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Unravelling the Mystery of the Singapore Stone: A Comparative Analysis with the Calcutta Stone and the Possible Kawi Connection

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Abstract: The Singapore Stone, discovered in 1819, was blown up in 1843 and remains an enigma today. Several studies have suggested the script to be Kawi, a Brahmic script used between the 8th and 16th centuries in Java and other parts of Southeast Asia. The language remains unknown but is thought to be Old Javanese, Sanskrit, or Tamil. There is great historical value in finding out what the script says, and it is the aim of this project to offer deeper insight into this undeciphered inscription. In this paper, an in-depth comparison of the Singapore Stone with the Calcutta Stone (1041 CE), a prominent example of a Later Kawi inscription, is performed. Brief comparisons of the Singapore Stone with other inscriptions are also conducted. Numerous characters on the Singapore Stone are matched to those on the Calcutta Stone. However, the Singapore Stone appears to have a much lower frequency of diacritics and clusters. Such a phenomenon is anomalous and could have hindered decryption efforts thus far. Nonetheless, an identification and comparison of such character signs are attempted. Overall, the two inscriptions are shown to share many stylistic similarities, suggesting that the Singapore Stone could be dated to the Later Kawi period.



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Keywords: Singapore; Singapore Stone; inscription; Kawi; Calcutta Stone; linguistics; decipherment

1. Introduction

The Singapore Stone was a sandstone boulder first chanced upon in June 1819 by labourers clearing forest trees at the mouth of the Singapore River. It was later blown up in 1843, leaving behind several fragments, of which only one is known to be in Singapore. It is displayed at the National Museum of Singapore today (Cornelius-Takahama 2016).

The then resident of Singapore John Crawfurd described the inscription on the stone as illegible in his journal in 1822 (Crawfurd 1828), foreshadowing the difficulties faced by researchers hoping to decipher the inscription in the coming centuries. Various attempts at deciphering this enigmatic stone have dated it to be from the 10th to the 14th century (Ng 2016).

Grammatological comparisons with Pallava, Thai, and Kawi scripts have shown evidence that it is unlikely that the Singapore Stone is written in either of the former two. The Kawi script, selected for comparison due to the Majapahit empire's influence on 14th-century Singapore, seems to have several matching characters. The exact type of Kawi script, as well as the language transcribed, have yet to be pinpointed (Quek and Perono Cacciafoco 2020).

Regarding the language, there remains no consensus. De Casparis (1975) believed that the language was Old Javanese, while Boechari hypothesised that it was Sanskrit (Miksic 1984). More recently, Dr Iain Sinclair claimed to have identified the substring “kesariva”, which could have been part of the word “Parakesarivarman”, a title used by several Chola rulers, suggesting that the language could be Tamil (Zaccheus 2019).

Since the Singapore Stone is believed to be the oldest record of writing found in Singapore (Ng 2016), any progress made towards its decipherment would have much historical value. However, given the degraded nature of the stone, as well as the small number of characters, it remains challenging to extract much meaning from the stone. Figure 1 shows a sketch by Laidlay (1848) of three fragments of the Singapore Stone after it was blown up. The fragments were transported to the Royal Asiatic Society's museum (known today as the Indian Museum) in Kolkata, India for analysis. Afterwards, only Fragment 3 was sent back to Singapore. It is currently displayed at the National Museum of Singapore (Miksic 1984).

