



Date : 24/05/2006

Korean Typography in 15th Century

LEE, Hee-Jae

Professor, Dept. Library and Information Science
Sookmyung Women's University
Korea

Meeting:	85 Rare Books and Manuscripts
-----------------	--------------------------------------

Simultaneous Interpretation:	No
-------------------------------------	----

WORLD LIBRARY AND INFORMATION CONGRESS: 72ND IFLA GENERAL CONFERENCE AND COUNCIL

20-24 August 2006, Seoul, Korea

<http://www.ifla.org/IV/ifla72/index.htm>

Table of contents

1. Introduction and prelude
2. *Jujaso*, National Foundry and metal types in Joseon dynasty in 15th century
 - 2.1 Gyemi type of King Taejong
 - 2.2 Different types of king Sejong
 - 2.3 The latter half of the 15th century
3. Typographical technique in Korea in 15 century
 - 3.1 Fabrication of types
4. Comparative study of typographical technique between Korea and Gutenberg
 - 4.1 Process of punch, matrix and type mold
 - 4.2 Composition and impression
5. Conclusion

<Abstract>

15 century is called "the age of revolution of written communication" with the invention of printing in both east(Korea) and west(Germany) world. This subject will show general point of view of Korean typography in 15th century, but specially focused in typographical technique.

In prelude, general history of ancient printing in Korea before 15th century including xylography, wood block printing, and typography(wax type mold) will be mentioned. The examples are Mugujunggwang Daedaranigyeong, Dharani Sutra of the pure light for early wood block printing in 8th century, Sangjeong yemun, Detailed examples of rites, and Jikjisimcheyojeol, or simply, 'Jikji', Edifying traits of buddhistic patriarchs, for early metal type printing, in 13th and 14th century.

In the main subject, all metal types casted in National Foundry in 15th century, Gyemi, Gyung-o, Gapin, Byeongjin, Eulhae, Gapjin, and their printing books will be introduced. And next, 15th century typographical technique in Korea with comparative study of all points of typographical process in 15th century between Orient(Korea) and Occident(Gutenberg) : puncheon or punch, matrix, type mold. composition and impression with many photographs and images.

1. Introduction and prelude

Fifteenth century is called "the age of revolution of written communication" with the invention of printing in both east(Korea) and west(Germany) world.

15th century was the time of changes and reformations for Joseon dynasty(1392-1910) in all aspects of politics, economy, society and culture when it was busy with the national foundation and formulating new culture and institutions. During the same period, the West was also stirred up with enormous changes and it is worthy of remark that the desire for printing arose almost simultaneously in the West and the East at the times. In connection with this coincidence, Maurice Audin, a French publisher and bibliographer, remarked in his *Histoire de l'imprimerie* as follows:

"It is curious that the invention of typography was appeared almost at the same time in Korea and Rhine land, two regions in the northern hemisphere where civilization had not been diffused. The two inventions, beyond all doubts, had a certain connection with and was incidental to the social aspect of the times that was full of reformative movements. Perfect coincidence of similarities between the two inventions gives us the awareness that there are likely a subtle and mysterious connection among human groups at any times however far away they are separated." (Audin, 1972, 31)

Although printing types had been already invented before the fifteenth century in Korea, it would be reasonable to compare *Gyemi type*, bronze types made in 1403, with Gutenberg types,

when we consider the invention of type as the communication revolution that has the basic significance of popularization of books.

Carter quoted, in his book(Carter, 1955. 229), De Vinne's writing : "The inventor of printing did not invent paper and did not originate engraving on wood. He was not the first to print upon paper, he was not the first to make printed books, it is not certain that he made the first press, it is not probable that he was the first to think of or make movable type. What he did was to invent the *type mold* - the first therefore to do practical and useful work(De Vinne, 1876, 67-68)".

Carter also agreed that the *type mold* then was the key to the invention of typographic printing and it was the *type mold* that the Koreans developed. He also point out that is the significance of Korean printing(Carter. *loc.cit.*).

While Gyemi type made during the reign of King Taejong have the significance as the first attempted type with practicality and utility, types made during the reign of King Sejong have the significance that they realized the most advanced technology available at the times to make a great development in quality and quantity before the invention of Gutenberg types. The types were produced in diverse sizes and materials although it was at their early stages and particularly, Gabin type in 1434 had been cast several times throughout the remaining period of Joseon dynasty to replenish and improve previously made types, thus making it the backbone of and representing ancient types.

In the meantime, invention of woodblock printing and use of type from the thirteenth century was the prerequisite for the printing revolution in the fifteenth century during

Joseon dynasty. Woodblock printing, particularly, was an epoch-making event that introduced and put in practice the concept of printing, that is, reproduction in volume, for the first time in history. While woodblock printing had advantage in printing same books in large quantities, it required making wholly new woodblocks to print new books. For the difficulties, woodblock printing had not been used beyond the Oriental cultures.

