An advertisement for a "Hangul Word Processor Slot Card," developed for Apple-compatible microcomputers, featured in the fifth issue of *Microsoftware* (March 1984).

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Korean Writing in the Age of Multilingual Word Processing: A History of the Non-Linear Alphabet

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> Are 16 bits, providing at most 65,536 distinct codes, sufficient to encode all characters of all the world's scripts? Since the definition of a "character" is itself part of the design of a text encoding scheme, the question is meaningless unless it is restated as: Is it possible to engineer a reasonable definition of "character" such that all the world's scripts contain fewer than 65,536 of them?
>
> —Joseph D. Becker[1]

In 2016, South Korean prime minister Hwang Kyoan reflected that Hangul—the Korean phonetic writing system, with fourteen basic consonants and ten basic vowels—had "been the foundation of the country as an IT powerhouse." Claiming that the almost six-hundred-year-old script was "well suited for the age of information," the prime minister emphasized that a glorious national culture had prospered based on this "ingenious and scientific" national script.[2] Indeed, today Hangul appears to be seamlessly compatible with information technology, not only with PCs and computer keyboards but also with smaller everyday digital devices like Samsung and LG smartphones. Effaced in the prime minister's retrospective statement was the fact that the Korean alphabet had long posed significant challenges to engineers and programmers stymied by the differences between its graphic characteristics and those of the Latin-Roman alphabet.

Hangul arranges its consonants and vowels horizontally and vertically, creating visual blocks developed by Sejong the Great and his scholars in 1443 with consideration for harmonious integration with the Han script.[3] It is therefore not entirely compatible with what historian Thomas Mullaney (in his account of the Chinese typewriter) calls "alphacentric" technologies.[4] Although several keyboard layouts had been developed as part of Korean typewriter designs throughout the twentieth century, it was not technically possible to write using Hangul on the computer until

the early 1980s. Even then, advances in processing power were needed to utilize all of the possible Hangul syllabic block combinations on the computer.[5] Further complicating matters was the fact that Korean writing had traditionally incorporated many *logographic* or *ideographic* characters—that is, "Chinese scripts" or *sinographs*.[6] South Korea, for example, used both Hangul-only writing as well as a mixed style of Hangul and sinographs well into the 1980s and 1990s, particularly in major media such as daily newspapers. However, sinographs rapidly disappeared from everyday writing practices thereafter, a shift that is tied not only to digitization but also to the longer history of modern writing technologies.[7]

Hangul's mechanizations—both into analog script and digital code—are not only episodes in the history of technology but also a story of cultural techniques. Mechanized Hangul and its devices need to be seen alongside language-reform efforts across the twentieth century and an educational retooling of human populations to write and read in reformed scripts. Reconnecting those sundered histories reveals how changes in the technical means of writing and reading were intertwined with nationalist efforts to break from a long history of linguistic and graphic interconnectedness across East Asia.

Mechanization involved the seeming disappearance of sinographs from Korean writing in what I call the age of global multilingual word processing. But the history I construct below is not about the Korean alphabet prevailing over ideographs, nor about a simple victory of nationalist phonocentrism in Korea. Although Hangul is usually referred to as an alphabet, it is more specifically defined as an *alphabetic syllabary*. This is because when consonants and vowels are combined to form syllables, the shapes of those consonants and vowels are often transformed, based on the signs around them; in addition, the very arrangement of consonants and vowels within visual blocks is syllable-specific. Hangul writing thus involves two-dimensional *visual/graphic* characteristics quite distinct from—for example—the horizontal strings of consonants and vowels in English. This complexity requires a radical reformulation of what writing becomes in a machinic, particularly digital, environment—a reformulation with implications extending well beyond the Korean language.

Two Facets of Phonocentrism

Coined by Jacques Derrida in the late sixties, *phonocentrism* refers to the long-standing tradition in Western discourse of assuming that writing is little more than an impoverished, derivative representation of the spoken word.[8] Phonocentric discourse assumes alphabetic writing as normative, and its structure is understood to be linear. In the words of philosopher Sybille Krämer,

> Writing owes its status as a single medium to the intermediality between *phoné* and *graphé*. However, as long as this intermediality is seen as linguistic *intra*mediality, in other words, as long as writing is seen as the transference of the oral form language to the graphic form, the graphic-visual dimension of writing is acknowledged only in order to be neutralized in favor of the visual discursiveness inherent in language. The obvious result of neutralization is the doctrine of linearity, or in other words the assumption that writing—and consequentially the text—characterizes itself by embodying a linear and sequential symbolic.[9]

At the same time, however, Derrida's late sixties interrogations of Western discourses on writing also considered long-standing imaginations of an alternative to alphabetic phonocentrism: that is, a *hieroglyphic* writing that communicated ideas to the mind via graphic images independent of the spoken word.[10] Chinese writing was considered by Derrida to be one such writing system (along with hieroglyphs both Egyptian and Mexican).[11] These supposed picture writings were imagined as presenting to the reader abstract signs for concepts with the capacity to communicate universally. This was all essentially ideation, but its conceptual legacies endure.

Building on these ideas, I argue that the tumultuous history of Hangul machines not only challenges the conceptualization and critique of alphacentric technologies but also questions efforts to contrast the Chinese script with those of the rest of the world.[12] This history of Hangul's mechanization reveals that the challenges posed by modern communication and information technologies were not primarily rooted in technologically embedded alphacentrism. Nor were the challenges simply about Western phonocentrism, a point made by Yurou Zhong in *Chinese Grammatology*.[13] Rather, what is central is the fact that communication and information technologies bring the *visual, non-linear* dimension of writing at large to the fore. In digital environments specifically, this dimension directly impacts the amount of data needed for a script's processing and rendering. In other words, modern writing machines unveil writing's significance beyond being a mere reflection of speech. As Kramer notes, this recognition opens up other theoretical possibilities for reimagining writing, including digital writing, such as conceiving it as a cultural technique.[14]

In 1984, Joseph D. Becker (who later cofounded the Unicode project and was then an employee of Xerox Corporation) published a famous essay titled "Multilingual Word Processing" in *Scientific American*. There he identified the need to develop a new word-processing technology so computers could "deal with a universal notion of 'text.'"[15] Becker highlighted the central issue that programmers worldwide were grappling with: writing's

graphic dimension, which complicated the doctrine of linearity.[16] Most notably, Becker divided the central challenge of multilingual word processing into three basic realms—three machine-mediated *processes*, literally: typing, encoding, and rendering. While it is certainly true that Becker described *encoding* in linear and phonocentric terms (within what was then a constrained 16-bit programming environment: that is, with only 2^{16} or 65,536 binary 0/1 combinations), he also understood that the framing processes of *typing* and especially *rendering* were spatially far more challenging: "The sequence of bytes is stored in the linear order in which the text would be spoken, and as such it is isolated from graphical complexities such as the variant forms of letters and the mixing of the directions in which multilingual text might have to be written."[17]

My critique of phonocentrism draws partly from Zhong, who associates phonocentrism with the Western prioritization of alphabetic writing under the banner of modern language sciences (linguistics), particularly as founded by Saussure, focusing on the modern devaluation of the Chinese script.[18] My analysis is also informed by Kojin Karatani, who identifies the modern valorization of spoken language and the decline of shared written languages, such as Latin and Classical Chinese, as phonocentrism, emphasizing its inextricable link to the rise of the nation-state as a universal form.[19] Karatani critiques nationalism—whose history is inseparable from Japanese imperialism—as well as a simplistic Western versus Eastern dichotomy. In fact, if we follow his formulation of phonocentrism, any investment in a "national script"—whether Chinese, Japanese, or Korean—can broadly be defined as phonocentric. The history of Hangul machines, therefore, represents a tension between opposing forces: writing technologies such as the Hangul typewriter not only produce linguistic nationalism and the glorified entity of the Korean alphabet itself but, by foregrounding the graphic qualities of writing, simultaneously undermine them.[20]

Another recurring theme in the history presented below is the complex relationship between linguistic nationalism and the forces that seem to oppose it—whether it be modern Japanese imperialism, Cold War politics and US neo-imperialism, or the push for globalization in the neoliberal era. As we will see, the historical construction of such binaries is inseparable from various script reform efforts and the cultural techniques of writing. While Kittler, for example, argues that Qing China's "failure" to adopt alphabetic print culture and linear perspective techniques in a timely manner led to its colonial subjugation, my focus here is on the processes through which imperial and national binaries are constructed by cultural techniques of writing.[21]

Following Bernhard Siegert, cultural techniques are understood

here as "heterogeneous arrangements in which technological, aesthetic, symbolic, and political concepts of one or more cultures of writing, image, number, line, and body interact," a definition that is suited for interrogating alternative histories of writing beyond the "Western" context.[22] Cultural techniques also provide a concept that facilitates the historical interrogation of the inseparability between media, culture, and technology, emphasizing their co-constitution. These media/techniques continually demarcate boundaries between inside/outside, civilization/barbarism, "intelligible speech/barbarian gibberish," and allies/enemies.[23] Thus, while the history presented below revises Western-centric, teleological narratives that view modern writing or print culture as already established, completed, and self-evident in the so-called digital era, I also aim to question binary categories such as West/East or national/imperial (e.g., Korean vs. Chinese, Japanese, or American).[24]

The turbulent modern history of Hangul and sinographs in Korea—sinographs now largely seen as Chinese script by the younger generation, though the central point here is that such consensus itself is continually negotiated—illustrates how cultural techniques of writing shape these political distinctions, in conjunction with the various communication technologies at each historical juncture.

In this article, I explore three key historical moments in the modern history of Hangul, focusing on the technological challenges posed by its visual characteristics. I examine first the era of linguistic nationalism across the long nineteenth century, which reconstituted the old Sinosphere; then the post–World War II liberation period, shaped by Cold War communication technologies and the emergence of the Hangul generation; and finally the digitization of the Korean language and the disappearance of sinographs in what I term the age of global multilingual word processing.[25] Sinographs are central to my history of Hangul—not only have they been an integral part of the Korean writing system, but they also play a crucial role in what Ross King terms "script nationalism" in Korea, serving as its binary counterpart.[26] This article critiques the phonocentric glorification of Hangul, and the alphabet more broadly, while emphasizing the visual dimension of writing, which becomes particularly significant in a technological context. The marginal, in-between nature of the Korean alphabetic syllabary makes it an ideal subject for examining this topic.

The Technology of Scripts and East Asian Discourse Networks Circa 1850

Hangul was created in 1443 by Sejong the Great (of the Chosun Dynasty, 1392–1910) and his scholars to address the complex linguistic reality of the Sinosphere. This was a society where the

canonical texts written in Literary Sinitic "cemented together an empire twice the size of Europe," endowing cultural and political authority to the Confucian elites across East Asia.[27] The dominant modern interpretation of the creation of Hangul is that the king wanted to create a national script that could properly represent the indigenous vernacular language, given that the sinograph, which had long served as the universal medium of communication in China, Korea, Japan, and Vietnam (thus later establishing the concept of the Sinosphere), was not adequate for the phonetic inscription of the Korean language.[28] However, this narrative, based on both nationalism and the phonocentrism of modern linguistics, might not accurately reflect the worldview of the premodern Sinosphere. Hangul aimed to register not only the spoken language of the Chosun Dynasty of Korea, but also that of Ming Dynasty China: it aimed to enhance communication between ruling elites and lower-class bureaucrats so that they could properly read venerated Literary Sinitic texts with up-to-date pronunciation. These reformist drives are registered in Hangul's original name, *Hunminjeongeum*, which literally means "the correct/proper sounds for the instruction of the people," through its mediation of not just the Korean language but also Chinese.[29]

Hence, Hangul was conceived as a phonetic script that could register multiple languages rather than just one vernacular language, and importantly, as a script that could assist in reading another script. Alternatively, the term *acoustic* might be more suitable than *phonetic* here. The king and his scholars took great pride in their new script's ability to register "the sounds of all things under Heaven," which included not only "the Eastern [Korean] sounds and Chinese sounds," but also "the sound of the wind and the cry of cranes, the crowing of roosters, and the barking of dogs."[30] Such an understanding of what is now called the Korean alphabet exemplifies a view distinct from the modern understanding of script based on phonocentrism, including its anthropocentric worldview. If sinographs were believed to represent the world pictorially through their graphic richness, Hangul aimed to capture it acoustically. However, it is difficult to say that Sejong the Great and his scholars fully recognized Hangul's legitimacy on par with sinographs, which remained the universal script in the region. Critics of the king and his Hangul called Literary Sinitic "true writing" and referred to Hangul documents as "vulgar writing," with the latter remaining a lowly medium for women, children, and commoners until the late nineteenth century.[31] In fact, the very name *Hangul*, which means the script of Korea or the Korean people, is a modern invention.[32]

The premodern conceptualization of script and writing in the Sinosphere faced a significant crisis as the region began to be incorporated into the modern nation-state system by European

and American imperialisms in the mid-nineteenth century. Such a crisis was simultaneously cultural and political; the Chosun Dynasty endowed Hangul the status of the national script in 1894, as a gesture that asserted the cultural and political sovereignty of Korea by severing its tributary relationship to Qing China, as well as the two-thousand-year-old textual ideal of the Chinese Empire, once understood as the universal center of the world. This history also shows that nationalization of languages is inseparable from introduction of modern phonocentrism and knowledge of linguistics; now Hangul was reconstituted as a national, phonetic, and alphabetic script that registers Korean language. On the other hand, the once-universal script of sinographs started to be seen as a barbaric pictograph or ideograph that cannot properly register spoken languages, not just Korean or Japanese, but even Chinese.[33] Therefore, along with the process of nationalization that dismantled the old order of Sinosphere, there was shared, translingual concern across East Asia, centering on the future of sinographs, invention of new national writing system, as well as the novel conceptualization of script and writing.[34] The modern history of the Korean writing system and Hangul can be comprehensively understood by simultaneously examining this larger context of "East Asia," which I argue emerged as a result of the dismantling and reconstitution of Sinosphere.

