Comparing Axis Compactness Measures

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Introduction

Suppose a code has been encrypted into a text. Given the text, we are given the task of decrypting it. Not knowing the encryption technique, how do we go about finding it and then decrypting the text? The first step is to determine consistent patterns in the cipher text that are not random. The second step is to hypothsize and then test encryption techniques that are consistent with these non-random patterns. Steps one and two iteratively change and are repeated until either the task is solved or the task is given up.

Torah codes are an instance of the above decrypting problem with some differences. We know something about the kind of encryption. If the encryption were 2D, then the Torah text is wrapped around a cylinder of a given size and ELSs of the key words that are being encrypted will be situated in compact meetings. If the encryption were 3D, then the Torah text is wrapped around a torus. A torus can be generated as the surface of revolution of a circle moved around a circle and it is thus characterized by two radii. One radius is the radius of the cylinder generated by the first circle. The second radius is the radius of the circle the first circle is revolved around. The circumference of the second circle is the length of the cylinder as it is bent to bring its beginning to touch its ending, thereby making the torus. The discussion here is limited to 2D.

To determine whether there is a non-random pattern, we must use methods of probability. We must describe an event and describe a control population where the kind of event we named occurs only by random chance. Then we must determine the probability that the described event occurs in the control population. If the event we named has sufficiently small probability of occuring in the control population, and if this event occurs in the Torah text, then we have evidence that the event is not one that occurs in the Torah text by chance.

In the case of Torah codes, the event is described by a list of a priori specified key words, a protocol for searching for ELSs, a criteria specifying when ELSs are resonant to a cylinder size and a compactness measure to evaluate the compactness of the meetings of the ELSs. In this report we explore the axis protocol in the context of the ELS random placement control population, a population we call the monkey text population. And in this context we explore six different compactness measures.

If everything else remains constant and the compactness measure changes, then the event changes. The protocol we explore here is called the axis protocol. The experiment consists of a given key word set, axis protocol, and compactness measure by which the experiment is conducted. The experiment produces a table having one ELS for each key word and the table has a compactness value. The event is about experiments producing a compactness value equal to or better than that produced by the Torah text. The fraction of time that an experiment using the monkey text population can produce a compactness value equal to or less than the compactness value produced by the Torah text is called the p-value of the experiment. Small p-values are indicative that something non-random is occurring in the Torah text.

Axis Protocol

In the axis protocol one key word is designated as the axis key word. The axis key word has its own ELS search specification and its own resonance specification. All the non-axis key words have a non-axis word ELS search specification and resonance specification.

An ELS search specification can be of three kinds:

(1) set the maximum skip of the ELSs for a key word to be so that the expected number of ELSs equals a user specified expected number for a monkey text population that is a random letter shuffle text population;
(2) set the maximum skip for an ELS to be the maximum skip possible;
(3) set the maximum skip to a specified maximum.

The resonance specification for a non-axis key word can be of two kinds:

(1) set the maximum row skip and column skip an ELS can have on a cylinder;
(2) one of the row skip or column skips must be zero and the other non-zero;

The resonance specification for the axis key word is similar to the resonance specification for the non-axis key word, but in addition, the axis ELS must have a minimum row skip greater than 0 on its resonant cylinder.

Axis Compactness Measure

Given any table, the first five axis compactness measure sums up the pairwise compactnesses of each the non-axis ELSs with the axis ELS. The pairwise compactness can be one of five kinds.
(1) the area of the bounding box;
(2) the half perimeter of the bounding box;
(3) the maximum Euclidean distance between pairs of table positions from the axis ELS to the non-axis ELS;
(4) the maximum city block distance between pairs of table positions from the axis ELS to the non-axis ELS;
(5) the minimum Euclidean distance between pairs of table positions from the axis ELS to the non-axis ELS.

For each pair consisting of the cylinder size and a resonant ELS of the axis ELS keyword, the ELS of each resonant non-axis key word is found that has the smallest pairwise compactness with the axis ELS. The compactness score for the table is the sum of these pairwise compactnesses. Thus for each cylinder size and each ELS of the axis keyword there results a score. The table having the smallest score is the one selected.

A sixth compactness measure is based on (3) the maximum Euclidean distance between pairs of tables positions from the axis ELS to the non-axis ELS. For a given axis ELS and given cylinder size, the closest non-axis ELSs are found using (3). The total compactness measure is formed not from the sum of the pairwise compactnesses, but formed from the area of the table that bounds the non-axis and axis ELSs.

Comparisons

We do four comparisons. the first on a key word set related to the murder of Elazar Abu Chatzirah, the second related to Nibiru and the comet Elenin, the third on the Palestinian state in 5771 and the fourth on the terrorist

Al Awlaki who was killed by an American drone.

We find that for these key word sets, the best compactness measure appears to be the distmax measure, followed by the half perimeter. The area and the distmin measures were the worst. For the Abu Chatzirah experiment the distmax compactness measure produced a p-value of 3.5/1000 and the area measure produced a p-value of 80.5/1000. For the Elenin experiment, the distmax compactness measure produced a p-value of 9/1000 and the distmin compactness measure produced a p-value of 32.5/1000.

It is interesting that the measure used by the Witztum, Rips, and Rosenberg was the distmin measure and an area-like measure, but not defined in accordance with the axis protocol as described here, is the one used for all the tables in the torahcode.us website. However, a direct comparison between the smallest table area measure used in torahcode.us cannot be made because the ELS search protocols are different. The axis ELS search protocol allows different ELS search protocols for axis ELSs and non-axis ELSs. The smallest table area measure used in torahcode.us does not distinguish an axis key word and there is just one ELS search protocol.

Elazar Abuchatzirah

We use the following key word set related to the murder of Elazar Abu Chatzirah by Asher Dahan in 5772. This key word set was established by Rabbi Glazerson and Professor Haralick.

פלא	התשעב
אשר	בבא
דהן	אלעזר
רצח	איש

Key words

We set the expected number of ELSs for the axis key word to be 100 and the resonance specification to be a maximum of a rowskip of 2 and a maximum column skip of 2. For the non-axis key words, the expected number of ELSs is set to 200 and the resonance specification is set for a maximum rwo skip of 7 and a maximum column skip of 7.

Using the area of the bounding box formed by a pair a ELSs, for the pairwise compactness, and the sum of the pair compactnesses as the total compactness, the following table results.

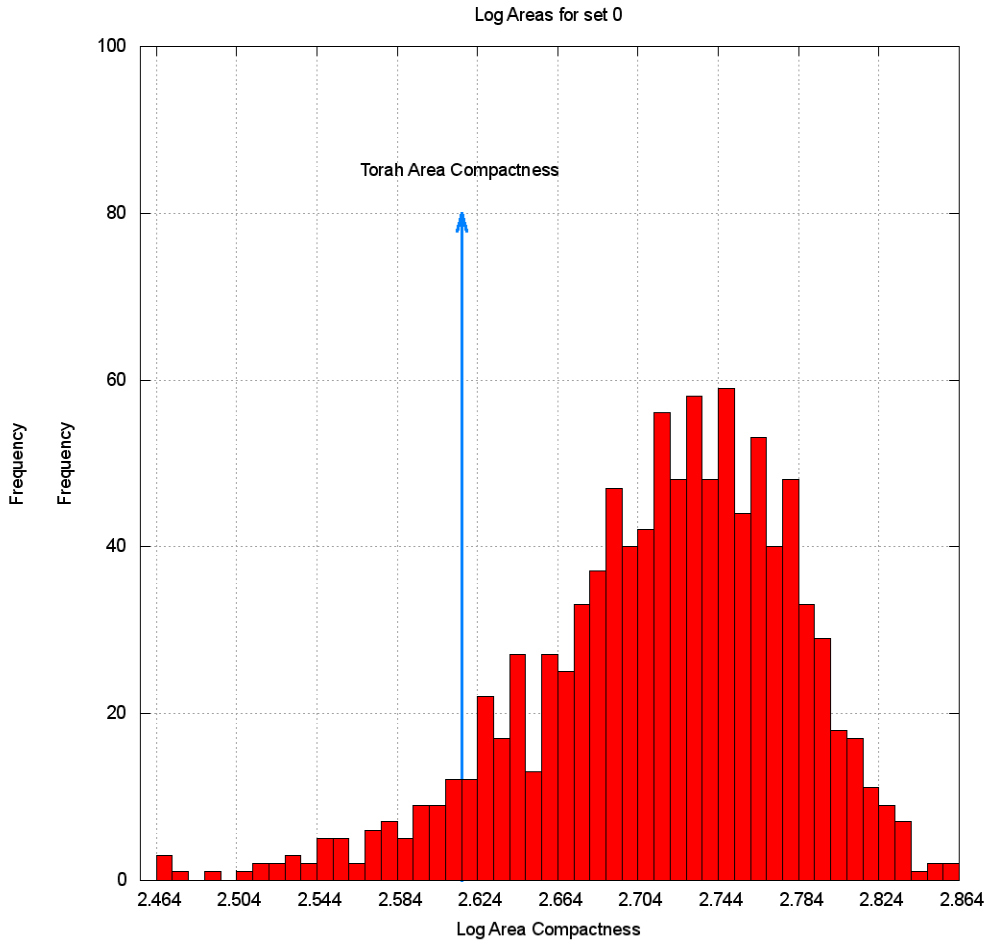
Cylinder size 57 Area Compactness

Key Word	Skip	Rowspan	Colspan	Area
התשעב	57	5	1	5
בבא	-3	5	7	35
אלעזר	1	8	6	48
איש	-2	9	11	99
פלא	4	10	9	90
אשר	1	7	7	49
דהן	5	5	11	55
רצח	-1	6	6	36

Table of Pairwise Area Compactnesses

The total compactness score is the sum of the area compactnesses which for this table is 417. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 80.5/1000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, the ELSs in this best table for **בבא** , **אלעזר** and **רצח** had the minimal area compactness to the axis ELS **התשעא**.

A histogram of the base 10 logs of the scores for the Torah text and each of the monkey texts is shown below.



Using the perimeter of the bounding box formed by a pair a ELSs, for the pairwise compactness, the following table results. This is the same table as the one found using the area as the pairwise compactnesses.

