AN ORIGINAL DOCUMENT ON THE TECHNIQUES OF CLAY-BOARD PRINTING IN ANCIENT CHINA

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ABSTRACT

During the Yong Zheng Emperor period of Qing Dynasty, Mr. Lv Fu, who was from Xinchang Country, Zhejiang Province, China, was enlightened by the invention of wood blocks and letter board for printing, and invented the techniques of clay-board for printing. Using this technique, he printed his own work of “Jingding Ershiyi Tongsu Yanyi (精订二十一史通俗演义 The Popular Historical Romances of China’s 21 Dynasties)”. In order to introduce Mr. Lv Fu’s technique of the clay-board for printing, the author of this paper translates the whole paper, which was an important document of printing technique in ancient China.

KEYWORDS

Fu Lv Clay-board printing

THE ORIGINAL ARTICLE

1. BACKGROUND

One of my favorite occupations was to read historical books when I was a young. The only pity was that I couldn’t understand the abstruse words. On March 1683 (23rd year of the Kang Xi Emperor in Qing Dynasty), I borrowed a book of “San Guo Zhi (三国志 History of the Three Kingdoms)” from Mr. Kuang Xuan. The problem was that there was no better book than this “San Guo Zhi”, which was about before or after the Epoch of the Three Kingdoms (220–265 A.D.). Therefore, I planned to complete serial books of the popular historical romances, which was from ancient to the present time for the convenience of the common people. Therefore, I required, searched for and purchased the books of “Kai Pi Yan Yi (开开开记 Romance of Separation of Earth from Heaven by Pan Gu)”, “Pan Gu Zhi (盘古志 History of Pan Gu)”, “Xia Yu Wang Zhi Shui Zhuang (夏夏王治夏 水传 Biography of Yu the Great Brought Water Control)”, “Lie Guo Zhi (列国志 History of Countries in Eastern Zhou Dynasty)”, “Xi Han Zhuan (西传 Commentary of Western Han Dynasty)”, “Dong Han Zhuan (东传 Commentary of Eastern Han Dynasty)”, “San Guo Zhi (三国志 History of the Three Kingdoms)”, “Liang Jin

I selected the materials from these books and deleted the mistakes, cut out the slanders and libel, and added the omissions in these books. I insisted on the principle of “seek truth from facts”. After the chapter of Dong Zhou Dynasty (770 B.C.-256 B.C.), I kept about two Cun (about 6.6cm) on the top of the page margin in order to copy the important sentences in “Chun Qiu (Spring and Autumn Annals) by Confucius, “Gang Mu (A Bridged Adaptation of a History Book from Zhou Dynasty Onwards) by Mr. Zhu Xi (1130–1200 A.D.), and "Xu Gang Mu (Sequels of A Condensation of the Comprehensive Mirror for Aid in Governance)" by Zhu Xi (1130–1200 A.D.). There was a short comment at the end of each chapter. This book was completed through the hard working of ten years. It was a spectacular sight of either in modern or in ancient times with total 242 Juan of 685 chapters. Before I put the “Si Da Tu (The Four Big Pictures)” in engraving the wood blocks for printing, and tried to publish this book, but it was only because of too expensive cost to complete this work. So this manuscript was put into my bookcase for about 30 years.

For this reason, I made a careful consideration to use a complete new method for printing this book.

2. MATERIALS PREPARATION

At first, I mixed the husked sorghum flour with water, rub the mixture and make this flour balls just like plum. Then, I put all the balls into the boiling water, and used the small wood club to hit them in order to make them thin paste until they can be drawn like wire. Next, I use a big comb for carding the new cotton, and also prepared some dry clay powder. Later, I put the three-mixed materials together on a thick wood board, and used the axe handle to hit them again and again, and made them rather harder than soft, and prepared it ready to be used.

The next step, I prepared a copper tube, which has two sides, and can be opened and closed but the interior mouth is square. I put the prepared materials into the copper tube, and put one of the copper tube on the letter, which is on the wood blocks for printing and pressed on it. Then, I put this character in shady and cool place to air-dry. Later on, I put the characters in the right line in compliance with
the sequence of “Zi Hui (汇 Collection of the Chinese Characters)”. At the obverse side, I used to write the character on it for easy to look for. I also write the sequence number on it for convenience to put it back.

