Preliminary Proposal to Encode Siddham in ISO/IEC 10646

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1   Introduction

This is a preliminary proposal to encode the Siddham script in the Universal Character Set (ISO/IEC 10646). It is a collaborative effort between the Script Encoding Initiative (SEI) at the University of California, Berkeley and the Shingon Buddhist International Institute.

The purpose of this document is to present a character-encoding standard for Siddham. It provides brief background on the script, describes the proposed character set and technical aspects of the writing system, and offers examples of usage. Issues requiring additional research are identified in Section 5.

Siddham is a Brahmi-based writing system that originated in India, but whose usage is centered primarily in East Asia. At present it is associated with esoteric Buddhist traditions in Japan. Nevertheless, Siddham is structurally an Indic script and the encoding proposed for it adheres to the UCS encoding model for Brahmi-based writing systems, such as Devanagari and similarly structured scripts. The technical description and implementation of Siddham given in this document may differ from the traditional analysis and philosophical interpretations of the script and its constituent characters and glyphs. An attempt has been made to encode all distinct characters attested in Siddham records, although more characters may be uncovered through additional research. The characters that are proposed for encoding have been analyzed in accordance with the character-glyph model of the UCS. As a result, the proposed character set for Siddham may contain characters that are not part of traditional character repertoires. It may also exclude characters that are traditionally regarded as independent letters, eg. conjuncts; such characters are to be represented in the manner specified by the UCS encoding model.

The Siddham 'Tenchiji' font used here was designed by the Shingon Buddhist International Institute, with assistance from Lee Collins and Peter Lofting. The present author has added new glyphs and made some modifications to existing glyphs.

A formal proposal is being developed in collaboration with Siddham experts and other scholars. Feedback is requested from experts and users of the script. Comments may be submitted to the author at the email address given above.

2   Background

The Siddham script ((मेह्र *siddhaṃ*, (मेह्रं *siddhāṃ*; Sans. सिद्धं *siddhaṃ*; Chi. 悉曇文字 *xītán wénzì*; Jap. 悉曇 *shittan*; Kor. 실담 *siltam*) is a Brahmi-based script historically used for writing Sanskrit in China, Japan, and Korea. It is also known in Japan as *bonji* (梵字; Chi. *fànzì*; "Brahmā letters" < Sans. ब्रह्मा *brahmā*). At present, Siddham is used predominantly in Japan, where it is associated with the Shingon (真言) and Tendai (天台) schools of Japanese esoteric Buddhism (密教 *mikkyō*). Siddham was used for writing Buddhist manuscripts, but it is now mainly used for ceremonial and ritualistic purposes, such as the copying of *sūtra*-s and the writing of *mantra*-s and *bījākṣara*-s "seed syllables" associated with esoteric Buddhist practices. It was also used for writing inscriptions on statuary, amulets, and other artefacts.

Tradition states that the esoteric philosophy of Siddham was introduced in Japan in 806 by the Buddhist monk Kūkai (空海) (774–835), who learned the script in China from Prajñā (Sans. प्रज्ञा; Chi. 般若三藏 Bōrě Sāncáng) (734–c.810), a monk from Kashmir who served the Buddhist community of Chang'an (modern 西安 Xi'an) as an expert of Sanskrit and translator of Buddhist texts (van Gulik 1980: 114; Abe 1999: 117–119). Known better by his posthumous title Kōbō-Daishi (弘法大師), Kūkai was the founder of the Shingon ("True Word") school. Another proponent of Siddham in Japan was Saichō (最澄) (767–822), also called Dengyō-Daishi (伝教大師), who was the founder of the Tendai school.

There are several regional forms of Siddham. The Japanese form is described here and it is presented as the normative form for the encoding. In Japan, Siddham calligraphy is classified as 'formal' or 'informal' based upon the implement used for writing. The 'formal' script is written using a wooden stylus called *bokuhitsu* (木筆; Chi. *mù-bǐ*), while the 'informal' or 'brush' style is written using the common hair-tipped *fude* (筆; Chi. 毛筆 *máo-bǐ*). The 'formal' and 'informal' styles of letters are shown in figures 12–17. The Siddham used in China and Korea (see figures 21–26) differ from that of Japan mainly in terms of letterforms. Given the close relationships between the various regional forms and their identities as 'Siddham', it is practical to unify regional variants of Siddham with the script block that is proposed here for encoding.

Siddham is most closely related to Sharada (see tables 1 and 2), a Brahmi-based script that originated in Kashmir and that was used throughout northwestern India for producing manuscripts and inscriptions (see Pandey 2009). Use of Sharada spread from India into Central Asia and travelled from there to China with Buddhist monks. An example of Central Asian Siddham is found on the palm-leaf manuscripts of the Hōryū-ji (法隆寺) temple in Nara, Japan (see figure 6), which were brought there from China in 609. A detailed palaeographical description of the Siddham of these manuscripts was presented by Georg Bühler (1884).

Additional background information will be provided in the formal proposal.

3   Proposal Details

A total of 82 characters is required to encode a basic character set for Siddham: 14 vowel letters, 14 dependent vowel and related signs, 33 consonant letters, 1 ᴠɪʀᴀᴍᴀ, 1 invocation sign, 4 punctuation marks, 3 repetition marks, and 12 section marks. Other characters used in Siddham texts have been identified, but are not yet proposed for encoding because additional information regarding their usage is required (see Section 5).

Siddham is allocated to the Supplementary Multilingual Plane (SMP) at the range U+11580..U+115FF. Character names follow the UCS convention for Brahmi-based scripts. The proposed code chart and names list are shown in figures 1 and 2. The code chart draws upon a document prepared by Michael Everson (1999), but offers some revisions and new additions.

4   Writing System

4.1   Structure

The general structure (phonetic order, *mātrā* reordering, use of *virāma*, etc.) of Siddham is similar to that of Devanagari. Consonant clusters are represented as conjuncts. Some consonants and vowel signs have different shapes when they occur in certain environments.

4.2   Directionality

Siddham is written hozitonally left-to-right, but it is also written vertically top-to-bottom with lines proceeding from right-to-left. See figure 4 for an example of Siddham written left-to-right and figure 5 for text written top-to-bottom.

4.3   Virāma

The Siddham ◌ VIRAMA is identical to the corresponding character in Devanagari. It is used for silencing the inherent vowel of a consonant and for producing consonant conjuncts. The default rendering of VIRAMA is as a visible sign. The VIRAMA is known in Sanskrit as हलन्त *halanta* and in Japanese as 怛達点 *tatatsu-ten*.

4.4   Vowel Letters

There are 14 vowel letters proposed for encoding:

अ A	ও U	ত O	୧ VOCALIC L
आ AA	ও UU	ত AU	୧ VOCALIC LL
ও I	◁ E	ধ VOCALIC R	
ও II	ঌ AI	ধ VOCALIC RR	

Graphical variants   Variant forms of vowel letters are attested, eg. आ AA is also written as आ (see figure 12). These are glyphic variants that are to be managed through fonts. Different forms of vowel letters are used in Korean Siddham (see figure 21).

4.5   Vowel and Related Signs

There are 14 dependent vowel and related signs (Jap. 摩多 *mata* < Sans. मात्रा *mātrā*) proposed for encoding:

◌ VOWEL SIGN AA	◌ VOWEL SIGN VOCALIC R	◌ VOWEL SIGN AU
◌ VOWEL SIGN I	◌ VOWEL SIGN VOCALIC RR	◌ SIGN ANUSVARA
◌ VOWEL SIGN II	◌ VOWEL SIGN E	◌ SIGN CANDRABINDU
◌ VOWEL SIGN U	◌ VOWEL SIGN AI	◌: SIGN VISARGA
◌ VOWEL SIGN UU	◌ VOWEL SIGN O	

Unattested vowel signs   Dependent forms of ꡧ VOWEL LETTER VOCALIC L and ꡧ VOWEL LETTER VOCALIC LL are as of yet unattested. Space has been reserved in the code chart in the event that additional research uncovers such characters.

Graphical variants   There are glyphic variants of vowel signs (see figures 12 and 19), which are to be managed through fonts.

Alternate forms   There is an alternate form for VOWEL SIGN VOCALIC RR. Normally, this sign is written as ়. The two-part form is also attested; it is a combination of ় VOWEL SIGN VOCALIC R and ◌ VOWEL SIGN AA, in which the latter sign acts as a vowel-length mark.

Nasalization   The signs ◌̇ ANUSVARA and ◌̐ CANDRABINDU are used for indicating nasalization.

Visarga   The sign ◌: VISARGA represents post-vocalic aspiration (/h/). In Sanskrit phonology, it indicates an allophone of 𑖭 SA or 𑖨 RA in word-final position.

Ordering of multiple signs   In certain cases, such as when writing 'seed syllables', a base letter that is combined with ANUSVARA or CANDRABINDU may also be combined with VISARGA, eg. 𑖁𑖽 or 𑖁𑖼 *āṃḥ*. In such cases the VISARGA should be written last: <𑖁 AA, ◌̐ CANDRABINDU, ◌: VISARGA>. Rendering engines should recognize such sequences of combining marks as valid.

4.6   Consonants

There are 33 consonant letters proposed for encoding:

𑖎	KA	𑖗	NYA	𑖠	DHA	𑖩	LA
𑖏	KHA	𑖘	TTA	𑖡	NA	𑖪	VA
𑖐	GA	𑖙	TTHA	𑖢	PA	𑖫	SHA
𑖑	GHA	𑖚	DDA	𑖣	PHA	𑖬	SSA
𑖒	NGA	𑖛	DDHA	𑖤	BA	𑖭	SA
𑖓	CA	𑖜	NNA	𑖥	BHA	𑖮	HA
𑖔	CHA	𑖝	TA	𑖦	MA		
𑖕	JA	𑖞	THA	𑖧	YA		
𑖖	JHA	𑖟	DA	𑖨	RA		

Each consonant bears the inherent vowel /a/, represented by 𑖀 A, which is silenced using ◌ VIRAMA. Variant forms of consonants are attested (see figures 13–17); these are to be managed at the font level.

4.7   Consonant Conjuncts

Consonant clusters are written as conjuncts. They are not encoded as independent characters. Conjuncts are represented using VIRAMA, which is written after each consonant in a cluster. Siddham conjuncts are written vertically, horizontally, and as independent ligatures. Additional details will be provided in the formal proposal.

There are traditional Chinese and Japanese tabulations for Siddham conjuncts. One such classification system was described in the manual *Xītán Zìjì* (悉曇字記) by the Chinese monk Zhì-guǎng (智廣) (d. 806), who organized the various possible cluster combinations of Siddham consonants into eighteen categories (see figure 42). Examples of several conjuncts are shown in figures 43–58.

Shaping   The shape of some consonants change when they occur in conjunct-initial position (eg. ᜱ KA → ᜱ; ᜨ RA → ◌ *repha*), some are written using post-base forms when they are non-initial (eg. ᜬ YA → ◌). These ligating forms are illustrated in figures 13–17 (column labeled "in combination") and figures 19–20.

Depth   Siddham conjuncts may represent clusters with large numbers of consonants. For example, a conjunct of six consonants is ᜱ *rkṣvrya*, which is produced using the sequence <ᜨ RA, ◌ VIRAMA, ᜱ KA, ◌ VIRAMA, ᜱ SSA, ◌ VIRAMA, ᜪ VA, ◌ VIRAMA, ᜨ RA, ◌ VIRAMA, ᜬ YA>.

Special Conjuncts   The glyphs ᜱ *kṣa* and ᜱ *llaṃ* are often shown as independent letters in Siddham charts. The *kṣa* represents conjuncts of different consonant letters and *llaṃ* represents conjuncts of geminate consonants. Based upon the UCS encoding model, they are not independent letters, but conjuncts. They are to be represented using the following sequences: ᜱ = <ᜱ KA, ◌ VIRAMA, ᜱ SSA> (compare Devanagari क्ष *kṣa* = <क KA, ◌ VIRAMA, ष SSA>); ᜱ = <ᜤ LA, ◌ VIRAMA, ᜤ LA, ◌ ANUSVARA>. It may be practical to define these conjuncts as named character sequences (see Section 5).

Default Representation   It is expected that a basic Siddham font will contain the necessary glyphs for properly representing conjuncts. A consonant cluster is depicted with the appropriate conjunct glyph only if such a glyph is available in the font. If the conjunct glyph is unavailable, the bare consonants in the cluster are depicted using their full forms combined with a visible VIRAMA. While these depictions of conjuncts may not be used in Siddham orthography, they are necessary for the representation of the script in plain text. In order to render Siddham text appropriately in the absence of distinct glyphs for any possible conjunct, it is recommended that a set of condensed forms of letters in conjunct-initial and non-initial positions be available so that arbitrary conjuncts may be rendered in the vertical orientation used in Siddham orthography.

4.8   Consonant-Vowel Combinations

Vowel signs combine with consonant letters and conjuncts as in Devanagari. Some consonant shapes are modified when they are written with vowels (eg. ᜱ KA → ᜱ when combining with ◌ VOWEL SIGN U: ᜱ *ku*). Some vowel signs are written as contextual forms when they occur with certain consonants. For example, ◌ VOWEL SIGN U → ◌ and ◌ VOWEL SIGN UU → ◌ when combining with ᜅ NGA, ᜱ JA, ᜩ TTA, ᜨ TTHA, ᜱ DDHA, ᜨ NA, ᜱ PA, ᜪ VA. When written with ᜨ RA, these signs have an additional contextual form: ᜨ *ru* and ᜨ *rū*. Additional details will be provided in the formal proposal.

4.9   Invocations

The following characters are used as invocations:

1. ᜲ SVASTI   This sign is written at the beginning of a text (see figures 6 and 37). It has a vertically-oriented glyphic variant ᜲ (see figure 32). The sign is traditionally analyzed as being formed from the lower portion of ᜲ I. Palaeographically, ᜲ corresponds to characters used in other Indic scripts, where it represents the Sanskrit invocation स्वस्ति *svasti* "may it be auspicious".

2. *oṃ*   The sacred syllable *oṃ* is represented using the sequence <ॐ O, ँ CANDRABINDU> → ॐ. A distinct *oṃ* character is not attested for Siddham.

4.10   Punctuation

The following punctuation characters are proposed for encoding:

1. ॰ DANDA and ॰ DOUBLE DANDA   The DANDA is used for marking the end of sentences and other short text sections, while DOUBLE DANDA is used at the end of paragraphs and larger text blocks (see figures 31, 39, 40). The DANDA and DOUBLE DANDA are written as �‹ and ᚼ in 'informal' Japanese writing; these are to be treated as glyphic variants and managed through fonts. The Siddham *daṇḍā*-s are graphically distinct from those of Devanagari and are, therefore, proposed for separate encoding.

