

Towards Reading in Four Dimensions

Helen Magowan

Abstract. Writing is implicitly four-dimensional, the outcome of an act that takes place in time and space. However, in East Asian brush writing, time and space are not only explicit but meaning-bearing. The clear expression of four-dimensionality made brush writing a medium which communicated not only language, but also the embodied writer. This paper proposes that in the premodern Japanese context, writing was a powerful mode for communicating social meanings associated with the body, meanings which contemporary reading practices overlook.

1. Introduction

As Amalia Gnanadesikan (2008, p. 3) has pointed out, speech unfolds in time, while writing arranges language in space, “each word following the previous one in a line. Writing is therefore a process of translating time into space”. We may of think this spatial transformation as rendering a 2-dimensional artifact: there is ink, or there is not. At the same time, in (non-automated) writing production, the writing instrument moves in three dimensions: the pen nib or pencil tip rises upwards at the end of a line or graphic element, and moves down into contact with the paper at the beginning of the next. The spatial arrangement of (hand)writing, with its beginnings and ends, thus notionally indicates the third dimension of space and the fourth dimension of time.

In East Asia, however, the traditional instrument of writing is the brush, and control in all four dimensions is needed to achieve competence (Ishikawa, 1994, p. 36; Kaya, 2002, p. 45). The four-dimensionality of writing production is therefore not only explicit, but meaning-bearing in the resulting text. Indeed, this paper proposes that four-dimensionality was an integral aspect of the signifying power of brush

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writing. This paper focuses on the writing culture of 18th century Japan to show premodern Japanese brush writing to have been a powerful medium for communicating not only language, but embodiment and associated social meanings, and asks whether such meanings can be accessed by contemporary readers, unaccustomed to the tactics of reading in four dimensions.

2. Writing in Print

As the 19th century turned into the 20th, Japan saw huge socio-cultural and technological changes, which had implications for the writing system. One of these was the introduction of pencils and pens; the more culturally visible change was the transition to moveable type for commercial publishing. Japan's well-established publishing industry had been thriving for some three hundred years, using woodblock print technology.

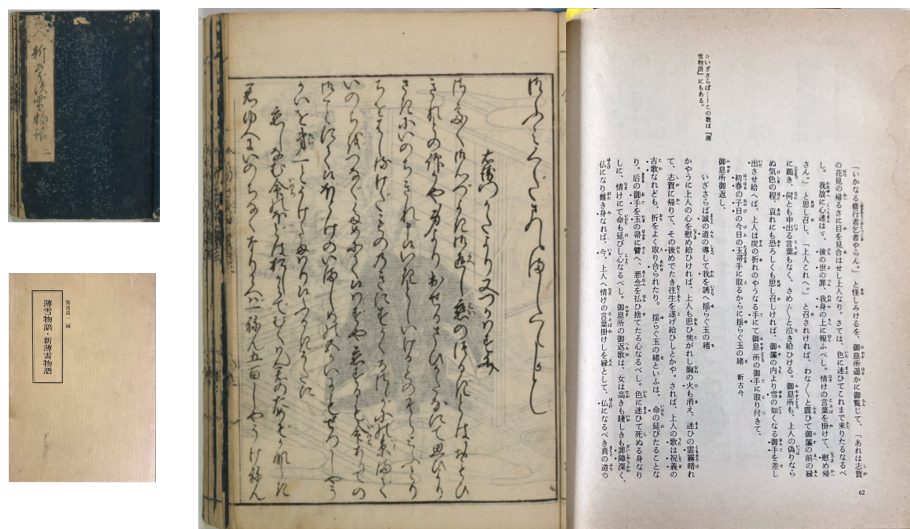


FIG. 1. Woodblock print and typography compared. Left, top, Rankeishi, *Shin Usuyuki monogatari* ('New Tale of Usuyuki'), Osaka, Japan: Kawachiya Tōbei, 1716. Right, bottom, Kikuchi Shin'ichi, ed., *Usuyuki monogatari. Shin Usuyuki monogatari*, Osaka, Japan: Izumi Shoin, 1983

Japanese printers had in fact briefly explored moveable type at the end of the 16th century, and the experiment itself is telling. Figure 2 shows one of the most celebrated of the early moveable type books

known as Saga editions.¹ It is not immediately apparent, perhaps, that this book was typographically produced, as it maintains all the characteristics of handwriting.² Indeed it was the product of collaboration with one of the most extraordinary calligraphers of the day.³

