Article

How Was the World’s Oldest Metal-Type-Printed Book (The Song of Enlightenment, Korea, 1239) Misidentified for Nearly 50 Years?

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Abstract: Six nearly identical versions of an ancient printed book, The Song of Enlightenment with Commentaries by Buddhist Monk Nammyeong Cheon (南明和尚頌證道歌), have been found in Korea since the 1920s. All of them were believed to be printed versions from the 13th to 16th centuries that used duplicated woodblocks of a metal-type-printed version from 1239 and its replica. Two of the six versions were designated as Korean treasures in 1984 and 2012. One other version was designated as a treasure of the Metropolitan city of Seoul, Korea in 2021. Since the 1970s, one of two Korean treasures has been identified as a potential movable metal-type-printed book prior to the Jikji printed in Korea in 1377, as recognized by the UNESCO Memory of the World program. The center of heated debates among Korean historians for the last 50 years was over the printing techniques and printing dates (or sequence). Due to the subjective nature of the examination, it was very difficult to reach a consensus. To end this heated debate, all six versions were examined by image comparisons of individual characters, lines of characters, pages and borderlines to identify whether they are the identical versions using the same woodblocks or different versions. Previous reports on the subjects were also reviewed very carefully. Very clear circumstantial and physical evidence showed that the one version designated as a Korean treasure in 2012 is significantly different from the others and very likely printed using movable metal type in September 1239, as indicated in the imprint. It is the world’s oldest extant book printed using metal type in 1239, 138 years prior to the printing date (1377) of Jikji. The mystery of the misidentification of the metal-printed book, as a woodblock print, has been revealed.

Keywords: The Song of Enlightenment (南明和尚頌證道歌); early history of printing; different printing versions; image comparison; printing technique; printing sequence; printing date

1. Introduction

Currently, the oldest extant printed material in the world using movable metal type is known to be Baegun Hwasang Chorok Buljo Jisimcheyojeol (白雲和抄錄佛祖直指心體要節), published by the Heungdeoksa Temple (興德寺) in Cheongju in 1377 during the Goryeo dynasty [1–4]. It is usually referred to as Jikji (直指). The book is kept at the National Library of France (BNF). It was brought back to France at the end of the 19th century from Korea by Victor Collin de Plancy (1853–1924), the first French diplomat in Korea who served nearly a decade from 1884. It was exhibited at the Universal Exhibition in Paris in 1900 and included in the Korean Bibliography of Maurice Courant, interpreter for the French Embassy in Seoul in 1890 and passionate about Korean literature on the recommendation of Victor Collin de Plancy. Henri Vever bought the Jikji at an auction at the Hôtel Drouot in 1911, along with other objects and books from the former diplomat’s Korean collection. It was in 1952 that the book was given to the BNF after the death of Henri Vever, according to his wishes. Park Byeong Seon, a Korean staff member working at the BNF, managed to have the book recognized as the oldest existing book printed with metallic movable type during the International Year of the
Book in 1972 [4]. On 4 September 2001, it was included in UNESCO’s “Memory of the World” program.

As easily expected, the Jikji is one of many ancient books printed with metallic movable type in Korea. It was officially recognized as the oldest existing book printed with metallic movable type during the Goryeo dynasty (918–1392) of Korea in 1377. According to ancient Korean literature, 28 copies of Sangjeong Gogeum Yemun (詳定古今禮文) are estimated to have been printed between 1234 and 1241, and are possibly the first example of movable metal-type printing recorded in history [5–10]. Thus far, no copies have been found. It has not been recognized as the oldest book printed with metallic movable type due to the lack of the real printed version. None may have survived.

In Korea, there are six very similar printed versions (possibly different editions, using different printing methods in different times) of Nammyeong Cheon Hwasaeng-song Jeungdoga (南明泉和尚證道歌; Song of Enlightenment with Commentaries by Buddhist Monk Nammyeong Cheon), which contain the identical postscript of Jinyang-gong Choi Yi (崔怡), a powerful ruler of the Goryeo (高麗) dynasty in Korea. The postscript suggests the books were printed with movable metal type and were dated as of 1239 September [11–19].

Among them, two versions were classified as Korean national cultural Treasures (寶物) on 30 May 1984 (Samseong version (三省本)) and 29 June 2012 (Gongin version (空印本)) [11,12]. They are possibly different versions in terms of printing techniques, i.e., woodblock printing and movable metal type printing. In Korea, there have been heated debates and divisions in opinions among historians and experts over printing techniques and printing dates of cultural heritage works for more than 50 years, even before the year of Jikji’s recognition in 1972 as the oldest extant metal-type-printed book [16–23]. One group believes both versions are woodblock-printed books dating back to the Goryeo dynasty (918–1392) after September 1239. They even insisted that both versions were printed using identical woodblocks during the Goryeo dynasty [20–23]. However, a majority of historians strongly believe that the Gongin version was printed much later, perhaps in the mid-Joseon (朝鮮) dynasty (1392–1897), based on the poor appearance of paper quality and imperfectly printed characters on the book [21–23]. This opinion was adopted by the Treasure status designation committee of the Cultural Heritage Administration of Korea in 2012 and recorded as a woodblock-printed book from the Goryeo dynasty [11,12].

However, historians with the opposite opinions use the poor quality of paper and printed characters as circumstantial evidence that proves the very early stage of movable metal-type printing in the 13th century. They claim that the Gongin version (空印本) was the original book printed with movable metal type in September 1239 [13–19]. If this is the case, it would predate the movable metal-type printing of Jikji by 138 years. All these debates are based on subjective personal opinions from researchers’ impressions during visual inspection of photographic images without side-by-side inspection of real books. The argument even continues today.