2. ᛫ WORD SEPARATOR ONE and ᛁ WORD SEPARATOR TWO   These signs are used for marking boundaries between words. Usage of WORD SEPARATOR ONE is shown in figure 37. The WORD SEPARATOR TWO is shown in figures 39, 40, 41, where it is used alongside ॰ DANDA and ॰ DOUBLE DANDA.

3. Middle dot   Word and phrase separation is also indicated using a · middle dot (see figure 38). This character is to be written using the already encoded · U+00B7 MIDDLE DOT.

Other punctuation marks are attested, but more information about their usage is required (see Section 5).

4.11   Section Marks

Several characters are used for marking the end of text sections. Twelve such characters are proposed for encoding: ※ SECTION MARK ONE, ※ SECTION MARK TWO, ※ SECTION MARK THREE, ※ SECTION MARK FOUR, ※ SECTION MARK FIVE, ◎ SECTION MARK SIX, ⊠ SECTION MARK SEVEN, ⸽ SECTION MARK EIGHT, ⸽ SECTION MARK NINE, ⫶ SECTION MARK TEN, ※ SECTION MARK ELEVEN, ⸎ SECTION MARK TWELVE.

Of these, the first ten are attested in various Siddham manuscripts (see figures 31, 32, 34). The last two are attested in a manuscript (see figure 38). The ⫶ SECTION MARK TEN is often used to indicate the completion of an entire text, while the others are used at the ends of paragraphs. Several other similar characters may be attested (see Section 5).

4.12   Repetition Marks

The ᒾ REPETITION MARK ONE, ௹ REPETITION MARK TWO, and ᒿ REPETITION MARK THREE are used for indicating the repetition of text. They are written after the text that is to be repeated. Questions regarding the usage of repetition marks are stated in Section 5.

The ᒾ REPETITION MARK ONE has the glyphic variants ᒾ and ᒾ (see figures 31, 32, 34). Based upon its graphical shape and function, it is likely that REPETITION MARK ONE is derived from an Indic digit '2' (compare Devanagari २). A common practice in manuscript traditions of northern India is to indicate the repetition of words using digits. The digit used indicates the number of repetitions, eg. '2' for twice, '3' for thrice. As there are no attested digits for Siddham, it appears that the original link between REPETITION MARK ONE and a numeric value was forgotten and the original digit for '2' was preserved as a symbol. This explains the serialized usage of REPETITION MARK ONE in the text excerpt in figure 35 for indicating a triple reading, ie. Devanagari "हूं २ २" instead of "हूं ३" for *hūṃ hūṃ hūṃ*).

The 𑑛 REPETITION MARK TWO is used in the vertical version of the *Uṣṇīṣa Vijaya Dhāraṇī Sūtra* shown in figure 5. An excerpt of the *Sūtra* with the repetition marks highlighted is shown in figure 36. Here, the mark appears after 𑌯 *ya* (3rd character), another *ya* (7th character), and 𑌰 *ra* (10th character). The mark prompts the reader to parse the text as "*jaya jaya, vijaya vijaya, smara smara*". It is possible that REPETITION MARK TWO is used only in a vertical environment. This is supported by the accompanying Japanese annotation, which glosses 𑑛 using 〳 U+3031 VERTICAL KANA REPEAT MARK.

The 𐀃 REPETITION MARK THREE is shown in several Siddham manuals. It is proposed for encoding because it is a graphically-distinct character.

4.13　Digits

Siddham does not have a traditional set of digits (see Section 5).

4.14　Editorial Marks

Siddham manuscripts contain editorial marks, such as those used for indicating the insertion or deletion of text. The characters ⁖ and ⋯ are used for marking deletions (see figure 34). Another character is a caret-like insertion mark that is written below the baseline to indicate the insertion of text. These editorial marks are not unique to Siddham and are used in various Indic manuscript traditions. These characters should be represented using already-encoded characters with similar functions (see Section 5).

4.15　Pedagogical Characters

There are several pedagogical characters used for describing Siddham letters in script manuals. Some of these are discussed below. These characters may be candidates for encoding, but additional research is required regarding their usage and suitability for encoding, as per the UCS encoding model (see Section 5).

Character Strokes　　Siddham manuals describe elemental character strokes that are used for writing letters (see figure 62). Some of these are described below.

1. ヽ *myō-ten*　　The stroke ヽ is the initial mark made when a brush is pressed upon a surface for writing any Siddham letter (see the stroke order in figures 63 and 64). It is known in Japanese as 命点 *myō-ten* "life mark". The *myō-ten* corresponds to the Chinese simple stroke ヽ (點 *diǎn* "dot"), which is encoded in the UCS as ヽ U+31D4 CJK STROKE D.

2. ￣ *a-ten*　　The stroke ￣ is shown in some historical and modern Siddham handbooks as a dependent vowel sign of 𑌅 A (see figures 19, 60, 61) or as a 'variation' of the letter (see figure 12). For this reason it is called ア点 *a-ten* "*a* mark" in Japanese. It is a horizontally elongated form of ヽ *myō-ten*. The *a-ten* is not a true 'vowel sign', but a portion of the top-stroke or *mātrā* (Sans. मात्रा) inherent in each consonant letter.

3. ⌣ *gyōgatsu-ten*　　The stroke ⌣ is known in Japanese as 仰月点 *gyōgatsu-ten* "moon-viewing mark" and in Sanskrit as अर्धचन्द्र *ardhacandra* "half-moon". It is the foundational stroke of the sign ̐ CAN-DRABINDU, which is produced by writing ̇ ANUSVARA with *gyōgatsu-ten*. The stroke is considered 荘厳 *shougon* (Sans. अलंकार *alaṃkāra*) "adornment" or "decoration" in that it does not change the phonological value of ANUSVARA. The use of *gyōgatsu-ten* is shown in figure 65, where it appears as an independent graphical element.

7

4. ⳋ *u-ten*   The stroke ⳋ is known as ウ点 *u-ten* "*u* mark" in Japanese. It is used for forming characters like ಔ I, ⳍ U, and ⳍ UU.

5. ⭕ *en-ten*   The stroke ⭕ is known as 円点 *en-ten* "circle mark" in Japanese. It is used for forming characters like ⭕ ANUSVARA and ⭕ TTHA.

'Headless' Letters   Some Japanese treatises on Siddham offer explanations about the phonological properties of Siddham consonants by using 'headless' letters, which are the regular consonants written without the top-stroke (*myō-ten*; Sans. *mātrā*). One such work, the *Shittan Bunsho* (悉曇聞書) of Jiun Sonja (慈雲尊者) (1718–1804), expounds upon the alphasyllabic and alphabetic natures of Siddham consonants by using 'headless' letters. Jiun explains that removing the top-stroke of ꜥ KA produces the 'headless' form ꜥ in which the inherent vowel is absent: /ka/ → /k/. According to this view, the inherent vowel /a/ is contained in the top-stroke and eliminating it produces an alphabetic form of a letter. Secondly, when this 'headless' *ka* is combined with a ꜥ VIRAMA as ꜥ, the remaining consonantal value is removed: /k/ → Ø. In this case, the VIRAMA essentially eradicates the entire letter. A table of 'headless' letters is given by Jōgon (淨嚴) (1639–1702) in his *Shittan Sanmitsushō* (𑖽𑖽三密鈔), which is presented here in figure 59.

While 'headless' forms of Siddham consonants would be required for accurately representing Jiun's *Shittan Bunsho*, they are to be considered as glyphic variants of regular letters and are to be managed through fonts.

4.16   Word Ligatures

A *bījākṣara* or *bīja* "seed syllable" may be written such that the constituent characters are joined to form a highly-stylized ligature (see figures 67, 68, 69, 70). For example, the word 𑖦 *phaṭ* (<𑖦 PHA, 𑖘 TTA, ꜥ VIRAMA>) may be written as 𑖦 *phaṭ* . A more complex example is a *bīja* of Ácala (Sans. अचल; Chi. 不動明王 Búdòng Míngwáng; Jap. Fudō Myōō), which is a ligature formed by joining 𑖮 *hāṃ* and 𑖦 *māṃ*, the last two syllables of his *mantra*, into a monogram written as 𑖮 or 𑖮 or 𑖮 *hāṃmāṃ*.

These types of ligatures cannot be represented in plain text using characters proposed for encoding. They are to be considered calligraphic innovations and managed at the presentation level, through the application of font features or text attributes.

4.17   Collation

The primary collating order for Siddham is as follows:

𑖀 A   <   𑖁 AA   <   ಔ I   <   ಔ II   <   ⳍ U   <   ⳍ UU   <   𑖊 E   <   𑖋 AI   <   𑖌 O   <   𑖍 AU   <

𑖤 VOCALIC R   <   𑖤 VOCALIC RR   <   𑖠 VOCALIC L   <   𑖠 VOCALIC LL   <   ꜥ KA   <   𑖏 KHA   <

𑖐 GA   <   𑖑 GHA   <   𑖒 NGA   <   𑖓 CA   <   𑖔 CHA   <   𑖕 JA   <   𑖖 JHA   <   𑖗 NYA   <

𑖘 TTA   <   ⭕ TTHA   <   𑖚 DDA   <   𑖛 DDHA   <   𑖜 NNA   <   𑖝 TA   <   𑖞 THA   <   𑖟 DA   <

𑖠 DHA   <   𑖡 NA   <   𑖢 PA   <   𑖣 PHA   <   𑖤 BA   <   𑖥 BHA   <   𑖦 MA   <   𑖧 YA   <   𑖨 RA   <

𑖩 LA   <   𑖪 VA   <   𑖫 SHA   <   𑖬 SSA   <   𑖭 SA   <   𑖮 HA   <   𑖯 SIGN AA   <   𑖰 SIGN I   <

𑖱 SIGN II   <   𑖲 SIGN U   <   𑖳 SIGN UU   <   � SIGN E   <   𑖶 SIGN AI   <   𑖺 SIGN O   <

𑖻 SIGN AU   <   𑖴 SIGN VOCALIC R   <   𑖵 SIGN VOCALIC RR   <   𑖿 VIRAMA

The following characters have secondary weights: 𑖽 CANDRABINDU, 𑖽 ANUSVARA, 𑖽 VISARGA.

5   Questions

Below are some questions regarding the encoding of additional Siddham characters:

1. *Named character sequences*   The glyphs ⟨ *kṣa* and ⟨ *llaṃ* are conjuncts that have symbolic significance. Should named character sequences be defined for these glyphs, as was done for BENGALI LETTER KHINYA? The sequences may be defined as follows:

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   SIDDHAM LETTER KSHA;1158E 115BC 115AB
   SIDDHAM LETTER LLAM;115A9 115BC 115A9 115BC
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2. *Digits*   There is no traditional set of Siddham digits. However, figure 18 shows "Bonji numerals" that are similar to Devanagari digits. Are these "numerals" modern innovations? Should they be encoded?

3. ⟨ *and* ⟨:⟨   These punctuation marks are used in the palm-leaf manuscript of the *Prajñāpāramitā Hṛdaya Sūtra* from the Hōryū-ji temple. Are they distinct characters? The glyph ⟨ appears to be a glyphic variant of ⟨ DOUBLE DANDA; is it? The glyph ⟨:⟨ may be analyzed as two DOUBLE DANDA characters surrounding a ○: VISARGA; is it?

4. *Avagraha*   Devanagari versions of the *Prajñāpāramitā Hṛdaya Sūtra* and other texts show the use of ऽ U+093D DEVANAGARI SIGN AVAGRAHA. The *avagraha* is used for marking the elision of word-initial अ *a* in Sanskrit as a result of sandhi when the preceding word ends with the vowels ए *e* or ओ *o*, eg. *śuddho 'ham* is written in Devanagari as शुद्धो ऽहम् (from शुद्धः *śuddhaḥ* + अहम् *aham*). Is this character attested in any Siddham manuscripts of these texts?

5. *Repetition marks*   Additional research is required in order to determine if the three repetition marks have distinctive functions or if their usage is specific to certain environments or certain regional Siddham traditions. For instance, ꧑ REPETITION MARK ONE appears in Chinese sources, which are presented as left-to-right text, while ꧒ REPETITION MARK TWO appears in Japanese sources and in vertical text. Is usage of these repetition marks restricted to certain regional traditions? Also, are there texts that show the use of ꧓ REPETITION MARK THREE? Is there any information about this character?

6. *Section marks*   In addition to the section marks that are proposed for encoding, there may be other similar characters attested in Siddham records. If such characters are found, should they be encoded separately or unified with proposed section marks that are graphically similar? Also, there are different forms of ꧗ SECTION MARK EIGHT, that having varying numbers of arcs; compare the form with two arcs in figure 33) with the three-arc form in figure 34 and the four-arc form in figure 32. Should these forms with ±1 arc be treated as distinct characters? The ꧘ SECTION MARK NINE is proposed for encoding because it is distinct from SECTION MARK EIGHT in the number of arcs that it possesses.

7. :‖:   The :‖: SECTION MARK TEN is presently classified as a 'section mark'. However, based upon its graphical structure, it is less 'ornamental' than other section marks. It may also be functionally distinct from the section marks. Should this character be encoded as a form of punctuation instead of as a section mark? Is it related to the ⟨:⟨ character described in item #3 above?

8. *Pedagogical characters*   The pedagogical characters described in Section 4.15 are used in Siddham manuals and are required by users who produce such materials. There is a precedent in the UCS for encoding character strokes and other such pedagogical characters, eg. the CJK radicals and the characters of the 'CJK Strokes' block (U+31C0..U+31EF).

9. ○   Figure 13 (row 11) shows the below-base character ○ listed along with ○̐ CANDRABINDU and ○̇ ANUSVARA. What is this character? Is this the *gyōgatsu-ten*?

9

10. ŏ Michael Everson's chart for Siddham shows a character ŏ named "ᴛᴅᴅʜᴀᴍ ᴠᴏᴡᴇʟ ꜱɪɢɴ ᴄᴀɴ-
     ᴅʀᴀ". It is not a vowel sign, but the pedagogical character *gyōgatsu-ten* described in Section 4.15. If
     the *gyōgatsu-ten* is to be encoded, should it be defined as a combining sign?

