



HAL
open science

Two Systems of Numerical Notation in Pali Buddhism

Javier Schnake

► **To cite this version:**

Javier Schnake. Two Systems of Numerical Notation in Pali Buddhism. Journal of the Pali Text Society , 2024, 35, pp.165-191. <halshs-04830580>

HAL Id: halshs-04830580

<https://shs.hal.science/halshs-04830580v1>

Submitted on 17 Dec 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Copyright - All rights reserved

Two Systems of Numerical Notation in Pali Buddhism

Javier Schnake

From the earliest time of Pali Buddhism numbers are not limited in their use to their ordinal function. They are also didactic and pedagogic tools, their manipulation serving the organization, memorization, and preservation of teachings. The constitution of lists exposed in the *nikāyas* facilitates the manipulation of material: through summaries consisting in apposite grouping of lists, for instance, the 37 conditions that contribute to awakening (*bodhipakkhiyā dhammā*); by employing the principles of numerical association, for example in the *Saṅgīti-sutta* and the *Dasuttara-sutta* of the *Dīgha-nikāya* or in a systematic way in the *Samyutta-nikāya* and *Anguttara-nikāya*; and in some *mātikās* present in Abhidhamma texts, acting as a basis for further exposition by following tables of items built up also according to a system of numerical progression.¹ Finally, in more recent times, numbers are also endowed with magical properties, active elements of geometric figures or *yantras*, such as magic squares present, for instance, in the Thai Buddhist practices using Pali (Schnake 2018a: 180–9).

In this paper I aim to call attention to other ways of dealing with numbers. Two encoding methods that have not attracted the attention of scholars working with Buddhist sources are succinctly presented here: the *bhū-tasaṅkhyā* and the *kaṭṭapayādi* methods, with more emphasis on the second due to the available material. The presence and developments of these systems, which have Indic origins, in the various fields of expression of the Pali language appear as marginal curiosities, especially when compared with

¹ All these points are developed in Gethin 1992: 149–64.

their actual histories and destinies in their original cradle. However, they are one sign of the external influences exerted on Pali, notably the Sanskrit norms, but also testify to the plasticity of this language, even if they remain very circumscribed.

I. The *bbūtasankhyā*

The *bbūtasankhyā* ('object numeral') is a well-known system operating in India since early times: it is a common practice in verse-inscriptions to give the date in the form of chronograms (Salomon 1998: 173); it has also been adopted in Vedic literature, in Tantric texts, in music to designate the division of musical patterns, in architecture, and in colophons of manuscripts for giving dates; but a more systematic use of the method is found in astronomy and mathematics, where the manipulation of numbers is central since the beginning of the Christian era (Sarma 2003: 39–41). Sreeramula R. Sarma thus defines the *bbūtasankhyā* method:

[It] refers to a system of numerical notation where a word denoting an object, concept, idea, or group implies, besides its normal meaning, a number by dint of meaning, convention, or use, for that reason that is used to denote the number in question. (Sarma 2003: 38)

For example, *ākāsa* (sky) is for 0, *canda* (moon) is equal to 1, *nayana* (eye) to 2, and so on. These words pertain to a cultural or religious background that the audience is already familiar with and refer to well-known notions and conceptions, making them easy to recognize and memorize. The possibility of using a large range of synonyms also provides a certain amount of flexibility, notably when they are included in verse-compositions, allowing consideration of metrical aspects. Conventionally, the compounds obtained by the addition of several of these words should be read from right to left.

Although the *bbūtasankhyā* system is widely evidenced in the Indic context, its use in the Pali traditions seems to be rare. However, this method shows signs of existence in different fields of Pali culture:

1. Manuscripts and epigraphy

1.1 Manuscripts

Scribal practices adopted this system to mention dates in the form of chronograms. This method is rare but known in Burmese manuscripts as

saṅketasaṅkhyā (Bechert 1979: xx).² For instance, the *Ñāṇavaḍḍhanadīpanī* traced in the catalogue of *Burmese Manuscripts*, Part 1,³ mentions in its colophon two dates which are mixes of classical and *bbūtasāṅkhyā* numbers: *pañcarasojammaduve* for 2265 BS (1721 CE), composed of *pañca* (5) – *raso* (taste) for 6 – *jamma* (i.e. *camma*) (skin) for 2 – *duve* (i.e. *dve*) for 2; and *ekāthasunñāsūrace* for 1081 CS (1719 CE), *racce* (i.e. *rajje*) (royalty) for 1, *sū* (?) for 8,⁴ *suñña* (empty) for 0, *ekātha* (i.e. Pali *ekattha*) (in one place) for 1.

1.2 Epigraphy

Chronograms are also present in the Pali epigraphy. Two main pieces of evidence originate from different geographical and cultural places, the system having surely been assimilated there for different reasons.

The most ancient witnesses are found in the corpus of Cambodian inscriptions written in Pali. Among the dozen epigraphs highlighted (de Bernon 2006: 54–56), two contain dates using the *bbūtasāṅkhyā* method, whether in a pure form (K. 754)—all numbers are mentioned by means of this method—, or in a hybrid form (K. 501)—the date mixes *bbūtasāṅkhyā* and traditional systems—(Chhom 2016: 396–398).⁵ For instance, in the bilingual Pali-Khmer inscription K. 754 dated 1230 MS (1308 CE)⁶ recording a donation made by King Śrīndravarman (Pali *Sirisirindavamma*) (r. 1296–1307 CE) (Coëdès 1936: 14), three stanzas deal with the *bbūtasāṅkhyā*:

2. *sirisirindavammākhyabbūpeso guṇabbūsaṇo*
yasodharapure āsi maṅgalinduyamindunā
3. *nabbaggiyamacandambi assinītārakānvite*
ravivārambi tatiye yāme tite dvipādake [...]
7. *candaggiyamacandambi bbūpādhipatīpesitā*
buddharūpaṇ ṭhāpapetvā dāsīdāsādike adā

2 This method is also evoked by W. A. de Silva in the Sinhalese context. He gave as an example a date composed by means of Sanskrit words (*gagana-rsi varna-nayane* for 2470 CS [1832 CE]). We could not however identify the manuscript in question which probably contains a text written in Sanskrit (de Silva 1938: xxiv). Nevertheless, nothing can assure us that this method does not exist for dating manuscripts in Pali.

3 Cf. ms. 106 in Bechert 1979: 152.

4 The word is incomplete but, as indicated by the editor, it corresponds to number 8.

5 K. Chhom considers also inscription K. 966 which has a link with the *bbūtasāṅkhyā* system only because it must be read from right to left. Numbers are however not been transformed in ‘object numerals’.

6 It is no longer the ‘oldest Pali inscription of Cambodia’, as stated by the French scholar, as it has been supplanted by the Angkor Borei tablet (K. 1355). It remains however the earliest Pali composition in the region (Skilling 2019: 45).

2. Il y eut à Yasodharapura, **en lune (1)** (i.e. moon) – **couple (2)** (i.e. pair) – **lune (1)** – **porte-bonheur (8)** (i.e. auspicious), un roi paré de vertus nommé Sirisirindavamma.
3. **En lune (1)** – **couple (2)** – **feux (3)** (i.e. fire) – **ciel (0)** (i.e. sky), sous l'étoile Assinī, un dimanche, deux pāda après la troisième veille révolue, (...)
7. **En lune (1)** – **couple (2)** – **feux (3)** – **lune (1)**, par ordre du (roi), elle fit ériger une statue du Buddha et donna des esclaves des deux sexes et autres présents. (French transl. Coëdès 1936: 18)

The dates (in bold) are expressed by the compounds 'maṅgala (auspicious) for 8⁷ – indu (moon) for 1 – yama (pair) for 2 – indu (moon) for 1', standing for 1218 MS (1296 CE); 'nabha (sky) for 0 – aggi (fire) for 3⁸ – yama (pair) for 2 – canda (moon) for 1', that is 1230 MS (1308 CE); and 'canda (moon) for 1 – aggi (fire) for 3 – yama (pair) for 2 – canda (moon) for 1', that is 1231 MS (1309 CE).

The presence of this system in the Cambodian inscriptions engraved in Pali could be a direct inheritance from the Sanskrit epigraphic tradition which was current previously. From the 7th to the 14th century, inscriptions were essentially written in Sanskrit in the area, and it was a common practice to figure numbers by using the *bhūtasankhyā* system (Chhom 2016: 276–278). It seems

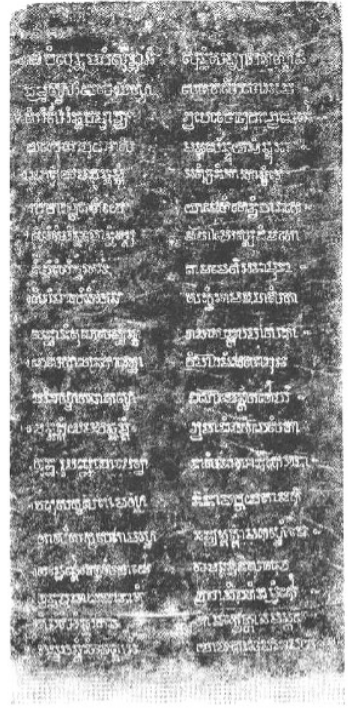


Figure 1: K. 754 inscription (Coëdès 1936: 15)

7 It probably refers to the eight auspicious symbols or objects (Pali *aṭṭhamāṅgala*, Skt. *aṣṭamaṅgala*) found for certain occasions.