To reach an agreement, a logical explanation must be given along with a mutually agreeable objective and scientific evidence. Four other versions (all woodblock-printed versions) of The Song of Enlightenment printed during the Joseon dynasty (1392–1897) of Korea can be compared with the Korean national cultural Treasures (woodblock-printed Samseong version (三省本)) printed sometime after 1239 and the presumably metallic, movable type-printed Gongin version (空印本) in 1239 for this purpose. The actual printing dates of at least two out of the four woodblock-printed versions were verified to be 1472 for the Daegu version (大邱本) [24] and 1526 for the Jongno Public Library version (鍾路圖書館本), determined from the imprint [25,26] at the end of the books. Two other woodblock-printed versions with only Choi Yi’s postscript dated 1239 are the Banyasa Temple version (般若寺本) and the National Library of Korea version (國立中央圖書館本).
In this paper, the order of public appearance of the six versions of *Nammyeong Cheon Hwasangsong Jeungdoga* (南明泉和尚頌證道歌; *Song of Enlightenment with Commentaries* by Buddhist Monk Nammyeong Cheon) is traced and reviewed from previous reports from the 1970s on the identification of printing technique and sequence based on one, two or three printed versions only. The origin of misleading conclusions on printing techniques and printing sequences are investigated. High-resolution photographs of the six versions of *Nammyeong Cheon Hwasangsong Jeungdoga* (南明泉和尚頌證道歌; *Song of Enlightenment with Commentaries* by Buddhist Monk Nammyeong Cheon) are compared using specially developed image analysis software (PicMan) to visualize the difference among them and to draw conclusions on the printing technique, printing sequence and printing dates of all six versions.

2. Materials and Methods

2.1. The Song of Enlightenment

*The Song of Enlightenment* (證道歌, 道歌, 唱頌歌), is a Chan (禪, 禪, Zen; meaning: mediation or meditative state) discourse, written sometime in the first half of the 8th century, which is usually attributed to the Zen Master Yongjia (永嘉禪師, 675–713) [11,12,18–23]. It also is referred as *Song of Awakening* or *Song of Freedom*. The true authorship of the work is a matter of debate. A number of elements in the writing suggest that either the text has been substantially changed over time or the Zen Master Yongjia may not be the true author [27]. It is written in combinations of three-character and seven-character Chinese poems. The full text in Chinese [28] and various versions of English translations are available from various Buddhist research institutes and religious institutes [29–32]. There are 105 three-character sentences and 214 seven-character Chinese poems. The total number of poems is 319. It consists of 1813 (105 poems $\times$ 3 characters + 214 poems $\times$ 7 characters = 1813 characters) Chinese characters.

The first commentaries appeared in the 11th century during the Song (宋) dynasty (960–1279). The subject of this study, *Nammyeong Cheon Hwasangsong Jeungdoga* (南明泉和尚頌證道歌; *Song of Enlightenment with Commentaries* by Buddhist Monk Nammyeong Cheon), is one of them. This work has remained popular through the centuries and is still often taught and memorized in Zen practice around the world [32].

2.2. The Six Versions of The Song of Enlightenment (南明泉和尚頌證道歌)

Six nearly identical old books of *Nammyeong Cheon Hwasangsong Jeungdoga* (南明泉和尚頌證道歌; *Song of Enlightenment with Commentaries* by Buddhist Monk Nammyeong) were found in Korea. They are the National Library of Korea version (國立中央圖書館本), Samseong version (三省本), Gongin version (空印本), Daegu version (大邱本), Banyasa Temple version (般若寺本) and Jongno Public Library version (鍾路圖書館本), as listed in the order of public appearances from the 1920s to 2010s. Details of characteristics of all six versions are summarized in Table 1.

<table>
<thead>
<tr>
<th>Version Symbol</th>
<th>Formal Name</th>
<th>Designation Status</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>National Library of Korea version (國立中央圖書館本)</td>
<td>None</td>
<td>First reported and opened to the public to view in the 1940s. Formerly part of the Ilsan-Mungo (一山文庫) collection donated by Late Professor Emeritus Kim Du Jong (金斗鐘) of Seoul National University, School of Medicine. First discussion on printing technique took place regarding this version. Identified as a woodblock-printed version using re-engraved woodblocks.</td>
</tr>
<tr>
<td>Version Symbol</td>
<td>Formal Name</td>
<td>Designation Status</td>
<td>Remarks</td>
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| **B**          | Samseong version (三省本) | Korean Treasure Designated on 30 May 1984 | • Collected by Kim Jong-Gyu (金宗圭).  
• Opened to the public to view in the 1970s and examined actively since then.  
• Initially recognized as a printed book made from woodblock re-engraved from movable metal type between the 13th–14th century during the Goryeo dynasty.  
• During the Cultural Heritage Designation Examination of the D: Daegu version (大邱本), the printing date was restated as 1472 or later.  
• No old Hangeul characters were found in the text.  
• Many obvious cutting and chisel marks and annual rings of woodblock were found in the printed book.  
• Unanimous agreement on the printing technique: woodblock printing.  
• Collected by former collector Park Dong-Seob (朴東燮) in 1969.  
• Opened to the public in the 1970s and actively examined from the 1980s.  
• Recognized as a replica version of the Samseong version and printed much later in the Joseon dynasty (14th~15th century) using the identical woodblocks.  
• Later, the printing date was restated as significantly after 1472, the printing date of the D: Daegu version (大邱本).  
• There have been debates on the possibility of movable metal-type printing in 1239, during the Goryeo dynasty, since the 1970s.  
• Many old Gugyeol (口訣) symbols were handwritten in the main text.  
• No old Hangeul characters were found in the text.  
• The lightest ink color among all versions.  
• No cutting or chisel marks and annual rings of woodblock were found in the printed book.  
• Few historians insisted that movable metal printing was used. |
| **C**          | Gongin version (空印本) | Korean Treasure Designated on 29 June 2012 | • Collected by Kim Byeong Gu in Daegu city.  
• Opened to the public in the 1990s and examined in the 2010s.  
• During the designation process, it was revealed that the prayer or epilog (跋文), written by Kim Su-on (金守溫) and dated as June 1472, was removed.  
• The factual printing date of June 1472 was used to date all other versions.  
• Many Gugyeol (口訣) symbols and old Hangeul (Korean characters invented and promulgated in September 1446) were handwritten in the main text.  
• Unanimous agreement on the printing technique: woodblock printing.  
• Opened to the public to view in the 1990s and examined in the 2010s.  
• The first leaf (page 1 and 2) is missing.  
• All pages are darkened by oxidation and aging.  
• The contents are exactly the same as other versions.  
• Similar to the C: Gongin version (空印本), many old Gugyeol symbols were handwritten in the main text.  
• No old Hangeul characters were found in the text.  
• Unanimous agreement on the printing technique: woodblock printing. |
| **D**          | Daegu version (大邱本) | Application denied in 2017 due to intentional removal of pages | • Opened to the public in the 1990s and examined in the 2010s.  
• All pages are darkened by oxidation and aging.  
• The contents are exactly the same as other versions.  
• Similar to the C: Gongin version (空印本), many old Gugyeol symbols were handwritten in the main text.  
• No old Hangeul characters were found in the text.  
• Unanimous agreement on the printing technique: woodblock printing. |
| **E**          | Banyasa Temple version (般若寺本) | Application in progress | • Opened to the public in the 1990s and examined in the 2010s.  
• All pages are darkened by oxidation and aging.  
• The contents are exactly the same as other versions.  
• Similar to the C: Gongin version (空印本), many old Gugyeol symbols were handwritten in the main text.  
• No old Hangeul characters were found in the text.  
• Unanimous agreement on the printing technique: woodblock printing. |
Table 1. Cont.

