

Antonio Manieri

# Writing and Rewriting Wooden Tablets in Seventh- and Eighth-Century Japan: The *Mokkan* Used for Learning

**Abstract:** The paper focuses on Japanese wooden tablets (*mokkan* 木簡), which represented the most relevant reusable medium in ancient Japan (seventh–eighth centuries CE). Indeed, the softness of certain wood types allowed these tablets to be easily smoothed and reused multiple times, until they became too worn and were transformed into thin sheets. By examining the tablets as physical objects, the paper aims to uncover how their material properties and the reuse potential of wood provided unique opportunities for learners, and to shed light on the cognitive mechanisms involved in mastering complex writing systems such as the Sinitic script.

## 1 Introduction

In the seventh and eighth centuries, Japan was a highly centralised bureaucratic state that had recently adopted writing technology. Within just a few decades, it managed to catch up with the continent’s expertise and produced a vast repertoire of documents.

In this centralised state, an officialdom, well trained in writing, reading, and copying, facilitated an intensive flow and interchange of information, leading some scholars to refer to it as an ‘administration by the use of written documents’.<sup>1</sup>

Various materials were used for writing: wooden tablets and paper were widespread, while silk and lacquer had more specialised applications. There was also limited use of stone, metals, pottery, and bamboo, but no evidence of that of clay, wax, or parchment.<sup>2</sup> Both wooden tablets and paper are writing tools and media that Japan adopted from China, along with the writing system itself and

---

1 Mesheryakov 2003, 187. For an extensive study on literacy in ancient Japan, see Lurie 2011.

2 A general introduction to Japanese writing supports is Tōno Haruyuki 2005. Specifically on the use of paper, see Tōno Haruyuki 1977. On the large corpus of paper documents preserved at the Shōsōin, see Sakaehara Towao 2011 and Lowe 2017.

many related cultural elements. The most commonly employed supports were also the most reusable ones.

In this paper, I focus specifically on wooden tablets, called *mokkan* 木簡 (literally ‘wooden slips’) in modern Japanese, which serve as examples of a reusable medium. Due to the softness of certain wood types, these tablets could be easily smoothed and reused until they became worn out, after which they were transformed into thin sheets.

The reusability of wood that can easily be scraped and reinscribed is well known, but for the sake of this volume, I would like to focus on the relationship between the reusability of this particular and widely used support, the technology of writing, and the process of learning, as evident in a corpus of ‘tablets for writing practice’ (called *shūsho mokkan* 習書木簡 in Japanese scholarship). The erasability of *mokkan* has been highlighted by David Lurie,<sup>3</sup> while the use of wooden tablets for writing practice has been studied by various Japanese scholars;<sup>4</sup> among them, Inoue Miyuki has highlighted how the content of these artefacts, particularly the inscribed characters, can illuminate some cognitive processes underpinning learning.<sup>5</sup> Some previous studies have focused on analysing the inscriptions to understand these mechanisms. However, this study seeks to broaden the scope of enquiry by shifting the focus from the content of the inscriptions to the physicality of the tablets themselves. I argue that these wooden tablets were not merely passive vehicles for recording characters; rather, they played an active role as ideal instruments for practising Sinitic script. By examining the tablets as physical objects, this contribution aims to uncover how their material properties and the reuse potential of wood provided unique opportunities for learners, thus offering valuable insights into the cognitive mechanisms involved in mastering complex writing systems.

This paper is therefore structured into three main parts. While certain aspects of *mokkan* production are well documented in Japanese-language studies, in order to enhance accessibility for readers unfamiliar with the Japanese manuscript culture, I first provide a brief introduction to wooden tablets in ancient Japan, including details of their discovery and their main types. Next, I delve into the technical aspects of reusing tablets, highlighting the methods employed to render them reusable. Finally, I focus on educational settings, presenting and discussing

---

3 Lurie 2011, 160–162.

4 See Tōno Haruyuki 1983, 167–183; Tōno Haruyuki 1990; Tōno Haruyuki 2003; Satō Makoto 1997, 429–465; Satō Makoto 1999, 170–177; Satō Makoto 2006; Arai Shigeyuki 2006; Watanabe Akihiro 2009; Inoue Miyuki 2017a; Inoue Miyuki 2017b.

5 Inoue Miyuki 2017a; Inoue Miyuki 2017b.

specific tablets that were used and reused for learning purposes, identifying distinct cognitive processes facilitated by reusable wooden surfaces.

Direct access to *mokkan* is not possible. Due to their high moisture content, exposure to the air upon unearthing results in rapid drying and subsequent deterioration. After excavation, the tablets are immersed in a dilute solution of boric acid and borax to prevent corrosion. After gentle cleaning with a soft-bristled brush and subsequent recording and textual analysis, the published wooden tablets are carefully stored in water in a usually restricted storage room.<sup>6</sup> Therefore, the manuscripts examined in this paper are all extracted from the freely available online Mokkanko – Wooden Tablet Database operated by the Nara National Research Institute for Cultural Properties, which consists of a corpus of around 57,000 tablets.<sup>7</sup> Fortunately, Mokkanko provides digitisation of the fragile wooden tablets in high definition, capturing details beyond direct observation and enabling advanced research while reducing the need for physical handling.

## 2 What are *mokkan*?

*Mokkan* are, by a simple definition, ‘documents written down by use of ink on wooden slips of varying size, usually not very big’.<sup>8</sup> Japan imported the use of wooden tablets from northern China, but, unfortunately, no surviving sources describe the production of *mokkan* in the ancient period.

The wood on which the slips are carved is mainly Japanese cypress (*hinoki* 檜, *Chamaecyparis obtusa*) or Japanese cedar (*sugi* 杉, *Cryptomeria japonica*). Other coniferous and some deciduous woods are also occasionally used. Either way, Japanese cypress and Japanese cedar are two native tree species that were, and still are, widespread throughout Japan. Both types of wood are favoured for their softness, which makes them easy to work with, as well as their resistance to

---

6 The condition of the tablets is evaluated approximately once a year. Baba Hajime 2023, 33; Wakiya Sōichirō 2010.

7 The Mokkanko database is available at <<https://mokkanko.nabunken.go.jp/>> (accessed on 6 January 2025). On the history of the database and some issues in the digitisation of *mokkan*, see Baba Hajime 2023.

8 Tōno Haruyuki 1983, 4. For a general introduction to *mokkan*, see Kitō Kiyooki 1984; Ōba Osamu (ed.) 1998; Satō Makoto 1997; Tōno Haruyuki 1977; Tōno Haruyuki 1983; Tōno Haruyuki 1997; Tōno Haruyuki 2005; Ishigami Eiichi, Katō Tomoyasu and Yamaguchi Hideo 1999. For remarks in English, see Farris 1998, as well as Piggott 1990; Van Goethem 2006; Manieri 2020; and Frydman 2023.

mould, insects, and weathering. The extant wooden tablets were preserved in a stable underground environment, guaranteed by the presence of abundant groundwater.<sup>9</sup>

The wooden tablets are inscribed, but never incised. The ink used is called *sumi* 炭, which consists mainly of three elements: (1) soot made by burning oils such as tung oil (*tōyu* 桐油, *Aleurites fordii* or *Vernicia fordii*), soybean oil, or wood such as pine; (2) animal glue; and (3) sometimes scents such as incense or medicinal herbs. This mixture was kneaded and then hardened. The resulting ink stick had to be ground up and dissolved in water before use.

Very few *mokkan* had come to light before 1961, the year when the first large corpus of wooden tablets was unearthed at the site of Heijō Palace in Nara. From that date onwards, around five hundred sites throughout the country, from northern Honshū to Kyūshū, have yielded approximately 470,000 exemplars from many different periods, especially from 700 to 800 CE, with a few examples dating to the mid seventh century.<sup>10</sup>

Around three-quarters of the *mokkan* come from Nara, but a significant number also come from the surrounding regions of other former capitals, such as Fujiwara, Nagaoka, and Heian; from the headquarters of certain provinces; and from Buddhist monasteries. In other words, areas of power with an advanced level of literacy. Some *mokkan* preserve only a few readable characters, while others contain texts that add substantially to what we know from paper documents.