6 Character Data

6.1 Character Properties

Character properties given in the data format of `UnicodeData.txt`:

```
11580;SIDDHAM LETTER A;Lo;0;L;;;;;N;;;;;
11581;SIDDHAM LETTER AA;Lo;0;L;;;;;N;;;;;
11582;SIDDHAM LETTER I;Lo;0;L;;;;;N;;;;;
11583;SIDDHAM LETTER II;Lo;0;L;;;;;N;;;;;
11584;SIDDHAM LETTER U;Lo;0;L;;;;;N;;;;;
11585;SIDDHAM LETTER UU;Lo;0;L;;;;;N;;;;;
11586;SIDDHAM LETTER E;Lo;0;L;;;;;N;;;;;
11587;SIDDHAM LETTER AI;Lo;0;L;;;;;N;;;;;
11588;SIDDHAM LETTER O;Lo;0;L;;;;;N;;;;;
11589;SIDDHAM LETTER AU;Lo;0;L;;;;;N;;;;;
1158A;SIDDHAM LETTER VOCALIC R;Lo;0;L;;;;;N;;;;;
1158B;SIDDHAM LETTER VOCALIC RR;Lo;0;L;;;;;N;;;;;
1158C;SIDDHAM LETTER VOCALIC L;Lo;0;L;;;;;N;;;;;
1158D;SIDDHAM LETTER VOCALIC LL;Lo;0;L;;;;;N;;;;;
1158E;SIDDHAM LETTER KA;Lo;0;L;;;;;N;;;;;
1158F;SIDDHAM LETTER KHA;Lo;0;L;;;;;N;;;;;
11590;SIDDHAM LETTER GA;Lo;0;L;;;;;N;;;;;
11591;SIDDHAM LETTER GHA;Lo;0;L;;;;;N;;;;;
11592;SIDDHAM LETTER NGA;Lo;0;L;;;;;N;;;;;
11593;SIDDHAM LETTER CA;Lo;0;L;;;;;N;;;;;
11594;SIDDHAM LETTER CHA;Lo;0;L;;;;;N;;;;;
11595;SIDDHAM LETTER JA;Lo;0;L;;;;;N;;;;;
11596;SIDDHAM LETTER JHA;Lo;0;L;;;;;N;;;;;
11597;SIDDHAM LETTER NYA;Lo;0;L;;;;;N;;;;;
11598;SIDDHAM LETTER TTA;Lo;0;L;;;;;N;;;;;
11599;SIDDHAM LETTER TTHA;Lo;0;L;;;;;N;;;;;
1159A;SIDDHAM LETTER DDA;Lo;0;L;;;;;N;;;;;
1159B;SIDDHAM LETTER DDHA;Lo;0;L;;;;;N;;;;;
1159C;SIDDHAM LETTER NNA;Lo;0;L;;;;;N;;;;;
1159D;SIDDHAM LETTER TA;Lo;0;L;;;;;N;;;;;
1159E;SIDDHAM LETTER THA;Lo;0;L;;;;;N;;;;;
1159F;SIDDHAM LETTER DA;Lo;0;L;;;;;N;;;;;
115A0;SIDDHAM LETTER DHA;Lo;0;L;;;;;N;;;;;
115A1;SIDDHAM LETTER NA;Lo;0;L;;;;;N;;;;;
115A2;SIDDHAM LETTER PA;Lo;0;L;;;;;N;;;;;
115A3;SIDDHAM LETTER PHA;Lo;0;L;;;;;N;;;;;
115A4;SIDDHAM LETTER BA;Lo;0;L;;;;;N;;;;;
115A5;SIDDHAM LETTER BHA;Lo;0;L;;;;;N;;;;;
115A6;SIDDHAM LETTER MA;Lo;0;L;;;;;N;;;;;
115A7;SIDDHAM LETTER YA;Lo;0;L;;;;;N;;;;;
115A8;SIDDHAM LETTER RA;Lo;0;L;;;;;N;;;;;
115A9;SIDDHAM LETTER LA;Lo;0;L;;;;;N;;;;;
115AA;SIDDHAM LETTER VA;Lo;0;L;;;;;N;;;;;
115AB;SIDDHAM LETTER SHA;Lo;0;L;;;;;N;;;;;
115AC;SIDDHAM LETTER SSA;Lo;0;L;;;;;N;;;;;
115AD;SIDDHAM LETTER SA;Lo;0;L;;;;;N;;;;;
115AE;SIDDHAM LETTER HA;Lo;0;L;;;;;N;;;;;
115AF;SIDDHAM VOWEL SIGN AA;Mc;0;L;;;;;N;;;;;
```

```
115B0;SIDDHAM VOWEL SIGN I;Mc;0;L;;;;;N;;;;;
115B1;SIDDHAM VOWEL SIGN II;Mc;0;L;;;;;N;;;;;
115B2;SIDDHAM VOWEL SIGN U;Mn;0;NSM;;;;;N;;;;;
115B3;SIDDHAM VOWEL SIGN UU;Mn;0;NSM;;;;;N;;;;;
115B4;SIDDHAM VOWEL SIGN E;Mc;0;L;;;;;N;;;;;
115B5;SIDDHAM VOWEL SIGN AI;Mn;0;NSM;;;;;N;;;;;
115B6;SIDDHAM VOWEL SIGN O;Mc;0;L;115B8 115AF;;;;N;;;;;
115B7;SIDDHAM VOWEL SIGN AU;Mc;0;L;;;;;N;;;;;
115B8;SIDDHAM VOWEL SIGN VOCALIC R;Mn;0;NSM;;;;;N;;;;;
115B9;SIDDHAM VOWEL SIGN VOCALIC RR;Mn;0;NSM;;;;;N;;;;;
115BA;<reserved>
115BB;<reserved>
115BC;SIDDHAM SIGN VIRAMA;Mn;9;NSM;;;;;N;;;;;
115BD;SIDDHAM SIGN CANDRABINDU;Mn;0;NSM;;;;;N;;;;;
115BE;SIDDHAM SIGN ANUSVARA;Mn;0;NSM;;;;;N;;;;;
115BF;SIDDHAM SIGN VISARGA;Mc;0;L;;;;;N;;;;;
115C0;SIDDHAM SVASTI;So;0;L;;;;;N;;;;;
115C1;SIDDHAM DANDA;Po;0;L;;;;;N;;;;;
115C2;SIDDHAM DOUBLE DANDA;Po;0;L;;;;;N;;;;;
115C3;SIDDHAM WORD SEPARATOR ONE;Po;0;L;;;;;N;;;;;
115C4;SIDDHAM WORD SEPARATOR TWO;Po;0;L;;;;;N;;;;;
115C5;SIDDHAM REPETITION MARK ONE;Po;0;L;;;;;N;;;;;
115C6;SIDDHAM REPETITION MARK TWO;Po;0;L;;;;;N;;;;;
115C7;SIDDHAM REPETITION MARK THREE;Po;0;L;;;;;N;;;;;
115C8;SIDDHAM SECTION MARK ONE;So;0;L;;;;;N;;;;;
115C9;SIDDHAM SECTION MARK TWO;So;0;L;;;;;N;;;;;
115CA;SIDDHAM SECTION MARK THREE;So;0;L;;;;;N;;;;;
115CB;SIDDHAM SECTION MARK FOUR;So;0;L;;;;;N;;;;;
115CC;SIDDHAM SECTION MARK FIVE;So;0;L;;;;;N;;;;;
115CD;SIDDHAM SECTION MARK SIX;So;0;L;;;;;N;;;;;
115CE;SIDDHAM SECTION MARK SEVEN;So;0;L;;;;;N;;;;;
115CF;SIDDHAM SECTION MARK EIGHT;So;0;L;;;;;N;;;;;
115D0;SIDDHAM SECTION MARK NINE;So;0;L;;;;;N;;;;;
115D1;SIDDHAM SECTION MARK TEN;So;0;L;;;;;N;;;;;
115D2;SIDDHAM SECTION MARK ELEVEN;So;0;L;;;;;N;;;;;
115D3;SIDDHAM SECTION MARK TWELVE;So;0;L;;;;;N;;;;;
```

6.2 Linebreaking

Linebreaking properties given in the format of `LineBreak.txt`:

```
11580..115AE; AL   # LETTER A .. LETTER HA
115AF..115BF; CM   # SIGN AA .. SIGN VISARGA
115C0;        BA   # SVASTI
115C1..115C4; BA   # DANDA .. WORD SEPARATOR TWO
115C5..115C7; AL   # REPETITION MARK ONE .. REPETITION MARK THREE
115C8..115D3; BA   # SECTION MARK ONE .. SECTION MARK TWELVE
```

6.3 Syllabic Categories

Syllabic categories given in the format of `IndicSyllabicCategory.txt`:

```
# Indic_Syllabic_Category=Bindu
115BD..115BE ; Bindu           # Mn  [2] SIGN CANDRABINDU .. SIGN ANUSVARA


# Indic_Syllabic_Category=Visarga
115BF        ; Visarga         # Mc      SIGN VISARGA
```

11

```
# Indic_Syllabic_Category=Virama
115BC        ; Virama            # Mn      SIGN VIRAMA


# Indic_Syllabic_Category=Vowel_Independent
11580..1158D ; Vowel_Independent # Lo  [14] LETTER A .. LETTER VOCALIC LL


# Indic_Syllabic_Category=Vowel_Dependent
115AF..115B1 ; Vowel_Dependent # Mc  [3] VOWEL SIGN AA .. VOWEL SIGN II
115B2..115B3 ; Vowel_Dependent # Mn  [2] VOWEL SIGN U .. VOWEL SIGN UU
115B4        ; Vowel_Dependent # Mc     VOWEL SIGN E
115B5        ; Vowel_Dependent # Mn     VOWEL SIGN AI
115B6..115B8 ; Vowel_Dependent # Mc  [2] VOWEL SIGN O .. VOWEL SIGN AU
11587..11589 ; Vowel_Dependent # Mn  [2] VOWEL SIGN VOCALIC R .. VOWEL SIGN VOCALIC RR


# Indic_Syllabic_Category=Consonant
1158E..115AE ; Consonant         # Lo [33] LETTER KA .. LETTER HA
```

6.4   Matra Categories

Matra categories given in the format of `IndicMatraCategory.txt`:

```
# Indic_Matra_Category=Right
115AF        ; Right  # Mc     VOWEL SIGN AA
115B1        ; Right  # Mc     VOWEL SIGN II


# Indic_Matra_Category=Left
115B0        ; Left   # Mc     VOWEL SIGN I
115B4        ; Left   # Mc     VOWEL SIGN E


# Indic_Matra_Category=Left_And_Right
115B6        ; Left_And_Right  # Mc  VOWEL SIGN O


# Indic_Matra_Category=Top
115B5        ; Top    # Mn     VOWEL SIGN AI


# Indic_Matra_Category=Top_And_Left_And_Right
115B7        ; Top_And_Left_And_Right  # Mc  VOWEL SIGN AU


# Indic_Matra_Category=Bottom
115B2..115B3 ; Bottom # Mn  [2] VOWEL SIGN U .. VOWEL SIGN UU
115B8..115B9 ; Bottom # Mn  [2] VOWEL SIGN VOCALIC R .. VOWEL SIGN VOCALIC RR
115BC        ; Bottom # Mn     SIGN VIRAMA
```

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8   Acknowledgments

	1158	1159	115A	115B	115C	115D	115E
0	11580	11590	115A0	115B0	115C0	115D0	
1	11581	11591	115A1	115B1	115C1	115D1	
2	11582	11592	115A2	115B2	115C2	115D2	
3	11583	11593	115A3	115B3	115C3	115D3	
4	11584	11594	115A4	115B4	115C4		
5	11585	11595	115A5	115B5	115C5		
6	11586	11596	115A6	115B6	115C6		
7	11587	11597	115A7	115B7	115C7		
8	11588	11598	115A8	115B8	115C8		
9	11589	11599	115A9	115B9	115C9		
A	1158A	1159A	115AA		115CA		
B	1158B	1159B	115AB		115CB		
C	1158C	1159C	115AC	115BC	115CC		
D	1158D	1159D	115AD	115BD	115CD		
E	1158E	1159E	115AE	115BE	115CE		
F	1158F	1159F	115AF	115BF	115CF		

Figure 1: Proposed code chart for Siddham.

15

Independent vowels

11580 SIDDHAM LETTER A
11581 SIDDHAM LETTER AA
11582 SIDDHAM LETTER I
11583 SIDDHAM LETTER II
11584 SIDDHAM LETTER U
11585 SIDDHAM LETTER UU
11586 SIDDHAM LETTER E
11587 SIDDHAM LETTER AI
11588 SIDDHAM LETTER O
11589 SIDDHAM LETTER AU

Additional independent vowels

1158A SIDDHAM LETTER VOCALIC R
1158B SIDDHAM LETTER VOCALIC RR
1158C SIDDHAM LETTER VOCALIC L
1158D SIDDHAM LETTER VOCALIC LL

Consonants

1158E SIDDHAM LETTER KA
1158F SIDDHAM LETTER KHA
11590 SIDDHAM LETTER GA
11591 SIDDHAM LETTER GHA
11592 SIDDHAM LETTER NGA
11593 SIDDHAM LETTER CA
11594 SIDDHAM LETTER CHA
11595 SIDDHAM LETTER JA
11596 SIDDHAM LETTER JHA
11597 SIDDHAM LETTER NYA
11598 SIDDHAM LETTER TTA
11599 SIDDHAM LETTER TTHA
1159A SIDDHAM LETTER DDA
1159B SIDDHAM LETTER DDHA
1159C SIDDHAM LETTER NNA
1159D SIDDHAM LETTER TA
1159E SIDDHAM LETTER THA
1159F SIDDHAM LETTER DA
115A0 SIDDHAM LETTER DHA
115A1 SIDDHAM LETTER NA
115A2 SIDDHAM LETTER PA
115A3 SIDDHAM LETTER PHA
115A4 SIDDHAM LETTER BA
115A5 SIDDHAM LETTER BHA
115A6 SIDDHAM LETTER MA
115A7 SIDDHAM LETTER YA
115A8 SIDDHAM LETTER RA
115A9 SIDDHAM LETTER LA
115AA SIDDHAM LETTER VA
115AB SIDDHAM LETTER SHA
115AC SIDDHAM LETTER SSA
115AD SIDDHAM LETTER SA
115AE SIDDHAM LETTER HA

Dependent vowel signs

115AF SIDDHAM VOWEL SIGN AA
115B0 SIDDHAM VOWEL SIGN I
115B1 SIDDHAM VOWEL SIGN II
115B2 SIDDHAM VOWEL SIGN U
115B3 SIDDHAM VOWEL SIGN UU
115B4 SIDDHAM VOWEL SIGN E
115B5 SIDDHAM VOWEL SIGN AI
115B6 SIDDHAM VOWEL SIGN O
115B7 SIDDHAM VOWEL SIGN AU

Additional vowel signs

115B8 SIDDHAM VOWEL SIGN VOCALIC R
115B9 SIDDHAM VOWEL SIGN VOCALIC RR
115BA <reserved>
115BB <reserved>

Virama

115BC SIDDHAM SIGN VIRAMA

Various signs

115BD SIDDHAM SIGN CANDRABINDU
115BE SIDDHAM SIGN ANUSVARA
115BF SIDDHAM SIGN VISARGA

Invocation

115C0 SIDDHAM SVASTI

Punctuation

115C1 SIDDHAM DANDA
115C2 SIDDHAM DOUBLE DANDA
115C3 SIDDHAM WORD SEPARATOR ONE
115C4 SIDDHAM WORD SEPARATOR TWO

Repetition signs

115C5 SIDDHAM REPETITION MARK ONE
115C6 SIDDHAM REPETITION MARK TWO
115C7 SIDDHAM REPETITION MARK THREE

Section marks

These characters are used for indicating the end of text
115C8 SIDDHAM SECTION MARK ONE
115C9 SIDDHAM SECTION MARK TWO
115CA SIDDHAM SECTION MARK THREE
115CB SIDDHAM SECTION MARK FOUR
115CC SIDDHAM SECTION MARK FIVE
115CD SIDDHAM SECTION MARK SIX
115CE SIDDHAM SECTION MARK SEVEN
115CF SIDDHAM SECTION MARK EIGHT
115D0 SIDDHAM SECTION MARK NINE
115D1 SIDDHAM SECTION MARK TEN
115D2 SIDDHAM SECTION MARK ELEVEN
115D3 SIDDHAM SECTION MARK TWELVE

Figure 2: Proposed names list for Siddham.