Scholars disagree about the time of invention of woodblock printing, but we can estimate approximate years of invention based on three block books in existence; Chinese *Diamond Sutra* with an imprint of AD 868, Japanese *Dharani Sutra of One million pagodas* without an imprint yet officially recognized to have been printed in AD 770 and Korean *Mugujeonggwangdaedarani gyeong, Pure-light Dharani Sutra* that were published between AD 706 and 751. Based on their state and existing records, we can safely estimate that woodblock printing began around the beginning of the eighth century(Cheon, 1976, 46) or a little earlier, in the middle of the seventh century. The origin of woodblock printing will be revealed more clearly with the discovery of new early block books and records.

But at this time we have to verify again the date of appearance, which is considered between 706 and 751, of *Mugujeonggwangdaedarani gyeong* in Shilla dynasty.

First, this *Dharani Sutra* was translated into Chinese writing in 704 in China and was

introduced to Shilla dynasty in 706. This year would be upper limit.

Second, the Seokka pagoda, in which this *Dharani Sutra* was discovered, had been set up at the same time as the Bulguk Temple was reconstructed and completed in 751. This year would be lowest limit.

Third, this *Dharani Sutra* contains 4 kinds of Muchou style characters which first appeared when Tsetien-Muhou wielded political power(690-704) during Tang dynasty in China and is known to have been used some time after her death.(Cheon, *op.cit.*, 41-43)

And finally, the fact that *Hwangboksatapdonghapmyoung, Inscription on copper box in the pagoda of Hwangbok temple*, was written in 706 in the same handwriting as *Mugujunggwang Daedarani* implies(Oh, 1994, 36) that the handwriter of the former and the inscriber of the latter is identical, which could be a critical evidence.

Woodblock printing had greatly contributed to publishing books in Korea, China and Japan until the nineteenth century, and more books had been printed by blocks than by type even after the invention of types, thus the concept of "printed" books seemingly stimulating the desire to print books in types.

Direct prerequisite is metal type print at the end of Goryeo dynasty, although its origin is not certain. I think it reasonable to begin the pursuit with *Gogeumsangjong yemun, Detailed examples of rites*, that is believed to have been written around 1234 and contained in *Dongguk Yi Sanggukjip, the Collection of Yi Gyubo*, as we can have definite knowledge of its contents by records. In addition to this, records appearing in Jeong Dojeon's *Sambongjip* and the *History of Goryeo* about type printing during Goryeo period are believed to have directly influenced on the type printing during Joseon period. Unlike paper and woodblock printing that were imported from China, metal type was the unique invention of Korea untouched by Chinese influences. It is, however, likely that Korea might have introduced the concept of type from chiao-ni, or clay movable types made by Pi Shêng during the period Ch'ing-li, 1041-1048. (Lee, 2004, 106-108)

The oldest type-printed book in existence is *Puljojikjisimch'e yojol, Edifying Traits of Buddhist Patriarchs* that have the record, "this was printed with cast types at *Heungdeoksa*, a Buddhist temple, outside Cheongju county." This book has been listed on *Bibliographie Coréenne*(Supplement volume, n. 3738) of Maurice Courant(1865-1935) and was located at an exhibition of precious books organized by Paris National Library in 1972 on the occasion of the Year of Books.(*ibid.* 109-113)



Comparison of two letter styles of Mugujeonggwang daedarani gyeong

2. *Jujaso*, National Foundry and metal types in Joseon dynasty in 15th century

2.1 Gyemi type of King Taejong

Printing technology of Joseon solidified the footing during the early years of Joseon from Taejo to Taejong. Taejo, the founder of Joseon dynasty, had a number of books printed using woodblocks and wood types, thus preparing for the making of Gyemi type during the reign of Taejong. It seems that woodblocks were used in printing a book in large quantity and wooden types in printing books in small quantity during the period. Use of wooden types is likely to have influenced on the making of Gyemi type, considering the fact that invention of type by Gutenberg was directly influenced from wooden types of Laurens Jonszoon Coster.

Appearance of Geymi type and books printed with Geymi type represents the printing practices during the reign of Taejong. According to records in *Annals of King Taejong*, *Jujaso*, the national foundry, was newly built to print books in February 1403, as there were few books for the use of Confucian scholars. To be specific, the record says that King Taejong, who worried that there were few books for scholars and it was hard to import books from China that was far away with the sea between and block books were damaged with ease, ordered to cast copper types in the second month, the third year of his reign(1403) and made types of hundreds thousand in a few months.