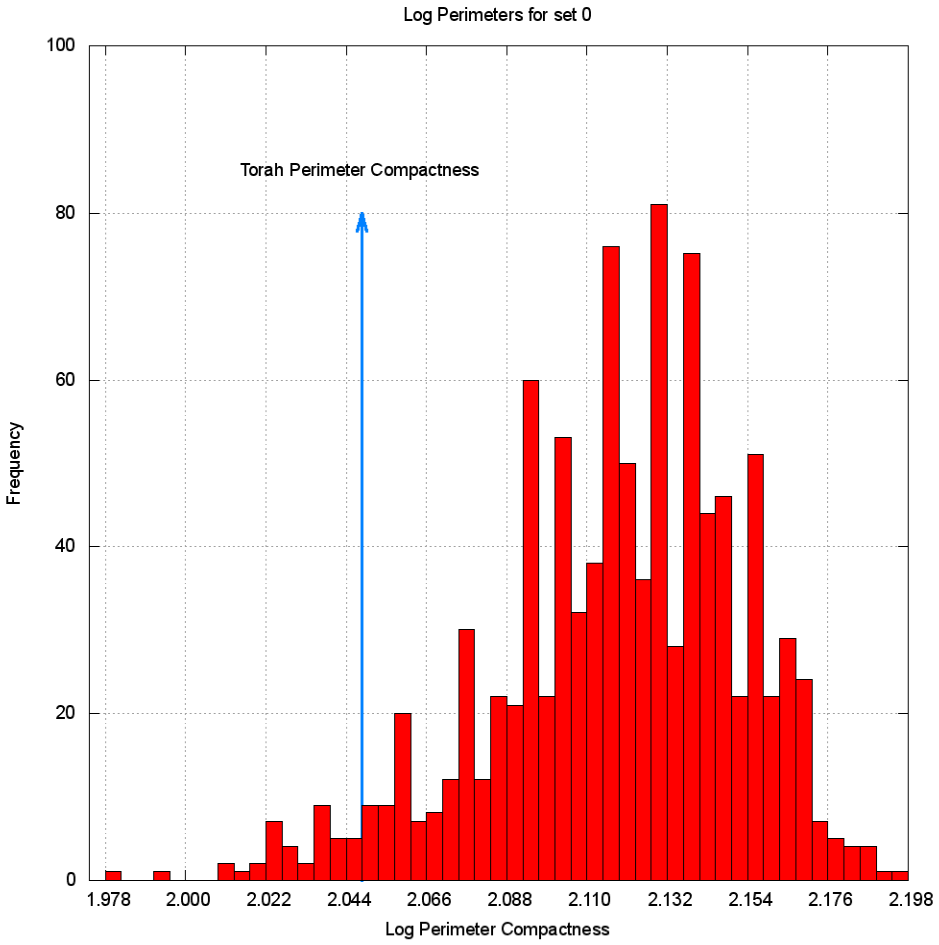
Cylinder size 57 Perimeter Compactness

Key Word	Skip	Rowspan	Colspan	Half Perimeter
התשעב	57	5	1	6
בבא	-3	5	7	12
אלעזר	1	8	6	14
איש	-2	9	11	20
פלא	4	10	9	19
אשר	1	7	7	14
דהן	4	7	9	16
רצח	-1	6	6	12

Table of Pairwise Perimeter Compactnesses

The total compactness score is the sum of the half perimeter compactnesses which for this table is 113. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 43.5/1000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, the ELSs in this best table for **בבא** , **אלעזר** and **רצח** had the minimal half perimeter compactness to the axis ELS **התשעא**.

A histogram of the base 10 logs of the scores for the Torah text and each of the monkey texts is shown below.



Using the max distance formed by a pair a ELSs, for the pairwise compactness, the following table results.

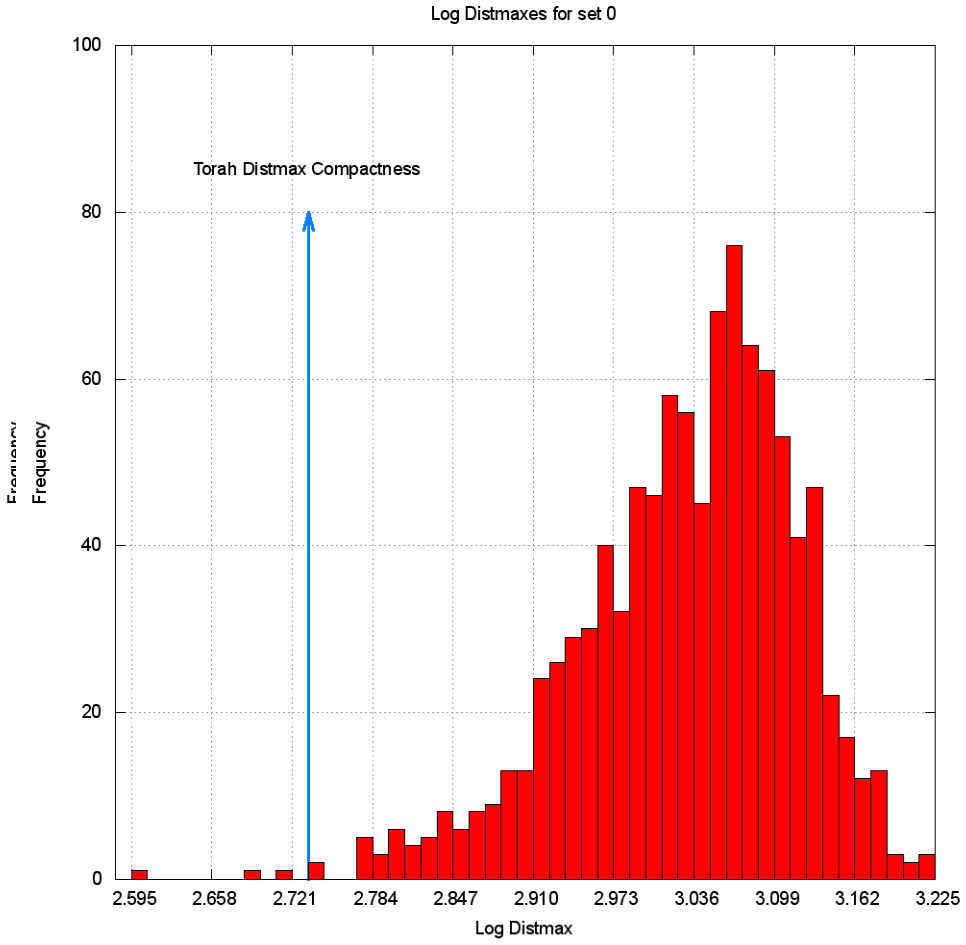
Cylinder Size 57 Max Distance Compactness

Key Word	Skip	Rowspan	Colspan	Distmax
התשעב	57	5	1	16
בבא	-3	5	7	34
אלעזר	1	8	6	74
איש	-2	9	11	164
פלא	4	10	9	106
אשר	1	7	7	72
דהן	5	5	11	50
רצח	-1	6	6	12

Table of Pairwise Distmax Compactnesses

The total compactness score is the sum of the max distance compactnesses which for this table is 557. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 3.5/1000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, the ELSs in this best table for **בבא**, **אלעזר**, **דהן**, **רצח** and **פלא** had the minimal distmax compactness to the axis ELS **התשעא**.

A histogram of the base 10 logs of the distmax scores for the Torah text and each of the monkey texts is shown below.



Using the min distance of the bounding box formed by a pair a ELSs, for the pairwise compactness, the following table results.

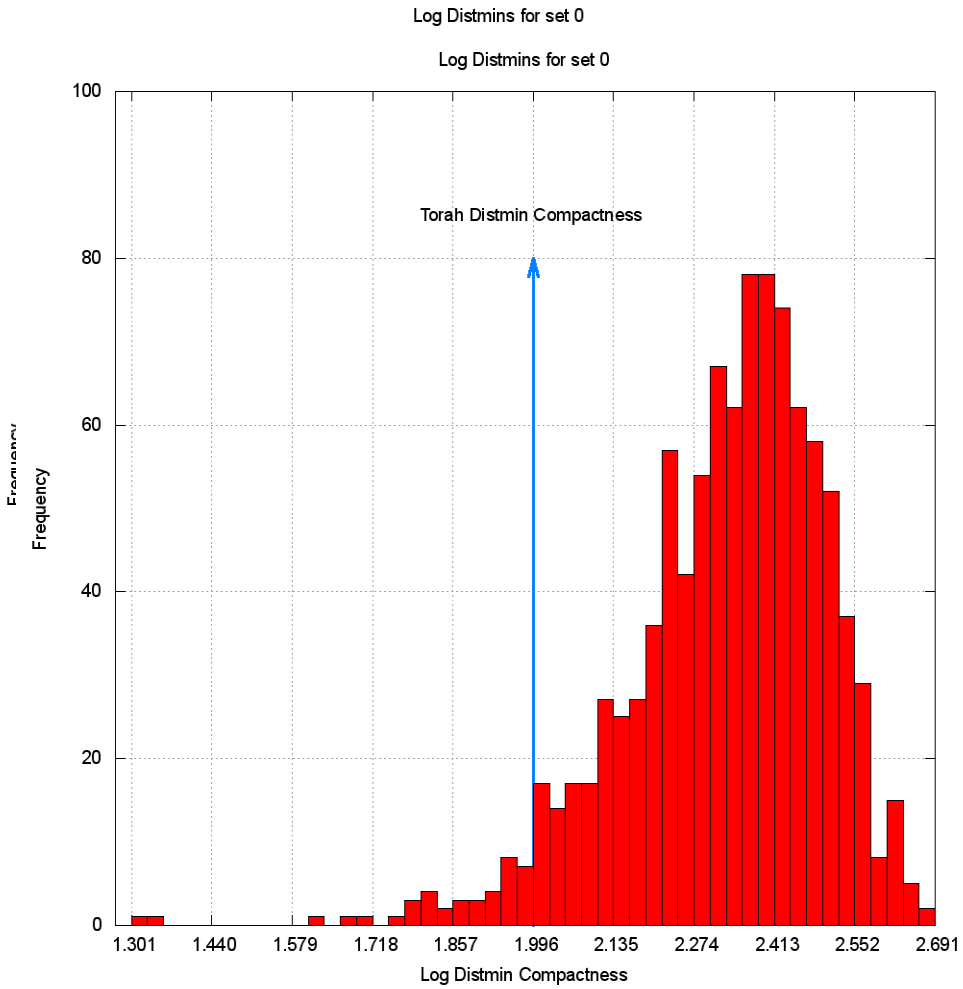
Cylinder Size 58 Distmin Compactness

Key Word	Skip	Rowspan	Colspan	Distmin
התשעב	57	5	5	0
בבא	-3	5	9	1
אלעזר	1	8	7	9
איש	-2	9	7	20
פלא	4	10	15	29
אשר	1	7	13	40
דהן	5	5	11	0
רצח	-1	6	5	5

Table of Pairwise Distmin Compactnesses

The total compactness score is the sum of the distance min compactnesses which for this table is 104. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 53.5/1000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, none of the ELSs of this best table had a minimal meeting with the axis ELS.

