Rambsel's Intuition For Probability

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This example is taken from Rambsel's book[1]. He finds that in Isaiah 53:10 there is an ELS of **ישוע שמי** meaning *Yeshua is my name*. And in the next verse he finds an ELS of **משיח**, *Messiah*. In addition the letter **ש** from the ELS of **ישוע** and the **ש** from **משיח** is shared, constituting the same **ש** in the text. This is illustrated in Figure 1. He concludes:

> This is a very unusual occurrence. Can one calculate the odds of this happening by chance?[2]

54175	ק ח ו א ת ד ו ר ו מ **י** י ש ו ח ח ב י נ ג	**54194**
54195	ז ר מ א ר צ **ח** י י מ **מ** פ ש ע ע מ י נ ג ע	**54214**
54215	ל מ ו ו י ת נ א ת ר **ש** ע י מ ק ב ר ו ו א	**54234**
54235	ת ע ש י ר ב מ ת **י** ו **ע** ל ל א ח מ ס ע ש ה	**54254**
54255	ו ל א מ ר מ ה ב פ י **ו** ו י ה ו ה ח פ צ ד	**54274**
54275	ב א ו ה ח ל י א מ ת **ש** י מ א ש מ נ פ ש ו	**54294**
54295	י ר א ה ז ר ע י א ר **י** ב י מ י מ ו ח פ צ	**54314**
54315	י ה ו ה ב י ד ו י צ ל ח **מ** ע מ ל נ פ ש ו	**54334**

Fig. 1. Code array for the key words **ישוע שמי**, meaning *Yeshua is my name* and **משיח**, meaning *Messiah* in Isaiah 53. Notice the shared **ש**.

We begin by understanding the protocol under which we can calculate this probability. Let us consider an experiment using a text of length N characters. Our text population is the ELS random placement text population.

Just to be simple, at first we suppose that there are two key words with no letters in each of the key words occurring more than once. And we suppose that there is exactly one common letter λ that occurs in both key words and we let n be the number of times that the letter λ occurs in the text. Suppose that in the given text, the number of ELSs that the first key word has is m_1 and the number of ELSs that the second key word has is m_2. We wish to determine the probability that if we were to choose a text from the text population at random, we would find in the randomly selected text i instances in which the letter λ of some ELS of the first key word and some ELS of the second key word occur in exactly the same text character position.

We assume that whenever this shared letter event occurs among ELSs of the same key word, that it happens only a pair at a time. That is, we assume that there are never more than 2 ELSs of the same key word that have some common letter located at the same character position in the text.

We analyze this situation as one in which there are 3 distinguishable classes of indistinguishable events, each event in one class being distinguishable from an event in another class and each event located at its own unique place from among the n places. There are $m_1 - i$ indistinguishable class 1 events in which the common letter λ in instances of the first key word is located in a text position that does not overlap with any of the text positions of the common letter λ in instances of the second key word. There are $m_2 - i$ indistinguishable class 2 events in which the common letter λ in instances of the second key word is located in a text position that does not overlap with any of the text positions of the common letter λ in instances of the first key word. And there are i indistinguishable class 3 events in which the common letter λ in each instance of the first key word is located in the same text position as the common letter λ of a distinct instance of the second key word.

To determine the probability of such i ELSs of shared letters, we compute the ratio of the number of equally likely ways that i shared letters can happen to the total number of equally likely ways all possible events can happen.

The number of ways that $m_1 - i$ indistinguishable events of class 1, $m_2 - i$ indistinguishable events of class 2, and i indistinguishable events of class 3 can distribute themselves in n places with each place constrained to hold at most one event is given by[4]:

$$\frac{n!}{(m_1 - i)!(m_2 - i)!i!(n - (m_1 - i) - (m_2 - i) - i)!}$$

The number of ways that m_1 indistinguishable events for word 1 can distribute themselves in n places, each place constrained to hold at most one event is

$$\frac{n!}{m_1!(n - m_1)!}$$

Likewise, the number of ways m_2 indistinguishable events for word 2 can distributed themselves in n places with each place constrained to hold at most one event is

$$\frac{n!}{m_2!(n - m_2)!}$$

The total number of ways the m_1 class 1 events and the m_2 class 2 events can distribute themselves among n places with each place constrained to hold at most one class 1 event and one class 2 event is

$$\frac{n!}{m_1!(n - m_1)!} \frac{n!}{m_2!(n - m_2)!}$$

The ratio of

$$\frac{n!}{(m_1-i)!(m_2-i)!i!(n-(m_1-i)-(m_2-i)-i)!}$$

to

$$\frac{n!}{m_1!(n-m_1)!}\frac{n!}{m_2!(n-m_2)!}$$

is the probability, p, of i shared letter events. After forming the ratio and simplifying, there results:

$$p = \frac{(n)_{n-m_1-m_2+i}(m_1)_{m_1-i}(m_2)_{m_2-i}}{i!(n)_{n-m_1}(n)_{n-m2}} \tag{1}$$