8 The set of three fires in Pali Buddhism designates *rāga*, *dosa*, and *moha*, but this number may also have been chosen in this context with reference to the three sacrificial fires of Vedic ritual.

that even when Pali became the new sacred idiom after this period, the *bbū-tasaṅkhyā* continued to be traditionally used by the royal court as a system of datation.

The *bbū-tasaṅkhyā* is also evidenced in the epigraphy of Burma. The long and important Kalyāṇī inscription (Kalyāṇī) dated 1479 CE (Taw Sein Ko 1892), which was commissioned by King Dhammaceti (1472–1492 CE) of Bago (Pegu) to record the reform of the *saṅgha*, frequently uses this method for expressing dates. This text is written in prose, and metrical considerations seem not really to have been an issue in the use of the *bbū-tasaṅkhyā* system. For example:

Ānandathero pana catupaññāsavassāni Pugāmanagare sāsanam jotayitvā, muni-suñña-rasa-sakkarāje sampatte yatbākamam gato. (Kalyāṇī 8.22–23)

And Ānandathera, after spending fifty-four rainy seasons in maintaining the Religion in splendor in Pugāma (i.e. Pagan), also passed away according to his deeds in the year ‘wise-empty-taste’⁹, Sakkarāj. (Transl. Kalyāṇī 56.8–10)

Here, ‘muni (wise) for 7 – suñña (empty) for 0 – rasa (taste) for 6’ refers to 607 CS (1245 CE).

2. Literature

2.1 The *Vuttodaya*

Although the *bbū-tasaṅkhyā* is well-known in Burmese vernacular literature, the use of this method in Pali works is not evidenced in documents that have come to us. However, this numerical method is presented in one of the appendices of the *Saddanīti* edition, where Helmer Smith took up the list of numbers and their correspondences in the entry dedicated to metrical aspects (Sadd 1149). He specified that he referred to the *Saddanīti*’s *nissaya* which uses this type of codification (Sadd 1148), borrowing from a Pali treatise very popular in Burma that has given rise to various commentaries, the *Vuttodaya*. Composed in Ceylon by Saṅgharakkhita (12th–13th century), the *Vuttodaya* deals with prosody and metrical matter, following the same outline as a metrical treatise in Sanskrit (the *Vṛttaratnākara*). It thus assimilates the *bbū-tasaṅkhyā* as a basic principle for its inner develop-

9 The translator did not translate this portion in bold word for word, preferring to directly convert the date into a number (that is 607).

ment, as clearly stated in the preliminary section describing the symbols and terminology used throughout:¹⁰

viññeyyā lokato saññā samuddosurasādinam. (Vutt 10ab)

The [conventional] terms should be known from worldly things: ocean, arrow, tastes, and so on.

Here *samudda* stands for 4 (oceans), *sura* for 5 (arrows belonging to the Hindu god Kāmadeva), *rasa* is for 6 (tastes). Generally, Saṅgharakkhita adapted the Sanskrit text to the peculiarities of the Pali language. He maintained, however, some of the Indic cultural or religious elements at work.

How are these ‘conventional terms’ used in the *Vuttodaya*? They participate in the elaboration of the definitions of the different metres described in this work and presented in short aphorisms. For instance, the *Sālinī* metre is revealed in this way:

vedassehi mtā tgagā Sālinī sā. (Vutt 66ab)

The *Sālinī* is *ma*, *ta*, *ta*, *ga*, and *ga*, with the Veda and the horses.

The formula details the elements shaping the *Sālinī* metre, which corresponds to a rhythmic pattern ----, -∪---∪--- alternating heavy (*garu*, -) and light (*labu*, ∪) syllables. *Ma* and *ta* are the abbreviations of the *gaṇas* (bars or sections) consisting of divisions of three syllables, a kind of shorthand used to describe the metrical patterns.¹¹ *ga* is the abbreviation of *garu*, a heavy syllable. In the prevailing prosodical conventions, a *bhūtasankhyā* word in the instrumental case, like *vedassehi* here, indicates the position of the word-break: ‘With the Veda and the horses’ is then understood as ‘after the fourth and after the seventh [syllables]’, indicated in the metrical pattern with the comma.

The *Vuttodaya* uses a specific terminology in which the *bhūtasankhyā* takes part, that is to say, it is considered as one linguistic tool among others shared by learned poets. This work is till now the only one that systematically uses the *bhūtasankhyā* technique, leading us to suppose, in absence of other data, that it could mark the first use of this system in Pali writings.

10 In his edition of the *Vuttodaya*, R. Siddharatha called this system *bhūtasankhyāvidhi* (Siddharatha 1929: 5).

11 The *ma-gaṇa* has three heavy syllables (---), and the *ta-gaṇa* has two heavy and one light syllable (-∪-).

2.2 The *Vajirasāratthasaṅgaha*

The *bbūtasāṅkhyā* also reached the Lanna kingdom in the Pali *Vajirasāratthasaṅgaha* (Vss) composed by Ratanapañña (1534 CE) (Schnake 2021). Rare occurrences are scattered throughout the work, as in the first *pāda* of Vss 57 *yantā uswidhā nyādi* ('the five parts starting with *ni* and ending with *ya*') where *usu* (arrow) stands for five.¹² However, Ratanapañña dedicates a very short section to this method entitled *lokasaññānīkitasaṅkhyā* ('Numbers designated by conventional terms'), making these elements the central point of arrangements. Only two stanzas constitute this chapter:

pādap' eko bhavakkhandbo sarasākho bahūdalo
Sineruggo suphalado a vi su iti nāmako. (Vss 104)
sādhūbi naradevehi mabito varapādapo
bbavaggo dvādasasākho narappatto bbavapupphīyo
sindhuphalo bbavaṅkūro dvimūlo jinaropīto. (Vss 105)

At first sight, the real meaning of these verses is almost impenetrable. The articulation of the elements of the compounds (in bold) tends to nonsense. The resolution is allowed only by treating nouns not syntactically, but numerically: *bhava* is for 3 (the three types of existences), *sara* for 5 (Kāmadeva's five arrows), *Sineru* for 1 (Mount Sineru), *sindhu* for 4 (the oceans):

The unique tree with **three** trunks, **five** branches, many leaves,
 With the **unique** summit, which gives the perfect fruits, is called 'a vi su'.
 (Vss 104)

It is the excellent tree revered by men and gods, by the virtuous,
 With the **three** summits, the twelve branches,¹³ the **twenty** leaves, the **three**
 flowers,
 The **four** fruits, the **three** burgeons, the two roots,
 It has been planted by the Conqueror. (Vss 105)

Here we obtain different notions revolving around a twofold metaphor of the tree:

1. The first stanza highlights the Tipiṭaka and its ramifications: '*a vi su*' stands for Abhidhamma, Vinaya, and Suttanta, a formula well-known in

12 This *pāda* belongs to a chapter dedicated to 'abbreviations by the beginning and the end' (*ādyantasaṅketa*) (*ibid.* chap. 3). Here, 'the five parts starting with *ni* and ending with *ya*' are the five *nikāyas*.

13 For *na-ra* = 12 cf. the next chapter.

the Thai context and animated with magical properties;¹⁴ the ‘five branches’ are the five *nikāyas*; the ‘many leaves’ correspond to the 84,000 portions of Dhamma; the ‘perfect fruits’ refer to the spiritual results expected by people following the right practice; the ‘unique summit’ is the *Buddhavacana*.¹⁵

2. The second stanza refers to the conditionality or causal conditions of phenomena (*paṭiccasamuppāda*), and is inspired by this conceptualization formalized in the *Abhidhammatthasaṅgaha*:

*tattha tayo addhā dvādas’angāni vīsat’ ākāra tisaṅkha
catusaṅkhepā tīṇi vaṭṭāni dve mūlāni ca vedītabbāni.* (Abhidh-s 40 §5)

It should be understood that there are here **three** periods, **twelve** factors, **Twenty** modes, **three** connections, **four** groups, **three** rounds, and **two** roots. (Transl. Bodhi 1993: 299)

This stanza adopts an angle of analysis of the twelve factors’ chain by ‘categories of analysis’: factors are understood and articulated through the prism of each of these aspects (periods, modes, connections, etc.). It aims to demonstrate the complexity of the links which unite them, connected to each other in different ways.¹⁶

So, this metaphor of the tree is rich and essential. It conceals fundamental aspects of the Buddhist doctrine: the Pali canon which proceeds from the word of the Buddha (*buddhavacana*); and what is considered by some to be the heart of the Buddhist doctrine, the teachings related to the conditioned production of phenomena (*paṭiccasamuppāda*). The manipulation of the *bbūtasāṅkhyā* (or *lokasaññāṅkitasāṅkhyā*) in the *Vajirasārattthasaṅgaha* goes beyond the purely pragmatic aspects of this system encountered so far. It integrates the system and puts it at the heart of compositions for enigmatic or esoteric purposes. In the opinion of its author, Ratanapañña, these facets are not in contradiction with scholastic or technical aspects; on the contrary, they are intertwined.

II. The *kaṭapayādi* system

The *kaṭapayādi* method organizes numbers differently, giving initially a numerical value to each of the consonants of the Sanskrit alphabet from 0 to

14 For the details regarding this method of abbreviation called *ādisāṅketa* cf. Schnake 2018a: 159–180 and Vss Introduction pp. xxx–xxxii and chapter 1.