<table>
<thead>
<tr>
<th>Version Symbol</th>
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<th>Designation Status</th>
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</table>
| F             | Jongno Public Library version (鐘路圖書館本) | Cultural Heritage of Seoul City Designated on 11 March 2021 | • Collected by the Jongno Branch of the Library of Seoul under the Japanese colonial government in the 1920s.  
• Opened to the public to view in the 2010s and examined since then.  
• Part of the former collection of Queen Sunjung Hyo (純貞景皇后) and the imperial family of Korea.  
• Similar to the A: National Library of Korea version (國立中央圖書館本);  
• The woodblock printing was re-engraved at Simwonsa Temple (思遠寺) in Mt. Jabi (藥悲山), Hwangju (黃州) in current North Korea.  
• The factual printing date of June 1526 was verified from the imprint. |

1 Gugyeol ([口語]) symbols: graphical system dating from the time of Silla (高麗, BC 57—AD 935) and used until the 19th century, consisting of borrowing the sounds of Chinese characters to transcribe grammatical morphemes.

All books consist of 44 folding leaves or 88 pages (two prefaces, the main text and two postscripts). The last page in each was left blank. All pages except for page 78 have eight vertical lines. Page 78 has only seven vertical lines. Each vertical line has 15 characters. Some vertical lines rarely have 14 or 16 characters. Two books, the Daegu version (大邱本) and Jongno Public Library version (鍾路圖書館本) have extra pages for additional postscripts indicating actual printing dates of 1472 and 1526 during the Joseon (朝鮮) dynasty (1392–1897) in Korea [24–26].

As the title of the book implies, a Buddhist Monk Nammyeong added comments and remarks to the combinations of the original 319 three-character and seven-character Chinese poems (Song of Enlightenment). There is a preface by the Buddhist Monk Wú Yōng (吳庸) Tiān Yǒng (天用), dated July 1077 from Kuò Cāng (括蒼) in Zhejiang Province (浙江省), China, in front of the main text by the main author Fà Quán (法泉). The main text is followed by a postscript dated 10 July 1076 by a Buddhist Monk Zhú Kuāng (祝況) in Kuò Cāng (括蒼) in Zhejiang Province (浙江省), China. At the very end, there is one more postscript in smaller Chinese characters describing the reasons for printing the book dated at the beginning of September 1239 by Jǐnyáng-gǒng (晉陽公) Choi Yì (崔怡; 1166–1249), a powerful ruler of the Goryeo (高麗) dynasty (918–1392) in Korea. It was 162 years after the original publication during the Song (宋) dynasty (960–1279) of China. According to his statement, the book had long been an essential textbook for Zen practice, but it was no longer available. Thus, he recruited workers for casting movable metal-type characters to print the book and made it available for a long time. His five-line statement was vertically written from right to left in Chinese as shown below.

夫南明證道歌者實禪門之極要也故後學
來禪之流莫不由斯而入升堂奧矣然則
其可盡而不傳通呼於是募工書於
字本以奮其傳焉時己亥九月上旬中書令
晉陽公崔怡謹誌

Since Chinese was neither Choi Yi’s or the Goryeo dynasty of Korea’s native language, some expressions may not be perfect or as natural as a native Chinese speaker could have written at the time of writing in 1239, 782 years ago. Some speculation and interpretation based on physical evidence from the actual books have to be involved to understand the true intention or meaning of the postscript. The translation of his five-line postscript was dated September 1239. In particular, one Chinese character 彫, which could mean carving or engraving, became the center of debate among historians with different opinions on the printing technique. The translation can be interpreted as recruiting workers to engrave a wooden mockup for making molds...
for metal movable type casting. It may also be interpreted as recruiting woodblock workers to re-engrave (remake or duplicate) using an existing print using movable metal type. It is difficult to accurately interpret the true meaning from the character itself without understanding the circumstance at the time of printing the book and physical evidence from the particular book under examination. Historians have to rely on the written statement as well as printing characteristics of actual books under examination to form their opinion.

If the printed book has clear characteristics of woodblock printing, such as chisel cut marks, age rings of woodblocks and/or missing strokes due to woodblock damage, historians naturally pick the Chinese character 影 as evidence for woodblock printing. If a metal movable type-printed book with the same postscript is given to examiners, they would interpret the same Chinese character 影 as evidence that a wood mockup was made for metal movable type casting. Thus, it is important to find out which printed version was used to form examiners’ opinions on printing technique and printing sequence.

To avoid the use of repeated descriptions of the long title of books, the version name such as A: National Library of Korea version (國立中央圖書館本), B: Samseong version (三省本), C: Gongin version (空印本), D: Daegu version (大邱本), E: Banyasa Temple version (般若寺本) and F: Jongno Public Library version (鐘路圖書館本) are used afterwards.