*Mokkan* come in a variety of shapes and sizes, showcasing a diversity not seen in their Chinese counterparts.<sup>11</sup> Scholars at the Nara National Research Institute for Cultural Properties have elaborated a taxonomy of surviving tablets based on their shape: of the fifteen identified types, two of the most common are long strips with square corners, while others feature pointed ends or indentations that allow them to be attached to goods as tags. Most are unfortunately illegible fragments.<sup>12</sup>

---

9 Many fragments and shavings have been found in what are supposed to be the latrines of the administrative complexes. These tablets were found to contain organic materials traceable to human faecal residues, indicating that, even after becoming too thin to serve as writing surfaces, they were repurposed one final time as ‘toilet paper’: a remarkable example of concern for resource conservation, and of ancient recycling taken to its fullest extent (albeit not exclusively in the sense intended by this volume)!

10 On *mokkan* falling into disuse in favour of paper documents, see Imaizumi Takao 1994.

11 Farris 1998, 201.

12 A picture representing the fifteen shape types of *mokkan* is always included in *Mokkan kenkyū* 木簡研究, the journal of the Mokkan gakkai 木簡学会, an academic society dedicated to

In terms of their content, *mokkan* can be classified into three major types: labels or tags, which were attached to tax goods such as dried fish or seaweed, bales of rice, iron, cloth, and so on; documents in the strict sense, on which officials wrote all sorts of memoranda, notes, public documents, dispatches of men and materials, and so on; and slips for calligraphy practice and for studying.

As stressed by Joan Piggott, ‘*mokkan* are different from most documents preserved on paper. Unlike the paper record, they were never meant to serve as a formal witness to contemporary events’.<sup>13</sup> Nonetheless, they have significantly contributed to our knowledge of administration, material culture, and the movement of goods, supplementing the information derived from paper documents. Besides being precious artefacts, *mokkan* are also now fundamental sources for the reconstruction of historical fields dealing with everyday life and transactions.<sup>14</sup>

### 3 Technological aspects of reusing wooden tablets

In this section, I examine various aspects of the tablets’ reusability, exploring the progression from raw wood to tablet, from an unused tablet to an inscribed one, and from an inscribed tablet to a reused one, while also considering the by-products of this reuse, specifically the shavings. To gain a comprehensive understanding of this process, it is essential to elucidate the technical attributes of the tablet as a medium for reuse, along with the tools that facilitated this process, such as brushes and knives.

#### 3.1 Production of tablets

As far as the production of wooden tablets is concerned, we can rely only on the reconstructions of scholars. A milestone in the field of *mokkan* as archaeological objects and their materiality is an early study by Yamanaka Akira, who has

---

the study of ancient wooden documents. The image is also available from Mokkanko <[https://mokkanko.nabunken.go.jp/ja/?c=how\\_to\\_use](https://mokkanko.nabunken.go.jp/ja/?c=how_to_use)> (accessed on 6 January 2025).

<sup>13</sup> Piggott 1990, 451.

<sup>14</sup> In a recent contribution, Paula Curtis (2024) has shown how replicas of *mokkan* can be effectively employed in object-based teaching of premodern Japanese history. Through physical interaction with historical sources, students not only engage in metacognitive reflection but also overcome preconceived notions regarding the legibility of artefacts with textual content.

demonstrated that label tablets from the districts exhibit commonalities at the village level, while those produced in the capital area show commonalities at the office level. These commonalities were not limited to calligraphy and style but also evident in the physical aspects of the tablets under investigation, such as the methods of cutting and splitting. Tablets were not prepared in advance and distributed; instead, they were produced directly in the villages, households, and offices responsible for their content. In other words, officials did not simply take ready-made tablets and inscribe them; rather, they were involved in the production process itself, which involved three steps for mass-producing tablets: cutting long strips from boards by moving the blade orthogonally to the timber grain or splitting the strips by moving the blade along the grain; folding the strips using arm strength to reduce them to smaller individual tablets; and smoothing the tablets down to create a flat surface.<sup>15</sup>

Therefore, as we shall see below, knives were of primary importance in producing the tablets, serving both for cutting and shaping. The wooden strip could also be further shaped to create a pointed lower end or a shaped upper end, needed to tie a string to.

### 3.2 The desk of a *mokkan* scribe

Once the tablet was produced, it went to the official's desk. The Nara National Research Institute for Cultural Properties has reconstructed the tablet scribe's desk based on archaeological data.<sup>16</sup> In addition to the wooden slips, the desk includes a brush, usually with a bamboo or wooden handle tipped with animal hair; an ink stick; an ink stone (*suzuri* 硯, or in eighth-century sources 研) made of Sue 須恵 ceramic, used to grind the ink stick into powder;<sup>17</sup> a water dropper, called *suiteki* 水滴, also made of Sue ceramic, for replenishing the water in the ink

---

<sup>15</sup> Yamanaka Akira 1992.

<sup>16</sup> The reconstruction of the desk can be viewed as a permanent exhibition in the Government Office Reconstruction Display Room at the Nara Palace Site Museum (Nara Palace Site Historical Park) and in the Nara Prefecture Complex of Man'yo Culture (Asukamura, Nara Prefecture). See also Nara bunkazai kenkyūjo 2010, 10.

<sup>17</sup> Ink stones and water droppers were typically made of ceramic, specifically Sue ware. Ink stones exhibit a variety of shapes, ranging from simple round slabs to more elaborate forms, including those resembling birds and sheep. However, numerous ink stones unearthed in Nara are shaped like inverted bowls, and actually could have originally served as bowls before being repurposed. Additionally, several jar shards discovered in Nara were similarly adapted for use as ink stones. For a discussion of ink stones, see Nara bunkazai kenkyūjo 2006; Nara bunkazai kenkyūjo 2007b.

stone, necessary to dissolve the ink; and a penknife, called a *tōsu* 刀子, which is a small knife used to scrape the surface of a wooden tablet to erase the writing on it. Other occasional tools included metal or wooden seals and counting rods, which were small bars, typically 3 to 14 cm long, used for calculation in East Asia.

The *tōsu* penknife was undoubtedly the most significant tool among these implements for making a wooden slip usable and reusable. The fact that the penknife was an essential tool in the work of the scribe and, more generally, of the writer is attested by a phrase used to describe the activities of copyists, *tōhitsu* 刀筆, which means ‘knife and brush’.

An early mention of this term can be found in a memorial to the sovereign issued in 757 by the Great Council of State (Daijōkan 太政官), recorded in the *Shoku Nihongi* 続日本紀 (*Chronicle of Japan, Continued*, 797), Book 20, Tenpyō hōji 1 (757).12.9:

正五位上大和宿禰長岡・從五位下陽胡史真身、並養老二年修律令功田各四町。外從五位下矢集宿禰虫麿・外從五位下塩屋連吉麿、並同年功田各五町。正六位上百濟人成同年功田四町。五人、並執持刀筆、刪定科条。

Yamato no Sukune Nagaoka, senior fifth rank, upper grade, and Yako no Fuhito Mami, junior fifth rank, lower grade, [are both owed] 4 *chō* [1 *chō* = c. 0.9917 ha] of merit rice fields each for compiling penal and administrative codes in the second year of the Yōrō era [718]. Yazume no Sukune Mushimaro, outer junior fifth rank, lower grade, and Shioya no Muraji Kichimaro, outer junior fifth rank, lower grade, [are both owed] 5 *chō* of merit rice fields each in the same year. Kudara no Hitonari, senior sixth rank, upper grade, 4 *chō* of merit rice fields in the same year. All five of these officials, *holding a brush and a knife, amended the rules and the articles.*<sup>18</sup>

The memorial aimed to record the rice fields granted to officials who had performed meritorious deeds. The five officials entrusted with amending the penal and administrative codes are specifically described as ‘holding a brush and a knife’. This expression emphasises that it was not only necessary to be skilled in using a brush, but also in handling a knife.