Using the Isaiah text, we find that if we search from a minimum skip of 2 to a maximum skip of 1000 there are $m_2 = 1,387$ ELSs of the key word משיח and $m_1 = 1$ ELSs of the key word ישועשמי. Isaiah has $n = 3,631$ occurrences of the letter ש. By equation 1, with $i = 0$, the probability that say the first ש of ישועשמי would be shared with the ש of משיח in no code instances is 0.6180. And by taking $i = 1$, the probability that there would be one instance of a shared ש is 0.3820. Since, ישועשמי has two שs, we would set $n = 3,631$, $m_1 = 1$, $m_2 = 2774$, and now the probability that there would be one instance for which one of the two שs of ישועשמי would be shared with a ש of an instance of a code for משיח nearly doubles to 0.7640. The shared שׁ, is expected, rather than unexpected.

Next we take another example from Rambsel's book. Rambsel[3] finds an ELS of the phrase ישוע יכול, *Yeshua is able*, beginning from the first י in the Torah and having a skip interval of 521. This code array is illustrated in Figure 2. Since this is not a particular religious doctrinal phrase, we suspect that the protocol Rambsel followed is one in which the search was begun from the first י of the Torah looking at all skip intervals until an ELS of ישוע is found. Then he continued the search looking for any four letter word that could be found following the ELS by continuing with the same skip interval. We want to compute the probability of this kind of event.

Since the first letter י is begun at a fixed position, the only letter uncertainties are with respect to the letters שוע. For any given list of three positions, the probability of the letter sequence שוע is

$$0.051164 \times 0.100106 \times 0.036909 = 1.8904 \times 10^{-4}$$

Suppose that this search goes from a skip interval of 2 to a skip interval of 1000. In this case the expected number m of times that a שוע will be found as an ELS is

$$m = 999 \times 1.8904 \times 10^{-4} = 0.1888$$

Once an ELS is found, we continue on with the next four letters at the same skip interval looking for a word spelled out in forward or reversed order. To

40	ב ר א ש **י** ת ב ר א א ל ה י מ א ת ה ש מ י מ ו א ת ה א ר צ ו ה א ר צ ה י ת ה ת ה ו ו	**0**
561	א ר צ ד **ש** א ע ש ב מ ז ר י ע ז ר ע ל מ י נ ה ו ו ע צ ע ש ה פ ר י א ש ר ז ר ע ו ב ו	**521**
1082	מ ב י ט **ו** ב ו י ב ר כ א ת מ א ל ה י מ ל א מ ר פ ר ו ו ר ב ו ו מ ל א ו א ת ה מ י מ	**1042**
1603	ו ל כ ל **ע** ו פ ה ש מ י מ ו ל כ ל ר ו מ ש ע ל ה א ר צ א ש ר ב ו נ פ ש ח י ה א ת כ ל	**1563**
2124	ה ו ה א **ל** ה י מ מ נ ה א ד מ ה כ ל ע צ נ ח מ ד ל מ ר א ה ו ט ו ב ל מ א כ ל ו ע צ ה	**2084**
2645	ו א ש מ **ו** ו י ק ר א ה א ד מ ש מ ו ת ל כ ל ה ב ה מ ה ו ל ע ו פ ה ש מ י מ ו ל כ ל ח	**2605**
3166	י י ת מ **כ** א ל ה י מ י ד ע י ט ו ב ו ר ע ו ת ר א ה א ש ה כ י ט ו ב ה ע צ ל מ א כ ל	**3126**
3687	מ י ח י **י** ב ו א י ב ה א ש י ת ב י נ כ ו ב י נ ה א ש ה ו ב י נ ז ר ע כ ו ב י נ ז ר	**3647**

Fig. 2. Code array showing the phrase ישוע יכול, meaning *Yeshua is able* beginning from the first י in Genesis. The key word ישוע is spelled out in forward order and the key word יכול is spelled out in reversed order.