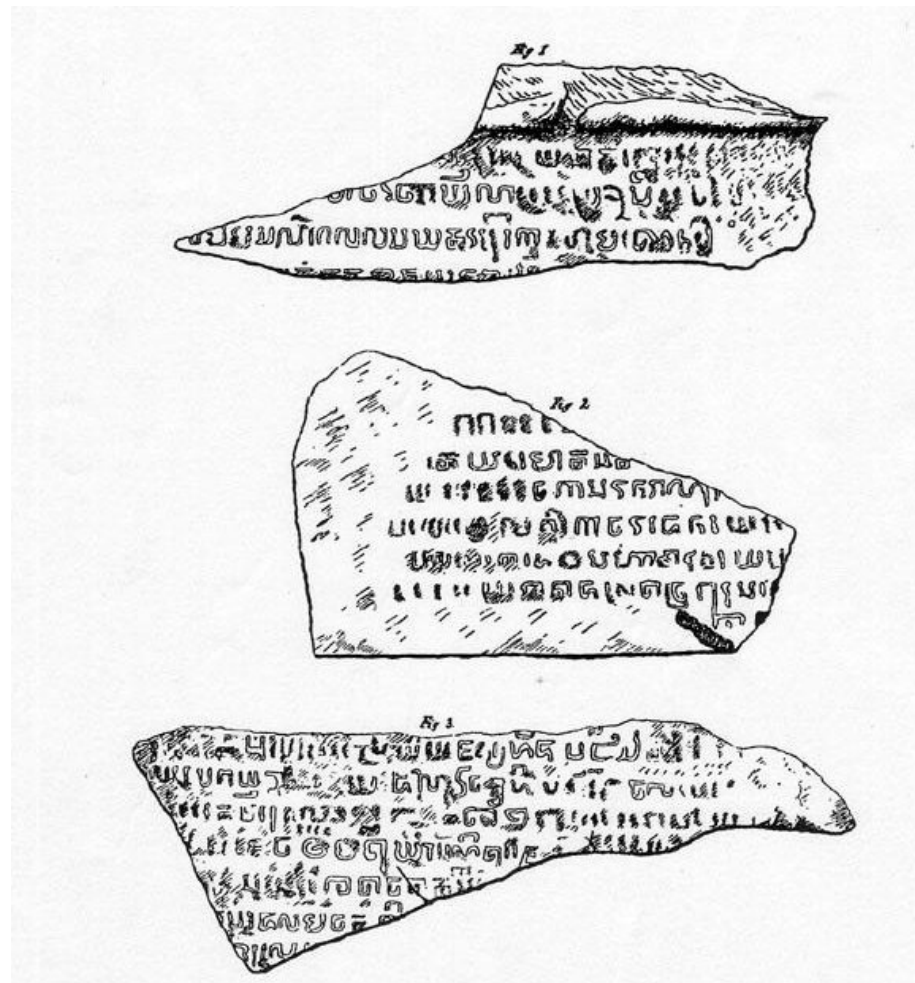


Figure 1. A sketch of three fragments of the Singapore Stone by Laidlay (1848). The fragments, from top to bottom, are referred to as Fragments 1, 2, and 3 in this paper. Fragment 3 is displayed at the National Museum of Singapore.

This paper aims to offer deeper insight into the Singapore Stone through comparisons with other inscriptions, given the evidence pointing to the script being Kawi.

2. Early and Later Kawi Script

De Casparis (1975) roughly divided the Kawi script into an Early Kawi script (c. 750 to 925 CE) and a Later Kawi script (c. 925 to 1250 CE). Early Kawi script can further be categorised into an archaic form, which was used until c. 856 CE, and a standard form, which was used thereafter. He hypothesised that the inscription on the Singapore Stone belongs to the Later Kawi period due to the letters being square, monoline, and upright. He also mentioned that the Singapore Stone should be dated back to the first half of the 10th century if it was from eastern Java. However, in western Java and Sumatra, such a script

continued to be used for centuries afterwards. Thus, attempts at dating the Singapore Stone must be made with caution. Nonetheless, he concluded that the script on the Singapore Stone is almost undoubtedly Later Kawi and should not greatly predate the Majapahit period. Figure 2 summarises different styles of Kawi represented in the form of digital fonts.

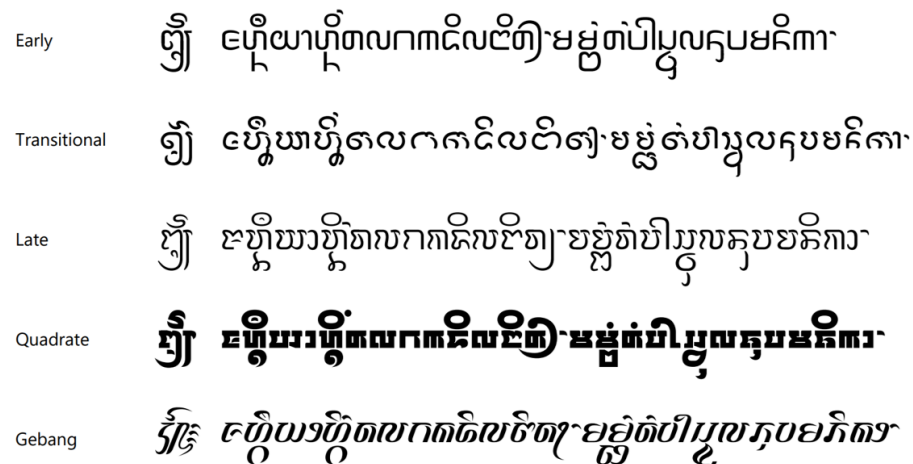


Figure 2. Various styles of Kawi rendered digitally (Perdana and Nurwansah 2020).