Examples of penknives used for writing have been preserved as archive objects and as artefacts yielded by archaeological discoveries.

Some highly valuable knives are now preserved at the Shōsōin 正倉院 repository, the storehouse of the Tōdai 東大 monastery in Nara, now under the supervision of the Imperial Household Agency. These feature handles crafted from materials such as ivory, dark-coloured or mottled rhinoceros horn, amber, black stone,

<sup>18</sup> Aoki Kazuo et al. (eds) 1992, 242. My emphasis. All translations from Japanese to English are mine, unless otherwise noted.

*muku* 棕 (*Aphananthe aspera*), black persimmon, red sandalwood, or Japanese apricot tree wood; and sheaths made of *muku*, black persimmon, jujube wood, bronze, *bachiru* 撥鏤 (engraving design motifs on the dyed surface of the ivory), tortoiseshell, water buffalo horn, rhinoceros horn, gilded silver, or lacquer. Both handles and sheaths are often adorned with tree bark, bronze, silver or gold fittings, gemstone decorations, or mother-of-pearl inlays.<sup>19</sup>

However, simpler and more affordable *tōsu* knives made of iron, probably with wooden handles, have been excavated at various sites, often in the proximity of tablet mounds, such as artefact J-596, found at Netsu, Nagano Prefecture, and now preserved at the Tokyo National Museum.<sup>20</sup>

### 3.3 The product of scraping: Shavings

The items in the Shōsōin collection and the carving penknives discovered at several archaeological sites are not the only evidence for the scraping of wooden tablets. The most tangible proof comes from the wood shavings (*kezurikuzu* 削屑) found in almost all tablet mounds.

These shavings, which demonstrate their resistance to moisture and water, represent 80 per cent of the total repertoire and show that the erasure and reuse of *mokkan* did indeed occur in ancient Japan.

Moreover, these shavings should not be confused with *mokkan* fragments (usually referred to as *saihen* 細片 in Japanese), which are the result of crumbling or a more incisive cut that is not a simple scraping and is not intended to ‘clean up’ the tablet for reuse.

Inscribed shavings hold particular significance as evidence of reuse. Some of these shavings exhibit further recycling of materials, bearing inscriptions on both sides.<sup>21</sup> This dual-sided use underscores the resourcefulness and practicality of wood use, reflecting broader practices of preservation and character training, as is elaborated upon later in this paper.

<sup>19</sup> The numerous penknives preserved at the Shōsōin can be consulted in the Shōsōin Treasures Database at <<https://tinyurl.com/dtkebe84>> (accessed on 6 January 2025).

<sup>20</sup> See the image of Tokyo National Museum, artefact J-596 in ColBase: Integrated Collections Database of the National Institutes for Cultural Heritage, Japan, <[https://colbase.nich.go.jp/collection\\_items/tnm/J-596?locale=ja](https://colbase.nich.go.jp/collection_items/tnm/J-596?locale=ja)> (accessed on 6 January 2025).

<sup>21</sup> See the examples via Mokkanko at <<https://mokkanko.nabunken.go.jp/ja/5BASNI33000399>> or <<https://mokkanko.nabunken.go.jp/ja/5BASNB32000666>> (accessed on 6 January 2025).

### 3.4 The reasons for scraping

In general, tablets were scraped for three main reasons. The first, intuitive one is the immediate correction of material errors. Another reason is the updating of data. For example, the various *mokkan* and shavings related to the evaluation and promotion of officials, unearthed at sites such as SD4750 and SD1525, in the correspondence of the residence of Prince Nagaya 長屋 (684–729), as well as at the SD4100 site, at what must have been the headquarters of the Ministry of Procedures (Shikibushō 式部省), fall into this category. In this case, each *mokkan* functioned as a sort of personal file, with more or less stable data, such as family name, personal name, and family register (*koseki* 戸籍), along with other variables such as age and, above all, an indication of rank and office, as well as any changes in this status since the previous year. To update this personal file, it was sufficient to scrape away the information that needed to be changed with a penknife, and then rewrite it.<sup>22</sup>

Finally, because wooden tablets were not usually meant for long-term preservation, they were scraped clean to allow for new inscriptions once the original message was no longer needed. For instance, after serving as a label accompanying tribute from the province to the capital, a wooden tablet could be reused for other purposes. Tablets were inscribed with new content, which could be analogous to the previous content or not.

When used for practising characters, there were two slightly different forms of tablet reuse: tablets previously used for documents or labels were scraped and repurposed for character practice, while tablets specifically designated for practice were reused for repetitive writing exercises and memorising characters. In both scenarios, the tablets were used for learning and practice and never intended for preservation.

From this point on, I focus on these ‘tablets for writing practice’ in order to show the correlation between tablet reuse and writing technology.

---

<sup>22</sup> Nara bunkazai kenkyūjo 1986, 13–38. A simpler presentation is in Nara bunkazai kenkyūjo 2018, 118–121.

## 4 Using and reusing wooden tablets in educational settings

Having examined the material aspects of reusing wooden tablets, I now turn to illustrating the deliberate use of wooden tablets as a reusable medium for writing and, consequently, as a preferred learning tool.

In my opinion, there are two primary reasons for the preference of wooden tablets over paper: first, their reusability helps to minimise the waste of paper associated with what is inherently a transient activity; second, the Chinese writing system comprises an extensive number of characters, exceeding 50,000, which necessitates continuous practice and memorisation.

For clarity, it is important to note that, in the Chinese writing system, each grapheme consists of a specific number of strokes written in a prescribed order. Certain characters, referred to as ‘radicals’, cannot be further simplified and serve as components of other characters. When learning a new character, whether in ancient or modern contexts, the learner must understand the radical and stroke order, both of which are essential for memorisation.

The Mokkanko contains 2,414 out of 56,831 recorded items as tablets for ‘calligraphy practice’.<sup>23</sup> This is just over 4 per cent of the total.

These tablets were unearthed at a number of sites throughout the country. A significant proportion originate from the capitals of Asuka, Nara, and Nagaoka. Consequently, they span a temporal range from the late seventh century to approximately 794 CE, which marks the year of the capital’s relocation from Nagaoka to Heian. However, a large number of these tablets were also unearthed at various provincial office sites, as well as at Dazaifu (a sort of super-provincial body located on the island of Kyūshū), and at several monastery areas, including Yakushi 薬師 monastery in Nara, Kannon 観音 monastery in present-day Tokushima Prefecture, and Tajima Kokubun 但馬国分 monastery in present-day Hyōgo Prefecture. This evidence suggests that the practice had disseminated throughout all the cultural and power centres of the archipelago.

Following the taxonomy proposed by Watanabe Akihiro,<sup>24</sup> it is possible to distinguish between tablets containing texts or portions of a text that can be read as coherent texts, and those containing individual characters that do not form a

---

23 Other categories, according to the content of the database, include Document, Tag, Shipping Tag, Voucher, Scroll Axle, Document Sealer, Wooden Utensil, Shogi Piece, Spell, Stupa-shaped Grave Marker, Sutra-inscribed Stupa Shape, Other.

24 Watanabe Akihiro 2009.

complete text. The former can be further divided into those containing quotations from Chinese classics and legislation, phrase books, Japanese poems, and texts without a specific source. In the first group, tablets contain complete sentences or texts; in the second, they do not, rather providing a unique glimpse into the techniques used for learning and writing characters. This is why I focus on the latter group, which not only is less investigated but also more readily lends itself to the deliberate practice of reusing a tablet as a standard writing procedure, rather than due to any mechanical error necessitating erasure and rewriting.