determine the probability that such a word would be found we created a four letter word Torah lexicon. There are $22^4 = 234,256$ distinct possible 4 letter sequences where each letter could be one of 22 possible characters. Of these 234,256 possible 4 letter sequences, only 10,004 distinct four letter words occur in the Tanach. If we use these 10,004 words as our four letter word lexicon, and if we assume that each letter is drawn independently[1] from a population of letters having the probability distribution of letters in the Tanach, then the observed probability is 0.116849 that a four letter sequence is one of the 10,004 four letter words of Torah. If we allow the sequence to be checked both in forward and backward order, then the probability is just less than double[2] 0.233665 that forwards or backwards it appears in Torah. And of course, if we use a larger lexicon, the probability increases.

The expected number of times that we would find a שוע after the given י, and then find some four letter word from the Torah lexicon is then

$$M = 999 \times 1.8904 \times 10^{-4} \times 0.235665 = 0.0445$$

Assuming that the number of times that we would observe such an event is Poisson distributed with mean 0.0445, we find that the probability of zero finds is 0.956 and the probability of at least one find is 0.044. This probability is small but not so small as to make the event of such an event unusual, especially since the protocol of the search was not stated ahead of time without peeking. For example, if the searcher would not have found a code instance starting from the first י, would the searcher then proceed to start from the second, third, or fourth י. If so, this probability would nearly double, triple, and quadruple.

[1] For the Torah text, the hypothesis of statistical independence between a pair of letters in any skip interval of 10 or greater cannot be rejected at the 1% significance level.

[2] If there were no words in the lexicon in which their reverse was also in the lexicon, the probability would be exactly double.

Finally, just to show the insignificance of these "one of a" kind of finds, we take one more example to stand against the previous two instances. We will consider looking for Torah codes of the following sentences: ישוע משיח שקר, meaning *Yeshua is a false messiah*, שמי ישוע meaning *My name is Yeshua*, and שמו ישוע, meaning *His name is Yeshua*. And we will look for these codes in Deuteronomy chapter 13, the chapter in Torah that discusses false prophets. This chapter has a text length of 1,269 characters. The letter probabilities for this text segment is given in Table 1.

Letter	Probability
א	0.120690
ב	0.055172
ג	0.000000
ד	0.027586
ה	0.100000
ו	0.144828
ז	0.000000
ח	0.027586
ט	0.000000
י	0.079310
כ	0.051724

Letter	Probability
ל	0.079310
מ	0.093103
נ	0.031034
ס	0.006897
ע	0.024138
פ	0.010345
צ	0.003448
ק	0.006897
ר	0.041379
ש	0.024138
ת	0.072414

Table 1. Lists the letters and their probabilities as they occur in Deuteronomy Chapter 13, the section on the false prophets in Torah.

Our population of texts will be the set of all texts which are the letter 1,269! permutations of this Torah text chapter. If we choose a text from this population at random, we wish to determine what would be the probability of finding at least one ELS of each of the five key words: שקר, משיח, שמו, שמי, and ישוע. We will limit our search to skip intervals from 2 to 422, since the largest skip interval a four character word can have is 422 in a text segment of 1,269 characters.

Table 2 gives the probability of finding each of the character sequences in a given set of positions obtained by multiplying the individual letter probabilities. To determine the number of possible code placements for a key word of length L letters in a text of N characters with a minimum skip interval of D_{min} and a maximum skip interval of D_{max} we reason as in Equation 3.

$$\begin{aligned} M &= \sum_{d=D_{min}}^{D_{max}} [N-(L-1)d] \qquad (2) \\ &= (D_{max}-D_{min}+1)[N-\frac{(L-1)(D_{max}+D_{min})}{2}] \end{aligned}$$

Key Word	Probability p	Number Of Code Placements M	Expected Number Of Occurrences $m = pM$	Probability Of One Or More Occurrences $1. - e^{-m}$
ישוע	1.244349×10^{-5}	532,986	6.632	.99868
שמו	2.889817×10^{-4}	711,490	205.607	1.00000
שמי	2.625101×10^{-4}	711,490	186.773	1.00000
משיח	6.205912×10^{-6}	532,986	3.308	.96341
שקר	3.207656×10^{-5}	711,490	22.822	1.00000

Table 2. Gives the probability of finding each character sequence in a prespecified set of positions, the number of possible times a code instance could occur, the number of times a code instance is expected to occur and the probability that at least one code instance will occur in a text of length 1,269 characters and shere the maximum skip interval is 422.