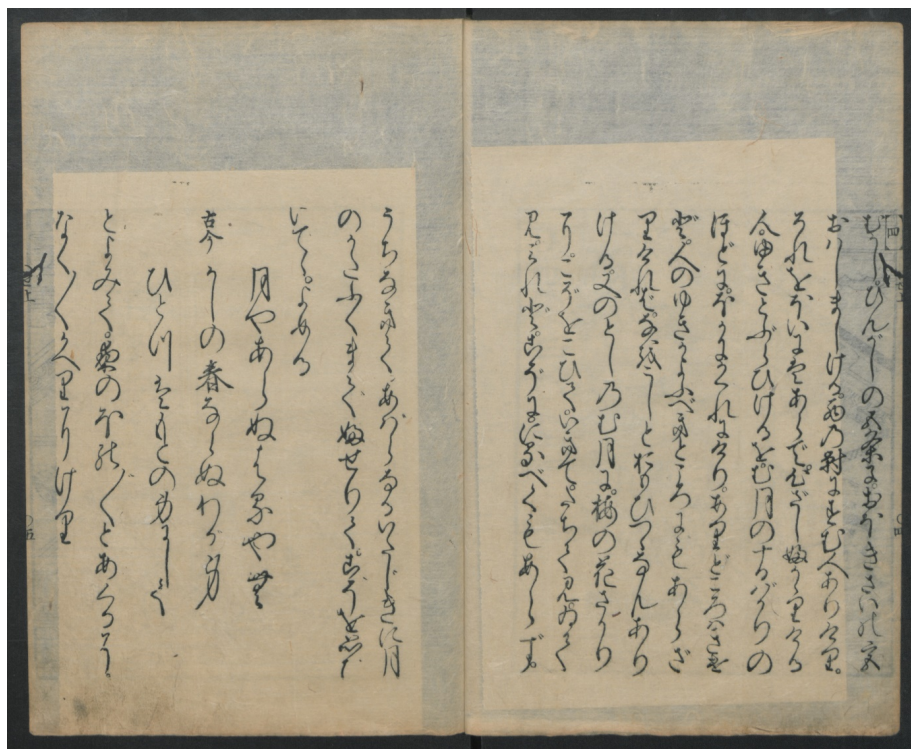


FIG. 2. Saga Edition of *The Tales of Ise*, c. 1608, The Metropolitan Museum of Art, New York

Each piece of type is irregularly sized, accommodating vertically extended, encroaching, and connecting graphemes, with ligatures of up to four graphemes.

1. Also Sagabon 嵯峨本, lit. Saga books, a generic term for a series of books published 1599–c. 1610 by Suminokura Soan 角倉素庵 (1571–1632) in Saga, near Kyoto.

2. The size and page design of these books was also in imitation of manuscripts (Sasaki, 2023, p. 195). Movable type in the West also initially used fonts cast imitating cursive handwriting (Sasaki and Burtscher, 2022, p. 61).

3. Hon'ami Kōetsu 本阿弥光悦 (1558–1637).

This flies in the face of the modular efficiency that moveable type should enable, but in contrast to the regularity and consistency preferred by western scribal and calligraphic practices, premodern Japanese privileged variation.⁴ It was a highly flexible writing system that avoided visual repetition through orthographic choices including allographs and varied cursivity. Typography was evidently a poor fit for Japanese writing. This incompatibility was not merely a matter of aesthetics, but as we shall see, the brush was a conduit for the expressivity of writing, which could not be recapitulated through modular type. A high-fidelity relationship to the manuscript original was required.⁵

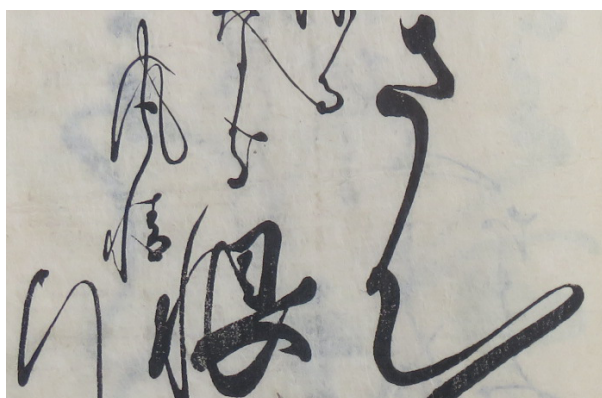


FIG. 3. Detail from Hasegawa Myōtei, *Sazareishi*, vol. 1 f. 9r, 1713

Woodblock print produces a facsimile of a full original page by carving a negative relief. This offers total flexibility in terms of layout, illustrations and textual forms, including degrees of cursivity; crucially, the marks of the brush were remediated with an extraordinary degree of detail (Figure 3). The choice of woodblock technology maintained the brush as integral to the written word.