One of the earliest and most formative moves for East Asian script reform emerged in Japan.[35] In her groundbreaking book on the birth and development of the unified, modern Japanese language, Yeounsuk Lee highlights the significant influence of German Neogrammarians such as Hermann Osthoff (1847–1909) and Karl Brugmann (1849–1919) on late-nineteenth-century Japanese linguistics.[36] Ueda Kazutoshi (1867–1937), a pivotal figure in the establishment of Japanese linguistics and a strong advocate for the abolition of sinographs, was taught and greatly influenced by German scholars between 1876 and 1879. Their phonocentric approach to language and emphasis on modern "national" languages over classical ones significantly shaped Ueda's work. Notably, Ferdinand de Saussure, who belonged to the same intellectual milieu as the German Neogrammarians, later expanded on their theories in his seminal work, contributing to a paradigm shift "from within."[37] Saussure's proposal to focus on synchronic language studies, for example, was grounded in the theoretical and methodological contributions of the Neogrammarians.[38] Ueda also indirectly influenced the prominent Korean linguist Ch'oe Hyŏnbae (1894–1970), who will be closely examined later.[39] Ch'oe was active during the Japanese colonial period in Korea (1910–1945) and played a crucial role in promoting Hangul and the concept of a national language after Korea's liberation, continuing his influence into the Cold War years. Lee argues that

Ueda played a similarly instrumental role in Japan, being the first to establish both the concept and institution of a national language. His introduction of nineteenth-century European linguistics was not purely intellectual but driven by the political and practical goal of "creating the orderly national language of the Japanese Empire."[40] While the East Asian history of modern linguistics, which predates Saussure's *Course in General Linguistics* (1916), invites further exploration, it is important here to emphasize that this history represents another form of cofiguration between modern imperialism and colonial nationalism, entangled with a system of modern knowledge production that is both similar to and distinct from its Western counterpart.

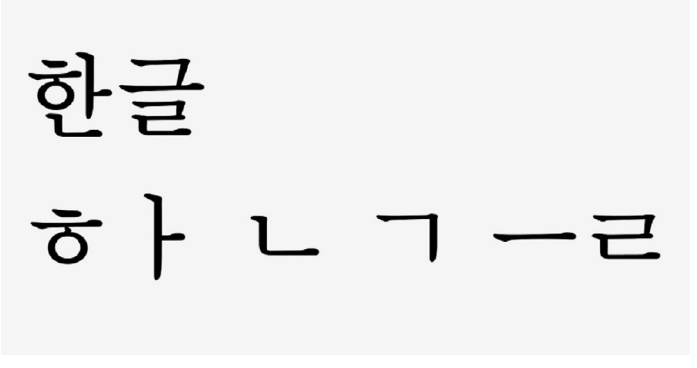
The reconstitution of the Sinosphere and the new ontology of script were not solely about phonocentrism. In what I term the East Asian discourse network circa 1850, script and writing at large began to develop two distinct ontologies: one related to the ideal of mass education based on modern phonocentrism, and the other related to technical media.[41] Put differently, the two different processes of what Kittler calls the European discourse networks of 1800 and 1900 were merged in East Asia, occurring simultaneously. It is important to first reiterate that the phonocentric conceptualization of writing is not universal, not even in Europe. Kittler specifically traces the bodily origins of its modern manifestation to early-nineteenth-century Europe, when the bodies and organs of children—the tongue, lips, gums, oral cavity, and nasal passage—became central to understanding language, particularly the national German language. He writes, "[t]he revolution of the European alphabet was its oralization" around 1800, which also meant nationalization.[42] On the other hand, Kittler notes that writing circa 1900 ceased to be the secondary mediation of speech, with the advent of new modern communication devices that "write writing." The "assortment of letters and diacritical signs" on the typewriter keyboard, which inscribe things that human voices cannot and do not articulate, signaled the separation between speech and writing in a new technical environment, or rather, revealed the fact that speech and writing are two independent entities from the outset.[43]

What was unique about the East Asian situation was that, while the nationalization/oralization of languages was ongoing, there were also markedly different scripts competing: the Korean alphabet of Hangul, the sinographs/Chinese ideographs, the Japanese syllabary of kana, and even the Latin alphabet, which became one of the candidates for new national writing systems in Japan and China. Script itself was always at the forefront, rather than disappearing into the mouths of mothers and children as in Kittler's media history. It served as a constant reminder that writing might not simply be a mediation of speech but an object in

its own right, with each script possessing differing strengths and weaknesses.

For example, one major criticism of sinographs across East Asia was the difficulty they presented to the modern masses due to their complex graphic characteristics and sheer number of characters. Although their exclusivity was in previous centuries seen as securing the authority of the ruling class to maintain Confucian social harmony, with the modern nation-state they were reconceived as a problem, given that mass literacy and widespread written communication became crucial for capitalist commerce and democracy by the late nineteenth century.[44] In other words, their graphic richness and complexity (once considered an excellent representation of the world at large) was newly viewed as an overburdening, superfluous feature for both humans and communication machines. On the other hand, Hangul's characteristics—supposedly not discriminating between "men and women, old and young, high and low, rich and poor, noble and humble"—and its relative ease of learning were newly valorized, attributed to its phonetic characteristics that were believed to register spoken language.[45] In other words, Hangul became the Korean alphabet for the modern masses, first quickly in theory and then slowly in practice.

But Hangul's compatibility with modern technological environments was a different matter. In that sense, Hangul was not radically different from sinographs, which began to be disparaged in the West with seemingly impossible and ridiculous images of the "Chinese typewriter" from the nineteenth century.[46] Although Hangul is an alphabet—a system of phonemic glyphs that are combined and recombined to represent syllables and words—Hangul letters are visually arranged somewhat similarly to sinographs: one syllable is represented on the page by a single square block, and in Hangul writing, these squares consist of Hangul "letters" (one phoneme each) assembled left to right, top to bottom. Hangul syllabic blocks typically consist of an initial consonant, a medial vowel, and sometimes a final consonant, forming combinations like 하 (C + V) or 한 (C + V + C). Complex forms can include double consonants, such as 깍 (Double C + V + C), complex vowels, as in 외 (C + Complex Vowel), and double final consonants, as in 읽 (C + V + Double Final C), demonstrating Hangul's flexibility in representing diverse phonetic and graphic structures.



"Hangul" written in the standard form, with letters grouped into syllabic blocks. This block consists of an initial consonant, a medial vowel, and a final consonant (assembled orthography). (Left) "Hangul" written sequentially, with the letters unassembled (linear orthography).

This means that, although inputting Hangul on the typewriter itself is easy, the graphic rendering process—in other words, the actual printing of letters on paper—is challenging. The human user can easily process Hangul's

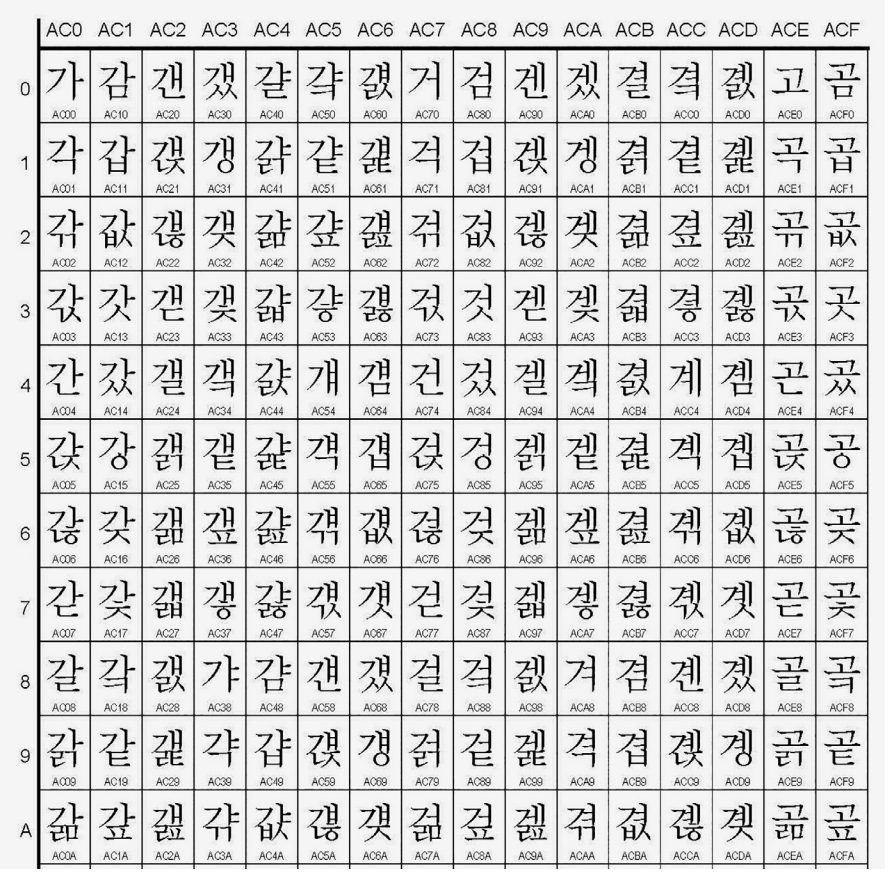
visual characteristics based on the simple rule of 24 vowels and consonants combining both vertically and horizontally. However, mechanizing those combinatorial possibilities presents a distinct challenge, precisely because Hangul is not merely a sequence of consonants and vowels; the graphic arrangement of characters on a page or screen is crucial. With printing technology, the existence of as many as 11,172 possible syllabic blocks in modern Hangul raised issues of cost and efficiency.[47] On the typewriter, one of the main challenges lay in the machine's inability to determine whether a consonant input was for the initial or final consonant. For instance, the three consecutive inputs of ㅎ ㅏ ㄴ could result in 한, but it could also result in 하, with another syllabic block starting with the initial consonant ㄴ (e.g., 나). This technical challenge is often referred to as the final consonant-first typing problem. Another challenge is that consonants and vowels can change their shape depending on their position within a block.[48]

Facing this thorny challenge and dilemma, early Korean linguists and inventors did not hesitate to suggest radically changing the script itself to make it suitable for both the demands of mass education and technological compatibility. Throughout the early to mid-twentieth century, linguists such as Chu Sigyŏng (1876–1914) experimented with combining Hangul vowels and consonants linearly, like the Latin alphabet. This is called *p'urŏssŭgi*, literally meaning "linear orthography," in contrast to the original, standard

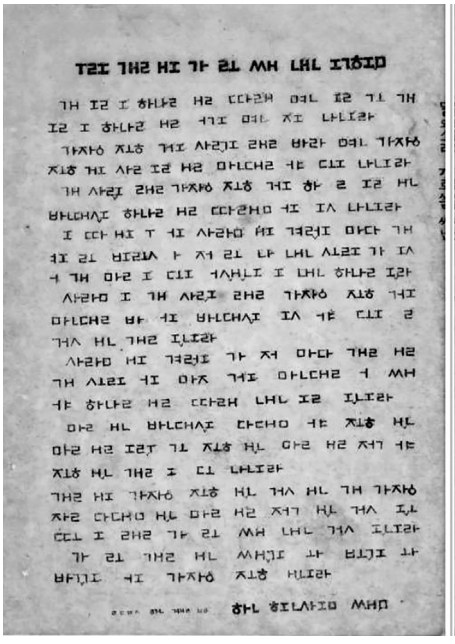
Below: A section of the Hangul syllabic blocks from the Unicode Hangul Chart, which today can render all 11,172 possible syllabic combinations.

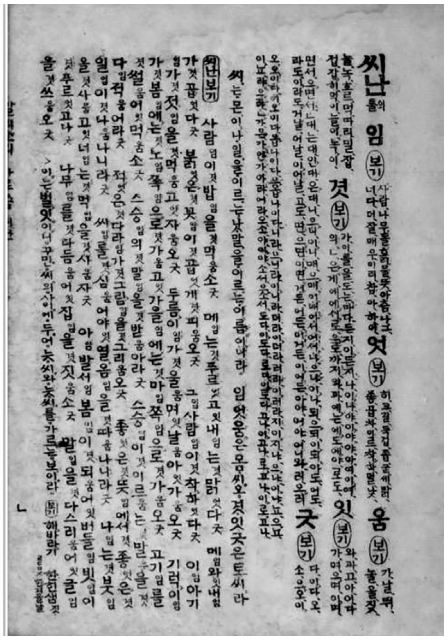
Opposite, top: Chu Sigyŏng's 1914 proposal for linear Hangul orthography, which adopts Western horizontal orthography (left). His book itself is written in assembled Hangul orthography, following a vertical format, as shown on the right. Today, Hangul is written in a compromised style between the two—a horizontally assembled style—but this writing style was a later invention. (Chu Sigyŏng, *Marŭi sori* [The sounds of speech]), (Seoul: Shinmunkwan, 1914).