2.3. Chronology of Printing Technique Examination

After lengthy examinations by historians, two books, the B: Samseong version (三省本) and C: Gongin version (空印本), were designated as Korean Treasure No. 758-1 and No. 758-2 on 30 May 1984 and 29 June 2012, respectively [11,12]. Both of them have been registered as woodblock-printed books since designation. In 2021, the official name for the designated versions was changed to: Nammyeong Cheon Hwasangsong Jeungdoga (南明和尚頌道歌; Song of Enlightenment with Commentaries by Buddhist Monk Nammyeong Cheon) 1984 and 2012. On 11 March 2021, the F: Jongno Public Library version (鐘路圖書館本) was designated as a Cultural Heritage of the Metropolitan City of Seoul [26]. It was also registered as a woodblock-printed book printed during the Joseon (朝鮮) dynasty of Korea in 1526.

The first version introduced and discussed by historians was the A: National Library of Korea version (國立中央圖書館本) at the discussion on Korean metallic movable type on behalf of The Korean History of Science Society in July 1972, immediately after Jikji’s introduction in the International Year of the Book in 1972 [20,22,23,33]. The second version mentioned was the B: Samseong version (三省本), which appeared in the literature in 1984 [23]. It was collected in the 1970s and opened to the public for examination around that time. The third version, the C: Gongin version (空印本), was collected by a collector in 1969 who investigated the printing technique [17]. The first meaningful debate over the printing technique of the C: Gongin version (空印本) was reported in 1988 [17,22]. The D: Daegu version (大邱本) was examined for the cultural property designation, but the application was denied because the intentional removal of the prayer or epilog (跋文), written by Kim Su-on (金守溫) and dated June 1472, was discovered during the examination process [24]. The E: Banyasa Temple version (般若寺本) is in the process of the designation examination to be considered cultural property [18,19]. The F: Jongno Public Library version (鐘路圖書館本) was collected by the Jongno Branch of the Library of Seoul under the Japanese colonial government in the 1920s and opened to the public to view in the 2010s. It was a part of the former collection of Queen Sunjung Hyo (純貞孝皇后) and the family of Imperial Korea [26]. It is generally similar to the A: National Library of Korea version (國立中央圖書館本), but there are a few specific differences between the two. The extra imprint at the end of the F: Jongno Public Library version (鐘路圖書館本) revealed that the woodblock was re-engraved at the Simwonsa Temple (深源寺) in Mt. Jabi (慈
The prevailing opinion among historians is that four printing versions of the B: Samseong version (三省本), C: Gongin version (空印本), D: Daegu version (大邱本) and E: Banyasa Temple version (般若寺本) were printed using the same woodblocks at different times.

2.4. Image Comparisons Using Image Analysis Software (PicMan)

Image comparison and analysis of all six versions were completed page-by-page, line-by-line and character-by-character using image analysis software (PicMan from WaferMasters, Inc., Dublin, CA, USA.). The image analysis software, PicMan, was developed and used for automatic and quantitative analysis of digital images in semiconductor, materials science, nanotechnology, food industry, biology, medical research, and colorimetric applications in various fields [34–38]. The key differentiation factor of PicMan from other commercial image manipulation or editing software is the ability to perform quantitative analysis and to export analyzed data in various image formats as well as the numerical format in CSV (comma-separated values) for statistical analyses. The exported numerical data can be used as valuable source data for further numerical analyses and statistical reasoning. By quantifying characteristics of image data in many different aspects and formats, subjectivity and human-originated deviations can be significantly reduced.

Application examples of PicMan in conservation and restoration of cultural heritages have been reported in recent years [14,34–39]. Quantitative characterization in paper foxing, color analysis, image comparison and damaged area mapping on cultural heritage paintings before and after treatment/restoration showed the significant merit of using image comparison and analysis. For this study, new functions such as image overlap, image subtraction, image division, outline generation, image crop, background color removal, transparency application and coloring of selected areas were added for the ease of image comparisons, visual presentation of comparison results and quantitative analysis. Very recently, a Korean book titled Digital Image Analysis Program Manual for Diagnosis of Conservation Status of Painting Cultural Heritage that uses PicMan was published by Konkuk University and the National Research Institute of Cultural Heritage (Korea) [40].

3. Results and Discussion

The image comparisons were performed page-by-page, line-by-line and character-by-character for all six versions to find clues and evidence for determining the printing technique and printing sequence of each printed version. The content of the postscript introduced in the literature was compared and checked for accuracy with the commentaries for additional clues on the understanding of the postscript at the time of examination.

3.1. Page-by Page Image Comparisons

Figures 1 and 2 show the images of page 10 (backside of the 5th folded leaf) and page 87 (front side of the 44th folded leaf containing Choi Yi’s postscript dated September 1239) from all six versions in the order of public appearance for examination from the 1970s to 2010s. These two pages contain significant clues for identifying printing technique and printing sequence. Since the first folded leaf for pages 1 and 2 is missing in the E: Banyasa Temple version (般若寺本), images of page 10 were selected. Many other pages also have good indicators which can be used as evidence for printing technique and printing sequence. Since the actual printing dates for the two versions, D: Daegu version (大邱本) and F: Jongno Public Library version (鍾路圖書館本), were identified to be 1472 and 1526 in 2017 and 2021, respectively, the
printing sequence and printing dates of the other four versions can be estimated with reasonable confidence by comparing the printed characters in all six versions.