This paper will first discuss the mechanics of brush writing, and then consider the contribution of the brush to the construction of meaning in writing.

4. Sagabon even show intentional differentiation between printed copies, with several types changed after each sheet was printed so that no two sheets were identical. (Sasaki, 2023, p. 204)

5. While in English there is an ontological difference between ‘manuscript’ and ‘print’, this does not obtain in a premodern Japanese context. See Chance and Davis (2016, pp. 92–94, 106).

3. Brush Writing in Four Dimensions

3.1. The Third Dimension



FIG. 4. Numeral 'one'. By kind permission of Yuasa Keisuke 湯浅圭祐 of Matsumoto Shōeidō 松本松栄堂 calligraphy school.

The beginner calligrapher's first word is likely to be the simplest of Sinitic graphemes, the numeral one, produced by inscribing a horizontal line. However, not all single horizontal lines are this numeral; although apparently simple, the stroke is somewhat involved, and difficult to execute well, as Figure 4, from a modern calligrapher, shows.

There are three highly specific instructions towards correctly forming the character. What is unstated, perhaps because it is aimed at those who are already brush users, is that the beginnings and ends of the grapheme are formed by pressing into the paper, while during the movement from left to right the brush is lifted slightly.⁶ Figure 5 shows the extreme flexibility of the calligraphy brush, and since it is highly sensitive to pressure, the 'depth' of the brush at different points is fundamental to the formation of the strokes and graphemes of Sinitic and Japanese scripts (here the stroke being formed is 'barai').

The third dimension also extends into space perpendicularly above the paper. In Japanese calligraphy the term *kyokaku* (虚画 'empty' stroke) is used for the line travelled by the brush through the air (Figure 6). This is not a ritual formalism: although the page only holds 2-dimensional marks, the connecting 'empty' stroke is visible to those trained in the brush.

6. In pen writing, width has traditionally been controlled through the angle of a flat-ended nib, not vertical pressure. Certain calligraphy styles today control line width through the application of pressure using a flexible nib, the result of a mid-19th century innovation to achieve results that had previously been produced by the flat nib. (Gilderdale, 1999)



FIG. 5. The qualities of the calligraphy brush are integral to the shape of strokes. Here the stroke called *barai* is being formed.



FIG. 6. 'Eternity', showing *kyokaku*, the 'empty' line. Image by kind permission of the Bimoji Blog 美文字ブログ

3.2. The Fourth Dimension

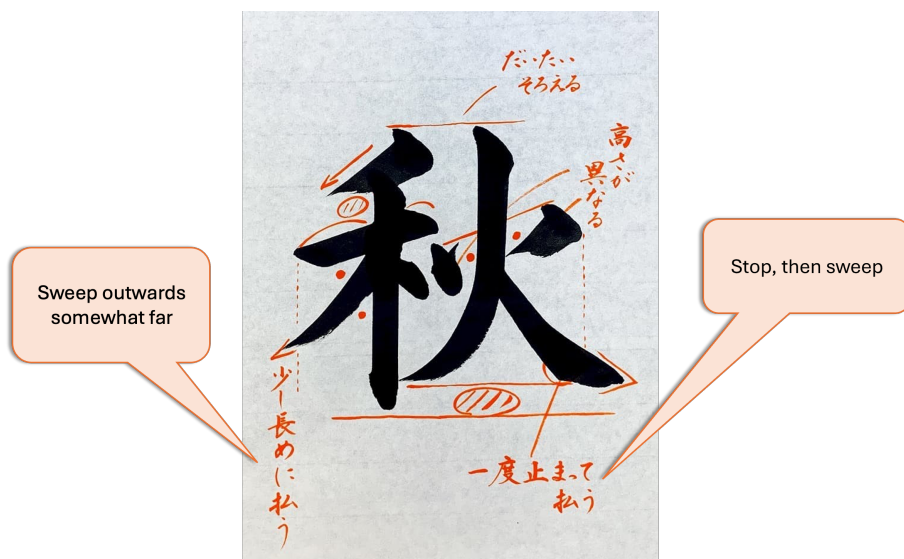


FIG. 7. 'Autumn', Image by kind permission of Yuasa Keisuke, Matsumoto Shōeidō Calligraphy School