	Siddham	Sharada	Nagari		Siddham	Sharada	Nagari
A	𑖀	𑆄	अ	-A	—	—	—
AA	𑖁	𑆃	आ	-AA	◌	◌	◌ा
I	𑖂	𑆅	इ	-I	◌	◌	◌ि
II	𑖃	𑆆	ई	-II	◌	◌	◌ी
U	𑖄	𑆇	उ	-U	◌	◌	◌ु
UU	𑖅	𑆈	ऊ	-UU	◌	◌	◌ू
R	𑖆	𑆉	ऋ	-R	◌	◌	◌ृ
RR	𑖇	𑆊	ॠ	-RR	◌	◌	◌ॄ
L	𑖈	𑆋	ऌ	-L	—	◌	◌ॢ
LL	𑖉	𑆌	ॡ	-LL	—	◌	◌ॣ
E	𑖊	𑆍	ए	-E	◌	◌	◌े
AI	𑖋	𑆎	ऐ	-AI	◌	◌	◌ै
O	𑖌	𑆏	ओ	-O	◌	◌	◌ो
AU	𑖍	𑆐	औ	-AU	◌	◌	◌ौ

Table 1: Comparison of vowel letters and signs of Siddham, Sharada, and Devanagari.

	Siddham	Sharada	Nagari			Siddham	Sharada	Nagari
KA	क्त	क	क	DA	र	ᢑ	द
KHA	र्व	प	ख	DHA	द	ए	ध
GA	ग	ग	ग	NA	र	न	न
GHA	घ	ᴘ	घ	PA	ч	प	प
NGA	र	ए	ङ	PHA	ᴎ	ᴎ	फ
CA	र	म	च	BA	द	ᴣ	ब
CHA	क	ᴚ	छ	BHA	र	ᴚ	भ
JA	र	ᴣ	ज	MA	म	म	म
JHA	ᴇ	ᴘ	झ	YA	च	घ	य
NYA	ᴇ	ᴎ	ञ	RA	ᴊ	ᴊ	र
TTA	ᴄ	ᴜ	ट	LA	द	ल	ल
TTHA	O	O	ठ	LLA	—	ᴚ	ळ
DDA	र	ᴣ	ड	VA	द	व	व
DDHA	ᴣ	ᴝ	ढ	SHA	ᴎ	म	श
NNA	ᴍ	~~	ण	SSA	ᴣ	ᴚ	ष
TA	ᴦ	ᴣ	त	SA	म	म	स
THA	ᴪ	घ	थ	HA	द	ᴝ	ह

Table 2: Comparison of consonant letters of Siddham, Sharada, and Devanagari.

Figure 3: Seed-syllables for the thirteen Buddhas (from Tokuzan 1974: 27).

Figure 4: The *Uṣṇīṣa Vijaya Dhāraṇī Sūtra*, known in Japanese as 佛頂尊勝陀羅尼 *Buccho Sonsho Darani Kyo* (Source: `http://dharanipitaka.net/2008/download/`). A version with vertical text is given in figure 5.

Figure 5: The *Uṣṇīṣa Vijaya Dhāraṇī Sūtra* written top-to-bottom, right-to-left (from Kodama 2005: 122–124).

FACSIMILE OF THE TWO PALM-LEAVES OF HORIUZI, FROM THE ASHARAGIO.

SEE CATAL. OF JAPANESE BOOKS & MSS. IN THE BODLEIAN LIBRARY; No. 46.

Figure 6: A manuscript containing the *Prajñāpāramitā Hṛdaya Sūtra* (from Müller and Nanjio 1884: Plate II). This manuscript was apparently brought from China to Japan in the early 7th century and was stored at the Hōryū-ji (法隆寺) temple in Ikaruga, Nara Prefecture.
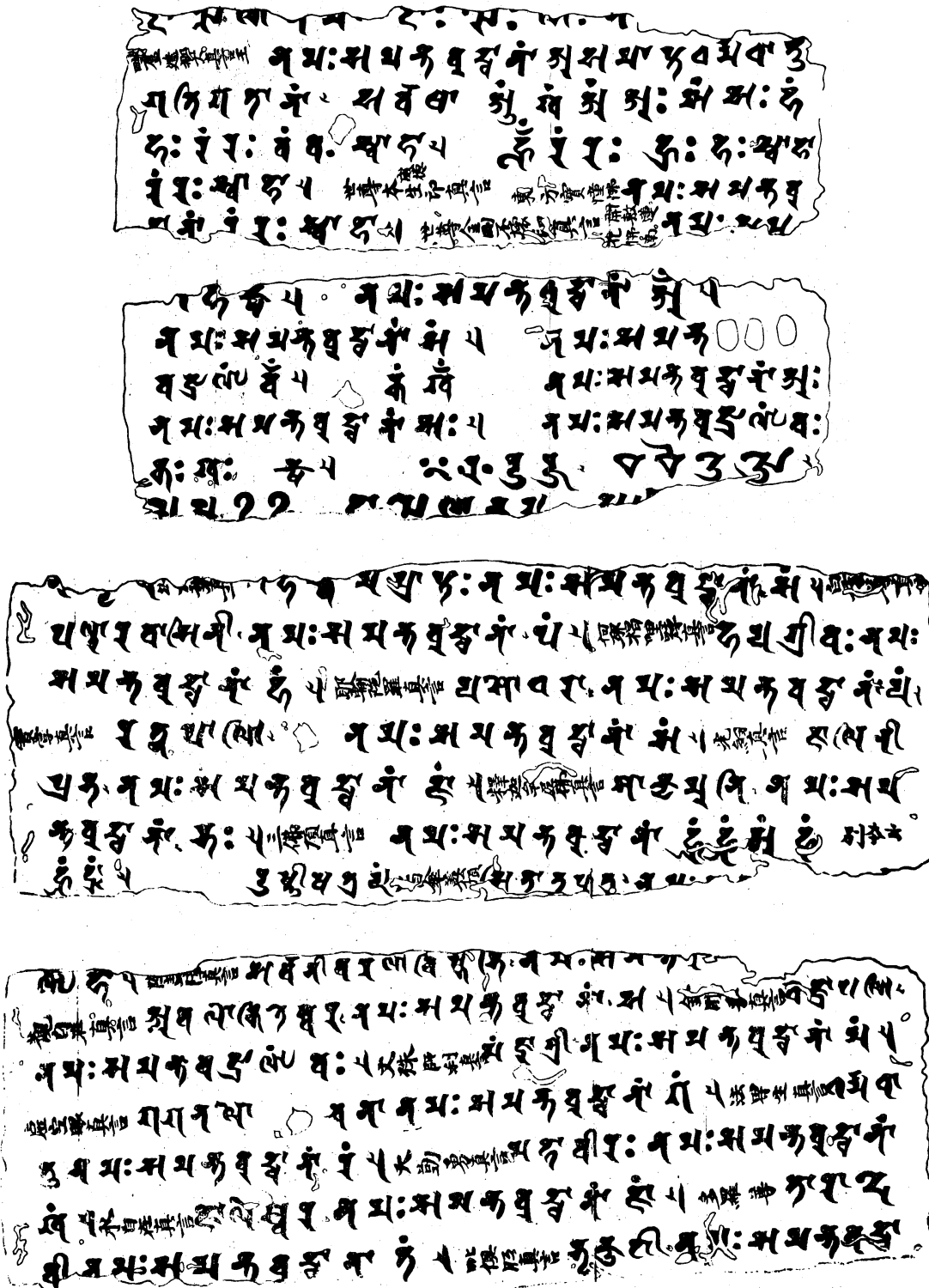
Figure 7: Folio fragments from a Siddham manuscript written by Prajñātāra (Sans. प्रज्ञातार; Chi. 般若多羅 Bōrě Duōluó) in the 9th century (from Lokesh Chandra 1965: fascicle 1, section 7). The folios are facsimiles traced by the Japanese monk Sōgen (宗源) and published using wooden-block printing in his *Ashara-jō* (1837).

Figure 8: Siddham inscriptions (from Nakamura 1977: Plate 21)

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Figure 9: Siddham inscriptions (from Nakamura 1977: Plate 30)
.
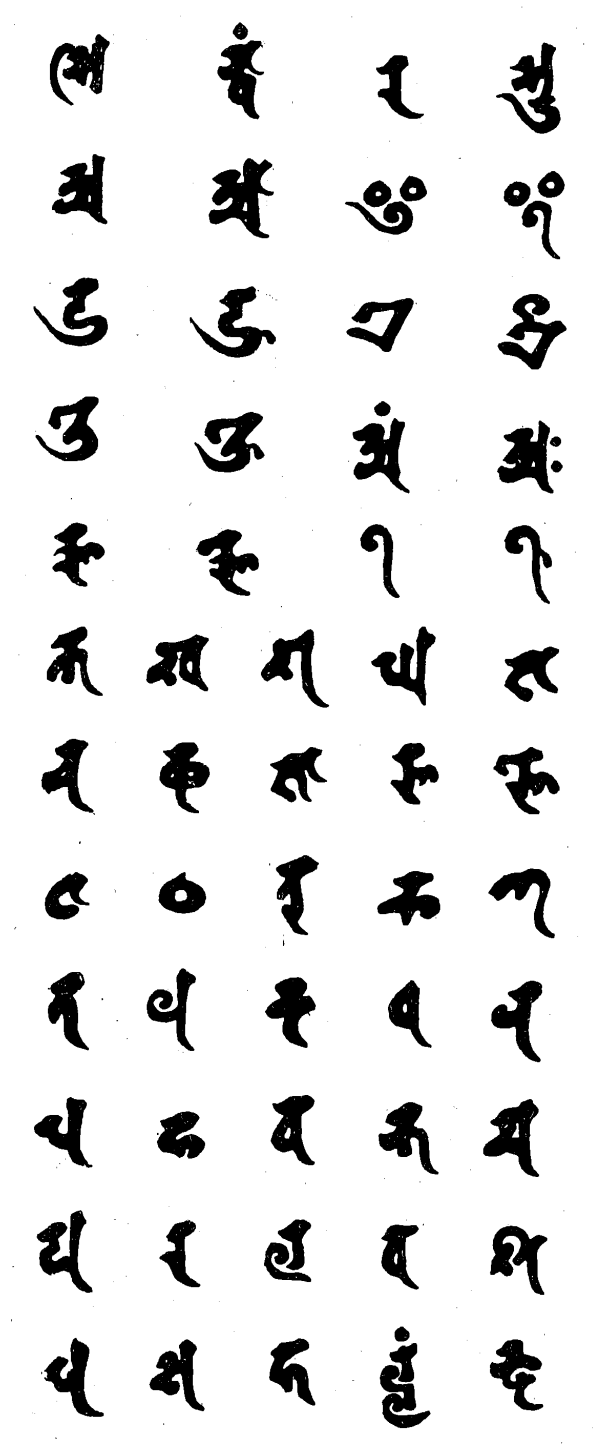
Figure 10: The Siddham *varṇapāṭha* written by Kūkai (from van Gulik 1980: Plate XI)
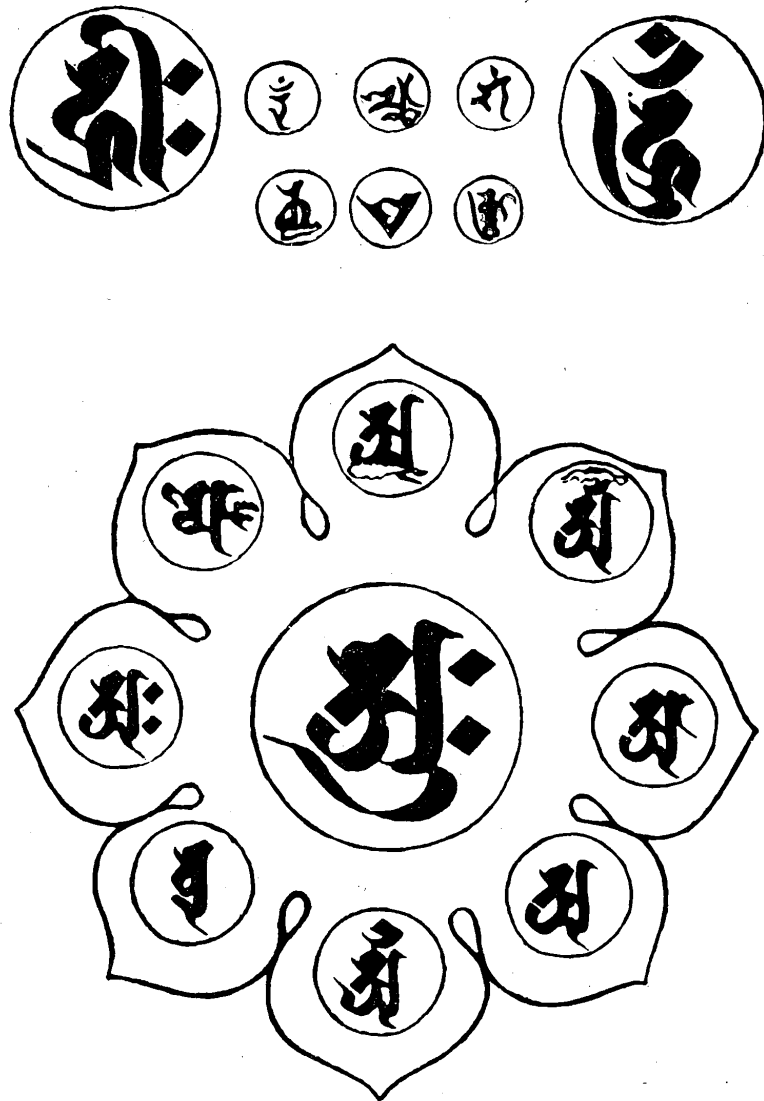
Figure 11: A *maṇḍala* inscribed by Saichō (from van Gulik 1980: Plate X)

