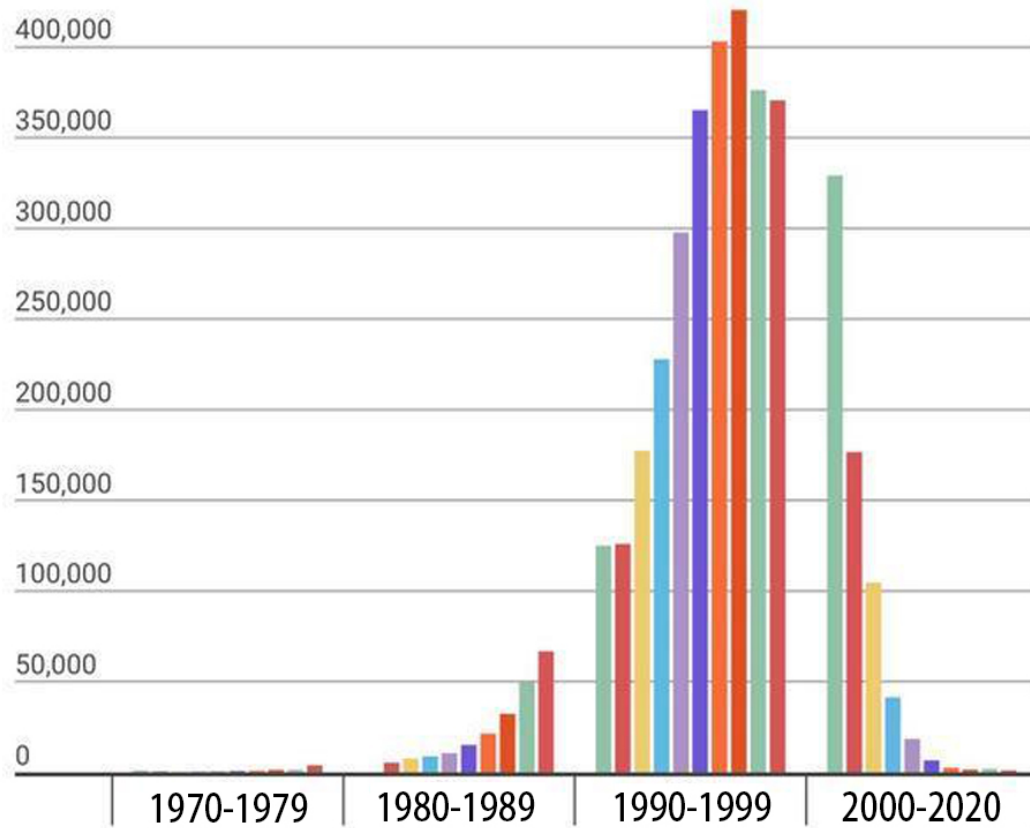


Fig.38. The Bilibili age group analysis of 20 million users in 2017

3.2 The contradictions of Chinese ink animation

In addition to the difficulties in the four aspects mentioned above, Chinese ink animation also faces three prominent contradictions in nature, essence and production in the contemporary cultural context below.

3.2.1 The contradiction of introspection and entertainment

Chinese traditional ink animation is an original creation confined to China, whose essence is to animate ink paintings on Xuan paper. Although Chinese painting has been continuously evolving through various schools over thousands of years in Chinese history, the central thread

of it has been relatively stable and continuous, where it is mainly based on the rendering of ink and water by changing the thickness of dark colours and virtual effects to shape and display the picture, rather than using a single line of flat paint as in cartoons produced elsewhere in the world (Sun, 2011, pp. 95–99). Its modelling has exceptionally high artistic aesthetic values, going beyond the object and the limits of the ‘real’ to pursue the harmonies between nature and humankind. The spirit and shape belong to the category of the mind, which conforms to the typical Oriental introspection mode of thought and provides the best explanation of the Chinese artistic spirit and the artist’s values. Due to its aesthetics is based on introspection and inspiration, Chinese ink painting has specific requirements for the academic and artistic appreciation of audiences, which tends to mean it is less easily appreciated and therefore less popular than other forms of animation. Its figures have no clear border when moving because of the way the image is modelled, and the whole image is intertwined by shade and light, concealing a deeply metaphorical and philosophical meaning. All these characteristics are in complete contrast to animation for entertainment, which is straightforward, extroverted and easy-going.

3.2.2 The contradiction between ‘minority’ and ‘mass’

Arguably, with elite culture, whether ancient or modern, from east or west, are still enjoyed only by a few. Due to the academic nature and seriousness of ink painting, some scholars think it is isolated from and irrelevant to contemporary culture (Huang, 2004).

In their opinion, Chinese ink painting, focusing as it does on the natural and conceptual is more suitable for the expression of self-personality, but is not aligned with current cultural trends. The development of anything, however, tends not to be in a single direction, so the type and style of ink animation should be diversified. As a modern art form, animation is a combination

of literary creation and audio-visual art. (Ma, 2003) It is integrated with high expression, infectiousness, zeitgeist and significant commercial value, and is destined to develop continuously. Essentially, because it belongs to the category of entertainment and is aimed at the public, it should be easy to understand, intuitive, lively and lovely, and imbued with beauty or humour, so that the public can enjoy and accept it easily. For the minority of ink painting and the mass of animation, the two art forms are contradictory. The predecessors of Chinese animation in the 1960s and 1970s grafted the two together intelligently to create a new style of ink animation. However, it has left us with a puzzle half a century later — should we continue to maintain the traditional culture style of minority elites? Or should we be encouraged to combine ink animation with contemporary mass culture. How does one go forward in concert with the tastes of the modern era and how to wisely solve the essential contradiction between ‘the minority’ and ‘the mass’? These are the issues that Chinese ink animators must consider (Huang, 2004, pp.146–147).

3.2.3 The contradiction between ‘slow’ and ‘fast’

We acknowledge that foreign animations have many advantages, such as quick and convenient production; active, creative thinking; a wide range of themes and accurate grasp of the psychological needs of audiences of all ages. They also have targeted design of animation characters, and they have successfully led the way in terms of technological development. Compared with western methods of single line and flat filling, the procedures of Chinese ink animation are more complex and time-consuming. It has a long production cycle, high cost and slow speed, both with early traditional production methods and with modern digital processes. This necessarily runs counter to the social rhythm and the speed of production demanded by industrialization and globalization (Ma, 2003).

3.3 Contemporary digital ink animation technology

With the development of computer painting software, digital technology has played a role in the development of the Chinese ink animation industry. Simultaneously, it has also brought new development opportunities, and thus better tools and more convenience, improving production efficiency and bringing significant cost savings. The use of digital animation software replaces the process of layering, drawing, and colouring on the celluloid in traditional ink animation, making the entire production process faster and more efficient.

Emerging digital ink animations can be divided into two forms: two-dimensional and three-dimensional. The software used combines 2D digital painting and animation software with 3D post-production and animation software. For example, the production software for 2D digital ink animation usually includes *Adobe Photoshop*, *Painter*, *Adobe Flash*, etc., while 3D production software includes *Autodesk Maya*, *Autodesk 3Dmax*, *Adobe After Effects*, *Adobe Premiere* and so on. With the continuous improvement of software functions, the production of ink animation has become more and more accomplished, and problems that could not be solved in the past are continually being overcome. However, there are still many technical and performance problems to be explored and researched.

Clearly, the exploration in how to effectively and realistically simulate Chinese traditional ink painting is the first and most crucial concern of the development of ink animation. Chinese ink animation is an artistic form of Chinese traditional ink painting activity.

This chain of thought naturally leads to identifying how one would use digital painting technology to express the traditional methods and styles of Chinese ink painting into the digital age. In order to bring the spirit of Chinese painting and Yi Jing into Chinese digital animation,

the qualities of brushstrokes and the spreading of ink (also known as blooming) on Xuan paper have been explored and analysed.

3.3.1 The simulation of 2D ink effect animation

From a technical point of view, Chinese ink animation technology development and innovation are seriously lacking. The contemporary Chinese ink animation industry relies heavily on the animation technology and software developed from overseas. The production of traditional Chinese ink animation is generally done in *Adobe Flash* (2D). The animation is drawn with the brush blooming effect in *Adobe Photoshop* software, then imported into *Flash*, and finally characters and actions are added in *Flash*. Essentially, *Photoshop* is used to paint the backgrounds, *Flash* is used to create motions; or frame-by-frame motions can be created in *Photoshop* for more realistic ink effects, which are then imported into *Flash*.

As the first choice in contemporary 2D web animation production, *Flash* software has its own unique artistic style: lines tend to be smooth and straight, the shape simple, colours evenly painted; action includes moving, zooming, rotating, plus colour change, to support traditional frame-by-frame rendering. Its ability to ‘batch calculates’ intermediate frames is fast and efficient and it is very expressive (Wang, 2010). However, these features tend not to be consistent with Chinese traditional ink animation, which tries to achieve the ink blooming effect of traditional Chinese ink on Xuan paper; horizontal transitions in colour; the combination of the real and the virtual; and the charm of the Yi Jing.

Flash animation can basically simulate the effect of a simple ink animation. However, even with the use of *Photoshop*, it would only demonstrate a kind of ink-filled simulation effect. Its strengths are software generation and graphics processing, but the ink effect is still difficult to

grasp, the visual effect of the animation is still very crude, and transitions tend to be unnatural. An example of this can be seen in a screenshot from the ink animation *Lotus Pond in Mid-Autumn* (Gao, 2017) where it was created in *Flash* (see figure 39). One can denote that the ink strokes look too smooth and that the ink spreads look too smooth and artificial.

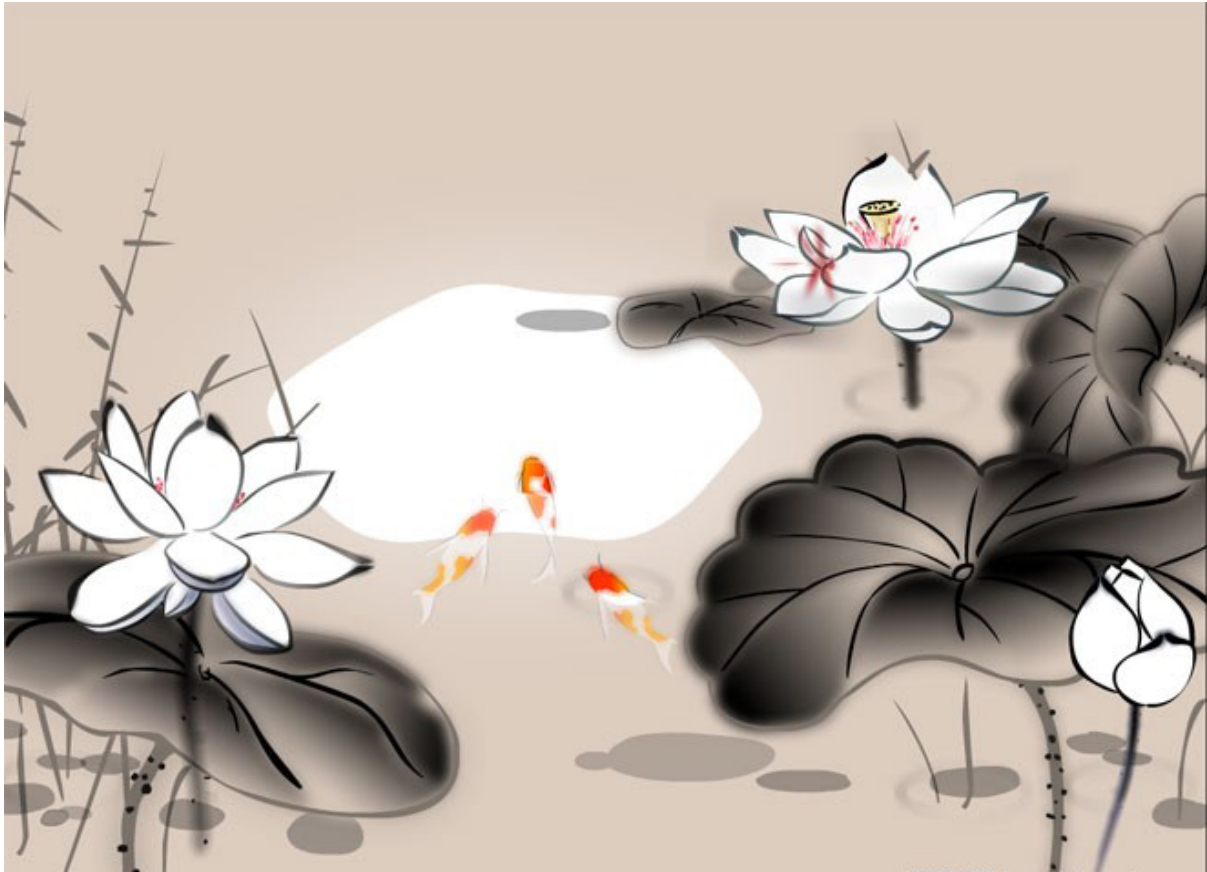


Fig. 39. A screenshot of the Flash animation, 'Lotus Pond in Mid-Autumn' (Gao, 2017)

This example shows the use of *Flash* software is an attempt by the new generation of Chinese animators to restore and develop Chinese ink animation for the modern age. Nevertheless, it does not seem to fully satisfy the expressiveness and the effects and that are produced by Chinese traditional ink animation.

3.3.2 The simulation of 3D ink effect animation

Chinese ink animation using digital effects has allowed Chinese traditional ink animation to move forward. As production efficiency is improved and the operation becomes more convenient, new development paths have presented themselves, and the prospect of fully digital ink animation has opened up. Advanced computer technology has been used to put ink animation in front of the audience once more. However, the process of changing ink painting from ‘paper’ to ‘digital’ is complicated. In the post-production of ink animation using digital software, the artist has to pursue more realistic effects, as well as showing qualities of Yi Jing of traditional Chinese ink painting. This will enable digital ink animation to develop its own unique artistic features. (Liu and Xiao, 2011)

What has become clear during the research and production process is that the animator needs to achieve the effect of ink painting and express it using different materials and textures. Thus, allowing it to imitate the original ink painting effect, and to preserve the essence of traditional Chinese ink painting in order to convey a profound sense of Yi Jing and the charm of the combination of the virtual and the real.

For simulating the effect of ink in three-dimensional space, it is necessary to make judicious use of the material editing system and material painting in the software. The most effective procedure is to combine these two methods. The material editing system using animation production software such as *Autodesk Maya* or *3D Max* is to simulate the ink effect of the black and white or colour gradient texture of the screen; this is one of the easiest and quickest ways to make 3D ink animation. However, this method also has its problems as it is only suitable for models with simple shapes and a few paint-strokes. It is therefore not suitable for more complicated modelling. In general, the use of 3D software to create ink animation is currently

at an exploratory stage. The first issue is the need to break the stacking effect on the 3D material. It is very important to create the effect of the ink blooming in the 3D software; this is the most intuitive expression of the ink effect. Secondly, when the 3D image is rendered into a 2D ink style, it is necessary to consider the characteristics of Chinese ink painting. Finally, using 3D software to make ink animations requires experimenting with different ink themes, but there are too many limitations with this process.

3.4 The comparison and scope of traditional ink painting and digital ink effects

Due to its unique artistic expression, Chinese ink animation has achieved an immense amount (Wang, 2010). However, since Chinese animation production has entered the commercial market, traditional ink animation has become almost stagnant in recent years. because it uses up a great deal of time and human resources. (Giesen, 2015, pp.76–81)

The development of digital animation technology at the end of the 20th century has had a tremendous impact on the craft. Some artists have begun to explore how computer operation platforms might save costs and eliminate photography. Digitising the repetitive work of painting appears to be the future of ink animation.

Although creating digital ink animations is different from the traditional ink animation method, its form and purpose still follow its characteristics. First of all, it emphasizes the use of ink, showing the heavy black, light black, dry black, wet black, and dark black characteristics of ink in the picture and thus it needs to be capable of showing the ink blooming effects. Secondly, the Yi Jing expresses an artistic conception with abstract elements and conveys the works of the virtual and the real and ‘Ch’i Yuen’(氣韻). Finally, in the narrative content, ink animation

usually combines Chinese traditional culture and incorporates unique Chinese cultural elements (Zhu, 2010).

After comparative research, it seems clear that the current skill base with *Flash* and 3D simulation ink animation in the Chinese animation community is still inadequate. Digital ink animation creation requires a creator who understands computer software, but they may be less skilled in traditional ink painting techniques and styles.

For example, the ink animation *Tadpoles Look for Their Mommy* 小蝌蚪找媽媽 uses painter Qi Baishi's (齊白石) paintings (see figure 40), 'Cowboys's Flute' 牧笛 takes Li Keran's (李可染) brushwork, and 'Feeling from Mountain and Water' 山水情 is also based on work by the artists Zhuo Hejun (卓鶴君) and Wu Shanming (吳山名). As one can denote, the digital ink animation can manage the surface shapes, but is not really capable of achieving a dynamic artistic effect combining both shape and spirit.

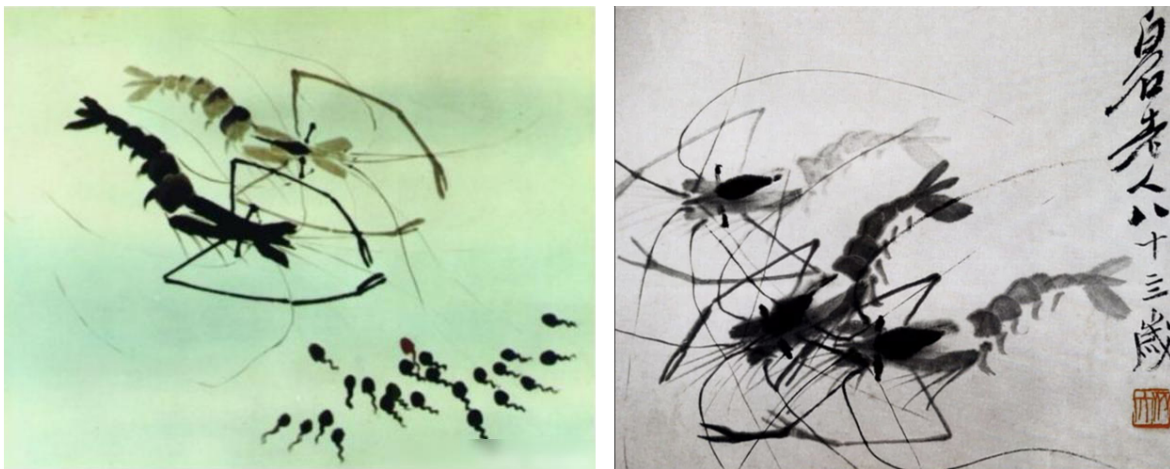


Fig. 40. 'Tadpoles Look for Their Mommy' from screenshot 1961 (left picture) and Qi Baishi's 'Shrimp' 1947 (right picture)

Traditional ink animation uses the ‘language’ of brushwork and ink to express lightness and the sense of power and rhythm, which infuses the audience with an emotional connection. Traditional Chinese ink effects such as wet and dry, blooming, and blending are commonly used effects — it is part of the process of painting and expressing the author’s subjective thoughts and emotions. This is the same as in the traditional Chinese painting process. The images produced are objectively realistic, though combined with the author’s imagination.

Unfortunately, digital ink animation cannot currently recreate this combination. First of all, whether using *Flash* or 3D ink animation, the brushstroke effects are difficult to control, and they cannot express that unique sense of inspiration and rhythm. When it comes to brushstrokes and expressiveness, existing digital ink painting technology is poor. At the same time, because 3D ink animation usually uses a model for each character, it lacks the dynamism of traditional ink animation, in which there is a slight difference caused by the blooming of the ink.

However, it is also true to say that using digital technology in ink animation has brought some new development opportunities. It can offer the aesthetic of the movie, such as a wide canvas, use of a long lens, audio, and so on. These can be used by animators to create works that match people’s viewing and thoughts. In traditional ink animation, camera movement is limited to a fixed lens or zooming in or out. ‘Movement’ is a significant feature of digital ink animation, especially in 3D, while *Yi Jing* is the defining feature of traditional ink animation. The 3D lens can express spatial qualities not available to the traditional animator. The use of some long-lens effects, this elegant but illusory spatial flow to express a poetic idea: in the performance of some large scenes, in the expression of this lens space, the three-dimensional ink animation picture has slightly the upper hand over the traditional form.

At the same time, composition is a significant feature of ink animation. In traditional paintings, the composition, colour, and atmosphere are rigorous. In general, there is much white space to set off the characters and express the sky and water. The use of three-dimensional ink to achieve the effect also impacts on the composition and the placement of each element in the picture has to be considered. Three-dimensional technology, however, abides strictly by the western perspective principle, while the principle of scattering perspective is commonly used in traditional ink painting. Therefore, there should be a focus on the spatial setting of the model, as it cannot currently replicate the characteristics of Chinese ink painting. Three-dimensional production needs to control camera movement to give the effect of the overall ‘moving’ ink painting.

Chinese animators have been experimenting with digital technology with some success. The short animated film *Ode to Summer* 夏 (see figures 41 to 43 below) shows the animators are heading in the right direction. However, the subject matter is still relatively narrow, and there is still a big difference between the performance on the screen and the traditional ink effect, where not many individual frames are satisfactory. After 3D rendering, the animator needs to use *Photoshop* to trim and simulate, but *Photoshop* cannot express the brush stroke and blooming effect of ink. It is likely that there are two reasons for this: first, we are familiar with digital reproduction ink animation software but they are designed overseas and not created specifically for ink animation. Japan and America, are two major powers in the animation industry, and software can be developed according to local characteristics and needs. An example of this is the production of *Kung Fu Panda* 功夫熊貓 (DreamWorks Studios, 2005), for which a set of custom ‘plug-ins’ was specially programmed in *Maya*, in order to reproduce hair effects. Therefore, in order to progress ink animation, specific solutions and technical

support are required, and custom software needs to be developed. Secondly, with existing software, there has not been found a way to quickly and correctly produce ink animation works. At present, some small companies have created short-form animations, usually with some experimentation, but it has not been a guarantee of high quality. They have usually used a combination of generic and custom software, but there is no comprehensive technical integration to exploit the characteristics of different software. Since they are experimental animations, there is no agreed system for the technical application of the production process. The finishing cannot reach the mature stylised production efficiency of larger 2D and 3D animation houses.



Fig. 41. 3D ink animation 'Ode to Summer' by Xu Yi 許毅 in 2003

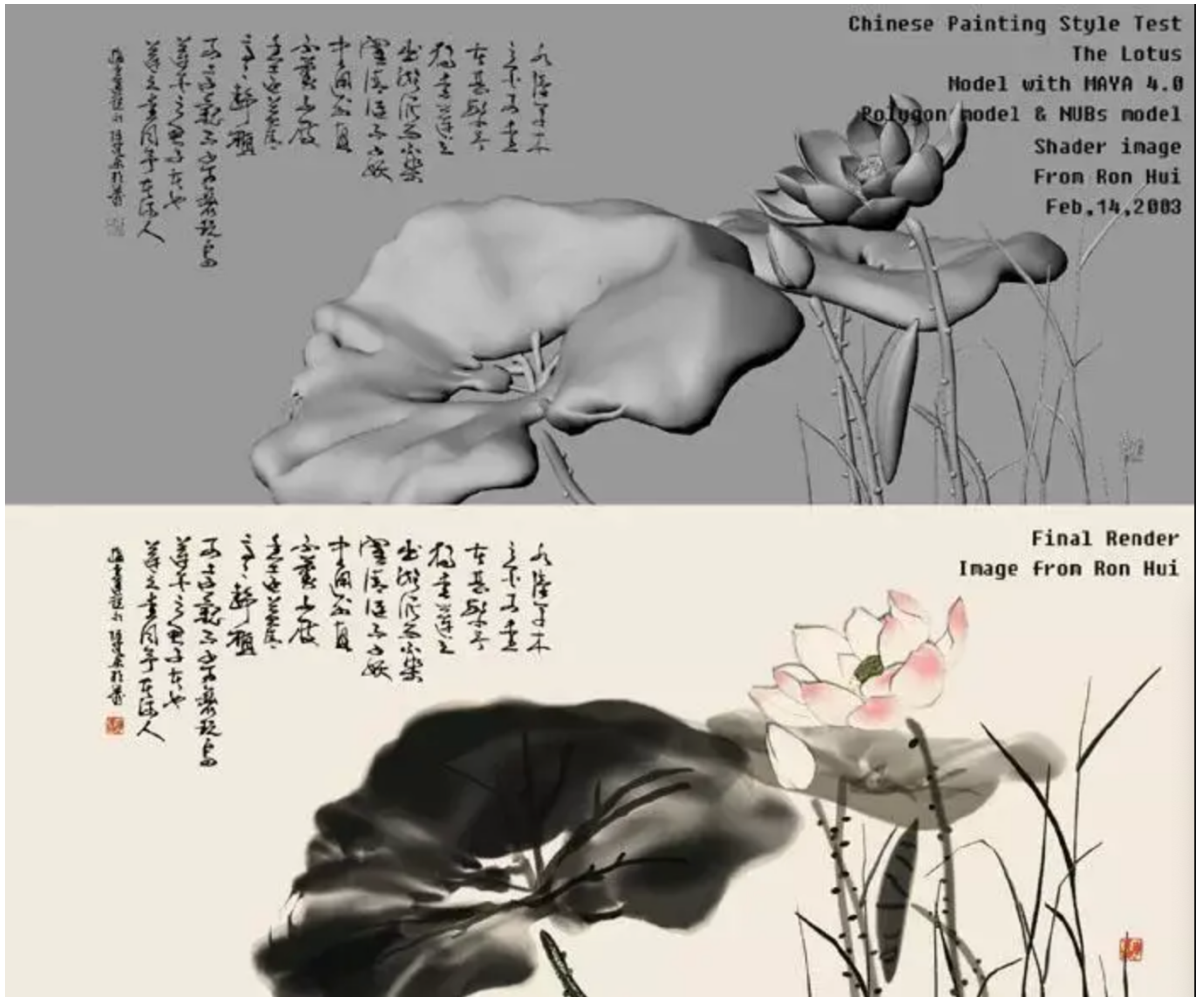


Fig. 42&43. Screenshot of 3D ink animation 'Ode to Summer'. The top picture demonstrates the 3D model effect, the picture below shows the rendering effect of 3D ink animation by Xu Yi 許毅 in 2003

3.5 Conclusion

This chapter has discussed the continuous development of Chinese ink animation through economic globalisation, and how information dissemination has changed significantly and provided more opportunities for contact and exchange with the rest of the world. This has promoted a better understanding of China, but not so far with the philosophy of Yi Jing. Moreover, in recent years, the animation industry overseas has used Chinese elements to make many animated films, some of which may have demonstrated the Chinese notion of Yi Jing. There has also been the Oriental theme of the Hollywood animated film *Kung Fu Panda*

(DreamWorks Studios, 2005), with its capturing of the role of shape and spirit, even down to the building details with Chinese colour and characteristics. Thus, from the perspective of the animation market, research into Chinese animation with Yi Jing is very significant.

In the above analysis, contemporary Chinese ink animation is facing some developmental issues, mainly focusing on:

1. There is a lack of high-end Chinese ink animators. Compared with the requirements of general types of animation production, ink animation production normally has higher requirements for animators, who need to understand both traditional Chinese ink painting and modern production techniques. At present, Chinese animation education focuses mainly on animation software skills and Western and Japanese animation styles, with relatively little research and training in production techniques for Chinese traditional animation styles. At the same time, it relies on the existing animation production software and ignores the latest software developments for Chinese traditional animation.
2. There is a lack of government support. Between 1960 and 1980, Chinese ink animation was developed under the planned economy system, which was isolated from the world animation market for a long time. Government development concentrated on other industries, lacking strategic planning and deployment for the development of animation and related cultural industries. As a unique form of artistic expression, Chinese ink animation should have a significant position in the world and be supported and developed.

3. There is a limitation of target markets and production inefficiency. The theme of traditional Chinese ink animation tends to be conservative, where they are based mainly on traditional fairy tales and children's education, which is no longer attractive to young people or adults in modern society. Thus, traditional ink animation production failed to make money, which explains why there were no new traditional ink animations after 1990. At the same time, the traditional ink animation production process was difficult, compared with general celluloid animation; it needs three times as much working time and has therefore been unable to keep up with the efficiency of modern animation production.

4. There is a lack of market leadership. After the Chinese animation market became fully commercialised, the animation process became standardised, rather than a personalised exploration. Experimental animation has actually been suspended for a long time in the Chinese animation market, which has been saturated with films from Europe, America, Japan, Korea and other countries, while Chinese ink animation has been squeezed out.

In addition, this chapter has discussed the potential for digital technology to help improve the production of animations with Chinese characteristics. Digital technology cannot be allowed to abandon the unique techniques and forms of expression of Chinese animation production. However, it could offer more efficiency for traditional ink animation and help increase the output of animation production, while retaining traditional animation production methods. Chinese animation would be better promoted with the help of digital technology, so there might well be interest from Chinese animators in new production methods.

The Chinese characteristics of ink animation, the virtual and the real of Yi Jing and its elegance of style could make a significant breakthrough. In order for Chinese ink animation to be able to communicate cross-culturally in the new century, it should not only stay at the level of form, but there also needs to have research into the internal problems of the Chinese ink animation system. At the same time, using the most advanced digital animation and synthetic methods, and the techniques and characteristics of Chinese ink painting, could ensure that traditional Chinese ink paintings are correctly displayed.

Chapter Four: Technical and Material Tests using Chinese

Traditional Animation

4.1 Introduction

This chapter introduces experiments developed and based on the literature review and a technical investigation of Chinese traditional ink animation. This section records the intention, reflection and comparison of each experiment, including tests on Xuan paper, smooth and frosted glass, porcelain, smooth and frosted celluloid and finally records my subsequent interviews, research and restoration of traditional ink animation.

4.2 The practice of Traditional Chinese ink animation

Traditional ink animation is based on combining Chinese ink painting with animation. The difference from ordinary animations is that ink animation has no outlines, similar to ink blooming naturally on Xuan paper, and each single-frame scene is an attractive ink painting in itself.