While time is implicit in handwriting, it is explicit in brush calligraphy. Figure 7 shows the grapheme for 'autumn', and the calligraphy teacher's instructions include not only the verb of motion *harau* (払う 'to sweep', 'to brush') but a further instruction on pausing before the sweep-

ing motion. The line of ink indicates the speed of the brush's motion as it passes, a factor which is even more prominent in cursive styles.⁷ The variable rhythmicity of brush calligraphy no doubt contributes to its modern status as a performance art.

An intrinsic four-dimensionality of script is particularly clear in media other than paper and ink. Highly valued ancient calligraphy has been preserved through stone carvings, and words carved into stone or wood express the four dimensions of the notional brush: where the brush would press into the paper, the letterform is carved deeper, and where the brush would skim quickly, the carved line is shallower. Whatever the medium, the brush was implicit in the written form (Ishikawa 1994, p. 37).⁸

4. Writing in Four Dimensions

Figure 8 shows a writing lesson in the 18th century, giving us a rounded picture of the practice of (cursive) writing.⁹ The image shows two girl students. The writing girl holds her brush very near the top of the handle, a position which is not common today, but predominates in early modern imagery, particularly when depicting women. The modern lower brush hold may be partly influenced by modern writing tools such as pens and pencils.

The second girl is actively participating in the lesson through observation. As Japanese writing is explicit in that its production takes place in time and space, real-time observation is extremely valuable for learning.

There is a calligraphy model book on the desk, but the girl's copy paper is covered with black scribbles, a sign of repeated overwriting. While there is an economy of paper involved in this practice, what this also indicates is that the intention is not, as we might assume, to make the correct shape on the page. The 2-dimensional line on paper is not the object of the lesson: rather, she is learning to make the correct movement with her body, and the correct movement will produce good lines. Unlike manipulation of the pencil, dominated by the fingers, brushed Japanese

7. Figures shown thus far are of the non-cursive style called *kaisbo* 楷書 (*kāisbū* in Chinese). This is typically called 'standard' or 'regular' script, a somewhat misleading term since in Japan this was used in limited contexts. Today *kaisbo* is taught before cursive, and the images here are beginner-oriented materials.

8. Ishikawa considers there to be a distinct difference between carved and brushed character forms in early Chinese contexts, but I set this aside for the present paper.

9. In early modern Japan, cursive styles were preferred for most contexts. While there are two named cursive styles, *gyōsho* 行書 (*xíngshū*) and *sōsho* 草書 (*cǎoshū*), in Japanese practice they were not strictly differentiated.



FIG. 8. *Wisdom* (Chi), Suzuki Harunobu, 1767, The Museum of Fine Arts, Boston

graphemes are gestures of the body, including the hand, wrist, arm, indeed the whole body—note that the only part of the girl's body in contact with the desk is her non-writing hand. Writing on the page will show if the brush is gripped tightly, or the elbow is held too close to the torso. Controlled but free movement is made possible by an upright posture, appropriately supported from the core. Execution of good writing even depends on the writer's breath.

That writing is a skill of the body is reemphasised by the teacher's holding the student's writing hand (and perhaps her waist). The teacher, like her modern counterparts, does this in order to transmit all four dimensions of writing through the embodied experience of writing, teacher to student, body to body.

5. Writing and Reading and the Body

While the early modern period saw literacy forcefully advocated for all classes of people, the discourse is on writing, not reading. While in English, we speak of children learning to read and write, visitors to early modern Japan observed the reverse: in Japan, *writing preceded reading*.¹⁰ A 17th century book concerning women's education says,

From a tender age, girls must be forced to write. First, if they are not able to write letters, they will miss out on all sorts of things. Moreover, the inability to write means that one is stupid and unable to distinguish the west from the east. **For a woman who cannot write, turning to books is like a blind person turning to a wall** [my emphasis].¹¹

Being unable to write renders one unable to read. Similarly a 17th century male diarist wrote,

