

The Kensington Rune Stone and Pentadic Numbers
Jerry Lutgen
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Introduction

Beginning with the first translations of the Kensington Rune Stone (hereafter KRS) there has been a debate about whether the author of the stone had a proper understanding of how numbers are formed from Pentadic numerals. It has even been suggested that the author was confused on this point because he was a forger. While we can not know the mind of the KRS author with complete certainty, this paper will demonstrate that the author was probably following a very simple and mathematically sound method for creating Pentadic numbers.

If this proposed method was employed by the author of the KRS, then it calls into question recent numerological/cryptographic interpretations of the KRS.

Furthermore, this paper will demonstrate that the method proposed for the KRS is inconsistent with how some commentators speculate that Pentadic numbers were formed on the Spirit Pond Rune Stones (hereafter SPRS).

Assumptions

Over the years there have been several proposals for how the KRS forms numbers using Pentadic numerals. Many of these proposals make use of the following three basic assumptions:

- The KRS uses the following symbol to represent a count of ten: 

(Note: whenever we make reference to the count associated with a rune we will enclose the count in brackets. Therefore the symbol for the rune representing a count of one will be given as [1] and a count of ten will be given by [10]. If these two runes appeared in sequence they would be written as [1] [10])

- The author of the KRS does not understand or chooses not to use the concept of zero.
- The author forms numbers using Arabic placement. That is, reading right to left, a number is formed by numerals representing the count of ones, tens, hundreds, thousands, etc.

This paper will demonstrate that these assumptions are probably correct. Still, most commentators reach faulty or incomplete conclusions about how the KRS forms numbers because they have not fully understood the full implications of these three assumptions.

Table 1. Pentadic Numerals from the “Larsson Papers”

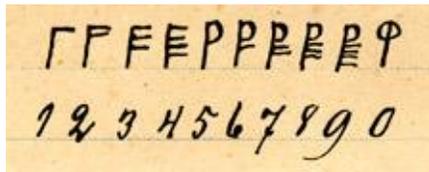


Table 2. Representing Arabic Numbers with Pentadic Numerals

Arabic #	Thousands	Hundreds	Tens	Ones
1	blank	blank	blank	[1]
2	blank	blank	blank	[2]
3	blank	blank	blank	[3]
4	blank	blank	blank	[4]
5	blank	blank	blank	[5]
6	blank	blank	blank	[6]
7	blank	blank	blank	[7]
8	blank	blank	blank	[8]
9	blank	blank	blank	[9]
10	blank	blank	blank	[10]
11	blank	blank	[1]	[1]
12	blank	blank	[1]	[2]
13	blank	blank	[1]	[3]
14	blank	blank	[1]	[4]
15	blank	blank	[1]	[5]
16	blank	blank	[1]	[6]
17	blank	blank	[1]	[7]
18	blank	blank	[1]	[8]
19	blank	blank	[1]	[9]
20	blank	blank	[1]	[10]
21	blank	blank	[2]	[1]
99	blank	blank	[9]	[9]
100	blank	blank	[9]	[10]
101	blank	blank	[10]	[1]
109	blank	blank	[10]	[9]
110	blank	blank	[10]	[10]
111	blank	[1]	[1]	[1]
999	blank	[9]	[9]	[9]
1000	blank	[9]	[9]	[10]
1001	blank	[9]	[10]	[1]
1109	blank	[10]	[10]	[9]
1110	blank	[10]	[10]	[10]
1111	[1]	[1]	[1]	[1]

The “Larsson Papers” and Pentadic Numerals

The discovery of the so-called “Larsson Papers” has served to complicate the debate about how the KRS uses Pentadic numerals to form numbers.

The Larsson Papers are an 1885 document that shows examples of several runes which match nicely with the KRS. As a result a great deal of attention has been paid to how Pentadic numerals have been represented in the Larsson document (see Table 1). We can see from Table 1 that Larsson used the same symbol for [10] as was used on the KRS. However, Larsson seems to have assigned it a count of zero, not ten. Given the way the symbol for [10] was used on the KRS, there seems to be a consensus that it is impossible that the symbol was intended to represent a zero.

A Proposed Method

It appears that a great deal of effort and chiseling expertise went into the creation of the KRS. It seems unlikely that the author, even if a forger, would have plunged into carving this stone without a clear and sound idea of how he was forming numbers. Therefore we should be motivated to discover what method for creating numbers was being employed by the author of the KRS.

The purpose of this section is to show that there is a very simple and mathematically sound method to accomplish this task of forming numbers from Pentadic numerals that is consistent with what we see on the KRS.