## 5 Tablets for learning characters and words

This section presents five distinct types of wooden tablets used for learning practice, with a particular focus on the acquisition of characters. This analysis is based on tokens extracted from the Mokkanko – Wooden Tablet Database. I first introduce each source with regard to its material characteristics and textual content. Subsequently, I elucidate the characters targeted in the learning practice and discuss the features of the acquisition strategy employed.

### 5.1 Tablet with miscellaneous, unrelated characters

The first example under investigation comes from the *mokkan* no. 967, unearthed at excavation SK1153 at the Asuka Ike Site, North Section in Asakamura, Nara Prefecture.<sup>25</sup>

This rectangular slip, made of Japanese cypress wood, was cut along the cross grain and measures c. 224 × c. 15 × 5 mm. The top edge is shaved, with visible cutting marks from before its final shaping, while the bottom edge is folded, and the left and right sides are split. Notably, the tablet, 5 mm thick, is heavily worn, which suggests extensive use over time.

On the recto, after a small blank space, there may be about thirteen characters inscribed in a line, of which six are readable, five may be marked as missing, and two are inferred.

On the verso, after a space for an unreadable character, the upper half has a double-line indented portion of text, followed by another line of unreadable char-

---

<sup>25</sup> For the excavation report, see Nara bunkazai kenkyūjo 2007a. A photographic reproduction is available from Mokkanko: <<https://mokkanko.nabunken.go.jp/ja/5BASNJ30000967>> (accessed on 6 January 2025).

acters. The indented section consists of two lines of partially overlapping writing, the right one with two readable and three missing characters, the left one with two readable and four missing characters.

The content of the *mokkan* is as follows:<sup>26</sup>

R. ○具具皮□留无□各□□乃?□□受?□

○□□□夫秦

V. □

○□□□□□□

□□□夫○奉□

The characters inscribed, in the order of their appearance and accompanied by annotations concerning their meaning, are 具 ('tool', two occurrences), 皮 ('leather'), 留 ('to stay'), 无 ('to be without'), 各 ('every'), 乃 ('then'), 受 ('to receive'), 夫 ('husband'), 秦 ('Qin dynasty'), and 奉 ('to offer').

The characters in question do not exhibit any discernible link at the level of the graph, with the exception of some superficial similarities between the final two characters. Nor do they show any sound or semantic connection. Consequently, the characters have been assembled on the basis of their probable occurrence in a text that was either in progress or in the process of being copied.

## 5.2 Tablets with a single repeated character

The rest of the examples I analyse do not, however, present unrelated characters, but rather characters that are associated in some way.

The second example (Fig. 1) is *mokkan* no. 1141, unearthed at excavation SK1153 at the Asuka Ike Site, North Section.<sup>27</sup>

<sup>26</sup> In this article, the following conventions are used for reproducing the inscription on the wooden tablet. R. and V. stand for 'recto' and 'verso', respectively, even in cases where it is not clear which of the sides is the front or back. The big circle ○ indicates a gap, or space with no writing, originally on the tablet; the small circle ◦ indicates the presence of a transverse hole in the tablet. Each square □ stands for a single missing character. A question mark ? placed to the right of a character indicates uncertainty about its reading. Text enclosed in 【 】 brackets runs in the opposite direction (i.e. upside down) from the rest. Linguistic data from Old Japanese follows Vovin 2020, and from Medieval Chinese, Baxter and Sagart 2014.

<sup>27</sup> For the excavation report, see Nara bunkazai kenkyūjo 1999, esp. 8. A photographic reproduction is available from Mokkanko: <<https://mokkanko.nabunken.go.jp/ja/5BASNJ30000802>> (accessed on 6 January 2025).

It is a small shaving (another shaving of the same tablet is item no. 1142, unearthed at the same site), with eight characters, of which five are readable, one inferred, and two unreadable.

The text of the *mokkan* reads as follows:

□得?得得得得得□□

The single repeated character 得 is pronounced *tok* in Medieval Chinese and means ‘to obtain, to have, to own’, or is employed as a modal adverb indicating uncertainty, possibility, or a mild suggestion. Additionally, the character is employed in Old Japanese as a phonogram for the syllables *u* or *tə* and disyllabic *təkə*. The repetition of a single character multiple times over serves to illustrate how mechanical repetition was used as a pedagogical technique for acquiring characters.



**Fig. 1:** *Mokkan* no. 1141, shaving with a single repeated character; courtesy of Mokkanko – Wooden Tablet Database, Nara National Research Institute for Cultural Properties.

From a cognitive perspective, repetition is an inevitable component of character acquisition. Even in the present era, the initial stage of education often entails rote learning of characters. It is evident that learners employ a plethora of memory techniques; however, to truly engage with the written character, use of a brush and tablet (or, in the modern era, a pen and paper) is required. The tactile experience of using the brush undoubtedly reinforced memorisation, and with continued practice, the process would become increasingly natural.

An interesting aspect of this type of slip is that some shavings scraped from the same tablet bear the same character and have been discovered at the same site. Of particular note is site SK514 26-D in Dazaifu, Fukuoka Prefecture, where a number of shavings bearing the same repeated character have been discovered. By way of illustration, the shavings designated nos 1-77, 1-78, 1-79, 1-80, and 1-81 all display the identical character 貳 ('two', a variant of 二 frequently used in legal documents), which is repeated twice in each of the aforementioned shavings, with the exception of 1-78.<sup>28</sup> Items nos 1-77 and 1-78 are composed of the same coniferous wood, while items nos 1-79 to 1-81 are made of Japanese cypress. This exemplifies the use of the same character on different tablets. The excavation report provides numerous examples of this type,<sup>29</sup> and it is noteworthy that this slip is evidence of writing practice in a peripheral office of the kingdom, such as the Dazaifu Office, which is situated near present-day Fukuoka.

### 5.3 Tablets with visually related characters

The following examples all concern tablets with characters that are related visually. In this regard, it is important to clarify that individual Chinese characters include components, known as 'radicals', that have individual meanings. Radicals are basic characters that cannot be simplified any further. They often define a broad category, giving either phonetic or semantic clues, and are also used as an index to classify other characters and words. Moreover, some characters that are not radicals can also be found within more complex characters; these are known as 'component characters', or simply 'components'.

<sup>28</sup> The Mokkanko database does not provide an image of the shavings, which can be found in the excavation report in *Kyūshū rekishi shiryōkan* 1976, 57.

<sup>29</sup> *Kyūshū rekishi shiryōkan* 1976, 57-61, 65-74.

The third example, *mokkan* no. 4688, was unearthed at excavation SD4100 at the Heijōkyū Miyashiro Tōnangū Site in Nara.<sup>30</sup>

It is a rectangular item, made of Japanese cypress cut along the cross grain, measuring c. 235 × c. 29 × 5 mm, with upper incision, and secondary incision on the left and right sides. The item has readable characters on both sides: nine on one side and eleven on the other.

The text of the *mokkan* reads as follows:

R. 青青秦秦謹謹申

V. 謹論語諫計計課課謂誰

The recto appears to be an exercise in four different characters: 青 ('blue-black; green') and 秦 ('Hata (Pata) family'),<sup>31</sup> both repeated three times; 謹 ('taciturn; respectful'), repeated twice; and 申 ('to state; to declare'), written only once.<sup>32</sup> It therefore combines the two cases seen above: characters that do not necessarily have a link, are repeated several times, and are probably taken from a text to be copied, composed, or filled in.

The other side contains eleven different characters, sharing the same radical for 'speech' (number 149 in the modern classification), which is placed to the left of other elements: 謹 ('taciturn; respectful'); 論 ('statement'); 語 ('to tell'); 諫 ('to admonish'); 許 ('to allow'); 計 ('to formulate'); 課 ('examination'); 誘 ('to induce'); 謂 ('to say'); 謂 ('to judge'); and 誰 ('who?').