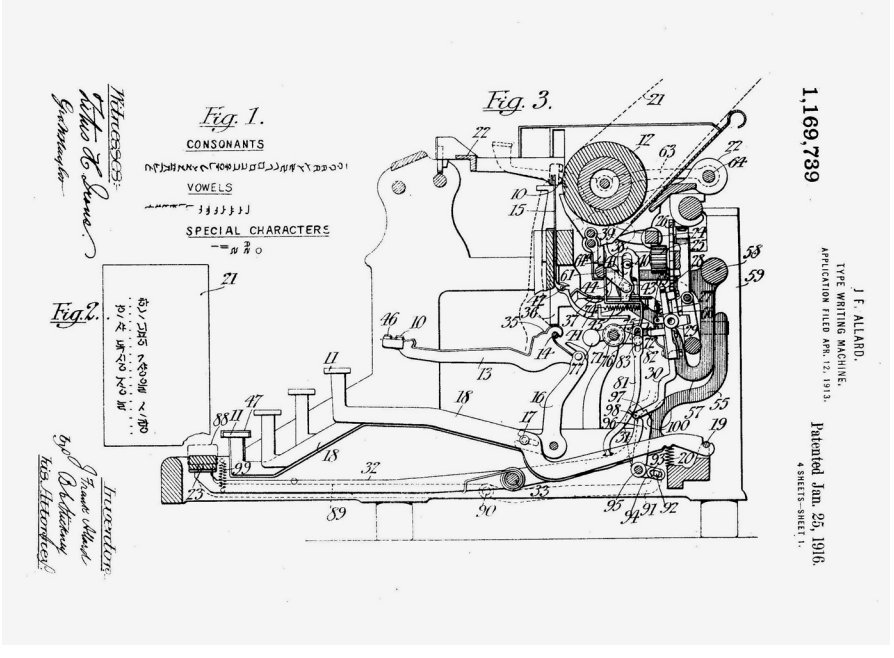
Opposite, bottom: J. Frank Allard (Underwood Typewriter Co.). *Type-Writing Machine*. 1913. An image from the US patent document filed on April 12, 1913.



moassŭgi, which literally means "assembled orthography." It was an attempt to make Hangul more compatible not only with modern communication technologies but also with the Latin alphabet and mathematical symbols. Proponents equated the reformulated script with Western horizontal orthography, in contrast to the traditional vertical format. In fact, linear orthography had long been referred to as horizontal orthography, as seen in *The Revolution of Script* (1947), the famous book of Chu's successor, Ch'oe Hyŏnbae.[49] The allegedly earliest Hangul typewriter, invented by the missionary Horace Grant Underwood, is said to have adopted these rules, but the model was never commercialized, and its design





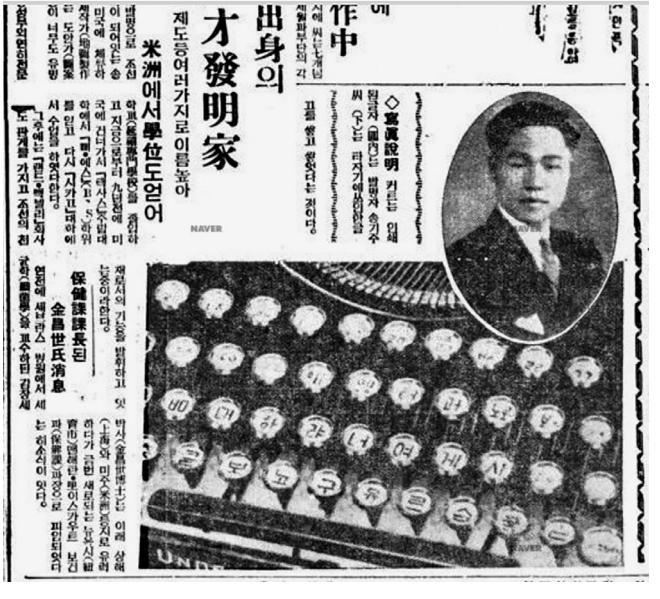


was lost.[50] Song Kiju (Keith C. Song) invented another typewriter prototype that adopted the method of horizontal linear orthography in 1927, but it too was a commercial failure.[51] Compounded by Korea's military annexation by the Japanese empire in 1910, efforts to reform and mechanize Korea were stymied until after liberation in 1945.

Reconstituting the Sinosphere: East Asian Imperialism and Linguistic Nationalism

To summarize, whether discussing sinographs or Hangul, the graphic dimension of writing has been prominent in modern Korea and across East Asia, particularly as the graphic complexity of writing was difficult to handle by writing machines and, possibly, by a population becoming modern masses. This does not mean that modern phonocentric knowledge did not often obscure this fact; nationalistic-minded Korean linguists continued to believe that Hangul is fundamentally distinct from sinographs due to its "superior" alphabetic and phonetic characteristics. Nonetheless, writing's non-phonetic, graphic element—closely entwined with its cultural and technical dimension—remained relatively more apparent in East Asia, where multiple script reform projects and thought experiments took place. This is why East Asian discourse circa 1850 culminated in debates and renegotiations about the nature of script and writing itself. Although such a view was never clearly theorized within the modern episteme of phonocentric linguistics, script was already being reconstituted not only through modern phonocentrism but also through the distinct logic of writing itself, in relation to both human cultural bodily techniques and the modern media environment, understood as cultural techniques involving the specific arrangement of technical artifacts and the body.[52] As for sinographs, although they were widely criticized, that does not mean there weren't strong proponents reevaluating their unique benefits based on old techniques of reading and writing. This was not simply a matter of attachment to tradition but also a practical consideration.

In this sense, it can be argued that sinographs, and script in general, were understood not merely as cultural entities but also as technologies or tools, albeit implicitly. As On Barak demonstrates in his work on nineteenth-century Egypt, this was also a time when "'culture' itself was in the making."[53] Significantly, nineteenth-century Japanese intellectuals invented key


作中
出身의
才發明家
米洲에서學位도얻어
제도등여러가지로이름높아
保健課課長된
金昌世氏消息

A *Dong-A Daily* article from January 24, 1934, introduces the assembled orthography typewriter model invented by Song Kiju (Keith C. Song).

Sino-Japanese vocabularies to translate and introduce Western-originated concepts such as nation, society, democracy, science, technology, arts, literature, theory, practice, industry, and capital, all of which spread across East Asia and are still used today.[54] This was because sinographs were viewed as valuable for coining modern neologisms; just as Latin roots form the basis of many English words, sinograph roots similarly underpin numerous Korean and Japanese words, particularly in conceptual and academic contexts.[55] Japan, therefore, ended up inventing a modern national prose style that incorporated sinographs with kana (the Japanese syllabary) instead of abandoning them entirely by the late nineteenth century.[56] A very similar thing happened in Korea; the mixed modern writing style of Hangul and sinographs was widely experimented with and eventually took root, although some continued to experiment with Hangul-only writing, notably literary writers and linguists. This was still a radical break from Literary Sinitic; the new modern prose aimed to faithfully register the spoken national language of Korea or Japan syntactically.

I have implicitly touched upon the introduction of modern phonocentrism, which is inseparable from European imperialism. Here, I want to emphasize the historical role of non-Western imperialism, particularly Japan's, as a dominant technological hegemony in the region. Aside from the Sino-Japanese neologisms that introduced modern concepts, ideas, and institutions, there was a technological and economic dimension to the reconstitution of sinographs and the Sinosphere that was inseparable from Japan's market expansion in Asia. Mullaney aptly coins the term *kanjisphere* (*kanji* being the Japanese term for sinographs) to describe Japan's technolinguistic hegemony in the typewriter and calculator industries across Japan, Korea, and China in the early to mid-twentieth century.[57] Notably, in this modern technological environment for textual production, sinographs were combined not only with other East Asian scripts but also with the Latin alphabets, numerals, and newly introduced non-alphabetical symbols such as punctuation marks and mathematical and technical symbols.[58] This coexistence in the modern technological environment also reflected the evolving ontology of sinographs, Hangul, and writing more broadly.[59] Alphabetic or not, writing came to signify writing with machines. In other words, the Sinosphere was not entirely dissolved but reconstituted through sinographs, which were disassembled from their Literary Sinitic context and then reassembled into new modern writing systems across East Asia, based on the two contrasting logics of the East Asian discourse network.[60] In this context, Hangul was long constrained by this new imperial hegemony of sinographs that continued to be viewed as the script of intellectuals, especially among Japanese-educated Koreans, until much later.

Returning to Hangul, its early-twentieth-century history was intertwined not only with Japan's techno-linguistic hegemony but also with its language education policies in the colonies. These were, of course, not separate but deeply entangled factors. After the Korean Peninsula was annexed by the Japanese Empire in 1910, language education in colonial Korea was practically dualized. The Korean language was partially taught in schools until the late 1930s, alongside the official national language of Japanese, which was written in a mixed style of kana and sinographs. The Japanese Empire allowed the publication of Korean-language materials, especially during the Cultural Rule period (1919–1931), albeit with strict censorship. Korean materials were also used for public dissemination of information; one might argue that the cultural techniques of Hangul—which include Hangul itself, modern printing technology, and the newly emerging bodily techniques of reading and writing—were partially employed as imperial tools for controlling the cultural practices of reading and writing. However, Hangul's status was secondary at best, and the Empire's later policy during the Pacific War aimed at prohibiting the use of Korean, ultimately striving for its extinction. Yeounsuk Lee argues that Japan's language practices in its colonies was more akin to "violence" than actual policy, due to a lack of coherent principles.[61] Here, we can also apply Kittler's insight that the education of writing is, in fact, a form of violence, even though the European discourse network circa 1800 disguised the modern state project of mass literacy with the discourse of motherly love.[62] Imperial linguistic policy more transparently reveals the violent nature of language education—or the nature of writing as a cultural technique that must be painstakingly and forcibly taught, with or without an alphabet.

To summarize, the early- to mid-twentieth-century history of the modern Korean writing system was inseparable from state and colonial violence, as well as modern technological infrastructure and the media environment. All these factors fueled resistant nationalism for the "mother tongue," understood as both spoken and written, motivating what is often called the "Hangul Movement."[63] Throughout the colonial period, Korean linguists and writers continued to refine the modern Korean writing system and develop systematic linguistic knowledge, all while remaining attentive to the role of media and technology. The development of the modern standard Hangul spelling system is one such example, and literary writers were unique in their experiments with Hangul-only prose. Despite the continued use of sinographs in the modern context—an ongoing legacy of both premodern tradition and Japanese imperial hegemony—there were passionate script reformers who firmly believed that the Korean writing system should ultimately transition to Hangul-only.[64] Crucially,

the events following liberation demonstrated how their vision of Korean "alphabetization" was based on a keen consideration of writing machines like the Hangul typewriter, as well as a physiological (rather than spiritual) understanding of humans and their new cultural technique of writing.[65]

After Liberation: Cold War Hangul Typewriters and Textbooks

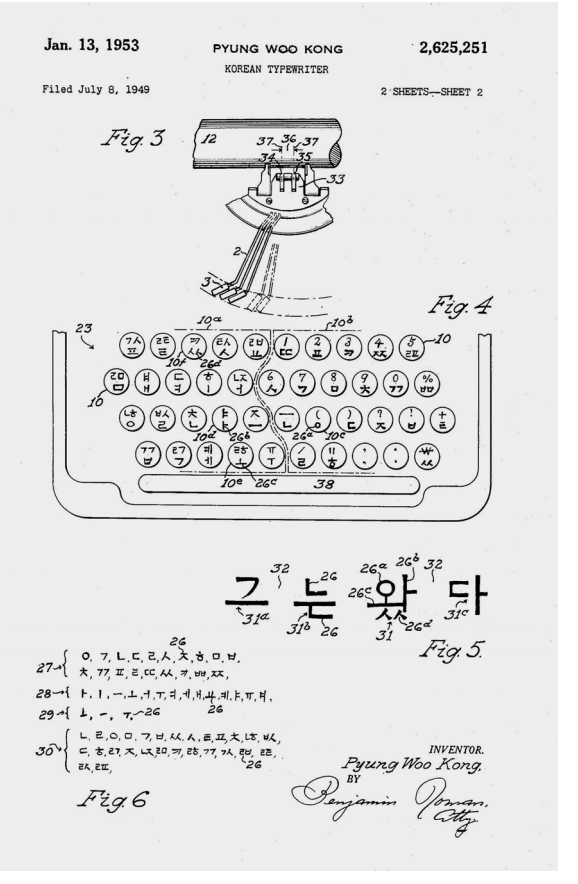
The first commercially successful Hangul typewriter was developed shortly after the liberation of Korea in August 1945, following the surrender of the Japanese Empire and the division of Korea into two regions—North and South Korea, the former occupied by the Soviet Union and the latter by the Allied Powers, primarily the US.[66] In the context of postcolonial nationalism and the military demands of the emerging Cold War era, sinographs were now seen not only as Chinese but also as a legacy of Japanese colonialism.[67] By the late 1940s, North Korea had decided to abolish the use of sinographs, making Hangul the sole official script to improve mass literacy among workers and peasants during their radical communist revolution.[68] In the "Free World" of South Korea, the script reform process was much slower and more controversial. Still, the first practical Hangul typewriter was developed in the South, and overall, South Korea led the way in the development of Hangul typewriters and computer technology capable of supporting Hangul.[69]

Possibly due in part to the earlier success of Hangul script reform in North Korea, linguistic nationalism has often been associated with leftist politics and Third World nationalism, even by South Koreans themselves, at least until the 1980s. Ironically, however, the rise in Hangul's prominence in South Korea was supported by the US Cold War presence in East Asia and the growing hegemony of American technocratic rationalism. Almost immediately after World War II, both the United States Army Military Government in Korea (USAMGIK) and the Supreme Commander for the Allied Powers (SCAP) in Japan pushed for radical script reform to abolish the use of sinographs (also known as "language simplification"), aiming to promote "democratic" mass literacy and to modernize the region's communication infrastructure.[70] Edwin O. Reischauer (1910–1990), the famous Harvard Orientalist who served as the United States' ambassador to Japan from 1961 to 1966, once praised Hangul as an "excellent phonetic system" and "perhaps the most scientific system of writing in general use in any language."[71] By December 8, 1945, fewer than four months after the war had ended, the USAMGIK Minister of Postal Services (the Telegraph Bureau) had completed the training of two hundred Hangul telegraph typists. For telegraph technology, where messages are relatively

short and not intended for everyday reading and writing, linear orthography was temporarily adopted. However, no typewriter model was considered practical enough, which the US military found problematic. For inventors, this situation signaled a market for the machine, and many embarked on the task of creating one, reassessing already available designs.