It has generally been accepted that the year 1362 was inscribed on the stone using Arabic positional notation. That is, there was a [1] rune in the thousands position, a [3] rune in the hundreds position, a [6] rune in the tens position and a [2] rune in the ones position. In this same way all of the numbers we see on the KRS can easily be read in their Arabic number form (i.e. 8, 22,2,10,10,14,1362) . The proposed method follows this procedure exactly and it produces a unique combination of Pentadic numerals for any Arabic number.

In order to demonstrate the proposed method we show some examples in Table 2 of how to count using Pentadic numerals. The reader may find that some of the entries in this table are counter-intuitive, but with a little practice the reader will find that this method of forming numbers is really quite simple.

The first section of Table 2 shows how to count from 1 to 21 using Pentadic numerals. Counting from 1 to 10 is straightforward. We start with the rune equivalent [1] to an Arabic 1 and come to the rune equivalent [10] to an Arabic 10. Notice that the [10] rune is placed in the ones column. This has to be so because the author does not have a [0] rune to call upon.

Counting from 11 to 19 is also straightforward. We start with the rune for [1] in the ones position and the rune for [1] in the tens position and end with a rune for [1] in the tens position and a rune for [9] in the ones position.

So far so good, but what about the Arabic 20? One might be tempted to say this should be a rune combination of [10] [10]. However using our assumptions this would mean that we have 10 counts of 10, plus 10 counts of one, which would equal one hundred and ten.

If one is thinking about the Larsson papers, another idea might be to place a rune for [2] in the tens column and a [10] in the ones column. Again using our assumptions we see that this would be two counts of ten plus 10 counts of one, yielding the incorrect count of thirty.

It turns out that the way to form an Arabic 20 using Pentadic numerals is to place a rune for [1] in the tens column followed by the rune for [10] in the ones column or [1] [10]. Meaning there is one count of ten plus 10 counts of one, adding up to twenty. Counting then simply continues in this manner to as large a number as one desires. The reader will want to study some examples from Table 2 carefully. The Arabic numbers of 100, 101, 110, 1000, 1010 and 1011 are particularly instructive.

Other Methods for Forming Numbers

This paper has proposed a method for forming numbers from Pentadic numerals that is consistent with the assumption that the author did not use the concept of zero and wanted to write numbers using Arabic positional notation. The key to making this work for the KRS author was to use the [10] rune. Is there a way, other than creating a [10] rune, that one can create numbers from Pentadic numerals using Arabic positional notation without the concept of zero.

Of interest here is the practice of the Cistercian monks. The Cistercians were opposed to the concept of zero on theological grounds. Hence they developed methods for creating numbers that did not depend on the concept of zero.

At least two different methods were employed by the Cistercians. In one case they simply left the column blank where a zero might appear, thereby preserving the notion of "positional notation" in a limited sense. In another case they used a complex set of extensible symbols to represent ever larger numbers starting at one, which did not make any use of positional notation.

The problem with both of these solutions is that they create problems when one wants to perform certain mathematical operations. So, like many other numeric systems from history, these solutions fell by the wayside in the face of the need for solutions that would work in commerce and science.

So, is the solution of using a [10] rune any better, in a mathematical sense, than the two solutions seen to be used by the Cistercians? This solution has an intuitive appeal relative to the other solutions, but it really does nothing toward achieving the mathematical power obtained by fully incorporating the concept of zero.

In fact, it would seem that the Cistercians would have had no problem with the solution of creating a [10] rune in order to form numbers. For those who have proposed that the KRS was in fact authored by a Cistercian monk this should be a comforting thought, despite the fact that we have no direct corroborating evidence that any Cistercians used this solution for forming numbers.

Numerology/Cryptology and the KRS

Some commentators have proposed that the numbers of the KRS should not be taken at face value. Rather, they suggest that the numbers on the KRS should be understood in a cryptographic manner. Furthermore, it has been suggested that these cryptographic numbers can be deciphered using the methods of numerology. There are many numerological schemes. The one thing these schemes often have in common is that letters and words have a numeric value. Therefore one can easily move between numbers and their equivalent letters or words. Additionally some numerological schemes utilize selected mathematical operations that can be performed on these numbers in order to derive the fundamental meaning of the cryptogram.

Currently, the most often discussed example of this type of analysis relating to the KRS is to be found in "The Enigmatist" by Paul Stewart. Very briefly, a large portion of Stewart's analysis of the KRS depends on the fact that the [10] rune can actually be used interchangeably with the Arabic number 10 for numerological purposes. That is, the [10] rune can be thought of as having a 1 in the tens column and a 0 in the ones column. Assuming this to be true, Stewart then goes on to perform a mathematical operation on the Arabic number ten called a reduction. In this operation one adds the digits of the Arabic number together (1 + 0) to get the reduced number of 1. Therefore he reduces the [10] rune to an Arabic 1.