The fourth example (Fig. 2) is a long tablet with a rectangular shape, of Japanese cypress, cut along the cross grain, measuring c. 475 × 30 × 5 mm. It was unearthed at excavation SD4750 at the well-known Prince Nagaya's Residence, in Nara.<sup>33</sup>

There are twenty-four characters interspersed with blank spaces on the recto, and twenty-three readable characters and two unreadable characters interspersed with blank spaces on the verso.

**30** For the excavation report, see Nara bunkazai kenkyūjo 1967, esp. 19. A photographic reproduction is available via Mokkanko: <<https://mokkanko.nabunken.go.jp/en/6AAICJ59001091>> (accessed on 6 January 2025).

**31** The character 秦 in Chinese is used for Qin (dynasty), but in Japan it can also be used to transcribe the family name Hata (Pata according to the Old Japanese reconstructed pronunciation).

**32** The characters 謹申 are usually used in compound to mean 'I humbly declare'.

**33** For the excavation report, see Nara bunkazai kenkyūjo 1990, esp. 15. A photographic reproduction can be found on Mokkanko: <<https://mokkanko.nabunken.go.jp/ja/6AFITD11000189>> (accessed on 6 January 2025).

Ten characters on the recto and eight on the verso run upside down as compared to the rest.

The text of the *mokkan* reads as follows:

R. 娘婚婚婚民眠暗暗暗○【婚】○婚○【受】○婚婚昏○【受号别】○受○【受受毆受受】  
 V. 婚婚婚婚婚婚娘○娘人○【娥】○娘○【娥】○娘妹妹○【毆】○妃婚○【綬綬純純歲】



**Fig. 2:** *Mokkan* with visually related characters; courtesy of Mokkanko – Wooden Tablet Database, Nara National Research Institute for Cultural Properties.

Of the forty-seven token characters, we can identify nineteen types – in order of number of occurrences, indicated in brackets – as follows: 婚 (‘marriage’, 12), 受 (‘to receive; to accept’, 7), 娘 (‘maid’, 4), 暗 (‘dull vision’, 3), 純 (‘silk thread all of one colour; pure; genuine’, 2), 娥 (‘slender’, 2), 毆 (‘to beat with a stick’, 2), 娘 (a character used in female given name, 2), 妹 (a graphic variant for 夫, ‘husband’,

2), 綬 ('seal-ribbon', 1), 歲 ('year', 1), 眠 ('to repose', 1), 婚 ('to come across; to join with', and a variant for 妬, 'to be jealous', 1), 昏 ('dusk; benighted', 1), 別 ('to separate', 1), 妃 ('wife, spouse; imperial consort', 1), 民 ('commoner', 1), 号 ('to designate, to name', 1), and 人 ('person', 1).

Sorting out the logic of the inscription is not easy, but the following observations can be made.

First of all, although many characters appear to refer to the semantic domain of marriage, some are completely unrelated. Most of the characters written upside down appear unrelated to the rest of the text.

Second, some groups of characters have the same radical in the left position: 婚, 娘, 媵, 媼, 媾, and 妃 have the same radical 女 ('woman'); 昏 and 眠 have the same radical 目 ('eye'); 綬 and 純 have the same radical 糸 ('thread').

Third, some characters are a component but not the radical of another character: 民 is the right component of 眠 (whose radical is the left component 目); 受 is the right component of 綬 (whose radical is the left component 糸).

Furthermore, 昏 and 婚 have the same right component, 昏; and 受 and 綬 share the same component 又 (which is radical only in 受) with 毆, whose radical is 攴.

Finally, 号 resembles the left component of 別.

To sum up, although some characters share the same radical, it seems that, unlike the previous tablet, this one focuses on the similar appearance of the characters or the sharing of an element that is not necessarily the radical. Accordingly, the learning technique prioritises visual memorisation, encompassing not only the radicals that facilitate the classification of characters but also the elements that prove challenging for learners and warrant specific attention.

The same type of exercise or learning process is observed in numerous shavings. Here, I will limit the examination to two examples. The first item is a shaving unearthed at excavation SD5100 at the Nijō Ōji Site in Heijōkyō (Nara), which reads as follows:

紫袋紫袋紫袋○袋

An alternation can be observed between 紫 ('purple') and 袋 ('sack'), which do not share the same radical but may exhibit some resemblance that could lead to con-

fusion. This is not the only shaving from excavation SD5100; there are fourteen others with similar characteristics.<sup>34</sup>

The second shaving under investigation was found at excavation SD5300 at the Nijō Ōji Site. It reads as follows:

○□遣還  
□○還○還○□

Here, the two characters 遣 (‘to dispatch’) and 還 (‘to turn round’) indeed share the same radical of 辵 (‘walk’) (or 辵, number 162 in the modern classification). In this case, the shaving is part of a much larger repertoire, comprising over one thousand shavings, many of which contain a single repeated character.<sup>35</sup> This illustrates how the reuse of wooden tablets was particularly prolific.

#### 5.4 Tablets with disassembled characters

The pertinent example in this section (Fig. 3) is shaving no. 3692, unearthed at excavation SD4750 at Prince Nagaya’s Residence.<sup>36</sup>

The shaving’s text reads as follows:

寺寺寺十一寸時

The shaving contains seven characters. The first three are the same, 寺, which means ‘monastery’. Although the first instance is not fully legible, it can still be easily recognised. The subsequent three characters are 十 (‘ten’), 一 (‘one’), and 寸 (‘inch’). All three are in fact components of the character 寺 (‘monastery’), whose radical is 寸.

The seventh character 時, meaning ‘time’, contains the character 寺, adding a further component, namely 日, the radical for ‘sun’.

<sup>34</sup> For the excavation report, see Nara bunkazai kenkyūjo 1997. A photographic reproduction of the shaving can be found on Mokkanko: <<https://mokkanko.nabunken.go.jp/en/6AFIUOZ0006548>> (accessed on 6 January 2025).

<sup>35</sup> For the excavation report, see Nara bunkazai kenkyūjo 1995. A photographic reproduction of the shaving can be found via Mokkanko: <<https://mokkanko.nabunken.go.jp/en/6AFIUOZ0006548>> (accessed on 6 January 2025).

<sup>36</sup> For the excavation report, see Nara bunkazai kenkyūjo 1993, esp. 43. A photographic reproduction can be found via Mokkanko: <<https://mokkanko.nabunken.go.jp/ja/6AFITC11002432>> (accessed on 6 January 2025).

In other words, the character for ‘monastery’ has been disassembled into its constituent components, arranged in the correct stroke sequence. The character for ‘monastery’ in turn is employed as a constituent element within another, even more complex, character, namely 時 (‘time’).

This tablet exemplifies the use of stroke-order rules as a learning strategy to facilitate the memorisation of characters. Indeed, at the outset of their learning, students were compelled to deliberately deconstruct each character into its constituent parts. Consequently, this facilitated the active production and recognition of the characters in question.



**Fig. 3:** *Mokkan* no. 3692: *mokkan* with a disassembled character; courtesy of Mokkanko – Wooden Tablet Database, Nara National Research Institute for Cultural Properties.

## 5.5 Tablets with semantically related characters

Wooden tablet no. 3122, unearthed at excavation SD5050VII at the Chiisako Section of the Heijōkyū site, in Nara,<sup>37</sup> is made of cypress, cut along the straight grain. It measures 229 × 24 × 2 mm and features a straight upper edge and an arcuate lower edge. The lower extremity is also perforated by a hole at the centre.

The item is, in fact, part of a set of seven wooden tablets perforated with a hole, nos 3121 to 3127, which were originally all plates of a cypress fan frame. Moreover, all the plates have the same handwriting.



**Figs 4a–b:** *Mokkan* no. 3122: *mokkan* with semantically related characters; courtesy of Mokkanko – Wooden Tablet Database, Nara National Research Institute for Cultural Properties.