And if we search using both positive and negative skip intervals, then the number of possible placements is double that given in equation 3.

$$M = (D_{max} - D_{min} + 1)[2N - (L - 1)(D_{max} + D_{min})] \tag{3}$$

To determine the expected number of occurrences we need only multiply the probability that the letters of the key word occurs in a given placement with the expected number of its occurrences. To determine the probability of at least one occurrence we assume the poison distribution.

$$q = \frac{\exp(-m)m^k}{k!} \tag{4}$$

Since the probability of at least one occurrence is 1 minus the probability of no occurrences, we find from equation 4 that the probability of at least one occurrence is

$$1 - \exp^{-m}$$

where m is the expected number of occurrences. And this is how the last column of Table 2 is computed. Finally, to compute the probability of observing at least one occurrence of each of the five key words in code in Chapter 13 of Deuteronomy we multiply together each of the probabilities of at least one occurrence.

$$p = 0.99868 \times 1.0000 \times 1.0000 \times 0.96341 \times 1.0000 = 0.96214$$

So if we were to select at random a text from our population of texts, approximately 24 out of 25 times we would find at least one occurrence of each of the key words. It is almost a certainty.

Indeed, upon examination of the Torah text, we find just what we expected. Table 3 lists the number of times we actually find a code instance of each of the four key words. A comparison with these observed numbers with the expected number of occurrences tabulated in Table 2 shows good agreement.

Key Word	**Observed Number Of Occurrences**
ישוע	6
שמו	186
שמי	166
משיח	3
שקר	22

Table 3. Lists the observed number of times each of the five key words are found in code in Chapter 13 of Deuteronomy.

And if we choose a text population whose frequencies of letter occurrences is given by Table 4, then the probability that a text of length 1,269 characters would contain a Torah code of the specified key words is 0.995787. This probability is higher than that obtained by using the letter frequencies of Table 1 because the probability of a ש in the passage of Deuteronomy chapter 13 is much lower than in the full Torah text and each of the five key words of the query has a ש.

Letter	**Probability**
א	0.088774
ב	0.053624
ג	0.006919
ד	0.023070
ה	0.092045
ו	0.100106
ז	0.007211
ח	0.023585
ט	0.005918
י	0.103446
כ	0.039264

Letter	**Probability**
ל	0.070766
מ	0.082314
נ	0.046351
ס	0.006014
ע	0.036909
פ	0.015764
צ	0.012998
ק	0.015403
ר	0.059464
ש	0.051164
ת	0.058890

Table 4. Lists the letters and their probabilities as they occur in Torah.

We can also choose a text population that consists of all contiguous text segments of 1,269 characters in the Torah itself. There are some 304,805 - 1,269 + 1 = 303,537 such text segments. In this text population we observe that 293,327 segments contain each of the specified key words in code. Hence, the probabilility that a text segment of length 1,269 characters chosen at random from the Torah text would contain a Torah code of the specified key words is 293,327/303,537=.966366.

Figure 3 shows the code array for the shortest length passage in Chapter 13 of Deuteronomy having at least one instance of each of the key words. Notice that there are some shared letters. The ש of משיח is shared with two different instances of שמו and the ש of שקר is shared with one instance of שמו. Perhaps this is unusual. Let us compute the probabilities of this degree of shared letters in this shortest length passage.

Key Word	**Observed Number Of Occurrences**
ישוע	1
שמו	12
שמי	7
משיח	1
שקר	1

Table 5. Lists the observed number of times each of the five key words are found in code in the shortest length passage in Deuteronomy having at least one code instance of each of the four key words.

Table 5 lists the observed number of times each of the key words occurred in code in this shortest length passage of 290 characters. The passage contains exactly 7 שs. We observed 12 occurrences of the code instances for the key word שמו. Table 6 tabulates these instances. We see from Table 6 that although there are 12 instances of the key word שמו as an ELS, there are multiple times that these instances share the same ש. The ELS instances having skip intervals of 71,65, and 60 all use the ש located in character 65 of Deuteronomy 13:4. The ELSs having skip intervals of 87 and 104 both use the ש located in character 14 of Deuteronomy 13:15. The ELSs having skip intervals of 72 and 77 both use the ש located in character 56 of Deuteronomy 13:3. The ELSs having skip intervals of 27 and 36 both use the ש located in character 65 of Deuteronomy 13:4. And the ELSs having skip intervals of 98, 80, and 11 each use their own ש. So we see that each of the 7 שs in this section participate in some code instance of שמו. Hence the probability is 1 that am ELS of משיח would share a ש with some ELS of שמו. Likewise, the probability is 1 that an ELS of ישוע would share a ש with some ELS of שמו.