Finally, I mixed the cooked Tung oil and rinsed clay mud, and then used the handle of axe to strike again and again, and made it rather dry than wet until thorough sticky and not easy to break. Then, I made the oil clay into square slices, and used the red cinnabar to draw checks on the clay slices. Brush the oil on wood board, cut up the square clay slices and put it on a wood board. I made moulding around the clay slices, and picked up the characters from the words check to the clay board in light of the books. If some characters are higher than the standard level, I’ll use the brick to polish them slightly and carefully, and to make them smoothly, up-right and square, which is the basic rule for printing the characters.

After printing, I have to use the engraving knife to clean the whole line. If some characters are slant, make it upright. Then, I should use the bamboo stab to make it firmly, and paint it with Tung oil again. According to above procedure’s steps, the clay-board for printing is ready. We can put the board in shady and cool place air-dry, until became hard. Before using the board, polish the board by sand paper and to make it flat. The cost of this kind clay-board for printing is cheaper and saves time.

So, I worked with my sons, Weiyuan (维), Weicheng (维), Weiji (维) and I, my nephew Weipan (维), Weifeng (封) and Weirong (荣), and with my neighbor Yu Shuozaiz (再) and others, and tried our best to make the clay board. This board is harder than pear wood and jujube wood, which were used to make the wood blocks for printing.

After I figured out the cost of this work, and final publishing this book, I found it was too expensive. To print this huge popular novel, only the cost of paper, less than two silver can’t accomplish this set of book. I said sadly: “This popular of History of Roman Fiction is not for the poor people, but for the rich.” Although my son Mr. Weiji (基) and other persons said that they will help me to sell several sets of this book, I said that: “This is not my original intention.” Therefore, I gave up this plan to print this monumental work. I made a revision of this book. In the part of unofficial history, I just kept 20–30% of the original one, for the other parts, I kept only 5–10% of the origin. The sources of the stories in history were from the “Er Shi Yi Shi (二二二史 The Twenty-One Dynastic Histories)” and “Gang Jian (鉴)”. So, this set of book had forty chapters with 22 Juan. Then, I deleted the comment at the end of each chapter, but added some contents like the titles of the emperor’s reign, mottoes, fairs, local custom, etc. The final text was 44 Chapters with 26 Juan.
3. PROCESSING METHODS AND TOOLS

Instruction of the methods and tools for the characters printing, as follows:

– **Piao Ni Fa (漂尼法 Method of Rinsed Clay)**
  To Choose the fine quality clay and put it into water and to stir them to make become muddy.
  To pour the muddy with water into another container, and take away the deposited sand, and then to stir the muddy water again and let it precipitating, and dumping the water.
  To take away the settled sand at the bottem of the clay and let the clay dry.
  Before using the dry clay, I should have to used the wood club and struck it into powder, and use the sieve to sift the dry clay, and make it ready for the usage.

– **Jian Tongyou Fa (煎同油法 Method of Frying Tung Oil)**
  Just as the lacquer man fries the lacquer. They should fry the oil toughly. Then the Tung Oil must be mixed with the tiny clay and stir it, and let it become a homogeneous mixture.

– **Liang Kai Fang Tongguan Xingzhuaug (两开中两两两方两铜 The figure of copper tube, which has two sides with square mouth, rectangular)**

– **Tongguan Fenkai Xingzhuang (两管开两两两铜 Separated figure of the copper tube)**
  There are two parts of the copper tube, which had one handle in each middle part of outside for ease to open and close. In the middle part, we make it very close to interlock with each other for keeping them tightly and can’t be moved by hands.
  To open the tube and put the clay, which is made of husked sorghum floury and other materials, and close it. Then put the character of the wood block for printing it, and use the bamboo stab to press solidly. In this way, we make the obverse character in intaglio. Later, we open the copper tube and put characters in shady and cool place air-dry, and make ready for usage.