The Shanghai animation film studio produced traditional ink animations. From the 1960 *Tadpoles Look for Their Mommy* 小蝌蚪找媽媽 to the *Feeling from Mountain and Water* 山水情, which was completed over two years in 1988–1990, their traditional ink animation production technology has been classified as confidential. According to my interview with Professor Zhuo Hejun (卓鶴君), a participant in the production of *Feeling from Mountain and Water*, after watching a Chinese ink animation, Japanese animators made a memorable trip to China in 1981, to try to find out how to make Chinese ink animation. In 1997, Duan Xiaoxuan (段孝萱) went to Japan to participate in the discussion. Because the government had not decrypted the ink animation production process, Duan Xiaoxuan only

provided the Japanese with opinions on the ink animations created by the Japanese themselves, and always refused to teach the traditional ink animation production technology.

In China, the directors and technicians who have been involved in the production of traditional ink animation are now of advanced age or have passed away. This is unfortunate for inheriting, restoring, and developing the traditional ink animation process.

With the development of digital animation technology, many companies have lost interest in traditional ink animation, because the use of digital technology can achieve the ink effect relatively quickly, eliminating the complicated process of traditional ink animation production. Current computer technology has the potential to bring improvements to ink animation, but it is not as delicate as the traditional process, lacking as it does the Chinese Yi Jing, and just being limited to basic ink effects. The reason for this is that contemporary ink animations are made without the understanding of traditional Chinese ink painting knowledge and effects. For a new generation of Chinese animation artists, exploring, restoring, developing and innovating traditional ink animation technology would be an important step in the development of the Chinese animation industry.

4.3 Experimental ink animation using glass and porcelain

I started to explore traditional ink animation technology in 2014, hoping to restore and innovate ink animation technology through this research. In the beginning, I experimented using glass as a drawing surface to make ink painting effects and replace the celluloid used in traditional ink animation. The inspiration for this was the Chinese technique of painting inside glass and crystal and the animation *The Old Man and the Sea* 老人與海, produced by the Russian artist Aleksandr Petrov in 1999.

This ‘inside’ painting was a Chinese technique developed in the late Qing Dynasty (see figure 44). It was originally designed to decorate snuff bottles and later developed into a unique craft. Generally, translucent snuff bottles are made from high-grade crystal, agate, jade, etc. The body of the bottle is generally flat, so that there are two sides for painting, with a unique small bamboo brush stretching in from the bottleneck and painting inside of the bottle. Thus, it needs a very high skill and a steady hand. Iron sand is shaken inside the bottle before making the painting, so that the internal surface of the glass becomes frosted. The process is complicated and done completely by hand, and in principle all kinds of painting methods can be used, but it was generally used for Chinese ink paintings. The snuff bottle is made from glass or crystal, and the surface is very smooth. It is originally made from a transparent glass pot with an unpolished inner wall, but it is prone to colour loss and uneven colour, so that some simple patterns are drawn. Afterwards, it was found that it was easy to attach ink and colour to a bottle with a frosted surface, and the effect is similar to painting on Xuan paper. The themes of inside painting began with simple decoration, but gradually developed into painting landscapes, figures, flowers and birds, etc. Using Chinese ink paint on the frosted glass gave a similar effect to that of ink painting on Xuan paper.



Fig.44. Lotus and two geese (Wang Xisan, 1961)

The animation *The Old Man and the Sea*, produced by Russian artist Aleksandr Petrov in 1999, used a similar method to this inside painting. However, the difference was that Petrov used oil paint to draw the animated characters and background (Cotte, 2009).

Petrov is unique in this use of oils to paint and create animation on the glass. *The Old Man and the Sea* (see figure 45) was completed in 1999 and took two and a half years. During this period, Russian animation developed relatively quickly. The research and artistic expression of animation techniques also diversified development; Russian animation artists continued to enrich the content and form of animation through experimentation.

In the context of Petrov's creation of *The Old Man and the Sea*, he used his fingertips to paint the surface of the glass with oil paint, then used a brush to draw the details, scraping off with a knife anything that needed to be erased. The production process uses different layers of glass; usually characters are drawn on one layer of the screen while a background is created on the other. Light passes through the glass to shoot the first frame, then the wet paint on the glass is adjusted and controlled to take the next frame. In this film, the artist repeated the process 29,000 times and could not make any mistakes. The whole production process is actually the same as animation on the Chinese traditional celluloid film. The difference is that the artist can express the unique texture of the oil painting on the glass, so that every single frame of *The Old Man and the Sea* is like a perfect oil painting.



Fig. 45. 'The Old Man and the Sea' by Alexander Petrov in 1999

Inspired by these two art forms, I got to thinking of using the single-frame picture technique of traditional ink animation, as in *The Old Man and the Sea*. Therefore, I tried to use glass as a medium to replace the celluloid film used in Chinese traditional ink animations.

When I first tried using Chinese ink paint on flat glass, I came across a seemingly insoluble problem. That is, Chinese colour and ink could not be easily attached to the smooth glass. After the ink dried, some of the pictures were missing, because when painting a lighter picture, the ink needs to be more dilute; also, Chinese inks contain a small amount of glue which, combined with the water, will break the tension of the ink on the glass surface, so that the picture effect cannot be guaranteed to stay on the smooth glass surface after it has dried. For comparison,

Petrov uses oil paints when painting on glass, and these oil paints have better viscosity and colloidal properties than Chinese traditional paints and inks, thus ensuring the adhesion of the paint to the glass. Acrylic paints used in modern painting show similar characteristics. However, if oils or acrylics are used for traditional Chinese ink paintings, then it will lack the characteristic natural blooming effect. This is because oils and acrylics are too rich to paint on colloid and lose the characteristics of paint flow.

4.3.1 Comparison tests between glass and porcelain

At the same time, I tried the traditional Chinese porcelain painting method to make the ink effect. In 2002, I successfully portrayed bamboo on a porcelain plate (see figure 46), but the porcelain painting used glaze. It needs to be fired before the traditional Chinese painting effect can be formed, and the effect is like a Gong Bi painting. However, every frame needs to be fired after painting, and this is undoubtedly a huge amount of engineering for an ink animation.



Fig.46. Porcelain plate painting (Zhang, 2002)

There is a successful example of porcelain plate painting animation. A flight safety video for KLM Royal Dutch Airlines uses porcelain plates to create an animation in November 2015, but each picture is relatively simple, there is no background and there would have been no requirement for too many complicated lenses.

The KLM Royal Dutch Airlines' security video (3 minute and 20 seconds) was created by using over 1,000 pieces of Delft Blue celadon. The blue-and-white porcelain features the Delft blue pottery from the Netherlands, which originated as an imitation of Chinese blue and white porcelain by Dutch artisans more than 300 years ago, and is now one of the national treasures of the Netherlands. This video shows the thousand hand-painted tiles edited as an animation (see figure 47).



Fig.47. KLM Royal Dutch Airlines flight safety video, created by painting on porcelain plates in 2015

Further research revealed further information regarding the adhesion of Chinese paints and inks, as well as the production process of 'inside' painting, after an interview with Dr Guo Jianyong (2016) from University of Sunderland, whose PhD research topic is *Glass Inside Painting*. He explained that I could use frosted glass for painting using the technique of snuff bottle inside painting, which can get an excellent effect of traditional Chinese ink painting. The main reason is that Chinese paints and inks can adhere to frosted glass well. Because of the frosted surface, the pigments and inks can be controlled by the proportion of water added, to get the same effect

as if they were rendered on Xuan paper. There is a difference in technique, however, between painting on Xuan paper and on frosted glass. With frosted glass, it needs to be layered: the darker ink is drawn on the first layer, and the large area of lighter colour is drawn on the second layer. Using this technique, Chinese ink painting can be well expressed on the glass, because it is usually painted on the back, but viewed from the front. This is the same order as in most traditional Chinese ink paintings, so there is no need to change the normal practice.

4.3.2 Tests using ink painting on frosted glass

I tried to use frosted glass and Chinese paint and ink experimentally to draw a chrysanthemum (see figure 48), mainly to test whether the Chinese ink can be successful on a large-sized glass. Following the techniques of traditional Chinese painting, the first layer uses heavy ink to sketch the shape of the petals of the chrysanthemum, the tree stems, and the stems of the leaves. Then for the second layer the leaves were painted with light ink, and then the petals drawn with yellow ink. This is the opposite of traditional Chinese ink painting, because traditionally leaves are drawn with light ink first, and then heavy ink is used to sketch the leaf stems. This way the light ink will not cover the leaf stems, while the heavy ink painting of leaves in the still-wet ink will create a blooming effect, so that it seems natural between the leaves and stems. However, because the glass is painted on the reverse side and viewed from the front, it is only essential to draw the leaf stem first and then paint the leaves of the light ink, to ensure that the leaf stem can be seen.



Fig.48. The 'Chrysanthemum' Chinese Ink Painting on Glass (Zhang, 2015)

The overall outcome of the experiment is considered to be useful as it shows that the effect of Chinese ink painting can be drawn on the frosted glass; but compared with the painting on the Xuan paper, the performance and blooming effect are still lacking in details. The main reason is that I still cannot control the dryness and wetness of the pigments and inks on the glass, and the strokes of painting on the glass. It shows my lack of experience in the art of inside painting on glass.

The success of the experiment on frosted glass is the first step in using glass to make ink animation. However, I found that using Petrov's method to complete a lens motion on glass requires the artist to erase the image after painting one frame before drawing the next. However, when frosted glass is used, it is difficult to erase the image effectively, and the trace of the

previous image will be left on the frosted glass. This is different from using a smooth flat glass, which can be wiped clean and can be used to keep the part of the image which does not move, and only modify the area with motion.

That is to say, using frosted glass can make ink animation, but every single frame needs to be drawn on a separate frosted glass, which is not feasible. Moreover, because the light transmission of frosted glass is not perfect, layering the background and characters is also a major issue.

4.4 Experimental ink animation using Xuan paper

After this experiment of drawing ink animation on glass, I started to think in 2015 whether I could use Xuan paper, which could guarantee the effect of traditional Chinese ink painting, as the performance in blooming and detail on Xuan paper is correctly displayed.

I tried to use the two traditional Chinese ink painting styles of Gong Bi (see figure 49) and Xie Yi brushwork, and practised both before embarking on the animation.

Gong Bi painting, also known as ‘fine stroke’, is traditional Chinese ink painting style which is neat and meticulous. There needs to be a draft showing the content and composition of the painting, and then the draft is drawn on alum coated Xuan paper, known as ‘Shu Xuan’(熟宣) and a rat whisker ‘Shu Hao’ (鼠毫) brush was used to limn the content and shape. The last step is to paint the colour, which generally needs to be rendered multiple times, so as to achieve the artistic effect of both form and spirit. Most of the time, the meticulous painting will involve seven or more steps of colouring: Ping Tu (平塗), Tong Ran (統染), Fen Ran (分染), Ti Ran (提染), Zhao Ran (罩染), Xing Ran (醒染), and Hong Ran (烘染), (see figure 50). Meticulous

painting is unique; in that the lines need to be neat, delicate, rigorous and strong. For the painting colours, there will be a uniform tone, while maintaining a brightness and calm. The detail can be achieved in a hierarchical manner.



Fig. 49. Gong Bi painting of Bamboo (Zhang, 2012)

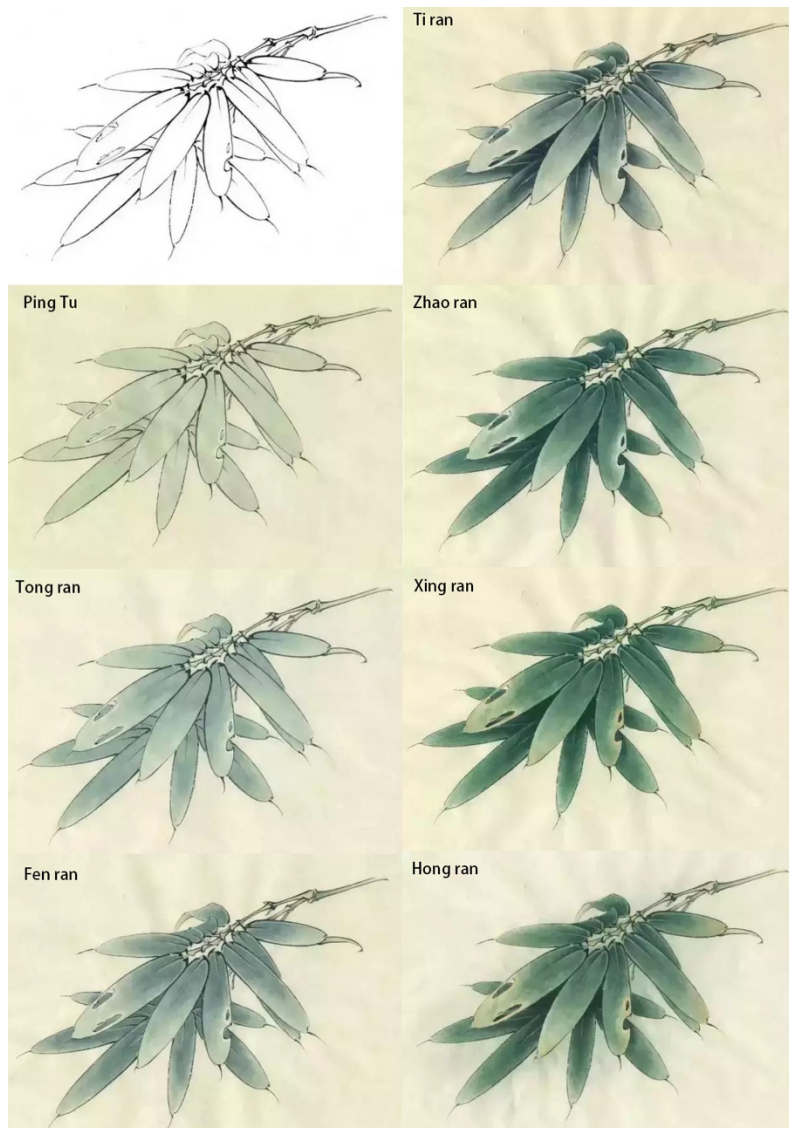


Fig.50. The various steps of Gong Bi (painting by Zhang, 2019)

In traditional Chinese meticulous painting, multiple layers of colour are applied to the image to ensure depth and realism, but considering the time needed for animation, I applied only two layers of colour. For my drawing of a lily in bloom, I drew the lily (see figure 51, please refer to Appendix B — ink animation test “Lily”¹) in thirteen drafts to make sure the whole blooming process was consistent, and then drew each draft as a continuous frame on Xuan paper. I started outlining with dark ink and the rat whisker brush to outline the shape, then used Chinese

¹ Ink animation test “Lily” <https://youtu.be/Sqoj-RtQx0>

pigments and a wool 'Yang Hao' 羊毫 brush to colour the petals and leaves. After drawing, I scanned each painting into the computer as a continuous frame for compositing, and completed the animation as the result of this experiment.



Fig. 51. 'Lily'—frame by frame animation created by using painting on Xuan paper (Zhang, 2016)

The results of the whole experiment show that the use of Xuan paper, Chinese pigments and ink to make meticulous style ink animation can be effective, but there are many difficulties to overcome:

1. First of all, it takes time to make ink animations in this way, from the meticulous painting needed to finish more than seven steps to show the overall effect of the ink painting. To produce an animation, every frame needs a huge amount of painting.
2. Secondly, the animator needs in-depth skills and knowledge of meticulous painting technique.
3. Thirdly, each painted frame needs to be consistent with the original painting and keyframes. This is different to general animation, where the middle frame cannot be drawn.
4. Finally, Xuan paper is not very translucent, and it is impossible to superimpose the background in a layered manner. If a background needs to be drawn for each frame, it becomes an impossible task.

While making ink animations in this meticulous style, I also tried the Xie Yi (freehand) method. Freehand brushwork originated in the Northern Song Dynasty and it is known for its large, thick strokes and it is the opposite of Gong Bi style where the form of an object is depicted by concise freehand strokes. Its main feature is that it does not attempt to achieve a realistic external image of the object, but emphasizes the inner spiritual essence by using the brush in a broad way, focusing on the expression of the demeanour and the inner feelings of the creator. The artist is required to use feelings to depict the object in the painting image, not focusing on the shape of object and the depiction in the scientific sense, but emphasizing concise brushstrokes to express the charm and the emotion of the object.

Xie Yi freehand drawing can be subdivided into two types: ‘Da Xie Yi’ 大寫意, (see figures 49 to 51) and ‘Xiao Xie Yi’ 小寫意. The Xiao Xie Yi style lies between the Da Xie Yi and Gong Bi styles where the brushwork emphasizes the shape of the painted object, but the stroke is more extensive than the meticulous touch of Gong Bi. On the contrary, the Da Xie Yi brushwork is the way to express the artist’s emotions and imagination and for the artist to understand through an inner comprehension after highly refining the image where it requires high painting skills.

In terms of materials, both the freehand and the meticulous styles use traditional Chinese materials, including Chinese traditional paints, ink and Xuan paper. However, there are different types of Xuan paper. The freehand style needs non-alum coated paper, which is called ‘Sheng Xuan’ 生宣; the meticulous style uses ‘Shu Xuan’ 熟宣, which is more sensitive to water and has an excellent blooming effect.

Before starting the animation, I also practised the freehand style while considering its content. I thought about using a Xiao Xie Yi style to practice and animate, because Xiao Xie Yi is more focused on the shape of the object, and can be more effective for the continuity of the action. To practise Xiao Xie Yi, I drew traditional themes such as peony, chrysanthemum and fish (see figures 52 to 54), mainly to understand the style and to improve my skills, at the same time, to test how to show the themes with good expressiveness.



Figs. 52. 'Fish' (Zhang, 2015).



Figs. 53. 'Chrysanthemum' (Zhang, 2016).



Figs.54. 'Peony'(Zhang, 2017).

After practising these three themes, I chose to use the theme of fish for my experiment (see figure 55), mainly because the swimming of the fish allows more expressiveness and movement. The subject is black goldfish, which requires black ink to draw the fish and is a better way to express the concept of five ink colours. At the same time, it can be combined with the expression of Yin Yang relationship from my theoretical research (see section 2.6.1). When I draw the theme of a traditional Chinese ink painting of fish, I do not draw water in a scientific way, but I leave white space to express the concept of water. Chinese ink paintings are mainly based on ink, using white space and black ink to show juxtaposition and highlight the theme, and to provide a free and flexible space for the artwork to express Yi Jing.



Fig. 55. 'Goldfish' (Zhang, 2017)

From the results of the whole experiment, it is clear that it is feasible to use Xuan paper to make a Xiao Xie Yi style ink animation, but there are still some difficulties. Firstly, each frame needs to be exactly the same style as the original painting and keyframe, which requires the painting of each frame to be carried out with extreme care. Secondly, in order to prevent frame skipping problems, the natural blooming effect of ink on Xuan paper needs to be consistent in each frame of the painting. This requires good Chinese painting skills and control of the ratio of ink and water. Thirdly, because Xuan paper is not very translucent, it is impossible to superimpose

the background in a layered manner, which in effect is the same as making an ink animation using a meticulous style.

4.5 Experimental ink animation using traditional methods

After these experiments, I began to explore the mystery of traditional ink animation technology. In 1960, the Shanghai Animation Film Studio established the Ink Animation Research Group and launched an exploratory experiment into ink animation. In the same year, the successful animation of *The Tadpoles Look for Their Mommy* marked the birth of China's and the world's first ink animation and a significant innovation in the animation industry. It expresses a feeling of the virtual and the real and is an elegant piece of work. It integrates the concept of the Yi Jing in Chinese ink painting into the animation and is a significant breakthrough in the artistic style of animation. As we have seen, there is a difference between Chinese ink animations and other kinds. Chinese ink animation is not constrained by the general animation lines or the limits of the matte painting. Traditional Chinese ink paintings use freehand brushwork to express ink animation, and there is no contour line; it is naturally rendered on Xuan paper, and each scene is a traditional ink painting in itself. The characters' movements and expressions are beautiful and dynamic, and the picture is full of poetry; the artistic concept of 'likeness and unlikeness' in Chinese painting is perfectly expressed in the animated picture (Sun, 2011, p.95).

The traditional Chinese ink animation technique is flat-painted with lines and single-lines. Usually, the production staff use celluloid to draw lines on the front and colour on the back to ensure even colouring, and then shoot the film accordingly at 24 frames per second. Ink painting is usually done on Xuan paper with strong water absorption without lines or uniform colouring, but showing expression through the different proportions of ink. Ink animation too

needs to maintain these traditional characteristics. Additionally, however, it is necessary to overcome the obstacles in the original animation drawing process, which is a crucial problem.

The traditional ink animation process is cumbersome and time-consuming. With the active ink rendering effect on the screen, only the static background image was made by traditional Chinese ink painting, painted on Xuan paper. Nevertheless, the character's ink effect is not painting on the Xuan paper; it contains all the mystery of Chinese traditional ink animation.

When using traditional techniques to make ink animations, there is a very significant technical difficulty to solve. This is the colouring problem of Chinese traditional paints and inks on celluloid film. It is very difficult to get the inks and pigments to adhere to the smooth celluloid after dilution. The adsorption capacity of celluloid is not sufficient, because the ink is diluted by water. I started experimenting on two different celluloid films using different colours, to alter the adhesion of the ink with different proportions of water.

1. Examinations:

In Chinese painting, 'ink' is not only black, but it also can be considered a highly-diverse material, depending on the proportion of water added. This is referred to as ink of 'five colours': black (100% ink), heavy black (add 30% water), strong black (add 50% water), light black (add 70% water) and pale black (add 90% water). Different effects can be produced, depending on the choice of brush with the ratio of water to ink or paints.

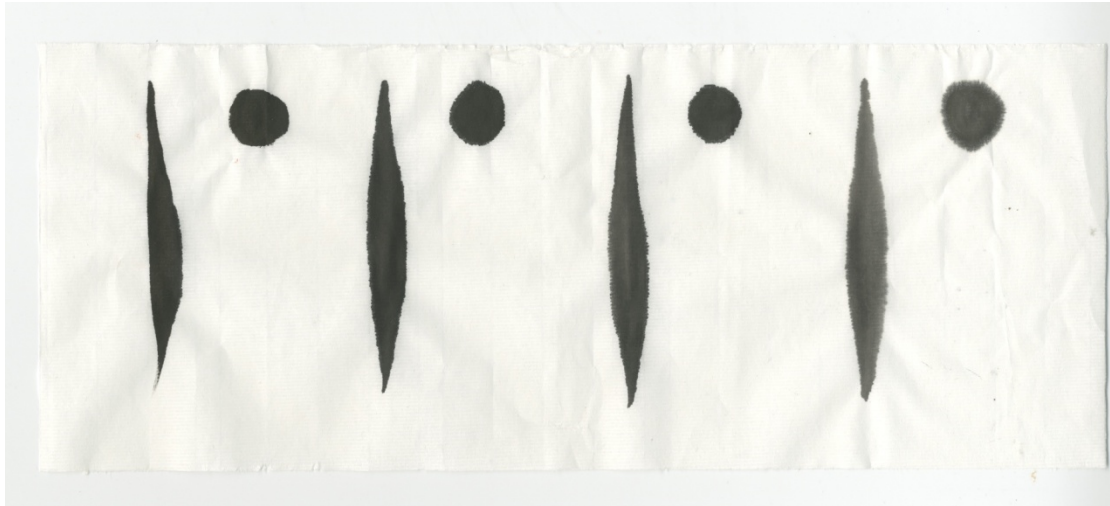


Fig. 56. Test showing 'five tints' of Chinese ink on Xuan paper (Zhang, 2017)

figure 56 shows a test expression of the different ink colours on Xuan paper. From left to right, it demonstrates the ratio of water:

1. Black: 100% ink;
2. Heavy black: add 30% water;
3. Strong black: add 50% water;
4. Light black: add 70% water.



Fig. 57. The ratio of water with Chinese ink on celluloid (Zhang, 2017)

figure 57, however, shows the same effect on celluloid and it can be seen that the higher the proportion of water, the worse the adhesion to the celluloid. After the ink is completely dried, the strong black ink and light black ink will have different proportions missing from the celluloid.

If we compare the adhesion of the ink and the change of the ink colour in the same proportion of water on the Xuan paper, we can see that the biggest problem is that the celluloid material has a low water absorption factor, and the Chinese ink cannot be effectively attached to the surface (see figures 58 & 59).



Fig. 58. The ratio of water with Chinese watercolour on celluloid (Zhang, 2017)

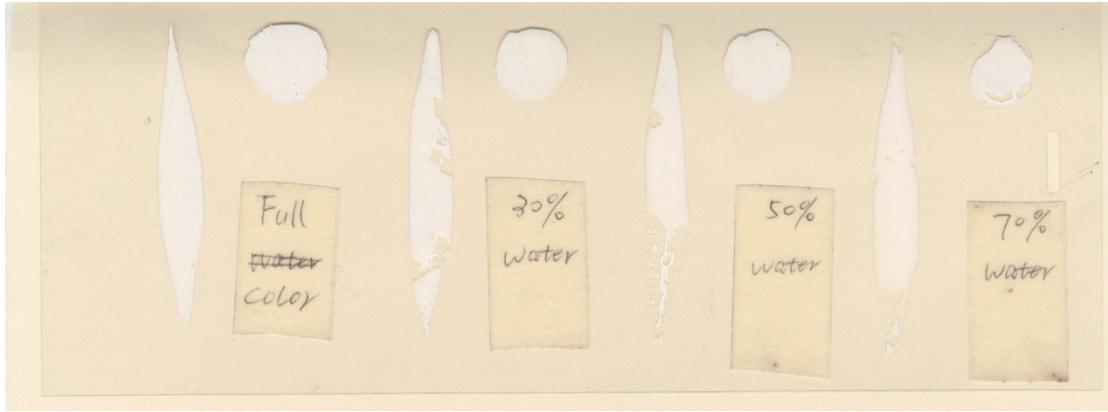


Fig. 59. The ratio of water with Chinese watercolour on celluloid (Zhang, 2017)

When using the Chinese paint test, the same amounts of water are added — 30%, 50%, 70% — and there is a similar problem as with the ink, although the effect with white paint is slightly better. The main reason is that the paint is relatively viscous, so its capacity for adhesion is relatively better, but the picture is still partially missing.



Fig. 60. Frosted celluloid sheet test with Chinese watercolour (Zhang, 2017)

The second test was with frosted celluloid (see figure 60). The same proportions of water were added — 30%, 50%, 70% respectively — corresponding to the different strengths of the ink:

black (100% ink), heavy black (30% water), strong black (50% water), light black (70% water), as in traditional Chinese ink painting.

From the experimental results, we can see the adhesion of the frosted celluloid material is considerably better than the smooth. This is the same as painting on frosted glass, but when blending 70% water to express ink, the ink colour still does not adhere well to the matte celluloid.

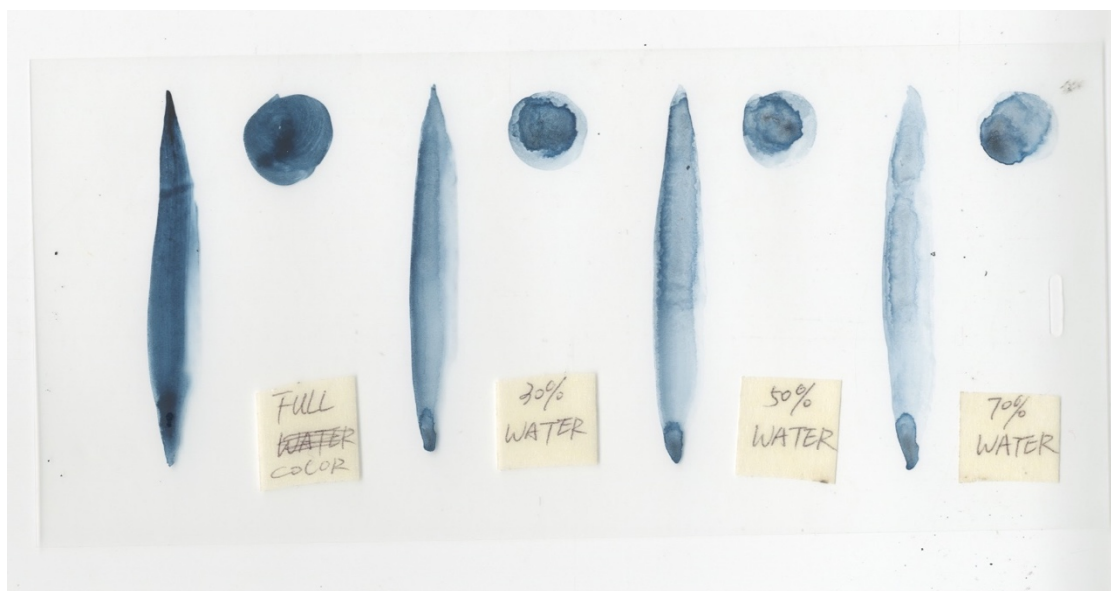


Fig. 61. Frosted celluloid sheet test with Chinese watercolour (Zhang, 2017)

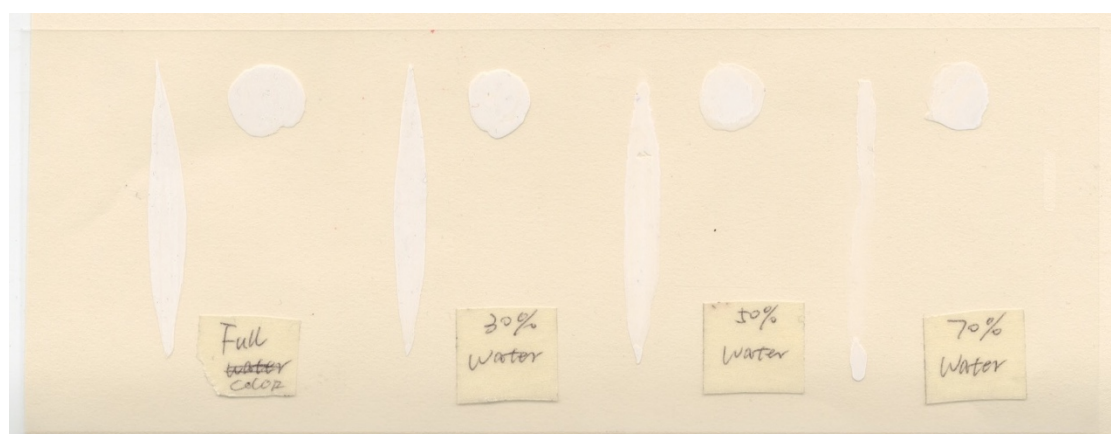


Fig. 62. Frosted celluloid sheet test with Chinese watercolour (Zhang, 2017)

figures 61 and 62 show tests of the adhesion of other colour paints, which is similar to the adhesion of ink. Overall, the frosted celluloid is better than the smooth celluloid, and the different colours will give slightly different results, depending on the gelatine content of the paint.