Judging from materials condition and technological circumstances, we have some doubts about the number of "hundreds thousand", but we can say it would have exceeded at least 100,000 types.

There are currently some ten books printed with Gyemi type existing, including *Sibchilsachangogeu mtongyo*, *Ancient and modern times' resumes of seventeen dynastic histories*.(Lee, 2002, 79-80)



Gyemi type

2.2 Different types of king Sejong

King Sejong the Great(1397-1450) is regarded as the most enlightened king in Korean history. He was ascended the throne in 1418 and during his 32 years reign, he energetically promoted learning. He was responsible for the creation of the Korean Hangeul alphabet, and this scientific alphabet is his most known achievement. This alphabet enabled literacy to become more

available to the general population, who could not be expected to master the classical Chinese language that was the official written language of Korea at the time.

In 1420, King Sejong established the Jiphyeonjeon(Hall of Worthies), a royal academy and institute. He gathered the foremost scholars and writers of the time and had them compile many works on history, geography, astronomy, mathematics, military science, pharmacology, and agriculture.

Casting of metal types and book printing would be the most significant among a number of achievements of King Sejong. Printing and book making of the times must have been the highest level of the world in terms of quality as well as quantity, and represented the culture of 500 years of Joseon dynasty.

Foundry of types during the reign of Sejong began with Gyeongja type in the second year of his reign(1420). As the previously cast Gyemi type was not so good in quality, it was required to pour the melt wax into copper plate to solidly set types. Thus, wax was much consumed and printouts were no more than a few sheets a day. To remedy such miserable state, the king personally directed how to change type pattern and recast for seven months from the eleventh month, 1420 to get the result that letters were well-shaped and there were no need to melt wax. As a result of it, printouts a day could have reached to 20 sheets. At this time, under order of king, *Tseu-tche t'ong-kien kang-mou, Précis of the mirror of government* was printed and edited by scholars at *Jiphyeonjeon*.

As the improved types, Gyeongja type had also some defects, such as pointed tips and thick letter pattern, over 200,000 of copper types were made again from July to September according to the lunar calendar of the year 1434 despite shortage of materials such as copper and iron, and difficulties in the supply of artisans. The newly made type was called Gabin type, and printing with these 200,000 types was launched to get the result of printing over 40 sheets a day. Gabin type had the pattern of straight *haeseo* that belongs to the pattern *jin*.



Gyeongja type



Gabin type



Hangeul type

Since then, types of Hangeul, Korean alphabet, had been made and using such types were *Seokbosangjeol*, *Extracts of the genealogy of Buddha* and *Weolincheongangjigog*, *Composition of the moon in one thousand rivers* printed thus raising Korea's printing then to the highest level of the world even before the appearance of Gutenberg type.

Following it, King Sejong had Byeongjin type, lead type, cast to print *Tseu-tche t'ong-kien kang-mou interpreted by Sajeong Palace*, and Donggukjeongun type, wooden type, to print *Donggukjeongun*, *Korea right rhyme* successively.



Byeongjin type

Donggukjeongun type

As we have considered above, foundry of types was followed by printing books. Although there are no explicit statement that those books were printed using Gyeongja or Gabin types, it is estimated by records such as in the *Annals of Joseon dynasty* that number of books printed by those types during the reign of Sejong would have exceeded 50 titles and the number would increase much more if books are added which have been alleged or confirmed later by scholars to have been printed using those types. (Lee, 2002, 80-84)

2.3 The latter half of the 15th century

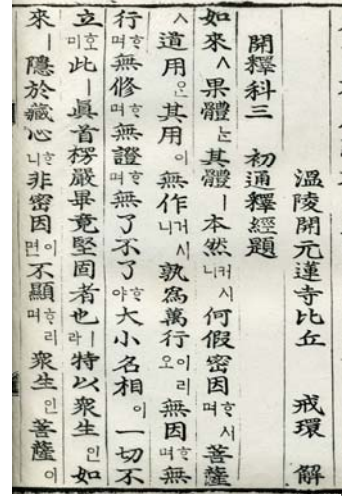
Printing, which had been briskly conducted during the reign of Sejong, was also conducted actively during the reign of Sejo and Seongjong. Types made during the latter part of the fifteenth century include; Gyeong-o type during the reign of Munjong, Eulhae type, Jeongchuk type, Muin type and Eulyu type during the reign of Sejo, and Gapjin type and Gyechuk type during the reign of Seongjong.

As Kyong-o type, which was made in the year of Munjong's accession to throne (1450), was melted and cast into Eulhae type in the first year of Sejo's reign (1455), it was used only in printing *Gomunjinbo*, *treasure of antique style writing* and *Yeokdaebyeongyo*, *Military principles of different dynasties*.