Writing should be the first accomplishment for a man. Even good-looking men will be looked down upon if they have no writing [*mubitsu* 'without the brush'] or bad writing [*akubitsu* 'bad brush'] skills. **Those who cannot write are not able to send and receive letters** and are barred from keeping diaries or account books [my emphasis].¹²

The term for illiteracy here refers to the very instrument of writing; furthermore writing skill was necessary to be able to merely receive letters. This was a culture in which reading literacy originated in writing. Reading was not disconnected from brush competence, but on the contrary, was intimately entangled.¹³

Learning to write involved copying graphemes, and then longer texts, and it was widely recommended that even very young children should

10. In 1585 the Portuguese Jesuit Luís Fróis (1532–1597) “observed a pattern of instruction that set Japanese education apart from practices in the West—that is, Japanese children learned to write before reading, whereas Western children practiced the reverse.” (Moretti, 2020, 307 n. 14)

11. *Onna kagami bidensho* (Secret book on ideals for women, 1650), quoted in Moretti (ibid., pp. 29–30).

12. *Kawachiya Yoshimasa kyūki* (Old records of Kawachiya Yoshimasa, c 1693–1706), quoted in Moretti (ibid., p. 32).

13. It is instructive also that copying—which is, in effect, writing—was an accepted method of consuming text in the early modern period, and remains in some contexts even today. The early modern publishing genre *ōraimono narabi ni tehon* (textbooks and copybooks) signals the widespread duality of reading and copying. Kaibara Ekiken's *Wazoku dōjikin* (1710), a guide for parents on the education of children, was given to unmarried women as a copybook, and copying was the route by which children were educated in moral and practical matters. (Koizumi, 2007, p. 42; Dore, 1965, p. 275) Today, publishing series such as *Enpitsu de tanoshimu koten* (Enjoying the Classics via Pencil) offer the opportunity to consume classical texts in an act which is both reading and copying, whilst improving one's handwriting. See for example Ōsako (2012).

be taught from good models from the very beginning. In copying a calligraphic model, one is learning to write words well through tracing the four-dimensional gestures of writing. Much like dance, or martial arts, one must learn to move one's body in the appropriate manner.

Indeed, educators explicitly recommended the simultaneous development of literacy and bodily deportment. Kaibara Ekiken, perhaps the most well-known educationalist of the period, itinerises children's training by age, with calligraphic training outlined contiguously with movement of the body and morality.¹⁴ Starting at the age of six or seven they should learn kana, respect and differences of social status, and they should copy kana texts. From eight, [male] children should learn both 'standard' (*kaisbo*) and cursive (*sōsho*) scripts, starting with large letter-forms so that the hand learns to move easily. This is also the moment to introduce the practice of reading words [*moji wo yomu keiko*], and memorisation of easier passages of Chinese classical texts, alongside etiquette, deportment (立ち居振る舞いの礼 *tachi-i furumai no rei*, 'manners of standing, sitting and actions'), and 'manners of tea' (茶礼 *sarei*). At the age of ten they should read the classical Chinese texts, and learn the literary and military arts (文武の技芸 *bunbu no gigei*), and their minds (*kokoro*) and deportment (*tachi-i furumai*) should be quiet and restrained. At fifteen, they should be fully learning their duty and self-management (*mi wo osameru*, a phrase which uses the word 'body' for the self).¹⁵

Writing is presented as one aspect of a holistic process of enculturing the body, a process discussed by sociologist Pierre Bourdieu in terms of *hexis*. He says,

The child imitates not "models" but other people's actions. Body *hexis* speaks directly to the motor function, in the form of a pattern of postures that is both individual and systematic, because linked to a whole system of techniques involving the body and tools, and charged with a host of social meanings and values: in all societies, children are particularly attentive to the gestures and postures which, in their eyes, express everything that goes to make an accomplished adult—a way of walking, a tilt of the head, facial expressions, ways of sitting and of using implements, always associated with a tone of voice, a style of speech, and (how could it be otherwise?) a certain subjective experience. (Bourdieu, 1977, p. 87)

The development of writing skills can be seen to contribute to the enculturation of appropriate *hexis*, and furthermore, writing may in itself express *hexis*.