From the test results, it is clear that Xuan paper and celluloid have different properties. Chinese watercolour mixed with water is poorly absorbed by the celluloid, and the larger the proportion of water, the less the watercolour adheres to the celluloid. Looking at the experimental results with smooth and frosted celluloid, the frosted celluloid has a better adsorption effect; nevertheless, it cannot achieve the results with traditional Xuan paper, the main reason being the low gelatine content of Chinese watercolour.



Fig. 63. Celluloid sheet test with Chinese watercolour (Zhang, 2017)

At the end of the test adhesion (see figure 63), I used celluloid film to draw a complete set of Chinese traditional ink paintings to complete the experiment.

On the whole, the biggest problem with Chinese paintings and inks on celluloid is that the adhesion of pigments is not perfect and will be reduced after dilution with water. The problem seems to be its smoothness, as mentioned above; and painting on glass has the same issue. The main reason is, when painting a lighter shade, Chinese paints and ink need to be diluted, and there is little glue content. The water will break the tension of the paint or ink on the surface of the celluloid, so that after it has dried, parts of the picture are missing.

After discovering this problem, I considered blending glue with Chinese paint and ink, to improve their adhesion on celluloid. I used gelatine (see figure 64) which is often used in traditional Chinese ink painting. Gelatine is also known as ‘Guang Jiao’ (廣膠); it is mainly produced in Guangdong and Guangxi Provinces. It is a partially degraded protein derived from collagen in bones, horns and other tissues of animals such as cattle and horses. The main characteristics of gelatine are that it is yellow as a solid but transparent once it is diluted, and tasteless (He, 2015, p. 62).



Fig. 64. Chinese gelatine

After I blended the gelatine with the paint, I used the same celluloid test as before (see figure 65). From the test results, it is clear that blending gelatine with the paint can ensure the adhesion of paints and ink to celluloid, even when diluted with water.

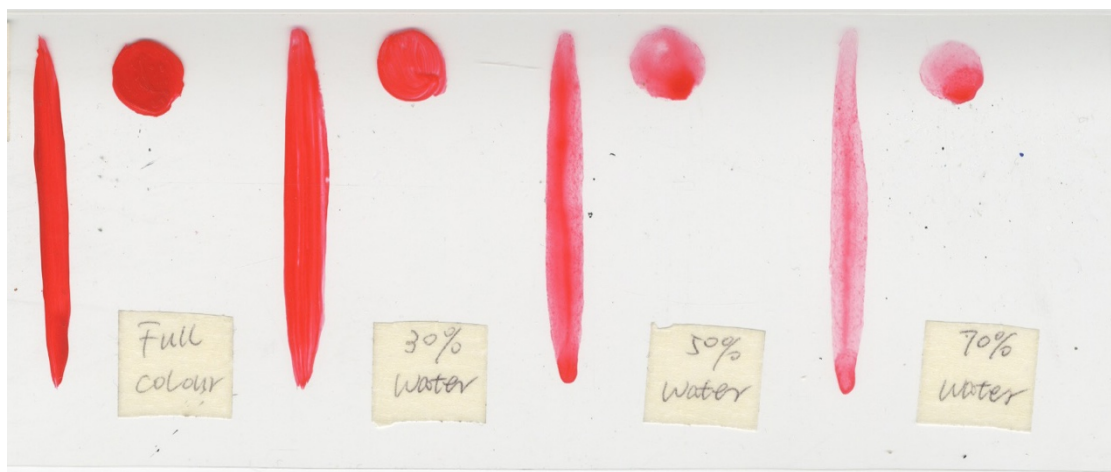


Fig. 65. Celluloid sheet test with Chinese watercolour blended with gelatine (Zhang, 2017)

I tried to use a variety of paints to blend gelatine and draw the colour of the peony petals, in order to verify that the layering of the colour can be drawn on the celluloid (see figure 66). The results show that the use of gelatine can effectively guarantee the adhesion of traditional Chinese paint to celluloid and also that layering of different colours has no effect on adhesion.



Fig. 66. Celluloid sheet test with layered Chinese watercolour blended with gelatine (Zhang, 2017)

In addition to these experiments, I also learned through interviews and data collection that the mysteries of ink animation are concentrated in the painting and filming departments. Traditional ink animation is produced in the same way as the animation materials of the same period, and is drawn on transparent celluloid; the difference being that all the characters of the traditional ink animation are subjected to colour separation, so that a character is inked according to the Chinese ink painting method and divided into five colours.

Using the Chinese ink painting of a buffalo as an example (see figure 67), the animal is divided into three to four layers, according to the ink colour. The first layer is separated with the largest area of light ink. The second layer has a small area of strong black ink. The third layer has the smallest area using black ink to outline the horn of the buffalo, the eyelid, the eyes, the nose and so on, where the different layers account for half the area of the artwork. This part will be carried out using a special photographic plate, called a ‘process plate’ in the technical terminology of printmaking. (Griffiths, 1995, p.16)

After the colour separation plates are made, the animator transfers the different layers of colour and blocks to different pieces of celluloid according to the requirements of colour separation plate-making; that is, the first layer of light ink, the second layer of heavy ink, and the final layer of full ink, painted on three separate celluloids.

Here I will explain my colour separation and colouring process (see figures 67 to 73). The first is to complete a single-frame draft of the buffalo character.

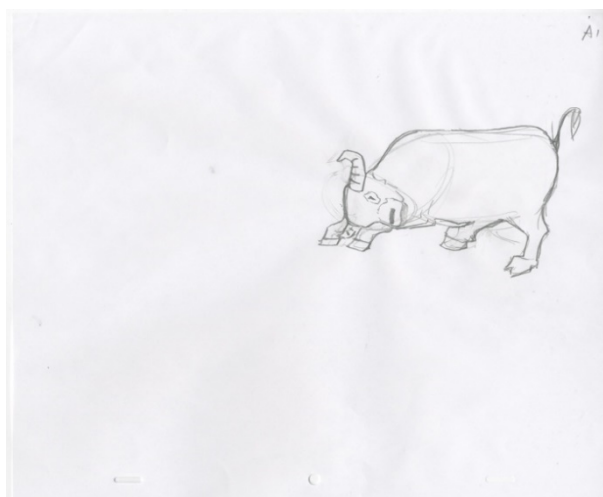


Fig. 67. Draft of the buffalo character (Zhang, 2017)

The number of layers in the colour separation plate is confirmed by colouring the draft according to the style of the traditional Chinese ink painting of a buffalo.



Figs. 68 & 69: Draft of the buffalo character with ink (Zhang, 2017)

According to the requirements of colour separation plate making, the first layer with the largest area of light black ink is drawn on the celluloid.



Fig. 70. The first layer on the celluloid (Zhang, 2017)

The second layer is to outline of the buffalo on the celluloid, using strong black ink.



Fig. 71. The second layer on the celluloid (Zhang, 2017)

The third layer is painted in the same way.



Fig. 72. The third layer on the celluloid (Zhang, 2017)

The fourth layer is to use the black ink to draw the smallest area: the horn, eyelid outline, eyes, nose and other positions on the celluloid.



Fig. 73. The fourth layer on the celluloid (Zhang, 2017)

The last and most important step is the capturing of the painted celluloids. In order to capture the unique smudge effect of ink painting, the masters of Shanghai Animation Film Studio used multiple exposure technology to shoot the animation. The technical parameters of multiple

exposures, such as exposure times, the exposure process, shutter speed, aperture, etc., all rely on the photographer's experience and skill, as well as a large number of preliminary experiments and data accumulation, accompanied by a high re-work rate.

I too tried to experiment with multiple exposure techniques. After many experiments, I arrived at the following procedure that would give the best results (see figure 74):

Camera	Nikon D600
Lens	AF 50mm 1.8F
Aperture	F/16
Exposure steps	The first step exposes the light ink layer; the second step, the heavy ink layer; the final step the dark ink layer.
Shutter time	0.625 seconds per layer
Number of exposures	3 times

Fig.74. Camera data (Zhang, 2017)

Compared with the traditional film camera, the number of exposures of digital cameras is limited by the camera function. I can achieve three multiple exposures; this should be different from the exposure of Shanghai animation film studio. I carried out interviews about the camera during the traditional production process. The number of exposures is related to the number of separation plates, which means that three layers require three exposures, and four layers require four exposures.

The following is the effect of my multiple exposure experiment.



Fig. 75. Buffalo character with multiple photography technique (Zhang, 2017)

From the experimental shooting results, the edge of the buffalo character has a good blur effect under the multiple photography technique, which is similar to the blooming effect of traditional Chinese ink painting (see figure 75). However, there is still a big gap in the quality of the animation compared to the work from the Shanghai Animation Film Studio.

We can compare what happens without using multiple shooting techniques (see figure 76 below):



Fig. 76. Buffalo character without multiple photography technique (Zhang, 2017)

One can see the effect of normal exposure, as the boundaries of each layer of the celluloid are very obvious and stiff.

Through an interview with Zhuo Hejun (卓鹤君), who is a professor at the Chinese Painting Department of the China Academy of Art, I learned that the last ink animation of the Shanghai Animation Film Studio – *Feeling Mountain and Water* – was completed in 1988. In the filming process, the artist used the painter to paint on-site, and the photographer took pictures on-site at the same time and then synthesized them through the animated lens. Professor Hejun is responsible for the background production. Wu Shanming (吴山明), also a professor of the Chinese Painting Department of the China Academy of Art, is responsible for the original paintings of the characters. The two professors conducted on-site painting according to the actual requirements of the film, so that the film fully displays a sense of rhythm from the

layering and under the artist's brush and ink. The animations that the audience sees are not just a few pre-paintings and multiple-exposure filming. They also incorporate the inspiration of the artist's improvisation, which is what we mean by integrating the Yi Jing into the animation to achieve the freehand brushwork, which has promoted this *Feeling Mountain and Water* to the highest realm of Chinese ink animation.

4.6 Conclusion

In general, the cost of traditional ink animation production is exceptionally high, mainly due to the long production cycle and high requirements for the most skilled artists. However, the Chinese government has been keeping the ink animation production technology secret for many years (in 2015, I hoped to interview Shanghai Animation Film Studio, but was refused). However, to imitate the traditional ink painting effect on the celluloid, it is necessary to reach the level of the original painting in every frame. This is unlike the ordinary two-dimensional animated film, which can be completed with lesser skilled animators — and therefore, cheaper labour. Time and labour costs are some of the most precious factors in the animation industry.

In researching Chinese traditional ink animation production technology, it has become clear that there is basically no relevant literature or documents on the subject, the main reasons being:

1. The Chinese government kept Chinese traditional ink animation technology secret.
2. No further production and development of Chinese traditional ink animation was carried out after 1988, and the animation production technology and skills were not passed on.
3. The production technology is difficult and the costs are too high, so it has lost any competitive advantage it might have had in the contemporary animation industry.
4. The old generation of ink animators are retired or have passed away, which has increased the difficulty of research into traditional ink animation production techniques.

5. There is a lack of existing research on traditional ink animation production.

Therefore, the research for traditional ink animation production techniques has mainly been implemented through interviews with the old generation of retired producers and artists. Simultaneously, experiments were conducted with different materials according to the characteristics of traditional Chinese painting. Inspired by the Russian artist Aleksandr Petrov's *The Old Man and the Sea* (1999) and the KLM Royal Dutch Airlines safety video (2015), I began to experiment with glass and porcelain materials for animation. Among the traditional Chinese art disciplines, porcelain painting and glass inside-painting are good carriers of the style and characteristics of traditional Chinese painting, and the rendering effect is close to that of painting on Xuan paper. Therefore, these two materials are suitable for making ink animations. I had experience of porcelain painting in the past. Due to the limitations of equipment and conditions, I could only make conclusions about the feasibility of using porcelain plates from experience. It is theoretically feasible to make ink animations by drawing Chinese paintings on porcelain plates. Judging by the animation of the KLM Royal Dutch Airlines safety video, the porcelain plate allows no light transmission, so the background and characters cannot be drawn in layers. Therefore, it is difficult to create the background, the content is relatively simple, it cannot handle complex action and each frame of the porcelain plate needs to be fired after drawing; thus, the production is very difficult and the costs are high.

During my interview with Dr. Jianyong, I learned about the 'inside bottle' materials and painting techniques. In the subsequent experiment, I used frosted glass to paint using the principle being the same as the inside-glass painting. The frosted glass can absorb Chinese painting watercolour and ink very well, and the finished effect is close to traditional ink

painting. For painting therefore, it is theoretically possible to use glass as a material to make ink animation. However, in comparison with Petrov's technique of using glass and oil paint, where each frame can be scrubbed clean and that the smooth glass allows for greater transparency. With frosted glass, it is difficult to scrub it clean of watercolour and ink, so it is necessary to use a new frosted glass for each frame. Moreover, the frosted glass will not transmit light, so it is impossible to layer the background and characters. In other words, if using frosted glass to make ink animations, there are additional problems of a complicated production process with added procedures.

The next experiment focused on testing the possibility of using Xuan paper for ink animation. The experiments used two traditional Chinese painting styles, Gong Bi and Xie Yi respectively. A lily was drawn in the Gong Bi style as the object, and although Gong Bi painting requires multiple renderings, only two layers were used in the experiments because of time considerations. For the same reason, the Xie Yi style experiment uses monochrome ink to draw a simple goldfish swimming. From the analysis of the experimental results, it is feasible to use Xuan paper for ink animation, but there are still many problems and difficulties in production:

1. Whether the brushwork is in Gong Bi or Xie Yi style, each frame of animation needs to be of high drawing quality, and it is impossible to save production time by partly modifying the character's action between frames.
2. Xuan paper is not transparent and cannot be layered to make the background. If the screen needs a background, the image needs to be drawn on each frame.
3. It is impossible to erase the picture or modify incorrect parts of the picture on Xuan paper; thus, every frame of the picture has to be drawn correctly.
4. Time and labour costs are immense.

The above-mentioned experiments reached a conclusion that I was unable to find suitable materials for making ink animations, and the process reached a bottleneck. It was not until 2017, through interviews with Professor Daoguang, that I learned that traditional ink animation production uses celluloid as the material, while using special pigments for drawing. So far, I have started to experiment with celluloid, and I tried two kinds of celluloid materials during the test: ordinary smooth and transparent celluloid and frosted translucent celluloid. Considering that the colour of ink animation should be as close as possible to the colours of traditional Chinese painting, Chinese watercolours and ink were used as pigments. The test results show that these materials offer weak coverage because of their low colloid content, and they cannot adhere well to the celluloid after being diluted with water. This indicates that there will be colour missing after the pigment dries. However, it has to be diluted with water to achieve the different-coloured layers. Faced with these problems, an attempt was made to add gelatine to the Chinese watercolour to improve its viscosity and adhesion, and the results were successful.

After the materials testing, I began experimental production of single-frame animations. According to Professor Daoguang's explanation, traditional ink animation production uses layered drawing and multiple exposure shooting techniques. Layered drawing requires drawing the characters on different celluloids, according to the colour and its intensity, and making sure that each layer of celluloid is drawn so that there is no deviation in the picture after overlapping. In the experiment, I layered the buffalo character into four colours according to the original painting colour, which corresponded to the five tints of ink colour used in Chinese painting: 'charred black', 'heavy black', 'strong black', and 'light black' in four layers. After completing the drawing, the photographic equipment was set up on a workbench for shooting. The next step was to experiment with multiple exposure techniques. In traditional Chinese ink animation

production, traditional analogue film cameras would be used for the shoot. However, I was restricted by conditions and could only use digital cameras for testing. I therefore used a Nikon D600 camera and set up three multiple exposures, something which traditional film cameras are not capable of. The experiment showed that three multiple-exposure shots can be blended to create the four layers of colour, and appear similar to the border vignetting effect of traditional Chinese ink painting. Moreover, if the number of multiple exposures can be increased, the effect should be better. On the whole, this experiment proves the possibility of re-creating traditional ink animation, but more experiments are needed to better restore the original effect in terms of colour; and more tests also need to be conducted on pigment materials and multiple-exposure techniques, in order to obtain more accurate photographic parameters.

Chapter Five: Development and Demonstration of Creative

Chinese Ink Animation

5.1 Introduction

In this chapter, I want to start with the experimental results of Chapter 4, and combine them with the Chinese traditional philosophical Yi Jing theory, which I studied to show how it is expressed through ink animation. The Yi Jing refers to the artistic realm formed by the integration of a picture from life depicted in works of art and the thoughts and emotions of the artist. The essence is that there is emotion in the scenery, there is scenery in the emotion, and the emotion combines with the scenery. Art that can touch an audience always reflects the 'Jing' of the object, and at the same time expresses the artist's 'Yi', that is, the creator can express their state of mind 'through' the image and also express it 'in' the image. In a broad sense, it includes both the creator and the appreciator; the former is determined by the creator's aesthetic concept and level of aesthetic evaluation, while the latter has the aesthetic concept and aesthetic evaluation of the appreciator (Gu, 1998). For me, the expression and feelings of Yi Jing cannot be pinned down using formulas. This is not like the golden ratio, perspective and other aesthetics which have fixed rationales and definitions. After four years of study and research, I believe that my personal artistic accomplishment and ability still cannot fully express the concept and beauty of Yi Jing. However, I hope that I can provide some idea of the artistic conception and the expression of Yi Jing in animation through its three main elements: Tian Ren He Yi, Yin Yang and Ch'i Yuen Sheng Tung. Animation can be regarded as an art form, and the incorporation of Yi Jing as part of the creative process. It starts with the storyline, and runs through scriptwriting, character modelling, background design, composition design of the dynamic picture, music, etc. The integration of the concept of Yi Jing should be considered in every aspect, as well as how to integrate the effect of ink animation with the story to be

expressed and the spirit to be conveyed by the film, a test of the creator's culture, artistic cultivation and accumulation of knowledge.

For the production of the backgrounds and the rendering of the scene atmosphere, I want to use some of the techniques from traditional Chinese ink painting, such as the 'PoMo' and 'Rubbing Ink' methods (see section 5.3.3 and 5.4.3), to develop new forms of expression, while incorporating the concept of Yi Jing, and breaking away from the traditional backgrounds used in ink animation and the artificial factors, and the desired scene picture from the natural acquisition effect.

Incorporating Yi Jing into ink animation has some of the same features as modern art, and even some abstract art, in that the animation can be more diverse and open. In the current Chinese social environment, there is more and more promotion, preservation and focus on traditional culture, which creates an opportunity for the development of ink animation, and the exploration of the art form is an important way to exploit it. At the same time, the development of new ink animation software gives the possibility of a better production platform. As part of the Central Government's push to preserve its cultural and intangible heritage, I was fortunate to be awarded the level B in 2018 to establish my own ink animation studio once I completed my PhD. The studio will be based in my home city of Shaoxing, and it will be the first of its kind in China. I hope to further develop my research in the art of Chinese ink animation.

5.2 The use of new technology and '*Expresii*' software

In March 2017, my supervisor Dr Manny Ling introduced me to an ink simulation program, called *Expresii*, which was developed by Dr Nelson Chu from Hong Kong. *Expresii* is 'Next-Gen' digital painting software, featuring the best replication of digital ink and watercolours. It

is also the best high resolution digital tool for Eastern Calligraphy and Chinese ink painting in the market.

I was immediately stuck by the natural variation of watercolour and ink; at last, you can have digital watercolour that flows — really flows (instead of simply diffusing locally). This is very different from the ink simulations in existing painting software, which lack a sense of flow and the effects are mostly stacked. The *Expresii* effect looks very close to traditional ink on Xuan paper.

5.2.1 What is ‘*Expresii*’?

Expresii software was developed in 1999 by Dr Nelson Chu, a computer scientist in Hong Kong. It updates the ideas and vision of the ‘Moxi’ system, which was unveiled in 2005 by the same author. According to its *Quick User Guide*, ‘one may find *Expresii* liberating when drawing and painting in a more Eastern way that celebrates serendipity’. (*Expresii* quick user guid, 2016)

Expresii simulates the effect of ink on Xuan paper through a computer intelligence algorithm, and can be used in calligraphy painting, ink handwriting and other Chinese elements. It makes a dynamic calculation of fluid dynamics on Xuan paper media and has GPU (Graphics Processing Unit) acceleration for advanced graphics, helping it to simulate water-based paint, ink, pigment, organic brushes; and there is an ultra-deep zoom function.

Its design mainly simulates traditional Chinese painting, the deformation of the real brush is imitated by the brush engine, and can also create Western watercolour effects.

Expresii software can generate images of up to 12K resolution and is accelerated by the GPU for smooth panning and zooming. With other pre-existing software, watercolour simulation is let down by a lack of fluidity; the effect has to be stacked, which is very distant from the effect of real ink and watercolours. In contrast, *Expresii* has a real-time ink simulation based on fluid mechanics that lends agility to ink and Chinese paint. To see what this means, one can compare the *Expresii* effect (figure 77) with standard painting software (figure 78).



Fig. 77. With the 'Expresii' software, the brush can simulate the layering of a real brush and ink. (Zhang, 2017)



Fig. 78. Existing software simulates ink brush strokes using Photoshop, Painter and other painting tools (Zhang, 2017)

To conclude, *Expresii* simulates Chinese ink and paint effects from two aspects.

1. *Virtual brush*: The flexible brush is an important tool for Chinese calligraphy and painting when drawing varied and layered lines. If creators want to simulate the characteristics of a brush — its hardness and its softness — they need to consider its physical characteristics, given the capacity of the typical home computer; using the ‘conservation of energy’ principle of physics to help simulate the bending of the brush-tip and the spread of the pen. To achieve this, the whole pen is divided into many small hair bundles; each bundle uses a mask method to create the end-scatter effect. This allows the creator to change the size, elasticity, water content and friction between the brush and the paper to achieve different types of line (see figure 79):

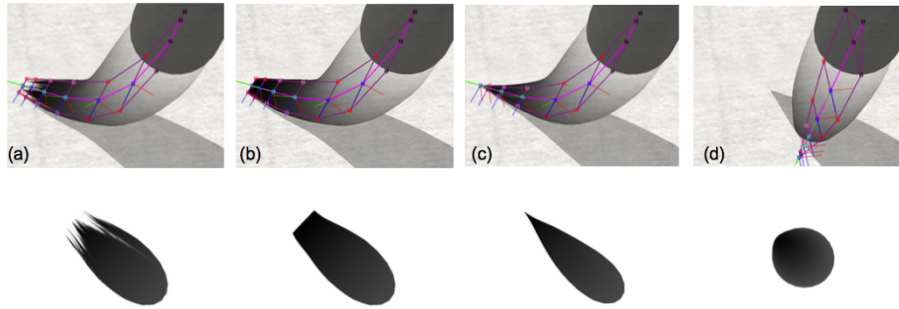


Fig. 79. Expresii virtual brush deformation and effects (Chu, 2007)

figure 79 shows the brush stroke deformation effect and trace comparison: (a) regular brush shapes and marks; (b) the nib is not splayed; (c) the nib is closed; (d) the point of impact between the nib and the paper (Chu, 2007).

2. Virtual ink (see figure 80):

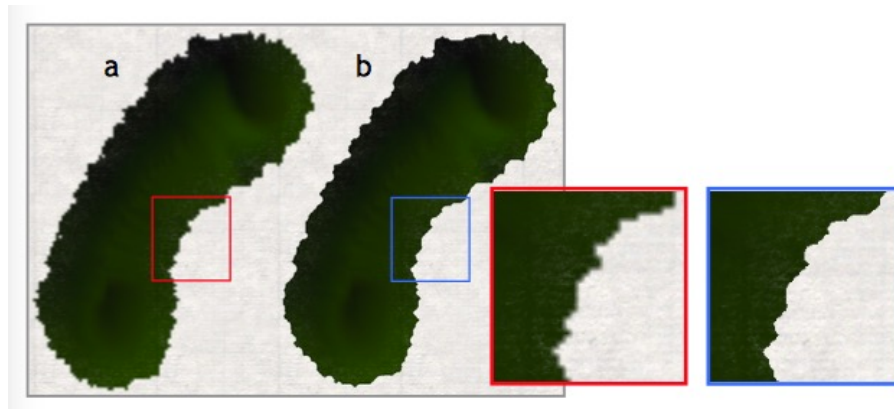


Fig.80. Expresii virtual ink effects, with magnification (Chu, 2007)

The above illustration shows the boundary modification (see figure 80): a) before modification; b) after modification. The more fluid-dynamic simulated ink is subjected to boundary modification the more realistic it looks. (Chu, 2007)

The placement of ink on Xuan paper can produce effects such as flow, spread and blooming. With the latest version of *Expresii* (2021), one can choose the Lattice Boltzmann fluid dynamic method to simulate the flow of ink or paint on Xuan paper, or simulate different ink textures, such as shunting, the irregular edges, feathering and so on. This is not possible with the ink effects that can be built up using general drawing software such as *Photoshop* or *Painter*. At the same time, one can try to add some real ink effects or techniques that are difficult to achieve by software, such as using a brush to push the ink on Xuan paper and using clear water to guide the direction of the ink, etc., which can change the Xuan paper to make different blooming effects.

5.2.2 ‘*Expresii*’ and ink animation

In essence, there is no actual connection between *Expresii* and ink animation, *Expresii* is a painting software that simulates ink effects. But if one converts the picture of the ink effect made by *Expresii* into a single-frame picture in the ink animation, then the *Expresii* can be very effective, when it is combined with general animation software such as *Adobe Flash*, *Toon Boom Animation*, etc., which can complete key animation, intermediate frames, background production, synthesis and other animation production processes. These processes and functions cannot be implemented in *Expresii* itself.

Using *Expresii* to produce ink animation is to develop a new process, which requires an understanding of the difference between traditional Chinese ink painting and new digital technology. The familiarity with the characteristics of both, plus consideration of how to combine them would produce usable outcomes. Since *Expresii* has the ability to imitate the ink effect, the outcome will depend to a large extent on the creator’s artistic accomplishment. Combining any traditional discipline with digital technology is a daunting and complex task,

and old values and environments cannot be ignored. On the other hand, it is necessary to develop a new perspective that combines the technical and artistic value of the times (Ling, 2008).

A sense of balance has to be achieved. Rick Valicenti, the American designer and lettering artist puts it: “We can always use the computer to make statements that are right for today, but at the same time you have to keep that balance, with high tech and with the high touch...” (Gilman, 1995, pp.20–29)

As I have mentioned in Chapter 3, ink animation is a continuing expression of traditional Chinese painting and it is an artform in its own right.

Expresii is a new platform for ink animation, using it to make ink animations closer to the traditional ‘ink painting’ of ink animation, and it is far superior than *Adobe Flash*, *Autodesk 3Dmax* and *Maya*, which are generic animation programmes. The language of painting that should be used in the creation of ink animation by *Expresii* comes from traditional Chinese ink painting where both aesthetic standards and creative techniques come from its original source. As the digital artist Zhang Wang 張旺 (2017) said: “My work is also painted, it is still based on the techniques of traditional Chinese ink painting, it also focuses on its characteristics, but the difference with *Expresii*’s predecessors is that I only have to change a pen.” (i.e. change from a traditional brush to a digital pen).

Using *Expresii* to make ink animations, or traditional Chinese ink paintings, brings a great deal of convenience. Firstly, tool preparation is much simpler than with traditional production methods, and it is easy to use: there is no need to consider the process of mixing water, ink,

pigment, glue, and pen washing. It can use a pen to draw from the beginning to the end, allowing the creator to concentrate on the screen and fully mobilize their creativity. Secondly, the artist can stop and think at any time, there is no need to worry about the pigment or the ink drying out and be rendered unusable, nor does it matter if the creator cannot finish the uneven colour on the celluloid in one session, as the colour mixing needed to alter colours can be done at different times, thus making the creation process much more relaxed. Thirdly, *Expresii* provides unprecedented space for ink animation creation. With traditional production, it is difficult to modify the painting on the celluloid, as each layer drawing needs to be redrawn if there is any deviation in position, so there is a very high re-work rate. Because of the technical limitations of the traditional process, it is impossible to achieve perfection in every detail. For instance, it is impossible to enlarge the viewing area, even when using software such as *Adobe Flash*, *Autodesk 3Dmax*, *Autodesk Maya*, etc. The saturated effect of the stacking of layers prevents the artist from zooming in to see the details. In contrast, the *Expresii* software, can generate images up to 12K resolution, which can fully magnify the image for most requirements (see figure 81 where it demonstrates the effect).