A histogram of the base 10 logs of the distmin scores for the Torah text and each of the monkey texts is shown below.



Using the city block max distance formed by a pair a ELSs, for the pairwise compactness, the following table results.

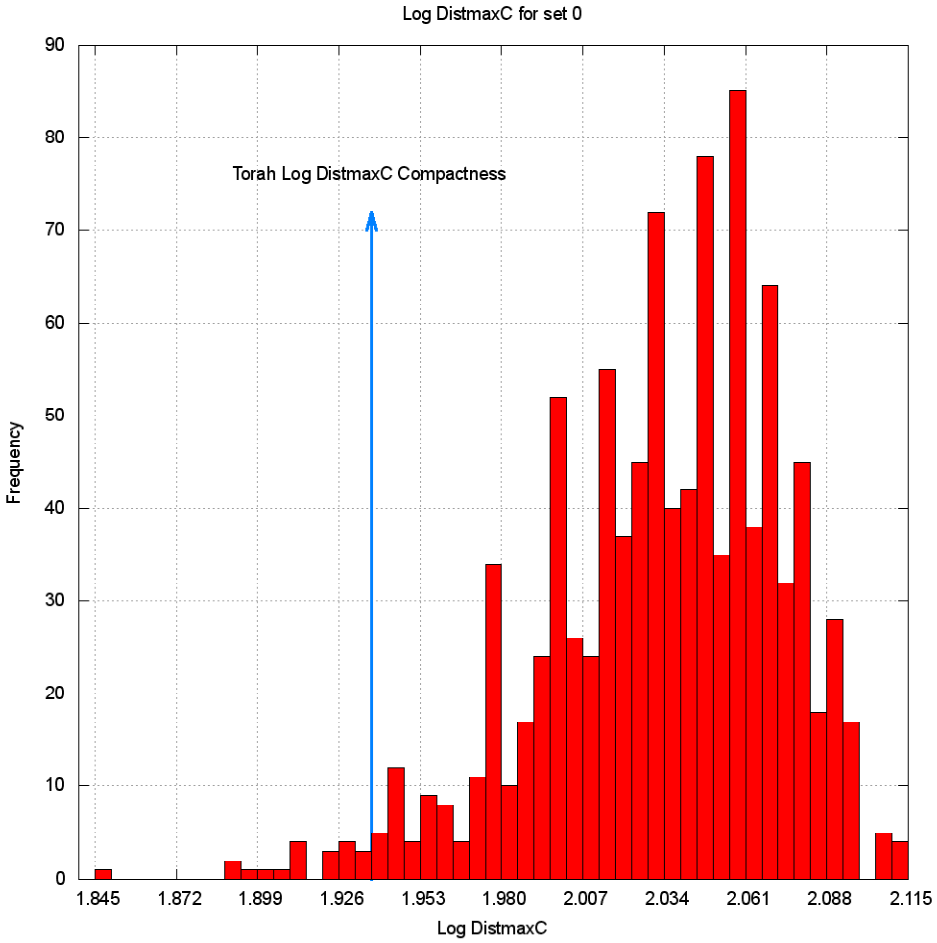
Cylinder size 57 City Block Max Distance Compactness

Key Word	Skip	Rowspan	Colspan	City Block Distmax
התשעב	57	5	1	4
בבא	-3	5	7	8
אלעזר	1	8	6	12
איש	-2	9	11	18
פלא	4	10	9	14
אשר	1	7	7	12
דהן	5	5	11	9
רצח	-1	6	6	10

Table of Pairwise City Block Distmax Compactnesses

The total compactness score is the sum of the city block max distance compactnesses which for this table is 87. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 20/1000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, the ELSs in this best table for **אלעזר** had the minimal city block max distance compactness to the axis ELS **התשעא**.

A histogram of the base 10 logs of the distmax scores for the Torah text and each of the monkey texts is shown below.



Using the Euclidean max distance to form the table by pairwise compactnesses but using the area of the resulting table as the total compactness measure, we find the following table which has a different cylinder size and different ELSs from the other tables. It has an area of 168.

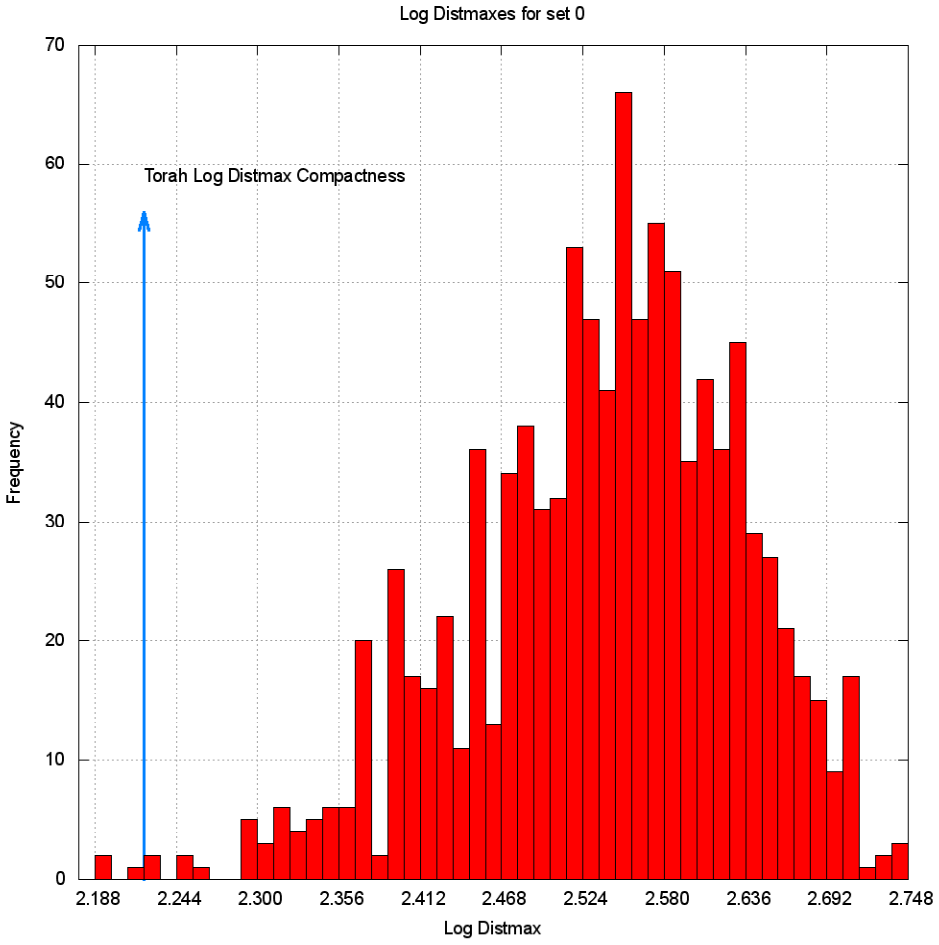
Cylinder size 155 Euclidean Distmax Compactness

Key Word	Skip	Rowspan	Colspan	Euclidean Distmax
התשעב	157	5	9	80
בבא	2	10	12	202
אלעזר	1	6	9	65
איש	-1	5	9	80
פלא	-1	9	9	113
אשר	1	7	9	52
דהן	-1	8	12	130
רצח	-1	10	9	106

Table of Pairwise City Euclidean Distmax Compactnesses

The total compactness score is the area of the resulting table which for this table is 168. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 3.5/1000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, the ELSs in this best table had no near minimal meetings of the axis ELS with the non-axis ELS.

A histogram of the base 10 logs of the distmax scores for the Torah text and each of the monkey texts is shown below.



Comet Elenin

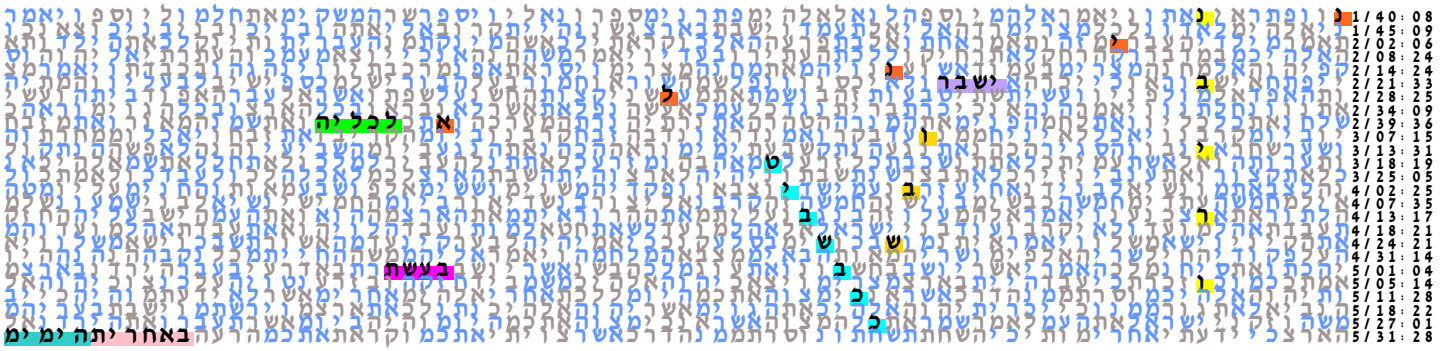
We use the following key word set related to the comet Elenin. This key word set was established by Rabbi Glazerson.