15 This reading of the different elements comes from Yaem 1969: 99.

16 For a detailed explanation cf. Bodhi 1993: 299–303.

9. Many hypotheses regarding the antiquity of this numerical system have been proposed. Its presence is, however, attested some time before the 7th century CE, confined essentially to Kerala (South India), from where it spread sporadically to other parts of the subcontinent. It has been employed continuously until present times, mainly for scientific purposes in astronomy and mathematics. It also spread beyond the scientific area and found different ways of expression: in music in order to designate the 72 *rāgas*; in the form of chronograms in textual compositions and epigraphy; and in the field of esotericism in Northern India (essentially to draw *yantra* or magic squares) (Sarma 2003: 41–44; Sarma 2012). Here is the chart summarizing this data:

1	2	3	4	5	6	7	8	9	0
<i>ka</i>	<i>kba</i>	<i>ga</i>	<i>gba</i>	<i>ña</i>	<i>ca</i>	<i>cha</i>	<i>ja</i>	<i>jba</i>	<i>ña</i>
<i>ṭa</i>	<i>ṭba</i>	<i>ḍa</i>	<i>ḍba</i>	<i>ṇa</i>	<i>ta</i>	<i>tba</i>	<i>da</i>	<i>dba</i>	<i>na</i>
<i>pa</i>	<i>pba</i>	<i>ba</i>	<i>bba</i>	<i>ma</i>					
<i>ya</i>	<i>ra</i>	<i>la</i>	<i>va</i>	<i>śa</i>	<i>ṣa</i>	<i>sa</i>	<i>ba</i>		<i>unattached vowels</i>

Compounds have to be read from right to left. For instance, *va-ra* refers to 4 and 2, that is to say, 24.

In the current state of knowledge, the only scholarly evidence for the use of *kaṭapayādi* method outside India goes back to John Faithfull Fleet, that is, more than a century ago (Fleet 1911: 792–793). He reported the existence of two chronograms taken from Burmese manuscripts written in Pali, without suspecting that the presence and use of the *kaṭapayādi* was much wider than that.

1. Method of dating

The dating of manuscripts using the *kaṭapayādi* method, in the form of chronograms, was known in Burma (Hla Pe 1964: 395; Bechert 1979: xix–xx) and Ceylon (de Silva 1938: xxiv), but at a relatively recent date (late 18th century), corresponding to the state of preservation of manuscripts. It is therefore difficult to know from when this system was actually used in this way. We could not find any trace of evidence of this system in manuscripts written in Khom or Tham script.

This technique makes it possible to create terms that are not necessarily provided with meaning but are easy to memorize and to place in the composition. The non-exhaustive review of certain catalogues of collections of manuscripts related to Pali literature, including mixed Pali-vernacular glosses, provides some instances of the use of the system as chronograms. Sinhalese manuscripts make the greatest use of the *kaṭapayādi* system, which is also shared by pieces written in Sinhalese and Sanskrit.¹⁷ For instance:

- The *Viśuddhimārga-mahā-sannaya* (ms. 15), a Sinhalese gloss of the *Viśuddhimagga*, contained in the *Catalogue of the Sinhalese Manuscripts in the British Museum*.¹⁸ In this copy dated to the beginning of the 19th century we read *solarudraṃ*, which gives the key date: *so* (7) *la* (3) *rud*¹⁹ (2) *raṃ* (2) that is equivalent to 2237 BS (1694 CE), the probable date of the composition according to the author.
- Fragments of the Pali *Majjhimanikāya* in Sinhalese characters (Paris, BNF 66),²⁰ mentions in its colophon the date *nāmagotram*, whose number correspondence is: *nā* (0) *ma* (5) *got* (3) *raṃ* (2), that is to say, 2350 BS (1807 CE).

Dates encoded by this numerical system in Burmese manuscripts are rare, but evidence can be retrieved from the *Burmese Manuscripts, Part 1*:

- The *Alaṅkā nissaya sac* (*Subodhālaṅkāra nissaya*) (ms. 21) is dated twice by *ripuṃ lakkbe* and *nalāṭake*. They refer to: *ri* (2) *puṃ* (1) *la* (3) *kkbe* (2) is 2312 BS (1758 CE); and *na* (0) *lā* (3) *ṭa* (1) *ke* (1) is 1130 CS (1768 CE).
- The *Samvegavattbudīpani* (ms. 101) also has one date mentioned in two different eras, *rattbakkhayaṃ* and *bbānuvakkhaṃ*: *ra* (2) *tthā*²¹ (2) *kkba* (2) *yaṃ* (1), for 1222 CS (1860 CE); and *bbā* (4) *nu* (0) *va* (4) *kkhaṃ* (2), that is 2404 BS (1860 CE).

17 Cf. for instance, Wickremasinghe 1900: mss. 88B; Somadasa 1996: mss. 73, 253, 441, 442.

18 Wickremasinghe 1900: ms. no.15.

19 It seems that in practice we can meet forms that are not limited to the presentation of a single syllable.

20 Filliozat 2003: ms. no. 66.

21 There is surely a mistake in the text, the letter is surely *tṭha*.

2. The *kaṭapayādi* in Pali literature

The first evidence of this method in the field of Pali literature can be found in a pair of texts sometimes attributed to a single author, King Kyacva of the Pagan dynasty (1234–1250 CE). Mention of this monarch and his works seems to have circulated among learned Burmese scholars: for instance, the *Gandhavaṃsa* succinctly informs us twice about the works he produced, namely, the *Saddabindu* and the *Paramatthabindu*,²² as does also the *Sāsanavaṃsa*, which also contains indications regarding their use;²³ the Burmese *Glass Palace Chronicle* alludes only to the composition of the *Paramatthabindu*.²⁴

What are these two works?

2.1 The *Saddabindu*

The *Saddabindu* is well-known in Burma as one of the fourteen ‘minor grammar texts’.²⁵ The work seems to be well-known in all the Pali traditions of South and Southeast Asia, as suggested by its considerable presence in many monastic libraries and catalogues dealing with manuscripts written in Pali.²⁶ Despite this widespread diffusion, little information is

22 Gv 64.3–5: *Kyacvārañño Saddabindu nāma pakaraṇaṃ Paramatthabindupakaraṇaṃ akāsi*. (‘The works that are the *Saddabindu* and the *Paramatthabindu* were composed by King Kyacva’). Gv 73.28–29: *Saddabindupakaraṇaṃ ca Paramatthabindupakaraṇaṃ ca attano matiṃ Kyacvā nāma raññā katā* (‘The works that are the *Saddabindu* and the *Paramatthabindu* were composed by the king named Kyacva on his own accord’).

23 Sās 76.24–28: *gandbaṃ uggaṇbantānaṃ orodbhānaṃ atthāya saṃkhepato Saddabindun nāma pakaraṇaṃ Paramatthabindun ca nāma pakaraṇaṃ akāsi*. (‘For the use of those in his harem, who were learning the book, he wrote in an abridged form the book called the *Saddabindu* as well as the book called the *Paramatthabindu*’ transl. Law 1952: 84).

24 ‘For the sake of his concubines he composed the *Paramatthabindu*, that they might know of mind and the qualities of mind, matter, *nirvana*, form and being, and personality’ (transl. Pe Maung Tin & Luce 1923: 155).

25 Lottermoser 1987: 79. Concerning the authorship, this work is also attributed to the preceptor of King Kyocva (*ibid.*, p. 105 note 9 for further details). Mabel H. Bode relied on the *Piṭakatthamain* to give the date 1234 CE for its composition (Bode 1909: 25 note 4), while the translation given by Peter Nyunt gives this date as corresponding to the coronation of the king (Piṭ-s § 289).

26 Without being exhaustive, the *Saddabindu* is mentioned in catalogues and inventories of Thai manuscripts (Skilling & Pakdeekham 2002), Sinhalese manuscripts (de Silva 1938), Burmese manuscripts (Nyunt 2012, 2014–2016), Khmer manuscripts (de Bernon 2018). Manuscripts are referenced in the databases of Lao manuscripts (*Digital Library of Lao Manuscripts*, <https://www.laomanuscripts.net>), Northern Thai manuscripts (*Digital Library of Northern Thai Manuscripts*, <http://lannamanuscripts.net>), Burmese manuscripts (*U Po Thi Library*, <https://mmdl.utoronto.ca/databases/u-po-thi-library>).

available regarding the content of this short Pali grammar. Anyway, its second stanza dealing with *sandhi* rules refers directly to the *kaṭapayādi* system, expounding its main principles:

*kādīritā navasaṅkhyā kamena ṭādi yādi ca
pādayo pañcasamkyā suññānāmā saraṃ ṇanā.* (Sadd-b 2)

Nine numbers are said to start respectively with *ka*, *ṭa* and *ya*,
Five numbers start with *pa*; the vowels, the *ṇa*, and the *na* are the zero.

Nothing more is said regarding the inclusion of the *kaṭapayādi* system in a Pali grammar. However, in grammatical works the *sandhi* section starts traditionally with the description of the different letters/sounds (*akkkhara*) of the Pali alphabet, elements that are able to convey and create syntactic/semantic meanings. The *Saddabindu* adds another level of understanding of the *akkkharas*, which is of numerical nature.²⁷ This manner of assuming number serves the exposition of grammatical contents in the rest of the text, as for instance in the following stanza dedicated to *sandhis*:

*sareh' eva sarā pubbā luttā vāci parā ramā
byañjanā c' āgamā vāci dīgharasādisambhavā.* (Sadd-b 3)

[Between] vowels, **sixty-four** are elided with the previous vowels, **fifty-two** with the following [vowels].