The inscription on the Singapore Stone is unlikely to be the standard Early Kawi script due to inscriptions of that script having slightly slanted characters and serifs on certain characters, unlike the Singapore Stone inscription (Quek and Perono Cacciafoco 2020). Their conclusion was arrived at after comparisons with two early Kawi inscriptions, namely the charter of Jurungan, dated 876 CE, and the charter of Humanding, dated 875 CE.

Thus, it would be judicious to conduct grammatological comparisons of the Singapore Stone with inscriptions corresponding to the Later Kawi period.

3. The Calcutta Stone

The Calcutta Stone (also known as the Pucangan Inscription) is a Kawi inscription written in Sanskrit and Old Javanese (Poesponegoro and Notosusanto 2008). It is dated 1041 CE, corresponding to the Later Kawi script. The inscription gives an overview of the life of King Airlangga of the Kahuripan Kingdom. The inscription is called so because it is in the Indian Museum located in Kolkata, India, though it was originally discovered on the slope of Mount Penanggungan in East Java (Kern 1917). A sketch of lines 1–4 (in Sanskrit) of the Calcutta Stone is shown in Figure 3. De Casparis (1975) termed the writing on the Calcutta Stone as a “nearly perfect compromise between functional requirements and aesthetic embellishments”, which is to say that the shapes of the characters are not just for aesthetic purposes, but also serve for easier differentiation between them.

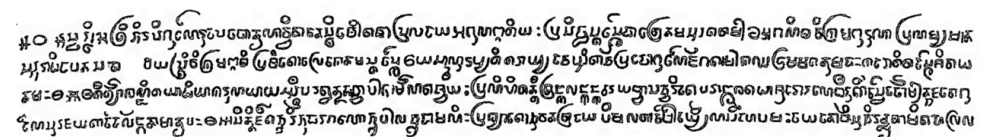


Figure 3. Lines 1–4 of the Calcutta Stone (Kern 1917).

4. Methodology

We compared the Singapore Stone with the Calcutta Stone and various other Kawi inscriptions, matching and identifying numerous characters on the Singapore Stone. We will present an analysis and discussion of notable similarities and differences between the characters.

Firstly, we visually examined the drawings in Figure 1. Visually discernible characters were identified as best as possible, and characteristic features of those characters were noted.

Following that, we identified and matched the characters on the Singapore Stone with those on the Calcutta Stone. Potential characters with diacritics and clusters on the Singapore Stone were also noted and compared with similar characters and clusters, respectively, on the Calcutta Stone. Diacritics are vowel signs that modify the inherent vowel “-A” of consonants. Clusters are merged consonants, with the preceding consonant losing its inherent vowel.

We also looked into the style of the Singapore stone inscription and compared it to that of the Calcutta Stone inscription. This includes a comparison of individual characters, as well as an overall survey of the strokes.

Finally, we attempted to identify characters with diacritics and clusters on the Singapore Stone, and once again, we recorded the similarities and differences.

5. Results and Discussion

5.1. An Overview of the Singapore Stone

A visual examination of the drawing of the three fragments by [Laidlay \(1848\)](#) showed the characters to be sans serif as well as largely squarish and upright. A few characters appeared to have diacritics. As noted by [Crawford \(1828\)](#), the crude workmanship made it hard to determine whether some characters were supposed to be the same or not. Admittedly, this could have also been due to the method employed by [Laidlay \(1848\)](#) to copy the characters. He swept fine charcoal powder over the surface of the stone, which filled the depressions and rendered the inscription more visible. Certainly, the variation in the characters might have been due to the weathering of the stone, but it could very well have been attributed to his technique of sweeping the charcoal powder, a natural variation in his freehand drawing, or simply a combination of all those factors.

5.2. Identification and Comparison of Basic Characters

In Table 1, a comparison was conducted between the Calcutta Stone and the Singapore Stone based on drawings by [Kern \(1917\)](#) and a transcription provided by [Witasari \(2009\)](#).

Table 1. Kawi characters on the Calcutta Stone and possible matches on the Singapore Stone.