לכליה	ככבשביט
באחרית	תשעב
הימים	נבירו
ישבר	אלנין
שבור	

Key Words

We set the expected number of ELSs for the axis key word to be 100 and the resonance specification of a maximum of a rowskip of 2 and a column skip of 2. For the non-axis key words, we set the maximum skip to be the maximum possible and the resonance specification is set for a maximum rwo skip of 14 and a maximum column skip of 14.

Using the area of the bounding box formed by a pair a ELSs, for the pairwise compactness, the following table results.



Cylinder Size 10047 Area Compactness

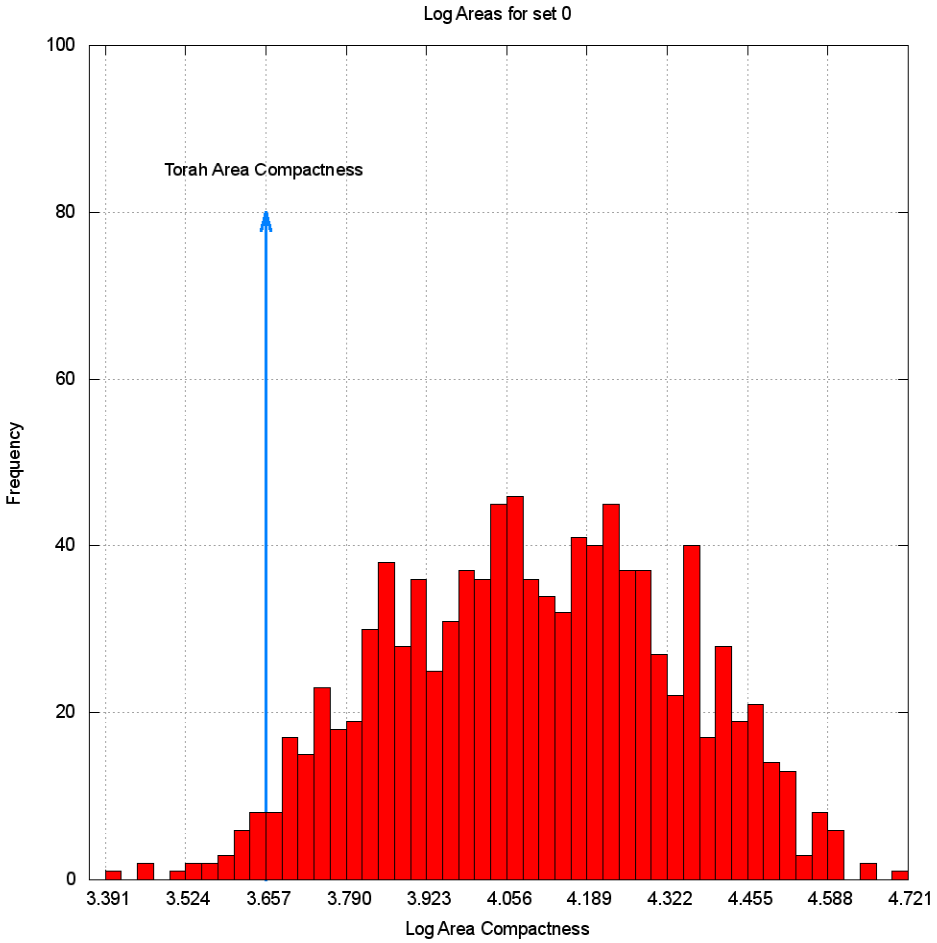
Key Word	Skip	Rowspan	Colspan	Area
ככבשביט	-20093	13	7	91
תשעב	-1	13	29	377
נבירו	50235	24	26	624
אלנין	-20107	24	53	1272
לכליה	1	16	33	528
באחרית	1	14	46	644

Key Word	Skip	Rowspan	Colspan	Area
הימים	1	14	51	714
ישבר	1	19	14	266
שבור	-40189	19	11	209

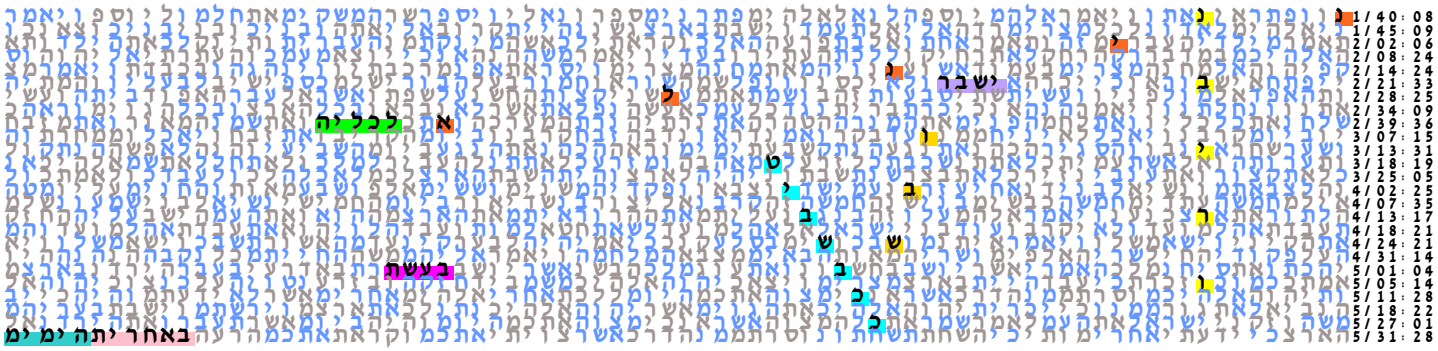
Table of Pairwise Area Compactnesses

The total compactness score is the sum of the area compactnesses which for this table is 4725. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 30.5/1000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, the ELS of **אלנין**, **לכליה**, **באחרית** and **הימים**, had their minimal meetings with the axis ELS. The ELSs of **נבירו** and **שבור** had the second minimal meetings with the axis ELS. The ELS of **ישבר** had the fourth minimal meetings with the axis ELS.

A histogram of the base 10 logs of the area compactness scores for the Torah text and each of the monkey texts is shown below.



Using the half perimeter formed by a pair a ELSs, for the pairwise compactness, the following table results. This is the same table as the one produced by the area compactness.



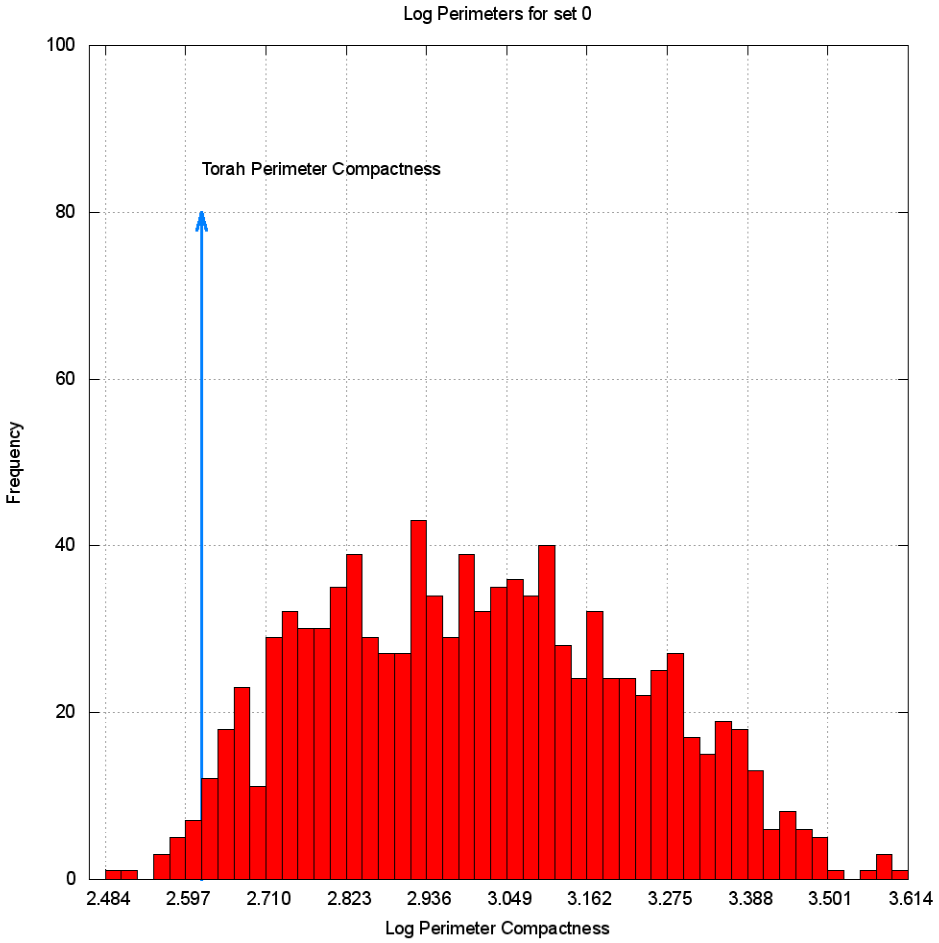
Cylinder Size 10047 Perimeter Compactness

Key Word	Skip	Rowspan	Colspan	Half Perimeter
ככבשביט	-20093	13	7	20
תשעב	-1	13	29	42
נבירו	50235	24	26	50
אלנין	-20107	24	53	77
לכליה	1	16	33	49
באחרית	1	14	46	60
הימים	1	14	51	65
ישבר	1	19	14	33
שבור	-40189	19	11	30

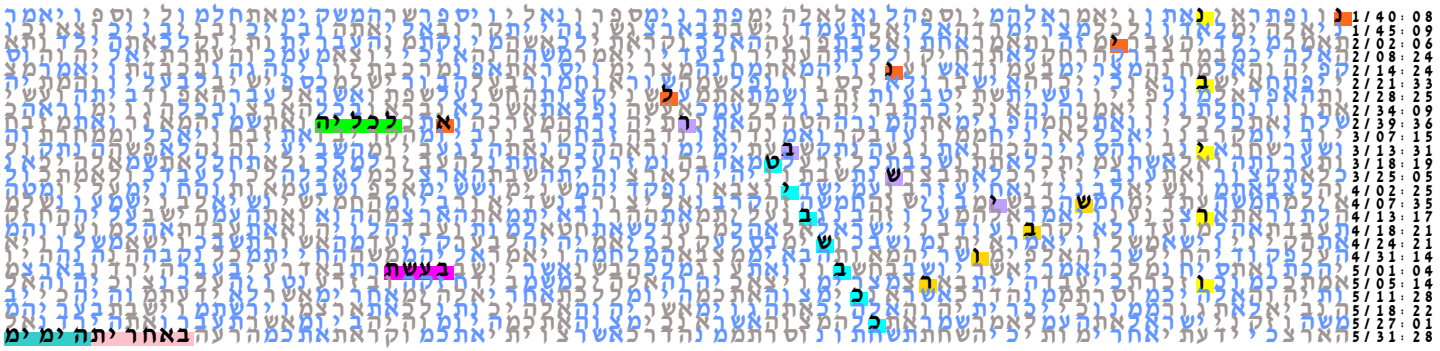
Table of Pairwise Perimeter Compactnesses

The total compactness score is the sum of the perimeter compactnesses which for this table is 426. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 21.5/1000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, in this best table, the ELSs of **נבירו**, **אלנין**, **לכליה**, **באחרית** and **הימים**, had their minimal meetings with the axis ELS. The ELS of **שבור** had the second minimal meeting with the axis ELS. The ELSs of **ישבר** and **תשעב** had the fourth minimal meetings with the axis ELS.