VOWELS (MĀTĀ)

	formal	brush	stroke order	variations	in combination	Devanāgarī	roman letter	esoteric meaning
1				`		प्र	a	anutpāda unborn
2						प्रा	ā	ākāśa space
3						इ	i	indriya sense organ
4						ई	ī	īti calamity
5						उ	u	upamā simile
6						ऊ	ū	ūna incomplete
7						ए	e	eṣaṇā seeking
8						ऐ	ai	aiśvarya sovereignty
9						प्रो	o	ogha flood
10						प्रौ	au	aupapāduka self-produced

Figure 12: Description of Siddham letters and dependent signs for the vowels A .. AU (from Stevens 1981: 34).

	formal	brush	stroke order	variations	in combination	Devanāgarī	roman letter	esoteric meaning
11							a ṃ	anta limit
12							a ḥ	astaṃgama setting

EXTRA VOWELS

13							ṛ	ṛddhi supernatural power
14							r̄	analogy
15							ḷ	dye
16							ḹ	submerge

CONSONANTS (VYAÑJANA)

17							ka	karma action
18							kha	kha sky

Figure 13: Description of Siddham letters (from Stevens 1981: 35).

	formal	brush	stroke order	variations	in combination	Devanāgarī	roman letter	esoteric meaning
19						ग	g a	gati going
20						घ	gha	ghana dense
21						ङ	ṅa	aṅga part
22						च	c a	cyuti transition
23						छ	cha	chāyā shadow
24						ज	j a	jāti birth
25						झ	jha	jhaṣabala warring enemies
26						ञ	ña	jñāna knowledge
27						ट	ṭa	ṭaṅka pride
28						ठ	ṭha	viṭhapana flourish

Figure 14: Description of Siddham letters (from Stevens 1981: 36).

	formal	brush	stroke order	variations	in combination	Devanāgarī	roman letter	esoteric meaning
29						ड	ḍa	ḍamara tumult
30						ढ	ḍha	mīḍha disappear
31						ण	ṇa	raṇa battle
32						त	ta	tathātā suchness
33						थ	tha	sthāna dwelling
34						द	da	dāna generosity
35						ध	dha	dharmadhātu dharma realm
36						न	na	nāman name
37						प	pa	paramārtha ultimate meaning
38						फ	pha	phena foam

Figure 15: Description of Siddham letters (from Stevens 1981: 37).

	formal	brush	stroke order	variations	in combination	Devanāgarī	roman letter	esoteric meaning
39						ब	ba	bandhana binding
40						भ	bha	bhava existence
41						म	ma	mama my
42						य	ya	yāna vehicle
43						र	ra	rajas passion
44						ल	la	lakṣaṇa mark
45						व	va	vāc speech
46						श	śa	śānti peace
47						ष	ṣa	ṣaḍāyatana six senses
48						स	sa	satya truth

Figure 16: Description of Siddham letters (from Stevens 1981: 38).

	formal	brush	stroke order	variations	in combination	Devanāgarī	roman letter	esoteric meaning
49						ह	**ha**	hetu cause

SPECIAL COMBINATIONS

	formal	brush	stroke order	variations	in combination	Devanāgarī	roman letter	esoteric meaning
50						ल्लं	**llaṃ**	
51							क्ष	**kṣa**	kṣaya destruction

Figure 17: Description of Siddham letters (from Stevens 1981: 39).

Numeral	English sound
Sanskrit−Bonji	

0 shuunya	1 eeka	2 dvi	3 tri	4 chatur
s'u:+nya	e+ka	dvi	tri	c'a+tu+r

5 pancha	6 shash	7 sapta	8 ashta	9 nava
pam,+c'a	s,a+s.	sa+pta	a+s,t,a	na+va

Bonji−Character Pronunciation Diagram

Figure 18: A set of 'Bonji' digits (Source: `http://www.mandalar.com/DisplayJ/Bonji/index6_E.html`). These closely resemble Devanagari forms.

梵字悉曇字母表

一、摩多十二字・別摩多四字

番号	文字悉曇	異体字 (別体)	摩多点画	音漢訳字	字口表記マ	中天音	南天音	発音種別	字義
1				阿	a	ア	ア	母以音六喉音単	本不生
2				阿引	ā	アー	アー	同	寂静(虚空)
3				伊	i	イ	イ	顎音	根
4				伊引	ī	イー	イー	同	災禍
5				塢	u	ウ	ウ	唇音	譬喩
6				汚引	ū	ウー	ウー	同	損減
7				瞪	e	エー	エ	母以音下喉四字顎複	求
8				愛	ai	アイ	エー	同	自在(自相)
9				汚	o	オー	オ	喉・唇	瀑流(熱瀑流)
10				奧	au	アウ	オー	同	化生(変化)
11				闇	aṃ	アン	アン	随韻	辺際
12				悪	aḥ	アク	アク	止声	遠離

別摩多

番号	文字悉曇	異体字 (別体)	摩多点画	音漢訳字	字口表記マ	中天音	南天音	発音種別	字義
13				哩	ṛ	リ	キリ		神通
14				哩引	ṝ	リー	キリー		類例
15				呢	ḷ	リヨ	リ		染
16				嚧	ḹ	リヨー	リー		沈没

二、体文 三十三字

番号	文字悉曇	異体字 (別体)	切継半体上部	切継半体下部	音漢訳字	字口表記マ	中天音	南天音	発音種別	字義
17					迦	ka	キャ	カ	音以下五字清音・無喉	離作業(作業)
18					佉	kha	キャ	カ	同・有	等虚空(等空)
19					誐	ga	ギャ	ガ	濁・無	行
20					伽	gha	ギャ	ガ	同・有	一合(一合相)
21					仰	ṅa	ギヤウ	ガ	鼻音	支分
22					遮	ca	シヤ	サ	音以下五字清・無顎	離遷変(遷変)
23					磋	cha	シヤ	サ	同・有	影像
24					惹	ja	ジヤ	ザ	濁・無	生

五類声一句   五類声二句

Figure 19: Chart of Siddham (from Kodama 1991: 65–66). Note the variant form ◌ of ◌ VOWEL SIGN VOCALIC RR.

	No.	漢	rom	kana	kana	note	meaning
同五句	39	麼	ba	バ	バ	濁・無	縛
	40	婆	bha	バ	バ	同・有	有
	41	莽	ma	マゥ	マ	五以鼻音字上五類齦声廿	吾我
遍 口 声	42	野	ya	ヤ	ヤ	以以下八字半通母音声	乗
	43	囉	ra	(アラ)	ラ		(離諸塵坵染)
	44	邏	la	ラ	ラ		相
	45	嚩	va	バ	バ		語言道断(言説)
	46	捨	śa	シャ	シャ	吾以下三字隔音	本性寂
	47	灑	ṣa	シャ	シャ		性鈍
	48	娑	sa	サ	サ		一切諸(諸)
	49	賀	ha	カ	カ		因(因業)
三重字				二字			
遍口声	50	濫	llaṃ	ラン	ラン	同体重	(都除)
	51	乞灑	kṣa	キシャ	サ	異体重	盡

Figure 20: Chart of Siddham (from Kodama 1991: 67–68).

35

Figure 21: Siddham letters used in Korea (from Lim 2005). Courtesy of Lee Collins.
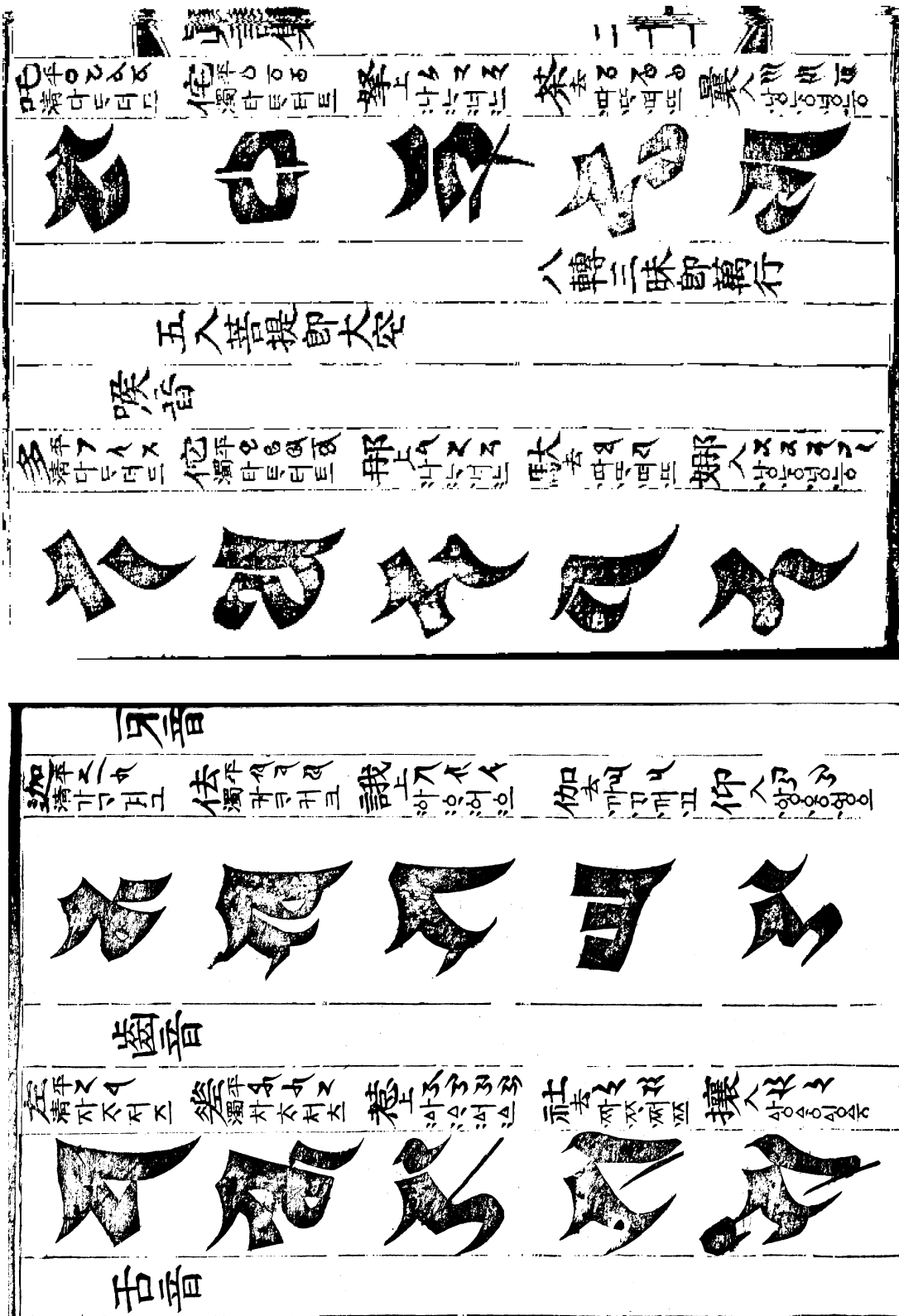
Figure 22: Siddham letters used in Korea (from Lim 2005). Courtesy of Lee Collins.

Figure 23: Siddham letters used in Korea (from Lim 2005). Courtesy of Lee Collins.

Figure 24: Siddham letters used in Korea (from Lim 2005). Courtesy of Lee Collins.

Figure 25: Siddham used in a Korean version of the *Nīlakaṇṭha Dhāraṇī* (नीलकण्ठ धारनी; Chi. 大悲咒 *Dàbēi Zhòu*) of Avalokiteśvara (from Lokesh Chandra 1988: 164).

Figure 26: Siddham letters used in Korea (from Stevens 1981: 8)

[39

₹६]

38]

[३८

Miscellaneous alphabets to be met on the manuscripts and incriptions of Nepal.

This type of Nepalese consonants and vowels is found on the palm leaf manuscript in the monastry of Horyuji in Japan.

Ta	Tha	Da	Dha	Na	Ta	Tha	Da	Dha	Na

Ya	Ra	La	Wa

Pa	Pha	Ba	Bha	Ma

Sha	Sha	Sa	Ha	Ksha

This type of consonants and vowels are also available in various incriptions of Nepal.

A	A	I	EE	U	OO	Ri	Ree

A	A	I	EE	U	OO	Ri	Ree	Lri	Lree

E	Ai	O	Au	Am	Ah

Ka	Kha	Ga	Gha	Na	Cha	Chha	Ja	Jha	Yan

Figure 27: Chart showing the variety of Siddham used in Nepal and Central Asia (from Shakyavansha 1985: 38–39). This form of Siddham is apparently that used on the Hōryū-ji palm-leaf manuscripts.

梵文體系字母對照表

Figure 28: Comparison of Siddham, Tibetan, Ranjana, and Chinese scripts (Source: `http://www.siddham-sanskrit.com/s-sanskrit2/learn-siddham/sid-ran-tib-han.GIF`).

Figure 29: Description of the basic vowels, ANUSVARA, and VISARGA in the *Shittan Sanmitsushō* (from Jōgon 1682: 722). Note the several glyphic variants given for each vowel.

Figure 30: Description of vowel signs and the vocalic letters in the *Shittan Sanmitsushō* (from Jōgon 1682: 722).