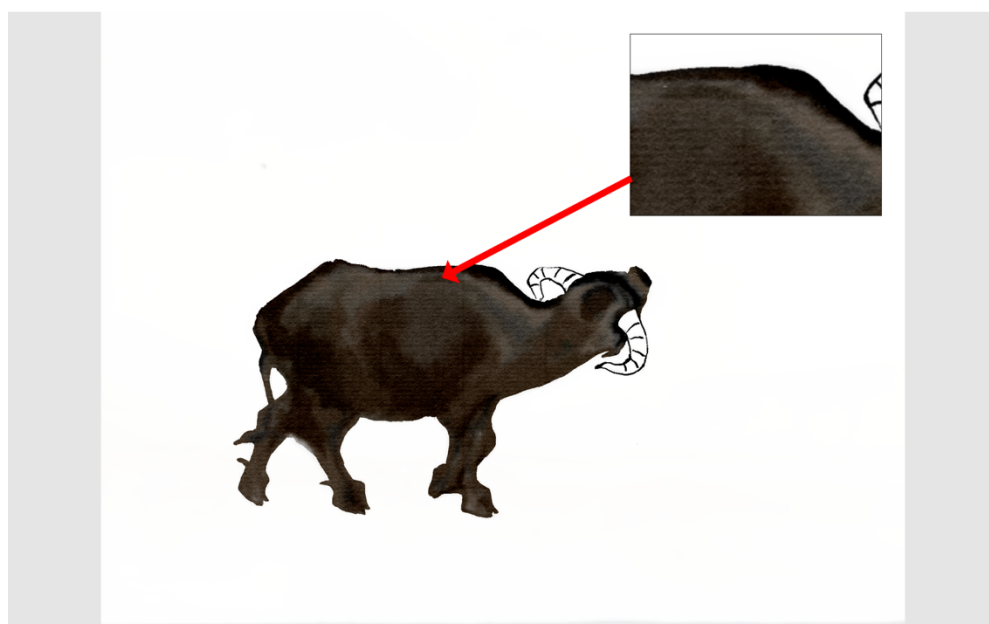


Fig. 81. Buffalo test chart with its engragement without losing detail (Zhang, 2017)

5.2.3 Comparison of ink effects using traditional methods and ‘*Expresii*’ software

The single-frame process and technique for drawing ink animations using *Expresii* are basically the same as with the traditional ink painting method (see figures 82 to 84, please refer to Appendix B — “Buffalo” Film Clip 01² and Film Clip 02³), except that the tools are different, using computers and tablets instead of Chinese brushes and ink. The drawing steps are as follows: firstly, a blank screen must be created, the colour of the Xuan paper used in the background selected, and the artist is now ready to start sketching a character, in order to confirm its position in the screen. Secondly, the artist separates the different parts, such as horns, face, body, legs and feet, and begins sketching in the different layers. Thirdly, using ink colours, the artist can start dyeing and colouring each layer to distinguish details such as black ink colouring on the horn, facial contours, eyes, hooves, etc. One can also add heavy colouring for the medium area, where a deeper-shaded part is needed, and then light colouring for a large area of the body and the legs, with the blooming of the ink giving a sense of volume and layering to the image. In this process, the creator needs to continually look for problems in modelling, colour, etc., and continually modify them.

² “Buffalo” Film Clip 01 https://youtu.be/RBgXS23f_zU

³ “Buffalo” Film Clip 02 <https://youtu.be/aICsyC1nPds>



Fig. 82. Animated character single frame picture (Zhang, 2017)

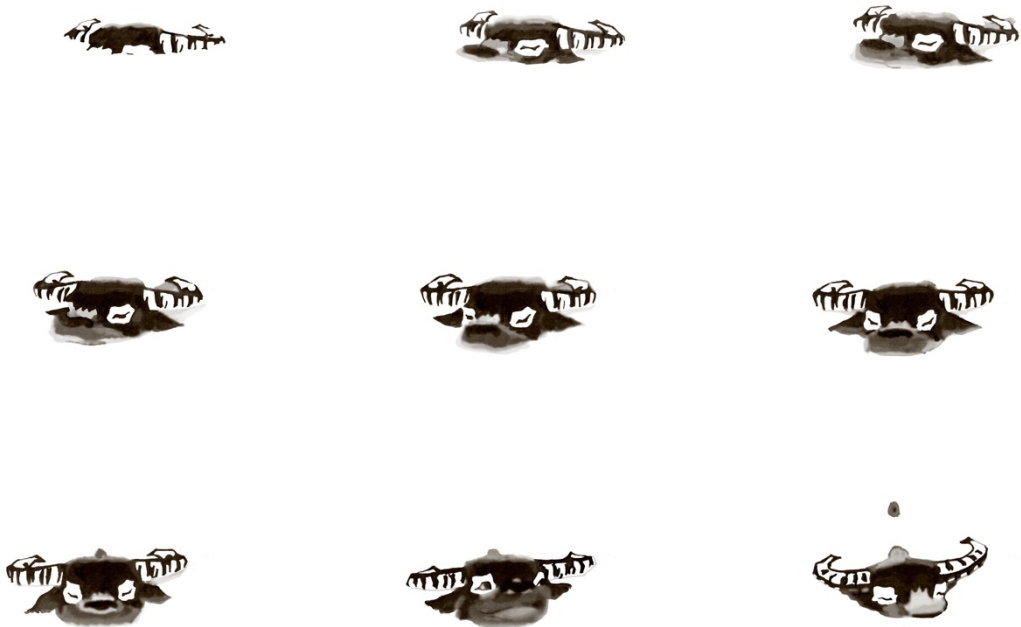


Fig. 83. Animated character single frame pictures (Zhang, 2017)

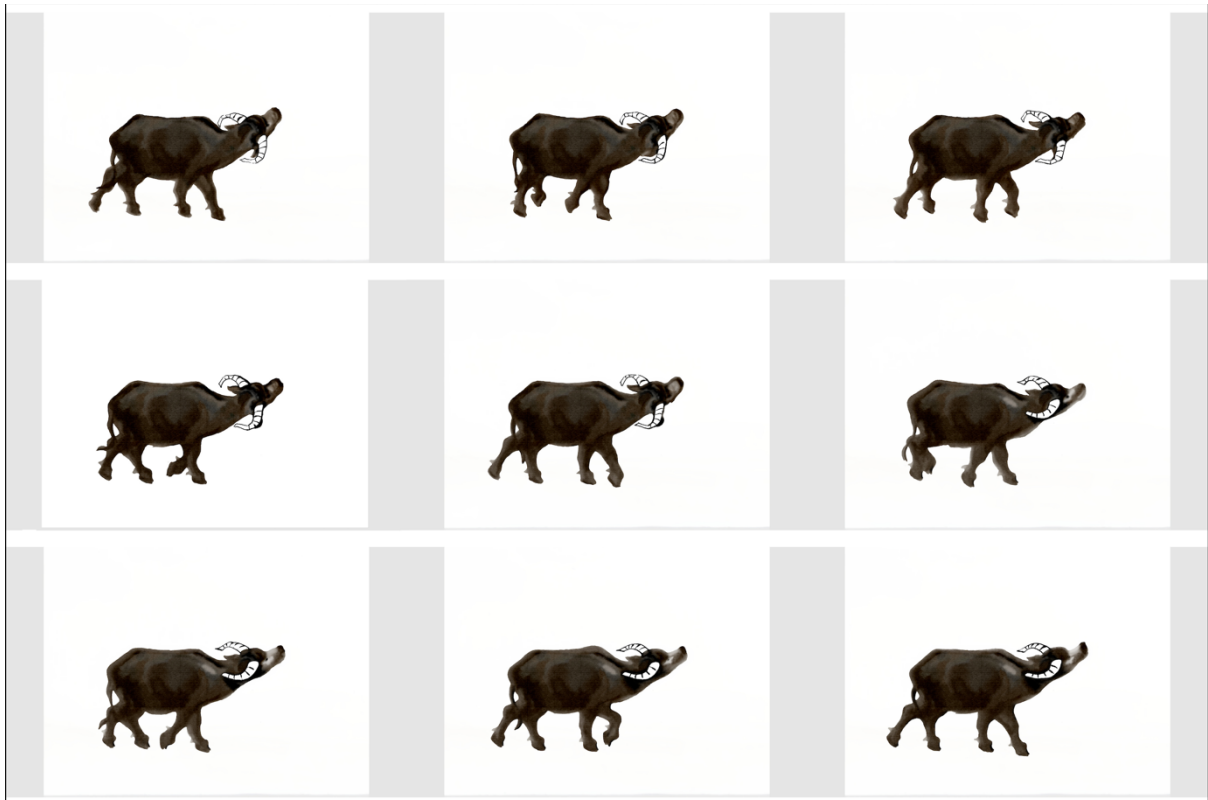


Fig. 84. Animated character single frame pictures (Zhang, 2017)

Expresii produces ink effects, at the edge of the character, which can completely simulate the effect of Chinese ink painting, with ‘flying white’ techniques (see below), ink blotting and so on. The software can simulate the ink and control of the water volume of the digital brush. It simulates the way Chinese traditional ink painting uses brushes. With the traditional brush, the effect of the ink depends on the ratio of ink to water. The dry and wet effect depends on the proportion of ink and water in the brush. The smaller the proportion of water, the more likely the effect of a dry brush and ‘Fei Bai’ (飛白) (the whiteness in the strokes — the feeling of flying). These two effects are uncontrollable, and each effect will be different. *Expresii* can imitate this uncontrollable effect of brush on Xuan paper, (see figure 85), etc. It is an excellent revelation in the natural flow of painting, and it also provides more creative spaces for artists.



Fig. 85. Ink strokes test using traditional Xuan paper (Zhang, 2017)



Fig.86. Brush effects tests using the Expresii software (Zhang, 2017)

As one can see from the examples above, using *Expresii* can show good results (see figure 86). The level of ink on the simulated Xuan paper can be clearly displayed, the fusion between different ink colours is very smooth, and the transition of blooming is natural. It can, in fact, successfully reflect the characteristics of ink and watercolours. These effects can be displayed on a single screen, which saves having to shoot multiple exposures as with traditional ink animation.



Fig. 87. Expressii test Xuan paper mechanism (Zhang, 2017)

At the same time, *Expressii* incorporates the texture of Xuan paper in the painting interface, imitating the texture of bamboo strips formed in the production process, so that the combination of ink and Xuan paper is perfect and natural (see figure 87), while still different from the texture of real Xuan paper.



Figs. 88 & 89. Compare the effects of traditional Chinese ink painting (left) and the ink painting made by Expressii (right) (Zhang, 2017)

One can compare the effects of traditional Chinese ink painting and that made in *Expresii* (see figures 88 and 89). The key point is to analyse whether several features of traditional Chinese painting can really be simulated. The first is the layers of ink, the five colours of ink with which each layer can be expressed, and whether different ink colours can interact with each other with a fluid transition. Secondly, the performance of painting strokes where each ink painting should be expressed as a touch of the brush, and the brushstrokes should appear to be agile, as this a process in which the artist injects emotion. Thirdly, the relationship of the virtual and the real. This is an important factor in Chinese ink painting, and how the characters depicted in the picture are distinguished from each other. At the same time, distinguishing the primary and secondary relationship can highlight the main body of the painting. Fourthly, the ink on the Xuan paper should be blooming and flowing naturally, and the ink colour completely uncontrolled. This is the most characteristic and the most difficult element to simulate using digital software.

All in all, the emergence of *Expresii* provides a new platform for the transformation of traditional ink painting to digital media, bringing opportunities for the digital ink painting in a freehand style. It is based on the characteristics of Chinese ink painting design software and, compared to the use of *Photoshop* and other painting software, allows more consideration of how to implement Chinese painting techniques with digital technology. Artists who understand Chinese painting techniques can better demonstrate their skills on *Expresii*.

5.3 Using the traditional Chinese ‘PoMo’ (泼墨) technique

In this section, I explored and experimented with a traditional Chinese painting technique called ‘PoMo’. In order to experiment the PoMo technique for my own work, I researched into

its historical development and application in different types of Chinese paintings. I later I applied my findings to create artwork that were used as the backdrop for my animation.

5.3.1 Definition/history (About ‘PoMo’ history and who created this method)

Chinese brush painting has provided a unique way into the exploration of more abstract techniques of Oriental painting. I have been exploring a style called ‘PoMo’ or ‘Splashing Ink’. This technique is to draw wet, throwing or pouring watercolour and ink on to Xuan paper, and then finishing the painting through the use of traditional brushwork. ‘Splashing Ink’ is agreed to be associated, with the ‘eccentrics’ of the later Tang dynasty and with some Zen artists of the 13th century, and was made popular by Zhang Daqian (1899–1983) (Fuhrman-Schulz, 2015) (see figure 90).



Fig. 90. PoMo Painting: Mount Lu(廬山) (1979CE), Zhang Daqian (張大千)(1899–1983))

The method of splashing ink originated from the Tang Dynasty of China (608 CE–917 CE) and was first created by the painters Wang Qia, Wang Mo 王默 (?–805 CE) and Gu Sheng 顧生 (dates unknown). Wang Mo invented the ink-spraying method, and Gu Sheng made a splash

of colour on the basis of splashing ink. Compared with Wang Mo's clear historical records, information about Gu Sheng is very limited. He was a poet and painter of the Tang Dynasty, or possibly another person altogether (Hong, 1998). At this point it is worth providing an introduction to the ink splash method and its use.

This type of ink splashing is a painting skill unique to Chinese painting. It can be subdivided into two types: splashing ink and splashing colour, but the principle is the same.

The spirit of traditional Chinese ink painting comes from brush and ink. Therefore, if artists leave out brush and ink, their work cannot be called Chinese ink painting. The splashing method is a special artistic effect produced by the interaction of specific Xuan paper and ink. The splashing technique allows ink to naturally bleed and permeate the raw Xuan paper, forming the main structure of the picture, which is then finished and supplemented with a brush to complete details afterwards.

Splash painting is generally based on landscapes, but there are also a few such paintings of flowers and birds. The splash painting landscape is dominated by ink, and the brush is used as an auxiliary expression. Although this method has certain accidental factors, it is often necessary to adjust the picture flexibly according to the effect of the ink on the Xuan paper. The main skill is to guide and control the ink painting. The changes and directions are a process from invisible to tangible, constructing pictures to convey the spirit, and finally drawing details such as rocks, vegetation, houses, etc., with a brush (Xie, 2010).

5.3.2 Development of ‘PoMo’ method 泼墨法

The development of the PoMo method has great significance in the history of Chinese ink painting, in that it introduced the concept of colour-blocking into painting. Before the Tang Dynasty, line drawing was the top priority. However, from the beginning of the Tang Dynasty, coordination between the line drawing method and colour-blocking ink painting began to be emphasised.

During this period, the style of ink painting began to change gradually, and to diversify. At the same time, the aesthetics of ink painting began to influence artists for future generations, mainly in the application of ink blocks or colour blocks in painting, and in how colour can be expressed partly by the character of the ink (black and white). In short, the soul of traditional Chinese ink painting of the main body is ink, whose expression complements the colours. The ink paintings of the Tang Dynasty are the icons and the starting point of this transformation. This period also incorporates philosophical concepts into ink painting. As the Tang Dynasty painter Jing Hao (荆浩) (850–911) mentioned in the ‘six essentials’, ‘Ch’i’ (氣) and ‘Yuen’ (韻) represent the aesthetic values from the world view; ‘thought’ (思) and ‘scenery’ (景) are the artistic realisation of the spirit; ‘brush’ (筆) and ‘ink’ (墨) are the values of the language of the ink (Sun, 2000, p.80).

From a research perspective, it is difficult to find authentic ink paintings from the Tang Dynasty. Examples found can only be roughly documented and appraised to get an understanding of the artistic style and characteristics of that period. Chinese ink paintings can be said to begin effectively during the Tang Dynasty, with Literati and Xie Yi painting. Literati paintings are mostly ink paintings which express personal emotions by focusing on landscape, flowers and birds, etc. After the start of the Song Dynasty (690 CE–1279 CE), Su Shi (蘇軾) (1037–1101),

Li Gonglin (李公麟) (1040–1106), Mi Fu (米芾) (1051–1107) and other artists looked to ink paintings as aesthetic ideals and passed on the tradition.



Fig. 91. Literati Painting: Rongxi Studio (容膝齋圖) (1372CE), Ni Zan (倪瓚) (1301–1374), Yuan Dynasty

Literati paintings (see figure 91) became popular in the Song Dynasty, emphasizing the expressiveness of the main body of painting and, in particular, using the style of the PoMo method, which relies on creating a resemblance in spirit rather than in form of the ink. The

theme of PoMo ink paintings began to diversify in this era, where it is no longer limited to landscapes, but incorporating themes of flowers, birds and other subjects to express the artist's emotions. This gave artists more space to express a more 'humanistic' perspective, which was then beginning to become typical of the freehand style. It can even be said that PoMo painting helped create a new style of freehand expression.

In the Ming and Qing dynasties, the use of the PoMo method on the theme of flowers and birds became particularly prominent. The artists Badashanren (八大山人) (1626–1705) and Xu Wei (徐渭) (1521–1593) are the first to integrate the PoMo method into the flower and bird ink painting and, in doing so, they reformed the Song Dynasty style, incorporating the concept of cursive script writing (草書), displaying the painter's personal feelings, breaking from the constraints of the image, and trying to achieve the feeling of 'Ch'i Yuen' (氣韻). The works often display strong personal feelings, usually using their art to reflect the social conditions of the time (Zheng and Li, 2013).

In the modern period, the painter Zhang Daqian (張大千) (1899–1983) absorbed the characteristics of Western paintings and continuously tried new techniques and media in the art of PoMo painting, resulting in many contingent effects on the paintings (Zeng, 2013).

5.3.3 Experiment, tests and processes of ‘PoMo’

1. The Xuan paper is dampered with sprays of water (figure 92).



Fig. 92. First step in the PoMo process (Liu Daoguang, 劉道廣 2017)

2. Use the brush to paint deep colour ink (figure 93).



Fig. 93. Second step in the PoMo process (Liu Daoguang, 劉道廣, 2017)

3. Use the brush to paint light colour ink and blooming within the deep colour (figure 94).



Fig. 94. Third step in the PoMo process (Liu Daoguang, 劉道廣, 2017)

4. Use the brush to draw rocks and delineate the effect of the lake (figure 95).



Fig. 95. Fourth step in the PoMo process (Liu Daoguang, 劉道廣, 2017)

Following the demonstration above by Professor Liu Daoguang (recorded during my field trip to Wuxi 無錫 China in 2017), I tried to experiment with the PoMo method to create a background for the animation. The difficulty of the PoMo method lies in the control of water and ink (see figure 96), and because its effect can only be determined after the ink is completely dried (see figure 97). Later, by observing the dried picture, further painting is added to create

characters and details. For instance, the picture in figure 97 looks like aquatic plants in a river, which can then be used as a background for painting fish swimming in the river (see figure 98).



Fig. 96. PoMo effect before drying (Zhang, 2019)



Fig. 97. PoMo effect after drying (aquatic plants) (Zhang, 2019)



Fig. 98. Aquatic plants and fish (PoMo method) (Zhang, 2019)

According to Professor Liu's explanation, another PoMo technique involves splashing ink or paint onto a hard but smooth table top. Two layers of Xuan paper are then placed onto the ink, and once dried, the absorbed ink marks produce natural textural effects which can be used as mountains, rivers, clouds and fog in Chinese painting (figures 100 & 101, please refer to Appendix B — One of the PoMo methods⁴). This 'accidental' approach can produce random but natural variations of marks, and the outcomes are often impossible for the artist to replicate manually.

⁴ One of the PoMo methods <https://youtu.be/HgOkExYBDCc>

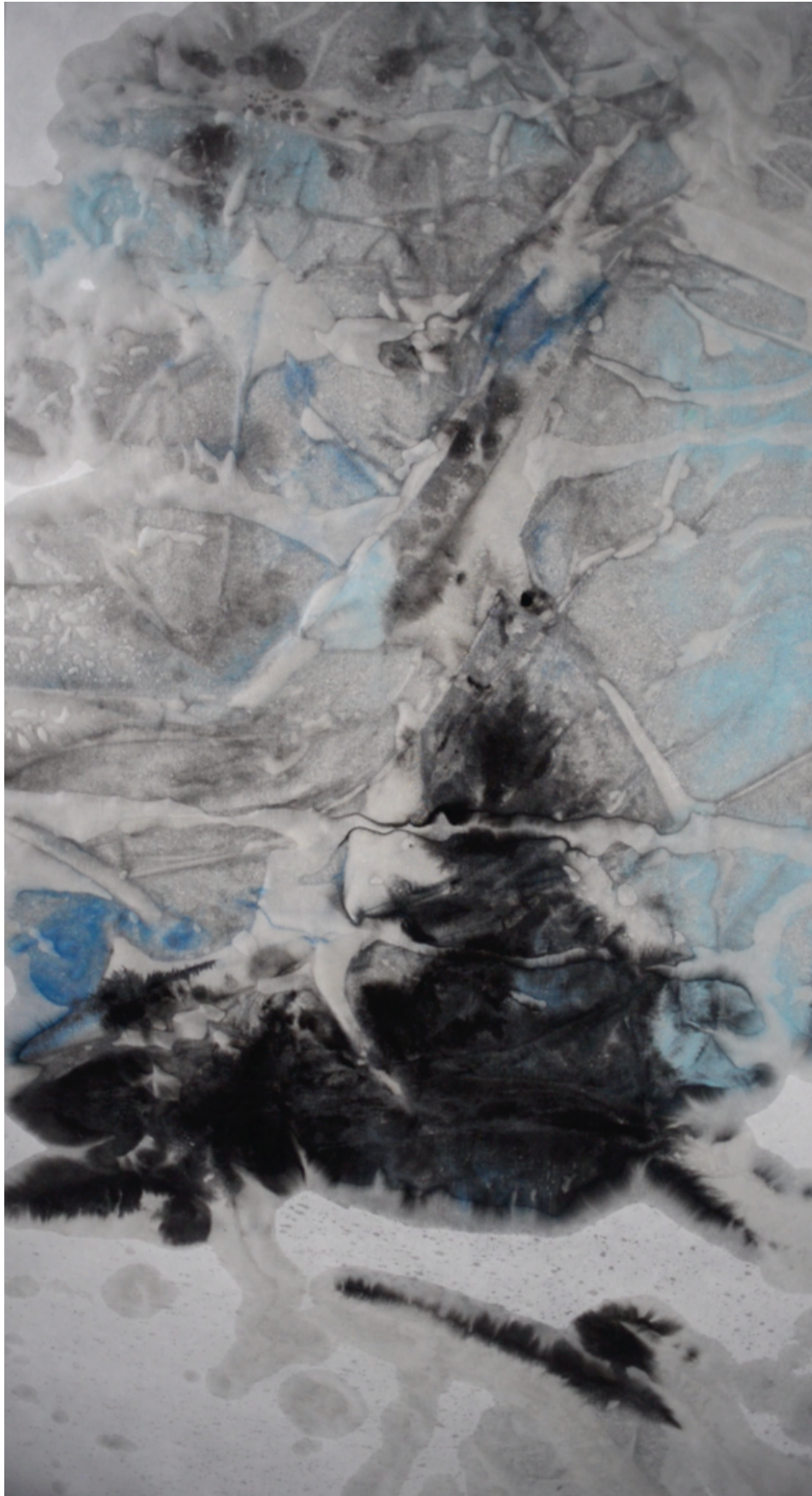


Fig. 99. The effect of two layers of Xuan paper covering the table top (Zhang, 2018)

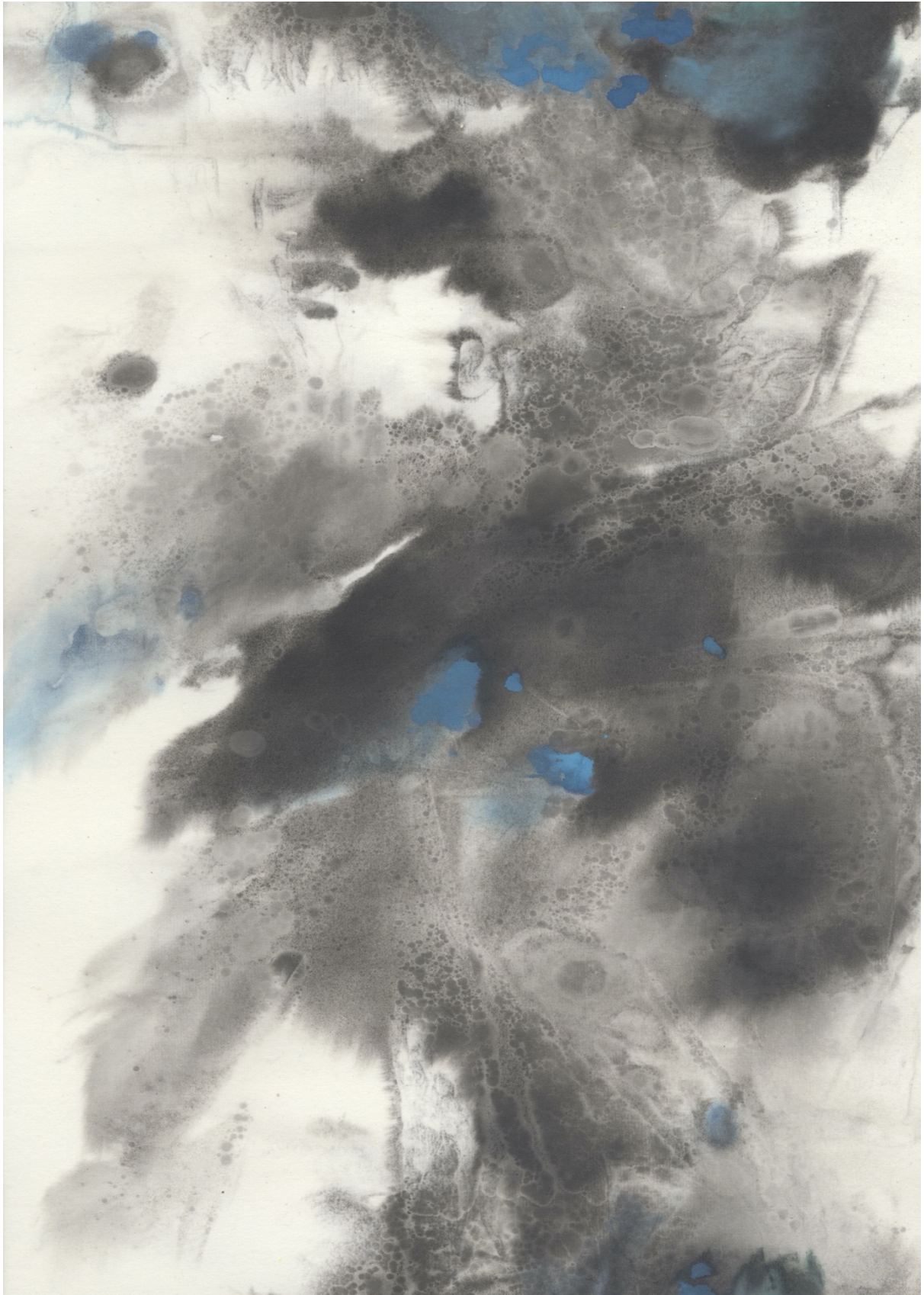


Fig.100. PoMo effects on Xuan paper (Zhang, 2018)



Fig. 101. Framed art work for PoMo method (Zhang, 2018)

5.4 Using the traditional Chinese ‘Rubbing Ink’ (拓墨法) technique

Similar to the ‘PoMo’ technique, I also explored and experimented with the ‘Rubbing Ink’ technique to ascertain if it might be useful for my animation. Using the same research methods carried out for the PoMo technique in the previous section, I firstly explored the historical and development process of this technique and then conducted practical experiments to see if any of the outcomes can be used in my work.

5.4.1 Definition and history of the ‘Rubbing Ink’ method

The Rubbing Ink method also originated in the Tang Dynasty, and was called the ‘Mochi method’ (墨池法), which is one of the 47 special techniques in Chinese traditional ink painting (Feng, 2010). It was first recorded in the *Miscellaneous Morsels from Youyang* (西陽雜俎) by the Tang Dynasty poet and novelist Duan Chengshi (段成式) (803–863). With the Tang Dynasty painter Zhang Yanyuan’s (張彥遠) (815–907) *Calligraphy Notes* (書法要記), historically recorded that the calligrapher Xiao Cheng (蕭誠) (dates unknown) as being good at making paper with mottled stone — these are the keystone documents of the Mochi method.

The Rubbing Ink method is a traditional technique similar to making rubbings from inscriptions on brass or stone. Generally, a container is filled with water, and then ink or colour is dropped on the surface of the water. Also, the ink can be directly placed on the surface of the water with a brush, or the ink can flow naturally along the edge of the container. After the ink meets the water, it will swirl naturally, and start to form random, but organic shapes. If the shape of ink in the water is unsatisfactory, it can be stirred or pushed below the water surface to allow the shape to re-form differently. Then, the artist lays a sheet of Xuan paper on the surface of the water, according to their requirements (using the absorption properties of the Xuan paper and its sensitivity to the ink or colour). The ink shape is absorbed by the Xuan paper, which now shows a picture which, according to the artist’s emotional feelings, can be sensitively modified with a stroke of ink or traditional Chinese colour to form the completed creation. The Rubbing Ink method can also be used as a background in artistic creation, and then the main content can be drawn over it to complete the work (Zhang, 2000).

5.4.2 Development of ‘Rubbing Ink’ method 拓墨法

The derivation of the ancient Chinese Rubbing Ink method is generally used in the reproduction and preservation of documents, and commonly used in the collection and preservation of stone tablets and images, especially those with inscriptions. By Rubbing Ink on paper over the raised surfaces of an object, the artist can reproduce the form of characters, images or patterns from cast and engraved objects, such as stone tablets, epitaphs, oracle bones, pottery, bronze inscriptions, jade patterns, tiles, stone bricks, statues, bronze mirrors, currency, seals and other artefacts (Yuan, 2017, p.58).

However, there are not many records of paintings using the Rubbing Ink method in the history of Chinese art, and there is not much information to be found about its development. After the 12th century, the ‘Mochi Method’ (its more formal name) was transmitted to countries such as Turkey and Japan, and gradually formed the Turkish Ebru (wet extension) and the Japanese Suminagashi (ink flow) methods.