<table>
<thead>
<tr>
<th>A: National Library of Korea version (國立中央圖書館本)</th>
<th>B: Samseong version (三省本)</th>
<th>C: Gongin version (空印本)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image A" /></td>
<td><img src="image2.png" alt="Image B" /></td>
<td><img src="image3.png" alt="Image C" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D: Daegu version (大邱本) 1472</th>
<th>E: Banyasa Temple version (般若寺本)</th>
<th>F: Jongno Public Library version (鍾路圖書館本) 1526</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image4.png" alt="Image D" /></td>
<td><img src="image5.png" alt="Image E" /></td>
<td><img src="image6.png" alt="Image F" /></td>
</tr>
</tbody>
</table>

**Figure 1.** Images of page 10 (the backside of the fifth folded leaf) from all six versions in the order of public appearance for examination from the 1970s to 2010s.
<table>
<thead>
<tr>
<th>A: National Library of Korea version (國立中央圖書館本)</th>
<th>B: Samseong version (三省本)</th>
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</tr>
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<tbody>
<tr>
<td><img src="image1" alt="Image A" /></td>
<td><img src="image2" alt="Image B" /></td>
<td><img src="image3" alt="Image C" /></td>
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<tbody>
<tr>
<td><img src="image4" alt="Image D" /></td>
<td><img src="image5" alt="Image E" /></td>
<td><img src="image6" alt="Image F" /></td>
</tr>
</tbody>
</table>

Figure 2. Images of Choi Yi (崔怡)'s postscript dated September 1239 on page 87 (the front side of the 44th folded leaf) from all six versions in the order of public appearance for examination from the 1970s to 2010s.
As seen in Figures 1 and 2, all six versions seem to be very similar. Characters, character shapes and their arrangements are nearly identical. Several versions even showed very similar broken border lines. Without a very close look, it is very easy to form an impression that all six versions are identical and printed using the same printing templates, either woodblocks or moveable metal typesets.

3.2. Literature Survey of the Postscript

The same postscript was spelled out differently by different historians and scholars in the field over time. In all the literature, the count of characters was reported to be 74, excluding spaces. However, several characters were reported differently from 1972 to 1988 [21–23]. This raised a big question for the author. It was very strange that all historians were very experienced and well-respected scholars at the time of their publication. One scholar reported his reading in 1984, but changed a few characters in his report in 1988, four years later [22,23]. It is questionable whether they really examined the same book to draw their conclusions. It is also very possible that they may not have well understood the true meaning or intention of postscripts written in 1239. Thus, the author started to closely look into the printing technique and printing sequence determination processes from the 1970s and 1980s. Figure 3 summarizes the three versions of postscripts reported in 1972, 1984 and 1988, and the author’s version in this study. The difference between versions are highlighted as different colored characters.

Figure 3. Three versions of Choi Yi (崔怡)’s postscripts reported in 1972, 1984 and 1988, and the author’s version in this study. The difference between versions are highlighted by different colored characters. In the 1970s, A: National Library of Korea version (國立中央圖書館本) was examined. In the 1980s, A: National Library of Korea version (國立中央圖書館本), B: Samseong version (三省本) and C: Gongin version (空印本) were examined together. Images of all six versions including D: Daegu version (大邱本) 1472, E: Banyasa Temple version (般若寺本) and F: Jongno Public Library version (鍾路圖書館本) 1526 were used in this study.
Figure 4 shows the images of the postscript in the A: National Library of Korea version (國立中央圖書館本) examined in the 1970s [33] and the B: Samseong version (三省本) examined in the 1980s [22,23]. Changes in the understanding of postscripts over time is clearly demonstrated. The incorrectly identified characters, substituted characters with equivalent ones and an obvious misusage in the original woodblock or typesetting are highlighted with white rectangles.

![Actual Printed Versions for Printing Technique Determination](image)

**Choi Yi’s Postscript dated September 1239 on Page 87**

A: National Library of Korea version (國立中央圖書館本) in 1970s

B: Samseong version (三省本) in 1980s

Figure 4. Images of Choi Yi (崔怡)'s postscript dated September 1239 on page 87 (the front side of the 44th folded leaf) from two versions. The incorrectly identified characters, substituted characters with equivalent ones in the earlier literature published in the 1970s and 1980s, as well as an obvious misusage of a character 己 (supposed to be 己), the ninth character from the top in the sixth line from the right, in the original woodblock or typesetting were highlighted with white rectangles.
Since *The Song of Enlightenment* deals with Buddhist teachings, it requires reasonable expert knowledge in the Buddhist philosophy, religion, terminology and culture, as well as literacy in ancient Chinese to properly examine the texts in the book. Even for well-respected historians, it would have been very difficult to properly examine and draw logical conclusions when the availability of information is insufficient, considering the fact that out of the three versions, only the A: National Library of Korea version (國立中央圖書館本) was examined. Additionally, in the 1980s, only the A: National Library of Korea version (國立中央圖書館本), the B: Samseong version (三省本) and the C: Gongin version (空印本) were available [20–23,33] and none of them had clues for identifying the factual printing dates as in the D: Daegu version (大邱本) from 1472 [24] and the F: Jongno Public Library version (錦路圖書館本) from 1526 [25,26].

There were many mistakes in earlier reports on just a 74-character sentence. The first character 天 was read correctly from the print, but it was supposed to be 夫 based on the intention of Choi Yi (崔怡). Four obvious mistakes of 外, 觀 and 合 should be corrected to 門, 升, and 今 in the reports published in 1972. The characters 文 and 門 have the same pronunciation and meaning of “moon” in Korean. Thus, it seemed to be a simple mistake that occurred during typesetting by a Korean type picker at the time of publication in the 1970s when the word processor and/or computer-aided document writing/editing technology was not available. The other three words of 外, 觀 and 合 were incorrectly read due to a lack of understanding Buddhist terminology, misunderstanding of context and poor printing of the A: National Library of Korea version (國立中央圖書館本). One character was expressed as 學, which is the original character. Three characters of 參, 閉 and 門 were the simplified, equivalent characters of 外, 觀 and 門. The character 己 was interpreted as a part of 己亥, meaning the year of the boar in the Chinese zodiac for 1239. Thus, the true meaning of the character 己 should be 己, as corrected in Figure 3.

In 1984, many earlier mistakes were corrected by Cheon [22]. However, one mistake 外 (supposed to be 升) was not corrected. It is supposed to be a part of a word 升堂 (meaning a Buddhist monastery). It shows that Cheon was not aware of the true meaning at the time. He also mistakenly used 堂 instead of 學. He corrected all of his mistakes in his report in 1988 other than the use of the equivalent simplified characters 參, 閉 and 門 instead of 外, 觀 and 門 [23].

The author corrected everything, including 己 → 己 (part of 己亥 meaning the year of the boar in the Chinese zodiac for 1239) at the far right of Figure 3, based on all six versions available today.