<sup>37</sup> For the excavation report, see Kitō Kiyooki 1985, 122. A photographic reproduction can be found on Mokkanko: <<https://mokkanko.nabunken.go.jp/ja/6ALTTL47000030>> (accessed on 6 January 2025).

The item under investigation has eight readable characters on the recto (Fig. 4a) and six characters on the verso (Fig. 4b), where one is not clearly legible but can be inferred. The text of the *mokkan* reads as follows:

R. 官宮中大式民治件

V. 有官宮口中<sup>2</sup>大式

The last character on the recto, 件, which is a measure word for counting articles, items etc., and the first character on the verso, 有, which means ‘there is; what there is; to have’, are not strictly related to the other characters, but are commonly used in administrative documents. The seven characters from 官 to 治 on the front and the five characters from 官 to 式 on the reverse are certainly part of the names of institutions of the eighth-century state.

The character 官 refers to the two councils of the state, namely the Daijōkan 太政官 (‘Great Council of State’), and the Jingikan 神祇官 (‘Council of Kami Affairs’). The characters 宮, 中, 大, 式, 民, and 治 respectively refer to the Kunaishō 宮内省 (‘Ministry of the Palace’); the Nakatsukashō 中務省 (‘Ministry of Central Affairs’); the Ōkurashō 大藏省 (‘Ministry of the Treasury’); the Shikibushō 式部省 (‘Ministry of Procedures’); the Minbushō 民部省 (‘Ministry of Popular Affairs’); and the Jibushō 治部省 (‘Ministry of Civil Administration’).

In other words, the tablet appears to function as a plate for exploring the vocabulary associated with the ‘two councils and eight ministries’ (*nikan hachishō* 二官八省) of the state, despite the absence of two characters representing the Hyōbushō 兵部省 (‘Ministry of Military Affairs’) and the Gyōbushō 刑部省 (‘Ministry of Justice’). These terms are indispensable for all officials, and it is entirely reasonable that learners would be required to write and memorise them.<sup>38</sup> In this instance, however, the emphasis is not on a single character or on the graphical representation of characters. In contrast, a semantic domain is provided, with the characters 宮, 中, 大, 式, 民, and 治 all being co-hyponyms of the hyperonym 官.

Furthermore, other tablets contain terms that are correlated by a semantic relationship of co-hyponymy, meronymy, and antonymy, and which refer to different semantic domains. These include seafood, plants, cereals, various products, or ranks, as well as more ‘empty words’, such as pronouns and deictics.

It can thus be seen that memorisation of specialised terms was a common practice among young officials in training. Indeed, some didactic tools were also designed to assist learners in this process, with the earliest examples of thematic

<sup>38</sup> Nevertheless,

*inryō* 職員令 (*Law on Officialdom*). For more on the law, see Inoue Mitsusada et al. (eds) 1976, 157–196.

dictionaries in the Japanese tradition, known as *kangoshō* 漢語抄, featuring a macro-structure comprising words classified according to lexical families in relation to co-hyponymy or meronymy.<sup>39</sup>

## 6 Tablets to learn math

I would like to add a few words about the tablets and shavings that record characters for numbers. They represent a different type of exercise, only partially related to characters and texts in the strictest sense: namely arithmetic. These items were used to learn mathematical rudiments by means of the Chinese multiplication table, which is a necessary foundation for using ‘rod calculus’.

The Chinese multiplication table consists of forty-five phrases that chant the times tables in a distinctly rhythmic way.

The table starts with the line 九九八十一, where 九 is the character for 9, 八 for 8, 十 for 10 or the multiples of 10, and 一 for 1, so that 九九 means 9 times 9 and 八十一 means 81 (literally ‘8 multiples of 10 [and] 1’). In other words, the table starts with the largest number,  $9 \times 9$  (‘nine nines’ equal 81), and progresses downward. Since  $9 \times 9$  was chanted as *ku-ku* in Japanese, literally ‘nine-nine’, it is often referred to as the ‘nine-nine table’, or simply ‘nine-nine’.

The example I would like to present here is wooden tablet no. 3604, unearthed at excavation SD285 at the Sakyō Shichijō Sanbō Sanchō Site in Nagaoka,<sup>40</sup> which, cut along the straight grain, is a fragment measuring about  $238 \times 35 \times 3$  mm. The upper edge is perforated by a hole.

The item under investigation contains three groups of characters:

○九々八十一○八九七十二○七九六十□□

The first group consists of the first line of the multiplication table, 九々八十一, where 々 is the so-called repetition symbol, used to repeat the preceding character.

The second group consists of the second line of the multiplication table, 八九七十二, namely 八九 (‘eight nines’) [equal] 七十二 (‘seventy-two’).

The third group is 七九六十□, namely 七九 (‘seven nines’) [equal] 六十□ (‘sixty[-three]’).

<sup>39</sup> Manieri 2022.

<sup>40</sup> For the excavation report, see Suzuki Hiroshi and Yoshizaki Shin 1991, 27. A photographic reproduction can be found via Mokka: <<https://mokka.nabunken.go.jp/en/MK013027000204>> (accessed on 6 January 2025).

Interestingly enough, some of the shavings also reveal mathematical errors – or perhaps memory lapses.

To sum up, I wanted to include this type of item in the study because, even though the focus here is not on the characters themselves, the cognitive process of memorisation through writing on a scraping tablet seems closely related to the practices involved in writing exercises. The repetition and mechanical use of the medium suggest similar strategies for retaining knowledge.

## 7 Conclusions

The analysis presented in the preceding sections yields several key insights.

First, from the perspective of the materiality of tablets, it is evident that *mokkan* often originated from the repurposing of objects initially intended for entirely different uses, such as fans. The extant tablets are frequently in a fragile and worn state, suggesting they were used to the point of near exhaustion, as exemplified by *mokkan* no. 967, discussed in Section 5.1. The presence of shavings bearing the same character, repeatedly scraped from the same tablet, stands out as a particularly notable feature of these reusable tablets used for writing practice.

Regarding the locations where these tablets (and their shavings) were discovered and produced, it is noteworthy that they were buried in diverse settings, ranging from the capital to provincial areas, and from administrative centres to religious sites. This distribution indicates that the production and use of such tablets were not confined to the places where officials received their training. The practice of writing was undoubtedly a continuous activity, particularly for scribes who were required to maintain their proficiency through regular practice.

From a content perspective, the example in Section 5.1 suggests that some tablets were used for exercises that consisted in practising characters taken from texts in process of being copied or composed. Section 5.2 highlights the technique of mechanical repetition as a fundamental method for learning characters. The examples in Section 5.3 employ one or more components of a character as visual aids for memorisation. In addition to emphasising radicals, which serve as classification criteria, these examples also focus on elements that share visual similarities, thereby helping to prevent confusion among learners and encouraging careful study.

The example in Section 5.4 underscores the importance of adhering to stroke-order rules to facilitate character memorisation. Learners, especially at the beginning of their writing education, would break down characters into their constituent parts, actively producing and recognising them through practice. The

example in Section 5.5 introduces a semantic domain, reminiscent of the thematic organisation found in educational texts such as primers, dictionaries, encyclopaedias, and commentaries from the early Japanese tradition. Finally, Section 5.6 illustrates a parallel learning process based on memorisation and repetition, though focused on number characters for calculations rather than Chinese characters, strictly speaking.

Quantitatively, certain types of exercises appear more frequently than others. The most prevalent type, accounting for at least 40 per cent of the examples recorded in the Mokkaiko – Wooden Tablet Database, corresponds to the repetition-based exercise described in Section 5.2. In contrast, there are relatively few examples of the type discussed in Section 5.4. However, in many instances, two or more techniques were employed within the same tablet. Numerous examples (at least 30 per cent) involve tablets where multiple unrelated characters are repeated several times, creating a fragmented mixture of the approaches seen in Sections 5.1 and 5.2.