Punctuation marks are as follows:

is written at the beginning of a text

ditto mark

comma (formal)

comma (informal)

period (formal)

period (informal)
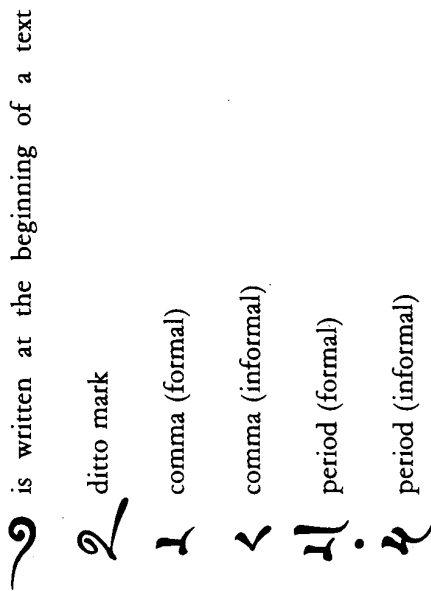
At the end of a text these marks are often used:
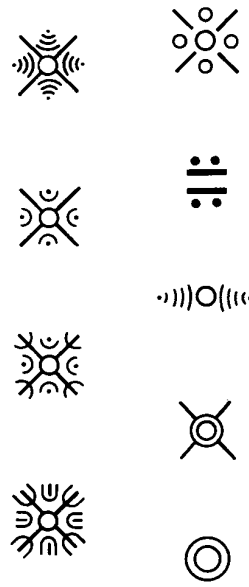
Figure 31: Punctuation and ornaments used in Siddham (from Stevens 1981: 41).
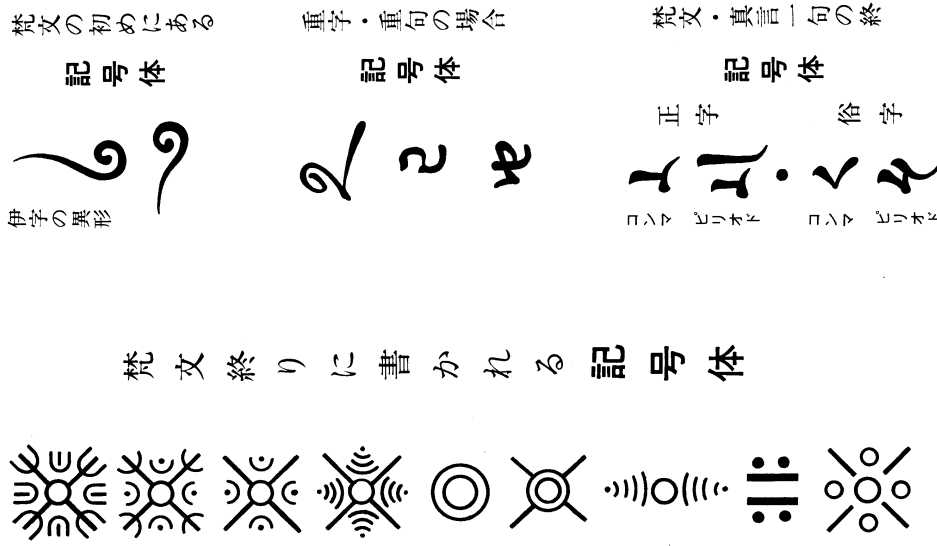
Figure 32: Punctuation and ornaments used in Siddham (from Tokuzan 1974: 227). Many of these are identical to those shown by Stevens (figure 31) and Kodama (figure 34). However, note here the vertical variant of SVASTI.
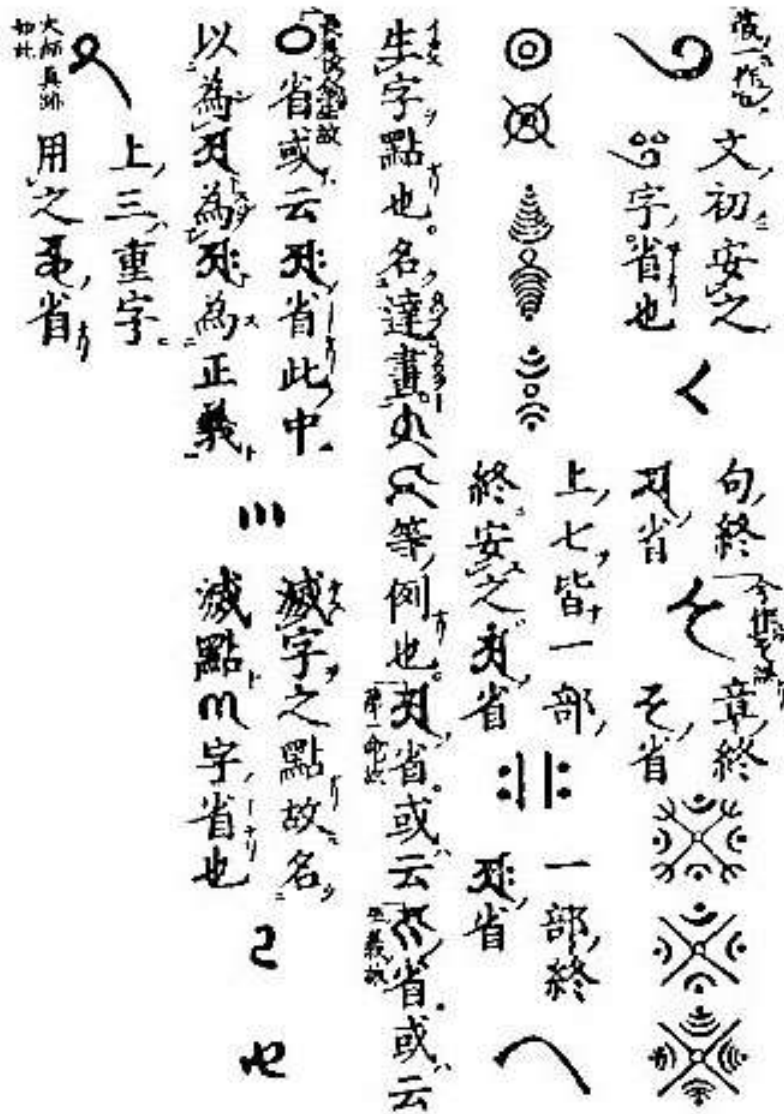
Figure 33: Description of an invocation sign, punctuation marks, section marks, a variant form of VIRAMA, a deletion mark, and repetition marks in the *Shittan Sanmitsushō* (from Jōgon 1682: 724). Note the separate listing of SECTION MARK EIGHT and SECTION MARK NINE, which are conflated into a single character in other sources.

記号

① 怛達（たたつ）（生の画）。母音符（a）を除いた子音字（半体文）を作るときに体文の下部につける。

② 文頭に書く。ⅰ字の省略。

③ 句末。読点にあたる。ma字の省略。

④ 文末。句点にあたる。da字の省略。

⑤ 畳句（じょうく）（同じ言葉をくり返すときに用いる）。cha字の省略。na・字の省略。

⑥ 減滅点（書き損じたときに、文字の上あるいは下にこの記号を符す）。

⑦ 文章の終りに符す。am・字の省略。

⑧ 文章の終りに符す。ah・字の省略。

Figure 34: Punctuation and ornaments used in Siddham (from Kodama 1991: 222). Column (1) forms of VIRAMA; (2) the SVASTI sign; (3) the 'informal' DANDA; (4) the 'informal' DOUBLE DANDA; (5) the three repetition marks; (6) deletion marks; (7) ornaments used at the end of a text section; (8) a sign used at the end of text.

㗚拏 16 滿怛囉 麼韈㗚多 逸史夜弭 17 薩嚩 遏㗚他 娑馱劍 18 薩嚩 尾覲曩

rṇa　mantra　māvartta　iṣyāmi　sarva　artha　sādhakaṃ,　sarva　vighna

）　〔真言〕　　　　　　〔誓願〕〔一切〕〔事〕〔完成〕　〔一切〕〔魔障〕

佉多劍 19 薩嚩 尾灑 曩捨難 20

ghātakaṃ,　sarva　viṣa　nāśanāṃ.

〔能破〕　〔一切〕〔毒〕〔消滅〕

唵 21 吽 吽 吽 22 多嚕攞 23 尾嚕攞 24 薩嚩 尾覲曩 伽多迦 25 入嚩

oṃ,　hūṃ　hūṃ　hūṃ,　tarula　virula,　sarva　vighna　ghātaka,　jva-

〔一切〕〔魔障〕〔能破〕　〔火

理多 尾娑普陵誐 吒賀娑 26 計娑囉 擦吒 娑跰跛 27 嚩日囉齲囉 捏伽多曩 28

lita　visphu liṅgā　ṭṭahāsa　kesarā　chaṭa　saṭopa　vajrakhura　nirghātana,

焰〕　〔火花〕　　〔哄笑〕〔鬣毛〕〔群集〕〔剛毛〕　〔金剛蹄〕　〔除去〕

左里多 嚩素馱多攞 29 顎濕嚩娑 麼嚕妬 得乞插多 30 馱囉抳 馱囉 31 鼻灑拏

calita　vasudhātala　niḥśvasa　māruto　tkṣipta,　dharaṇi　dhāra　bhīṣaṇā

〔震動〕〔地表〕　〔鼻嘆息〕〔空氣〕〔吐出〕　〔咒〕　〔持〕〔可怖畏〕

吒賀娑 32 阿跛哩弭多麼攞 33 跛囉屹囉麼 34 鼻多部多藥拏 35 沒地也 沒地也

ṭṭahāsa　aparimita　bala　parākrama　bhītabhūtaganā,　buddhya　buddhya

〔哄笑〕〔無量〕　〔力〕　　〔強鎮〕〔驚怖步多鬼眾〕

36 賀也屹里嚩 37 佉娜 佉娜 38 跛囉滿怛囉 39 㘛乞叉 㘛乞叉 40 遏荅麼 滿怛囕

hayagrīva,　khāda　khāda　paramantra　rakṣa　rakṣa　ātma　mantraṃ

〔馬頭明王〕　　〔噉食〕〔他真言〕　〔保護〕〔〃〕　〔自己〕〔真言〕

Figure 35: Chinese Siddham showing usage of **২** REPETITION MARK ONE (source unknown). Note the serialized use of **২** after the syllable *hūṃ*, which indicates that the word is to be read thrice.

Figure 36: Excerpt from the *Uṣṇīṣa Vijaya Dhāraṇī Sūtra* in figure 5 showing usage of 𑖿 REPETI-
TION MARK TWO in vertical text (from Kodama 2005: 123)).
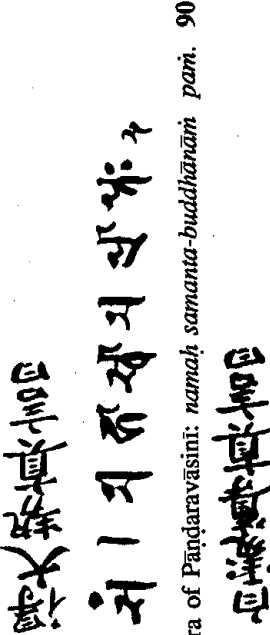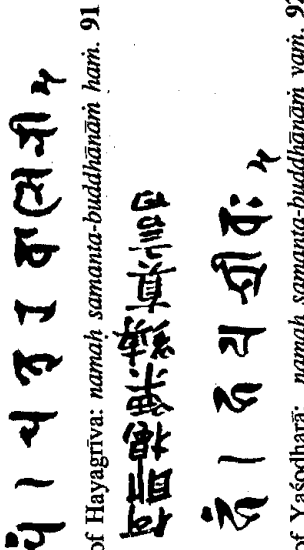
Figure 37: Use of ˙ word separator one (from Lokesh Chandra 1965: fascicle 1, section 12). Note also the use of the invocation sign ◡э svasti at the beginning of the text.

Figure 38: Use of a middle dot as a word separator (from Lokesh Chandra 1972: 410). Note also the use of ⸬ section mark eleven and ⸭ section mark twelve.
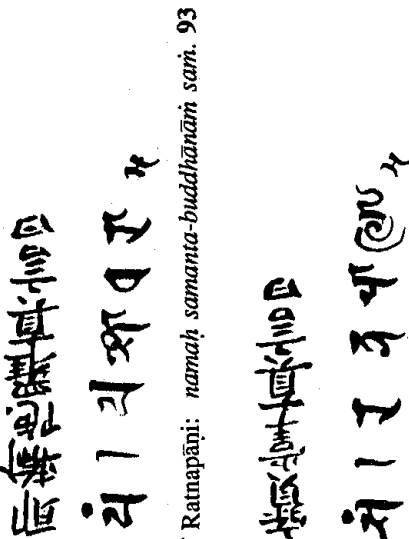
Figure 39: Text showing use of ⟨ DANDA, ⟨ DOUBLE DANDA, and ǀ WORD SEPARATOR TWO (from Lokesh Chandra 1972: 15). Note the writing of DANDA and DOUBLE DANDA beneath WORD SEPA-RATOR TWO.
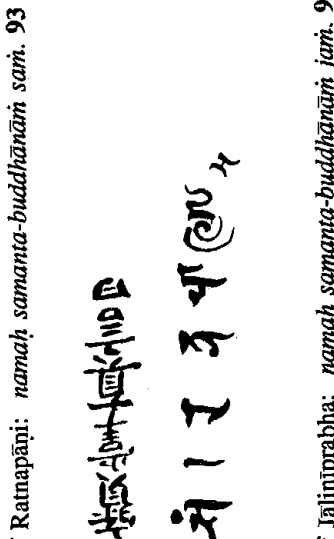
Figure 40: Text showing use of ǀ WORD SEPARATOR TWO, ⟨ DANDA, and ⟨ DOUBLE DANDA (from Lokesh Chandra 1972: 33). Here WORD SEPARATOR TWO is written independently.

The mantra of Śākyamuni: *namaḥ samanta-buddhānāṁ bhaḥ.* 95

The mantra of the three Buddhoṣṇīṣas: *namaḥ samanta-buddhānāṁ hūṁ trūṁ.* 96

The mantra of Sitātapatroṣṇīṣa: *namaḥ samanta-buddhānāṁ laṁ.* 97

The mantra of Jayoṣṇīṣa: *namaḥ samanta-buddhānāṁ śaṁ.* 98

The mantra of Vijayoṣṇīṣa: *namaḥ samanta-buddhānāṁ śi.* 99
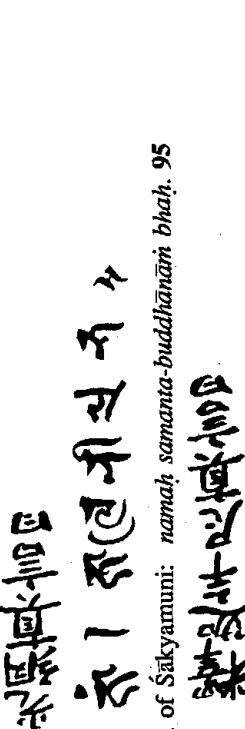
The mantra of Pāṇḍaravāsinī: *namaḥ samanta-buddhānāṁ paṁ.* 90
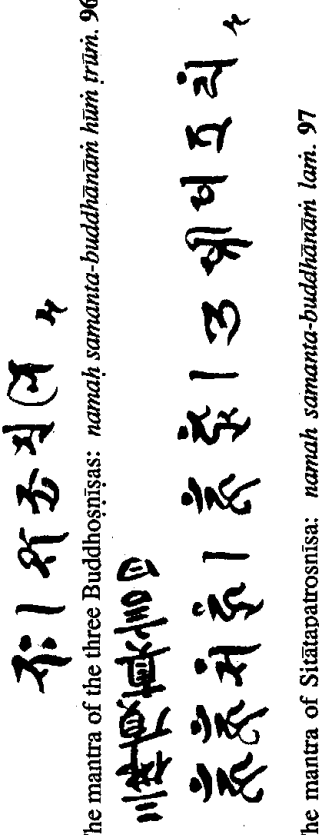
The mantra of Hayagrīva: *namaḥ samanta-buddhānāṁ haṁ.* 91
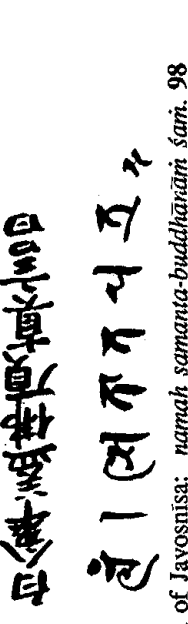
The mantra of Yaśodharā: *namaḥ samanta-buddhānāṁ yaṁ.* 92
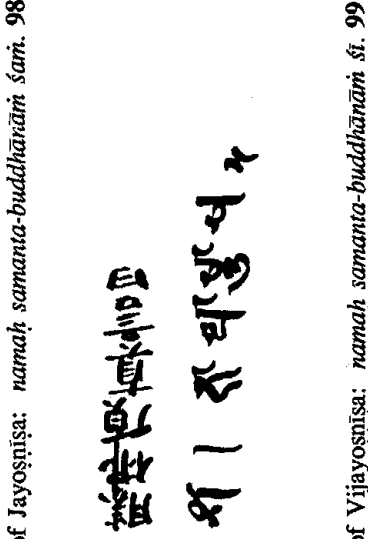
The mantra of Ratnapāṇi: *namaḥ samanta-buddhānāṁ saṁ.* 93

The mantra of Jāliniprabha: *namaḥ samanta-buddhānāṁ jaṁ.* 94

Figure 41: Text showing use of **|** WORD SEPARATOR TWO and **॥** DOUBLE DANDA (from Yamamoto 1990: 61, 62).