Sejo had many large and small types made, including Eulhae type, Jeongchuk type, Muin type and Eulyu type, and succeeding Sejong in good printing achievement, had many books printed during his reign. With Eulhae type, particularly, which was cast in three sizes, large, middle and small, books that mingled Hangeul with Chinese characters were printed, thus making it another backbone of



Eulhae type

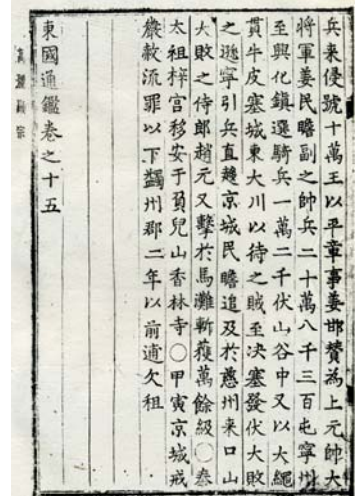


Hangeul type with

Joseon types along with Gabin type during the Sejong period.

Gapjin type was made in the 15th year of Seongjong's reign (1484) by casting together with Eulyu type of Sejo period and the number of types exceeded 300,000, which is the largest number of types made during Joseon period. As Gapjin type was a little short in size, a type larger than it, Gyechuk type, was made in the 24th year of Seongjong (1493).

These diverse types were used in printing numerous books.



3. Typographical technique in Korea in 15 century

3.1 Fabrication of types

In principle, to cast metal types, the process of punch, matrix and type mold had been needed either in Occident and Orient.

Seong Hyeon, described in his writing *Yongjechonghwa*, *Yongje's compilation of essays*(1470) the Korean process :

Characters were cut first from beech wood, these were the models. Then sand was taken from the shore of the sea where the reeds grow. This was placed in a trough and the wooden letters pressed against it. In this way the negative molds were made, from which the type were cast. Over these was placed a cover with openings, and melted bronze poured in. When this cooled, it became type. Where irregularities occurred such as sharp corners, they were worked over

afterwards with a file. The single type were held in columns by bamboo strips, so that they could not get out of line. At first it was not known how the type could be placed one against the other and held firm, and for that purpose a wax plate was arranged for fixing the type. This, however, was not sufficiently firm, and so the practice began of fitting the type into a bamboo frame.



Punch, matrix and mold(Joseon)

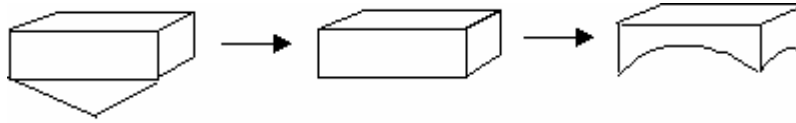


Types hanging on the bronze branches

Materials for the alloy of types had been mainly bronze throughout the whole period of Joseon as well as in the fifteenth century and patterns were almost the same as we can see the table below which shows only a few patterns(Jeon, 1970, 54).

year	name of type	Cu	Zn	Sn	Pb	Fe	other
1455	Uelhae	79.45(%)	2.30(%)	13.20(%)	1.66(%)	1.88(%)	
1677	Hyeonjongsillok	64.70	3.10	18.40	4.40	2.10	
1677	Hangu	79.80	1.40	10.60	2.10	2.00	
1777	Jeongyu (recasting Gabin)	73.04	2.30	6.12	17.50	0.83	
1795	Jeongri	85.50	6.30	6.10	1.10	1.30	
17C	Iron type	10.56				81.24	

The relatively easy mixing rate of materials is said to have 80% of copper and 20% of tin, lead or zinc with tolerance 5%. Casting method of types had hardly changed until new types of Western style was introduced. The only change of types was that conic end of Gyemi and Gyeongja types was changed into flat end in Gabin type. Hyeonjong Sillok type or Jeongyu type currently in existence show roundly hollowed bottoms of types. /See below.



Ancient types had different sizes and breadths respectively, and their heights that was the most important factor in typesetting was as low as 6.5 - 8mm, unlike Western types.



Figure of types(Joseon)

Typesetting and printing processes were as follows: Cast types were kept in chests and prearranged as in the order of manuscript to be printed.

Processes prior to typesetting that is equivalent to today's type-picking were vast, as to print Chinese characters, an ideogram, it was required types as many as 100,000 to 300,000 and it was very important and hard to pick correct letters.

The next process was *sangpan*, or composing that set types in the plate. In the process, the gap between words was filled with bamboo pieces or paper scraps to prevent types from shaking. At earlier days, types were set in melt lead spreaded on the plate and for the purpose, bottom end of Gyemi or Gyeongja types, as stated above, had a conic form.