Sixty-four are insertions of consonants [after a vowel]; long and short [letters] are produced, etc.²⁸

Here, three numbers are involved, associated with different types of elision. Between two succeeding vowels (*sarasandhi*): elision of the previous vowel, that is to say 64 possibilities (*vā-ci*) (8 vowels × 8 vowels); elision of the posterior vowels, when this one is *asarūpa* ('dissimilar'),²⁹ meaning 52 combinations (*ra-mā*) that are the 64 previous possibilities minus

Different editions also exist in Sinhalese script (cf. Kitsudo 2015: § 99), in Thai script (TNPC 2008: 65–67), in Burmese script (Anonymous 1912: 38–39). Furthermore, the *Saddabindu* is present in a list of text sent to the royal court at Kandy on behalf of the king of Siam 18th century (von Hinüber 1988:175–184); alternative titles (*Saddabinduvitthāra*, °*saikkhapa*) are present in a 'ideal' Tipiṭaka painted in the Wat Thong Nopphakhun (Thailand) (Pakdeekham 2021); etc.

27 This conception seems to have been perfectly accepted by scholarly monks till today, as its wide diffusion shows, as well as its inclusion in an 'ideal' set of Pali texts during the 6th Burmese council that took place in Yangon in 1954. Cf. the Chaṭṭhasaṅgāyana database (www.tipitaka.org).

28 This translation is currently conjectural, pending further study of this text.

29 It concerns *a ā i ī u* and *ū*, that is to say twelve possibilities (*a + ā, ā + a, i + ī, ī + i*, etc.). I thank Aleix Ruiz-Falqués for clarifying this point.

the 12 *asarūpas*. And insertion (*āgama*) of a consonant after a vowel (or *sandhi*-consonant) to avoid hiatus,³⁰ that is to say 64 possibilities (*vā-ci*) (8 consonants × 8 vowels).

The concise definition provided by the *Saddabindu* supposes some external aid, as it gives no further explanation of the internal functioning of this numerical system. Two commentaries to the *Saddabindu* fulfil this task:³¹ the *Linatthasūdani* (or *Saddabindu-purāṇa-ṭikā*) written by Nāṇavilāsa in Pagan (Burma) at an uncertain date (Geiger 1916: 35);³² and the *Saddabinduvinicchaya* composed by Dhammakitti Mahāphussadeva in Haripūñjaya (present-day Lamphun, Northern Thailand) in the late 15th century (Lottermoser 1987: 79–109). These two commentaries developed the concise definition provided by the *mūla* text. Here is the section dealing with the construction of the *kaṭṭapayādi* in the *Linatthasūdani*:

He said the stanza ‘nine numbers are said to start respectively with *ka*, *ṭa* and *ya*, five numbers start with *pa*; the vowels, the *ñā*, the *na* are the zero’. Here, nine numbers are said respectively [refers to] the range of consonants that start with ‘ka’ and ‘kha’, and the set of numbers—one, two, three, four, five, six, seven, eight, nine—with the exception of the nine which end with vowels and the *niggahita*; to start with *ka* [means] to begin with the letter ‘ka’, etc., and end with the letter ‘jha’.

Here, the letter ‘ka’ and the character ‘one’ refer to the number ‘one’; the letter ‘kha’ and the character ‘two’ refers to the number ‘two’; the letter ‘ga’ and the character ‘three’ to the number ‘three’; the letter ‘gha’ and the character ‘four’; the letter ‘ja’ and the character ‘five’; the letter ‘ca’ and the character ‘six’; the letter ‘cha’ and the character ‘seven’; the letter ‘ja’ and the character ‘eight’; the letter ‘jha’ and the character ‘nine’ refer to the number ‘nine’.

Thus, nine numbers are said [means] the nine letters to start with *ṭa*, [i.e.] starting with the letter ‘ṭa’ and ending with the letter ‘dha’; and nine numbers [means] the nine letters to start with *ya*, [i.e.] starting with the letter ‘ya’ and ending with the letter ‘la’.

30 There are eight consonants possible (*y*, *v*, *m*, *d*, *n*, *t*, *r*, and *l*) according to Kacc 35 *yavamadanataralā c’ āgamā*.

31 The localization of these works is sometimes delicate. Notably because these texts may bear the generic title *Saddabindu-ṭikā* (or variants), which is present in various collections of manuscripts. To make research more complex, the *Saddabindu-ṭikā* may also contain other unlisted *Saddabindu*’s commentaries: for instance, there is a *Saddabindu-samvaṇṇanā* in Laos and Northern Thailand (cf. mss. *Ṭikā Saddābindu* [*Saddabindu-samvaṇṇanā*] and *Pali ṭika Santbaphintbu* [*Saddabindu-samvaṇṇanā*]), and a *Saddabindu-vaṇṇanā* in Northern Thailand (cf. ms. *Pali Saddābindu* [*Saddabindu-vaṇṇanā*]).

32 Geiger stated that the work had been composed in the 16th century.

After positioning the letters 'sa' and 'ṣa' in the fifth and sixth places, beginning with 'ya', [and] the letters 'sa' 'ha' and 'la' in the seventh, [eighth], ninth [positions], we produce 'ya, ra, la, va, [śa, ṣa,] sa, ha, and la'. Why do we retain the two letters [śa and ṣa]? Because in the books of the ancients it was used for an old science of numbers. After having harmonized the figures developed in Sanskrit in the books of the ancients, we kept the two letters [śa and ṣa] to include [before] 'sa', 'ha', and 'la' that are for the numbers seven, eight, and nine.

Five numbers are said to start respectively with five letters beginning *pa*. As it has already been said, we must know [the value] of the letters and the characters after having ... (?), and after making the eight vowels, the letters 'ña' and 'na' as the zero. Such is what is meant.³³

The *Saddabinduvinicchaya* is surely the most didactic explanation regarding the construction of the *kaṭapayādi* method. It probably expresses the increasing interest in this matter in Lanna during its 'golden age' (Penth 1994: 42–125), and the need to fully grasp this new method of codification. Here is the gloss on the *kaṭapayādi* system:

It was said first '(...) are said (...) to start with *ka*'. Here, to start with *ka* [means] 'ka', etc., that is to say, when *ka* is located at the beginning; *are said* [means] we have to say, to formulate; the root 'ira' means to formulate. *Numbers* have to be figured (?). *Nine*, [means] nine and nine and nine; the one remaining [sequence of letters] should be treated. *Nine numbers* [means] they are nine and they are numbers. *To start with ṭa* [means] that 'ṭa' is located at the beginning; *to start with ya* [means] that 'ya' is located at the beginning; *starting with pa* [means] that 'pa' is located at the beginning; *the vowels, the ña, the na*, [means] the vowels and the *ña* and the *na*.

33 Ms. *Ṭikā Saddābindu [Līnatthasūdanī]*, folio 12.line 3–folio 13.line 5: 'kādīritā navasaṃkhyā, kamena ṭādi yādi ca pādāyo pañcasamkhyā suññanāmā saram ṇanā' ti gātham āba. tatttha kādi kakārādayo jhakārāntā nava vaññasarantaṃ niggaḥitaṃ vajjjetvā byañjānā mattā kakkādinam eka-dvi-ti-catu-pañca-cha-satta-aṭṭha-navasaṃkhyaganaṃ ca kamena navasaṃkhyā ti iritā. tatttha kakāro ekasaṃkhyā ekalekkaṃ bhajati, khakāro dvi-samkhyā dvilekkaṃ bhajati, gākāro tisamkhyā tilekkaṃ, gbakāro catulekkaṃ, ṇakāro (it should be ja^o) pañcalekkaṃ, cakāro cbalekkaṃ, chakāro sattalekkaṃ, jakāro attbalekkaṃ, jhakāro navasaṃkhyā navalekkaṃ bhajati. evaṃ ddbādi (it should be ṭādi) ṭakārādayo dbakārāntā navavaññā navasaṃkhyā ti ca yādi ca yakādayo lakārāntā navavaññā navasaṃkhyā ti ca iritā. yādīmhi ca pañcamachattthaṭṭhāne śakāra-ṣakāre pakkhipitvā, sa-ba-lā-kāre sattama[attthama]navame karoti ya-ra-la-va-sa-ba-la iti. kasmā dvevaññā gahitā ti porāṇakasattbasamkhyānaṃ purāṇattthaṃ porāṇakasattthesu hi sakkatābhāsāya katasamkhyāya samaggaṃ katvā, sa-ba-lānaṃ sattaṭṭhanavamasamkhyāsu samgahaṇattthaṃ dvevaññā gahitā ti. pādāyo pañcavaññā kamena pañcasamkhyā ti iritā ti. yatbhavutte vaññā lekkhāyo byañjanānaṃ nissayasare a^oobhārikam katvā aṭṭha sare ṇakāre nakāre ca suññam katvā ṇetabbā ti adbhippaya.