3.3. Review of the Previous Printing Technique and Sequence Determination Process

Historians concluded that all three versions, the A: National Library of Korea version (國立中央圖書館本), B: Samseong version (三省本) and C: Gongin version (空印本), were printed using woodblocks. They even insisted that both the B: Samseong version (三省本) and C: Gongin version (空印本) were printed using identical woodblocks [22,23]. The only difference they could admit was that the B: Samseong version (三省本) was printed much earlier than the C: Gongin version (空印本) based on the poor appearance of printing quality and paper quality. The author’s opinion is that these are wrong conclusions without supporting evidence. At the time of their examination, only three versions were available and the factual printing dates cannot be determined for any of them with reasonable confidence. In the 1970s and 1980s, it was very difficult to access the real book. No collectors would show their valuable collection items even to scholars because their opinions could ruin the value of their collections. Cheon even mentioned in his report in 1988 that he was not able to inspect the C: Gongin version (空印本) from the former collector [23]. It is time to re-examine all previous claims with the new evidence and new versions with known factual printing dates. Additional pieces of information are available to put the puzzle together.
Figure 5 shows six selected characters, 即, 外, 殊, 見, 豈 and 千, on pages 8 and 9 of the A: National Library of Korea version (國立中央圖書館本), B: Samseong version (三省本) and C: Gongin version (空印本), showing evidence for improper judgment of the printing technique and printing sequence in the 1970s and 1980s. Their comments used for justifying their judgment at the time of examination were summarized. One can tell that their judgment was very subjective and merely based on an impression. More objective judgment based on evidence is strongly desired. The author’s opposition or questions against the prior judgment is also provided at the bottom left of Figure 5. It is worthwhile to conduct a full investigation on this question. It may change the history of printing entirely depending on the outcome of this study.

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Figure 5. Selected characters on pages 8 and 9 of (A): National Library of Korea version (國立中央圖書館本), (B): Samseong version (三省本) and (C): Gongin version (空印本) showing evidence for improper judgment of printing technique and printing sequence in the 1970s and 1980s.

If both the B: Samseong version (三省本) and C: Gongin version (空印本) were printed using the identical woodblocks and the B: Samseong version (三省本) is pre-dated, the full recovery of missing strokes and chisel marks of the B: Samseong version (三省本) in the C: Gongin version (空印本) cannot be explained. Either the printing sequence is determined wrong or different woodblocks or metal movable type were used for the C: Gongin version (空印本). Images of characters line-by-line and character-by-character on all six versions were compared to gather mean-
ingful clues and effective evidence towards identification of printing technique and printing sequence. Comparison results of the selected images are introduced in the following subsections.

3.4. Line-by-Line Image Comparisons

Selected line-by-line character images from the same page and same line from all six versions were compared to see the similarities and differences and to gain insights into printing techniques and printing sequence. Figure 6 shows line-by-line character comparison images from the third line from the right on page 84 (backside of the 42nd folded leaf) in the title’s (南明泉和尚頌證道歌) postscript for the examination sequence and identified printing sequence, based on the features of the printed characters in each version.

Figure 6. Line-by-line character comparison images from the third line from the right on page 84 (backside of the 42nd folded leaf) in one of the title’s (南明泉和尚頌證道歌) postscripts for the examination sequence (left) and printing sequence (right) identified by the author from the features of printed characters on each version. Two characters (一部) are missing in A: National Library of Korea version (國立中央圖書館本), (B): Samseong version (三省本), (C): Gongin version (空印本), (D): Daegu version (大邱本) 1472, (E): Banyasa Temple version (般若寺本) and (F): Jongno Public Library version (鍾路圖書館本) 1526).
The A: National Library of Korea version (國立中央圖書館本), examined in the 1970s, only has nine characters (南明泉和尙頌證道歌) and is missing two characters (一部), whereas all other versions contain eleven characters (南明泉和尚頌證道歌一部). It is a very important difference from other versions. It suggests that the A: National Library of Korea version (國立中央圖書館本) was printed using different woodblocks. The identified printing sequence becomes obvious towards the end of this paper as evidence builds up. For the time being, the printing sequence identified by the author should be assumed in the earlier report [13,14]. The factual printing dates of 1472 and 1526 for the D: Daegu version (大邱本) and F: Jongno Public Library version (鍾路圖書館本), respectively, are added in Figure 6.

Similarly, Figure 7 shows line-by-line character comparison images from the eighth line from the right on page 86 (backside of the 43rd folded leaf) for the examination sequence (left) and printing sequence (right) identified by the author, based on the features of printed characters in each version and previous reports [13,14]. One character (啘) was modified to a new character (得) by adding a radical (彳) during re-engraving of a duplicated woodblock for the A: National Library of Korea version (國立中央圖書館本). Figure 6 is very strong evidence that the A: National Library of Korea version (國立中央圖書館本) was printed using a different set of woodblocks.