In the Orient, a plate was arranged to print two pages at a time and by folding the printed sheet by the centerline, front and back pages were made. Just as in the West, a sheet was printed to proofread prior to the final printout. Upon completion of proofreading, Chinese ink was applied to the type plane with horsehair brush and using another horsehair brush, they brushed the paper put on types while pressing.

Printing method like this had been kept unchanged throughout the whole period of Joseon dynasty and daily printout efficiency increased from 10 sheets by Gyemi type, 20 sheets by Gyeongja type to 40 sheets by Gabin type.

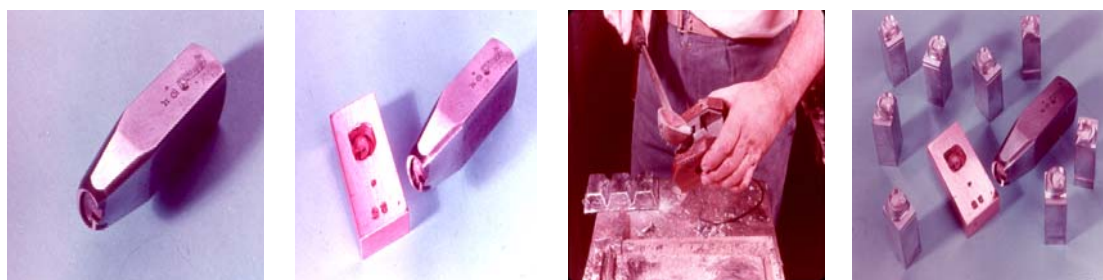
4. Comparative study of typographical technique between Korea and Gutenberg

4.1 Process of punch, matrix and type mold

Printing processes were comprised of casting, typesetting and composition, and impression at large and the basic principles and method was the same for all times and in all places with differences only in tools, materials and patterns.

In the casting of Gutenberg types, letters were carved using carving auger in relief the right

side left to the 5-8cm-long punch made of strong metal. And then the marking press was hammered on scraps of tender metal with the convex surface down to engrave letters in intaglio to the metal piece in the right form, which was called the matrix that is used in making the lettering part at the casting. The matrix was inserted into the type mold and then casting liquid was poured into the matrix with casting scoop. The cast-metal product was taken out after having been set and the surface was carefully finished.(Audin, *op. cit.*, 102-103; Febvre et Martin, 1971, pp. 81-86).



Punch, matrix and type mold

Unlike the West that reportedly used brass or copper for the punch and lead for the matrix, in Joseon, wooden pieces were used for the punch and tender silt for the matrix. While types of Joseon were made of bronze alloy, early standard types of the West were made of an alloy of lead 70%, antimony 25% and tin 5%(Technoques Graphiques, programme 2, p. 5, slide n. 2.26).






The oldest type in existence in the West is 222 types of Lyon that was made during the period between the end of the fifteenth century and the beginning of the sixteenth century. The proportion of the main ingredients, lead, tin and antimony, of the types is somewhat different from type to type and some types contain a little percentage of silver or iron. The types can be divided into two groups, types with a round hole and types with an oval hole, according to their shapes, and into 14 groups according to size, height and breath(*Les type lyonnais primitifs*)./See the table below and a example on right side.






PREMIÈRE CATÉGORIE : TYPES					
A. — TYPES					
N°	Œil gros 2 fois	Face latérale grandeur naturelle	Hauteur en papier	Corps	Épais.
1. — HAUTEUR ENV. 2720					
Police A — Corps env. 430					
1	d		2725	430	210
1 ^{ha}	—		2715	430	210
1 ^{sur}	—		2715	430	200
2	m		2715	430	285
2 ^{ha}	—		2720	430	290
3	ft		2715	430	220
4	n		2710	430	190
5	u		2710	430	180
5 ^{ha}	—		2715	430	180
6	z		2715	430	120
7	a		2715	425	165
8	e		2715	430	150
8 ^{ha}	—		2710	430	150
8 ^{sur}	—		2715	430	125
9	b		2720	430	245

Group	height(mm)	real height(mm)	body size(mm)	width(mm)
1.	2720	2690-2730	280-690	80-715
2.	2530	2520-2570	315-850	80-585
3.	2400	2385-2440	330-955	85-505
4.	2615	2600-2625	350-440	110-355
5.	2770	2770-2775	330-460	85-165
6.	2750	2745-2750	510-655	175-410
7.	2680	2680-2685	320-335	115-225
8.	2640	2635-2645	435-610	130-220
9.	2585	2575-2585	350-570	170-315
10.	2520	2520-2530	430-470	90-275
11.	2430	2415-2445	385-415	85-195
12.	2480	2480	595	355
13.	2290	2290	470	100-170
14.	2190	2190	595	260

These heights of the types, don't show any big difference from types 23.45mm±0.015mm that have been used until recently, so they must have been practical.