However, this paper has made it clear that the [10] rune is a single numeral or digit. Remember, we do not have any evidence that the author of the KRS knows how to use the number for zero. In this respect [10] is no different than the runes for [1], [2],[3]...[9]. Just like these other numerals it can not be reduced any further. So, if the method proposed in this paper is correct, then the numerological analysis involving the [10] rune as found in the Enigmatist is almost certainly incorrect.

Implications for Understanding the Spirit Pond Rune Stone

One can find many common points between the KRS and the SPRS. In fact many commentators speculate that these stones had the same author or at least that the authors are somehow connected.

One of the key points listed by these commentators is that the KRS and the SPRS both make use of the [10] rune. The question arises, is the [10] rune used in the same way on both the KRS and the SPRS. The article found in Wikipedia entitled "Pentimal Systems" seems to be representative of the thinking of many on this subject.

"The authors of the North American rune stones do not seem to understand the positional notation or the concept of zero. The rune for 10 is used interchangeably for 0, 10, and <1,0> with little consistency. The inscription stone from Spirit Pond contains the sequences ahr:011 and ahr:00,^[4] which have been read as year 1011 and year 1010 respectively. It is unclear if the notation can represent all numbers unambiguously; for example, it may not be possible to distinguish 1010 from 100."

Given our previous discussion of the [10] rune we can see that the Wikipedia article raises some issues. Let's take this one sentence at a time.

"The authors of the North American rune stones do not seem to understand the positional notation or the concept of [zero](#)."

We have shown that the author of the KRS does understand positional notation, but it is agreed that the KRS author does not understand the concept of zero.

"The rune for 10 is used interchangeably for 0, [10](#), and [<1,0>](#) with little consistency"

This is incorrect with regard to the KRS, but it may be true of the SPRS as we will see below.

"The inscription stone from Spirit Pond contains the sequences ahr:011 and ahr:00,^[4] which have been read as year 1011 and year 1010 respectively."

Using the notation developed in this paper we would say that the SPRS contains the rune sequences [10] [1] [1] and [10] [10]. If the authors of the KRS and SPRS are using the Pentadic numerals in the same way then we would convert these sequences to the Arabic numbers 1011 and 110.

"It is unclear if the notation can represent all numbers unambiguously; for example, it may not be possible to distinguish 1010 from 100."

We have seen that the author of the KRS would not have any problems writing numerals that would distinguish between 1010 and 100, or any other numbers for that matter.

So, how do we explain these apparent discrepancies between how the KRS and the SPRS use Pentadic numbers? There are three possibilities:

1. There are two different authors for the KRS and the SPRS and the author of the SPRS may be confused about how to create numbers from Pentadic numerals.
2. The authors of the KRS and the SPRS are one in the same, and this author is confused about how to write certain numbers using Pentadic numerals. Alternatively he may have simply made a mistake when he wrote ahr [10] [10].
3. One commentator* has proposed that the sequences [10] [1] [1] and [10] [10] should not be interpreted directly as numbers. Rather he proposes that they should be thought of as column and row entries into a date table called the Perpetual Calendar. Therefore, [10] [1] [1] would refer to the 10th column and 11th row of this table and [10] [10] should be read as the 10th column and 10th row of this table. This process results in the plausible years of 1401 and 1402. Adding credibility to Nielsen's idea, it has been shown elsewhere that the author of the KRS is familiar with this type of calendar. However we need to note that the KRS author denotes row and column values using a different method. Since the author of the KRS and SPRS do not denote column and row entries into a date table in the same way, this could be further evidence that there may be different authors at work for these two stones.

*<http://www.richardnielsen.org/PDFs/Nielsen%20ESOP%20Article%20SP.pdf>)

Do the KRS and SPRS have the same author? Based on the Pentadic number evidence presented above we can not answer that question with certainty. However, there is at least enough evidence in their use of Pentadic numbers to suggest the possibility that the stones had different authors.

Conclusion

This paper has shown that there is a plausible method by which the author of the KRS could have formed numbers using Pentadic numerals while using Arabic positional notation, but not using a concept of zero. The discussion of the methods employed by the Cistercian monks demonstrates that there are a limited number of ways to effectively form numbers under these constraints.

One important consequence of this paper is that it demonstrates to those making numerological interpretations of the KRS that they must exercise caution in how they form numbers based on Pentadic numeral rune sequences from the KRS and SPRS.

Does this result have any bearing on whether or not the KRS is authentic? This result is not direct evidence that the KRS is authentic. However, this is one more example taken from the stone where we see that the author has acted in a purposeful and knowledgeable manner. Either the KRS is authentic or we are witnessing the work of a very clever forger.