It was not until the 20th century that many artists began to develop several new techniques based on the Rubbing Ink method, such as:

- Paper rubbing: this method is based on dipping a crumpled ball of paper into ink or colour and then imprinting it on to Xuan paper, thus forming an interesting abstract effect.
- Cloth rubbing: here, the technique is to dye a cloth with a relatively thick texture with ink or pigment, and then rub it over a sheet of Xuan paper to obtain unusual shapes and lines.
- The water extension method: this is closer to the ancient ‘Mochi method’. The pigment or ink are sprinkled on the surface of the water. Due to the tension and diffusion of the

water surface, the pigment or ink gradually spreads out to form different shapes and patterns. When the texture on the water surface is changed to the satisfaction of the artist, the paper is covered. On the surface of the water, the pattern is printed on the paper.

A few artists have used these techniques since the end of the Qing Dynasty with the most extensive and in-depth research being conducted by the Taiwanese artist Liu Guosong (Michael, 2006).

5.4.3 Experiment, tests and processes of ‘Rubbing Ink’

The practical experiment of the ‘Rubbing Ink’ technique focused primarily on material testing to verify the feasibility of using this technique on Chinese Xuan paper using Chinese inks and watercolour pigments. Different colour combination and effects were conducted leading to some finished pieces of artwork for backgrounds which are suitable to be used in animation.

Rubbing Ink effects:

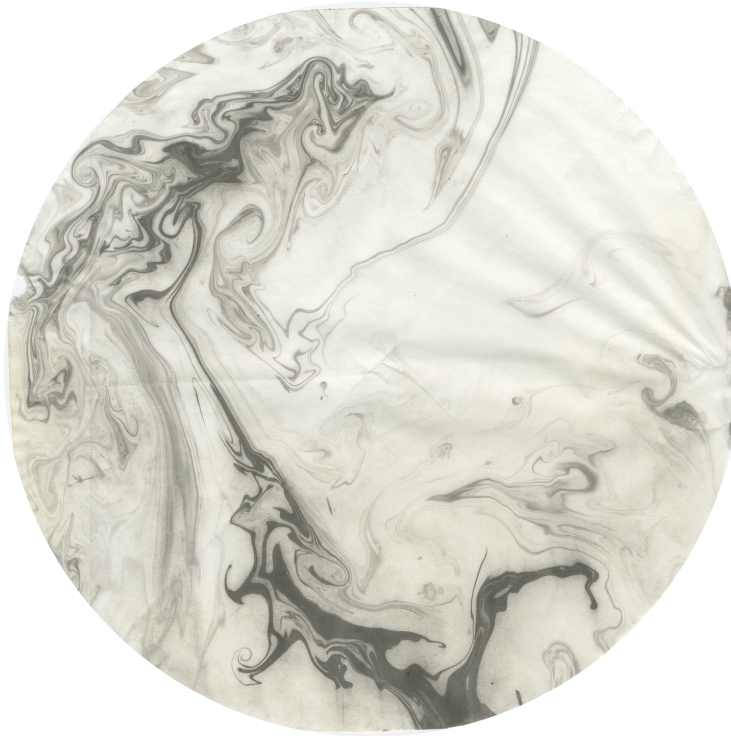


Fig 102. An example of Rubbing Ink technique on Xuan paper using only black ink (Zhang 2017)

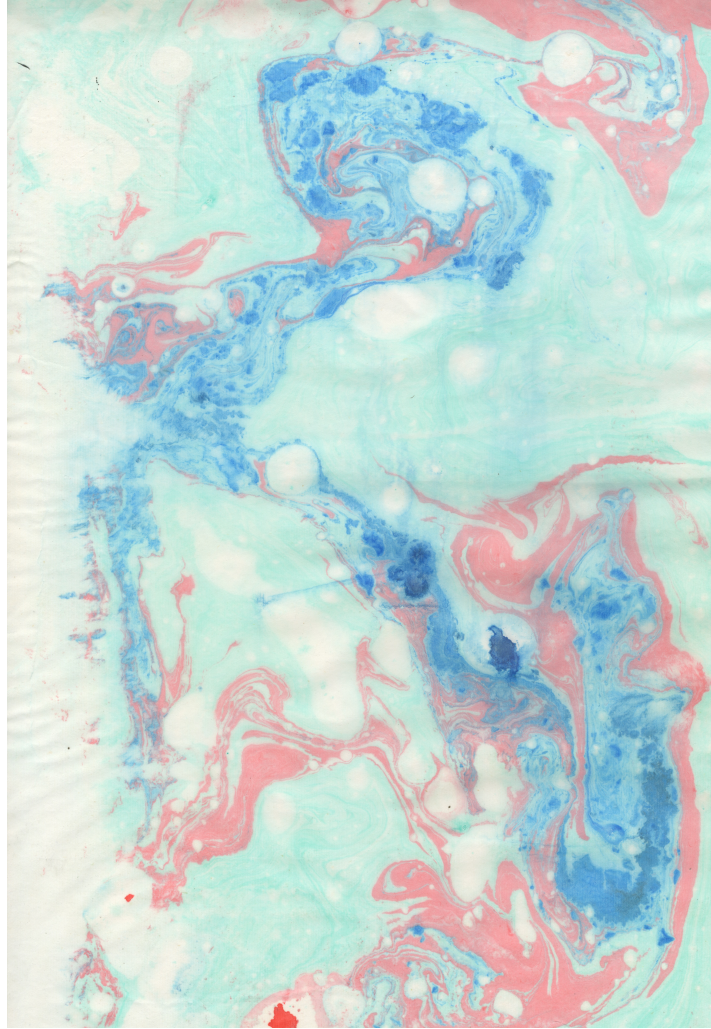


Fig. 103. Rubbing Ink effects on Xuan paper using Chinese watercolour paint (Zhang, 2017)

‘Rubbing Ink’ method process:

1: Black Chinese ink is sprinkled onto the water and then stirred to control the flow of ink (see figure 104).



Fig.104. First step for ‘Rubbing Ink’ process, where Chinese ink is sprinkled on to the surface of the water and stirred (Zhang, 2017)

2: Xuan paper is gently placed on the water’s surface (see figure 105).

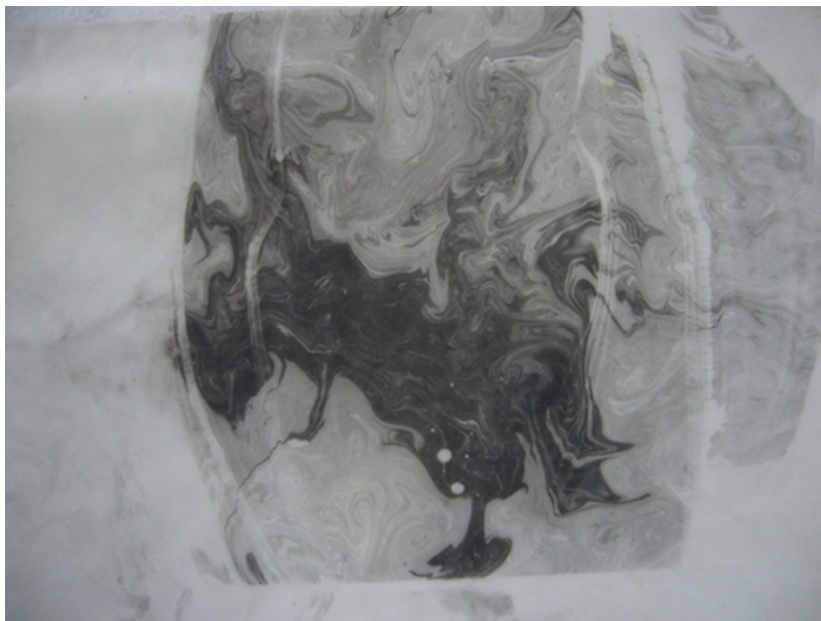


Fig. 105. Second step for the ‘Rubbing Ink’ process, where the Xuan paper is placed gently onto the water’s surface (Zhang, 2017)

Just as with the PoMo method, the Rubbing Ink method can also be used for animation background production. However, there are some differences in the production technique: the Rubbing Ink method can be adjusted by completely wetting the picture. For example, on the basis of figure 106, I felt that the structure of the picture was not balanced enough, so I added more details into the picture (see figure 107). After some consideration, I wanted to keep the blank part on the left side of the picture and the lines in the upper part of the picture, as a representation of the waterfalls and clouds in the distant mountains, and then added the foreground and the mountains in the middle-range of the composition to complete the painting (see figure 108).



Fig. 106. The original Rubbing Ink effect on wet Xuan paper (Zhang, 2019)



Fig. 107. The Rubbing Ink effect after adding details to balance the picture (Zhang, 2019)



Fig. 108. The same artwork from figure 106, where colours and additional elements are added to complete the painting (Zhang, 2019)

I contend that in the history of traditional Chinese painting, both PoMo and Rubbing Ink methods are techniques developed by artists seeking to integrate with nature. Natural things such as mountains, water, clouds, fog, trees, flowers, birds, animals, etc., are not formed by human intervention. The artist always incorporates his own emotions and project them into the

painting. In terms of objects, this kind of painting will be accompanied by deliberateness (inflexible), especially in the case of painting mountains, water, clouds, fog and so on. The eventual picture will definitely deviate from the natural world. Therefore, the PoMo and Rubbing Ink methods are a kind of natural expression formed by human intervention, which is the same as the formation of things in nature; the effect of painting is unknown to the artist, some natural states are like mountains, water, clouds and fog, etc. Then, based on these forms, the artist can choose to exploit the natural features to add objects, such as houses, people, etc., which can also be seen as people in tune with nature. This is also a manifestation of the ancient Chinese artists' pursuit of the Tian Ren He Yi (the harmony of Man and nature). Both the PoMo and Rubbing Ink methods are ways for artists to choose natural expressions and to integrate them into nature. Without human intervention, uncontrollable effects can bring surprises to the artist. In the same way, shooting film scenes in the natural world, with natural scenery, will bring more surprises and beauty, which cannot be compared with the artificially-produced scenery of the studio. For this reason, the PoMo and Rubbing Ink methods seem a good choice for making animation backgrounds, especially those containing mountains, clouds, and so on.

5.5 Case Study: The animation work for 'Buffalo'

5.5.1 The story behind the animation

The animation *Buffalo* (Li, 2018) depicts some interesting events experienced by the animal on the way home after a day of fieldwork. The story is set on a quiet and cool summer's evening. The buffalo has done his day's work and was led by the shepherd boy. The buffalo saw that the sun was setting and began to return to his home to rest. On the way home, the buffalo swayed and watched the scenery alongside the road. The willow forest blown by the breeze showed a golden scene in the afterglow of the setting sun. The buffalo slowed down and walked

back to enjoy the beautiful scenery. When the buffalo walked to the end of the willow forest, the shadow of his home was visible in the distance. At this point, the buffalo is attracted by the lake's crystal-clear water. The buffalo likes to play in the water as this is his nature, and he is tempted by the lake. After a day's work, the buffalo wants to play in the water and relax his tired body, but when he came to the water's edge, he began to look around, hesitating whether to completely immerse himself, because the shepherd boy at home is still waiting for him to get back. Just then, the buffalo saw the lotus in the lake, gently floating in the breeze. It seemed to interact with the fish in the water. The breeze also wafted the fragrance of the lotus into his face, as if calling the buffalo to come to it. Now the buffalo has completely forgotten all thought of returning home and walks into the lake to enjoy the beauty of the moment. He is half-immersed in the lake and looks up at the surrounding lotus, which is in bloom and seems to be smiling at him. The buffalo sneaks all the way into the lake, swims to the lotus, and lifts his head out of the water. He smiles and blows a ripple in the water as if greeting the lotus. The buffalo's smile means that the fatigue of this day has been forgotten. A beautiful view without any concerns will bring him unlimited happiness. Home, lake and lotus are the sources of the buffalo's happiness.

I tell this story using the buffalo to express the idea that human beings can also transform mind and body with just a few good things in life. Good things are created inadvertently, and people need to have a mentality which is open to discovering and feeling good things. Home, partners, and the little things are the driving force for a positive and optimistic life.

5.5.2 The implementation of ‘Yi Jing’

5.5.2.1 The use of colour

The traditional Chinese painting colour concept is based mainly on two principles: ‘Suitability to Type’ 隨類賦彩 (mentioned in section 2.7.1) and ‘Five Tints of Ink Colour’ 墨分五色 (mentioned in section 2.7.2); these two viewpoints play an essential role (Xia, 2016). The idea behind ‘Suitability to Type’ was based on ‘Xie He’s Six Principles 謝赫六法’, which cover the basic principles used in Chinese traditional painting colours. ‘Suitability to Type’ has two meanings in traditional Chinese painting: firstly, the process of colouring paintings based on objective reality and colouring according to the type of object depicted. The objects in the painting are divided into several categories, and each category is aligned to a particular colour. For instance, a figure painting could be arranged with the face and hand a category; a landscape painting could be divided into grass and trees as a category; and each category of the object can be processed according to the same colour tone — it also can be classified according to the season. The second meaning is subjective colouring method, in which the colour is placed according to the painter’s subjective emotions; in other words, it is not purely based on the reproduction of natural colours, but the result is the painter’s perception of the image. The choice of colour is not aimed at copying the inherent colour of the painting object, but at emphasising the painter’s emotional state. The painter will use colours flexibly according to the content and form required by the picture, and even subjectively change colours to express their mood. For example, Qi Gong 啟功 (1912–2005) painted bamboo using the colour red in the picture named ‘Red Bamboo’ (see figure 109). In China, bamboo remains green and upright throughout the year, typifying a man with exemplary conduct, nobility of character and modesty, and the colour red expresses a man who acts from a pure heart for their own country and career. Simultaneously, red bamboo also represents the meaning of ‘lucky’, ‘auspicious’ and ‘good blessings’. However, this kind of colouring method is not based on the objects’

natural colour, but expresses the painter's imagination and state of mind; this is also a way used by Chinese artists to express the Tian Ren He Yi.

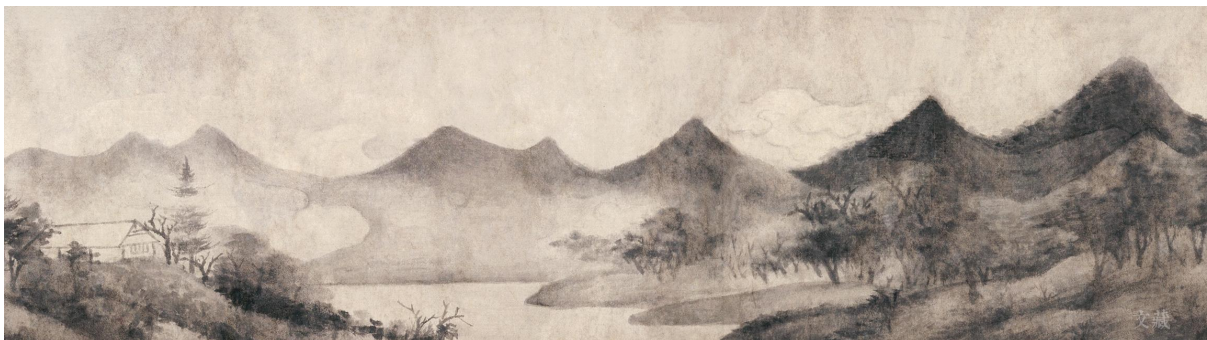


Fig. 109. 'He Ke Yi Ri Wu Ci Jun' by Qi Gong 啟功, 1981)

Moreover, 'Five Tints of Ink Colour' 墨分五色 mainly refers to changing the colour of the ink, which is the second meaning of 'Suitability to Type' 隨類賦彩. Regardless of whether it is in modern society or ancient, all the Chinese painters have focused on the use of ink in painting colours, and ink has become a basic feature and skill in traditional Chinese painting. Chinese painting does not simply use ink as black, but uses layers of black which change according to the proportions of water and ink in the brush (see section 4.5). This is very different from the

concept of black, white and grey as separate colours. The change of ink colour is basically a change in the colour black.

The Tang Dynasty painter Zhang Yanyuan 張彥遠 said in the *Great painting views of past dynasty* 歷代名畫記 that the colour of the ink will change according to the weather and the season. If the characteristics of the ink are changed, it will produce green hills, green grass, red flowers, white snow and other effects, without using cyan, mineral green, cinnabar red, lead powder white or other pigments; similarly with the flower and bird figure paintings. For example, in the Southern Song Dynasty, Mi Youren 米有仁 (1074–1153) painted *The Spectacular views of Xiao and Xiang Rivers* 瀟湘奇觀圖, where he uses smudges of Chinese ink (with varying percentages of water) to portray the misty mountains and rivers in Jiangnan (a region of China), as full of magical weather. The hills and trees in the picture are painted with Chinese ink, but there is no feeling of being faced with black mountains and trees. On the contrary, it gives an impression of a luxuriant and green colour (see figure 110 below). There are many traditional Chinese paintings where the painter does not use brushstrokes for every detail; sometimes the painters using ‘Rubbing Ink’ and ‘PoMo’ methods to bloom the ink and express a feeling. This kind of feeling needs to be experienced by the viewing audience; this is also the meaning of ‘Yi Jing’ in Chinese painting.



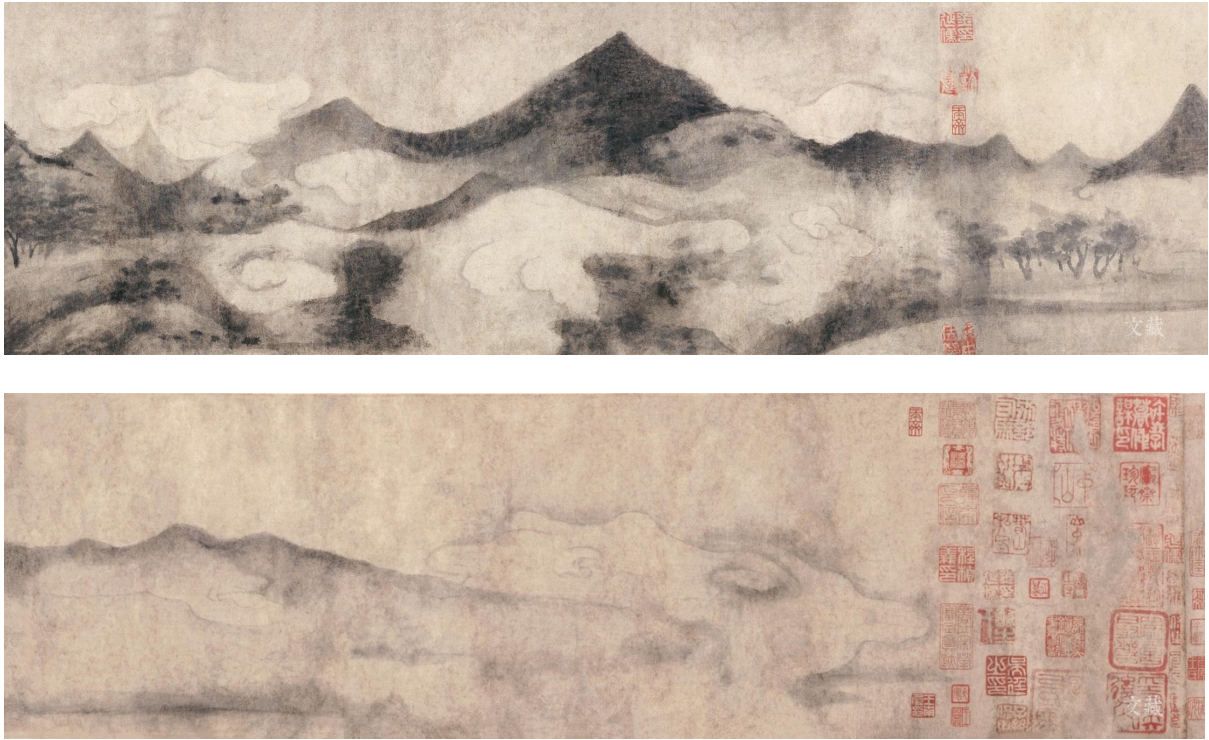


Fig.110. 'The Spectacular views of Xiao and Xiang Rivers' 瀟湘奇觀圖 'Mi Youren' 米有仁 (1074-1153)

In my experimental animation, I used both these colouring methods. In the first, I used 'Suitability to Type' to display the scenery of the willow forest beneath the sunset (see figure 111 below), and used natural colours to depict the willow trees under the sun, emerald green for the trees and golden yellow for the ground.



Fig. 111. The background used in the 'Buffalo' animation (Zhang, 2018)

Furthermore, I used the ‘Five Ink Colour’ principle to portray the rural landscape, using the colours of the ink to show the variously sparse and dense trees (see figure 112 below), the relationship between the distant and close scenes, and the spatial relationship between the ridge and the pond.



Fig. 112. The landscape scene created by using the ‘Five Tints of Ink Colour’ principle (Zhang, 2018)

5.5.2.2 The composition

Traditional Chinese ink painting, as a unique art style, is different from other art forms, abandoning the pigments and the colours of the natural world, and usually using the simple colours of Chinese ink and Xuan paper as a basis, to constitute and render all kinds of everything in the world. This is the traditional Chinese ink painting of ‘body’; while the paintings of the soul and of life are the Yi Jing. Moreover, Yi Jing is one of the most basic aesthetic categories in traditional Chinese art. It is the characteristic foundation of the traditional Chinese ink painting of ‘life’, and also the artists’ pursuit of the highest spirit and soul in their paintings. Thus, artworks of soul and life are composed according to the concepts

of Tian Ren He Yi, Yin Yang, and of Ch'i Yuen Sheng Tung. They do not only exist independently in artworks, but can also be intertwined and integrated. If there was no 'body' of traditional Chinese ink painting, the Yi Jing of soul and life would lose its vehicle; on the other hand, if they did not have the soul and life of Yi Jing, the artworks would become rigid, and lose all vitality, like a machine. As a result, for traditional Chinese art, both 'body' and 'soul and life' are indispensable. This notion can be also be applied to ink animation, where the 'body' has become a vehicle for Yi Jing in the art form of animation.

5.5.2.3 Experimental notion of 'Tian Ren He Yi' 天人合一 in the animation

This section discusses the practice and application of Tian Ren He Yi explicitly, and will separate out two aspects of the concept, including 'spiritual' and 'surface' layers. For the spiritual perspective, I agree with Zhang Shiyong 張世英 (in 1999, *New direction of artistic philosophy* 藝術哲學的新方向), who suggested that Tian Ren He Yi is an aesthetic consciousness, which transcends the relationship between the subject and the object. Aesthetic consciousness integrates man with the world, and in the Tian Ren He Yi the word 'Tian' refers to the world. Man and world are integrated, but Tian Ren He Yi is different from the unification of subject and object. Theoretically, it is man and world combined into one, or it can be said the two are integrated with each other. As the Chinese Ming Dynasty philosopher Wang Yangming 王陽明 (1472–1529) said: "Without the human mind, there is no heaven, earth and all things on earth; and without heaven, earth and all things, there is no human mind. 無人心則無天地萬物, 無天地萬物則無人心"; the human mind with heaven and earth are all one, and they are inseparable. That is to say, when artists create an artwork, they need to integrate themselves with their painting; and combine the subject (the artists themselves) and the object (the thing depicted), so that there is no separation.

As mentioned above, Tian Ren He Yi is to seek a state that transcends the relationship between subject and object, and in which all things are combined into one; the things of the world are all connected, interacting and mutually influencing each other. Moreover, the artwork is an aesthetic product of the art; it is the crystallisation of the spiritual realm to the extreme. Outstanding artworks need to use a limited image to express the limitless imagination, and thus enter an infinite realm of freedom. In other words, the highest state of artworks is the merger of the objective artwork and the spirit. Therefore, when the artist is creating artworks, they need to integrate the spirit into their work. However, the spirit cannot be integrated with the object itself (its surface) (Zhang, 2018).

In my experimental ink animation research, I hope that through the relationship between the buffalo and the surrounding scenery, the buffalo is perceived after a day of hard work and nature has repaid him with beautiful scenery, following the warmth of the sunset, the lotus pond with the cool breeze, and the lotus blossoms, thus expressing some spiritual meaning behind the whole work and giving the animation a soul beyond the mere appearance. In short, artworks should serve both life and thoughts, and from the art object can be derived the spiritual and the relevant philosophical expression: this is the spiritual realm of Tian Ren He Yi.

The second layer is the ‘surface’ which, compared with the spiritual layer, Tian Ren He Yi is easier to understand: ‘Tian’ means natural things, ‘Ren’ means human behaviour, and ‘He Yi’ is to combine the ‘Tian’ and ‘Ren’. In ink painting, the artist are more likely to ‘have a thought-out plan 胸有成竹’ of the method of expression. Before beginning to paint, they already have a full idea of their portrayal, and have given full consideration to the aspects of modelling, structure, composition, constituent elements, colour, and light and shade, and so on. Meanwhile, through the drawing of the draft, there is continuous modification and improvement in the

painting to achieve satisfactory work. If this process is carried out without considering the spiritual dimension of Tian Ren He Yi, this painting is just the human's subjective behaviour; that is, purely an expression of 'Ren'. The expression of 'Tian' is not reflected here, so there is no 'He Yi'. Therefore, I considered how to integrate the concept of Tian Ren He Yi into the painting from the beginning, taking advantage of the uncertain characteristics of the smudge of paint on Xuan paper; then using the 'PoMo' and 'Rubbing Ink' techniques, and taking these two methods to draw the background. I considered using 'PoMo method' on Xuan paper to naturally form the whole background structure, the colour scheme and so on (see figure 113, please refer to Appendix B–Ink animation “Buffalo”⁵). In this process, the picture presented on the Xuan paper is not controlled directly by human behaviour, it is completely at the whim of nature to complete the painting process. It can therefore be considered that this is the 'Tian' of formation. After this part of the drawing, I could add some elements such as rocks, trees, etc., and in this part the 'Ren' is formed: the artist integrates the subjective emotion of the human on the naturally formed picture, which is the way to express Tian Ren He Yi (Zeng, 2017).

⁵ Ink animation “Buffalo” <https://youtu.be/uxcaw0xyHg0>

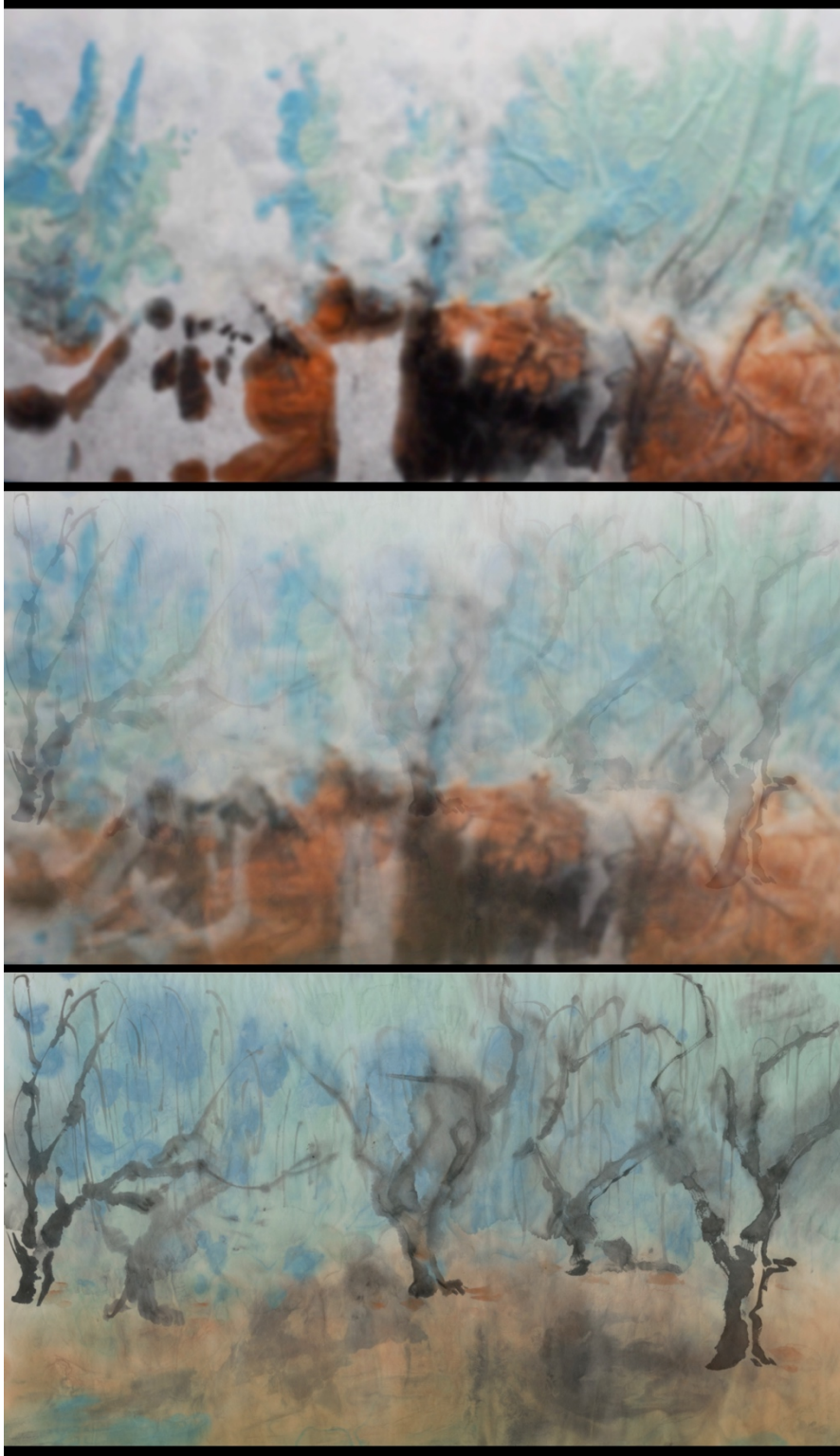


Fig. 113. Three background scenes from the animation 'Buffalo' (Zhang, 2018)

In my experimental animated 'Buffalo' background production, the first picture is drawn through the 'PoMo method', the second one is the process of picture formation, and the third one is based on the needs of the picture, and then trees are added through human behaviour.