Although we don't have existing types of Joseon in the fifteenth century, we can confirm their diverse sizes through their printed books. The height of types, 6.5-8mm, had remained unchanged throughout the whole period of Joseon.

Gyemi type (1403)	Gyeongja type(1420)	Gabin type (1434)	Byeongjin type (1436)	Dongguk jeong-un(1447-48)
				
(L)1.4×1.7 cm (s)1.2×0.8 cm	(L)1.1×1.3cm (s)1.1×0.6cm	(L)1.4×1.6 cm (s)1.4×0.8 cm	2.3 × 3.4 cm	1.8 × 2.0 cm

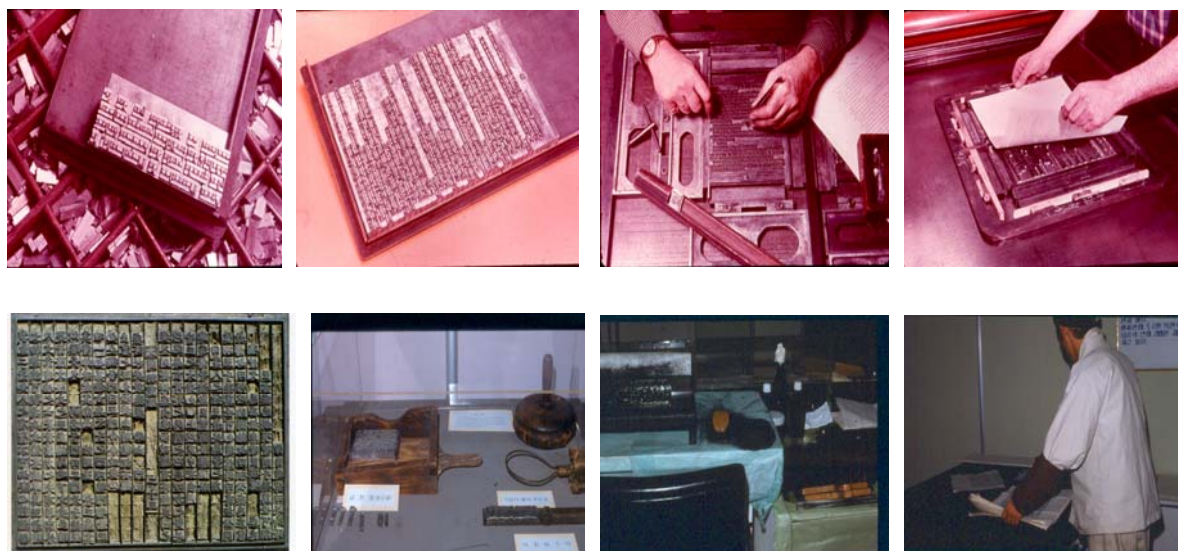
Gyeong-o type (1450)	Eulhae type (1445)	Muin type (1458)	Eulyu type (1465)	Gapjin type (1484)
				
(L)1.4×1.6 cm (s)1.4×0.8 cm	(L)1.8×2.3 cm (s)1.2×1.1 cm	(L)1.8×1.9 cm (s)1.4×0.4 cm	(L)1.5×2.1 cm (s)1.0×0.6 cm	(L)1.0×1.1cm (s)1.0×0.5cm

Comparison of each types(Joseon)

Name(year)	body(large) size	body(small) size
Gyemi(1403)	1400 * 1700(length*width)	1000 * 800(length*width)
Gyeongja(1420)	1100 * 1300	1100 * 600
Gabin(1434)	1400 * 1600	1400 * 800
Byeongjin(1436)	2300 * 3400	
Eulhae(1455)	1800 * 2300	1200 * 1500
Gapjin(1484)	1000 * 1100	1000 * 500
Gyechuk(1493)	1600 * 2100	1600 * 1100

4.2 Composition and impression

The typesetting and composition process that put types in order as in the manuscript was not so different between the West and the East and had been manually conducted without great changes since the invention of printing to the nineteenth century. In the West, types were moved from the type case to the composing stick one by one. In gaps between words, metal pieces with the same size as types yet shorter in the height were inserted to make a space and the letters placed at the end of lines were arranged to be of uniform ending, which is called the process of justification.



Correction type setting and composition

The finished galley was put on the printing stand and ink was applied to it with a ink applying tool. And then paper was put on it and impressed with the *press* to print letters of types to the paper. The use of the *press* was the only difference between the West and the East in the process of impression.