Figure 42: Grid showing traditional Siddham character set (adapted from Stevens 1981: 40–41). This appears to be based upon the analysis of Siddham conjuncts by Zhi-guǎng (see Section 4.7).

Figure 44: Siddham ligatures (from van Gulik 1980: Plate VIIb).
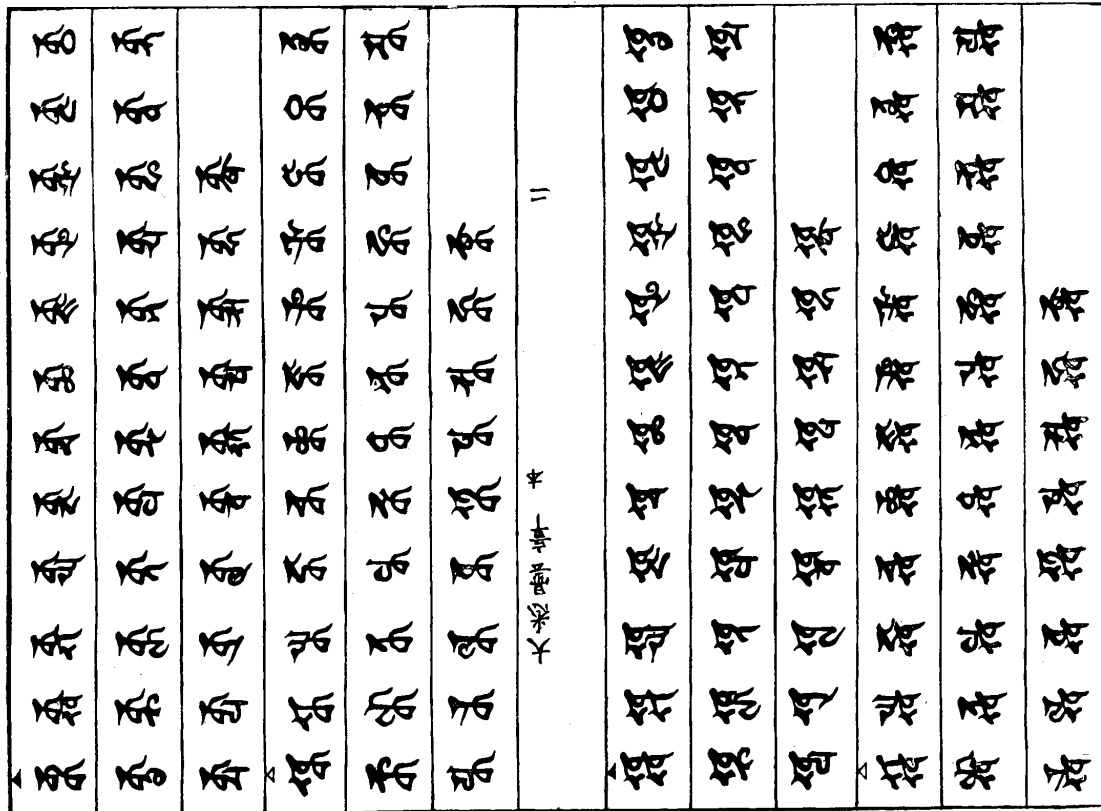
Figure 43: Siddham ligatures (from van Gulik 1980: Plate VIIa).

Plate VIId.　Siddham ligatures

Figure 46: Siddham ligatures (from van Gulik 1980: Plate VIId).

Plate VIIc.　Siddham ligatures

Figure 45: Siddham ligatures (from van Gulik 1980: Plate VIIc).

Plate VIIf. Siddham ligatures

Figure 48: Siddham ligatures (from van Gulik 1980: Plate VIIf).
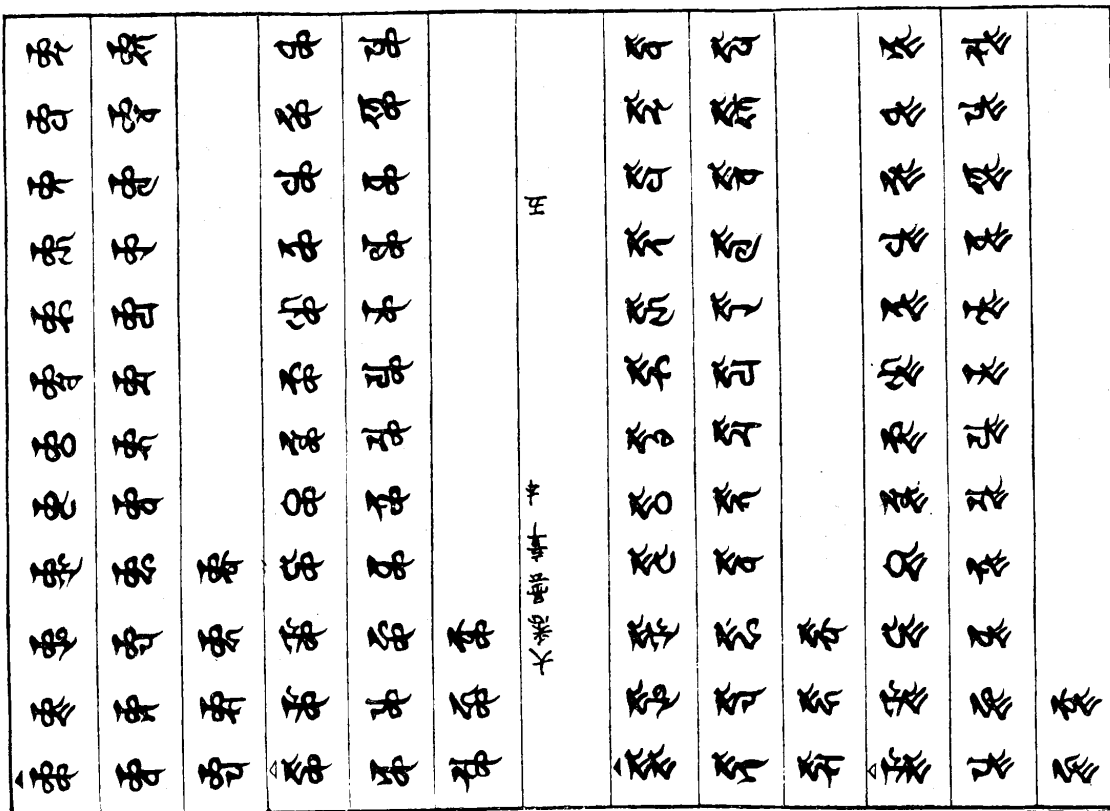
Plate VIIe. Siddham ligatures

Figure 47: Siddham ligatures (from van Gulik 1980: Plate VIIe).

Plate VIIh. Siddham ligatures

Figure 50: Siddham ligatures (from van Gulik 1980: Plate VIIh).
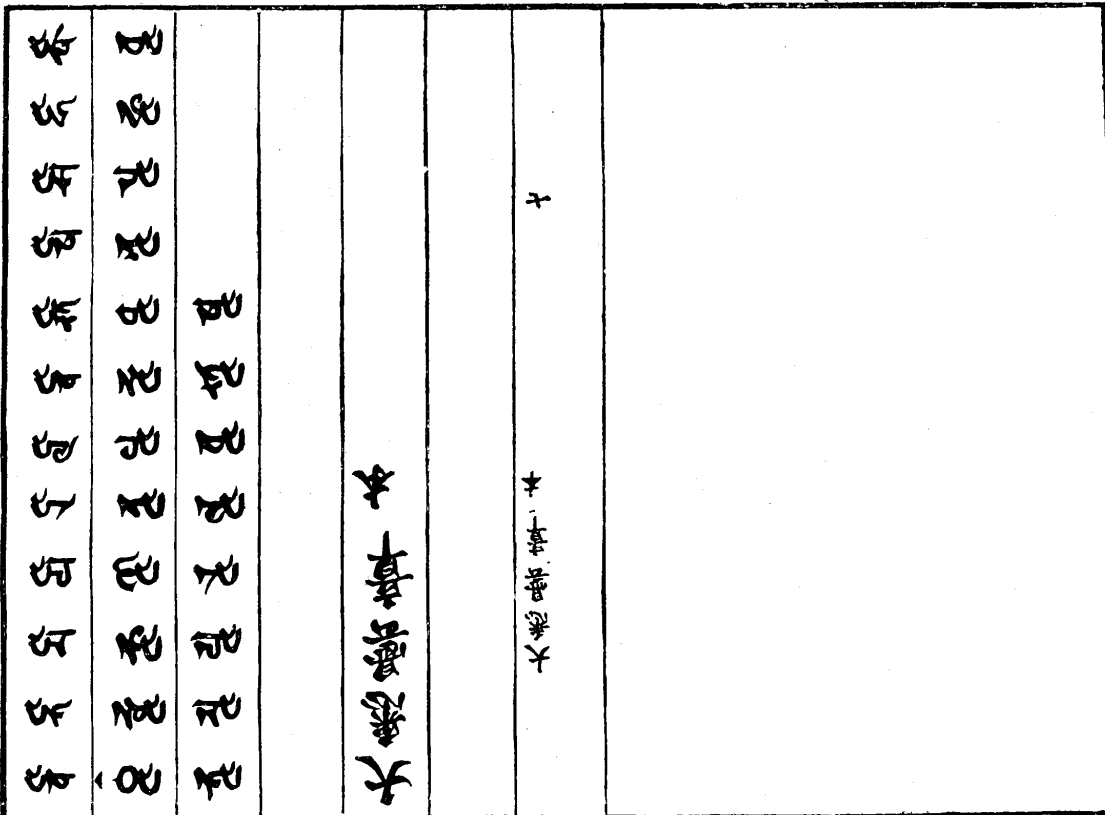
Plate VII g. Siddham ligatures

Figure 49: Siddham ligatures (from van Gulik 1980: Plate VIIg).

-Plate VIIj. Siddham ligatures

Figure 52: Siddham ligatures (from van Gulik 1980: Plate VIIj).

Plate VIIi. Siddham ligatures

Figure 51: Siddham ligatures (from van Gulik 1980: Plate VIIi).

Figure 54: Siddham ligatures (from van Gulik 1980: Plate VII).

Figure 53: Siddham ligatures (from van Gulik 1980: Plate VIIk).

Plate VII n. Siddham ligatures

Figure 56: Siddham ligatures (from van Gulik 1980: Plate VIIn).

Plate VII m. Siddham ligatures

Figure 55: Siddham ligatures (from van Gulik 1980: Plate VIIm).

Plate VIIp.　Siddham ligatures

Figure 58: Siddham ligatures (from van Gulik 1980: Plate VIIp).

Plate VIIo.　Siddham ligatures

Figure 57: Siddham ligatures (from van Gulik 1980: Plate VIIo).

62

Figure 59: Chart showing 'headless' consonants combined with VIRAMA (from Jōgon 1682: 779). These are pedagogical forms of regular consonants letters (see Section 4.15).
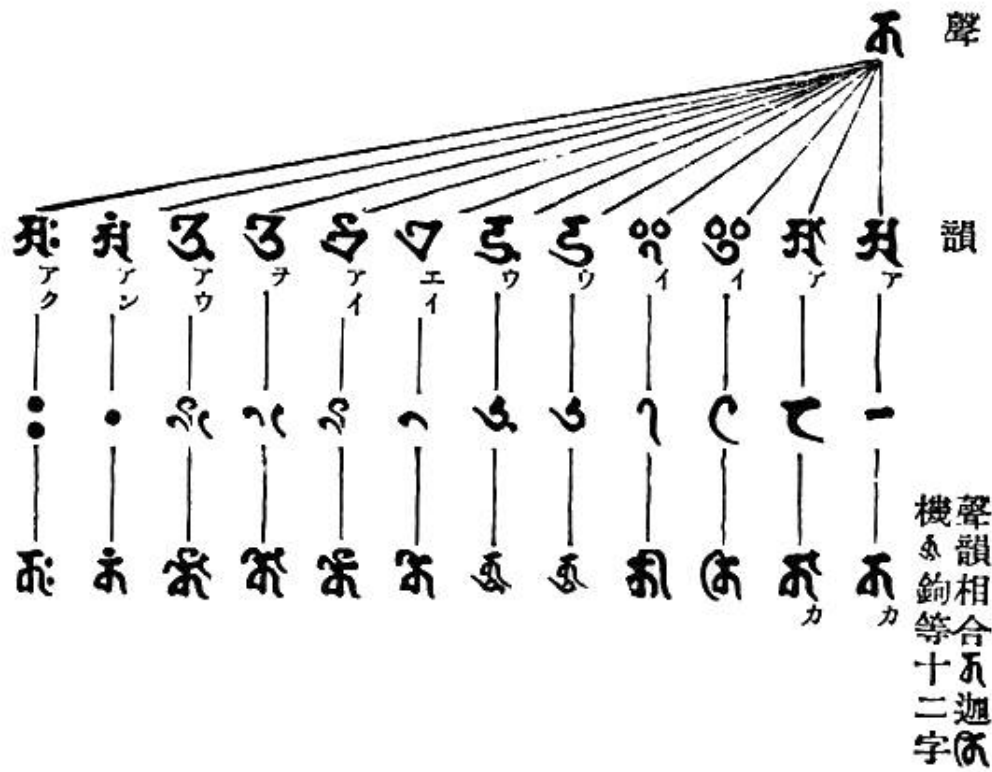
Figure 60: Chart showing Siddham dependent vowel signs and their combinations with 𑖎 KA (from Shinpan: 644). Note the presence of the vowel sign ˉ for 𑖀 A, which is derived from the top-stroke of the letter KA. See Section 4.15 for more details.
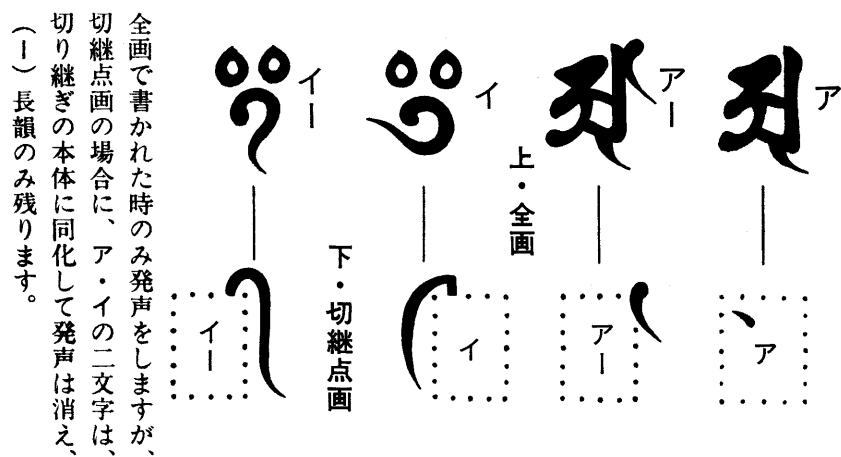
Figure 61: The ˋ *myō-ten* shown as the dependent form of 𑖀 VOWEL LETTER A (from Tokuzan 1974: 226).