272655	בקרבכנביאאוחל**מ**חלומ	272638
272673	ונתנאליכאותאומופתו	272656
272691	באהאותוהמופתא**ש**רדבר	272674
272709	אליכלאמרנלכהאחריאל	272692
272727	הימאחר**י**מאשרלא**י**דעתמ	272710
272745	**ו**נעבדמלאתשמעאלדברי	272728
272763	הנביאההואאואל**ח**ולמה	272746
272781	חלומההואכי**מ**נסה**י**הוה	272764
272799	אלהיכמאתכ**מ**לדעתהישכ	272782
272817	מאהבי**מ**אתיהוהאלהיכמ	272800
272835	בכללבבכמובכלנפ**ש**כמא	272818
272853	חרייהוהאלהיכמתלכוו	272836
272871	אתותירא**ו**ואתמצותיות	272854
272889	שמ**ר**וב**ק**לות**ש**מעו**ו**אתו	272872
272907	תעבדו**ו**בותדבקונוהנב	272890
272925	יאההואאוחלמהחלומהה	272908
272943	ואיומתכידברסרה**ע**ליה	272926

Fig. 3. Code array of shortest passage in Chapter 13 of Deuteronomy having at least one instance of each of the key words משיח, שמו, ישוע, שקר, and for an unexpected bonus shows שמי. Notice that the ש of משיח is shared with the ש of two different instances of שמו. The ש of שקר is shared with the ש of an instance of שמו. And the ש of ישוע is shared with the ש of שמי. These words can be grouped to form the sentences ישוע שמי, meaning *Yeshua is my name*, שמו ישוע, *Yeshua is his name*, and ישוע משיח שקר, meaning *Yeshua is a false prophet.*

Word	Skip	Beginning Location	Ending Location
ומש	71	Deut 13:2+25	Deut 13:4+65
ומש	65	Deut 13:2+37	Deut 13:4+65
ומש	60	Deut 13:3+6	Deut 13:4+65
שמו	87	Deut 13:3+15	Deut 13:5+27
שמו	104	Deut 13:3+15	Deut 13:5+61
שמו	98	Deut 13:3+47	Deut 13:6+12
ומש	72	Deut 13:3+56	Deut 13:5+38
ומש	77	Deut 13:3+56	Deut 13:5+48
שמו	80	Deut 13:4+4	Deut 13:5+63
שמו	27	Deut 13:4+65	Deut 13:5+18
שמו	36	Deut 13:4+65	Deut 13:5+36
שמו	11	Deut 13:5+38	Deut 13:5+60

Table 6. Lists each of the code instances of the key word שמו observed in the shortest passage in Chapter 13 of Deuteronomy containing at least one code instance of each of the four key words.

We can conclude that if we search hard enough, over a long enough text segment, we certainly expect to find instances of groups of key words as ELSs and even expect to observe some shared letter finds. These are not unusual and finding them in a passage of 1,269 letters is not surprising and no cause to draw the conclusion that the Torah text is a statistically unusual text.

0.1 Misadvertising

As illustrated in the previous section, the probability of observing a Torah code instance is relative to the experiment which is done to find it. Change the experiment and the probability changes. This means that it is easy to advertise an insignificant result as a significant result by finding a Torah code in one kind of experiment but advertising that it was found with another experiment.

To illustrate this, we take our previous example whose query consisted of the key words משיח, שמו, שמי, שקר, and ישוע. Suppose that we do the experiment as before using the text consisting of chapter 13 of Deuteronomy. After we find the ELSs, we misadvertise, saying that we were looking only in the text segment starting in verse 2 of Deuteronomy, chapter 13, and continuing through verse 5, a text segment of length 400 characters using a maximum skip interval of 133. In this case, using the letter frequencies of Table 1, the probability of observing a Torah code corresponding to the query changes to 0.11796. And had the span of our Torah code been smaller, say 150 characters, and we misadvertised that we searched, using a maximum skip interval of 50, over this precisely same text interval of 150 characters that just happened to contain the ELSs we previously found, then the probability of observing such an event in a text randomly selected from the population of texts is 0.00895.

References

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4. William Feller, *An Introduction to Probability Theory and Its Applications* (New York: John Wiley and Sons, 1968), p. 41.