As an example of the Tian Ren He Yi expression, it concerns filming in the natural world as a way to express Tian Ren He Yi; because the rocks and trees in the natural world were formed in a million years, there are no human factors to control them. In the shooting process, the human enters the scene, and their integration into the scene is a human element. The film produced by the combination of 'natural world' and 'human' is actually an expression of Tian Ren He Yi. In Chinese ink animation both are usually indispensable.

5.5.2.4 Experimental notion of 'Yin Yang' 阴阳 in the animation

In this section, I will specifically discuss the application of the concept of Yin Yang in traditional Chinese painting and ink animation. I mentioned above (in section 2.6) that the conceptual system of Yin Yang originated from Chapter 42 of Lao Tzu's *Tao Te Ching*. Lao Tzu explained that "everything is a correlation, all things in the world can be expressed with the concept of Yin Yang, alternating between 'Yin' and 'Yang'; they are interdependent, mutually developing, mutually restricting, and transforming to achieve a balanced state". In ancient China, the phenomenon that things were opposite but interconnected was called Yin Yang, and then this powerful concept influenced traditional Chinese art, and the application of the concept of Yin Yang can be seen in the fields of traditional Chinese painting, calligraphy and sculpture, etc.

For traditional Chinese ink painting, Yin Yang is often reflected in the use of black and white, virtual and real, dense and sparse, dynamic and static relationships in traditional ink elements.

It also includes the depiction of the opposite relationship of things, for example:

- The sky is yang.
- The ground is yin.
- The mountain is yang.
- The water is yin.
- The man is yang.
- The woman is yin (please see the Yin and Yang concepts in section 2.6.1).
-

The discussion below will consider the application of ink elements in ink animation. These will include the ‘black and white’, ‘virtual and real’, ‘sparse and dense’, and ‘static and dynamic’.

- a) To begin with, I would like to discuss the application of ‘black and white’ in Chinese traditional ink elements, for the traditional Chinese ink painting of ‘white space’ art (mentioned above in section 1.7.3), which has been the essence of Chinese painting art. Depending on the different proportions of water to ink, the water will affect the ink shade, resulting in different shades and coloured ink in each layer. The ‘colour’ contrast formed by the changed ink colour, while flexibly using the colour of the Xuan paper itself, is the basis of the concept of ‘white space’ in Chinese painting; the white space leaves room for the imagination of the audience, which is the key to the presentation of symbols in the language of painting: the traditional ink painting of ‘black and white’ skills to demonstrate the Yi Jing, thereby creating a simple and elegant artistic atmosphere. (Wei, 2013, p.87–90)
- b) The next stage is the use of the ‘virtual and real’ elements of traditional Chinese ink

painting. In classical Chinese philosophy, the idea of ‘virtual and real’ exist in terms of artistic expression based on the concept of ‘coexistence between virtual and real’. In ancient China, artists usually use virtual and real composition to depict the artistic realm. The use of ‘virtual’ and ‘real’, and ‘black’ and ‘white’ in ink painting creates a unique concept, which takes the Yi Jing beyond the picture and brings it into the realm of aesthetics, leaving room for the imagination of the audience (Lou, 2015).

- c) The application of ‘sparse and dense’ of traditional Chinese ink elements is a relationship of opposites. In traditional Chinese ink painting, the application of ‘sparse and dense’ is a significant artistic effect for presentation, the density and sparseness of the painting form a three-dimensional spatial relationship, visually showing a variety of artistic aesthetic effects. The use of ink elements and the balancing of the sparse and dense relationship when painting various objects, can use the opposing relationship between sparse and dense to realise the points, lines and surfaces of change. This both unifies the picture and takes it beyond the rigidity of the object, making the picture look more rhythmic.

- d) The use of ‘static and dynamic’ in the ink elements of traditional Chinese ink painting is an important method of expression in the composition of traditional Chinese ink paintings; it is particularly prominent in showing their flexibility. Usually, it draws on the relationship between the painting’s characters and the background, and from the change of ink colour to show its formal beauty and visual rhythm.



Fig. 114. Ink animation screenshot by Zhang, 2018

In figure 114 (please refer to Appendix B section Ink animation “Buffalo”⁵), I used the elements of the ‘black and white’, ‘virtual and real’, ‘sparse and dense’, and ‘static and dynamic’ in the concept of Yin Yang in traditional Chinese painting to create the scene.

5.5.2.5 Experimental notion of ‘Ch’i Yuen Sheng Tung’ 氣韻生動 in the animation

In this section, I will concentrate on the practice and application of Ch’i Yuen Sheng Tung and its application into my animation work. During the Southern Qi Dynasty, Xie He 謝赫 (dates unknown) put forward the meaning of the word Ch’i Yuen (479 CE–502 CE) in *Six Principles of Chinese Painting* (古畫品錄), saying the Ch’i Yuen Sheng Tung refers to the overall requirement of paintings in terms of ‘surface’ and ‘spirit’; that is, the ‘spirit’ should have Ch’i

⁵ Ink animation “Buffalo” <https://youtu.be/uxcaw0xyHg0>

Yuen and the ‘surface’ should have Sheng Tung. The Qing Dynasty painter Tang Dai 唐岱 (1675–1752) mentioned in *Hui Shi Fa Wei* 繪事發微 (republished by Tang Dai, 2012) that the value of the painting is the Ch’i Yuen. Ch’i Yuen is not simply mist-shrouded; it is the breath of life between heaven and earth. The highest realm of painting is Ch’i Yuen Sheng Tung — its most outstanding aesthetic criterion. In other words, Ch’i Yuen Sheng Tung is the expression produced after the Tian Ren He Yi, and it is a kind of life force expressed in the artwork.

In the creation of traditional Chinese artwork, the artist’s creative process is to grasp and discover the essential beauty of the depicted object, and also it is the full expression and sublimation of thoughts and feelings. The depicted object and thoughts are effectively combined through the idea of Tian Ren He Yi; and with the rhythm of the ‘Ch’i’ of the brush strokes; the flow of the ink; the scatter perspective and the ‘three ways’ perspective for the structure; the virtual and real for space; and the dynamic and static relationship for the objects are all vividly and fully expressed. By combining the spirit and surface, the sensibility and rationality, and depicting a highly harmonious and unified aesthetic state between objects and artists, in order to achieve the requirements of Ch’i Yuen Sheng Tung, so that the audience has a vivid experience when watching the artworks, even a static picture will have a feeling of activity. Whether it is a painting of figures, animals, plants, even the rocks, mountains, scenery and so on, will appear active in the picture. The modern scholar Zhou Ruchang 周汝昌 (1918–2012) said that Ch’i Yuen Sheng Tung is the art of life, and also the life of Chinese painting.

The painter Huang Binhong 黃賓虹(1865–1955) said that the production of ‘Ch’i Yuen’ originates from ink and brush stroke. Without skilled use of brush and ink, it is impossible to achieve ‘Ch’i Yuen’. The Chinese ink painting method is not purely a matter of skill; it is a set

of specifications that combines brush and ink usage and cultural connotations. Back in the Northern Song Dynasty (960–1127), the calligraphy and painting connoisseur Guo Ruoxu 郭若虛 (dates unknown) said in *Tu Hua Jian Wen Zhi* (*An account of my experiences in painting*) section *Lun Yong Bi De Shi* 圖畫見聞志. 論用筆得失 (re-published in 1964) “in all paintings, the Ch’i Yuen is from the mind of the artist, the spirit of the painting comes from the brush, it is too difficult to imagine”. This means that the brush should be combined with the mind of the artist, and the traces of brush and ink are drawn with the heart, which demonstrates that the brush is a way of expressing the artists’ mind. Moreover, the Qing Dynasty painter Tang Dai (唐岱) (1673–1752) also mentioned in the *Hui Shi Fa Wei* 繪事發微 that Ch’i Yuen is produced by the brush and ink, that rounded brushstrokes look very strong and powerful, while smooth brushstrokes can be vivid and flexible, this is a breath of brushstrokes. The ink should be thick and light, dry and wet properly; it is a kind of a breath of ink. These are the levels that brush and ink practice in painting needs to reach, and are also the embodiment of Ch’i Yuen Sheng Tung practice for brush and ink in paintings.

As I mentioned above in section 3.4.2, the production of ink animation should focus on the concept of ‘drawing’ rather than the ‘making’ of animation. Simultaneously, it is necessary to consider the use of painting strokes and ink, even if using digital software. It also needs to be flexible, and have control on the ‘brush and ink’, each frame of the drawing needs to integrate the artist’s emotion and inner feelings, which can make the characters in the picture look vivid, and even the animation works have vitality (see figure 115, please refer to Appendix B section Ink animation “Buffalo”⁵).

⁵ Ink animation “Buffalo” <https://youtu.be/uxcaw0xyHg0>



Fig. 115. Experimental animation screenshot from the animation 'Buffalo' (Zhang, 2018)

The Ch'i Yuen aesthetic principle of Chinese painting is implemented through aesthetics, and the same applies to the ink animation derived from Chinese painting. Ch'i Yuen Sheng Tung is to express the vitality of the painting. Artists should integrate their spiritual and inner feeling into natural life, and incorporate it into the picture with brushstrokes so that their spirit can be integrated with infinite natural life, and the vitality of nature will produce the Ch'i Yuen.

As a result, it can be concluded that there are three kinds of Ch'i Yuen Sheng Tung: the first is the brush and ink of Ch'i Yuen, which is produced by the artist's use of brush and ink, which is mainly related to the sense of vividness of the artworks, that is the surface of Ch'i Yuen Sheng Tung. The second type is the consciousness of Ch'i Yuen, which is the artist's aesthetic consciousness applied to the depicted object and enforced 'life', this is the spiritual element of the Ch'i Yuen Sheng Tung. The third type is the merger of 'surface' and 'spiritual', which is a philosophical Ch'i Yuen Sheng Tung, and is the artist's inner beauty of embodiment (Ling, 2008, pp.47–48). To summarise, these three kinds of Ch'i Yuen Sheng Tung can be more

clearly understood: the Ch'i Yuen Sheng Tung in the artwork comes from the artist's spirit, emotion and the mind. 'Ch'i Yuen' is the effect of artworks; it is more significant to use artwork to reflect the spirit of the artist section the inner emotion applied to brush and ink to achieve the Ch'i Yuen Sheng Tung effect.

5.6 Conclusion

The research in this chapter is mainly focused on the actual production of ink animation. From the results of the experiments on traditional ink painting production technology in Chapter 4, it can be seen that there are problems, such as complicated procedures, high cost and a high re-work rate. Seeking a software that can effectively avoid the above-mentioned problems and express the characteristics of traditional Chinese ink painting, the focus becomes one of whether traditional ink animation can be innovated and developed. At the same time, can digital ink animation connect with the modern animation production industry. Therefore, the subsequent animation production plan is based on the use of the *Expresii* software. Essentially, *Expresii* is a watercolour and ink simulation drawing software, not intended for animation. Its main feature is that the software can simulate the ink flow and blooming effects on Xuan paper, and the software develops a brush that simulates the characteristics of the Chinese brush. When using *Expresii*, the focus was on testing and comparing the digital ink rendering effects with those rendered on traditional Xuan paper, such as ink blooming, the diversity of ink layers, wetness and dryness, as well as the overall digital painting and traditional ink painting on Xuan paper. From the results, it is clear that the simulated digital ink painting achieved using *Expresii* is very close to the non-digital effect on Xuan paper. Compared with software such as *Photoshop* and *Painter*, *Expresii* focuses on a naturally realistic and smooth performance. After confirming the feasibility of *Expresii* for ink animation, I started to use this software to create animated characters based on the script.

The research into the style of production ink animation is similar to that of traditional ink animation. The whole animation is produced by combining digital ink animation and traditional Chinese painting, the animation characters are completed by *Expresii*, while the background production is Chinese ink painting drawn on Xuan paper. The animation as a whole is intended to incorporate the concept of Yi Jing and demonstrate the aesthetic qualities of Chinese painting. The background was created by general traditional Chinese painting techniques, and in addition the PoMo and Rubbing Ink methods were also used. PoMo and the Rubbing Ink methods were used to obtain naturally formed textures, and with the assistance of the artist, to elaborate the concept of Tian Ren He Yi. The entire animation picture will encapsulate the Tian Ren He Yi, Yin and Yang, and Ch'i Yuen Sheng Tung principles from the concept of Yi Jing, which form its spiritual and superficial levels. From the perspective of animation, it reveals the importance of the concept of Yi Jing and aesthetics, with the main purpose being the vitality of animation works. As a whole, the discussion in this chapter focuses on how to integrate the concept of Yi Jing, Tian Ren He Yi, Yin and Yang, and Ch'i Yuen Sheng Tung into animation; how to express the aesthetic and spiritual emotions through animation from the artist's point of view; and how to understand and interpret the vitality of an artwork from the point of view of the audience.

The realm of the picture produced by artworks is the artist's own aesthetic and the reflection of their mental state. Therefore, artists must improve their self-cultivation, spirit and inner emotions, which are the foundation of Chinese painting skills.

Simultaneously, art creation is a kind of activity and spiritual need generated by the human spirit and emotion, which is dominated by the artist's inner life, and the painting of Yi Jing and

life are the embodiment of the inner human emotions. In using the *Expressi* software, the PoMo and Rubbing Ink methods to create the animation, *Buffalo* (2018).

Finally, in the process of artistic creation, artists cannot exist without the inner emotions, and emotion can foster the Yi Jing in artworks. Any artform can include technology and techniques, but not all technologies and techniques are equivalent to art, and they cannot replace art. The association of emotion and thought is an important factor that distinguishes art from technology and techniques. An artwork must have the artist's inner emotion and profound ideological meaning. I think this is the most basic way of embodying Chinese philosophical Yi Jing in art.

Chapter 6: Conclusion

6.1 The context of this research

The background of this research was influenced by my systematic study of traditional Chinese calligraphy and painting and was also developed based on my study of animation design. This research has intended to increase familiarity with traditional Chinese painting and calligraphy techniques and animation production processes; it also aims to achieve an understanding of the significance of traditional Chinese aesthetics for traditional Chinese calligraphy and painting. On this basis, the purpose of this research was to develop a method for the animation of traditional Chinese ink paintings, which would perfectly combine Chinese painting and calligraphy with animation. Therefore, in defining the areas that should be covered by this study, I have chosen the three most important Chinese aesthetic elements that can help focus attention on this issue. In the beginning, I explored the concept of Yi Jing in Chinese philosophy and aesthetics. The second was to analyse the relationship between the concepts of Tian Ren He Yi, Yin Yang and Ch'i Yuen Sheng Tung, generated by Yi Jing as it relates to traditional Chinese ink painting animation. The third part was to analyse the limitations of ink animation and the issues and opportunities facing the Chinese animation industry. The final section was to analyse the production process of Chinese traditional ink animation and how to intertwine the concept of Yi Jing with ink animation.

The research questions supporting this research were as follows:

- i. What are the techniques, materials and approaches used to develop traditional Chinese ink animation?
- ii. How to articulate the Chinese philosophical notion of Yi Jing through animation?

iii. Why might it be beneficial to apply the Chinese philosophical notion of Yi Jing within the contemporary animation industry.

The central theme of this research has been to examine Yi Jing. It has found that the various throughout the development of the richness of artistic creation and aesthetic thoughts, there has been more and more discussion, explanation and interpretation in relation to the aesthetic connotations of Yi Jing. These were shown in Chapter 2. Achieving an understanding of Yi Jing helps to provide an understanding of traditional Chinese art and the establishment of a possible bridge between traditional Chinese art and animation, so that it becomes a significant factor in their influence and development. In analysing and establishing this theme, I discovered the influence of Yi Jing on traditional Chinese art, especially in painting. Moreover, I explored how traditional Chinese ink animation is derived and developed from traditional Chinese ink painting and animation, and whether the aesthetic concept of Yi Jing can influence it. The aim was to combine Chinese traditional ink painting and animation to develop a new aesthetic for animation production, thereby promoting and developing the unique Chinese ink animation style.

As shown in Chapters 2, 4 and 5, the research was conducted in two stages. The first stage was to explore the definition of Yi Jing and identify its characteristics. The second stage dealt with the process of exploration and practice, as well as exploring new materials and technologies to make traditional Chinese ink animation, and then researching how the Yi Jing could be applied to the animation.

As mentioned in Chapter 2, an extensive survey of the literature was carried out as part of this first stage. As a result, it was found there was a lack of literature in the fields related to Yi Jing

and ink animation. There are very few publications directly related to this relationship, and little literature related to the elements of the Yi Jing, namely Tian Ren He Yi, Yin Yang and Ch'i Yuen Sheng Tung. Furthermore, literature related to traditional ink animation production techniques is also very rare. Therefore, I was forced to research and focus on different fields, and then to try to establish the connection and intercommunication between different elements and integrate concepts through both theoretical analysis and practice. The research objectives include restoring and understanding traditional ink animation production techniques, incorporating new concepts into new production methods, and identifying features and processes that may prove useful for new concepts and production methods.

6.2 Yi Jing in context

The first research question explored the need to solve the theoretical concept of Yi Jing. It was therefore necessary to define the scope and field of exploration, involving the origin and definition of Yi Jing (see section 2.2: 'The origins of 'Yi Jing 'theory'). It was also significant to explore the philosophical category of Yi Jing, to determine what kinds of traditional Chinese philosophical thought compose it and have evolved from it, including the influence of Yi Jing on traditional Chinese culture, such as poetry, literature, aesthetics, art and so on.

In researching the origin of Yi Jing, I found that it was clearly defined as an aesthetic concept; however, there are different views as to its source.

1. The orthodox theory of the origins of Yi Jing is the traditional concept of Chinese aesthetics; the theory of Yi Jing in modern Chinese aesthetics is a continuation of this, while it continues to have a place in traditional aesthetics.
2. From a Western theoretical perspective, the modern Yi Jing theory is a variant of German aesthetics, and the theory of Yi Jing in modern Chinese aesthetics is actually a

translation of the relevant German theory of aesthetics. This statement mainly relates to the aesthetics scholar Wang Guowei 王國維(1877–1927); where the research found that Wang Guowei’s aesthetics were influenced by Alexander Gottlieb Baumgarten (1714–1762), Immanuel Kant (1724–1804), Arthur Schopenhauer (1788–1860) and other scholars (as mentioned in section 2.4 above) (Rickett, 1977)

3. The evolutionary theory from observations 1 and 2 holds that Yi Jing is a traditional Chinese aesthetic concept. Nevertheless, the meaning of modern aesthetics is different from traditional aesthetics. There are two versions: the first argues that modern Yi Jing theory is completely different from the traditional Chinese conception of Yi Jing; in traditional Chinese aesthetics, Yi Jing is not a prominent concept, but Yi Jing has become a core concept in modern aesthetics. The Yi Jing theory of change in modern aesthetics is not the result of any evolution of Chinese aesthetic theory itself, but in fact comes from the strong influence of Western aesthetics.
4. The second evolutionary theory holds that modern Yi Jing theory is a development of the traditional theory; there have been some changes between them, but on the whole, there is no essential difference. (Peng, 2018)

Throughout the analysis of the above four Yi Jing origin theories, it is helpful to understand both the concept of Yi Jing and the characteristics of modern Chinese aesthetics. The latter has developed under the influence of Western aesthetics, and the West has influenced modern Chinese academics (as mentioned in section 2.3.4 above). However, Chinese aesthetics has its unique content, and some Chinese aesthetic concepts are untranslatable, or only translatable with difficulty, into English. Therefore, there is no fixed translation of the phrase Yi Jing in English. In the English-Chinese bilingual version of *The Contemporary Chinese Dictionary* 現代漢語詞典, the concept of Yi Jing is translated as ‘mood of a literary work or a work of art;

artistic conception; artistic mood’; however, Yi Jing rarely occurs in English literature. Obviously, there are still some parts of Chinese aesthetics that are not found in its Western counterpart; Yi Jing is a concept that Western aesthetics cannot relate to, let alone Yi Jing-related concepts, such as ‘Realm’ 境界, ‘Ch’i Yuen’ 氣韻, ‘Imagery’ 意象 and so on. These come from traditional Chinese aesthetic concepts and continue to be relevant to contemporary aesthetics, artistic creation, aesthetics, and art criticism, with the most relevant being Yi Jing. Western culture proposed their own aesthetic concept, and it was translated into Chinese. However, although influenced and adapted by Chinese culture, it still generally belonged to the West; and when traditional Chinese aesthetic concepts entered the modern era, although they were influenced by Western thought and have changed as a result, they still belong to the Chinese aesthetic tradition. It seems therefore that the source and definition of the Yi Jing can be determined by the first orthodox and the fourth evolutionary theory above. This researcher finds that the orthodox theory of Yi Jing in contemporary aesthetics is the same as that in traditional aesthetics and, in order to maintain the purity of Chinese aesthetics, Yi Jing should be put back into its historical context. I think, however, that this restricts the development and application of the concept of Yi Jing. It also will prevent the conception of the Yi Jing from being applied to the development of contemporary aesthetic theory. and could also affect the vitality of the Yi Jing itself. This is because Yi Jing first related to the characteristics or essence of poetry, before being developed in relation to painting, with the result that the formation of Yi Jing became the sole pursuit of Chinese painting. Therefore, the fourth (evolutionary) theory clarifying the theoretical source of the Yi Jing, encourages a significant retrospective view of the Yi Jing and its conceptual development section to explore whether the Yi Jing can contribute to contemporary aesthetics and modern art.

6.3 The relationship between the concept of ‘Yi Jing’ and ‘Tian Ren He Yi’, ‘Yin Yang’ and ‘Ch’i Yuen Sheng Tung’

The second research question is about the relationship between the concept of Yi Jing and its principles of Tian Ren He Yi, Yin Yang and Ch’i Yuen Sheng Tung, and their definition and potential application. It means this research needed to come up with a definition for these three elements, and consider how they may be useful for artistic creation or ink animation. These three elements are then researched separately and their findings are outlined here:

1. Tian Ren He Yi

While exploring the Tian Ren He Yi, I found that this philosophical concept is rarely considered in the Western culture and is very different to Western thought. Another notable observation is that the literature is mostly edited by Eastern scholars.

As far as Chinese philosophy is concerned, both ‘Tian’ and ‘Ren’ have multiple meanings. For instance, ‘Tian’ might be referred to as ‘god’, ‘celestial phenomena’, ‘rules’, ‘naturalness’, etc. and ‘Ren’ refers to the ‘behaviour’, ‘human nature’, ‘human society’, etc. (Feng, 1990). Due to this conceptual variation in meaning, the concept of ‘He-Yi’ will also be variously interpreted, so that when scholars propose Tian Ren He Yi as the basic feature of Chinese philosophy, there will be different understandings (Zhang, 1995). For instance, Confucianism and Taoism have two different concepts of it (as mentioned in section 2.5 above).

The relationship between the Tian Ren He Yi and Yi Jing is explained by the contemporary scholar Pu Zhenyuan 蒲震元 in *The Artistic Conception of Chinese Art* 中國藝術意境論. “The theory of the Yi Jing of Chinese art is an aesthetic theory that transcends the image of the East, and its philosophical foundation is the great universe life theory of the Tian Ren He Yi in

ancient China” (Pu, 1999, p.80). Thus, the proposition of Tian Ren He Yi as the philosophical background of the Yi Jing, in which the conception elaborates and creates a poetry and pictures, is precisely an evolution from the poetic form of Tian Ren He Yi.

2. Ch’i Yuen Sheng Tung

It has been determined from this research that there is a close relationship between the concepts of Ch’i Yuen Sheng Tung and Yi Jing. The concept of Ch’i Yuen Sheng Tung itself originated from traditional Chinese aesthetics, and became an essential aesthetic topic in the first half of the 20th century. Many aestheticians and scholars have comprehensively dealt with the relationship between China and the West, and between tradition and modernity. The successful transformation of Ch’i Yuen Sheng Tung into a contemporary aesthetic and art-critical concept has made an important contribution to the establishment of contemporary Chinese aesthetics. At the same time, Western scholars have conducted research into and discussion of Ch’i Yuen Sheng Tung and have reached various interpretations. For example, it is defined as ‘rhythmic’, ‘vitality’ (Ling, 2008, p.42 and p.52); American Sinologist Martin Powers also mentioned that the respect of contemporary Western painting for ‘rhythm’, ‘stroke’, ‘posture’ and ‘expression’ was influenced by Chinese painting and painting theory (Powers, 2007). Calligrapher and educator Manny Ling (Ling, 2008, p.175) believes that the characteristic of Ch’i Yuen Sheng Tung can be applied to Western calligraphy:

- i. A natural flow of energy (Ch’i)*
- ii. The rhythmic pattern of writing (Yun)*
- iii. The vitality of letter-forms (Sheng)*
- iv. The gestural movement of the calligrapher (Tung)*

However, this research suggests that Ch'i Yuen Sheng Tung embodied in Chinese art revolves around 'Ch'i' as its core element. In Chinese art:

1. *Ch'i* is the energy that originates from nature; it outlines the artist's vitality and creativity, including the artist's physical and mental (spiritual) activities;
2. *Yuen* is rhythm and resonance, expressing the artist's style and personality. Ch'i gives life to Yuen, and the two are inseparable;
3. *Sheng Tung* is the carrier and expression of Ch'i Yuen. The vitality of the Ch'i Yuen concept in the artwork is called Sheng Tung.

In general, Ch'i Yuen Sheng Tung is a kind of natural energy, it is infused in the artist's body and spirit, and then transmitted by the artist to the artwork, fully displaying the aesthetic aspect of the artwork's vitality and infectiousness. Therefore, a work of art without the concept of Ch'i Yuen Sheng Tung is merely a mechanical expression (see section 2.7).

Chinese aesthetician Zong Baihua (1897–1986) also explained the relationship between Yi Jing and Ch'i Yuen Sheng Tung. He describes a structure of aesthetics with Yi Jing as the core; the key to this concept of aesthetics is autonomy. The characteristics of the artistic realm are generated by the Yi Jing, creatively embracing the mood of life, thus marking the Ch'i Yuen Sheng Tung as the highest level of traditional Chinese aesthetics (as mentioned in section 2.7 above) (Wang, 2005).

3. Yin Yang

Taken together, the Yi Jing and Yin Yang provide a kind of aesthetics for life. This is the concept of 'Yin and Yang coexistence', which is the beauty of life in traditional Chinese culture. This beauty of life is rich in connotations of the opposition and integration of all things, and of

cosmic change. According to Zong Baihua, Yin and Yang are the theories of the aesthetics of life, which originated from the book *The Book of Changes* 易經. The concept of Yin Yang reveals the law of growth and evolution of all things, including artistic creation. Chinese art is a kind of life art that combines the virtual with the real, forming a unique artistic way of life. Yin Yang also encompasses the unique law of artistic creation and generates a kind of vitality through the contrast between Yin and Yang. (Zeng, 2017)

Zong Baihua believed that the *The Book of Changes*, Taoist thought and traditional Chinese paintings all stem from the cultural roots of Chinese art, and drew attention to the beauty of Yin and Yang coexistence, described as ‘virtual and reality coexistence’ (see section 2.6 above). For instance, as has been shown, traditional Chinese painting creates an artistic vitality through the contrast between black and white, thick and light, and virtual and real (Zeng, 2014).

From the research results, there is a clear relationship between the Yi Jing and Tian Ren He Yi, Yin Yang and Ch’i Yuen Sheng Tung, and there is a interlinked relationship between each element, as well as an intersection between these concepts (see figure 116 below). This is different from my earlier research, which suggested a subordinate relationship between Yi Jing and the concepts of Tian Ren He Yi, Yin Yang and Ch’i Yuen Sheng Tung.

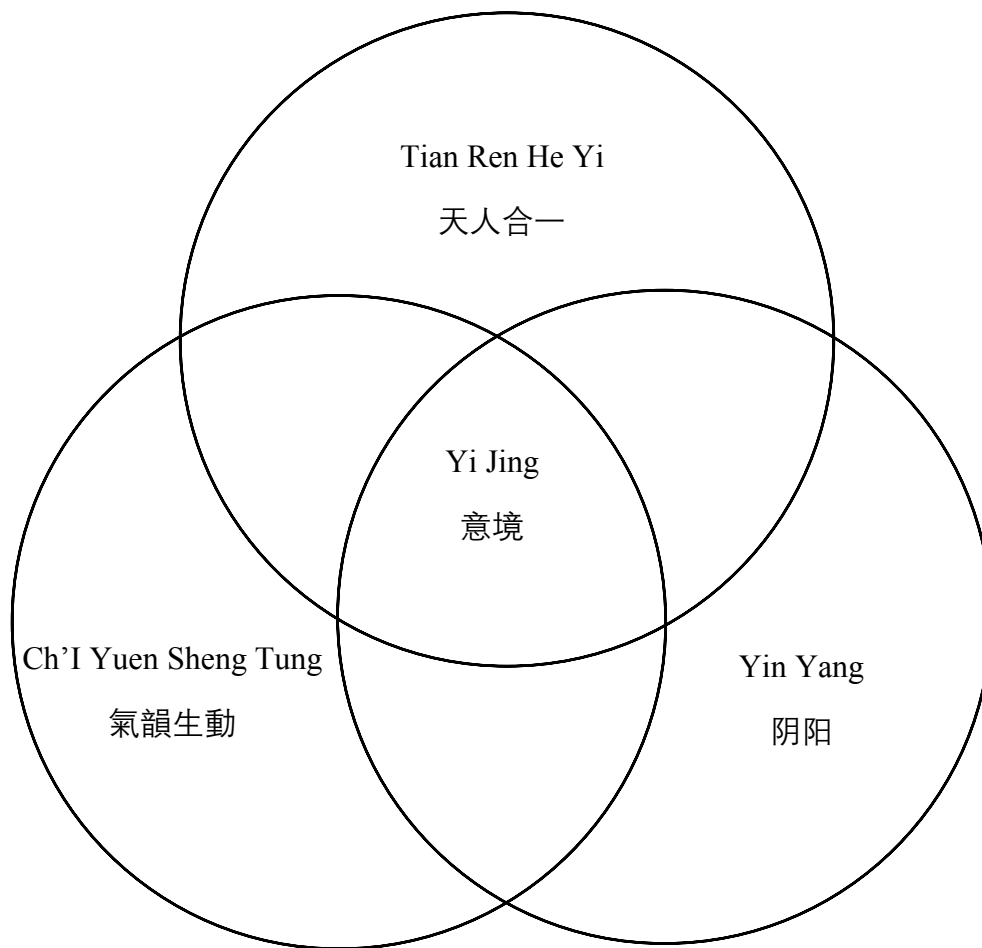


Fig. 116. This diagram demonstrates the relationship between Yi Jing and Tian Ren He Yi, Yin Yang and Ch'i Yuen Sheng Tung (Zhang, 2020)

6.4 The limitations of traditional ink animation and issues within the contemporary Chinese animation industry

The third research question (Chapter 3) leads to the analysis of the limitations of ink animation and the issues facing the contemporary Chinese animation industry. This is the beginning of a common debate, whether digital technology has anything in common with traditional ink animation. The application of digital technology is already widely used for animation production. Nevertheless, its application in Chinese ink animation is a relatively new field, in which more exploration and development is taking place; the rules and traditions have not yet

been established. From another perspective, the development of an animation format with prominent Chinese characteristics and styles remains restricted and will limit the development of the Chinese animation industry.