– **Zhuzhen Xingzhuang (竹两针 Figure of the bamboo stab)**
  The head and the end of the bamboo stabber are parallel, but one is big, the other one is small. The size is neither too big nor too small in order to remove the copper tube in and out freely.
The board for holding the characters is like the window frame. The size of the plate pattern is 84.15 cm. (L) X 51.15 cm. (W) X 3.5 cm. (H). There are five checks in length and three checks in width. The characters were written on the edge of the frame for convenient to find it. Sixteen boards like this form a group for convenient to transport from one place to another by shoulder pole. To prepare the wood board for placing at the bottom and on the plate and tie up in order to put in the store.

The characters, which were important and common, were selected in accordance with the Zi Hui (Chinese Character Collection). The characters, which were seldom used, will not be selected. There are different styles of Chinese written characters. We selected the style of character and prevalent character at that time. Others are Song calligraph style, Wang calligraph style, Mi calligraph type, but not stick to only one pattern. For printing the ordinary article, we need about 3,000 Chinese characters, but for printing the ancient and old book, which about 7,000 Chinese characters are necessary. However, all the characters can be made by the copper tube one by one, until it is enough for the usage.

Symbols and punctuations in the book should use the woodblocks to engrave in intaglio, like ○ (ring) △ (triangle) ▽(punctuation marks in Chinese ancient articles) etc. It is necessary to make some more duplication for additional usage.