More evidence for modifications or mistakes made during the re-engraving of woodblocks using printed images of prior versions can be found in the main text. Some examples found on page 10 (backside of the fifth folded leaf) are shown in Figure 8. The left side of the figure shows a string of 14 characters (散浮雲孤月上大千沙界一時) in the fifth line from the right in the examination sequence since the 1970s. The right side shows rearranged images in the printing sequence based on findings in the author’s previous studies [13,14] and this study. The last character ( ), which is the ancient form of the character for 明, was modified to the newer form (明) in both the A: National Library of Korea version (國立中央圖書館本) and the F: Jongno Public Library version (鍾路圖書館本) printed in 1526. Throughout the text, 44 ancient forms of the character were used, and one new form of the character 明 was used in all other versions. The new form of the character 明 was only used as a small size in the Choi Yi (崔怡)’s postscript dated 1239. Since the main text was published during the Song (宋) dynasty (960–1279) in China in 1077, the usage of the ancient form is normal. Both the A: National Library of Korea version (國立中央圖書館本) and the F: Jongno Public Library version (鍾路圖書館本) printed in 1526 modified 2 out of the 44 ancient characters to a newer character 明. One character on page 10 and the other on page 5 (not shown) is particularly interesting in that only one out of two ancient characters on page 5 was modified to a newer 明 character in both versions printed in 1526 or later. These facts are very strong evidence that the A: National Library of Korea version (國立中央圖書館本) was printed using a different set of woodblocks after printing the F: Jongno Public Library version (鍾路圖書館本) in 1526. An increase in stroke damage for a character 月, as highlighted with red rectangles, also indicates the printing sequence of earlier versions.
Figure 7. Line-by-line character comparison images from the eighth line from the right on page 86 (backside of the 43rd folded leaf) for the examination sequence (left) and printing sequence (right). One character (導) was modified to a new character (得) by adding a radical (彳) during re-engraving of a duplicated woodblock for (A): National Library of Korea version (國立中央圖書館本). (A): National Library of Korea version (國立中央圖書館本), (B): Samseong version (三省本), (C): Gongin version (空印本), (D): Daegu version (大邱本) 1472, (E): Banyasa Temple version (般若寺本) and (F): Jongno Public Library version (鍾路圖書館本) 1526.)
Figure 8. The images of characters in line 5 on page 10 (backside of fifth folded leaf) from six versions in the order of examination (left) and estimated printing sequence (right). One Chinese character (ancient form) was replaced with a newer equivalent character 明 in two later versions (A,F). (A): National Library of Korea version (國立中央圖書館本), (B): Samseong version (三省本), (C): Gongin version (空印本), (D): Daegu version (大邱本) 1472, (E): Banyasa Temple version (般若寺本) and (F): Jongno Public Library version (鍾路圖書館本) 1526).

3.5. Character-by-Character Comparisons

Character-by-character comparisons are necessary to find similarities and differences between versions in an assumed printing sequence. Figure 9 shows 17 selected characters from page 10 of all six versions for detailed comparison. To make it easier to recognize the character image only, the background color of the paper and other disturbing influences were removed and significant deviations were highlighted between versions. One can notice that the six versions can be classified into three groups based on printing dates (before 1472, between 1472–1526 and 1525 and after).
### Figure 9. Seventeen selected characters from page 10 (backside of fifth folded leaf) of six nearly identical books of *The Song of Enlightenment* (南明泉和尚頌證道歌) after cropping (left) and after paper color removal (right). Chinese characters highlighted with red boxes show significant deviations from those in other versions. (A): National Library of Korea version (國立中央圖書館本), (B): Samseong version (三省本), (C): Gongin version (空印本), (D): Daegu version (大邱本) 1472, (E): Banyasa Temple version (般若寺本) and (F): Jongno Public Library version (鍾路圖書館本) 1526).

#### 3.6. Choi Yi (崔怡)’s Postscript Comparisons

Choi Yi’s postscript only has 74 small-size characters, but it is the center of debates in terms of interpretation of text, printing quality and printing sequence. Figure 10 shows line-by-line image comparisons of the third line from the right on page 87 (front side of the 44th folded leaf) of all six versions for the examination sequence (left) and printing sequence (right).
There are two particular characters of interest. They are the first character 夫 and the last character 學. Due to the printing quality variations, the first character 夫 can also be read as 天 in the versions of A, C and F. From the Buddhist tradition of writing, the first character should be read as 夫 based on the context from the beginning. However, the historians first examined the A: National Library of Korea version (國立中央圖書館本) in the 1970s, and it was not corrected until 1984 after the examination of the B: Samseong version (三省本) in the early 1980s [22]. This was because the printed character in the first examined version showed the printed character of 天 very clearly, as seen in Figures 2 and 10.

The other character of interest 學 was modified to a simplified equivalent character in two versions (F and A) printed after 1526. The modification of two characters...
At the time of examination, in the 1970s and 1980s, there was no knowledge about the factual printing dates for all three versions (A, B and C), and the three other versions (D, E and F) were not being discussed [20–23,33]. This study was only possible today and the earlier conclusions should be re-evaluated based on the additional information (images of three additional versions of D, E and F, and the known factual printing dates of 1472 for D and 1525 for F).

Figure 11 shows printed images of seven characters (夫, 學, 升, 令 and 閏) in all six versions in the printing sequence. Three characters (夫, 學 and 升) in the old versions were modified to 天, and 外 during the re-engraving and making duplicate woodblocks during and after 1526. The modification of 夫 → 天 and 升 → 外 was due to the engravers’ lack of knowledge of the context. When they made duplicated woodblocks, the engraver had to make their best guess based on the poor printed image. As seen from the right side of Figure 11, poor printed characters from an earlier version (C: Gongin version (空印本), presumably movable metal-type printing) evolved with time as new woodblock duplicates were made. It is very probable that the C: Gongin version (空印本) is the surviving metal movable type-printed version that was printed in 1239 during the Goryeo dynasty in Korea. It predates by 138 years the Jikji, which was printed in 1377 and was recognized as the world’s oldest extant metal-type-printed version by the UNESCO Memory of the World program on 4 September 2012.

**Figure 11.** Images of seven characters (夫, 學, 升, 令, 閏) in all six versions in printing sequence. ((left): as cropped and (right): after background color removal). ((A): National Library of Korea version (國立中央圖書館本), (B): Samseong version (三省本), (C): Gongin version (空印本), (D): Daegu version (大邱本) 1472, (E): Banyasa Temple version (般若寺本) and (F): Jongno Public Library version (鍾路圖書館本) 1526).

### 3.7. Woodblock Engravers’ Psychology

Partial images of page 14 (backside of the seventh folded leaf) from four earlier versions in the order of printing sequence are shown in Figure 12. The top four images are as cropped and the bottom four images are superimposed images of seven red-colored characters of the C: Gongin version (空印本) on all four versions to demonstrate thickening of character strokes. When woodblock engravers carve woodblocks,
they naturally tend not to cut inside the printed characters. It is the typical psychology of humans.

As seen from the bottom image of Figure 12, two specific characters of 放 and 皮 showed growing deviations in stroke widths and sizes in the order of the printing sequence: the C: Gongin version (空印本) → the E: Banyasa Temple version (般若寺本) → the D: Daegu version (大邱本) in 1472 → the B: Samseong version (三省本). This also points to the C: Gongin version (空印本) being the earliest printed version.