Chinese animation comprises a variety of art forms and artistic styles, and ink animation is the most distinctive form of artistic expression in China. Production started in 1960, combining the traditional Chinese ink painting style with animation technology and breaking through the contour line and colour flat coating 色彩平涂 technique of traditional animation (see figure 117), applying the brushstroke and smudge effect of ink painting to animation, which created a unique animation expression (Zhang, 2019, p.15–25). Generally speaking, ink animation is based on the rendering effect of water and ink, and the feeling of Yi Jing, brush, ink, lines, etc. are highly unified, and expressed between likeness and non-likeness, to stimulate the spatial imagination of the audience.



Fig. 117. Colour flat coating for Hayao Miyazaki Animation celluloid sheet. (*My Neighbour Totoro*, 1988)

From 1960 to 1990, Chinese ink animators were exploring and developing their art, but after 1990, the industry entered a period of stagnation. Although Chinese animators hope that ink animation can advance, it has faced many problems. At the present stage, its development is facing unprecedented difficulties and significant problems in the following (mentioned above in section 3.1):

- The lack of top-quality Chinese ink animators in the animation industry. Ink animation demands a higher level of difficulty. It requires the artist to master the traditional Chinese ink painting techniques and methods of expression, as well as digital computer technology, calligraphy and other traditional arts and technologies.
- There are problems with contemporary market acceptance. When animation products from Europe, America, Japan and other countries flooded the Chinese animation market, ink animation could not keep up with market demands, and gradually lost the audience who had enjoyed their output.
- The audience age group limitation and production inefficiency is another key factor for its demise. The theme of traditional Chinese ink painting animation is focused on fairy tales, mainly aimed at children's education, and is relatively simple. In the modern era, it has lost most of its appeal to youths and adults. In production terms, the traditional hand-made animation of ink painting has become history, while modern ink animation is entirely dependent on software developed by other countries, which is unable to satisfy its unique technical needs.
- The Chinese animation market runs counter to industry trends and has been saturated with European, American, Japanese, Korean and other countries' product since it was fully opened up, and Chinese ink animation is being squeezed out.

In the current social environment, when more and more attention is being paid to the promotion and preservation of traditional culture, there is an opportunity for the development of ink animation, which requires a new understanding and experimentation to succeed.

6.5 The production and application of the concept of ‘Yi Jing’ with traditional Chinese animation

The fourth problem was to research the production methods, materials and processes of traditional Chinese ink animation and to develop ink animation on this basis, and then to try to combine and apply the concepts of Tian Ren He Yi, Yin Yang and Ch’i Yuen Sheng Tung with ink animation.

As noted, this research process is complicated. A total of only four Chinese traditional ink animations were completed between 1960 and 1990. The first ink animation, *Tadpoles Looking for Their Mom* in 1960, was produced by the Shanghai Animation Film Studio and directed by Te Wei 特偉 (1915–2010). However, the production techniques, materials and processes of ink animation have become a state secret (Sun, 2011, p.96–98). Therefore, this has brought many difficulties in researching traditional ink animation production. Neither the Chinese nor the English literature includes content about Chinese ink animation production technology or materials. It has only been possible to collect some relevant information through the Internet, but the validity of these sources needs to be verified. Therefore, I planned to interview the artists who participated in the production of ink animation at that time, to understand the relevant information.

From a technical perspective, traditional ink animation is different from contemporaneous animation production. The difference is that traditional ink animation requires colour

separation and the making of plates, divided into different-coloured layers, and using multiple exposure technology to shoot on celluloid (see section 4.5 above) and these are not required in general animation.

Interestingly, it was discovered that there was no literature on the materials and techniques used in traditional ink animation. The main reason for this was that they were classified as confidential, and the documents and literature were stored in the Shanghai Animation Film Studio (with whom I was unsuccessful in procuring an interview in 2015), but it has not been made public (see section 4.2 and 4.6). Therefore, research can only be carried out through personal experiments. The experimental process outlined below mainly takes into account the characteristics of traditional Chinese painting and how to improve production efficiency.

- A. Considering the characteristics of traditional Chinese painting, I tried to use Chinese traditional painting pigments, deploying Gong Bi and Xie Yi brushwork techniques to produce ink animation on Xuan paper. The experiments showed it is feasible to make ink animations on Xuan paper, but there are also many difficulties. First of all, because of the need to ensure the precise effect of each frame of the painting, production efficiency is low, and the rate of reworking very high. Second, Xuan paper is not translucent, so it is impossible to draw the characters and the background separately and then overlay them (section 4.4 above).

- B. Considering the efficiency of the production, it was also influenced by Alexander Petrov's *The old man and the sea* (Cotte, 2009) animation and inspired by the traditional Chinese handicraft of painting inside snuff bottles. I tried to use glass to make traditional ink animation but, compared with the use of oil paints in the *Old Man and*

the Sea, the adhesion of Chinese watercolour on glass is too poor. Therefore, I used the same technique as for the inside-painted snuff bottles, using frosted glass, which was a good solution to this problem, and the effect is closer to traditional Chinese ink painting. But the problem is the difficulty of wiping frosted glass clean, which means that every single frame needs to be painted separately, and a separate frosted glass sheet is required for every single frame drawn, which is just not feasible for animation production (see section 4.3.2).

C. Facing this bottleneck in researching which modern digital technology to use to develop and continue traditional ink animation, my supervisor Dr Manny Ling recommended a new program called *Expresii*, that simulates the effects of traditional Chinese ink painting (see section 5.2.1). The software uses computer fluid dynamics to simulate the dynamic effect of ink on Xuan paper, and the effect of an ink smudge is very natural and smooth. It is difficult to create ink animation with *Expresii*, which is intended as a painting software, as there is no corresponding function for animation. This research therefore adopted *Expresii* to draw each single-frame picture and then used *After Effects* software to complete the animation process. For the single-frame process and technique of drawing ink animation, the experiment still followed the traditional method of ink animation, adopting the technique of drawing by editing, using different layers to draw different colours. Judging by the overall effect, *Expresii* can be used to complete ink animation production. Compared with traditional ink animation production, digital painting technology is convenient to modify, reducing the amount of rework, and to improve production efficiency (see section 5.2.2). However, there are shortcomings. First of all, there is still a gap between the digital ink colours and the effect of traditional ink painting. Secondly, using digital brushes to simulate traditional ink painting

techniques still has certain limitations. Thirdly, there is a difference in colour and a transition compared with the effect on Xuan paper. Lastly, from the perspective of software related to animation, *Expresii* offers no animation-related functionality.

After testing the mechanics of the ink animation produced by *Expresii*, the research moved on to integrate the three concepts of Tian Ren He Yi, Yin Yang and Ch'i Yuen Sheng Tung into Yi Jing and merge the integrated whole into the expression of the animation. The following observations came out of this research:

- A. The practice and application of Tian Ren He Yi are mainly reflected in the spiritual and surface layer. From the spiritual aspect, it is necessary to integrate the beauty of the artist's mind into the artwork during the artistic process and to incorporate both the spiritual and aesthetic. It is interpreted from the surface layer as the composition of natural things and the surface of human behaviour (see section 5.5.2.3).
- B. The practice and application of Ch'i Yuen Sheng Tung are mainly focused on the endowment and presentation. From the endowment perspective, Ch'i Yuen Sheng Tung is full of life and vitality, and the free spirit engendered in a human being conducting aesthetic activities; that is to say when creating an artwork, it is necessary to give it life and spirit. From the presentation perspective, Ch'i Yuen Sheng Tung demonstrates that the aesthetic object has a holistic life force, and the artwork shows the vitality of life (see section 5.5.2.5).
- C. With the practice and application of Yin Yang, the concept of Yin Yang mainly focuses on internal meaning and external expression. The 'internal' meaning is based on the idea that all things in the world exist in pairs, which are both opposite and

interdependent, and the beauty of life and this contrast create the vitality of art. The ‘external’ expression is reflected by painting techniques, such as the concepts of ‘white space’, ‘virtual and real’, ‘dense and sparse’, ‘static and dynamic’, and so on, helping create an artistic work endowed with the beauty of life (see section 5.5.2.4).

6.6 Contribution to knowledge

This research focuses on an analysis of the concept of Yi Jing, the restoration of traditional ink animation technology, and the use of modern digital technology to improve the efficiency of ink animation production based on the characteristics of traditional ink animation. It theoretically analyses the relationship between the concept of Yi Jing and traditional Chinese painting, then the relationship between traditional Chinese ink painting and traditional ink animation, in order to demonstrate the possibility of applying Yi Jing theory in the animation process, finally combining these three theoretical research results through their application in experimental practice. The submission includes theory-led interpretation of Yi Jing and its application to animation. Finally, it can be argued that this research will contribute to new knowledge to the field of animation and provide an opportunity to articulate academically both the notion of Yi Jing and its suitability for animation. Moreover, this research will provide model examples for interpreting the notion of Yi Jing and its application to animation possibilities, as well as for viewers and researchers within both the artistic and social science fields.

This research aimed to explore the possibility of applying Yi Jing through experimental animation, and finally obtained an understanding of the concept of Yi Jing from the perspective of artists and their audiences. Whilst there was a lack of knowledge of traditional ink animation technology, such as materials and shooting techniques, and the production process remained

unclear, this research nevertheless accomplished the basic practice of traditional ink animation production.

The term Yi Jing comes from the traditional Chinese aesthetics theory, but Yi Jing has always also been the aesthetic pursuit of Chinese style experimental animation. In the process of exploring the artistic performance of Chinese traditional ink animations, the following conclusions are drawn:

- A. It resolutely rejects the use of static and conservative views to understand and think about the aesthetic characteristics of Chinese animation. Instead, it should stand at the squarely with the times and interpret the development and transcendence of Chinese artistic conception from the perspective of its aesthetic character and cultural connotations.
- B. ‘Animation of Yi Jing’ is a kind of aesthetic form that is created by the combination of subjective thoughts and emotions with animated objects. It can inspire the viewers’ associations and imagination, thus transcending the specific image into a broader artistic time and space. Furthermore, the theory of animated images has been used to guide the traditional ink animation to the experiment with Yi Jing.
- C. Although the creative methods of experimental traditional ink animation are complex and varied, no matter how the techniques change, they always focus on the three basic levels of the language of animation art: aesthetic language, painting language and film language. The guidance of the aesthetic language lays the artistic style of the animation. The taste of the painting language enables the audience to obtain the aesthetic sense in the plane. The exploration of the film language further creates a poetic realm of scene

blending in the multi-dimensional space.

- D. How can Chinese traditional ink animation play a pioneering role, boldly extend and evolve the artistic conception of animation, explore effective ways to express the Yi Jing of Chinese animation, and form a kind of nationality and representativeness, while also exploiting modern and international production modes to maximize the artistic quality of Chinese animation? This will be the test of Chinese traditional ink animation for some time to come.

In the previous sections 3.5 and 4.2 mentioned that traditional Chinese ink animation technology has been classified as confidential by Chinese government since 1960; and then the Chinese animation market opened up at the end of the 20th century and European and Japanese animation entered the Chinese market; simultaneously, as the older generation of ink animation directors and technicians retired and passed away after entering the 21st century, the development of traditional Chinese ink animation stopped, and the technology of ink animation also began to be lost. One of the main focuses of this research is the study of traditional ink animation techniques, and through interviews with older generations of artists and scholars who participated in the production of ink animation, it had roughly understood the process and technical points of traditional ink animation production. Then through experiments with different materials, painting techniques, photography techniques, etc., and the traditional ink animation techniques are verified. From the experiment, it solved the technical difficulties in material selection, drawing technology, and photography parameters in traditional ink animation production. Meanwhile, it understood the process of traditional Chinese ink animation production, and recovered the key technical points in the results and also obtained great picture effect by the production. However, there is still a big gap in the quality of the

animation compared to the work from the Shanghai Animation Film Studio. Therefore, more research can be conducted in the post-doctoral stage.

At the theoretical level, this research focuses on systematic research on the history, development, and compositional relationship of Yi Jing. And as a traditional Chinese aesthetic theory, Yi Jing has a long history with unique characteristics. In the process of researching the literature, it is noted that the English-language documents on context are very scarce and scattered. Therefore, this research has made a certain contribution to the systematic collation of the Yi Jing theory into English, which helps to form a body of literature survey and contextual theory that is more accessible to the English readers. It also illustrates different aspects of contextual theory in English, including the relationship between traditional Chinese painting and calligraphy, as well as its relationship to animation.

6.7 Recommendations for further research

This research is considered to be an exploration across the aesthetic and animation fields, and it is clear that there are further research possibilities, especially for work on the practice and expression of Yi Jing in the field of art, and for research on the aesthetic development of Chinese ink animation. From a technical point of view, other significant research directions include how to improve the efficiency of Chinese ink animation production and develop digital software to make it suitable for the characteristics of Chinese ink animation. The future research direction will still focus on the field of aesthetics and art, the purpose of which is to convey the beauty of Chinese art through art. And through this research, it will propose the aesthetic spirit of traditional Chinese art to the world, such as Chinese calligraphy, ink painting, aesthetic theory and so on.

Through this doctoral studies and research, it became clear that artistic cultivation and ability cannot completely express the beauty of Chinese aesthetics. Nevertheless, this is a research direction which will improve my artistic accomplishment in the future.

Furthermore, in January 2018, I obtained a B-class result in the competition for the Shaoxing City 330 “Overseas Talent Program”, so that I can obtain support from the Shaoxing Municipal Government in my plan to establish an ink animation production company in Shaoxing City, China. The purpose of establishing the company is to develop the ink animation industry. From a technical perspective, I plan to cooperate with Dr Nelson Chu to develop ink animation software, based on *Expresii*, which is more in line with the characteristics of Chinese ink animation. Moreover, from the industrial development perspective, it would promote the development of ink animation and establish an animation style with Chinese characteristics.

Finally, from the cultural perspective, the Chinese aesthetics and aesthetic connotation can be introduced to the international community in a more intuitive way with the expressive form of ink animation. In addition, I will join Shaoxing University in 2021, to promote the development of Chinese animation from the educational level, as mentioned in sections 3.1.2 and 3.1.3. At present, animation education in Chinese universities is mainly focused on teaching skills in line with the contemporary animation industry, and the style is more akin to the European, American, and Japanese animation styles, so there is a lack of research into and teaching of traditional Chinese animation styles. In addition, this move can benefit from university resources and better develop Chinese ink animation production software. I hope that through education, students majoring in animation in Chinese universities can realise the beauty of their own traditional Chinese ink animation style and develop the craft, so that Chinese animation can establish a certain position in the international animation industry.

APPENDIX A

Chronological Table in China

Dynasties	Detail	Approximate Dates
XIA (夏)		
SHANG (商)		1550 BCE–1030 BCE
ZHOU (周)	Western Zhou (西周) 1030 BCE–771 BCE Eastern Zhou(東周) 770 BCE–256 BCE Spring and Autumn period(春秋) 722 BCE–481 BCE Warring States period(戰國) 480 BCE–222 BCE	1030 BCE–256 BCE
QIN (秦)		221 BCE–207 BCE
HAN(漢)	Former(Western) Han(西漢) 202 BCE–9 CE Xin Dynasty (新) 9–23 Later(Eastern) Han(東漢) 25–221	202 BCE– 220 CE
THREE KINGDOMS (三國)	Shu (Han) (蜀) 221–263 Wei (魏) 220–265 Wu (吳) 222–280	221 CE–265 CE
JIN (晉)	Western Jin(西晉) 266–316 Eastern Jin(東晉) 317–420	266 CE–420 CE
SOUTHRN (Four Dynasties) (南朝)	Liu Song (劉宋) 420–479 Southern Qi (南齊) 479–502 Liang (梁) 502–557 Chen (陳) 557–589	420 CE–589 CE

Dynasties	Detail	Approximate Dates
NORTHERN DYNASTIES (北朝)	Northern Wei (北魏) 386–535	386 CE–581 CE
	Eastern Wei (東魏) 534–543	
	Western Wei (西魏) 535–554	
	Northern Qi (北齊) 550–577	
	Northern Zhou (北周) 557–581	
SUI (隋)		581 CE–618 CE
TANG (唐)		618 CE–906 CE
FIVE DYNASTIES (五代)	Later Liang (後梁) 907–923	907 CE–960 CE
	Later Tang (後唐) 923–937	
	Later Jin (後晉) 937–946	
	Later Han (後漢) 947–950	
	Later Zhou (後周) 951–960	
TEN KINGDOMS (十國)	Yang Wu (楊吳) 902–937	902 CE–979 CE
	Wu Yue (吳越) 907–978	
	Min (閩) 909–945	
	Southern Han (南漢) 917–971	
	Ma Chu (馬楚) 927–951	
	Jiangnan (荊南) 924–963	
	Former Shu (前蜀) 907–925	
	Later Shu (後蜀) 935–965	
	Southern Tang (南唐) 937–975	
	Northern Han (北漢) 951–979	
LIAO (遼)		916 CE–1125 CE

Dynasties	Detail	Approximate Dates
KINGDOM OF XIA (西夏)		1038 CE–1227 CE
SONG (宋)	Northern Song (南宋) 960–1126 Southern Song (北宋) 1127–1279	960 CE–1279 CE
JIN DYNASTY (金)		1115 CE–1234 CE
YUAN (元)		1260 CE–1368 CE
MING (明)		1368 CE–1644 CE
QING (清)		1644 CE–1912 CE

APPENDIX B

Ink Animation YouTube Link

1. Ink Animation Test “Lily”
<https://youtu.be/SqoJj-RtQx0>
2. “Buffalo” Film Clip 01
https://youtu.be/RBgXS23f_zU
3. “Buffalo” Film Clip 02
<https://youtu.be/aICsyC1nPds>
4. One of the PoMo Methods
<https://youtu.be/HgOkExYBDCc>
5. Ink Animation “Buffalo”
<https://youtu.be/uxcaw0xyHg0>
6. “Buffalo” Film Clip 03
<https://youtu.be/Y0HsfE1igC4>
7. “Buffalo” Film Clip 04
<https://youtu.be/JYbjFvibXrI>

APPENDIX C

Framed art work for Rubbing ink method

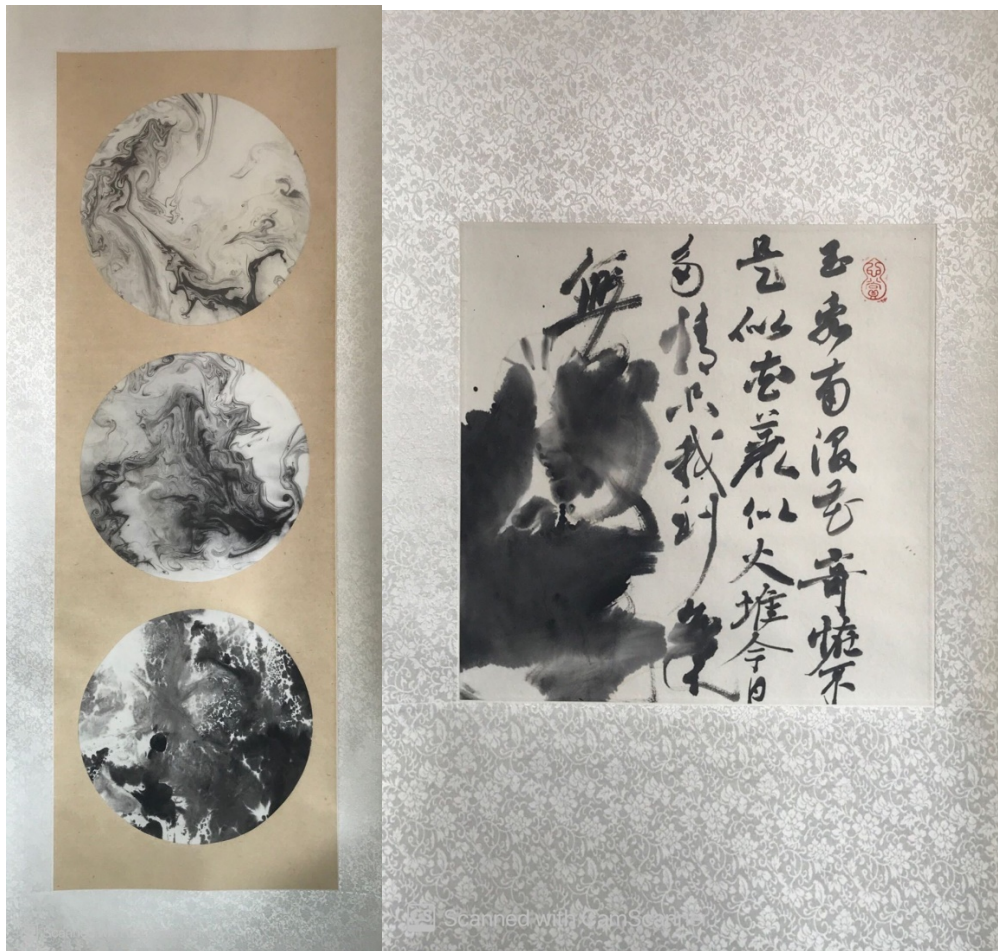


Rubbing Ink effects on Xuan paper using Chinese watercolour and ink (Zhang, 2017)

Experimental works using the Rubbing Ink method, testing the effect of different colour combinations, and colour and ink combinations.

APPENDIX D

Framed art work for PoMo method



PoMo effects and PoMo effects with calligraphy on Xuan paper (Zhang, 2018)

Experimental works using the PoMo method, testing the effect of different PoMo techniques and the combination of PoMo and calligraphy.

APPENDIX E

Practice work for Xie Yi (寫意)



Chinese painting of peony on Xuan paper using Chinese watercolour and ink (Zhang, 2018)



Chinese painting of peony on Xuan paper using Chinese watercolour and ink (Zhang, 2018)



Chinese paintings of chrysanthemum and a young lady on Xuan paper using Chinese watercolour and ink (Zhang, 2016)



Chinese painting of baby tigers on Xuan paper using Chinese watercolour and ink (Zhang, 2016)



Chinese paintings of lotus and chrysanthemum on Xuan paper using Chinese watercolour and ink (Zhang, 2016)



Chinese painting of tropical fish on Xuan paper using Chinese watercolour and ink (Zhang, 2012)

Different traditional Chinese paintings (Xie Yi style) practice works in preparation for different ink animation production styles.

APPENDIX F

Practice work for Chinese calligraphy



Chinese calligraphy using semi-cursive script on Xuan paper (Zhang, 2018)

Calligraphy practice works, exploring the relationship between calligraphy and Yin Yang.



Chinese calligraphy for clerical script on Xuan paper (Zhang, 2016)



Chinese calligraphy using clerical script on Xuan paper (Zhang, 2016)

永和九年歲在癸
 之初會于會稽山陰
 亭脩禊事也羣賢畢至
 集此地有峻領茂林脩竹
 漱湍映帶左右引以為
 列坐其次雅集絲竹管
 一觴一詠一足以暢敘幽
 也天朗氣清惠風和暢
 宙之大俯察品類之盛
 騁懷足以極視聽之娛信
 人之相與俯仰一世或取
 一室之內或因寄所託放

也天朗氣清惠風和暢
 宙之大俯察品類之盛
 騁懷足以極視聽之娛信
 人之相與俯仰一世或取
 一室之內或因寄所託放
 雅趣舍萬殊靜躁不同
 遇輒得於已快然自足不
 及其所之既倦情隨事遷
 兩之所欣俯仰之間以為陳
 以之興懷况脩短隨化終期
 死生亦大矣豈不痛哉每
 之由若合一契未嘗不臨文
 三於懷固知一死生為虛誕
 作淡之視今之視昔悲夫
 錄其可述雖世殊事異所

Chinese calligraphy using semi-cursive script on Xuan paper (Zhang, 2014)

Calligraphy practice works, focusing on Clerical Script and Semi-cursive Script.

APPENDIX G

Practice work for Chinese calligraphy with Rubbing Ink method

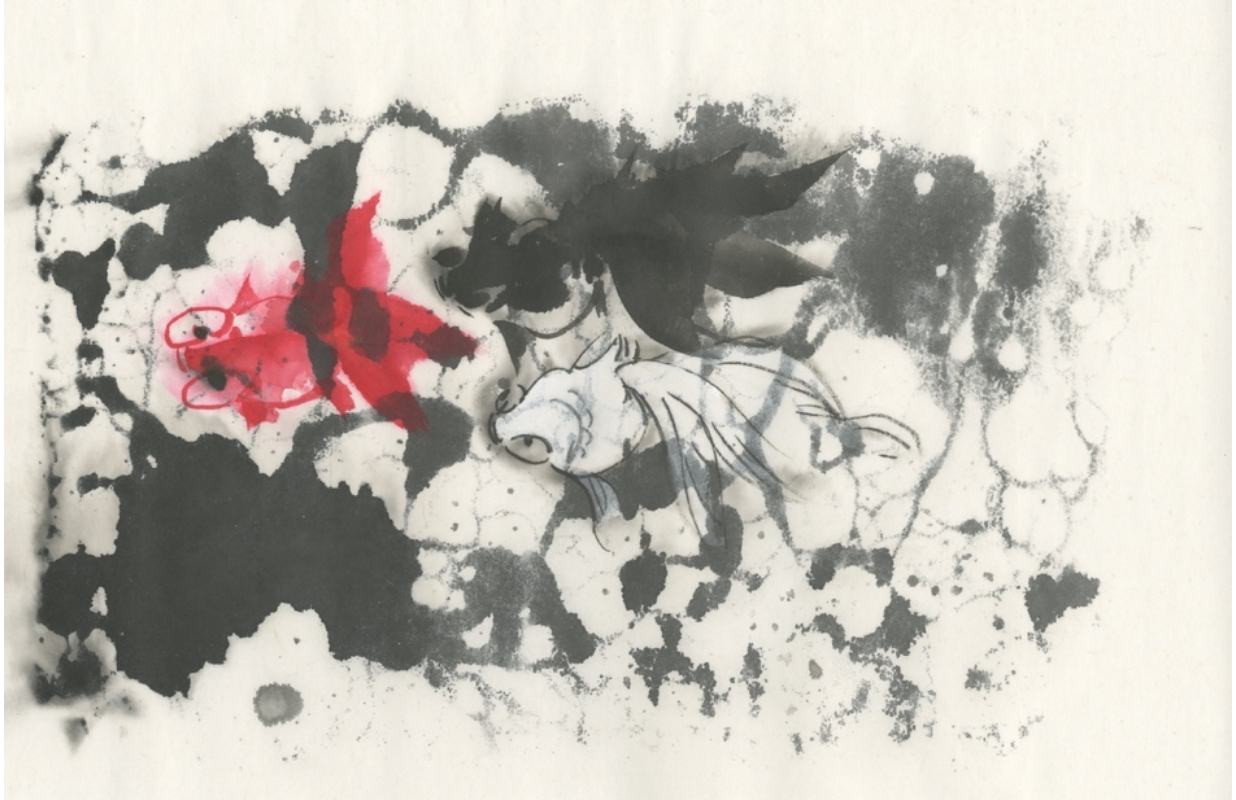


Rubbing Ink effects with calligraphy on Xuan paper using Chinese ink (Zhang, 2018)

Experimental works with Rubbing Ink method, combined with cursive script style of calligraphy.