In this way, letters *starting with ka* are the nine letters 'ka kha ga gha ṅa ca cha ja jha'. They are the nine numbers formulated by poets. Letters [said] *to start with ṭa* are the nine letters 'ṭa ṭha ḍa ḍha ṇa ta tha da dha'. They are the nine numbers formulated by experts and learned people. Letters [said] *to start with ya* are the nine letters 'ya ra la va śa ṣa sa ha ḷa' enunciated by the scholars, they are the nine numbers. Letters [said] *to start with pa* are the five letters 'pa pha ba bha ma' for five numbers, enunciated by masters.

The vowels, the ṅa, the na [means] that the eight vowels, the 'ṅa' and the 'na' are the zero, they are then formulated 'a, etc., o, ṅa, na'. *Respectively* [means] that each term is treated in this way. Thus, the five sections, which are the forty-two letters written, were treated to make the sons of good family experts in the Tipiṭaka. And in these sections, *nine numbers* are the three sections 'ka ṭa ya', *five numbers* are the section beginning with 'pa', *the zero* is the ten letters that are the vowels, the 'ṅa', and the 'na'. We made [these] five sections according to the classification of these [letters/numbers] for the understanding of this set, this is the intention. But how do we recognize their characteristics? There, 1, 2, 3, 4, 5, 6, 7, 8, 9 have to be done with the word 'ka' which is the character 1, the word 'kha' which is the character 2, etc., 'jha' which is the character 9. 1, 2, 3, 4, 5, 6, 7, 8, 9 have to be written with the word 'ṭa' which is the character 1, etc., the word 'dha' which is the character 9. This is also the method for 'ya, ra, la, va, śa, ṣa, sa, ha, ḷa'. 1, 2, 3, 4, 5 must be made with the word 'pa' which is the character 1, etc., the word 'ma' which is the character 5. We must consider that the zero is 'a, ā, etc., o, ṅa, na'. The zero has eight signs: it must be made like o, o, o, o, o, o, o, o. Here, the letters are illustrated: 'my thirty-nine thousand men' [is] 39,000 [is] 'ga-jha-a-ṅa-na'.³⁴ These letters should be known under all circumstances.³⁵

34 Sadd 307.20-33 explains that *tiṃsa nāvutiyo* is a well-known popular expression corresponding to 'thirty-thousand and nine-hundred', that is to say 39,000.

35 Sadd-v 89.15-90.9: [..] 'kādiritā' ty ādim āha. tattha 'kādi' ti ko ādiye sante ti kādayo; 'iritabbā katbetabbā' ti iritā, ira-dhātu kabhane. nimitabbā saṅkhyā. navañ ca navañ ca navañ ca navañ ekaseso kātabbo. navañ ca taṃ saṅkhyā cā ti navasaṅkhyā. 'ṭo ādiye sante' ti ṭādayo, 'yo ādiye sante' ti yādiyo, 'po ādiye sante' ti pādayo, 'saro ca ṅo ca no ca' sara-ṅā-nā. tattha kādi-akkharā nāma yathā 'ka, kha, ga, gha, ṅa, ca, cha, ja, jhā' ti navakkharā nava saṅkhyā nāma kavīhi katbitā. ṭādayakkharā nāma yathā 'ṭa, ṭha, ḍa, ḍha, ṇa, ta, tha, da, dha' ti navakkharā nava saṅkhyā nāma saddasattbhavidūhi vuttā. yādayakkarā nāma yathā 'ya, ra, la, va, śa, ṣa, sa, ha, ḷa' ti' me navakkharā nava saṅkhyā nāma viññūhi iritā. pādayakkharā nāma yathā 'pa, pha, ba, bha, mā' ti pañcakkharā pañca saṅkhyā nāma pañḍitehi bhāsītā. 'sara-ṅā-nā' ty aṭṭha sarā ṅa-nā yeva suññaṃ nāma cā ti, taṃ yathā 'a, pa, o, ṅa, na' ti pakasītā ti. 'kamenā' ti kamaṃ eva padacchedo. evaṃ dvitālisakkhāre lekhaṇā ti ime pañca vaggē katvā kulaputtānaṃ tipiṭakesu eva paṭubhāvāyā ti. tesu paṇa 'ka-ṭa-yā' ti tayo vaggē nava saṅkhyā nāma, pādivaggē pañca saṅkhyā nāma, 'sara-ṅā-nā' ti dasakkharā suñña nāma. tesam nāma pabbhedato saññā paṇ' atthāya pañcavaggē katvā ty adhippāyo. tesam paṇa lakkhaṇaṃ kathaṃ viññāyāti ti. tattha 'ka' ti padaṃ 1 (ekaṃ)

The scheme from these two commentaries is summed up in the following chart. It differs from the Sanskrit scheme only by the addition of the letter *la*, keeping also the two sibilants *śa* and *ṣa*. The reading of compounds remains the same, from right to left:

1	2	3	4	5	6	7	8	9	0
<i>ka</i>	<i>kba</i>	<i>ga</i>	<i>gha</i>	<i>ṅa</i>	<i>ca</i>	<i>cha</i>	<i>ja</i>	<i>jba</i>	<i>ṅa</i>
<i>ṭa</i>	<i>ṭba</i>	<i>ḍa</i>	<i>ḍba</i>	<i>ṇa</i>	<i>ta</i>	<i>tba</i>	<i>da</i>	<i>dba</i>	<i>na</i>
<i>pa</i>	<i>pba</i>	<i>ba</i>	<i>bba</i>	<i>ma</i>					
<i>ya</i>	<i>ra</i>	<i>la</i>	<i>va</i>	<i>śa</i>	<i>ṣa</i>	<i>sa</i>	<i>ba</i>	<i>la</i>	unattached vowels

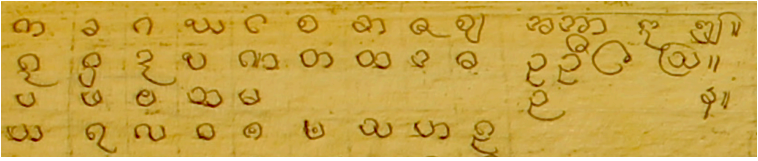


Figure 2: Visualization of a chart in a Burmese manuscript, cf. ms. *Paramatthabindu paṭṭh nissaya* folio 52b

2.2 The *Paramatthabindu*

The second work attributed to Kyocva, the *Paramatthabindu*, does not seem to have enjoyed the same success as the *Saddabindu*. Very little is known about it,³⁶ and manuscripts remain rare in catalogues and monastic libraries. So far, we have been able to trace this text only in Burmese script. Its contents, which is difficult to grasp and transmit, may explain its apparently limited circulation. In ten stanzas which are particularly cryptic

lekkaṃ, ‘*khā*’ ti *paḍaṃ* 2 (*dve*) *lekkaṃ*, *pa*, ‘*jhā*’ ti 9 (*nava*) *lekkaṃ* *kātabbaṃ*: 1, 2, 3, 4, 5, 6, 7, 8, 9. ‘*ṭā*’ ti *paḍaṃ* 1 (*ekaṃ*) *lekkaṃ*, *pa*, ‘*dhā*’ ti *paḍaṃ* 9 (*nava*) *lekkaṃ* *likkhitabbaṃ* *eva*: 1, 2, 3, 4, 5, 6, 7, 8, 9. ‘*ya*, *ra*, *la*, *va*, *śa*, *ṣa*, *sa*, *ba*, *lā*’ ti *es’eva* *nayo*. ‘*pā*’ ti *paḍaṃ* 1 (*eka*) *lekkaṃ*, *pa*, ‘*mā*’ ti *paḍaṃ* 5 (*pañca*) *lekkaṃ* *kātabbaṃ*: 1, 2, 3, 4, 5. ‘*a*, *ā*, *pa*, *o*, *ṅa*, *nā*’ ti *suññā* *nāmā* ti *daṭṭhabbaṃ*. *suññā* *nāma* *aṭṭhalakkhaṇaṃ*: *bindu* *kātabbaṃ* 0, 0, 0, 0, 0, 0, 0, 0, 0. *idha* *lekkaṃ* *udābaṭaṃ*: ‘*tiṃsa* *me* *purise* *nāvutyō*’, 39000, *ga-jha-a-ṅa-na*. *idaṃ* *pana* *lekkaṃ* *sabbattha* *veditabbaṃ*.

³⁶ It is mentioned in Bode 1909: 25 and Law 1933: 582, who relied on the Gv and Piṭ-s § 289. For a preliminary critical edition of this work cf. Schnake 2018b: Annex 8.

the *Paramatthabindu* deals with Abhidhamma topics encoded through the *kaṭapayādi* method. This is hardly surprising, since the Abhidhamma system appreciates the classification and organization of elements by numbers, the *kaṭapayādi* is perfectly suited to this purpose.

The *Paramatthabindu* also has a key-stanza defining the method, close in its wording to the one explained in the *Saddabindu*, and well-known in Burma as *Piṭakasankhyā* (Bechert 1979: xx):

kāditādiyakārādi navasaṅkhyā pakāsītā
pañcasankhyā pakārādi suññā nāma sarañanā. (Pb introductory stanza)

Nine numbers are known, starting with the letters *ka*, *ṭa*, and *ya*,
 Five numbers start with the *pa* letter; vowels, *ñā*, and *na* are the zero.

Its commentary, the *Paramatthabindu-ṭikā* (or *Paramatthamañjūsā*) composed by Mahākassapa³⁷ at an unknown date offers a shorter development than the *Linatthasūdani*. This relative brevity suggests that explanations of the system were already known:

After making four lines thus ‘one line is from the consonant *ka* to the consonant *jha*; one line is from the consonant *ṭa* to the consonant *dha*; one line is from the consonant *pa* to the consonant *ma*; one line is from the consonant *ya* to the consonant *ḷa*’, we get one, two, three, etc., according to the conventional method.