In conclusion, from a cognitive standpoint, repetition, visual memorisation, semantic association, and stroke order are fundamental mechanisms to solidify the retention of characters. In the context of ancient Japanese education, the rote learning of characters represents an essential preliminary and foundational stage. Nevertheless, in practice, it constitutes one of the most onerous tasks of officials engaged in the daily activities of reading, compiling, and transcribing documents, and one practised throughout their entire careers.

While learners could employ various mnemonic techniques, the act of writing with a brush on a tablet was essential for fully internalising the fluidity and structure of each character. The tactile experience of brushwork significantly enhanced the memorisation process; the more frequently learners practised writing, the more intuitive and natural the process became. This parallels the method of learning the multiplication table, which similarly required rote memorisation and repeated practice through writing. As a result, the demand for a suitable writing surface increased with the frequency of practice. Reusable tablets, typically crafted from Japanese cypress or cedar and easily erased with a knife, emerged as the ideal tools for intensive writing practice within educational settings.

It can be reasonably argued that simply washing a tablet that was meant for rinsing, as practised in other manuscript cultures,<sup>41</sup> might have provided a valid and potentially more straightforward and cost-effective alternative to scraping within educational contexts. However, it is crucial to recognise that writing exer-

---

<sup>41</sup> See the article by Andrea Brigaglia and Dahir Mu'az in this volume, on Qur'anic tablets in Hausa manuscript culture.

cises were not confined to educational environments, where waterproof tablets could be readily rinsed. At any point in their career, bureaucrats might have needed to practise a rare, complex, or confusing Chinese character. The use of a penknife to scrape the wooden tablet was often preferred to washing, as it allowed for more controlled and precise corrections. The knife was particularly advantageous for removing an isolated mechanical error without disturbing the surrounding text, making it ideal for minor adjustments. In contrast, washing the tablet would have been impractical for such minor corrections, as it involved erasing the entire surface, thus necessitating the rewriting of all the text. This inability to manage partial erasures through washing highlights the practicality of scraping, which offered a controlled, efficient way to maintain the overall text with minimal disruption. Therefore, the availability of the penknife for correcting errors by scraping likely facilitated the widespread adoption of this method of tablet reuse across various settings.

## Databases

ColBase: Integrated Collections Database of the National Institutes for Cultural Heritage, Japan, <<https://colbase.nich.go.jp/>>, accessed on 6 January 2025).

Mokkanko – Wooden Tablet Database, Nara National Research Institute for Cultural Properties, Japan, <<https://mokkanko.nabunken.go.jp/ja/>>, accessed on 6 January 2025).

Shōsōin Treasures Database, Imperial Household Agency, Japan, <<https://shosoin.kunaicho.go.jp/en-US/search>>, accessed on 6 January 2025).

## References

- Aoki Kazuo 青木和夫, Inaoka Kōji 稲岡耕二, Sasayama Haruo 笹山晴生 and Shirafuji Noriyuki 白藤禮幸 (eds) (1992), *Shoku Nihongi* 続日本紀, vol. 3, Tokyo: Iwanami shoten.
- Arai Shigeyuki 新井重行 (2006), ‘Shūsho-rakusho no sekai’ 習書・落書の世界, in Hirakawa Minami 平川南, Okimori Takuya 沖森卓也, Sakaehara Towao 栄原永遠男 and Yamanaka Akira 山中章 (eds), *Moji to kodai Nihon (5) Moji hyōgen no kakutoku* 文字と古代日本 5—文字表現の獲得, Tokyo: Yoshikawa kōbunkan, 217–232.
- Baba Hajime (2023), ‘Research Resources of Japanese Mokkan: Turning Information on Ancient Wooden Tablets into Research Data’, in Chiara Palladino and Gabriel Bodard (eds), *Can’t Touch This: Digital Approaches to Materiality in Cultural Heritage*, London: Ubiquity, 29–49.
- Baxter, William H. and Laurent Sagart (2014), *Old Chinese: A New Reconstruction*, New York, NY: Oxford University Press.

- Curtis, Paula R. (2024), 'The Materiality of Mokkan: Creating Sources for Reflection on Text in Ancient Japan', in Ioannis Gaitanidis and Gregory S. Poole (eds), *Teaching Japan: A Handbook*, Tokyo: MHM, 226–239.
- Farris, William Wayne (1998), *Sacred Texts and Buried Treasures: Issues in the Historical Archaeology of Ancient Japan*, Honolulu: University of Hawai'i Press.
- Frydman, Joshua (2023), *Inscribed Objects and the Development of Literature in Early Japan*, Leiden: Brill.
- Imazumi Takao 今泉隆雄 (1994), 'Monjo mokkan wa itsu haiki sareru ka' 文書木簡はいつ廃棄されるか, *Mokkan kenkyū*, 16: 265–281.
- Inoue Mitsusada 井上光貞, Seki Akira 関晃, Tsuchida Naoshige 土田直鎮 and Aoki Kazuo 青木和夫 (eds) (1976), *Ritsuryō 律令*, Tokyo: Iwanami shoten.
- Inoue Miyuki 井上幸 (2017a), 'Ichiji shiryō toshite no shutsudo kanji' 一次資料としての出土漢字, in Inukai Takashi 犬飼隆 (ed.), *Kodai no moji bunka 古代の文字文化*, Tokyo: Chikurinsha, 398–425.
- Inoue Miyuki 井上幸 (2017b), 'Kodai no shūsho mokkan ni okeru renshū haikai tenbyō. Tōji no shiyō jitai kara no suisoku' 古代の習書木簡における練習背景点描—当時の使用字体からの推測, *Asia: Shakai, Keizai, bunka*, 4: 192–180.
- Ishigami Eiichi 石上英一, Katō Tomoyasu 加藤友康 and Yamaguchi Hideo 山口英男 (1999), *Kodai monjoron. Shōsōin monjo to mokkan, urushigami monjo 古代文書論—正倉院文書と木簡・漆紙文書*, Tokyo: Tōkyō daigaku shuppankai.
- Kitō Kiyooki 鬼頭清明 (1984), *Mokkan no shakaishi. Tenpyōbito no nichijō seikatsu 木簡の社会史—天平人の日常生活*, Tokyo: Kawade shobō shinsha.
- Kitō Kiyooki 鬼頭清明 (1985), 'Nara-Heijōkyū seki (dai30ji)' 奈良・平城宮跡(第39次), *Mokkan kenkyū*, 7: 118–122.
- Kyūshū rekishi shiryōkan 九州歴史資料館 (1976), *Dazaiju shiseki shutsudo mokkan gaihō (1) 太宰府史跡出土木簡概報(一)*, Fukuoka: Kyūshū rekishi shiryōkan.
- Lowe, Bryan D. (2017), *Ritualized Writing: Buddhist Practice and Scriptural Cultures in Ancient Japan*, Honolulu: University of Hawai'i Press.
- Lurie, B. David (2011), *Realms of Literacy: Early Japan and the History of Writing*, Cambridge, MA: Harvard University Asia Center, Harvard University Press.
- Manieri, Antonio (2020), 'Document Production by Low-Rank Officials in Ancient Japan: Notes on Some Public Advisory Texts on Wooden Tablets', in Antonella Brita, Giovanni Ciotti, Florinda De Simini and Amneris Roselli (eds), *Copying Manuscripts: Textual and Material Craftsmanship*, Naples: UniorPress, 241–270.
- Manieri, Antonio (2022), 'Technical Education in Nara Japan: Text and Context of the *Yōshi kangoshō* (c. 720)', *Annali, Serie Orientale*, 82: 172–210.
- Mesheryakov, Alexander N. (2003), 'On the Quantity of Written Data Produced by the Ritsuryō State', *Japan Review*, 15: 187–199.
- Nara bunkazai kenkyūjo 奈良文化財研究所 (1967), *Hakkutsu chōsa shutsudo mokkan gaihō. Heijōkyū hakkutsu chōsa shutsudo mokkan gaihō (4) 発掘調査出土木簡概報：平城宮発掘調査出土木簡概報(四)*, Nara: Nara bunkazai kenkyūjo.
- Nara bunkazai kenkyūjo 奈良文化財研究所 (1986), *Heijōkyū mokkan 4 平城宮木簡四*, Nara: Nara bunkazai kenkyūjo.
- Nara bunkazai kenkyūjo 奈良文化財研究所 (1990), *Hakkutsu chōsa shutsudo mokkan gaihō. Heijōkyū hakkutsu chōsa shutsudo mokkan gaihō (23), Nagaya ōke (2) 発掘調査出土木簡概報：平城宮発掘調査出土木簡概報(二十三)—長屋王家木簡二*, Nara: Nara bunkazai kenkyūjo.
- Nara bunkazai kenkyūjo 奈良文化財研究所 (1993), *Hakkutsu chōsa shutsudo mokkan gaihō. Heijōkyū hakkutsu chōsa shutsudo mokkan gaihō (28) Nagaya ōke, 5 (Kezurikuzu hen) 発掘調査出土木簡概*