APPENDIX H

Practice work for Chinese painting with Rubbing Ink and PoMo method

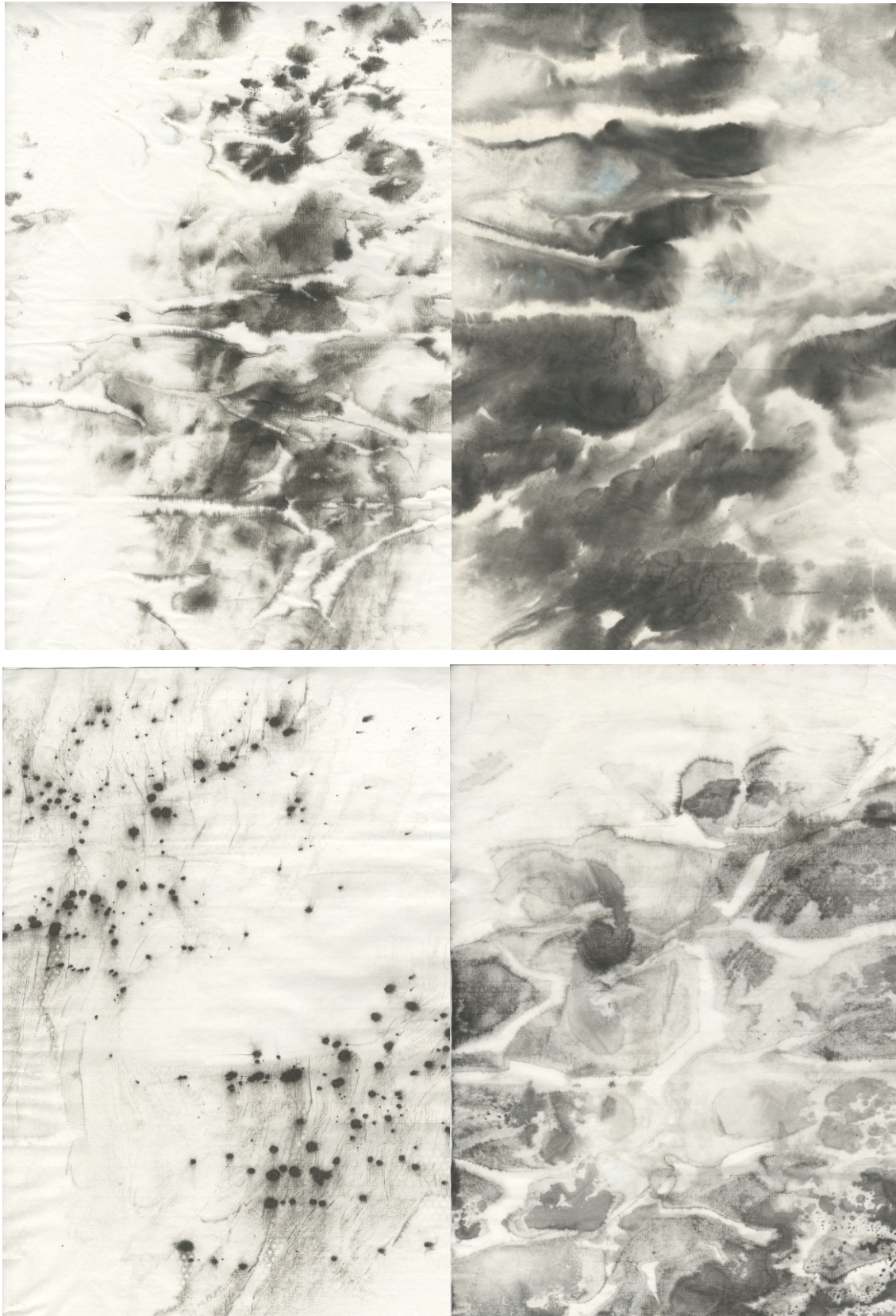


*Rubbing Ink effects with goldfish Chinese painting on Xuan paper using Chinese ink
(Zhang, 2018)*

Experimental works using the Rubbing Ink method, combined with the Xie Yi style (fishes), experimenting the feasibility of Rubbing Ink method as background for painting.



PoMo effects on Xuan paper (Zhang, 2018)



PoMo effects on Xuan paper (Zhang, 2018)

Experimental works using the PoMo method, testing different PoMo effects, verifying the feasibility of the effects as mountains, rivers, clouds, water plants, etc.

APPENDIX I

Practice work for Gong Bi (工筆畫)



Chinese Gong Bi painting with bird and plant on Xuan paper using Chinese watercolour and ink (Zhang, 2016)

Experimental works of Gong Bi, learning its techniques and painting processes.

REFERENCES

Action-Based research by CAEL 2012. [Internet] 2012. Available from:

<<https://alaworkshopdata.wordpress.com/2012/04/12/action-research-powerpoint-from-carl-2012/>> (06.04.2016)

Art Network (2017) “2017 China Online Animation Market White Paper” Available from:

<<https://new.qq.com/omn/20180412/20180412B1VIOI.html?pc>> (27.11.2017)

Ayako, T. (2015). *Multi-dimensional line-drawing with glass though a development of lampworking*. Sunderland: University of Sunderland.

Acker, W.R.B. (1954 reprinted 1997). *Some T'ang and Pre-T'ang on Chinese painting*.

Leiden: Brill academic publish.

Baumgarten, A.G. (1986). *Aesthetica*. Published by Hildesheim: Olms (Originally published in 1750).

Binyon, L. (1911). *The flight of the dragon: an essay on the theory and practice of art in China and Japan, based on original sources*. London: Murray.

Baofu, P. (2007). *The future of aesthetic experience: conceiving a better way to understand beauty, ugliness, and the rest*. London: Cambridge scholars publishing.

Catmull, E. and Wallace, A. (2014). *Creativity, Inc: overcoming the unseen forces that stand in the way of true inspiration*. New York: Random House.

China National Radio and Television Administration (2017). 2017 China Animation Big

Data. Available from:

<<http://www.nrta.gov.cn/col/col2178/index.html?uid=14416&pageNum=2>>

(27.11.2017)

- Chu. (2016). Expresii quick user guid. Available from:
<<http://www.expresii.com/files/theme/ExpresiiUserGuide.pdf>> (14.12.2017)
- 陳望衡 (1998) *中國古典美學*, 湖南教育出版社.
- Chen, W.H. (1998). *Chinese classical aesthetics*. Hunan: Hunan Education Press.
- 陳來 (2008) *馮友蘭先生小傳. 燕園問學記*, 北京大學出版社.
- Chen, L. (2008). *Biography of Mr. Feng Youlan. Study records at Peking University*.
Beijing: Peking university press.
- 陳師曾 (2013) *中國繪畫史* 杭州：浙江人民美術出版社.
- Chen, S.Z. (2013). *The history of Chinese painting*. Hangzhou: Zhejiang people's Fine arts publishing house.
- 成曉娜 (2013) 論中國傳統畫論中的‘氣韻生動’與藝術的形象性, *青春歲月* 5 期 p123.
- Cheng, X.N. (2013). ‘Ch’i-Yun-Sheng-Tung’ in Traditional Chinese Painting Theory and Artistic Imagery. In: *Youth years*. No.05. p123.
- Chen, D.Z. 陳大中 (2015). ‘The concept of Yin Yang and the principle of Ch’i Yuen Sheng Tung and its relationship to Chinese traditional ink painting and calligraphy’.
Interview by Li Zhang, March 2015.
- Chiu, C.C. 邱俊肇 (2016). ‘Yi Jing importance in Chinese art’. Interview by Li Zhang, June 2016.
- Chong, A. (2007). *Digital Animation*. London: Bloomsbury publishing.
- Chu, C.C. (2005). *A Cross-cultural Study of Chinese Yi Jing Aesthetic Theory and Ch’an Philosophy Applied to Contemporary Art Bright Moon Tender Wind*. Newcastle: University of Newcastle.

Chu, S. H. (2007). *Making Digital Painting Organic*. PhD Thesis. Hong Kong: The Hong Kong University of Science and Technology.

Cotte, O. (2009). *Secrets of Oscar winning animation*. publication: Eyrolles.

崔海峰 (2005) 王夫之詩學中的意境論, *遼寧大學學報 (哲學社會科學版)* 33 卷 1 期 pp.65–69.

Cui, H.F. (2005). On the conception of Yi Jing in Wang fu zhi's poetics. In: *Journal of Liaoning University (Philosophy and Social Sciences Edition)* Liaoning: Liaoning University. Vol.33 No.1 pp.65–69.

Kwo, D.W. (1990). *Chinese brushwork in calligraphy and painting*. New York: Dover Publications.

Dewey, J. (1933 reprinted 2019). *How we Think: A Restatement of the Relation of Reflective Thinking to the Educative Process*. Published: Forgotten Books. (Originally published in 1933)

范文瀾 (2010) *中國通史簡篇*, 第一編, 人民出版社.

Fan, W.L (1955 repainted 2010). *General History of China, first part*. Beijing: People's publishing house.

Fang, B.Y. 方本幼 (2015). 'The principle of 'Tian Ren He Yi' expression used in Chinese ink painting'. Interview by Li Zhang, March 2015.

Fang, B.Y. 方本幼 (2017). 'PoMo and Rubbing Ink methods'. Interview by Li Zhang, December 2017.

馮禹 (1990) *天與人- 中國歷史上的天人關係*, 重慶出版社.

Feng, Y. (1990). *Heaven (Tian) and Human (Ren) — The Relationship between Heaven and Human in Chinese History*. Chongqing: Chongqing Publishing House.

- Feng, Y.L. (1983) *A History of Chinese philosophy*. Princeton: Princeton University press.
- Feng, Y.L. (2012) *英漢中國哲學簡史 A history of Chinese philosophy (English and Chinese)*
Jingsu: Jiangsu literature and art publishing house.
- 馮增木 (2011) *中國畫特殊技法詳解*, 山東美術出版社.
- Feng, Z.M. (2011). *Detailed explanation of special techniques of Chinese painting*.
Shandong: Shandong Fine Arts Publishing House.
- Giesen, R. (2015). *Chinese animation: a history and filmography, 1992-2012*. Jefferson:
McFarland & Company.
- Gilman, K.L. (1995). In pursuit of balance: an interview with Rick Valicenti. In: *Letter Arts Review*. Vol, 12, No. 1, pp.20-29.
- Gray, C. and Malins, J. (1993). *Research procedures/ Methodology for Artists & Designers*.
The Centre of Research in Art & Design, Gray's School of Art. Aberdeen: The Robert
Gordon University.
- Gray, C. and Malins, J. (2004). *Visualizing research: a guide to the research process in art
and design*. New York: Routledge.
- Griffiths, A. (1995). *Prints and printmaking: an introduction to the history and techniques*.
California: University of California press.
- 古风 (2001) *意境探微*, 百花洲文艺出版社.
- Gu, F. (2001). *Yi Jing tan wei*. Jiangxi: Baihuazhou literature and art press.
- 顧明遠 (1998) *教育大辭典：增訂合編本*, 上海教育出版社.
- Gu, M.Y. (1998). *Dictionary of Education: revised edition*. Shanghai: Shanghai Education
Press.

- 郭熙 (2010) *林泉高致*, 濟南 : 山東畫報出版社. p.86.
- Guo, X. (2010) *The lofty message of forest and streams*. Shandong: Shandong pictorial publishing house.(original publish in Song Dynasty).p.86
- 郭若虛 (1964) *圖畫見聞錄, 論筆得失*, 上海 : 上海人民美術出版社.
- Guo, R. X. (1951). *Kuo Jo-Hsu's experiences in painting: Tu hua Jian wen zhi: an eleventh century history of Chinese painting together with the Chinese text in facsimile* (Studies in Chinese and related civilizations). New York: American Council of Learned Societies.
- 何科丁 (2015) *中國畫技法研究*, 中國書籍出版社.
- He, K.D. (2015). *Research on Chinese Painting Techniques*. Beijing : China Book press.
- He, L.S. 何來勝 (2015). 'The principle of Ch'i Yuen Sheng Tung expression through calligraphy'. Interview by Li Zhang, March 2015.
- 黃堅 (2004) *當代文化語境下中國水墨畫的發展*, 文藝研究 No.3 pp146-147.
- Huang, J. (2004). The development of Chinese ink painting in the contemporary cultural context. In: *Literary research*. No.3. pp146–147.
- 黃蓉, 邵曉峰 (2004) *中國畫寫意論*, 南京林業大學學報 : 人文社會科學版, Vol. 04. No.01 pp.76–79.
- Huang, R. and Zhao, X.F. (2004), Chinese Painting Freehand (Xie Yi) Theory. In: Journal of Nanjing forestry University (Humanities and social sciences edition). Vol. 04. No.01.pp76–79.
- Jiang, T. (2015). *Creative approaches and techniques for new glass jewellery design on the theme of 'Harmony between Man and Nature'*. Sunderland: University of Sunderland.
- Koffka, K. (2013). *Principle of Gestalt psychology*. New York: Routledge.

- Kolb, D.A. (1984). *Experiential Learning: Experience as the Source of Learning and Development*. Prentice-Hall.
- Li, L.L. (2011). Understanding Chinese animation industry: The nexus of media, geography and policy. In: *Creative industries Journal*, 3:3, pp.189–205.
- Ling, M. (2008). *Calligraphy Across Boundaries*. Sunderland: University of Sunderland.
- 劉綱紀, 李澤厚 (1987) *中國美學史第二卷*, 北京: 中國社會科學出版社.
- Liu, G.J. and Li, Z.H. (1987). *The history of Chinese aesthetics volume two*. Beijing: China social sciences press.
- 劉勰 (unknown date) *文星雕龍*.
- Liu Xie (unknown date) *book of The Literary Mind and the Carving of Dragons*
- 劉佳, 肖永亮 (2011) 數字語境下的動畫美學變革, *藝術探索*. Vol.25 No.4, pp. 110-112.
- Liu, J. and Xiao, Y.L. (2011). The transformation of animation aesthetics in the digital context. In: *Art exploration*. Vol.25 No.4, pp.110-112.
- 劉啟 (2013) 動畫觀眾的年齡分層—動畫接受研究之一, 非群裡畫傳播時代的電視動畫—動畫觀眾年齡分層初探, *中國電視 (動畫)* 6 期. p.52.
- Liu, Q. (2013). The age stratification of the animation audience — one of the studies on the acceptance of animation. The television animation in the era of non-group painting and dissemination — A preliminary study of the age stratification of the animation audience. In: *China TV (Animation)*. No.6. p.52.
- Liu, D.G. 劉道廣 (2015). ‘What the sense of Yi Jing is for Chinese art?’. Interview by Li Zhang, March 2015.
- Liu, D.G. 劉道廣 (2017). ‘What difficulties in the production methods of Chinese traditional ink animation?’. Interview by Li Zhang, December 2017.

- Liu, Y.J. And Wang, Y.P. (2015). *Sleep Medicine in Ancient and Traditional China*. New York; Berlin: Springer.
- Li, Z. (1996). On the unity of man and nature — A survey of an important traditional Chinese way of Thinking. Utrecht: Memory, history and critique: European identity at the millennium. Proceedings of the fifth conference of the international society for the study of European ideas.
- 婁山 (2015) 現代平面設計對傳統水墨元素的傳承與應用, *凱里學院學報* Vol.33. No.04. pp. 172–174.
- Lou, S. (2015). Modern Graphic Design Inheritance and Application of Traditional Ink Elements. In: *Journal of Kaili University*. Vol.33. No.04. pp.172–174.
- 馬倩 (2010) 儒家思想與道家文藝思想的比較, *職業時空* 4 期 pp.152–153.
- Ma, Q. (2010). Comparison of Confucian and Taoist Literary Thoughts. In: *Career Horizon*. No. 04, pp.152–153.
- 馬欣 (2003) 對中國動畫片民族化的反思, *美術*, No.07. pp.120–124.
- Ma, X. (2003) Reflections on the nationalization of Chinese animation. In: *Fine Arts*. No.07. pp.120–124.
- 馬文策, 王玉紅 (2014) 略論中國實驗動畫的意境表現, 河南: *美與時代*. Vol:04. pp.99–101.
- Ma, W.C. and Wang, Y.H. (2014). Discuss the artistic conception of Chinese experimental animation. He nan: *Beauty and times*. Vol:04. pp. 99–101.
- Maeshall, J. (2004). Living systemic thinking: Exploring quality in first-person action research. In: *Action research* Vol.2 No.3. pp.305–325. Sage Publication Sage CA: Thousand Oaks.
- March, B. (1927). A note on perspective in Chinese painting. published in 1927 in the *China Journal* Vol. VII, No.2, pp.69–72.

- Michael, S. (2006). *Modern Chinese Artists: A Biographical Dictionary*. California: University of California Press.
- Minford, J. and Lau, S.M.J. (2002). *Classical Chinese Literature: An anthology of translations. Volume I: From antiquity to the Tang Dynasty*. New York: Columbia University press. Hong Kong: The Chinese University press.
- Oriental Brushstrokes by Charlene M. Fuhrman-Schulz 2015, Available from: <<https://www.orientalbrushstrokes.com/pomo--splashed-ink-painting>> (10.06.2019)
- 岡倉天心, 蔡春華譯 (2009) *中國的美術及其他*, 中華書局.
- Okakura, T. (Translate by Cai, C.H. 2009). *Chinese art and others*. Beijing: Zhonghua Book Company.
- Owen, S. (1992). *Readings in Chinese literary thought* (Wen xin diao long by liu xie translation from Owen). Cambridge: Harvard University Press.
- Oppenheim, A. N. (1992) *Questionnaire Design, Interviewing and Attitude Measurement*. London: Continuum.
- 彭鋒 (2018) 現代意境說辨析, *北京大學學報 (哲學社會科學版)* Vol.55, No.01. pp.133–143.
- Peng, F. (2018). An Analysis of contemporary ‘Yijing’. In: *Journal of Peking University (Philosophy and social sciences)* Vol.55, No.01, pp.133–143.
- Peng, Y. (2014). *Cross cultural lampworking for glass art: the integration, development and demonstration of Chinese and Western lampworking approaches, materials and techniques for creative use*. Sunderland: University of Sunderland.
- 包華石 (2007) 中國體為西方用：羅傑·弗萊與現代主義的文化政治, *文藝研究* Vol.04, pp.141–144,
- Powers, M. (2007). The Chinese system is used in the West: Roger Frye and Modernist Cultural Politics. In: *Literary Research*. Vol.04, pp.141–144.

- Rickett, A.A. (1977). *Wang Kuo-wei's Jen-Chien Tz'u-Hua: A Study in Chinese literary Criticism*. Hong Kong: Hong Kong University Press.
- Pohl, K-H. (2009). "Identity and Hybridity — Chinese Culture and Aesthetics in the Age of Globalization", in: Van den Braembussche, Anton et al. (Hg.): *Intercultural Aesthetics. A Worldwide Perspective*, Berlin: Springer. p.55. pp.87–103.
- Pohl, K-H. (2012). "Chinese and Western Aesthetics — Some Comparative Considerations", in: Alfredo P. Co et al. (ed.): *Thomism and Asian Cultures: Celebrating 400 Years of Dialogue Across Civilizations*. Manila: University of Santo Tomas Publishing House. pp.17–29.
- Rowley, G. (1974). *Principles of Chinese painting revised edition*. Printed in the USA, by Princeton University Press, Princeton, New Jersey (originally published in 1959).
- Russett, R. and Starr, C. (1988). *Experimental animation: Origins of a new art*. Boston: Da Capo Press.
- Schön, D.A. (1983). *The Reflective Practitioner: How Professionals Think in Action*. New York: Basic Books.
- Schön, D.A. (1987). *Educating the Reflective Practitioner: Toward a New Design for Teaching and Learning in the Professions*. San Francisco: Jossey-Bass.
- Setton, S.H. (2017). *The spirit of the brush: Chinese brush painting techniques: simplicity, spirit, and personal journey*. Beverly, MA: Rockport Publishers.
- 孫立軍 (2011) *中國動畫史研究*, 商務印書館.
- Sun, L.J. (2011). *Research on the history of China's animation*. Shanghai: The commercial press.

- 孙恩扬 (2010) *泼墨画研究*, 中國藝術研究院.
- Sun, N.Y (2010). *Research of 'PoMo' method*. Beijing: Chinese National Academy of Arts.
- Sze, M.M. (1956, reprinted 1959). *The way of Chinese painting, its ideas and technique: with selections from the Seventeenth Century Mustard Seed Garden manual of painting*. New York: Random House.
- 唐岱 (1739) *繪事發微* 山東畫報出版社 2012 出版.
- Tang, D. (2012). *Hui-shi-wei-fa*. Shandong: Shandong Pictorial Publishing House (original published 1739).
- 唐磊 (2011) 正在消亡的水墨動畫電影. *中國新聞周刊* 32 期 pp.74–76.
- Tang, L. (2011). The fade away Chinese ink animation film. Beijing. *China Newsweek*. Vol: 32, pp.74–76.
- Tang, Y.J. (1991). *Confucianism, Buddhism, Daoism, Christianity and Chinese culture*. Washington DC: The Council for Research in Values and philosophy.
- Tang, Y.J. and Li, Z. (2004). *Man and nature: the Chinese tradition and the future*. Washington DC: The Council for Research in Values and philosophy.
- Tao Te Ching by Lao Tzu. Translated by Waley, A. (1934 reprint by 2005). *The way and its power: a study of the Tao Tê Ching and its place in Chinese thought*. London: Routledge.
- Thorp, R.L. and Vinograd, E.V. (2014). *The book Chinese Art and Culture, 2nd edited*. Beijing: Beijing United Publishing Co. Ltd.
- 王迪 (2012) 中國水墨動畫的發展及藝術特色, *河南師範大學學報 (哲學社會學科學版)* Vol.01, pp.260–263.
- Wang, D. (2012). The development and artistic characteristics of Chinese ink animation. In: *Journal of Henan Normal University (Philosophy and Sociology Science Edition)* Vol. 01, pp. 260–263.

王國維, 靳德峻 (1981) 人間詞話, *藝術中國*, 第一版.

Wang, G.W. and Jin, D.J. (1981) Ren Jian Ci Hua. In: *Art of China*. Vol.1

王君 (2019) 莊子美學思想與中國劃創作, *中國藝術報*.

Wang, J. (2019). Zhuangzi's Aesthetic Thoughts and Chinese Painting of Creation.
In: *China Art News*.

王進進 (2005) 宗白華美學思想述評, 浙江大學.

Wang, J.J. (2005) *A review of Zong Baihua's thoughts on learning*.
Hangzhou: Zhejiang University.

王靜娟 (2009) 中國水墨畫和水墨動畫的關係, *蘇州教育學院學報* 2 期 PP77-79.

Wang, J.J. (2009). The relationship between Chinese ink painting and ink animation.
In: *Journal of Shuzhou college of Education*. Vol.26, No.2, pp.77-79.

王吉祥 (2010) 對中國水墨動畫本體內涵的思考, *中國美術* No.06, pp. 111-112.

Wang, J.X. (2010). Thinking about the meaning of Chinese ink animation. In: *Chinese fine arts*. No. 06, pp. 111-112.

王曦 (2010) 讓水墨在虛擬世界中流淌-論水墨動畫在數字時代的發展前景, *今傳媒*
No.11, pp.178-179.

Wang, X. (2010). Let ink flow in the virtual world — On the development prospect of ink animation in the digital age. In: *Jin media*. No. 11, pp.178-179.

王烏雲, 劉天婕, 曲猛.(2011). 現代水墨動畫藝術形式中如何體現傳統水墨人物畫的意境. *內蒙古民族大學學報 (社會科學版)* 2011. vol. 06, pp.26-27.

Wang, W.Y. Liu, T.J. Q, M. (2011). On the embody the traditional figure painting artistic conception in modern Chinese wash Cartoon. Inner Mongolia: *Journal of inner Mongolia University of the Nationalities (Social Sciences)* Vol.06, pp.26-27

- 王維.(1959). *山水論 山水訣*. 人民美術出版社.
- Wang, W. (reprinted 1959). *Landscape theory and Landscape knack*. Beijing: People's Fine Arts Publishing House.
- Watson, B. (ed.) (1968). *The complete Works of Chuang Tzu*. Columbia: Columbia university Press.
- 蔚淑英 (2013) 水墨元素之新風 — 海報設計中水墨元素的應用, *中國藝術*.
No.04, pp.130–131
- Wei, S.Y. (2013). New trend of ink- and-wash element: the use of ink- and- wash in poster design. In: *Chinese Arts*. No.04, pp. 130–131.
- Worldlee Gallery (2017) ‘ Yi Jing’ of Chinese painting. published in Culture [Internet]
Available form: <<https://kknews.cc/culture/e9xob3n.html>> (07.06.2017)
- Wu, W.H. (2018). *Chinese animation, creative industries, and digital culture*. London; New York: Routledge.
- 夏天明 (2016) 論中國畫的色彩觀, *藝術科技* No.07, p.224.
- Xia, T.M. (2016). The colour concept of Chinese painting. In: *Art science and Technology*.
No.07, p.224.
- 謝赫 (1962) *古畫品錄*, 人民美術出版社.
- Xie, H. (unknown date reprinted 1962). *book of Six Principles of Chinese Painting*. Beijing: People's Fine Arts Publishing House.
- 謝晉 (2010) *國學全知道*, 北京燕山出版社.
- Xie, J. (2010). *Guoxue knows*. Beijing: Beijing Yanshan Publishing House.
- 肖潇, 田林鑫 (2016) *数读动漫产业：现状与挑战* 新华网.
- Xiao, X. Tian, L, X. (2016). *Date for Animation industry: Status Quo and Challenges*.
Published: Xinhuanet. Available from:

<http://www.xinhuanet.com/video/sjxw/2016-12/23/c_129417157.html> (12.09.2017)

楊成寅 (2017) *太極美學*, 學林出版社.

Yang, C.Y. (2017) *Taiji Aesthetics*. Shanghai: Xue lin press.

Yang, Y.N. (2015). An analysis on traditional Chinese painting art Characteristic — A case study of “Qunxian Zhushou”. International conference on arts, design and cotemporary Education (ICADCE 2015).

Yao, M.M. (2015). *The influence of Chinese Calligraphy on Western Informal Painting*.
Printed by: Buchdruck Jürgens, Hamburg.

葉朗 (2005) 《中國美學史大綱》上海人民出版社.

Ye, L. (1985 reprinted 2005). *Outline History of Chinese Aesthetics*. Shanghai: Shanghai people's publishing house.

Yee, C. (1973). *Chinese calligraphy: An introduction to its aesthetic and technique*.
Boston : Harvard university press.

袁玉紅 (2018) *石刻拓片與傳拓*, 國家圖書館.

Yuan, Y.H. (2018). *Stone rubbing and Chuantuo*. Beijing: National Library

朱友丹 (2013) *中國古代毛筆研究*, 榮寶齋出版社.

Zhu, Y.D. (2013). *The research on ancient Chinese brush*. Beijing: Rong Bao Zhai publishing house.

曾繁仁 (2016) ‘天人合一’ — 中国古代的‘生命美学’, *社会科学家* 1 期, pp. 28–33.

Zeng, F.R. (2016) ‘Tian-Ren-He-Yi’ — An ancient Chinese ‘Life Aesthetics’. In: *Social scientist*. No.1, pp. 28–33.

曾繁仁 (2017) 生生美學具有無窮生命力, *人民日報* 17 版.

Zeng, F.R. (2017). Shengsheng aesthetics has infinite vitality. *People's Daily* 17 Edition.

曾繁仁 (2017) 解讀中國傳統“生生美學”，山東大學演講。

Zeng, F.R. (2017). Interpretation of Chinese Traditional ‘Aesthetics of Life’. Shangdong: Shandong University Speech.

曾國武 (2013) 張大千潑墨潑彩與傳統中國畫, *藝海* No.03, pp.62–63.

Zeng, G.W. (2013). Zhang Daqian splashing ink (PoMo) and colour with traditional Chinese painting. In: *Yihai*. No.03, pp.62–63.

曾繁仁 (2014) “氣本論生態-生命美學”的發現及其重要意義宗白華美學思想試釋, *文學評論* No.01, pp. 17–26.

Zeng, F.R. (2014). A Discussion on Zong Baihua’s Thought on Aesthetics. In: *Literary review*. No.01, pp.17–26.

張鎧焜 (2000) *教育大辭典*, 台灣國家教育研究院。

Zhang, H.K. (2000) *Dictionary of Education*. Sin-pak: Taiwan National Institute of Education.

張志偉 (1995) “天人合一”與“天人相分”—中西哲學比較研究中的一個誤區, *哲學動態* No.07, pp. 30–32.

Zhang, Z.W. (1995) ‘Oneness between man and nature’ and ‘partition between man and nature’— a misunderstanding in the comparative study of Chinese and Western philosophy. In: *Philosophical dynamics*. No.07, pp. 30–32.

Zhang, X. (2019). From ‘Chinese school’ to Chinese style’— a comprehensive view of the development of domestic animation in 70 years. In: *Art wide angle*. No.05, pp15–25.

趙艷 (2008) 中國書法與國畫的融合淺論, *科技創新報導* No.32, pp. 247–248.

Zhao, Y. (2008). On the fusion of Chinese calligraphy and Chinese painting. In: *Science and technology innovation herald*. No.32, pp. 247–248.

鄭明武 李妮 (2013) *變態不窮-花鳥畫*, 吉林出版社。

Zheng, M.W. and Li, N. (2013). *Bian tai bu qiong — Hua niao hua (Flower and Bird Painting)*. Jilin: Jilin Publishing House.

- 周龍 (2015) 水墨動畫和油畫動畫中的繪畫性研究, *大舞台* 2 期, pp.44–45.
- Zhou, L. (2015). The Study of Painting in Ink Animation and Oil Painting Animation. In: *Big stage*. No.2, pp. 44–45.
- Zhuo, H.J. 卓鶴君 (2018). ‘What difficulties of Chinese traditional ink animation techniques?’. Interview by Li Zhang, December 2017.
- 朱冬勇 (2010) 民族性文化元素在動畫設計中的應用, *美術教育* No.05, pp. 91–92.
- Zhu, D.Y. (2010). The application of national cultural elements in animation design. In: *Artistic education*. No.05, pp. 91–92,
- 朱光潛 (2006) *談美* 五南圖書出版有限公司.
- Zhu, G.Q. (2006). *Tan Mei*. Taipei: Wu-Nan Book inc.
- 朱榮英 (2016) *中國哲學的現代化與馬克思主義哲學的中國化*, 中國社會科學出版社.
- Zhu, R.Y. (2016). *The modernization of Chinese philosophy and the Sinicization of Marxist philosophy*. Beijing: China Social Sciences Press.
- 宗白華 (1987) *美學與意境*, 人民出版社.
- Zong, B.H. (1943 reprinted 1987). *Aesthetics and Yi Jing*. Beijing: People’s publishing house.
- 宗白華 (2005) *美學散步*, 上海人民出版社.
- Zong, B.H. (2005). *Aesthetic walk*. Shanghai: Shanghai people’s publishing house.
- 朱其 (2018) *民國時期仲係比較視野下的水墨現代性*, 中國國家畫院.
- Zhu, Q. (2018). *The Modernity of Chinese Ink painting from the Perspective of Comparison between China and the West in the Republic of China*. Beijing: China National Academy of Painting. Available from:
<<http://www.cnep.org.cn/cnep/pinglun/201803/9e41fa434bb741078f7560a1b217c293.shtml>> (06.10.2018)

張彥遠 (2011) *歷代名畫記*. 浙江人民美術出版社.

Zhang, Y.Y. (847 reprinted 2011) *The famous paintings of the past*. Hangzhou: Zhejiang People's Fine Arts Publishing House.