Kawi	Calcutta Stone	Singapore Stone
 KA	 Line 1 (KRA)	 Fragment 1
	 Line 2 (KE)	 Fragment 2
	 Line 2	 Fragment 2
 KHA	 Line 4 (KHYA)	 Fragment 3
 GA	 Line 1	 Fragment 1
		 Fragment 3

Table 1.
 Cont.







































































Kawi	Calcutta Stone	Singapore Stone
 JA	 Line 4	 Fragment 3
 NNA	 Line 1 (NNI)  Line 1 (NNAA)  Line 1	 Fragment 1
 TA	 Line 1  Line 1	 Fragment 2  Fragment 3
 DA	 Line 2 (DO)	 Fragment 2  Fragment 2  Fragment 3  Fragment 3
 NA	 Line 1  Line 2	 Fragment 1  Fragment 2  Fragment 2
 PA	 Line 2 (PYA)  Line 3 (PRA)  Line 4  Line 4 (PI)	 Fragment 1  Fragment 3  Fragment 3
 MA	 Line 1  Line 1 (MYA)  Line 4	 Fragment 1  Fragment 3

Table 1. Cont.

Kawi	Calcutta Stone	Singapore Stone
 YA	 Line 2  Line 4	 Fragment 1  Fragment 2
 RA	 Line 1 (RU)  Line 2  Line 2 (RAA)	 Fragment 2  Fragment 2
 LA	 Line 2 (LPA)  Line 4 (LAA)  Line 4	 Fragment 1  Fragment 1  Fragment 3
 WA	 Line 1 (WI)  Line 2 (WI)  Line 4	 Fragment 3  Fragment 3
 SA	 Line 1 (SAA)  Line 2	 Fragment 2
 HA	 Line 3 (HI)	 Fragment 3

Note: Some Calcutta Stone characters have diacritics or are clusters, of which the transliterations are shown in brackets.

Table 1 details the possible characters identified on the Singapore Stone and compares them to those on the Calcutta Stone. Ignoring diacritics, many of the characters bear close similarities (e.g., GA, JA, NNA). Others appear rather similar, though they may differ in their proportions. However, some of the same characters on the Calcutta Stone look rather different from one another, which may hinder accurate comparison. For example, MA (Line 1) appears more squarish, and the middle horizontal line on the left vertical stroke touches the right vertical stroke, while MA (Line 4) appears more horizontally elongated, and the middle horizontal line on the left vertical stroke does not touch the right vertical stroke. Despite the variation in the Calcutta Stone characters, several characters on the Singapore Stone have been found to resemble MA rather closely.

Another point that must be mentioned is the NA on the Calcutta Stone, whose uniqueness was highlighted by [De Casparis \(1975\)](#). It has a downwards-pointing wedge on top, from which extends a vertical stroke downwards that hooks sharply to the left before rising upwards on the left, cutting horizontally through itself at a height of roughly half of itself, and curving down on the right. Such a character is almost perfectly represented several times on the Singapore Stone, although those depicted on the Singapore Stone appear more squarish.

A comparison of NA on other inscriptions (Figure 4) demonstrated that the NA on the Calcutta Stone and those hypothesised to be on the Singapore Stone are indeed unique.

Regardless of the period (Early or Later Kawi) and place of origin (East Java, where the Calcutta Stone may or may not be from) of the depictions of the NA in Figure 4, they seem to be more similar to one another than to the characters on either the Calcutta Stone or the Singapore Stone, with perhaps the exception of that from the Patapan II Inscription. The top half of its character is reminiscent of the wedge found in the characters on the Calcutta Stone and the Singapore Stone, although it appears more rounded, and the vertical stroke extends downwards from both its left and middle. However, it must be remarked that two characters on Fragment 2 of the Singapore Stone (Figure 5) do appear rather like the conventional NA, though their two strokes appear disconnected. Nonetheless, the characters hypothesised to correspond to NA on the Calcutta Stone are still of note.



Figure 4. NA and DA on other Kawi inscriptions ([Perdana and Nurwansah 2020](#)). (left to right) Desa Jeruk Gold Plate, Jurungan Inscription (Karanganyar, Central Java; 876 CE), Air Tabar B Inscription (Bali; 983 CE), Mpu Mada Inscription from Candi Singhasari (Malang, East Java; 1351 CE), Sobhāmṛta Inscription (Sidoarjo, East Java; Majapahit era (1293 – c. 1500 CE) copy of a charter from 939 CE), Patapan II Inscription (Surabaya, East Java; 1418 CE).



Figure 5. Two characters on Fragment 2 of the Singapore Stone that appear more similar to NA found in the inscriptions in Figure 4.