- 報：平城宮発掘調査出土木簡概報(二十八)—長屋王家木簡五(削屑篇), Nara: Nara bunkazai kenkyūjo.
- Nara bunkazai kenkyūjo 奈良文化財研究所 (1995), *Hakkutsu chōsa shutsudo mokkan gaihō (30) Nijō Ōji mokkan*, 4 発掘調査出土木簡概報(三十)：二条大路木簡四, Nara: Nara bunkazai kenkyūjo.
- Nara bunkazai kenkyūjo 奈良文化財研究所 (1997), *Hakkutsu chōsa shutsudo mokkan gaihō (33) Nijō Ōji mokkan*, 7 発掘調査出土木簡概報(三十三)：二条大路木簡七, Nara: Nara bunkazai kenkyūjo.
- Nara bunkazai kenkyūjo 奈良文化財研究所 (1999), *Hakkutsu chōsa shutsudo mokkan gaihō. Asuka Fujiwarakū hakkutsu chōsa shutsudo mokkan gaihō (14)* 発掘調査出土木簡概報：飛鳥藤原宮発掘調査出土木簡概報(十四), Nara: Nara bunkazai kenkyūjo.
- Nara bunkazai kenkyūjo 奈良文化財研究所 (2006), *Nara bunkazai kenkyūjo shiryō 77: Heijōkyō shutsudo tōken shūsei* 奈良文化財研究所史料 77：平城京出土陶硯集成, Nara: Nara bunkazai kenkyūjo.
- Nara bunkazai kenkyūjo 奈良文化財研究所 (2007a), *Nara bunkazai kenkyūjo shiryō 79 Bessatsu: Asuka-Fujiwarakū mokkan* 奈良文化財研究所史料 79 別冊：飛鳥藤原京木簡, Nara: Nara bunkazai kenkyūjo.
- Nara bunkazai kenkyūjo 奈良文化財研究所 (2007b), *Nara bunkazai kenkyūjo shiryō 80 Heijōkyō shutsudo tōken shūsei* 奈良文化財研究所史料 80：平城京出土陶硯集成, Nara: Nara bunkazai kenkyūjo.
- Nara bunkazai kenkyūjo 奈良文化財研究所 (2010), *Tenpyōbito no koe o kiku. Chika no Shōsōin – Heijōkyū mokkan no subete* 天平びとの声をきく—地下の正倉院・平城宮木簡のすべて, Nara: Nara bunkazai kenkyūjo.
- Nara bunkazai kenkyūjo 奈良文化財研究所 (2018), *10shūnen kinen Chika no Shōsōinten. 10nen no ayumi 10* 周年記念地下の正倉院展—10年のあゆみ, Nara: Nara bunkazai kenkyūjo.
- Ōba Osamu 大庭脩 (ed.) (1998), *Mokkan. Kodai kara no messēji* 木簡—古代からのメッセージ, Tokyo: Taishūkan shoten.
- Piggott, Joan (1990), 'Mokkan: Wooden Documents from Nara Period', *Monumenta Nipponica*, 45: 449–470.
- Sakaehara Towao 栄原永遠男 (2011), *Shōsōin monjo nyūmon* 正倉院文書入門, Tokyo: Kadokawa gakugei shuppan.
- Satō Makoto 佐藤信 (1997), *Nihon kodai no kyūto to mokkan* 日本古代の宮都と木簡, Tokyo: Yoshikawa kōbunkan.
- Satō Makoto 佐藤信 (1999), *Kodai no iseki to moji shiryō* 古代の遺跡と文字資料, Tokyo: Meicho kankōkai.
- Satō Makoto 佐藤信 (2006), 'Kanji bunka no juyō to gakushū' 漢字文化の受容と学習, in Hirakawa Minami 平川南, Okimori Takuya 沖森卓也, Sakaehara Towao 栄原永遠男 and Yamanaka Akira 山中章 (eds), *Moji to kodai Nihon 5: Moji hyōgen no kakutoku* 文字と古代日本 5—文字表現の獲得, Tokyo: Yoshikawa kōbunkan, 195–216.
- Suzuki Hiroshi 鈴木廣司 and Yoshizaki Shin 吉崎伸 (1991), 'Kyōto-Nagaokakyō seki 1' 京都・長岡京跡(1), *Mokkan kenkyū*, 13: 24–27.
- Tōno Haruyuki 東野治之 (1977), *Shōsōin monjo to mokkan no kenkyū* 正倉院文書と木簡の研究, Tokyo: Hanawa shobō.
- Tōno Haruyuki 東野治之 (1983), *Nihon kodai mokkan no kenkyū* 日本古代木簡の研究, Tokyo: Hanawa shobō.
- Tōno Haruyuki 東野治之 (1990), '26. Shūsho-rakusho' 二六 習書・楽書, in Mokkan gakkai 木簡学会, *Nihon kodai mokkansen* 日本古代木簡選, Tokyo: Iwanami shoten, 134–135.
- Tōno Haruyuki 東野治之 (1997), *Mokkan ga kataru Nihon no kodai* 木簡が語る日本の古代, Tokyo: Iwanami shoten.

- Tōno Haruyuki 東野治之 (2003), 'Shūsho' 習書, in Mokkan gakkai 木簡学会, *Nihon kodai mokkan shūsei* 日本古代木簡集成, Tokyo: Tōkyō daigaku shuppan, 106–107.
- Tōno Haruyuki 東野治之 (2005), *Nihon kodai shiryōgaku* 日本古代史料学, Tokyo: Iwanami shoten.
- Van Goethem, Ellen (2006), 'The Construction of the Nagaoka Palace and Capital – Mokkan 木簡 as a Historical Source', *Nachrichten der Gesellschaft für Natur- und Völkerkunde Ostasiens*, 76/179–180: 143–174.
- Vovin, Alexander (2020), *A Descriptive and Comparative Grammar of Western Old Japanese*, rev., updated and enlarged 2nd edn, Leiden: Brill.
- Wakiya Sōichirō 脇谷草一郎 (2010), 'Mokkan no hozon shori' 木簡の保存処理, in Nara bunkazai kenkyūjo 奈良文化財研究所, *Tenpyōbito no koe o kiku. Chika no Shōsōin -Heijōkyū mokkan no subete* 天平びとの声をきく—地下の正倉院・平城宮木簡のすべて, Nara: Nara bunkazai kenkyūjo, 84–85.
- Watanabe Akihiro 渡辺晃宏 (2009), 'Nihon kodai no shūsho mokkan to kakyū kanjin no kanji kyōiku' 日本古代の習書木簡と下級官人の漢字教育, in Takata Tokio 高田時雄 (ed.), *Kanji bunka sannennen* 漢字文化三千年, Kyoto: Rinsen shoten, 91–110.
- Yamanaka Akira 山中章 (1992), 'Kōko shiryō toshite no kodai mokkan' 考古資料としての古代木簡, *Mokkan kenkyū*, 14: 147–188.