We should understand that in each line we have counted from the initial consonant: the consonant *ka* is one, the consonant *kha* is two, the consonant *ga* is three, the consonant *gha* is four, the consonant *ṇa* is five, the consonant *ca* is six, the consonant *cha* is seven, the consonant *ja* is eight, the consonant *jha* is nine.

In the same way for the line starting with *ṭa*, etc., and starting with *ya*. But for the *pa*-line, etc., we should get five numbers. For others—that are the eight vowels, the consonant *ñā*, and the consonant *na*— we should understand that they are the ten letters for the zero.³⁸

37 The only information at our disposal comes from Bode 1909: 25 note 4, relying on the *Piṭakathamaing* (cf. Piṭ-s § 321).

38 Ms. *Paramatthabindubū-ṭikā*, folio 67a, lines 9–folio 67b, line 2: *kakkharato yāva jhakkharā ekaṃ paṃṇaṃ ṇakkharato [sic] yāva dbakkharā ekaṃ, pakkharato yāva makkharā ekaṃ, yakkharato yāva ḷakkharā ekaṃ ti cattāro pappe karitvā lokavobārānuruṇṇe eko dve tīṇi ādinā nayena. tesu ekamekaṃ pappe ādyakkharato pathāya gaṇiyamāne kamakkharo [sic] eko, kbakkharo dve, gakkharo trīni [sic], ghakkharo catu, ṇakkharo pañca, cakkharo cha chakkharo satta jakkharo aṭṭha jhakkharo navā ti veditabbā. tatthā ṭādiyādiṇṇapappesu pi pādi pappe pana yāva pañca saṅkhyā laddhabbā avasesā pana aṭṭhasarā ca ṇakkharanakkharāni cā t’ ime dasa suññakkharā ti veditabbā.*

How does the *Paramatthabindu* assimilate this system? It summarizes large sets of Abhidhamma data, as in the following stanza, whose commentary is indispensable for its understanding:

*cbalaṃ dumbi nadaṃ sumbi maṇaṃ suddhimbī dutiye
cacc' āditatiye Vehapphale mutāṃ rūpe dbutaṃ.* (Pb 3)

Thirty-seven are in *du*, eighty in *su*, fifty-five in the Pures, sixty-six in the second, sixty-five in the first and the third [planes of *jhāna*] and in the Great Rewards [plane], and sixty-nine in the form-sphere.

This stanza is part of a longer development that deals with the realms where the 89 varieties of consciousness distinguished in the Abhidhamma can occur. It summarizes their distribution according to the various planes and spheres of existence. Pb 3 gives the varieties of consciousness arising (1) in the sense-desire sphere (*kāmaḥbhūmi*), distinguished by the levels of unhappy destiny (*duggati*) and the happy destiny (*sugati*), abbreviated using their first syllable *su* and *du*;³⁹ (2) in the form-sphere (*rūpabhūmi*) including the levels of the first/second/third *jhāna*, and levels of the Pure Abodes (*Suddhāvāsa*) and of the Great Reward (*Vehapphala*) both belonging to the level of the fourth *jhāna*.⁴⁰

It is difficult to know with certainty the reason for such encrypting. We assume that this way to present lists of numbers could be a didactic device for *ābbidhammikas* to learn and memorize teachings through numerical data.

2.3 Spread of the *kaṭapayādi* system

The presence of the *Saddabindu* and commentaries in the different Pali traditions of South Asia indicates that the *kaṭapayādi* was known in certain scholarly circles. However, this system has managed to go beyond the scope of these works, even if literary evidence remains scarce.

To date, only one work is known to have fully developed the potential of the *kaṭapayādi* method in its compositions. It is the *Vajirasāratthasaṅgaha* (1534 CE), already mentioned, where around 63 stanzas use this numer-

39 If the *ādisaṅketa* method is a tool privileged in the field of magic, it is also used in more didactic ways as one linguistic mechanism used by *ābbidhammikas*. For instance, it is present in the *Nāmacārādīpaka* (Nāmac 185 to 191).

40 The number of consciousness arising in the level of the Unconscious Beings (*Asaññasattā*), which belongs also to the level of the fourth *jhāna*, is not mentioned for one reason: beings reborn in this noumenal level without conscious experience of any kind, have form only.

ical technique, mainly in the handling of Abhidhamma topics. Its author, Ratanapañña, manipulates numerical data in different ways: some stanzas are borrowed from the *Paramatthabindu*—strictly, with variations in contents, or built on the same model—, others use number sporadically to help in the composition of enigmatic statements, while the implementation of others is much more elaborate. We let aside examples recalling the *Paramatthabindu*, since they have already been illustrated, and present Vss 21 where the *kaṭṭapayādi* is used as a tool to help in composition:

pa bba ā da sa ghā sā phu saṃ tī vo jo ta cu ki bbyā
pa bhā ā vi saṃ ti vo jo ta cu thā nayam pakāsitaṃ. (Vss 21)
pa bba ā da sa ghā sā phu saṃ tī vo jo ta cu are the **fourteen** *ki*,
pa bhā ā vi saṃ ti vo jo ta cu are the **ten** *thā* that have been expounded.

This stanza describes the fourteen functions of consciousness (*ki* for *kiccacitta*) that occur within a cognitive process or cognitive series (*cittavāṭhī*), as well as their summarized form by phase (*thā* for *thāna*). We find the description of this series in summarized form in the *Visuddhimagga* (Vism 457.19–460.20) as well as in the later *Abbidhammatthasaṅgaha* (Abhidh-s 13, §§ 18–19). These functions are here expounded according to a system of abbreviation referring to items by their first syllable (*ādisaṅketa*), and presented in the order of their appearance, from rebirth (*paṭisandhi*) to death (*cuti*).⁴¹ Here, the hidden numbers are *bbyā* and *nayam* (in bold), that is to say, *bba* + *ya* = 4 + 1 = 14, and *na* + *ya* = 0 + 1 = 10.

Ratanapañña also provides complex compositions playing with different levels of understanding. In a short chapter entitled *dvatthaka* ('double meaning'),⁴² there are six stanzas, such as Vss 99 belonging to a series of four dedicated to the same topic:

ghaniddhilūnaṃ dulabhakkuluppannaṃ
anīraṃ akkaṃ kudabaṃ bhavallunaṃ
phutaṅgalilaṃ yasaggaṃ āriṇipūñṇakaṃ
divārilu' ggāṇ' iha viddhibhīñṇavaṃ. (Vss 99)

He put an end [to the harmful elements] thanks to his exceptional powers, born in a rare lineage,

41 These different functions are: *paṭisandhi* (relinking), *bbavaṅga* (existence-continuum), *āvajjana* (adverting), *dassana* (seeing), *savana* (hearing), *ghayana* (smelling), *sayana* (tasting), *phussana* (touching), *sampaṭicchana* (receiving), *santīrana* (investigating), *voṭṭhapana* (determining), *javana* (impulsion), *tadārammaṇa* (retention), and *cuti* (decease).

42 Cf. Vss Chapter 7.

He is unshakable, the sun that burns that which is harmful,
 He destroyed the states of existence, has a clear physical grace,
 He has the best fame, virtuous towards enemies,
 He destroyed the enemies of the divine here, has the greatest authority,
 He possesses extraordinary powers and clairvoyance.

This stanza celebrating the Blessed One's virtue takes another turn if we consider the text as a series of syllables, and then of numbers. Then it reveals an essential aspect of the Buddhist doctrine:

*gha ni ddbi lū nam du la bba kku lu ppa nam*⁴³
a nī ram a kkaṃ ku da haṃ bba va llu nam
phu ṭ añ ga lī lam ya sa ggā ri pu nna kaṃ
di vā ri lu' ggā ñi ba vi ddbi bbi nna vaṃ. (Vss 99)

13,143,803,904

34,488,115,200

101,237,133,312

404,948,533,248.

These huge numbers refer to a section of the *Pañcappakaraṇa-aṭṭhakathā* commenting on the *Paṭṭhāna* (Paṭṭh-a 394–410), the last book of the Abhidhamma-piṭaka. The *Paṭṭhāna*, well-known as 'all-encompassing infinite methods' (*anantanayasamanta*), aims to highlight from a different angle the method of dependent arising (*paṭiccasamuppāda*) as represented by the twelve factored chain.⁴⁴ Its specific approach shows the very nature and dynamism of the relations binding mental and physical phenomena of existence (*dhamma*), intertwined, and interdependent within a vast network of possibilities. The *dhammas* listed in the *Dhammasaṅgaṇī*—the 22 triplets (*tika*) and the 100 couplets (*duka*), that is to say, 266 *dhammas* ((22 × 3) + (100 × 2))—are the basis of this vast synthesis: the *Paṭṭhāna* organizes and describes all the possible relationships between them, according to a complex procedure. Commentators calculated the extent of these relations, following a model of analysis called 'combinatoric' in mathematical language. The vertiginous figures obtained in Vss 99 are then the different mathematical steps putting into perspective the total of conditional relations (in bold), that is 'the depth of causality' (Kyaw 2014: 15).