English has a relative paucity of words for 'writing', and although the range of terms used in Japanese is illuminating, here I draw attention

14. In *Wazoku dōjikin* (Teaching on Children's Education Traditions in Japan, 1710).

15. Ekiken (1979, pp. 244–247). For comparisons between Ekiken and other educationalists of the period, see Koizumi (2007).

to one in particular: *bisseki* 筆跡. This is usually adequately translated as ‘handwriting’ or ‘calligraphy specimen’: the word is a compound of *bitsu* ‘brush’, and *seki*, which refers to that which is left behind, like footprints, a path, a remnant or residue. A given piece of writing is understood to be the ‘trace of the brush’, the mark left behind by the hand of a writer, the vestige of something that occurred before.¹⁶ While pen writing may be suggestive of the person who held the writing instrument, Japanese calligraphy is a record of a performance of a text by a writer, made possible by the brush acting as an extremely sensitive seismograph of the body.¹⁷

6. Reading in Four Dimensions

Since all readers were also writers, readers were literate not only in written language, but in the embodied idiom of the brush. The brush-literate reader recognises the movement of the brush through an understanding constituted by their experience of the brush. In cognitive science, theories of embodiment fuse “action production” and “action understanding” into a single system, wherein sensory input induces “simulation of the observed actions in the motor system of the observer” (Caramazza, Anzellotti, Strnad, and Lingnau, 2014, p. 7); in observing an action, “the relevant action is effectively reenacted within the observer’s premotor cortex” (Rizzolatti and Sinigaglia, 2010, p. 7).

It has been mentioned that the brushed line can indicate whether a writer’s brush hold is tight or their gestures are awkward, their brush fast or slow. These are qualities that can signify more than mere movement. The brushed line may index physical sickness or old age, hesitation or uncertainty, and even affective states. One calligraphy manual advises beginners to “take up your brush straight of body and upright of mind”.¹⁸ Discourses of affect being transmitted by the brush can be traced as far back as the 11th century classic, *The Tale of Genji*, which situates (kana) brush writing as communicating emotion through the somatic manifestation of the writer’s emotional state. An example is in the character Kashiwagi’s increasing distress of mind being legible to his friends, when his writing began to appear “like the tracks of strange birds”.¹⁹

16. It has been pointed out that “the literate Heian elite [8th–12th centuries] conceptualized the process of writing as an exercise in leaving physical traces”. (Blair, 2017, p. 284)

17. Calligraphy “becomes a record of a performance of a text by the skilful movement of the hand”. (Carpenter, 2019, p. 157)

18. *Hitsudō bidenshō* (筆道秘伝抄 Excerpted Secret Teachings of the Way of the Brush, Oshio Yūshō 小塩幽昭 1692; Oshio, 1914, p. 168).

19. Kashiwagi was writing a letter, “but his hand was trembling badly, and he gave up trying to say all he wished”, and shortly thereafter, “he wrote his reply lying down,

The somatic and even emotional expressiveness of brush writing remains available to readers with expertise in the brush. Modern calligraphy teachers continue to speak of perceiving a student's emotional state at the moment of inscription in their output, but this is a type of reading that is not easily accessible to others.²⁰ However, the embodied expressiveness of brush writing can in some cases be recognised even by 21st century viewers of writing. The early 12th century scroll of *The Tale of Genji* uses tangled and disordered writing for the death scene of the protagonist's deeply beloved wife, a depiction of anguish in writing that remains powerful, even while the text itself is as good as illegible even to highly competent palaeographers.²¹ This is a trope which survived at least into the 18th century, as shown in Figure 9. Here, a distraught fictional heroine writes to her beloved from her deathbed, and the page expresses her disordered mind and body in a way which contrasts to her earlier letters, one of which you can see on the right.



FIG. 9. Rankeishi, *Shin Usuyuki monogatari*, 1716. Left, vol. 5 f. 9v-10r. Right, vol. 1 f. 20r

between bouts of weeping. The words made no sense and resembled the tracks of strange birds" (Tyler, 2003, pp. 676, 677). Further examples include Oborozukiyo's grief-stricken poem to Genji as he departs for Suma, and Genji's melancholy poem to Utsusemi, both "written in a disarrayed manner" (*midare kaki* 乱れ書き) reflective of their emotions. *Genji monogatari* chapters *Suma* and *Yūgao*. (Carpenter, 2019, p. 33)

20. Among the calligraphers who have affirmed this to me I thank Mami Matsuzawa and Yukiko Ayres (Eāzu Shōkaku 恵杏壽昌鶴).

21. As a National Treasure, images are not widely available, but the section in question can be seen at Carpenter et al. (2019, p. 26).