Gutenberg press

In this comparison of printing between the West and the East, we have noted that the most remarkable differences in the process of casting types are the materials of punch and matrix, type mold, lettering and alloy materials, and finally the press. Inferiority of the Oriental printing may be attributed to the short supply of metals, poor mining and casting technology, but it may be also attributed to the different application of basic technology separate from the problem of technical inferiority.

Although not generally practiced, but it was the same process as the green sand casting that was applied to the production of metal carving art works. In the process, a model is made of gypsum and others and cast metal is poured into the green sand that has been imprinted on front and back sides, which is coincident with the casting method of the Orient. What is interesting in it is the fact that the casting in the founding was bronze or brass(Laudais, 1965, 630-631) like bronze types in Korea.

From this, we can find the fact that while the West has distinguished alloy for types from that for other cast products, Korea has consistently used bronze for the main material for most of cast products since the bronze age.

Comparing number of types to be cast should not be omitted in the discussion about the casting of types. In case of alphabet that has only 26 letters, number of types required to print a book couldn't be compared to the number of types required to print a book in Chinese characters, an ideogram, however many patterns of types are made. We don't know exactly how many types were molded, but while number of Gutenberg types made to print the Bible was no more than 290 kinds of types including identical types, abbreviated letters, duplicated types, connecting types and symbols, to realize each ideogram Gyemi type exceeded 100,000, Gabin type 200,000 and Jeongri type 300,000 quantitatively. (Lee, 1997, 82-85)

Here is the comparison of each element of cast type and printing between Occident and Orient.

	Occident	Orient
Punch	strong metal (like a brass; bronze)	wooden piece
Matrix	tender metal (like a lead)	sand or scouring sand
Mould	wood and iron	sand and iron
Principal metal of types	lead	bronze
Height of type	long(2190 to 2775 mm)	short(550 to 750)
Body	small(280 to 955 mm)	large(1000 to 2300)
Width	thick(80 to 715 mm)	big(500 to 2300)
Number of types melted	unknown	100.000 to 300.000
Number of letters needed a time	290 letters	4.000 to 5.000 or more
Justification	necessary	unnecessary
Necessary objects of composition	little piece of metal between each word	wax or small piece of bamboo
Support	parchment and paper	paper
Impression	press	rubbing with a horsehair
Quantity of papers printed a day	300	20-40

5. Conclusion

Type printing of Korea in the fifteenth century can be summed up as follows:

While Gyemi type made during the reign of King Taejong has the significance as the first attempted type with practicality and utility, types made during the reign of King Sejong have the significance that they realized the most advanced technology available at the times to make a great development in quality and quantity before the invention of Gutenberg types. The types were produced in diverse sizes and materials although it was at their early stages and particularly, Gabin type in 1434 had been cast several times throughout the remaining period of Joseon dynasty to replenish and improve previously made types, thus making it the backbone of and representing ancient types. Following the foregoing kings, Sejo and Seongjong also cast diverse types and printed a great number of books, but they failed in making technical improvements.

Another point worthy of note is the modernistic and democratic idea expressed in the ordinance of Taejong for casting Gyemi type. Comparing with the feudalism during the fourteenth and fifteenth century in the West, the fact that "type foundry and the department specialized in book printing" was established by the state, and the ordinance of Taejong that asked "high- and low-ranking ministers to pay the expenses for the casting of types, as it is unfair to extort the expenses from people" is regarded as really noble idea and behavior (Otto W. Fuhrmann, pp. 245-246).

Although it was woodblock printing, the Oriental printing had influence on the printing of the West, as we can confirm from Carter's book, but it doesn't appear that metal type printing of Korea has influenced on the printing of the West. Though Korea's metal type printing was not succeeded to the invention of the world, Korea was in the center of the third information revolution of mass communication when it happened in the fifteenth century.

By the end of the twentieth century when the invention of computer brought forth digital era of the fourth information revolution, Korea had transferred the entire texts contained in 888 volumes of true record of Joseon dynasty in three CD-Rom's and has been producing a great number of e-books and u-books in package and on-line form .

In this age of Internet and telecommunication, the West and the East will be unified to establish a common record culture.