It should be noted that, in addition to linear orthography typewriters, several models of assembled orthography typewriters were also invented during the colonial period, including the model shown labelled "Fig. 4" in the diagram below.[72] The biggest issue was that their typing mechanisms were overly complicated and, therefore, slow. These machines had either four or five sets of keys, not only to differentiate the initial and final consonants but also to account for how each consonant and vowel changes shape depending on its position within a syllable.[73] Another problem was that although the typewriters printed letters horizontally, the result was intended to be read vertically, making these machines less compatible with the Latin alphabet or mathematical symbols. Linguists from the Hangul Society, notably Ch'oe Hyŏnbae, never abandoned their earlier argument that Hangul should forgo both assembled and vertical orthography. Ch'oe, an ambitious script reformer who recognized the significance of technology, particularly prioritized the Hangul typewriter as a means to ultimately eliminate sinographs from the writing system. Not only did he host typing contests even during the Korean War, but he also worked continuously with the Hangul Society and the South Korean government on standardizing the Hangul typewriter, specifically devising and strongly advocating for a model with only two sets of keys: one for vowels and one for consonants.[74] This two-set (*tubŏlssik*) typewriter became part of a broader trend, as other inventors adopted similar mechanisms with varying keyboard layouts. However, the majority of Koreans remained strongly opposed to the idea of linear orthography due to its vastly different graphic characteristics, which would necessitate a complete relearning of Hangul reading and writing techniques.[75]

The winner in the market was a new model called the three-set (*sebŏlssik)* typewriter, invented by an ophthalmologist named Kong Pyŏng-u (1907–1995).[76] To solve the notorious final consonant-first typing problem, Kong also modified the visual, non-linear

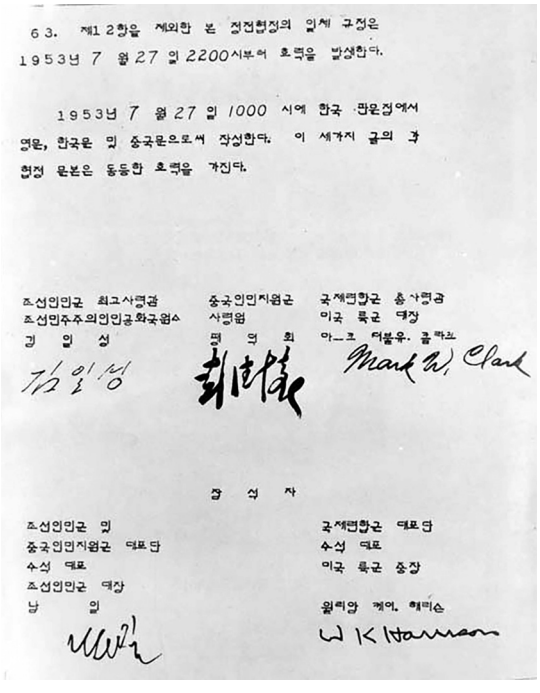


characteristics of Hangul but did not entirely abandon the original principle of assembled orthography.[77] On documents printed with Kong's three-set typewriter, each syllabic block appeared as two horizontal, linear lines layered on top of each other, making the blocks resemble laundry hanging on clotheslines—hence the infamous nickname, "clothesline font"—rather than as ideal, perfect square blocks. Significantly, his model was the fastest in the market and was called the "speed typewriter."[78] Although his font and typewriter were widely used in the military, they were criticized because many considered his non-rectangular fonts a far cry from the ideal and original Hangul syllabic square block. The defense supplier passionately argued that script is, ultimately, a tool and technology that serves as a major weapon of war, and that an excessive focus on aesthetics is both wasteful and inefficient. Kong often used the term *Hangul machine* to describe the typewriter's "superiority," a term that could, in fact, have another meaning: the very technology of the Korean alphabet itself.

Kong was one of the most fervent advocates for the abolition of sinographs, a stance undeniably shaped by the Cold War geopolitics of the region. He not only associated sinographs with the premodern legacy of China and Japanese colonialism but also positioned them as the antithesis of the ideal modern technoculture represented by the US. But Kong's understanding of script had another interesting dimension: its connection to the human body and physiology. He would often say that inventing the Hangul typewriter stemmed from his need to efficiently read texts. After the liberation, Kong began translating his book *New Pediatric Ophthalmology* from Japanese into Korean but encountered significant difficulties reading his assistants' handwritten Hangul.[79] The ophthalmologist concluded that the typewriter, with its clean and standardized font, could solve the problem of the human eye's difficulty in visually processing texts. His strong criticism of sinographs was not only due to the inefficiency of sinograph typewriters but also because they were visually tiring for the human eye, requiring too much graphic information to be deciphered. He also trained visually impaired Korean War veterans to become typists, allowing them to type documents they could not read themselves.[80] For Kong, the human being was not understood as a holistic entity, as the tasks of reading and writing were now theoretically separated. In the new Cold War information circuit, which aimed for the fastest and most efficient (another of Kong's favorite words) textual production and consumption, human

Opposite: Kong Pyŏng-u (Kong Pyung Woo). Korean Typewriter. 1949. US Patent US2625251A, filed on July 8, 1949.

Below: The Korean War Armistice Agreement, printed by Kong's typewriter; it demonstrates its signature "clothesline" font. Signed by representatives of North Korea, the United States, and the People's Republic of China (PRC), the document symbolizes the new geopolitical division of East Asia that emerged from Cold War tensions.


63. 제12항을 제외한 본 정전협정의 일체 규정은
1953년 7 월 27 일 2200시부터 효력을 발생한다.

1953년 7 월 27 일 1000 시에 한국 판문점에서
영문, 한국문 및 중국문으로써 작성한다. 이 세가지 글의 본
협정 문본은 동등한 효력을 가진다.

조선인민군 최고사령관
조선민주주의인민공화국원수
김 일 성

중국인민지원군
사령원
팽 덕 회

국제연합군 총사령관
미국 육군 대장
마-크 웨불유. 클라크

참 석 자

조선인민군 및
중국인민지원군 대표단
수석 대표
조선인민군 대장
남 일

국제연합군 대표단
수석 대표
미국 육군 중장
윌리암 케이. 해리슨

bodies were theoretically disassembled and then reincorporated as individual parts with designated functions.

Despite Kong and Ch'oe's belief that the typewriter should be popularized alongside the practice of horizontal Hangul-only writing, it never gained widespread use outside of the military or government offices. The decades following liberation were formative and characterized by a diverse—and some might say chaotic—range of everyday reading and writing practices, as well as competing mechanical and ergonomic models for writing machines. Despite their achievements, Cold War–era script reformers—whether linguists or typewriter engineers—struggled to eliminate the entrenched habit of mixed writing styles, even with government support. The earlier generation of intellectuals, including literary writers who composed their works almost entirely in Hangul, strongly believed that sinographs were indispensable for efficient communication in mediums like academic books and newspapers. Hangul-only writing went against common practices, common sense, established bodily and cultural habits, and class and institutional interests in the post liberation cultural landscape of Korea.[81] However, things were already beginning to change slowly.

Like Kong, Ch'oe viewed re-education as a necessary cultural supplement to technological invention. After being appointed Editing Chief of the Ministry of Education under USAMGIK, Ch'oe developed and disseminated Hangul-only textbooks for elementary schools, despite strong social resistance and criticism. He and his colleagues at the Hangul Society also completed the compilation of the first comprehensive Korean-Korean dictionary in history, made possible with support from the Rockefeller Foundation. From the beginning, Ch'oe understood that the central issue was the systemic cultivation of new techniques for reading and writing in the national language—specifically, the cultural technique of Hangul reading and writing for the newly liberated nation-state. To reference Kittler, Ch'oe was one of the people who created the equivalent of "a new ABC book" for "whole regions to read."[82] In that sense, the ambitious linguist did not waste the unique opportunity to push forward his long-held belief in Hangul-only writing within the new nation-state.[83] The generations who grew up being taught with the new Hangul textbooks and dictionary became known as the Hangul generation (*han'gŭlssedae*). Unlike the previous generation of intellectuals, who often confessed they could never fully familiarize themselves with Hangul-only texts despite speaking Korean as their mother tongue, these children (later adults) became increasingly accustomed to the Hangul-only writing system as the publishing industry produced more and more Hangul books for the postwar generations.[84]

Ch'oe still could not adhere to the principle of linear orthography for his Hangul textbooks. Nevertheless, the suggestion for the two-set typing layout survived much longer. In 1958, physicist Song Kyebŏm invented the electric two-set teleprinter (or teletype).[85] His application of electronic circuit technology enabled the machine to automatically identify whether each input was for the initial or final consonant, preserving the original principle of assembled orthography. Initially, this invention was praised as a marvelous machine that could "think and make decisions" thanks to a "cybernetic brain" that helped preserve Hangul's "graphic aesthetics."[86] However, the machine overheated easily, and the technological limitations of that time hindered its commercialization and widespread use. More serious discussions about standardizing and expanding the use of digital or "cybernetic" keyboards resumed only in the late 1960s.[87] From then through the early 1980s, many keyboard layout models, including Kong's three-set layout, fiercely competed with one another. By 1982, the standardization of the Hangul keyboard was finalized. Today's standard two-set keyboard is closely modeled after the typewriter design created by Ch'oe's grandson, Ch'oe Tongsik, in 1980.

If we consider Ch'oe and Kong as the inventors of postliberation Hangul machines, their first invention would be human bodies equipped with new physical techniques of writing (in the general definition of cultural techniques, but also physiological in this context), with Hangul typewriters and keyboards being their second.[88] Both inventions played a crucial role in promoting the idea that the complete Hangulization of Korean writing could and should be realized, along with the belief that documents produced by machines were naturally written in Hangul only. It is also essential to recognize that these factors are co-constitutive

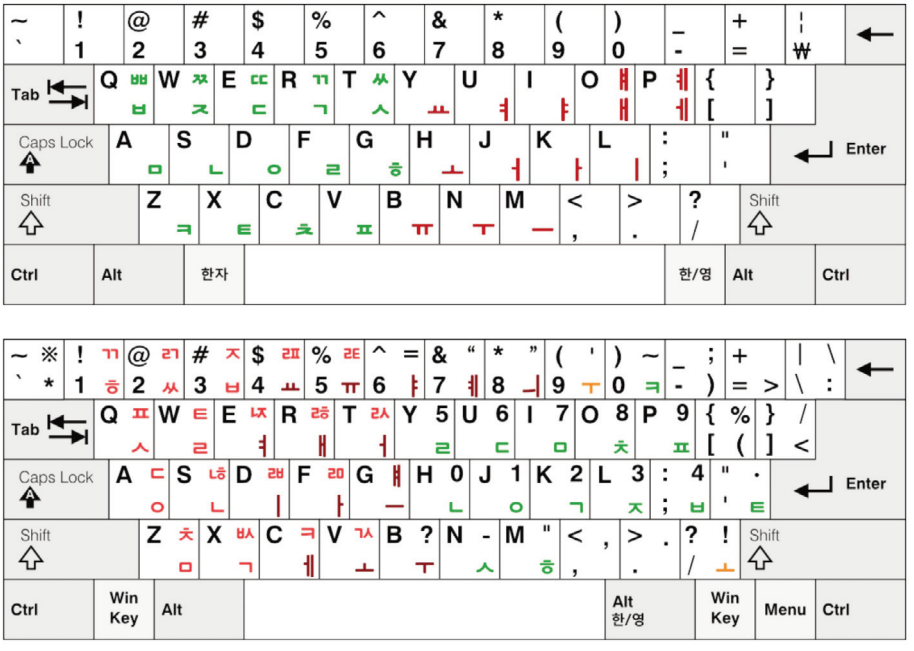


Image comparison from a website titled "Let's Use the Three-set Keyboard." The upper image shows the standard two-set layout Hangul keyboard, which contains two types of keys (consonants and vowels), while the lower image displays the final three-set Hangul keyboard layout (closely based on Kong's invention), featuring three types of keys (initial consonants, vowels, and final consonants).

and interactive, rather than causal; the concept of cultural techniques itself aims to transcend the dualism between media and culture. What is particularly illuminating, however, is how entities like national writing culture and linguistic nationalism—typically associated with notions of national spirit and ahistoric culture—are shaped by technologies themselves, rather than simply the other way around.

Since the early 1980s, the state-led *informatization* project marked a new phase in the script reform debate.[89] Driven by both dictatorial statism and left-leaning populism, a strong linguistic nationalism emerged, rapidly elevating Hangul as the sole legitimate national script. The young Hangul generation—particularly those born between the mid-1960s and mid-1970s—not only provided a key justification for script reform due to their distinct reading and writing habits but also became central to the rise of Hangul nationalism in the era of digitization and global multilingual word processing. This new generation fully embraced the phonocentric, or *alphacentric*, arguments and legacies of Kong and Ch'oe, which sought to erase or diminish the graphic dimension of Hangul and writing in general, playing a pivotal role in the gradual disappearance of sinographs during the 1980s and 1990s. At the same time, the seemingly earlier-era Hangul typewriter and keyboard played a catalytic role in this process, uniquely revived through their connection with digital technology. Kong and his Hangul keyboard became icons of Hangul discourse in the early digital space among the younger generation, once again exemplifying the amalgamation of media, culture, and human bodies. However, before this disappearance could be fully realized, they first had to address the graphic richness of Hangul at the level of coding, so that its complexity could seemingly vanish from the user's perspective.