3.8. Additional Clues for Printing Technique and Printing Sequence Determination

To show the complexity and human psychology of determining the printing technique and printing sequence of nearly identical versions of ancient books, seven selected characters (即, 外, 殊, 見, 豈 and 千) of interest on pages 8 and 9 are summarized in the order of examination sequence and printing sequence in Figures 13 and 14, respectively. The collection of the same characters from the first three versions in the examination sequence was already shown in Figure 5. It was already complicated and hard enough to draw a conclusion. When there are images from six versions of...
very similar characters, it is much more difficult, as if the number of jigsaw puzzle pieces is increased.

When the character images are shown in examination order without factual printing date information of any versions, it is very difficult to sort out and judge the difference. Additional clues such as factual printing dates for some versions are necessary to put the puzzle together. The factual printing technique and printing date information can be like the jigsaw puzzle pieces at the corners of a finished jigsaw puzzle.

With the verified woodblock printing technique and printing date information for the D: Daegu version (大邱本) (1472) and the F: Jongno Public Library version (鍾路圖書館本) (1526), the selected character images were rearranged, as shown in Figure 14. Thickening of stroke width, missing strokes, chisel marks, shape change, overall brightness of printed characters and non-uniformity of printed characters were considered for the rearrangement. The logical conclusion on the printing technique and printing sequence can be reached, as summarized in Figure 14, from all the evidence. Water-based ink used for woodblock printing does not stay on metal surfaces due to the surface tension and cannot be used for metal-type printing. Oil-based ink must be prepared for metal-type printing. The oil-based ink is much lighter in color as seen in the C: Gongin version (空印本). Details of types and characteristics of ink for historic woodblock printing and metal-type printing in Korea can be found elsewhere [4,41].

**Figure 13.** Selected images of six characters on pages 8 and 9 from all six versions in examination sequence before (left) and after (right) paper color removal of cropped character images.
Figure 14. Selected images of six characters on pages 8 and 9 from all six versions in printing sequence before (left) and after (right) paper color removal of cropped character images. Printing technique and woodblock duplication timing is indicated by blue arrows. ((A): National Library of Korea version (國立中央圖書館本), (B): Samseong version (三省本), (C): Gongin version (空印本), (D): Daegu version (大邱本) 1472, (E): Banyasa Temple version (般若寺本) and (F): Jongno Public Library version (鍾路圖書館本) 1526).

4. Discussion and Recommendations

As described in the previous report, there have been claims that the Gongin version (空印本) is the world’s oldest surviving movable metal-type-printed version, dating from September 1239 during the Goryeo dynasty in Korea. The claim has been consistently raised over the past 50 years, since the 1970s [13–19]. It was time to re-evaluate this claim with new evidence introduced in the author’s previous report and this study.

The controversy was started in the 1970s and 1980s due to the lack of important information available today. When historians inspected the C: Gongin version (空印本) with the knowledge that the A: National Library of Korea version (國立中央圖書館本) and the B: Samseong version (三省本) were printed with woodblocks, they immediately determined that the C: Gongin version (空印本) was the much later version printed using the same woodblocks based on their impression of the quality of paper and printing. If the C: Gongin version (空印本) were introduced first, without exposure to the A: National Library of Korea version (國立中央圖書館本) and the B: Samseong version (三省本), their impression and conclusion might have been completely opposite. As Kim Doo Jong stated in his paper, he noticed that Choi Yi’s postscript dated September 1239 indicates the printing was conducted by metal movable type. However, the version in his possession at that time (which later became the A: National Library of Korea version (國立中央圖書館本)) showed many characteristics of woodblock printing. This was the start of the 50-year-long heated debates. The chisel cut marks and missing strokes of the second version (the B: Samseong version (三省本))
made them believe no metal movable type-printed original version had survived. It is a very unfortunate series of events.

The author would like to strongly urge historians around the world to again look closely at the ancient book, Nammyeong Cheon Huwasangsong Jeungdoga (南明泉和尚證道歌; Song of Enlightenment with Commentaries by Buddhist Monk Nammyeong Cheon). “The Song of Enlightenment” was designated as Korean Treasure No. 758-2 (C: Gongin version (空印本) in this paper) on 29 June 2012. The official name for the designated version was changed in 2021 to Nammyeong Cheon Huwasangsong Jeungdoga (南明泉和尚證道歌; Song of Enlightenment with Commentaries by Buddhist Monk Nammyeong Cheon) 2012. This version may be the world’s oldest surviving movable metal-type-printed book and is a great candidate for the UNESCO Memory of the World program as it adds to our insight into a truly impactful contribution from long ago; the invention and usage of metal movable type to facilitate our understanding and preservation of important history, of technology and of mankind.

For the determination of paper and printed ink composition, measurements using tools such as Fourier-transform infrared spectroscopy (FTIR) can be conducted if collectors and the Cultural Heritage Administration of Korea can arrange such tests. Even though it is a destructive technique, radiocarbon dating of specimens from each version of the books can also be used for date verification of when paper and ink blocks were made. However, the use of destructive characterization techniques on cultural heritages should be avoided as much as possible.

**Funding:** This research received no external funding.

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** Not applicable.

**Acknowledgments:** The author would like to thank my colleagues Jung Gon Kim and Kitaek Kang, and James Schram of WaferMasters, Inc. for their understanding and support during this very exciting cultural heritage image analysis and evaluation project. He is also thankful to Kwon Hee Nam of Kyungpook National University, Daegu, Korea, Yun Pyo Hong of Yonsei University, Seoul, Korea and Tae-Ho Choi of Chungbuk National University, Cheongju, Korea for their introduction and study materials on this very topic. He is also thankful to the collector and Buddhist Monk Won-Jin, Yangsan, Korea for providing the opportunity to inspect the C: Gongin version (空印本) of The Song of Enlightenment with Commentaries by Buddhist Monk Nammyeong Cheon multiple times upon request. He also would like to thank Sang Keun Lee, Chairman of the Cultural Heritage Restoration Foundation, Seoul, Korea for his interest, encouragement and support.

**Conflicts of Interest:** The author declares no conflict of interest.

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