[De Casparis \(1975\)](#) noted a few peculiarities that render the appearance of the characters on the Calcutta Stone less squarish:

1. The strokes are rarely completely straight, some of which appear as a tribhanga-like curve (e.g., RA, left strokes of WA and BA). Such a feature can be observed in some of the characters on the Singapore Stone, which appear to have a similar curve.
2. Descending vertical strokes connecting to a horizontal baseline bend slightly left before the connection (e.g., PA, HA, DA, WA, BA, CA). In the Singapore Stone, this can be somewhat seen in the characters corresponding to PA, HA and WA.
3. Contrasted strokes, which differentiate this and later Javanese types of writing from Early Kawi, are apparent in many descending verticals (e.g., RA, PA, SA, DA). This gives them a brushwork-like appearance, where the verticals thicken at the base. For RA, the hook to the left is reminiscent of a brush being lifted from the paper. This can be somewhat observed in the Singapore Stone characters as well. The hook to the left for RA is evident too, albeit less pronounced.















In Table 1, there are characters on the Singapore Stone that appear more like the DA in other inscriptions (Figure 4) than that on the Calcutta Stone. This discrepancy implies that the Singapore Stone inscription is not identical to that of the Calcutta Stone. Nonetheless, as mentioned earlier, De Casparis (1975) stated that the features of the characters on the Calcutta Stone that have been elaborated on do not solely serve aesthetic purposes; they aid in making the characters more easily recognisable. The Singapore Stone and Calcutta Stone inscriptions do share many stylistic similarities, suggesting that they could be dated to a similar period.

5.3. Characters with Diacritics and Clusters

In addition to looking at basic characters, it is also important to look at characters with diacritics and clusters. A cursory comparison between the Singapore Stone and the Calcutta Stone seems to show a marked lack of such signs on the Singapore Stone. This observation could be explained by the fact that the Singapore Stone was already eroded when it was first discovered before being blown up (Cornelius-Takahama 2016). Thus, the basic characters themselves would already have been challenging to identify, let alone the signs, some of which would have been situated above or below the main lines of the script and could have blended in with the weathered texture, resulting in Laidlay (1848) not picking them up.

Nevertheless, the identification of possible diacritics and clusters on the Singapore Stone was performed and once again compared with the Calcutta Stone (Table 2).

Table 2. Kawi characters on the Calcutta Stone and possible matches on the Singapore Stone.




Kawi	Calcutta Stone	Singapore Stone
 AA	 Line 4 (TAA)	 Fragment 1 (TAA)
	 Line 1 (MAA)	 Fragment 2 (MAA)
	 Line 4 (MAA)	 Fragment 2 (RAA)
	 Line 3 (RAA)	 Fragment 3 (YAA)
	 Line 3 (YAA)	
 Virama/"Killer" sign ("kills" inherent vowel)	 Line 1 (M)	 Fragment 2 (G?)
	 Line 2 (M)	

From Table 2, we see that there are not many confidently identifiable diacritics or clusters in the Singapore Stone. Given the inconsistent nature of the Calcutta Stone script, this is difficult to conclude confidently. For example, two instances of MAA on the Calcutta Stone are shown in Table 2, one of which has MA connected to the diacritic while the other does not. The identified MAA on the Singapore Stone has the basic consonant connected to the diacritic.

In comparison with other Kawi inscriptions, there is a notable lack of characters with diacritics or clusters. This unusual phenomenon could be a reason why the Singapore Stone remains undeciphered to this day. More specifically, the Singapore Stone lacks circles, which are featured in certain vowel signs (e.g., I, II, EU, EUU).

Table 3 summarises other symbols that could be character signs. However, they could not be confidently assigned to any sign.

Table 3. Possible character signs on the Singapore Stone.

Fragment	Character Sign
1	
2	
3	

The ambiguous and poorly defined nature of the character signs in Table 3 could have contributed to the difficulties in deciphering the Singapore Stone.

6. Conclusions

Given the evidence from various research studies suggesting that the script of the Singapore Stone is Kawi, this research paper aimed to offer an even deeper insight via comparison with other Kawi inscriptions, most notably the Calcutta Stone. The Calcutta Stone was chosen for comparison as its script and that of the Singapore Stone both correspond to the Later Kawi period (De Casparis 1975; Quek and Perono Cacciafoco 2020). Indeed, many stylistic similarities were observed, including both the overall shapes of the characters as well as the individual strokes. However, when looking past the basic characters, a glaring lack of diacritics and clusters was found. Some were able to be somewhat confidently assigned and matched with those on the Calcutta Stone, while others could not be. Also, a lack of circles on the Singapore Stone was atypical, as some vowel signs in Kawi have them.

Future work could include a comparison of the Singapore Stone inscription with other Later Kawi scripts from around the 10th century or later. Identification of the ambiguous symbols in Table 3 would also greatly aid decryption efforts.

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