All the characters, which have the same radicals would be (丨) listed in the same check. Horizontal line (一) and straight stroke with a bending tip (乙) one check, vertical line straight stroke with a bending tip (丶) and left slash one check (丿), two horizontal lines (丿) and dot with horizontal line (㇀) one check, rénzìpángr (人) according to the number of strokes divided into nine checks, ròuzìpángr (肉) and zhènwénr (夊) one check, bāzìpángr (八) one check, characters jǐzìpángr (几) and jǐzìpángr (几) one check, characters rénzìpángr (人) and bāzìpángr (八) belong to the check of ròuzìpángr (肉), characters like zhèn (日) and mián (冕) are list under the radical of yuēzìpángr (曰), tūbāozìpángr (冖) and bāozìpángr (宀) share two checks, xuèzìtóur (穴) one check, dàozìpángr (刀) one two checks, lìzìpángr (力) one check, bāozìtóur (勹), stroke like 出(穴) and sīzìr (厶) one check, characters chū (出) belong to the check of shén (神), bīzìpángr (匕), bǎizìpángr (比) and máozìpángr (毛) belong to one check, shízìpángr (二) stroke like 卍 and cùnzìpángr (寸) one check,dān’èrdāor (卍) and yìzìpángr (邑) share three checks, characters like wei (危) juàn (卷) and niǎn (卺) belong to the departement of jǐzìpángr (己), fùzìpángr (阜) two checks, chángzìpángr (长) and guāngzìpángr (广) share two checks, yǒuzìpángr (尢) and zhéwénr (夊) one check, dàzìpángr (大) and shùzìpángr (矢) one check, kǒuzìpángr (口) nine checks, fāng-kuāng (方) one check, tūtìpángr (𡨀) three checks, shìzìpángr (十), qiǎnzìpángr (千) and gōngzìpángr (工) one check, nǔzìpángr (尢) four checks, zǐzìpángr (子) one check, xiāozítour (小), yóuzìpángr (尤), sānguāir (庀) and...
wángzìpángr (⿱) one check, shàn zìpángr (⿱) three checks, shìzi tōu (⿵) and hùzī tóu (⿵) one check, jǐn zìpángr (⿲) two checks, yāozì pángr (⿵), xuán zìpángr (⿵), zhí zìpángr (⿵), wǔzì pángr (⿵) and dǒu zì pángr (⿵) one check, nóng zì dì (⿵) and gōng zì pángr (⿵) one check, yè zì pángr (⿵) and gē zì pángr (⿵) one check, stroke like xà, sān pī èr (⿵) and jǐn zì pángr (⿳) one check, shuāng rèn pángr (⿳) one check, xìng zì pángr (⿶) and zhí zì pángr (⿶) one check, wéng zì pángr (⿶) and fān wénr (⿶) one check, xīn zī dì (⿷) eight checks, tī shǒu pángr (⿷) nine checks, fāng zì pángr (⿷) one check, rì zì pángr (⿷) four checks, yú zì pángr (⿷) and bá zì pángr (⿷) one check, yuè zì pángr (⿸) and róu zì pángr (⿸) share five checks, qiān zǐ pángr (⿸) one check, mù zì pángr (⿸) ten checks, hēn mū pángr (⿸) one check, wù zì pángr (⿸), shí zì pángr (⿸) one check, quān pángr (⿸) three checks, yú zì pángr (⿹) three checks, wā zì pángr (⿹) and fù zì pángr (⿹) one check, gān zǐ pángr (⿹), shēng zì pángr (⿹), pī zì pángr (⿹) four checks, yǒng zì pángr (⿹) and pí zì pángr (⿹) one check, tián zì pángr (⿹) one check, bǐng zì tóu (⿹) one check, mǐn zī dì (⿺) and xuě zì pángr (⿺) one check, mào zì pángr (⿺), shí zì pángr (⿺) and nèi zì pángr (⿺) one check, má zì pángr (⿻) two checks, zī zì pángr (⿻) and wāng zì pángr (⿻) one check, shì zì pángr (⿻) two checks, shí zì pángr (⿾) two checks, yī būr (⿾) three checks, lì zì pángr (⿾) and xī zì pángr (⿾) one check, zhǔ tóu (⿾) five checks, cāo zì tóu (⿾) eleven checks, mǐ zì pángr (⿾) one check, jiāo sī pángr (⿾) six checks, yán gōng zì (⿹) and lèi zǐ pángr (⿹) one check, yú zǐ pángr (⿹) one check, lāo zǐ pángr (⿹), èr zì pángr (⿹) and ér zǐ pángr (⿹) one check, chén zì pángr (⿹), shéi zǐ pángr (⿹), zhǐ zì pángr (⿹), jiā zǐ pángr (⿹), gēn zǐ pángr (⿹), sè zǐ pángr (⿹) one check, yǔ zǐ pángr (⿹), jiù zǐ pángr (⿹) and hù zǐ tóu (⿹) one check, zhǒu yǔ zǐ pángr (⿹) one check, chōng zǐ pángr (⿹) five checks, xī zì tóu (⿺), jiāo zǐ tóu (⿺), guí zǐ pángr (⿺) one check, jiān zì pángr (⿺) one check, yān zǐ pángr (⿺) six checks, zhī zǐ pángr (⿺) and fān quǎn pángr (⿺) one check, bēi zǐ pángr (⿺) one check, yě zǐ pángr (⿺) two checks, dōu zǐ pángr (⿺), chì zǐ pángr (⿺), shēn zǐ pángr (⿺), chéng zǐ pángr (⿺), cāi zǐ pángr (⿺) one check, fān zǐ pángr (⿺) and zhǒu zǐ pángr (⿺) one check, zōu zhǐ pángr (⿺) five checks, zǔ zǐ pángr (⿺) two checks, chē zǐ pángr (⿺) two checks, yōu zǐ pángr (⿺) two checks, jīn zǐ pángr (⿺) four checks, lǐ zì pángr (⿺), qīng zǐ pángr (⿺), fēi zǐ pángr (⿺), miǎn zǐ pángr (⿺) one check, měn zǐ pángr (⿺) two checks, zhú zǐ pángr (⿺) one checks, niào zǐ pángr (⿺) three checks, yā zǐ tóu (⿺) one check, gē zī pángr (⿺) one check, shǐ zì pángr (⿺) two checks, wēi zǐ pángr (⿺), yīn zǐ pángr (⿺) and fēng zǐ pángr (⿺) one check, shǒu zǐ pángr (⿺), xiāng zǐ pángr (⿺), cháng zǐ pángr (⿺), hē zǐ pángr (⿺), lǜ zǐ pángr (⿺) and mǎi zǐ pángr (⿺) one check, guì zǐ pángr (⿺) and biǎo zǐ pángr (⿺) one check, mǎ zǐ pángr (⿺) two checks, guī zǐ pángr (⿺) and lǜ zǐ pángr (⿺) one check, yú zǐ pángr (⿺) two checks, mǎ zǐ pángr (⿺), huāng zǐ pángr (⿺), sū zǐ pángr (⿺), zhī zǐ pángr (⿺) dīng zǐ pángr (⿺), guī zǐ pángr (⿺), bǐ zǐ pángr (⿺) one check, hēi zǐ pángr (⿺), miǎn zǐ pángr (⿺) and guī zǐ pángr (⿺) one check, shū zǐ pángr (⿺), qī zǐ pángr (⿺), chī zǐ pángr (⿺) and
longzi pān (龙) one check, other characters one check. Common characters which are putting in together again for two checks, such as huā (花), zhī (之), hū (胡), zhé (者), yē (也), yě (野), yǒu (有), zài (在), wú (无), fū (夫), cún (存), xīn (心), huái (怀), xiǎng (想), niàn (念), tiān (天), dà (大), xiǎo (小), shàng (上), zhōng (中), xià (下), gài (盖), yǐ (以), yán (焉), zài (在), yě (也), etc. symbols like △, ○, are listed in one check, knife, stab and other tools put into one check.