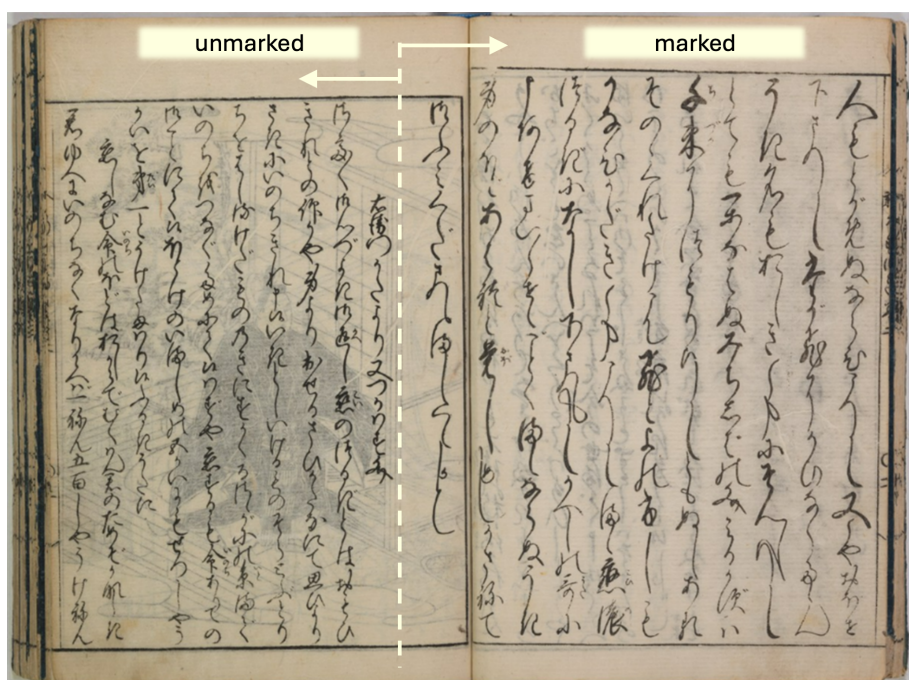


FIG. 10. Usuyuki's writing vs everything else. Rankeishi, *Shin Usuyuki monogatari*, 1716, vol. 2 f. 2v-3r

An attentive reading of brush writing can thus be highly informative, even in the absence of brush skills of premodern readers are absent. The brush is remarkable in its power to communicate all kinds of indexical meanings which relate to, draw on, or are clarified when considered in four dimensions and with attention to the encultured body. The 18th century book shown above is an epistolary romance, in which the heroine Usuyuki's letters are presented differently from the rest of the text: they use the fictional character's fictional handwriting to construct her character and affective state for readers. Her script, and only her script, (Figure 10) is vertically extended in a manner which indexes a particular kind of social relationship, and thus already carries para-linguistic meanings. More vertical extension means longer lines, which are not only more technically challenging, but seismographically expose more of the writing body, making the writing body more legible, both in its physical and social aspects. The circuit of understanding of this text is both constructed and interpreted in four dimensions.

Figure 11 shows a selection of letters from Usuyuki to her love interest, and each has a very different texture. They construct her affective



FIG. 11. Usuyuki's affective variation in script. Rankeishi, *Shin Usuyuki monogatari*, 1716. L-R: vol. 2 f. 7r; vol. 3 f. 3r; vol. 1 f. 20r; vol. 5 f. 9v-10r

stance in the moment of correspondence, arranged here from left to right in terms of intensity of affect. These meanings are partly constructed in the way we normally understand text to operate, through language in all its complex aspects. However, meaning is also partly constructed through her writing production in time and space. The seismograph of the brush and the extended line exposes Usuyuki's writing body to her lover in a way that also increases from left to right.

The more vertically extended writing of the second letter is more intimate than the first, because it allows him to 'read' her writing body through her brush. We see her affective stance changing, gradually un-cloaking herself in her writing from a kind of self-concealing reserve on the far left. The exposure of the body here is an exposure of affects and other meanings associated with the body. If we look at the right-hand side, letterforms are positioned in spatial relations with each other in a way that does not correspond to the linguistic structure of the text. This is a codified *mise-en-page* which indexes sincerity, but it also performs sincerity with exposed and extended brushstrokes which give the writer nowhere to hide.