After 1982: The Age of Multilingual Word Processing

Although the Hangul keyboard was standardized in 1982, the digital environment introduced novel technological challenges. To revisit Joseph D. Becker's 1984 essay, "Multilingual Word Processing," these challenges were not merely about typing technology but also about the newly introduced realms of digital encoding and rendering.[90] Philip K. Hwang, a North Korean-born founder of the Silicon Valley computer terminal company TeleVideo Corporation, remarked in 1986: "Even if Koreans know English very well, without Hangul processing technology, the personal computer market cannot expand successfully."[91] What is unique about this history of digitization is that, in Korea, digitization—referred to as *informatization* by the government—primarily prioritized writing as a means to connect the nation to new information circuits. While Liu Xiao examined how the

"brainwave" information fantasy was imagined as a way to connect humans to information machines in post-Mao China, here we see the realistic concerns of technocrats and programmers struggling to make writing in the national language (script) functional on computers.[92]

But why did Hwang only mention Hangul as the interface connecting the nation to computers—or more accurately, to the emerging global information network? In 1982, *Dong-A Daily,* one of the most prestigious newspapers in South Korea, defined the Korean writing system as a "dual script system" that uses both the Korean alphabet (Hangul) and sinographs, similarly to Japanese.[93] But the first two issues of *Microsoftware* showed how things were changing—possibly in ways not yet fully registered by the general public. If the first issue concentrated on explaining what a personal computer was to its curious readers, the writers of this second issue focused on the problem of Hangul digitization and the development of a marketable Hangul interface. According to the magazine editorial, the second issue "put considerable emphasis on the problem that our Hangul script raises for the computer. The computer will remain a difficult, hard-to-handle object if we cannot freely process Hangul on it."[94] This issue includes long articles, such as "Designing the Hangul Word Processor" and "How to Use Hangul on the Microcomputer I." In these essays, the Latin-Roman alphabet letters are simply called English letters, indicating the new media environment and the horizon of writing in which the possible options are now Hangul and English letters, not Hangul and sinographs. The Samsung personal computer advertisements—illustrated later in this article—condense the historical scene.

The nature of the Hangul "problem" was both similar to and different from the challenges faced by the inventors of typewriters and teletypes. One key difference was that programmers now had to integrate Hangul with all other scripts, including sinographs, within the global digital environment, which was constrained by its own technological limitations and logic. The task was not merely national but inherently global. Becker's "Multilingual Word Processing," reflects this perspective by advocating for a universal concept of text. He observed that computers had largely been limited to processing words in English, which he found predictable due to the simplicity of its writing system: English "happens to have the simplest writing system of all: unadorned alphabetic letters laid out one after the other."[95] The new task, however, was to address writing's visual dimension, encompassing the spread of syntactical characters in multiple directions and combinatorial possibilities that are not confined by the doctrine of linearity.

As mentioned earlier, in Becker's formulation, the challenges

of multilingual word processing were clarified and categorized into three key aspects: typing, encoding, and rendering. In other words, the cultural technique of writing was now suddenly divided into these three realms with the introduction of the machine. Even though the problem of Hangul input was largely resolved earlier, two additional aspects followed from this observation: first, while graphic intricacies remained a challenge, the focus shifted to visual rendering on screens rather than printed paper. Second, this issue culminated in the allocation of digital space for data processing, transmission, and storage, which had to be done in binary code. As Becker explained:

> Encoding is governed by a single, basic fact: the computer can store only numbers. Indeed, it can store only binary numbers, consisting of strings of 0s and 1s. Hence text is represented in a computer by storing a binary code number for each letter. In the case of the English language the American Standard Code for Information Interchange, abbreviated ASCII, assigns the binary code number 01000001 to the letter A. 01000010 to B. 01000011 to C and so on. Thus when you type an A on a computer keyboard, the computer is really being instructed to store the code.
>
> Computers generally store information in units of bytes, where each byte is a group of eight bits. It therefore seems a sensible strategy to store text as one byte per character. The trouble is, there are only 2^8, or 256, ways in which eight 0's and 1's can be combined in a byte. The living scripts of the world have far more letters than that. A two-byte coding scheme, in which each letter would be identified by two successive bytes, would yield 2^{16}, or 65,536, possible codes; a three-byte scheme would yield 2^{24}, or well over 16 million, codes.[96]

Initially, the Korean government, local programmers, and corporations like Samsung and LG struggled to tackle this challenge on their own, focusing particularly on how to encode and visually render Hangul in the digital environment. But, as the title of Becker's essay suggested, the task at hand was inherently global, requiring new rules of standardization for all the world's scripts. Even the International Standard Organization recognized the need for international collaboration by the mid-1980s.

In a way, the challenge was still rooted in Hangul's non-linear characteristics, which result in 11,172 character blocks, as evident in the history of Hangul printing technology and typewriters. As Becker demonstrated, encoding the entire Hangul system on a 1-bit computer was technologically impossible; the 1-byte system could only process up to 256 Hangul syllabic blocks. The 2-byte system allowed for up to 65,536 possible codes, but Hangul still

consumed excessive memory space in the microcomputer environment of the 1980s. Moreover, the conventional 8 × 12 font grid, designed for the English alphabet, proved inadequate for rendering Hangul due to its combination of horizontal and vertical elements. The functionality of each Hangul encoding system also varied depending on how programmers interpreted and applied the core linguistic principles for encoding.[97] The Samsung SPC-1000 was one of the early PC products that failed to provide an adequate solution to the problem, and *Microsoftware* became a major public forum where numerous programmers shared, discussed, and debated their own solutions. By 1985, twenty-seven Hangul codes were available in the market, and in 1986, the Korea Data Communication Corporation had to initially offer its online services in English only due to the challenges of Hangul code standardization.[98]

By the end of the 1980s, two major Hangul code standards were competing with each other: the composition system (*chohaphyŏng*), which could process all 11,172 character blocks, and the precomposed system (*wansŏnghyŏng*), which could display the 2,350 most commonly used characters. In 1987, the South Korean government chose to adopt the latter (KSC-5601), not only due to its technological feasibility but also because it was more compatible with ASCII and aligned with the emerging demands from the ISO meetings, as will be discussed below. Korean users were often frustrated by the character limitations, labeling the government standard as an "anti-cultural code" or the "crippled character code."[99]

An advertisement for Samsung's SPC-1000 computer, included in the first issue of *Microsoftware* (November 1983), claims that the SPC-1000 can display 64 standard ASCII (American Standard Code for Information Interchange) characters and 128 additional user-defined characters. Hangul is not mentioned.

In this context, I would like to address a final—and perhaps rather curious—twist in the story: the disappearance of sinographs from the everyday writing practices of Koreans. Sinographs were rarely mentioned in South Korean computer magazines from the early 1980s onward, providing clear evidence of a shared focus on Hangul. The consistent omission of sinographs in these discussions is somewhat peculiar, especially considering that, as the aforementioned *Dong-A Daily* article indicated, much published material and everyday documents continued to use a mixed style of Hangul and sinographs well into the 1980s and mid-1990s.[100] Several possible reasons could explain this exclusive focus on Hangul. One likely reason is the inheritance of the earlier dictatorial government's attempt to abolish the use and education of sinographs around

the late 1960s—the same period when the government imported (or more accurately, rented) supercomputers for census purposes for the first time in history.[101] Another was that the technology for digitally rendering sinographs was easily obtainable from other countries, particularly Japan, which was already at the forefront of office automation. Moreover, prioritizing Hangul digitization made logical sense, as Hangul could function similarly to pinyin (a Romanization system that transliterates Chinese characters into the Latin alphabet) in a Chinese digital input system, avoiding the need to introduce the foreign Latin alphabet.

The need to align the domestic character code standard with international standards, then, is key to understanding the prioritization of Hangul during this era. Ironically, this focus is evidenced by the government's willingness to compromise on the number of Hangul blocks that could be rendered and used. The state prioritized making the Korean writing system compatible with the global digital environment, even if it meant sacrificing aspects of everyday linguistic practices that were important to the public. However, as the next section will show, many programmers and technocrats continued to oppose this approach.

The Politics of Script/Memory Space: "Are Japanese Ideographs Different from Chinese and Korean?"

In 1987, Yu Kyŏnghŭi, then a senior researcher at the Data Communication Corporation of Korea, became the first representative of the South Korean government to participate in the ISO's Joint Technical Committee 1 (JTC 1) Subcommittee 2 meeting on Character Sets and Information Coding, held in Berlin.[102] During the meeting, what caught the senior technocrat's attention was the ISO's suggestion regarding ideographic characters, or sinographs. Specifically, it was proposed that the PRC, Japan, and Taiwan would each be allocated 8,000 characters in a code space of 32,000, while Korea would share a quarter of the remaining space with other nations.[103] As Yu explained, the ISO had long focused on 1-byte (or 1-octet) coded character sets. It was not until 1985 that the organization recognized the need to develop a 2-byte (16-bit) character set to accommodate the vast number of "ideographs of China" and "the kana [Japanese syllabaries] and ideographs of Japan."[104] At that 1987 meeting, a European ISO executive—unaware of the non-linear characteristics of Hangul and the continued

Another Samsung computer advertisement from the second issue of *Microsoftware* (December 1983). This advertisement highlights the SPC-1000's ability to process Hangul, promising to "fix the Hangul problem" with its special software.

use of sinographs in the Korean writing system at the time—remarked that he had heard a space for twenty-four letters would be sufficient for the Korean language since Korea used the Korean alphabet.[105] Looking back, it is both fascinating and strange how the universal character code system was imagined as a finite resource that needed to be shared among nations.

In this context, managing the two different scripts—Hangul and sinographs—used for the national language was indeed a daunting task. It is important to note that there was no clear consensus even among technocrats regarding the future of the national writing system, despite what was reflected in computer magazines at the time. According to Yu's account of his experience at the 1987 ISO meeting, Korean technocrats faced a twofold challenge.[106] First, Korean representatives had to contend with two of the most visually complex and "heaviest" scripts in the world, while the ISO did not fully understand how Hangul functioned. Second, they needed to establish a suitable definition of a national script and writing system in order to participate in the fierce international debates and competition over character code space allocation. One option under consideration was the elimination of sinographs from the Korean language.

As Yu noted, the PRC and Japan were already fighting to determine how to divide the limited ISO character code space allocated for sinographs.[107] To provide further context on the international perspective, it is worth noting that the seemingly neutral term *sinographs/Han script* (*Hanja* in original) used by Yu in his account following the Berlin meeting might not have been considered politically neutral during the ISO meetings of that time. While the PRC insisted upon developing a unified character code system for sinographs (a unified Han character set, i.e., Han character collection), implying the long-standing cultural commonality of the old Sinosphere dating back to ancient times, Japan was adamant about getting a separate space allocated, since Japanese *kanji,* or "Japanese ideographs," had taken a separate developmental path from the Chinese *hanzi* for many years and, therefore, could not be treated as the same script system.[108] This was the context in which Becker, as a cofounder of the Unicode project, gave a presentation titled "Are Japanese Ideographs Different from Chinese and Korean?" at an ISO meeting in 1989.[109] What was at stake at these ISO meetings was the perceived cultural commonalities and differences between East Asian countries being newly recodified and rearranged at the level of a technical, digitized structure that was often perceived to be neutral.

The issues that needed to be resolved were not limited to the technological realm but also encompassed the political and even philosophical dimensions. In the terms of "Unicode 88" (another noted essay by Becker), what was at stake at the time was not

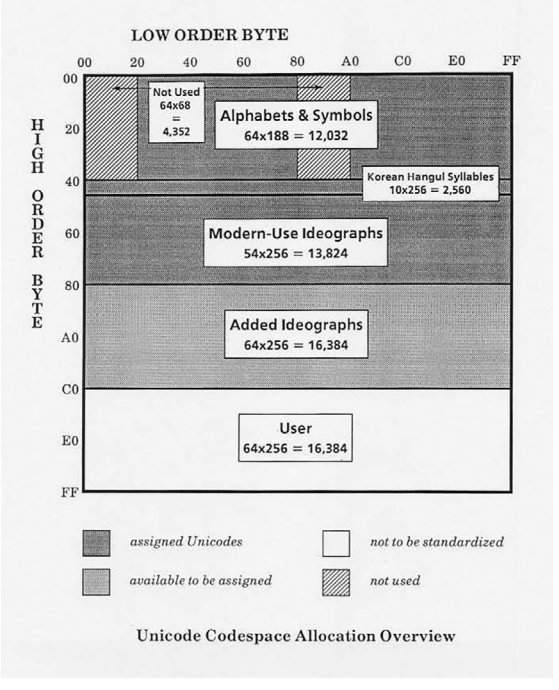
whether 16 bits (which provided, at most, 65,536 distinct codes) were "sufficient to encode all characters of all the world's scripts" but whether they could possibly "engineer a reasonable definition of 'character' such that all the world's scripts [would] contain fewer than 65,536 of them."[110] The PRC's "engineering" of the character definition meant less code duplication and less waste of memory space and, hence, shared the common industrial rule of maximum efficiency. On the other hand, many commentators have pointed out that Japan's approach was based on the nation's brand of strong linguistic and cultural nationalism that sees *kanji* as an essential part of Japanese language. What was missing, however, was the recognition that culture and technology are not separate entities but are dynamically intertwined, constantly influencing and reshaping each other—an awareness that had been more prevalent among Japanese script reformers in earlier periods. According to Marshall Unger, even technocrats, in the face of the challenges that the massive body of *kanji* posed on the digital environment, reached a consensus that the Japanese language could not be "abolished for the sake of convenience of usage of computers" and that "technology must be altered to fit the local culture."[111] The Unicode was, in effect, a solution for the ideograph problem that came from the US, a solution that was interestingly but also not surprisingly closer to the PRC's approach than to the Japanese method (and, thus, has been widely criticized in Japan). In this historical context, the seemingly objective, descriptive terms such as *Chinese script* or even *sinographs/Han script* may have been associated with a particular way of "engineering" definitions of characters and scripts, as well as with specific political interests.