A histogram of the base 10 logs of the perimeter compactness scores for the Torah text and each of the monkey texts is shown below.



Using the distmax compactness formed by a pair a ELSs, for the pairwise compactness, the following table results.



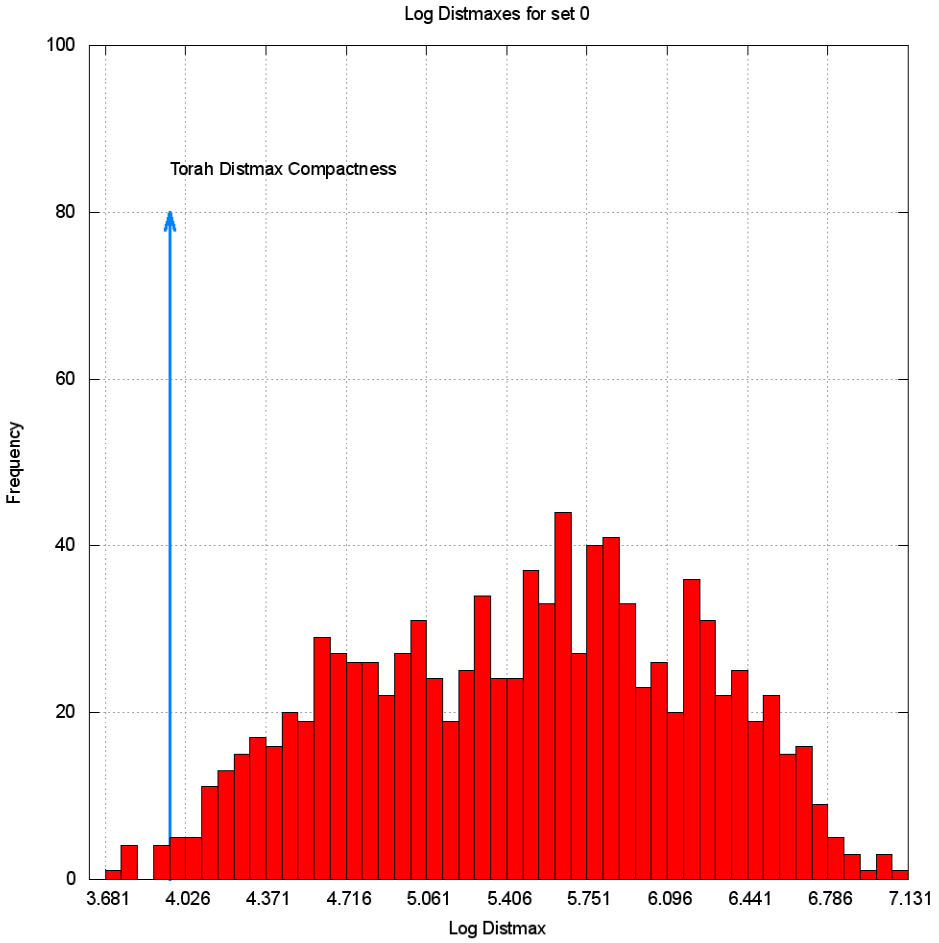
Cylinder Size 10047 Distmax Compactness

Key Word	Skip	Rowspan	Colspan	Euclidean Distmax
ככבשביט	-20093	13	7	180
תשעב	-1	13	29	800
נבירו	50235	24	26	890
אלנין	-20107	24	53	1258
לכליה	1	16	33	1249
באחרית	1	14	46	2026
הימים	1	14	51	2501
ישבר	-20088	16	19	346
שבור	20097	13	19	333

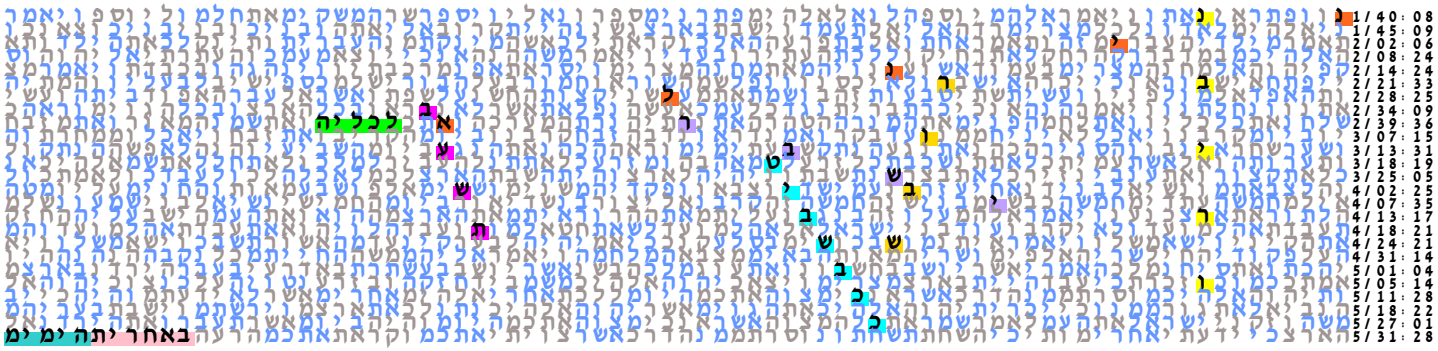
Table of Pairwise Distmax Compactnesses

The total compactness score is the sum of the pairwise Euclidean max distance compactnesses which for this table is 9583. The probability that a text from the ELS random placement monkey text population would have a better compactness scores is 9.5/1000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, in this best table, the ELS of **נבירו**, **אלנין**, **לכליה**, **באחרית** and **הימים**, had their minimal meetings with the axis ELS. The ELS of **שבור** had the second minimal meeting with the axis ELS. The ELSs of **ישבר** , **שבור**, and **תשעב** had the second minimal meetings with the axis ELS.

A histogram of the base 10 logs of the distmax compactness scores for the Torah text and each of the monkey texts is shown below.



Using the distmin compactness formed by a pair a ELSs, for the pairwise compactness, the following table results.



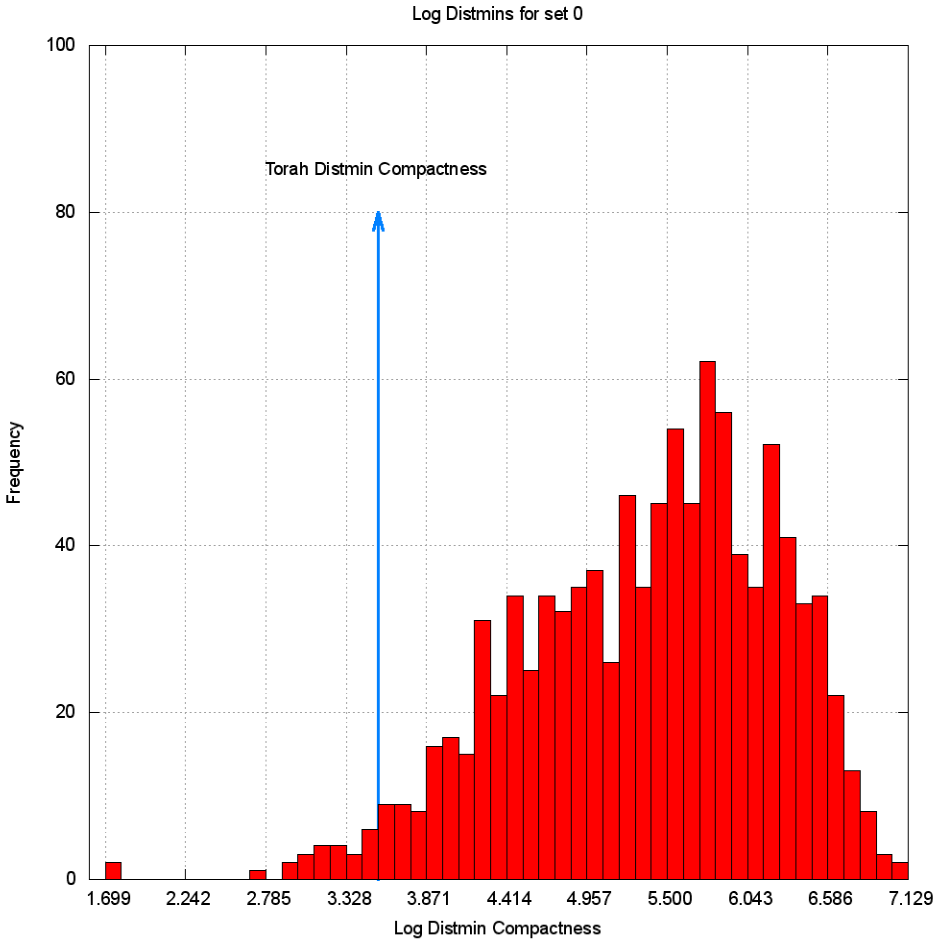
Cylinder Size 10047 Distmin Compactness

Key Word	Skip	Rowspan	Colspan	Distmin
ככבשביט	-20093	13	7	0
תשעב	-1	13	29	314
נבירו	50235	24	26	370
אלנין	-20107	24	53	61
לכליה	1	16	33	493
באחרית	1	14	46	1325
הימים	1	14	51	1769
ישבר	-20088	19	19	2
שבור	20097	13	19	13