– Geban and Tuoban (格版与托板 木板放版 for putting the characters and the wood board for supporting the clay-board)

Geban means the wood board for putting the characters. Each worker takes one piece of board when he/she is working. The worker can also take more than one piece in compliance with the situation.

Tuoban is the wood board for supporting the clay-board. Each of the clay-board of the ready arrangement character can print two pages. When we print characters on the oil-clay board, don’t print the reverse side until the characters dry thoroughly on the obverse. Timber was used to make Geban and Tuoban must go through the heat treatment. According to the timber’s property, China fir wood is the best, the poplar wood and other wood are secondary. Only pine wood can’t be used because of its nature of expansion and contraction.

Before placing the characters, we have to print several lines on the clay-board, and also to brush a layer of oil on the Tuoban evenly and equally. In this way, the character will not stick to the clay-board, and it will be easy to remove the character. We also have to slip the character in the dry clay powder for avoid adhering to the clay-board.

– Jie Fang (界方 like ruler)

When the worker places the character on the clay-board, he/she has to use a ruler (Jie Fang), which has more than 5.45 cm. long and width. It will prevent to damage the characters.

– Xiao Zhu Jie Fang (小竹界方 Ruler make of bamboo)

This ruler is made of bamboo with straight and smooth. It is for drawing the lines on the clay-board in accordance with the length and width of the characters. In this way, the placing characters will not be in different situations of higher and lower, or all awry.

– Pingtou Zhuzhen (头竹针 Bamboo stab with flat on both ends)

The two ends of bamboo stab could be round or square, big or small. It is a tool for cleaning the clay crumbs in the characters, and for making the character solidly.
- **Xian (线 Thread)**
  The thread is about 33 cm. long, which is the thinner, the better, and with a small clay cake in both ends. After making the lines in the clay-board, we place the characters in accordance with the line. In this way, the characters will not appear higher or lower or in disorder.

- **Qingzi Xiaodao (清字小刀 Small knife for cleaning the characters)**
  This small knife is like the engraving knife. One end is small, round and flat for making the character solidly. The other end is like the horse-hoof knife for cutting off the unnecessary clay. It also can be used for drawing lines or placing the characters. Practice can always make perfect.

- **Gua Tie (刮铁 Sheet-iron)**
  The sheet-iron is a tool for making every line of the characters straight and in order.

- **Cuo Zi Shou Ge (撮字手格 Wood board for holding the characters)**
  The size of this wood board is 19.8 cm. (L) X 16.5 cm. (W) and with the handle of 9.9 cm. The wood strips are nailed around the edges. The inner part of the wood strips is hollow for the convenience of the bamboo slice to stretch in and to move and pick up the characters easily.

- **Fang Zi Ban (放字板 Wood board for holding the characters)**
  This wood board is rectangular for holding the characters and is a good tool for helping to arrange the characters.
  The other ways work, which I have described the above contains.

### 4. CONCLUSION

In a word, I can employ one worker for picking up the characters and two workers for placing or arranging the characters on the clay-board. I can print four pages a day. If I ask my cousins or my friends to work together, I don’t have to employ the engraver to carve the characters. In this way, I can complete even 1,000 articles within several months. It is the easiest way for scholars to obtain books.
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