All these international debates were closely tied with the domestic discussions in Korea about the future of written national language. South Korean ISO representatives were deciding whose side to take between the PRC and Japan with their approach to the ideograph problem, a question for which the answer changed depending on whether to include sinographs in the new definition of the Korean writing system. Yu wrote in 1990 that if South Korea wanted to keep mixed style of Hangul and sinographs, it should oppose the PRC approach since Korean ideographs are also different from Chinese or Japanese ones.[112] The second challenge was determining whether demanding and receiving the space for all of 11,172 syllabic Hangul blocks at the ISO meeting was feasible, when it was highly likely that either China or Japan would raise an objection to such a demand. What is interesting about Becker's "Unicode 88" is that while it recognizes the unique challenge that Hangul posed (it is one of the two scripts separately mentioned in the image below, next to ideographs), it still significantly undermined the total number of Hangul syllabic

blocks in its calculation; 2,560, instead of 11,172. In fact, Korea and other countries had to carve out the space for their script at the ISO meetings throughout the late 1980s and the mid-1990s, where the importance of each script is ranked based on their "commercial importance."[113] In a way, the debate resembled a territorial fight, except that the said territory was digital.

There is no clear, straightforward evidence demonstrating that these international debates and pressures were the major reasons behind the final disappearance of sinographs in South Korea. However, accounts from technocrats like Yu, now largely forgotten, reveal the significance of these international debates, which is less known to the public, if not entirely hidden; in fact, "access to SC 2 Documents is restricted to SC 2 members registered by their National Body," even today.[114] On the other hand, South Korean media from the late 1980s onward would focus on the issue of Hangul digitization with their brand of script nationalism, narrowly framing the question as to whether it is possible to secure space for the total number of 11,172 Hangul square blocks in the face of techno-political challenges. Sinographs were often omitted from the new horizon of the national writing system in digital environments, even when these accounts were published in the mixed style. Paradoxically, as Hangul was required to coexist with sinographs in the digital space of Unicode, sinographs were disappearing from the Korean writing system.

One of the first Hangul-only dailies in South Korea, *One Nation* (*The Hankyoreh*, 1988–), marked the beginning of a broader transition to Hangul-only style among major dailies and periodicals throughout the 1990s.[115] Founded in 1988 by dissident journalists, the newspaper was closely associated with "common people" (*minjung*) politics and Third World Marxism—both of which exhibited a degree of sympathy toward North Korea's ideology of national autonomy and independence (*juche*). In fact, when the newspaper was first published, some were shocked by its unfamiliar Hangul-only writing style and horizontal orthography, with comments such as "it's like a North Korean newspaper."[116] But far less known than their leftist linguistic nationalism—closely affiliated with Kong, who had dramatically shifted his political stance from pro-US to a more oppositional view in his later years—is that their unique style was inseparable from their early adoption of computer typesetting technology (CTS) from Japan.[117] By the late 1990s, even conservative newspapers had largely abandoned the use of sinographs and



"Unicode Codespace Allocation Overview," from Joseph Becker's "Unicode 88" (1988).

vertical orthography, a shift closely tied to the rise of computer typesetting technology.[118] Today, books, periodicals, and online content are predominantly written in Hangul, with only a few rare exceptions.

Conclusion: Hangul Generation and the Cultural Technique of Digital Writing

So far, I have examined different theories of writing: first, the phonocentric conceptualization of writing as a mediation of oral speech, particularly spoken national language, and second, writing as a visual medium and a cultural technique. And although the techno-cultural and political debates surrounding digital writing arose from writing's graphic-visual dimension and the increasing discourse of globalization, linguistic nationalism—once again rooted in phonocentrism—played a crucial role as a practical interface for navigating the complexities of multilingual word processing. This ideology was fully embodied in the 1980s and 1990s, as a generation raised with Hangul-only textbooks and books came of age. However, it was digital technology that, conversely, fueled and catalyzed such linguistic nationalism. As we have seen with both the theory of cultural techniques and a close examination of media history of writing, modern machines have transformed Hangul in conjunction with human bodies, while the reverse is also true.

This young generation also played an active role in the growing disappearance of sinograph usage, represented by notable figures such as then seventeen-year-old Park Hyŏn-ch'ŏl, who invented one of the very first Korean word-processing programs in 1982. In fact, another completely new cultural technique demarcates this young generation, more specifically, middle-class youth: their ability to program. After declaring 1983 the "Year of the Information Industry," the South Korean government made computer use an official extracurricular activity in schools.[119] Park was one of many young programmers, including elementary and middle school children, who sought to develop well-functioning Korean word-processing technology throughout the 1980s, submitting their own codes to various computer magazines. Arae-A Hangul, Hancom's widely used word-processing program that still competes with Microsoft Word, was developed by four university students in 1988.[120] As the software's very name indicates, the Hangul generation heavily relied on a specific brand of linguistic nationalism, dismissing sinographs as a rather foreign (that is, either Chinese or Japanese) element in the Korean language system that is also inefficient and not suitable for the digital environment. The new generation embraced Kong and Ch'oe's arguments and legacies; Kong remained vigorous in his '70s and '80s, maintaining an online presence until his death in

1995, and nearly became an icon for Hangul nationalism.[121]

The contours of ISO meetings also turned into a new phase, as this young generation, not older generations such as Yu who still felt highly unsure about the future of Korean writing system, started to serve as the new governmental representatives. Kang T'aejin, who developed Hangul Processor 3 in 1983 during his college years in Canada, left an essay titled "I am a Computer Independent Activist" in 1996, reflecting on his experience from the ISO meetings around the early to mid-1990s.[122] The essay starts by describing how the young Korean Canadian programmer was greatly inspired by the student activism of 1980s South Korea, with their devotion to "the future of the country and the nation."[123] And it was this nationalistic passion and the belief that Hangul is the sole national script of two Koreas that guided his core principle at the ISO meetings held for the Universal Coded Character Set (Unicode/ISO/IEC 10646) standardization. Kang notes that not only the PRC and Japan but also the United States opposed the idea of allocating the space for 11,172 syllabic Hangul blocks, possibly undermining the commercial, political, and cultural importance of the Korean language while placing more importance on Chinese and Japanese. One Polish representative sympathetically commented in between; "These American imperialists are terrible. Why can't they just let you use your script?"[124] In the end Kang and his comrades proudly succeeded in defending Hangul, which is one of the reasons why users can use all modern Hangul syllabic block combinations on their digital devices today. What is ironic in this historical scene is that, while there was a tension, at the end it was linguistic and cultural nationalism that served a central role in realizing the Unicode/ISO goal of making the global exchange of information seamless. Since then, the ontology of writing has become increasingly embedded in the circuits of finance capitalism and in machines produced by multinational corporations such as Samsung and Apple. Of course, we have now entered another phase with the rise of generative AI as a writing tool.

IIIII

But have sinographs truly disappeared from the Korean writing system? While it is true that sinographs are rarely written or printed in Korea today, having been largely transliterated into Hangul, they remain a significant part of the Korean language, much like Latin in English, through numerous Sino-Korean and Sino-Japanese-Korean vocabularies. In that sense, they can be largely seen as abolished or as having disappeared from visible human use. Put differently, they have become graphically invisible to humans; although trained eyes can still identify, read, and

write what is invisible, many young Koreans today cannot. In this way, sinographs in the Korean language exist somewhat like ghosts, with their visual presence having vanished from everyday use. Interestingly, despite their invisibility to humans, machines can still read sinographs through advanced data processing. If you type a Hangul word into a generative AI application and request its sinographic transliteration, it will generate one instantly—though occasional errors due to homonyms can arise, these are easily corrected by leveraging the vast amounts of available data. In this sense, sinographs still materially exist in the digital media environment, though not as traditional graphic signs. They are encoded in the vast datasets of human language activity but are not rendered unless commanded by humans.

What does this borderline (invisible yet visible) ontology of sinographs in the age of generative AI tell us about the nature of writing? Before concluding, I would like to pose a new question for further exploration: If machines can easily read sinographs, can we truly say they are invisible, despite their graphic invisibility to human eyes? This inquiry also connects to the graphic dimension of writing, which I have examined throughout this article in an attempt to reconceptualize writing. The history of multilingual word processing and now-obsolete typewriters shows how figures like Ch'oe and Kong, while advocating for the superiority of alphabetic Hangul over ideographs, sought to suppress the visual dimension of writing, adhering to the contentious doctrine of linearity. Conversely, as Kramer demonstrates, emphasizing the graphic dimension of writing allows for the dethronement of phonocentric or logocentric (in Derrida's terms) conceptualizations of writing. In this paper I have proposed an alternative view of writing as a cultural technique. However, when we remove the graphic dimension of writing, as seen in the visually invisible yet mechanically existent Korean sinographs, we arrive at another conceptualization of writing—one potentially liberated not only from the human mind but also from the human body. For Siegert, who drew on the theory of cultural techniques, reversing the logocentric (or phonocentric) assumption—where "words are understood as pure signals prior to meaning"—is not about the disappearance of man, but about "defining (. . .) noise and message relative to the unstable position of an observer."[125] Indeed, invisible, transliterated sinographs can be a message to some and noise to others. But is this conclusion about the continued relevance of human bodies and the concept of cultural techniques sufficient in the age of generative AI, beyond the era of multilingual word processing? Can we, and should we, conceptualize writing without involving the human mind and body? Or, if we are to retain the theory of

cultural techniques, how should we describe the human role in this new writing culture in relation to media? What is the nature of writing that humans perform at this media-historical juncture?

Notes

1. Joseph D. Becker, *Unicode 88* (1988; repr., Unicode Consortium, 1998), https://www.unicode.org/history/unicode88.pdf.

2. "Hwang ch'ongni 'han'gŭrŭn munhwayungsong sirhyŏn kiban·ptkangguk t'odae'" [Prime Minister Hwang: "Hangul, catalyst for cultural flourish and cornerstone of an advanced IT nation"], *Maeil Business Newspaper,* October 9, 2016. https://www.mk.co.kr/news/politics/7528395.

3. Si Chŏnggon and Ch'oe Kyŏngbong, *Hangul and the Science Culture* [Han'gŭlgwa kwahangmunmyŏng], (Seoul: Tŭllyŏk, 2021).

4. Thomas Mullaney, *The Chinese Typewriter: A History* (Cambridge, MA: MIT Press, 2017), 10.

5. Chŏng Ch'ŏl. "Maik'ŭro k'ŏmp'yut'ŏŭi han'gŭl kuhyŏn pangbŏp I" [How to use Hangul on the microcomputer I]. *Microsoftware*, December 1983; Pae Myŏngjin. "Han'gŭl wŏdŭp'ŭrosesŏŭi sŏlgye I" [designing the Hangul word processor I]. *Microsoftware*, December 1983.

6. A logograph is a symbol representing a word or morpheme, while an ideograph denotes a symbol that represents an idea or concept rather than a specific object. Sinographs have been categorized as both. Throughout the modern era, sinographs have been described using terms such as ideograph, logograph, and even pictograph, often influenced by ideological and political motivations. This article focuses particularly on their ideographic characteristics, following the International Organization for Standardization (ISO), which used the term *ideographs* in their meetings during the 1980s. On the deeper history of these categories in Western discourse, see John De Francis, *The Chinese Language: Fact and Fantasy* (Honolulu: University of Hawai'i Press, 1984); and Byron Ellsworth Hamann, "How Maya Hieroglyphs Got Their Name: Egypt, Mexico, and China in Western Grammatology since the Fifteenth Century," *Proceedings of the American Philosophical Society* 152, no. 1 (2008): 1–68.

7. For instance, this article documents the systematic changes South Korean newspapers were undergoing in the 1990s: Kim Ŭnnam. "Han'gŭl sedae sarojapcha" sinmundŭl taebyŏnsin" ["Capturing the Hangul generation: major transformation in newspapers"], *Sisa Journal*, November 21, 1996. https://www.sisajournal.com/news/articleView.html?idxno=97909.

8. Jacques Derrida, *Of Grammatology*, trans. Gayatri Chakravorty Spivak (Baltimore: Johns Hopkins University Press, 2016).

9. Sybille Kramer, "Writing, Notational Iconicity, Calculus: On Writing as a Cultural Technique," *MLN* 118, no. 3 (2003): 520. Indeed, eye-movement studies by cognitive scientists have made clear that even the reading of English-language texts involves complex spatial processes that cannot be reduced to mere "linearity"; see Dennis Fisher, "Spatial Factors in Reading and Search: The Case for Space," in *Eye Movements and Psychological Process*, ed. Richard Monty and John Senders (Hillsdale, NJ: Lawrence Erlbaum Associates, 1976), 417–427; Simon Garrod and Meredyth Daneman, "Psychology of Reading," in *Encyclopedia of Cognitive Science*, ed. Lynn Nadel (New York: Macmillan/Nature, 2003), 848–853; Elizabeth Hill Boone, *Descendants of Aztec Pictography: The Cultural Encyclopedias of Sixteenth-Century Mexico* (Austin: University of Texas Press, 2021), 11–14.

10. Derrida, 26–28.

11. Derrida, 99–100.

12. Mullaney, *Chinese Typewriter*, 63.

13. Yurou Zhong, *Chinese Grammatology: Script Revolution and Literary Modernity, 1916–1958* (New York: Columbia University Press, 2019).

14. Kramer, 518–519.

15. Joseph D. Becker, "Multilingual Word Processing," *Scientific American*

251, no. 1 (1984): 96.