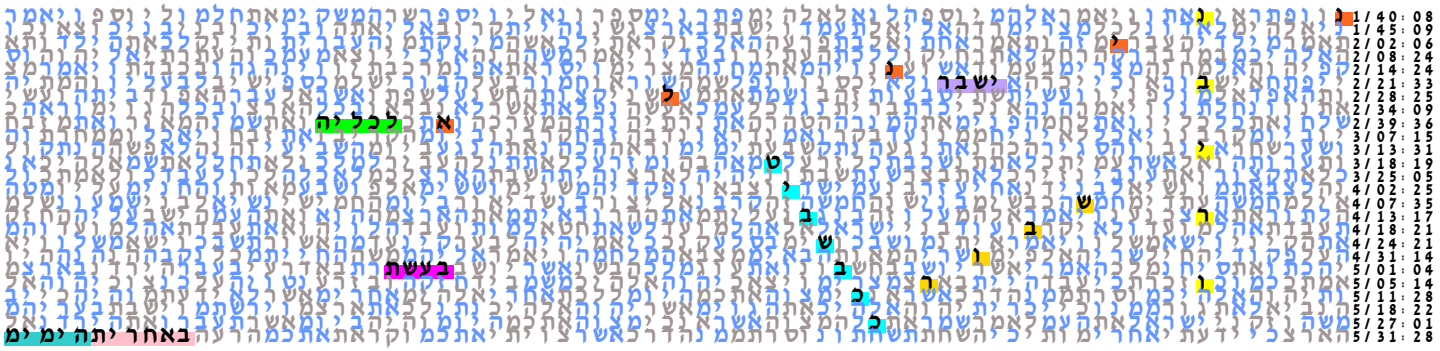
Table of Pairwise Distmin Compactnesses

The total compactness score is the sum of the distmin compactnesses which for this table is 4347. The probability that a text from the ELS random placement monkey text population would have a better compactness scores is 32.5/1000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, in this best table the ELS of **נבירו**, **לכליה**, **באחרית**, **הימים**, and **ישבר** had their minimal meetings with the axis ELS. The ELS of **אלנין** had the second minimal meeting with the axis ELS. The ELS of **תשעב** had the third minimal meetings with the axis ELS.

A histogram of the base 10 logs of the distmin compactness scores for the Torah text and each of the monkey texts is shown below.



Using the city block distmax compactness formed by a pair a ELSs, for the pairwise compactness, the following table results. This is the same table as that produced by the area and perimeter compactnesses.



Cylinder size 10047 City Block Max Distance Compactness

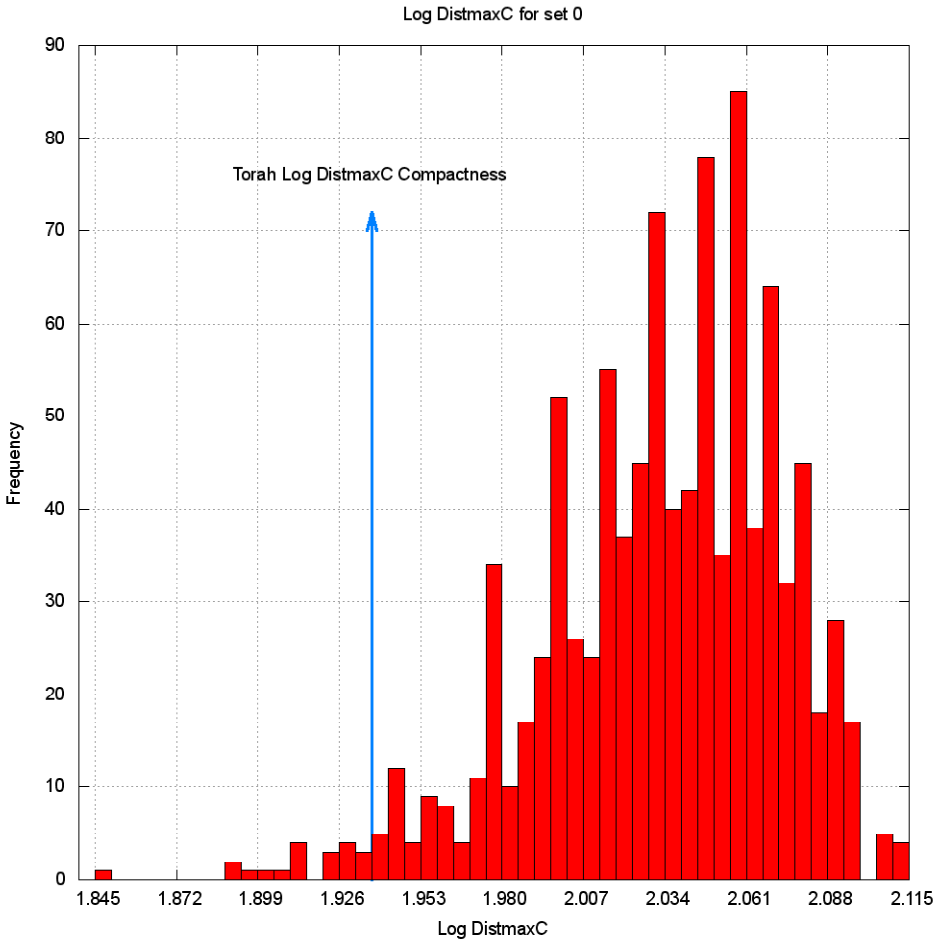
Key Word	Skip	Rowspan	Colspan	City BlockDistmax
ככבשביט	-20093	13	7	18
תשעב	-1	13	29	32
נבירו	50235	24	26	42
אלנין	-20107	24	53	50
לכליה	1	16	33	47
באחרית	1	14	46	52
הימים	1	14	51	57
ישבר	1	19	14	25
שבור	20097	13	19	21

Table of Pairwise City Block Distmax Compactnesses

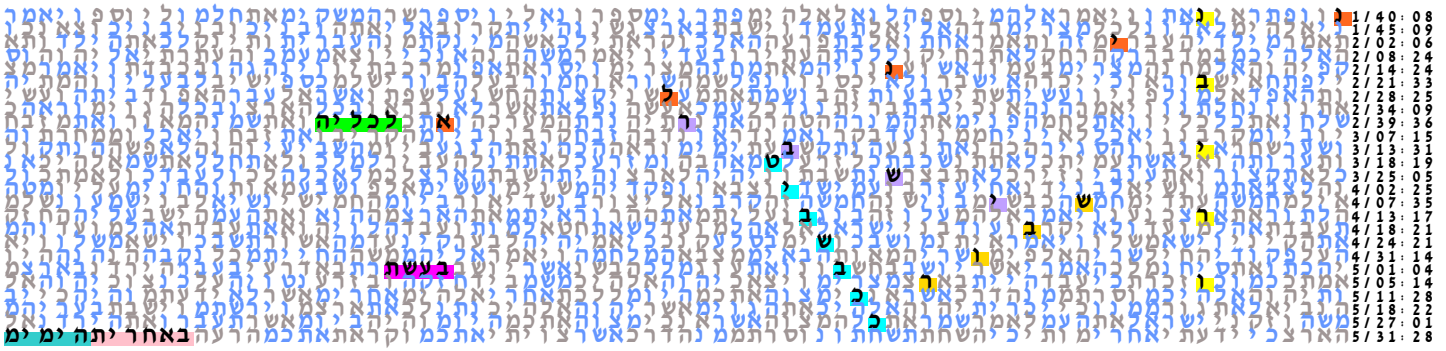
The total compactness score is the sum of the pairwise city block distmax compactnesses which for this table is 344. The probability that a text from the ELS random placement monkey text population would have a better compactness scores is 18.5/1000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, in this best table, the ELS of **נבירו**, **אלנין**, **באחרית** and **הימים**, had their minimal meetings with the axis ELS. The ELS of **לכליה** had the second minimal meeting with the axis ELS. The ELS **שבור** had the fourth minimal meetings with the axis ELS. The ELS of **תשעב** had the fifth minimal meeting with the axis ELS.

A histogram of the base 10 logs of the city block distmax compactness scores for the Torah text and each of the

monkey texts is shown below.



Using the Euclidean distmax compactness formed by a pair a ELSs, for the pairwise compactness, and the area of the resulting table as the total compactness, the following table results.



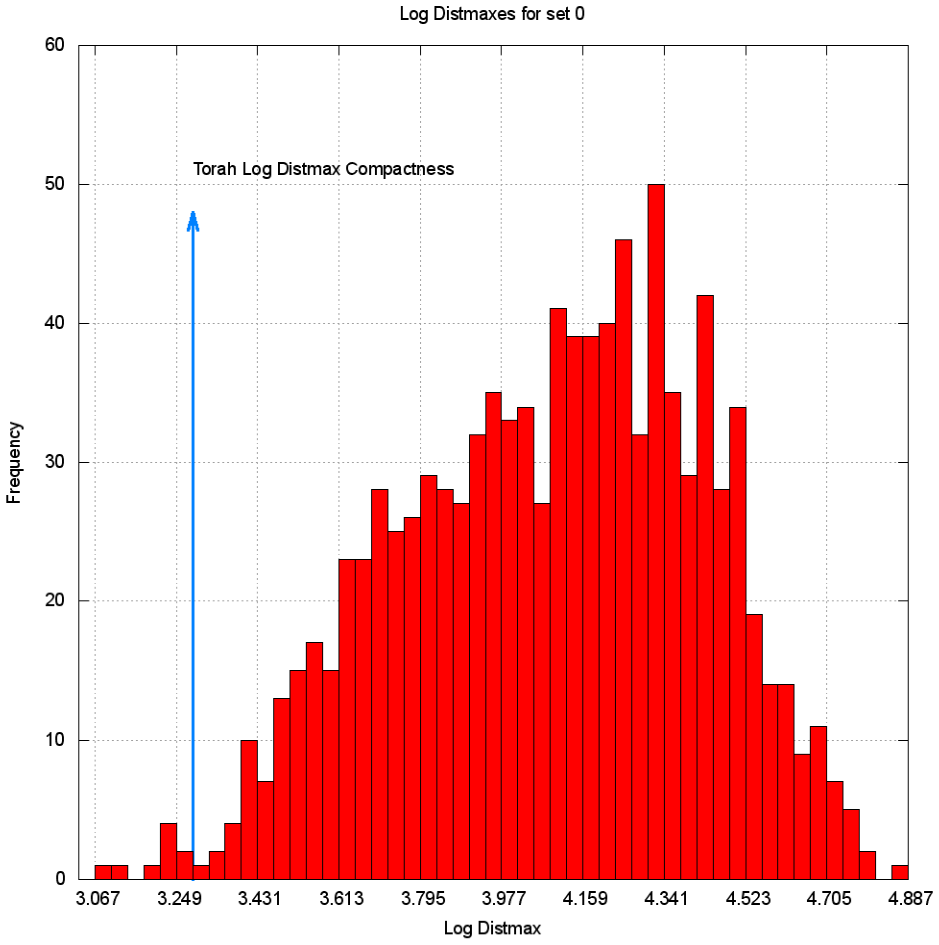
Cylinder size is 10047. Smallest area table resulting from Euclidean max distance pairwise compactnesses.