BIBLIOGRAPHY

References In Korean :

- Kim, Du-Jong, *History of technique of korean ancient printing*, Seoul : Tamgudang, 1974.
- Son, Bo-Gi, *Movable metal types and technique of printing*, Seoul :
Compilation committee of Collection of Korean History, 1976.
- Oh, Kukjin, *The culture of early printing in Korea*, Cheongju : Bookpublishing Ilsan, 1994.
- Lee, Hee-Jae, "Synthetic study of publishing under the reign of King Sejong", *Korean Socio-economic History in Modern Age*, Seoul, Chungum Munhwasa, 1985, pp.181-208.
- _____, "Significance of civilisation of books in the early years of Joseon dynasty", *Journal of the Korean Library Science Society*, n° 13, 1986, pp.121-142.
- _____, "The development of typographic technique in early Joseon dynasty", *Conference for Korean old types, Museum of ancient printing in Cheongju*, 2002, pp.73-96
- _____, "Jikji and the typographic culture of early Joseon dynasty", *Research of Bibliography*, 28(2004,9), pp. 99-136
- Jeon, Sang-Un, "Development of bronze type printing in Korea, a technical aspect" *Collection of papers in Sungshin Womens University* n. 3, pp. 43-54
- Cheon, Hye-Bong, *History of early printing in Korea* Seoul, Seoul : Korean Library Science Research Institute, 1976.

References in English and French :

- Audin, Maurice, *Histoire de l'imprimerie*, Paris, A. et J. Picard, 1972.
- Carter, Thomas Francis, *The invention of printing in China and its spread westward*, New York, Ronald Press, 1955.
- Courant Maurice, *Bibliographie Coréenne*, Paris: Ernest Leroux, 1894~1896, 3 vol. Supplément, 1 vol, 1901.
- De Vinne, Theodore L. *The invention of printing*, New York, 1876.
- Dhal, Svend, *Histoire du livre*, Paris : Edition Poinat, 1967.
- Fevbre, Lucien, et Henri Jean Martin, *L'apparition du livre*, Paris : Albin Michel, 1971.
- Gaur, Albertine, *A History of writing*, rev. ed., The British Library, 1992.
- La chose imprimée*, sous la direction de John Dreyfus et Francois Richaudeau. Paris : RETZ, 1977.
- Laudais, M. *Histoire generale des techniques*, edite par (Paris: P.U.F., 1965), pp. 630-631.
- Lee, Hee-Jae, "Etude comparative des techniques typographiques en Occident et en Orient", *Le Livre et l'Historien*, Geneve: DROZ, 1997, pp. 75-84.
- Lee, Hee-Jae, *Typographie Coréenne au XVème siècle*, Paris: Edition du C.N.R.S., 1987, 209p.
- Les type lyonnais primitifs*. Paris : Bibliothèque Nationale, 1955, 70p.
- Martin, Henri Jean, *Histoire et pouvoirs de l'écrit*, Paris : Perrin, 1988, 518p.
- Mcluhan, Mashall. *La galaxie Gutenberg*, Paris : Gallimard, 1977, 2 vol. *Techniques graphiques*, Paris: Fédération Nationale des Maîtres Artisans et Petites Entreprises des Métiers Graphiques, 700 diapositives, 15 bandes sonores, 15 livrets d'accompagnements.

Non book materials :

- Annals of Joseon Dynasty* CD-Rom, 1995, 3 disc +1 disc for install.
- Bibliographie Coréenne*, of Maurice Courant, with revised edition in Korean by Lee, Hee, Jae, CD-Rom, Seoul, Nurimedia, 2005.

<http://sillok.history.go.kr>

<http://www.jikjiworld.net>

<Appendix>

Romanization system of Korean

Ministry of Culture and Tourism(2000-)	McCune- Reischauer System
Byeongjin type	Pyŏngjin type
Dongguk jeong-un type	Tonggukjngun type
Dongguk Yi Sanggukjip	Tongguk Yi Sanggukjip
Eulhae type	Ŭlhae type
Eulyu type	Ŭlyu type
Gabin type	Kabin type
Gapjin type	Kapchin type
Gogeumsangjong yemun	Kogŭmsangjŏng yemun
Gomunjinbo	Komunjinbo
Gyechuk type	Kyech'uk type
Gyemi type	Kyemi type
Gyeong-o type	Kyŏng-o type
Hangeul type	Hangŭl type
Heungdeoksa	Hŭngdŏksa
Hwangboksatapdonghapmyoung	Hwangboksatapdonghapmyŏung
Hyunjong Sillok type	Hyunjong Sillok type
Jeongchuk type	Chŏngch'uk
Jeongri type	Chŏngri
Jeongyu type	Chŏngyu
Jiphyeonjeon	Chiphyŏnjŏn
Joseon	Chosŏn
Mugujunggwangdaedaranigyeong	Mugujŏnggwangdaedaranigyŏng
Muin type	Muin type
Puljojikjisimch'e yojol	Buljojikjisimche yojŏl
Sambongjip	Sambongjip
Seokbosangjeol	Sŏkbosangjŏl
Sibchilsachangogeumtongyo	Sipch'ilsachangogŭmtongyo
Weolincheongangjigog	Wŏlinch'ŏgangjigog
Yeokdaebyeongyo	Yŏkdaebyŏngyo
Yongjechonghwa	Yongjech'onghwa