43 Vss-ṭ 99 specifies that the two final *nam*s are not included in the counting. They have been inserted here probably to respect the metrical pattern.

44 For a detailed account of this work see Kyaw 2014.

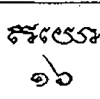
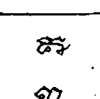
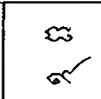
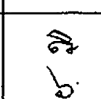


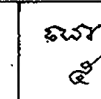
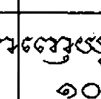
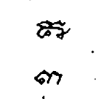
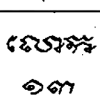
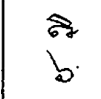

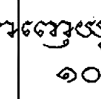
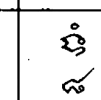
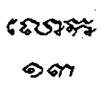
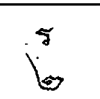

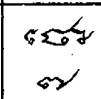

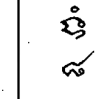
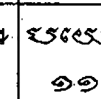


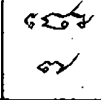
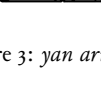
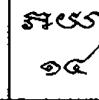
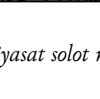
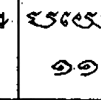
 	 	 	 
 	 	 	 
 	 	 	 
 	 	 	 

Figure 3: *yan ariyasat solot mongkhon*

At this point, it is difficult to assess the reason for such elaboration in the *Vajirasāratthasaṅgaha*. It may have mnemonic purposes, *ābhidhammikas* using them to memorize some of the *Paṭṭhāna*'s contents. But it may also belong to the field of esotericism: this text enjoys also great popularity in certain traditions, especially Burmese, for its protective role in Buddhist rituals and practice (Kyaw 2014: 124–140). The active role of the *kaṭapayādi* method in esoteric activities is quite plausible, as the process has quietly penetrated the esoteric practices of today's Thai Buddhism. It operates for instance in the *yan ariyasat solot mongkhon* (ยันต์ อริยสัจจ์ สप्तส มงคล) (Urakhin 1966: 179), a magic diagram or *yantra* which combines in each of its entries a syllable/syllables with a number (in Khom script) according to the logical correspondence provided by the *kaṭapayādi* method (see Fig. 3). The literature where this *yantra* appears says nothing about this system. This is hardly surprising since it serves primarily to reference and prescribe. It is then impossible to know what degree of knowledge these authors had, and only further research will be able to draw the outlines of this singular field of application.

The *kaṭapayādi* system also found its way into the oldest Buddhist text known to have originated in Laos (mid-16th century), the *Gurupadesa*, which deals with legal concerns (Kourilsky 2023). One passage is, how-

ever, dedicated to the life-span of the 24 Buddhas starting from Dīpaṅkara and listed in the *Buddhavaṃsa*. For this purpose, the *Gurupadesa* resorts to the *kaṭapayādi* method, relying explicitly on the *Saddabindu*. For instance:

KO [is meant] for the Buddha Koṇāgamana; he is aged GA-*nabuti*, that is, 30,000 years old. KA is meant for the Buddha Kassapa whose lifespan was RO-*nabuti*, that is, 20,000 years old. [Syllables] VE RE are meant for all 24 Buddhas, whose lifespan was not below *eka-nabuti*, that is 10,000 years old. GO is meant for the Buddha Gotama, whose lifespan was only 80 years old. The preceding *gāthā* are given according to the numbers given in the *Saddabindu*. (Transl. Kourilsky 2023: 337)

Like the *Vajirasāratthasaṅgaha*, the *Gurupadesa* makes use of a mix of *ādi-saṅketa* and *kaṭapayādi* systems for its development. For example, the number of Buddhas is *ve-re*, that is to say, $ve + re = 4 + 2$, that is 24. The influence of Lanna scholars, and then Burmese ideas and concepts, is here obvious and not surprising, as the religious culture of Northern Thailand had at that time a deep impact in what was the Lan Xan kingdom, on literature, epigraphy and art (Kourilsky 2023: 282).

Finally, the *kaṭapayādi* is also present in a contemporary Khmer chant composed by the layman Suttantaprijā Ind (late 19th or early 20th century). The *Ārādbanā dhammakathik oy samtèn dhaṛm* ('Invitation to a Preacher to Preach the Dharma') (Walker 2020: 56–63) includes four additional Pali stanzas praising the Buddha and inviting the preacher to deliver a sermon on the Dhamma. The third stanza of this text contains an element related to our purpose:

*tato pabbūti sambuddho
anūnā dhammadesanam
māgha-vassāni desesi
sattānam atthasiddhakam.*

From that complete beginning, the Perfect Buddha
for **forty-five** rainy seasons
preached sermons on the Dhamma
to fulfill the aims of living beings. (Transl. Walker 2020: 62)

Here, *māgha* is not the name of a constellation, but the number composed of *mā* and *gha* ($5 + 4 = 45$). Beyond the fact that it informs us about the presence of the *kaṭapayādi* in the Khmer Buddhist tradition, this discrete use has also the merit of showing that this system is still alive in certain scholarly circles and has not fallen into oblivion.

Conclusion

Only a few traces of the *bhūtasāṅkhyā* and *kaṭapayādi* methods exist in the different Pali traditions from South and Southeast Asia. These systems did not meet the same success as in Indic culture. Nevertheless, their field of application and expression are not negligible (Pali literature, epigraphy, or copyist practices). For both techniques, their uses range from the most practical—for instance in the case of chronograms—to the most complex and esoteric compositions. Further research is needed to delineate the spread and use of these two numerical systems. It is likely that the few examples given in this modest contribution are not isolated cases.

Open Access This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.

Abbreviations

Abhidh-s	<i>Abbidhammatthasaṅgaha and Abbidhammatthavibhāvinī-ṭikā</i> , ed. by Hammalawa Saddhatissa (London: Pali Text Society, 1989).
BS	<i>Buddhasakarāja</i> (Buddhist Era, begin 544 CE)
CE	Common Era
CS	<i>Cullasakkarāja</i> (Lesser Era, begin 638 CE)
Gv	<i>Gandha-Vamsa</i> , ed. by Ivan P. Minayeff, <i>Journal of the Pali Text Society</i> , 2 (1886), 54–80.
Kacc	<i>Kaccāyana and Kaccāyanavutti</i> , ed. by Ole Pind (London: Pali Text Society, 2013).
Kalyāni	<i>The Kalyāni Inscriptions Erected by King Dhammaceti at Pegu in 1476 A.D.</i> , ed. and trans. by Taw Sein Ko (Rangoon: Government Printing, 1892).
MS	Mahāsakarāja (Great Era, begin 78 CE)
Nāmac	‘ <i>Nāmacārādīpaka</i> of Chapaṭa’, ed. by Hammalawa Saddhātissa, <i>Journal of the Pali Text Society</i> , 15 (1990), 1–28.
Paṭṭh-a	<i>Paṭṭhāna-aṭṭhakathā</i> in <i>Pañcapakaraṇa-aṭṭhakathā</i> , Aṭṭhakathā Series, 50 (Yangon: Buddhasāsana Society, Ministry of Religious Affairs, 2008).
Pb	<i>Paramatthabindu</i> ; cf. Schnake 2018b (Annex 8).

Piṭ-s	<i>Piṭakatthamaing</i> ; cf. Nyunt 2012.
Sadd	<i>Saddanīti</i> , ed. by Helmer Smith, 5 vols (London: Pali Text Society, 1928–1966, repr. 2001).
Sadd-b	<i>Saddabindu</i> , ed. by Friedgard Lottermoser, ‘Minor Pāli Grammar Texts: the Saddabindu and its “New” Subcommentary’, <i>Journal of the Pali Text Society</i> , 15 (1987), 79–109 (80–82).
Sadd-v	<i>Saddabinduvicchaya</i> , ed. by Friedgard Lottermoser, ‘Minor Pāli Grammar Texts: the Saddabindu and its “New” Subcommentary’, <i>Journal of the Pali Text Society</i> , 15 (1987), 79–109 (82–103).
Sās	<i>Sāsanavaṃsa</i> , ed. by Mabel Haynes Bode (London: Amen Corner E.C., 1897).
Vism	<i>Visuddhimagga</i> , ed. by C.A.F. Rhys Davids (London: Pali Text Society, 1920–1921, repr. 1975).
Vutt	<i>Vuttodaya: the Composition of Metre by Ven. Saṅgharakkhita</i> , ed. and trans by Ānandajoti Bhikkhu (2016), < https://www.ancient-buddhist-texts.net/Textual-Studies/Vuttodaya/index.htm >
Vss	<i>Vajirasāratthasaṅgaha</i> , cf. Schnake 2021.
Vss-t	<i>Vajirasāratthasaṅgaha-ṭīkā</i> , cf. Schnake 2021.