Key Word	Skip	Rowspan	Colspan	Distmax
ככבשביט	-20093	13	7	180
תשעב	-1	13	29	800
נבירו	50235	24	26	890
אלנין	-20107	24	53	1258
לכליה	1	16	33	1249
באחרית	1	14	46	2026
הימים	1	14	51	2501
ישבר	-20088	16	19	346
שבור	20097	13	19	333

Table of Pairwise Distmax Compactnesses

The total compactness score is the area of the resulting table which for this experiment is 25 rows by 78 columns, making an area of 1950. The probability that a text from the ELS random placement monkey text population would have a better compactness scores is 9.5/1000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, in this best table, the ELS of **נבירו**, **אלנין**, **באחרית** and **הימים**, had their minimal meetings with the axis ELS. The ELS of **לכליה** had the second minimal meeting with the axis ELS. The ELS **שבור** had the fourth minimal meetings with the axis ELS. The ELSs of **תשעב**and **ישבר** had the fifth minimal meeting with the axis ELS.

A histogram of the base 10 logs of the distmax compactness scores for the Torah text and each of the monkey texts is shown below.



Palestinian State

We use the following key word set related to the politics of the Palestinian state in 5771. This key word set was established by Professor Rips and Rabbi Glazerson.

ישמאל	פלשתין
תשעא	פלשתים
איום	מדינת

Key Words

We set the expected number of ELSs for the axis key word to be 100 and the resonance specification of a maximum of a rowskip of 2 and a column skip of 2. For the non-axis key words, we set the maximum skip to be the maximum possible and the resonance specification is set for a maximum rwo skip of 7 and a maximum column skip of 7.

Using the area of the bounding box formed by a pair a ELSs, for the pairwise compactness, the following table results.

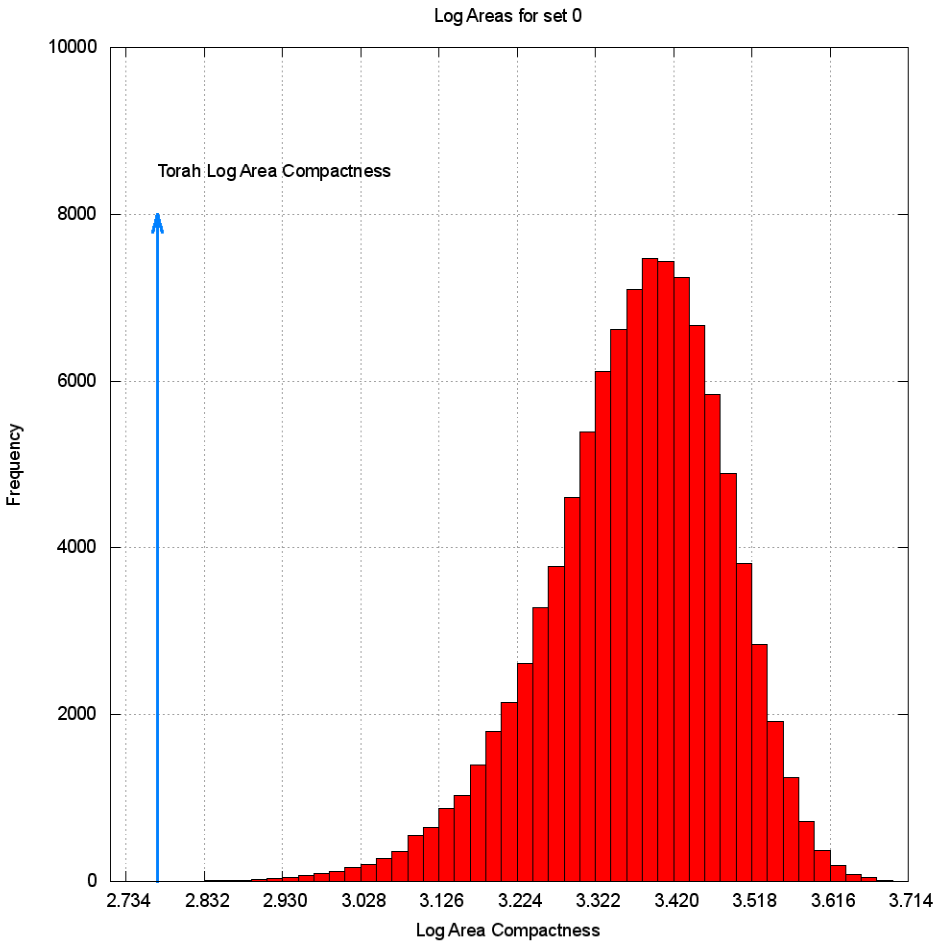
Cylinder Size 222 Area Compactness

Key Word	Skip	Rowspan	Colspan	Area
פלשתין	-222	6	1	6
פלשתים	1	8	14	112
מדינת	222	6	28	168
ישמאל	1	7	6	42
תשעא	2	6	34	204
איום	-1	6	13	78

Table of Pairwise Area Compactnesses

The total compactness score is the sum of the area compactnesses which for this table is 610. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 3.5/100,000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, the ELS of **מדינת** and **ישמאל** had its second minimal meeting with the axis ELS. The ELSs of **פלשתים** had the third minimal meetings with the axis ELS.

A histogram of the base 10 logs of the area compactness scores for the Torah text and each of the monkey texts is shown below.



Using the half perimeter formed by a pair a ELSs, for the pairwise compactness, the following table results. This is the same table as the one produced by the area compactness.

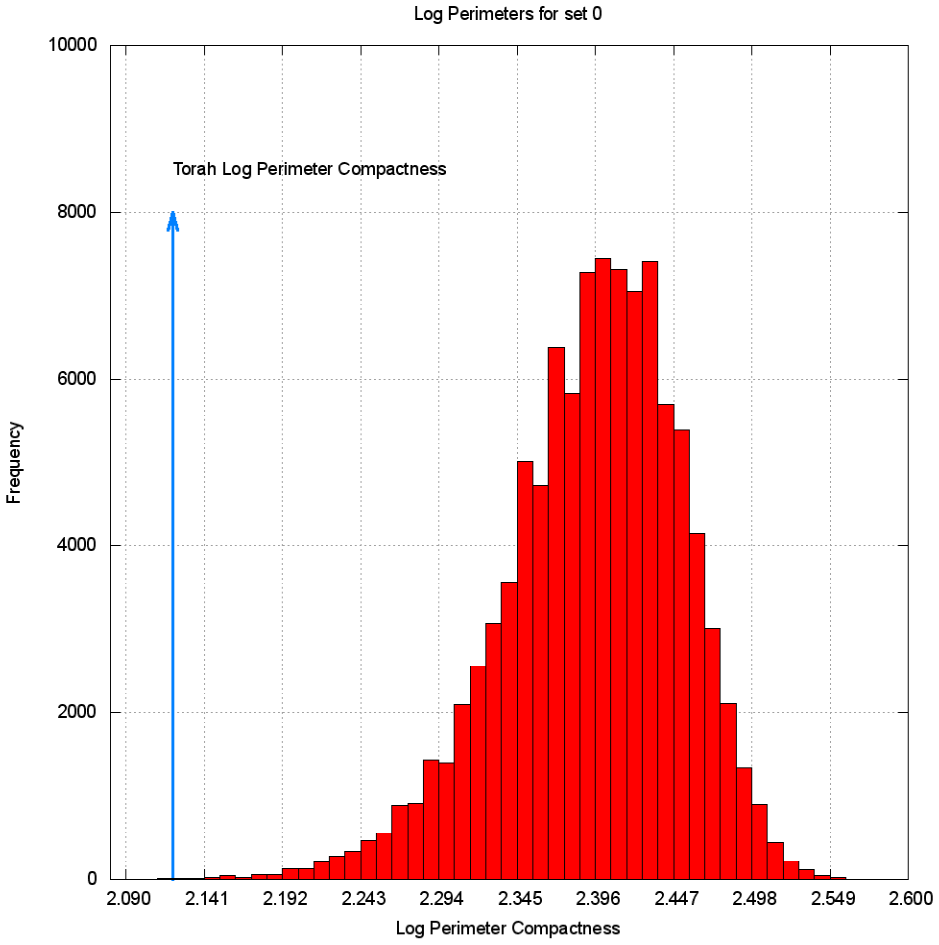
Cylinder Size 222 Perimeter Compactness

Key Word	Skip	Rowspan	Colspan	Half Perimeter
פלשתין	-222	6	1	7
פלשתים	1	8	14	22
מדינת	222	6	28	34
ישמאל	1	7	6	13
תשעא	2	6	34	40
איום	-1	6	13	19