16. Becker, 96.

17. Becker, 97.

18. Zhong, 3–6. Also see Ferdinand de Saussure, *Course in General Linguistics*, trans. Wade Baskin, Perry Meisel, and Haun Saussy (New York: Columbia University Press, 2011).

19. Kojin Karatani, "Nationalism and Écriture," *Surfaces* 5 (1995): 1–25.

20. Similarly, Bernhard Siegert writes that "media are not only cultural techniques that suspend codes or disseminate, internalize, and institutionalize sign and symbol system; they also serve to loosen cultural codes, erase signs, deterritorialize images and tones." Bernhard Siegert, "Cacography or Communication? Cultural Techniques in German Media Studies," *Grey Room* 29 (2007): 31.

21. Friedrich A. Kittler, "Perspective and the Book," *Grey Room* 5 (Autumn 2001): 49.

22. Bernhard Siegert, "Cacography or Communication?," 31.

23. Bernhard Siegert, *Cultural Techniques: Grids, Filters, Doors, and Other Articulations of the Real*, trans. Geoffrey Winthrop-Young (New York: Fordham University Press, 2015), 30.

24. Naoki Sakai, *Translation and Subjectivity: On Japan and Cultural Nationalism* (Minneapolis: University of Minnesota Press, 1997).

25. The term *Hangul generation* can have slightly different meanings depending on the context. It may refer to the generation educated in the Korean language after liberation. In this context, it specifically refers to the generation that received minimal sinograph education due to changing educational policies and, as a result, is much more familiar with Hangul-only texts than any previous generation.

26. Ross King, "Nationalism and Language Reform in Korea: The Questione della Lingua in Precolonial Korea," in *Nationalism and the Construction of Korean Identity*, ed. Hyung Il Pai and Timothy R. Tangherlini (Berkeley: University of California Center for Korean Studies, 1998), 33–72.

27. Ross King, "Cosmopolitan and Vernacular in the Sinographic Cosmopolis and Beyond: Traditional East Asian Literary Cultures in Global Perspective," in *Cosmopolitan and Vernacular in the World of Wen: Reading Sheldon Pollock from the Sinographic Cosmopolis*, ed. Ross King (Leiden: Brill, 2023), 8.

28. In his discussion on terms such as Classical Chinese and Literary Sinitic, King argues that it is preferable to avoid the term *Chinese* when a more accurate alternative is available, in order to prevent the retrospective projection of modern nationalism. A similar argument can be made regarding the use of the term *Korean alphabet*. King, "Cosmopolitan and Vernacular," 2.

29. Im Yonggi, "Hunminjŏngŭm ch'angjewa kwallyŏnhan myŏt kaji munjenuga wae, ŏttŏk'e mandŭrŏnnŭn'ga?" [A few issues related to the creation of Hunminjeongeum: who, why, and how was it made?], *Korean Language History Studies* 1 (June 2014): 107–113.

30. Sŏ Minjŏng, "Hunminjŏngŭm 'Sŏmun'ŭi tu kaji pŏnyŏk: 15-segiwa 20-segi" [The two translations of the Hunminjeongeum 'Preface': the 15th and 20th centuries], *Cogito* 69 (February 2011): 35.

31. Im, 97–98. See also Andre Schmid, *Korea between Empires, 1895–1919* (New York: Columbia University Press, 2002), 65–66.

32. The term first appeared in 1913. Yi Sang-hyŏk, "Hunminjŏngŭmgwa han'gŭrŭi ŏnŏmunhwasajŏk chŏpkŭn: munja, munja kinŭngŭi ideollogijŏk soksŏngŭl chungsimŭro" [A linguistic and cultural historical approach to Hunminjeongeum and Hangul: focusing on the ideological characteristics of characters and their functions], *Korean Linguistics* 41 (November 2008): 61–81.

33. In 1897, Chu Sigyŏng argued that sinographs are more like pictures than

like a script. Chu Sigyŏng, "Kungmullon I" [On the Korean language I], *Tongnipsinmun* 47 (April 22, 1897).

34. This transitional period requires careful analysis due to the clash and exchange between completely different epistemes; we should remain constantly aware that entities like Korea, the Korean language, and the Korean script are not ahistorical but were being constructed both conceptually and in practice.

35. Shortly after Japan forcibly opened its ports to the US in 1854, Maejima Hisoka authored "Kanji on-haishi no gi" [Proposal for the abolition of sinoscript] in 1866. Maejima also launched the Japanese postal service in 1871 and founded an all-kana (Japanese syllabary) newspaper in 1873. Fukuzawa Yukichi, a prominent Meiji-era writer and thinker, along with Inoue Kakugorō, also advocated for script reform in the Chosun Dynasty by providing Hangul typesets for *Hansŏng jubo* (1886–1888), the first newspaper to use a mixed style of writing. Thomas S. Mullaney, "Controlling the Kanjisphere: The Rise of the Sino-Japanese Typewriter and the Birth of CJK," *Journal of Asian Studies* 75, no. 3 (2016): 725–753; Pak Ch'ŏnhong, *Hwaljawa kŭndae nŏmŏbuksŭ* [Movable type and modernity] (Seoul: Nŏmŏbuksŭ, 2018), 337–342.

36. Yeounsuk Lee, *The Ideology of Kokugo: Nationalizing Language in Modern Japan,* trans. Maki Hirano Hubbard (Cambridge, MA: Harvard University Asia Center, 2016).

37. Olga Amsterdamska, "Saussure's Revolution from Within," in *Schools of Thought: The Development of Linguistics from Bopp to Saussure* (Dordrecht: D. Reidel, 1987). Meanwhile, Zhong's *Chinese Grammatology* identifies 1916 as the beginning of the modern Chinese script revolution, coinciding with the publication of Ferdinand de Saussure's *Course in General Linguistics*, edited by Charles Bally and Albert Sechehaye (1916), and marking a global shift toward phonocentrism at the turn of the twentieth century. I emphasize how Saussure's nineteenth-century contemporaries had already significantly impacted the development of linguistics and script reform discussions in East Asia (of course, it is important to note that the European development of linguistics itself was inseparable from imperialism and the need to study different languages).

38. Amsterdamska, "Saussure's Revolution," 199.

39. Ch'oe was taught by one of Ueda's most distinguished pupils, Shinmura Izuru (1876–1967), during his studies at Tokyo Imperial University.

40. Ochiai Naobumi et al., *Meiji bungaku enshū* 44 [Complete collection of Meiji literature 44] (Tokyo: Chikuma Shobō, 1968), quoted in Lee, *Ideology of Kokugo*, 76.

41. The year 1850 is chosen to mark the beginning of script reform discussions in East Asia and to highlight the convergence of two distinct processes. I also would like to refer to Kittler's emphasis on the heterogeneity of the nineteenth century, where "[u]niversal alphabetization circa 1800 and technological data storage circa 1900" were intricately intertwined. Kittler writes: "According to Heidegger, the nineteenth and 'most ambiguous' century can 'never be understood by means of a description of the chronological succession of its periods. It must be demarcated and approached simultaneously from two sides.'" Friedrich A. Kittler, *Discourse Networks 1800/1900* (Stanford, CA: Stanford University Press, 1990), 370–371.

42. Kittler, *Discourse Networks 1800/1900*, 32.

43. Kittler, *Discourse Networks 1800/1900*, 211–212.

44. Mori Arinori, in his letters to linguist William Dwight Whitney from 1872 to 1873, framed the challenges faced by early Japanese language reformers in terms of promoting "communication" and countering "the commercial power" and habits of "the English-speaking race." Mori Arinori. 1872. "Letter Addressed to Whitney." In *Ōkubo Toshiaki*, 1:305–310. Quoted in Yeounsuk Lee, *The Ideology of Kokugo: Nationalizing Language in Modern Japan*, 10.

45. Chu Sigyŏng, "Kungmullon I" [On the Korean language I], *Tongnip Sinmun* 48, April 24, 1897. Cited in Kwŏn Chuan, "Chusigyŏng ŏnŏmunjagwanŭi hwangnip kwajŏnge taehan koch'al: Chusigyŏngŭi kugŏ mit kungmun kwallyŏn nonsŏlŭl chungsimŭro" [A study on the establishment of Chu Sigyŏng's views on language and writing: focusing on his discourses on national language and national script], *Hangul* 82 (December 2021): 1155.

46. Mullaney, *The Chinese Typewriter: A History*, 35–40.

47. Nineteen initial consonants × 21 middle vowels × (27 final consonants + 1 non-final consonant) = 11,172. This is a formula that needs to be more closely examined, but here, I will only briefly cite it. Chŏn Sanghun, "Han'gŭl mit han'gugŏ chŏngbo ch'ŏri k'odŭ" [Hangul and Korean information processing codes], *Microsoftware* (November 1998).

48. Kim T'aeho, *Han'gŭlgwa t'ajagi* [Hangul and the typewriter] (Seoul: Yŏksabip'yŏngsa, 2023), 67–69.

49. Ch'oe Hyŏnbae, *Kŭljaŭi hyŏngmyŏng* [The revolution of script] (Seoul: Kunjŏngch'ŏng mun'gyobu, 1947).

50. Horace Grant Underwood was the elder brother of the famous typewriter entrepreneur John T. Underwood. Chang Bongs n, *Han'gŭl p'urŏssŭgi kyobon* [A guide to writing Hangul] (Seoul: Hanpul Munhwasa, 1989); Chang Bongsŏn, "Han'gŭl t'ajagi paljŏnsa" [The history of Hangul typewriter development], *Han'gŭljŏngbo* 1, no. 58 (September 1992): 58.

51. A *Dong-A Daily* article cited in Figure 4.2 references Yi Wŏnik's (Wonik Leigh) 1914 orthography typewriter, dismissing it as impractical while praising Song's model as the first commercially viable Hangul typewriter.

52. The compatibility of certain alphabets with communication technologies is not determined by whether they are phonetic, but rather by their graphic characteristics.

53. On Barak, "Outdating: The Time of 'Culture' in Colonial Egypt," *Grey Room* 53 (2013): 8.

54. This is one reason why many believed that Hangul-only or kana-only writing could not become a sufficient means of communication. However, in Korea today, Sino-Korean words are written exclusively in Hangul, effectively erasing their etymology. It is worth noting that even today, there are advocates for the revival of sinographs in Korea, arguing that sinographs help identify etymology and that their rich graphic characteristics actually make reading faster and more accurate.

55. Hwang Hoduk, "Translation: The Geopolitics of Vernacularity and Sinographs: The Making of Bilingual Dictionaries in Modern Korea and the Shift from Sinographic Cosmopolis to Sinographic Mediapolis." in *Cosmopolitan and Vernacular in the World of Wen: Reading Sheldon Pollock from the Sinographic Cosmopolis*, 567–57.

56. Yeounsuk Lee's book thoroughly documents the debates surrounding the abolishment of sinographs in the late nineteenth and early twentieth centuries. See also Nanette Twine, "Toward Simplicity: Script Reform Movements in the Meiji Period," *Monumenta Nipponica* 38, no. 2 (Summer 1983): 115–132.

57. Mullaney, "Controlling the Kanjisphere." According to Mullaney, the People's Republic of China continued importing Japanese-made typewriters and calculators well into the 1950s. South Korea's newspaper and publishing industries also long relied on Japanese technological infrastructure and industrial practices, such as typesetting design, even after liberation.

58. In Korea, the technology of textual spacing was also introduced.

59. In modern China, the Chinese romanization movement was ongoing throughout the early to mid-twentieth century, culminating in the official recognition of Gwoyeu Romatzyh by the Republic of China as the national

romanization ×system for Standard Chinese. Zhong, 41.

60. Naoki Sakai's contention that Asia is a product of the modern Western/non-Western binary opposition is useful here. Naoki Sakai, "'You Asians': On the Historical Role of the West and Asia Binary," *South Atlantic Quarterly* 99, no. 4 (2000): 789–818.

61. It seems that this discussion in the original Japanese book is omitted in the English translation. I am referring here to the Korean translation: Yeounsuk Lee, *Kugŏranŭn sasang* [The ideology of national language], trans. Ko Yŏngjin and Im Kyŏnghwa (Seoul: Somyŏngch'ulp'an, 2006), 357.

62. Kittler, *Discourse Networks 1800/1900*, 52–74.

63. Hŏ Jaeyŏng argues that the term *Hangul movement* was officially adopted starting in the mid-1920s. Before the term became widely used, research and dissemination activities related to Hangul continued. Hŏ Jaeyŏng, "Iljegangjŏmgi han'gŭrundonggwa munmaengt'oech'i (munjabogŭp) undong yŏn'gu" [Study on the Hangul movement and the literacy campaign (character dissemination) during the Japanese colonial period], *Journal of Reading Research* 44 (2017): 128–162.

64. Michael E. Robinson, "Ch'oe Hyŏn-bae and Korean Nationalism: Language, Culture, and National Development," *Occasional Papers on Korea*, no. 3 (June 1975): 19–33.

65. Kittler cites Nietzsche's "scandalous surmise" in 1881 that "humans are perhaps only thinking, writing, and speaking machines." Friedrich A. Kittler, *Gramophone, Film, Typewriter* (Stanford, CA: Stanford University Press, 1999), 188.

66. Kim T'aeho, 154–156.

67. Ch'oe Hyŏnbae, 44–45.

68. Ko Yŏnggŭn, T'ongil sidaeŭi ŏmun munje [Language and writing issues in the era of unification] (Seoul: Kilbŏt, 1994). See especially the chapter titled "North Korea's Exclusive Use of Hangul and Script Reform."

69. In his autobiography, Kong Pyŏng-u recounted narrowly escaping abduction by North Korea during the Korean War, as they sought his expertise due to their lack of a practical Hangul typewriter.