筆法基本

7	6	5	4	3	2	1

1 命点　梵字を書くときは先ず筆を落して一点をうつ。これを阿字命点（略して命点）という。すべての字は刃字の変現であることを表わす。また刃字の点画とも考えられる。命点をうたない梵字は「ただの梵字」で悉曇ではないといわれて来た。

2 横画（第一画）　命点に続けて書く。命点をうち、筆先を離さずに少し斜上にあげ、命点にかぶせるように筆をおろし、横に一の字を引く。（早書の場合は、命点から斜上にあげた筆をすぐにおろさず、右に引きながら下げる。）

3 竪画　筆をおろし（命点ではない）軽く左斜下に押し下げ、筆の終るところを見定めてから、まっすぐに引きおろす。A終りを止めるときは筆全体を内側に押しつけ、B引くときは右斜下へ引きながららゆっくり筆をおさめる。（早書の場合は、左斜下へ押し下げた筆を止めずに下へ引くので、左よりとなるのを引きながら右へもどす。）

4 鶯点　刃刃ての終画、ウ点。筆を向うへ倒して（掌が上を向く）一ぱいにおろし、そのまま右斜下から横へ引きながら筆をおさめる。（手首をつかわず脇を開きながら引く。）筆先が下側を通る逆筆である。竪画との連続は、下を向いて竪画の終りに重ねて筆をおろす（上図C）。掌を下に向けたままでは下図Dのように竪画と点が離れ、点の形も舟のようになる。（早書の場合でも掌は横に向くらいに反す。）なお鶯点の名は刷毛書の場合、長く引いた形が鶯の谷渡りに似ているところから出たもので、毛筆書には当らないが、昔からそのまま用いている。

5 雲形点　ウ点。（ⓔⓢⓢⓢの下部も同じ要領）竪画の筆を一たん止め、左斜下へ押し出し、引き返して同じ角度で右斜下へ引き、丸みをつけて左へまわし、斜上へはねる。このとき筆が切れたら、筆の終るところまで筆を運び軽くおとして引き返す。（早書ならば切れたままでよい。）斜上へはねずにダラリと下へさげるのはいけない。

6 円点　空点、涅槃点、また〇字。宝珠形と伝えているが、それにとらわれると細長い形となる。（むしろ少し平たい方がよい。）おろした筆を左へ押し上げるくらいにして大きく割り、右へまわす。第二筆は第一筆の始点に重ねて軽く筆をおろし、左側と同形になるように右へまわして終りを合せる。（早書の場合は、第一筆を長く右わきまで引いておき、第二筆は補う程度にする。）黒点にするには第一筆を筆を倒して肉太に書き、第二筆で補えばよい。

7 半月形　弧線の半月形では腹がせまく、従って字が細長くなりすぎるので、初めの三分の一は斜直線、後の三分の二はゆったり丸みをつける。終りは上げない。（39刃字は終りを上げて竪画に続ける。）

Figure 62: Elemental Siddham strokes (from Bonji Kichō Shiryō Kankōkai 1980: 114).

Figure 64: The position of ` *myō-ten* in the seed-syllables for the five elements 𑖀 A, 𑖪 VA, 𑖨 RA, 𑖏 KHA, 𑖮 HA (from Tokuzan 1974: 180).

THE LETTER A WRITTEN WITH A BRUSH
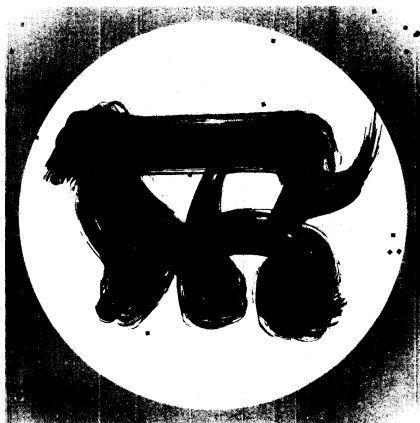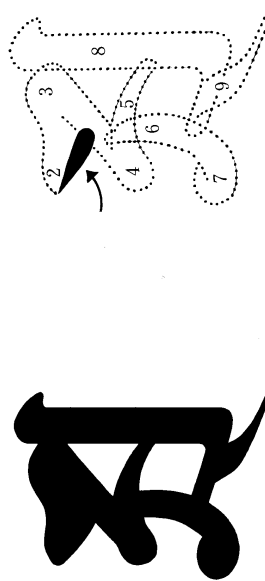
SOFT BRUSH STROKE ORDER

Figure 63: Stroke sequence for writing 𑖀 A using a soft brush (from Stevens 1981: 44). The initial stroke ` *myō-ten* is highlighted. See Section 4.15 for details on Siddham stroke characters.

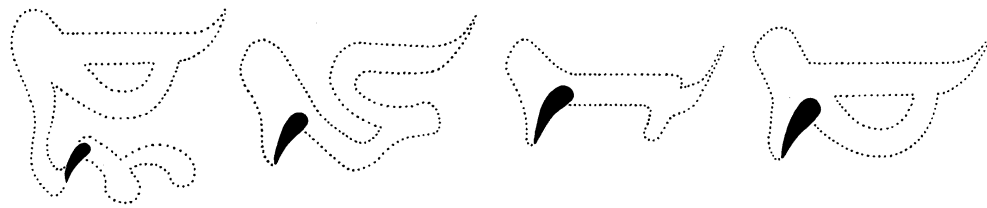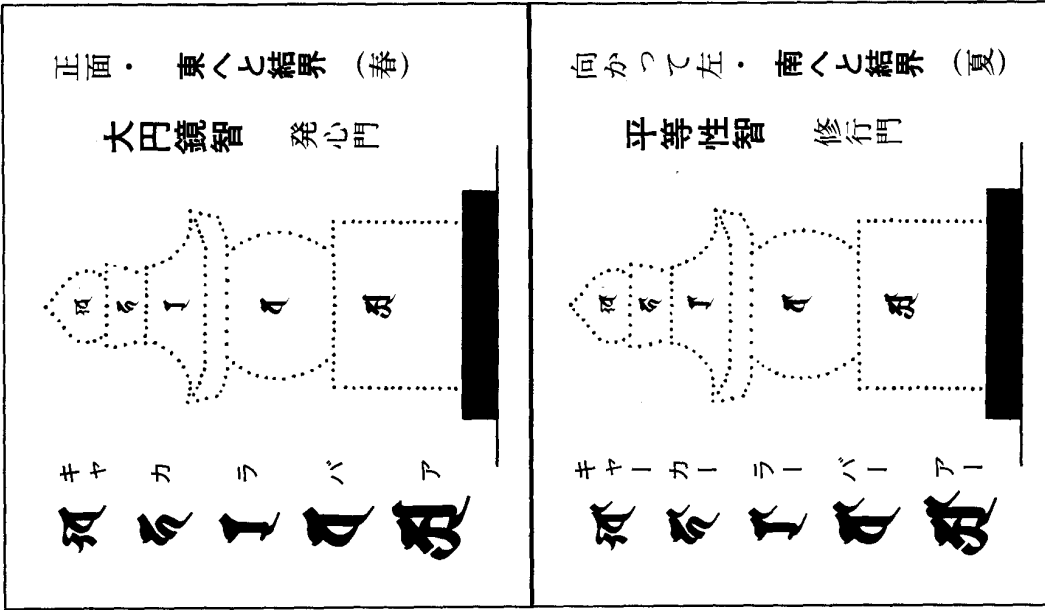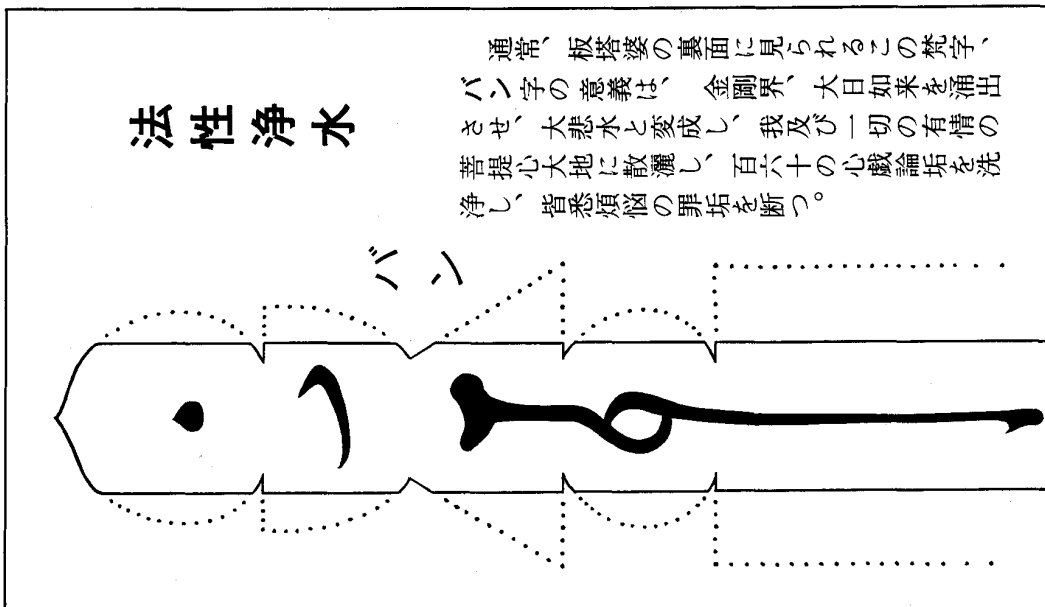Figure 66: The seed-syllables for the five elements A, VA, RA, KHA, HA conceptualized as a *stūpa* (from Tokuzan 1976: 28).

Figure 65: A conceptualization of the syllable *vaṃ* as a *stūpa* (from Tokuzan 1976: 43). The elements from top are ANUSVARA, the *gyōgatsu-ten*, and VA.

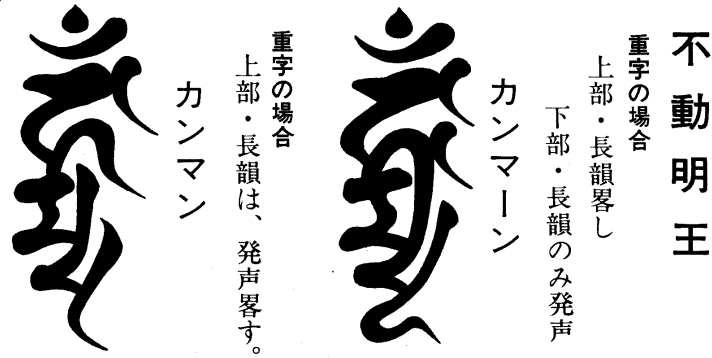Figure 67: Different forms of *hāṃmām*, the *bīja* of Fudō Myōō (Acala) (from Tokuzan 1974: 227)

Figure 68: The seed syllables of 不動明王 Fudō Myōō and his attendants, 制吒迦童子 Seitaka-dōji (Ceṭaka) and 矜羯羅童子 Kongara-dōji (Kiṃkara) (from Kodama 2005: 97).

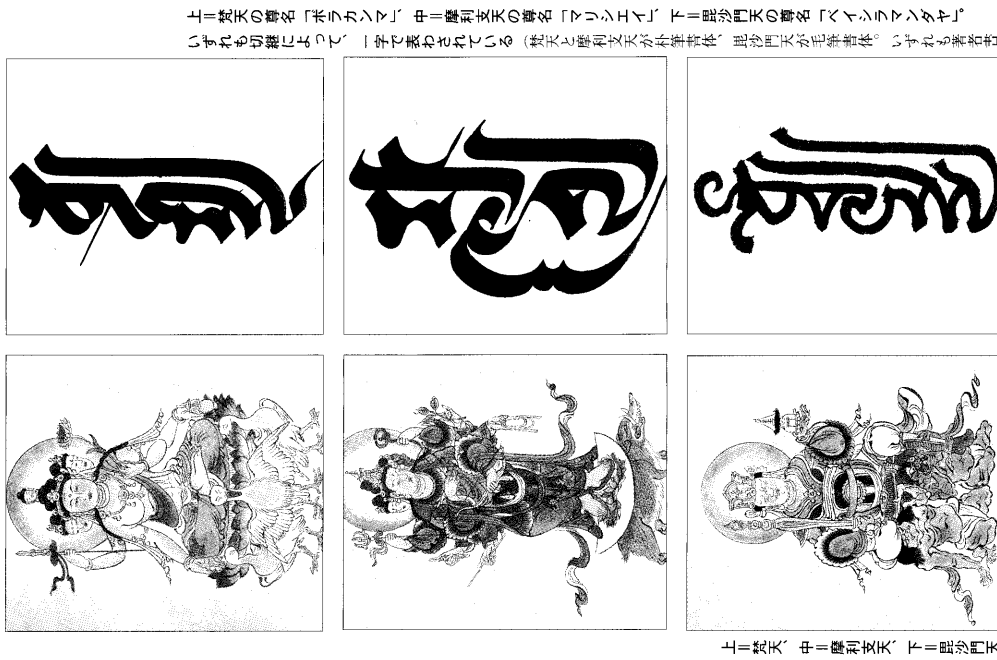Figure 70: Two variations of the seed syllable *dhiḥmaṃ* (from Kodama 2005: 101).

Figure 69: Seed syllables of 梵天 Bon-ten (Brahmā), 摩利支天 Marishi-ten (Marīcī), and 毘沙門天 Bishamon-ten (Vaiśravaṇa) (from Kodama 2005: 99).