Manuscripts of Pali texts

- Ṭīkā Saddābindu* [*Linatthasūdanī*]. 3 fascicles, 70 folios (*ka à chaṃ*), in *Pba pālī ṭīkā saddasāra, ṭīkā saddabindu vaṇṇanā, ṭīkā saddavutti, ṭīkā vibhattikatthā, pba ṭīkā bālapabodhi, saddhagati pakaraṇa, pba dhammapada ban ton* [collection of texts], 13 fascicles, 388 folios, Pali, Tham script, no. 13092504026_00, Vat Canthasalo (Laos).
- Ṭīkā Saddābindu* [*Saddabindu-saṃvaṇṇanā*]. 7 fascicles, 185 folios, Pali, Tham script, no. 06018504183_00, Luang Prabang Provincial Museum (Laos).
- Pali tika Santhaphinthu* [*Saddabindu-saṃvaṇṇanā*]. 7 fascicles, 171 folios, Pali, Tham script, no. 070104023_00, Wat Sung Men in Phrae (Northern Thailand).
- Paramatthabindu pāṭh nissaya* [*Paramatthabindu and nissaya*]. 5 folios, Pali, Burmese script, no. UPT_520.2, U Pho Thi library in Thaton (Burma).
- Paramatthabindhu-ṭīkā*. 22 folios, Pali, Burmese script, no. UPT524.5, U Po Thi Library in Thaton (Burma).

Secondary sources

- [Anonymous], *Saddā nīy 14 coṇ tvaī pāṭh*, (Rankun: Sudhammavati cā puṃ nhip tuik, 1912 [ed. 1928]).
- Chhom, Kunthea. 2016. ‘Le rôle du sanskrit dans le développement de la langue khmère : Une étude épigraphique du vi^e au xiv^e siècle’, 2 vols (doctoral dissertation, EPHE and INALCO, Paris).

- Bechert, Heinz (ed.). 1979. *Burmese Manuscripts*, Part 1 (Wiesbaden: Franz Steiner Verlag).
- Bernon, Olivier de. 2006. 'The Status of Pāli in Cambodia: from Canonical to Esoteric Language', in *Buddhist Legacies in Southeast Asia: Mentalities, Interpretations and Practices*, ed. by François Lagirarde and Paritta Chalermpong Koanantakoo, Études thématiques, 19 (Paris-Bangkok: École française d'Extrême-Orient), 53–66.
- . 2018. *Inventaire provisoire des manuscrits du Cambodge. Deuxième partie*, Materials for the Study of the Tripiṭaka, 15 (Paris/Bangkok: École française d'Extrême-Orient/Fragile Palm Leaves Foundation).
- Bode, Mabel Haynes. 1909. *The Pali Literature of Burma* (London: Luzac, repr. 1966).
- Bodhi, Bhikkhu, and others. 1993. *A Comprehensive Manual of Abhidhamma: The Abhidhammattha Sangaha of Ācariya Anuruddha* (Onalaska [U.S.A.]: BPS Pariyatti Editions, repr. 2010).
- Cœdès, George. 1936. 'Études cambodgiennes', *Bulletin de l'École française d'Extrême-Orient*, 36, 1–21.
- Filliozat, Jacqueline. 2003. *Catalogue des manuscrits palis des collections françaises, fonds des bibliothèques publiques et privées*, EFEO database, EFEO library. The manuscripts described in this catalogue are the subject of individual notices at <<https://archivesetmanuscrits.bnf.fr/pageCollections.html?col=1>>
- Fleet, John F. 1911. 'The Katapayadi system of expressing numbers', *Journal of the Royal Asiatic Society of Great Britain and Ireland*, 43.3, 788–794.
- Geiger, Wilhelm. 1916. *Pāli Literatur und Sprache* (Strassburg: Karl J. Trübner).
- Gethin, Rupert. 1992. 'The Mātikās: Memorization, Mindfulness and the List', in *In the Mirror of Memory (Reflections on Mindfulness and Remembrance in Indian & Tibetan Buddhism)*, ed. by Janet Gyatso (New York: State University of New York), 149–172.
- Hinüber, Oskar von. 1988. 'Remarks on a list of books sent to Ceylon from Siam in the 18th century', *Journal of the Pali Text Society*, 12, 174–185.
- Hla Pe. 1964. 'Abbreviations, Cryptograms and Chronograms in Burmese', *Journal of Burma Research Society*, 47, 385–396.
- Kitsudo, Masahiro. 2015. *Pāli Texts Printed in Sri Lanka in Sinhalese Characters with Supplementary Information on Related Texts* (Bristol: Pali Text Society).
- Kourilsky, Gregory. 2023. 'Legal Concerns in 16th century Laos. A Preliminary Study of the Gurupadesa', in *Proceedings of the Third International Pali Studies Week Paris 2018*, ed. by Claudio Cicuzza, Materials for the Study of the Tripiṭaka, 18, (Bangkok/Lumbini: Fragile Palm Leaves Foundation/Lumbini International Research Institute), 263–354.
- Kyaw, Pyi Phyo. 2014. 'Paṭṭhāna (Conditional Relations) in Burmese Buddhism', unpublished doctoral dissertation, King's College, London) <<https://kclpure.kcl.ac.uk/portal/en/studentTheses/paṭṭhāna-conditional-relations-in-burmese-buddhism>>

- Law, Bimala Churn. 1933. *A History of Pāli Literature* (Varanasi: Indica Books, repr. 2000).
- . 1952. *The History of the Buddha's Religion (Sāsanaṃsa)* (London: Luzac).
- Nyunt, Peter. 2012. *Catalogue of the Piṭaka and Other Texts in Pāli, Pāli-Burmese, and Burmese (Piṭakat-tō-sa-muiñ)* (London: Pali Text Society).
- . 2014–2016. *A Descriptive Catalogue of Burmese Manuscripts in the Fragile Palm Leaves Collection*, 3 vols, Materials for the Study of the Tripiṭaka, 9–10 (Bangkok/Lumbini: Fragile Palm Leaves Foundation/Lumbini International Research Institute).
- Pakdeekham, Santi. 2021. *Painted Catalogue of Pāli Literature. Uposatha Hall of Wat Thong Noppakhun, Bangkok*, Materials for the Study of the Tripiṭaka, 17 (Bangkok/Lumbini: Fragile Palm Leaves Foundation/Lumbini International Research Institute).
- Pe Maung Tin and Gordon H. Luce. 1923. *The Glass Palace Chronicle of the Kings of Burma* (Rangoon: Rangoon University Press, repr. 1960).
- Pentth, Hans. 1994. *A Brief History of Lanna* (Chiang Mai: Silkworm Books).
- Salomon, Richard. 1998. *Indian Epigraphy: A Guide to the Study of Inscriptions in Sanskrit, Prakrit, and the Other Indo-Aryan Languages* (New York and Oxford: Oxford University Press).
- Sarma, Sreeramula Rajeswara. 2003. 'Words and Alphabetical Numerical Systems in India', in *The concept of Śūnya*, ed. by A. K. Bag and S. R. Sarma (New Delhi: Indira Gandhi National Centre for the Arts, Indian National Science Academy and Aryan Books International), 37–71.
- . 2012. 'The Kaṭapayādi system of numerical notation', *Revue d'Histoire des Mathématiques*, 18.1, 37–66.
- Schnake, Javier. 2018a. 'Letters and Numbers: Protective aspects in the *Vajirasāratthasaṅgaha*', in *Katā me rakkhā, katā me parittā, Protecting the protective texts and manuscripts*, ed. by Claudio Cicuzza, Materials for the Study of the Tripiṭaka, 14 (Bangkok and Lumbini: Fragile Palm Leaves Foundation, Lumbini International Research Institute), 157–195.
- . 2018b. 'Le Dhamma par le jeu d'esprit et de la langue: le *Vajirasāratthasaṅgaha*, texte pāli du Nord de la Thaïlande (XVIIe siècle), vol. III, Étude' (doctoral dissertation, EPHE, Paris).
- . 2021. *Ratanapañña's Vajirasāratthasaṅgaha and Its Tikā* (Bristol: Pali Text Society).
- Shwe Zan Aung. 1912. 'Abhidhamma Literature in Burma', *Journal of the Pali Text Society*, 6, 112–132.
- Siddharatha, R. 1929. *Samgharakkhita's Vuttodaya. A Study of Pali Metre* (India: Sri Satguru Publications, repr. 1981).
- Silva, W. A. de. 1938. *Catalogue of Palm Leaf Manuscripts in the Library of the Colombo Museum*, vol. 1 (Colombo: Ceylon Government Press).
- Skilling, Peter. 2019. 'The Theravaṃsa Has Always been Here: K. 1355 from Angkor Borei', *Journal of the Siam Society*, 107.2, 43–62.

- Skilling, Peter and Pakdeekham, Santi. 2002. *Pāli Literature transmitted in Central Siam: a Catalogue Based on the Sap Songkhro* (Bangkok: Fragile Palm Leaves Foundation).
- Somadasa, K. D. 1996. *Catalogue of the Sinhalese Manuscripts in the Library of the Wellcome Institute for the History of Medicine* (London: Bookcraft).
- Tripitaka Nissayas Publication Committee (TNPC). *Chulasathat sasat 31 khamphi. The Pāli grammars [31 books]* (Nakhon Pathom: CAI Centre, 2008).
- Urakhin, Wiriyaburana. 1966. *108 yan chabap phitsadan*. (Krungthep: Samnakngan Luk So. Thamphakdi, 2509 [1966]).
- Yaem, Praphatthong. 1969. *Phra Khamphi Wachirasaratthasangkhaha* (Krungthep: Rongphim Aksonsamphan).
- Walker, Trent. 2020. 'A Chant Has Nine Lives: The Circulation of Theravada Liturgies in Thailand, Cambodia, and Vietnam', *Journal of Vietnamese Studies*, 15.3, 36–78.
- Wickremasinghe, Martino de Silva. 1900. *Catalogue of the Sinhalese Manuscripts in the British Museum* (London: Gilbert and Rivington).