70. Marshall J. Unger, *Literacy and Script Reform in Occupation Japan: Reading between the Lines* (New York: Oxford University Press, 1996). As Unger notes, the reform efforts in Japan largely ended in failure and were later perceived as an imperialist endeavor led by the US, despite the fact that there were also Japanese initiatives rooted in the earlier history of script reform. Although Unger does not discuss the history of South Korea in his book, evidence suggests a connection between these two distinct script reform efforts. For example, see Yi Ŭngho's book cited in note 81.

71. Edwin O. Reischauer, *East Asia: The Great Tradition* (Boston: Houghton Mifflin, 1962), 435–436. Reischauer, along with George M. McCune and with the assistance of Ch'oe Hyŏnbae, also created the well-known McCune–Reischauer Hangul romanization system.

72. Yi Wŏnik (Wonik Leigh) invented one of the earliest assembled Hangul typewriters in 1914 while living in the US, but it saw little use. Song Kiju invented another in 1934, but fewer than thirty units were sold.

73. Although the machine printed text horizontally, the output was meant to be read vertically, making it less compatible with the Latin alphabet or mathematical symbols.

74. Kong Pyŏngu, "Han'gŭl sarangŭl silch'ŏnhan sŏn'gakcha ch'oehyŏnbae paksa" [Dr. Choi Hyun-bae, a pioneer who practiced love for Hangul], *Narasarang* 88 (March 1994): 68–71. Song Hyŏn, a passionate advocate of the three-set layout, wrote: "I believe the primary reason for the failure of past attempts to standardize keyboard layouts by the Ministry of Education, Ministry of Commerce, and the

Hangul Society lies in Dr. Ch'oe Hyŏnbae, a key figure in these efforts, being influenced by an unrealistic belief in linear orthography and the two-set typing system." Song Hyŏn, *Han'gŭrŭl Kigyero Olk'e Ssŭgi* [Writing Hangul correctly with machines] (Seoul: Taewŏnsa, 1989), 75. See also Ch'oe Yujin, "Han'gŭrŭi kigyehwa, kŭ hŏmnanhaettŏn 100 nyŏn: t'ajagi" [The mechanization of Hangul: a challenging 100-year journey: typewriters], *Official Website of the National Archives of Korea*, accessed December 12, 2024, https://theme.archives.go.kr/next/koreaOfRecord/typewriter.do.

75. Yi tongsŏk, "Han'gŭrŭi p'urŏssŭgiwa moassŭgie taehayŏ-ch'oehyŏnbae sŏnsaengŭi 『kŭljaŭi hyŏngmyŏng』 ŭl chungsimŭro" [On Hangul's spaced and combined writing: focusing on Choi Hyun-bae's The revolution of letters], *Ch'ŏngnamŏmun'gyoyuk* 38 (2008): 401–427.

76. The armistice document for the Korean War (1950–1953) was printed using Kong's typewriter.

77. Kim T'aeho devotes an entire chapter, titled "An Ophthalmologist Obsessed with Typewriters, Kong Pyŏng-u," to examining the critical impact of Kong's inventions and writings on the post liberation Hangul typewriter market and the promotion of a Hangul-only writing culture. See Kim T'aeho, pp. 102–168.

78. Other models with more sets of keys but producing better-looking fonts were referred to as "style" or "aesthetic" typewriters.

79. Kong was inspired by the famous linguist and Hangul movement activist Yi Kuk-no (1893–1978; Yi studied in Berlin in the late 1920s and joined the North Korean regime after liberation) while treating him during the colonial period. The ophthalmologist was much more fluent in Japanese when it came to reading and writing, highlighting the distinction between spoken and written language. Like many Koreans, he had to properly learn the techniques of reading and writing Hangul only after liberation.

80. Kim T'aeho, 188–222.

81. Yi Ŭngho, *Migunjŏnggiŭi han'gŭl undongsa* [*History of the Hangul education movement during the period of U.S. interim military government in 1945–1948* (Seoul: Sŏngch'ŏngsa, 1974), 338.

82. Kittler, *Discourse Networks 1800/1900*, 28. Note that the reference to Kittler here is not arbitrary. Ch'oe's linguistic knowledge and very understanding of national language (*kugŏ*) itself were founded on those of his mentor Shinmura Izuru (1876–1967) and of Ueda Kazutoshi (1867–1937), the foundational Japanese linguists who played a significant role in establishing the national language (*kokugo*) in Japan.

83. That is, much like his former colleagues who were involved in script reform in the North.

84. This does not mean that sinograph education in schools disappeared overnight. It remained prevalent for quite some time, particularly in secondary education where advanced knowledge of sinographs was still considered necessary, lasting at least until the 1980s and 1990s.

85. Kim T'aeho, 174–181. Song also collaborated with mathematician Pak Yŏnghyo to improve his model. See Pak Yŏnghyo and Song Kyebŏm, "han'gŭl t'ajagiŭi kŏnbanbaeyŏre kwanhayŏ" [On the keyboard layout of Korean typewriters], *Chŏn'git'ongsinyŏn'gusobo* 9, no. 2 (1968): 75–89.

86. "Chŏn'ginoe han'gŭl t'ellet'aip'ŭ wansŏng" [Electronic brain Korean teleprinter complete], *Kyunghyang Shinmun*, December 2, 1958, 3. At the time, the term *cybernetic* was translated as "electronic brain" *(chŏnjanoe*).

87. Sŏ Hyŏnjin, "Taemangŭi 70nyŏndae-Han'gŭl Chŏnsanhwa (4)" [The pivotal 1970s: Hangul informatization (4)]. *Electronic Times*, August 20, 1998.

88. Siegert, "Cacography or Communication?," 29.

89. In 1983, Yi Chŏngo, South Korea's Minister of the Science and

Technology Agency, submitted a report titled "The Dawn of the Information Age" and declared the promotion of the information industry. "Chŏngbosanŏp yuksŏngbŏp mandŭlgir" [Enacting the information industry promotion act], *Dong-A Ilbo*, January 1, 1983. 1. For the popularization of the term "informatization" in Japan, see Yuriko Furuhata, *Climatic Media: Transpacific Experiments in Atmospheric Control* (Durham: Duke University Press, 2022), 60.

90. Becker, "Multilingual Word Processing," 96.

91. Kim Duhŭi, "P'ittamŭi tojŏnŭro segye chŏngsange: sillik'on paelliŭi k'ŏmp'yut'ŏ chaebŏl hwanggyubin paksa" [Becoming the top of the world after toil and moil: The computer mogul of the Silicon Valley Hwang Kyubin], *Science Dong-A* (June 1986): 54–57.

92. Xiao Liu, *Information Fantasies: Precarious Mediation in Postsocialist China* (Minneapolis: University of Minnesota Press, 2019).

93. "K'ŏmp'yut'ŏ chejak sŭk'ŭrin chimyŏn sinmun chesam·chesa sedaero" [Computer generated screen newspaper: Toward the third and the fourth generation], *Dong-A Ilbo*, April 1, 1982, 19. South Korea's everyday writing practice at the time was dualized between two styles of Hangul-only and mixed style, with the latter retaining cultural and social privileges.

94. "Editor's Note," *Microsoftware* (December 1983): 11.

95. Becker, "Multilingual Word Processing," 96.

96. Becker, 96.

97. Korean users had to employ one of two methods in the 1980s. They either purchased a separate hardware component called a Hangul card and connected it to their computers display Hangul characters, or they utilized special software enabling Hangul usage. Since the special software method consumed a significant amount of memory, many users opted to invest in Hangul cards. For further details on hardware, software, and Hangul cards, refer to sources such as "Han'gŭlk'adŭ-tokkaebiga molgo on han'gŭl yŏlp'ung" [Hangul card: *Hangul* fever *Tokkaebi* generated], *Science Dong-A* (December 1992): 139–145.

98. "Yŏngmun DNIS chegong-han'gukteit'a t'ongsin" [English DNIS service available: Korea Data Communication], *Science Dong-A* (June 1986): 180.

99. Dongoh Park, "The Korean Character Code: A National Controversy," *IEEE Annals of the History of Computing* 38, no. 2 (April–June 2016): 47.

100. "K'ŏmp'yut'ŏ chejak sŭk'ŭrin chimyŏn sinmun chesam·chesa sedaero," *Dong-A Ilbo*, April 1, 1982, 19.

101. Sŏ Hyŏnjin, *Ch'ŏŭm ssŭnŭn han'guk k'ŏmp'yut' ŏsa* [The first written history of Korean computers] (Seoul: Chŏnjasinmunsa, 1997), 15–20.

102. Yu Kyŏnghŭi, "Han'gŭljŏngbohwaŭi tangmyŏn'gwaje" [Challenges facing Hangul informatization], *Han'gukt'ongsinhakhoe haksuldaehoe charyojip* [1989 academic conference papers of the Korean Institute of Communications and Information Sciences] (1989), 50. This subcommittee was initially formed as a working group under ISO/TC 97B "Character Sets and Coding" in 1961. It was subsequently renamed ISO/TC 97/SC 2 in 1962 and later transferred to JTC 1/SC 2 with the title "Character Sets and Information Coding."

103. Yu Kyŏnghŭi, 50.

104. Yu Kyŏnghŭi, "Uriga mandŭn 'uri p'yojun'iŏya handa-k'ŏmp'yut'ŏyong han'gŭl mit hanjak'odŭ p'yojunjejŏnge puch'yŏ" [It must be 'our standard' that we create: on establishing a standard code for Korean and Chinese characters for computers], *Ch'ulp'anjŏnŏl* 59 (April 1990), 6.

105. Possibly, it was Dara Hekimi.

106. Yu Kyŏnghŭi, "Han'gŭljŏngbohwaŭi tangmyŏn'gwaje," 51–53.

107. Yu Kyŏnghŭi, 50; Yu Kyŏnghŭi, "Uriga mandŭn 'uri p'yojun'iŏya handa-k'ŏmp'yut'ŏyong han'gŭl mit hanjak'odŭ p'yojunjejŏnge puch'yŏ," 6.

108. K. T. Lua, "A Proposal for Multilingual Computing Code Standardization,"

Computer Standards and Interfaces 10, no.2 (1990): 118.

109. This information was available at the following website until 2022, but the site was inaccessible as of its retrieval on December 10, 2024: http://std.dkuug.dk/jtc1/sc2/wg2/docs/n1300.htm. However, it has been archived by the Internet Archive's Wayback Machine as of January 4, 2015: https://web.archive.org/web/20150104030439/http://std.dkuug.dk/jtc1/sc2/wg2/docs/n1300.htm.

110. Becker, "Unicode 88," 4.

111. Marshall J. Unger, *The Fifth Generation Fallacy: Why Japan Is Betting Its Future on Artificial Intelligence* (New York: Oxford University Press, 1987), 104. Here Ungar is quoting Dr. Uenohara Michiyuki, senior vice president of one of Japan's biggest computer manufacturers, Nippon Electric Company, as a "typical" example.

112. Yu Kyŏnghŭi, "Uriga mandŭn 'uri p'yojun'iŏya handa-k'ŏmp'yut'ŏyong han'gŭl mit hanjak'odŭ p'yojunjejŏnge puch'yŏ," 6.

113. Becker, "Unicode 88," 2.

114. This information is sourced from an email response I received from the ISO in August 2022 in response to my request for access to these earlier documents.

115. The first newspaper in history to use only Hangul script was *Tongnip Sinmun/The Independent* (1896–1899), which was in fact published in both Korean and English, and such style remained marginal for many decades.

116. Kim T'aeho, "Ŏsŏlp'ŭn chŏlch'ungesŏ saeroun mihagŭro: kongbyŏngut'ajagiŭi yusan'gwa 't'allemot'ŭl kŭlkkol'ŭi t'ansaeng" [From clumsy compromise to new aesthetics: The legacy of Kong Pyung-woo's typewriter and the birth of the non-square typeface], *Tongagŏmunhak* 77 (February 2019): 9–39.

117. Kwŏn Ŭnjŏng et al., *Hŭimangŭro kanŭn kil: Han'gyŏre 20nyŏnŭi yŏksa* [The road to hope: 20 years of Hankyoreh's history] (Seoul: Han'gyŏre Sinmunsa, 2010).

118. "Chŏnmyŏn karossŭgi chungangilbo santtŭt'an ach'imŭl yŏnŭn sinmun" [Full-page horizontal writing, *JoongAng Ilbo*, a newspaper that opens a fresh morning], *JoongAng Ilbo* (9 October 1995); "'Han'gŭl sedae sarojapcha' sinmundŭl taebyŏnsin" ['Let's capture the Hangul generation': Newspapers undergo a major transformation], *Sisa Journal* (21 November 1996).

119. "Imun'gyo ch'o·chunggwajŏnge k'ŏmp'yut'ŏ kyoyukch'uga" [Minister of Education Yi adds computer education to elementary and middle school curricula], *Kyunghyang Shinmun*, March 17, 1983, 1.

120. "Sop'ŭt'ŭweŏ chŏnmunjŏm: k'ŏmp'yut'ŏ 「tunoe」 p'anda" [Software specialty store: selling computer 'brains'], *Chosun Ilbo*, September 24, 1990, 23.

121. The developers of Arae-A Hangu were directly influenced by Kong, who provided these young venture entrepreneurs with office space.

122. Kang T'aejin, "Nanŭn k'ŏmp'yut'ŏ tongnibundongga" [I am a computer independent activist], in *Sesangŭn kkumkkunŭn chaŭi kŏsida* [The world belongs to those who dream] (Seoul: Hyŏnamsa, 1996).

123. Kang T'aejin, 14.

124. Kang T'aejin, 17.

125. Siegert, "Cacography or Communication?," 43.