7. Conclusion

Premodern Japanese writing is challenging to read; for contemporary Japanese readers without palaeographic training, it is impenetrable. For

these kinds of texts to be accessible to modern readers, they have to be transformed into the kind of writing in which we are literate (Figure 12). While the four dimensions of the brush are integral to the historical development of the Japanese writing system, technological changes accompanying dramatic modernisation since the turn of the 19th century have separated the brush from the written word.

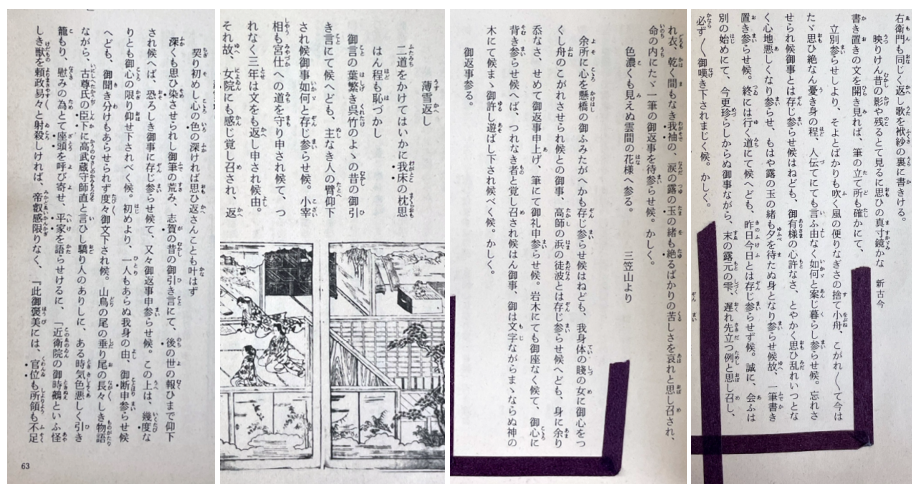


FIG. 12. Usuyuki transcribed—the same letters as Figure 11. Kikuchi Shin'ichi, ed., *Usuyuki monogatari. Shin Usuyuki monogatari*, Osaka, Japan: Izumi Shoin, 1983. L-R: Pp. 63, 74, 57, 108

We have come to depend on writing that has been regularised and abstracted away from the human originator. For us, the human hand is at best an inconvenience, a materiality that hampers access to the apparent principal matter: the semantic, immaterial content of text. We live in a world structured by a typographic paradigm, where even in a post-typographic, digital age, typography regulates the regime of knowledge. The text you are reading here could not have been submitted in handwriting, however beautiful and legible that handwriting might be. Early modern Japanese books exist to a modern readership only once they have been transcribed—a process which extracts textual 'content' to fit the automated text of the typographic paradigm, based on a 2-dimensional understanding of what writing does.

Premodern writing, organised by embodied experiences of four-dimensional worlds, was far richer than 2 dimensions allow, and the transcribed page in isolation engages only with the aspects of writing that we are comfortable with; the rest is discarded. Indeed, a 2-dimensional transcription effectively *conceals* a crucial layer of social meaning, and

thereby solidifies a particular understanding of the meaning of writing, which is then applied ahistorically.

The TEI East Asian/Japanese SIG has, in less than ten years, made enormous progress in advancing models appropriate to East Asian writing systems in historical context, from the initial implicitly Eurocentric approach of the TEI project.²² It remains to be seen whether the features of brush-written writing highlighted here could be marked up, particularly in the case of affective and uncoded dimensions of meaning.

Scriptural materiality *is* an inconvenience for the typographic regime: it is a materiality which insists on the unique case over the general, and it disrupts our systems of knowledge. The typographic paradigm has transformed animate ‘writing’—a verbal noun—into disembodied and inanimate ‘text’. This is, I argue, a profound loss which not only diminishes the object of enquiry, but diminishes our own capacity to engage with that enquiry. Nevertheless, the four-dimensionality of the brush-written remains available for as long as the ink persists on the paper. While we may lack the capacity to read such writing fully, the four-dimensional world of the embodied human in which it was produced is the same world that we inhabit, and still structures our perception and experience. The brush’s resistance to the typographic regime can be understood, I suggest, as an invitation to reclaim our embodied experience in an increasingly digital world.

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22. Text Encoding Initiative – East Asian/Japanese Special Interest Group. See for example <https://tei-c.org/activities/sig/eastasian/> and <https://tei.dhi.jp/>.

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