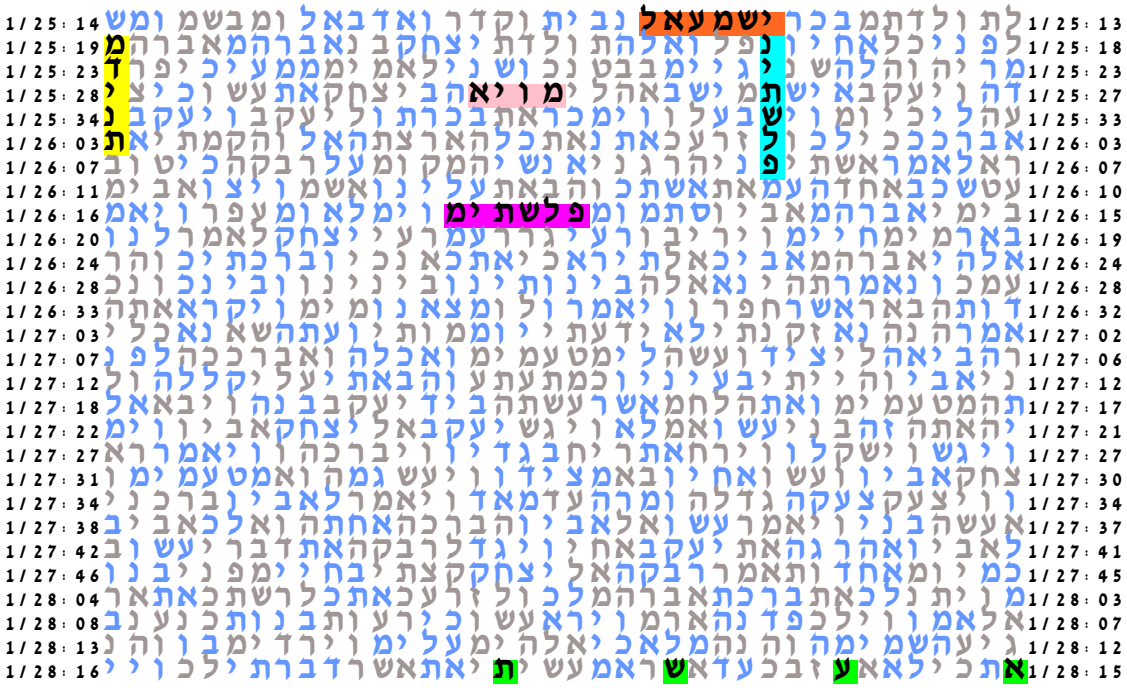
Table of Pairwise Half Perimeter Compactnesses

The total compactness score is the sum of the perimeter compactnesses which for this table is135. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 22.5/100,000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, the ELS of **מדינת** and **ישמאל** had its second minimal meeting with the axis ELS. The ELSs of **פלשתים** had the third minimal meetings with the axis ELS.

A histogram of the base 10 logs of the perimeter compactness scores for the Torah text and each of the monkey texts is shown below.



Using the distmax compactness formed by a pair a ELSs, for the pairwise compactness, the following table results. Here the ELS chosen for **תשעא** is different from that chosen for the area or perimeter compactnesses. Here, the furthest Euclidean distance of the non-axis ELS to the axis ELS is 26 rows and 11 columns and is therefore 26*26+11*11=797. For the area or perimeter compactnesses, the furthest Euclidean distance of the non-axis ELS to the axis ELS is 4 rows and 30 columns and is therefore 4*4+30*30=916, greater than 797.



Cylinder Size 222 Euclidean Distmax Compactness

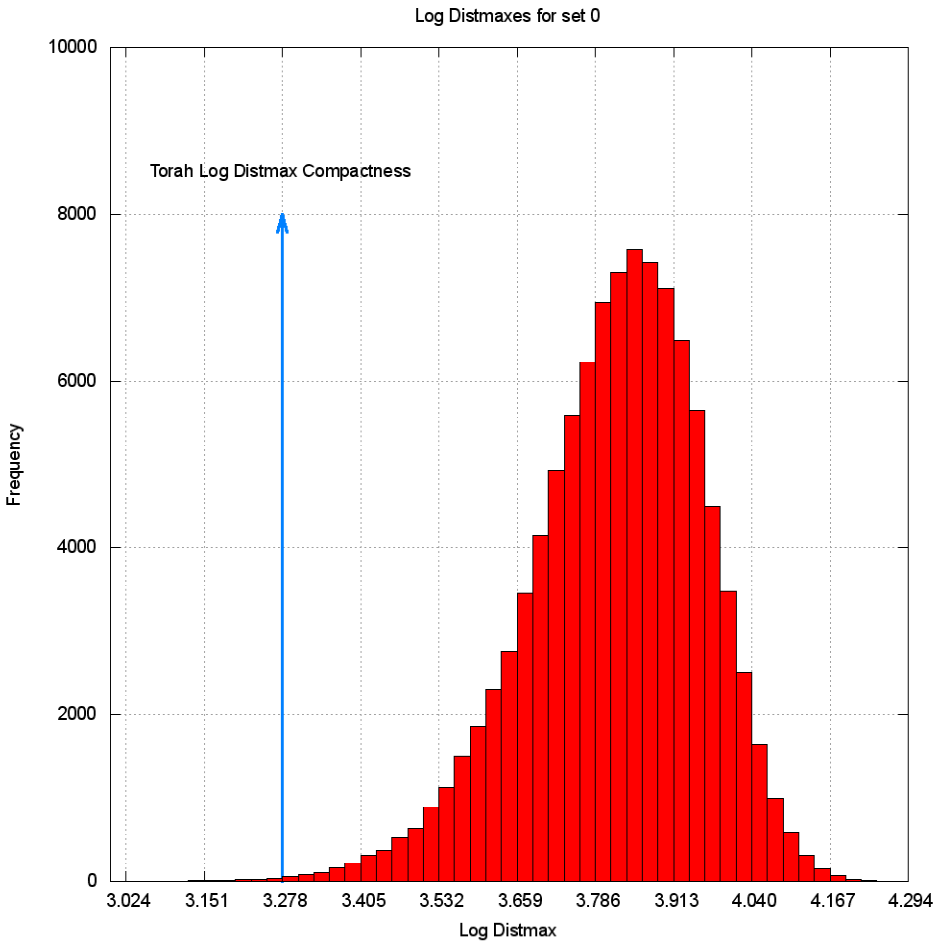
Key Word	Skip	Rowspan	Colspan	Euclidean Distmax
פלשתין	-222	6	1	25
פלשתים	1	8	14	218
מדינת	222	6	28	754
ישמאל	1	7	6	61
תשעא	-7	27	22	797
איום	-1	6	13	153

Table of Pairwise Euclidean Distmax Compactnesses

The total compactness score is the sum of the Euclidean distmax compactnesses which for this table is 2008. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 178/100,000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, the ELS of **ישמאל** had its second minimal meeting with the axis

ELS. The ELSs of **פלשתים** had the fourth minimal meetings with the axis ELS.

A histogram of the base 10 logs of the area compactness scores for the Torah text and each of the monkey texts is shown below.



Using the Euclidean distmin compactness formed by a pair a ELSs, for the pairwise compactness, the following table results.

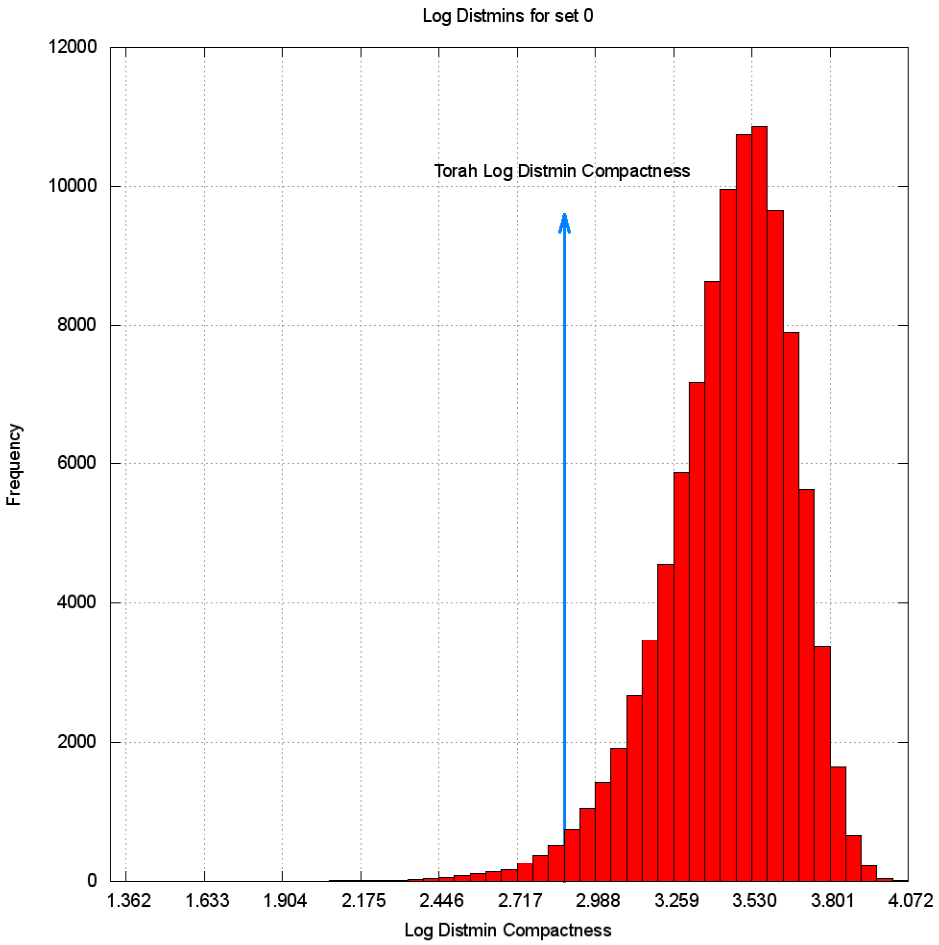
Cylinder Size 224 Euclidean Min Distance Compactness

Key Word	Skip	Rowspan	Colspan	Euclidean Min Distance
פלשתין	-222	6	11	0
פלשתים	1	8	11	13
מדינת	222	6	38	377
ישמאל	1	8	12	4
תשעא	-2	6	36	377
איום	-1	6	19	29

Table of Pairwise Euclidean Min Distance Compactnesses

The total compactness score is the sum of the Euclidean min distance compactnesses which for this table is 800. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 2117/100,000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, the non of the non-axis ELSs had a near minimal meeting with an axis ELS.

A histogram of the base 10 logs of the area compactness scores for the Torah text and each of the monkey texts is shown below.



Using the city block distmax compactness formed by a pair a ELSs, for the pairwise compactness, the following table results. This is the same table as that produced by the area and perimeter compactnesses.

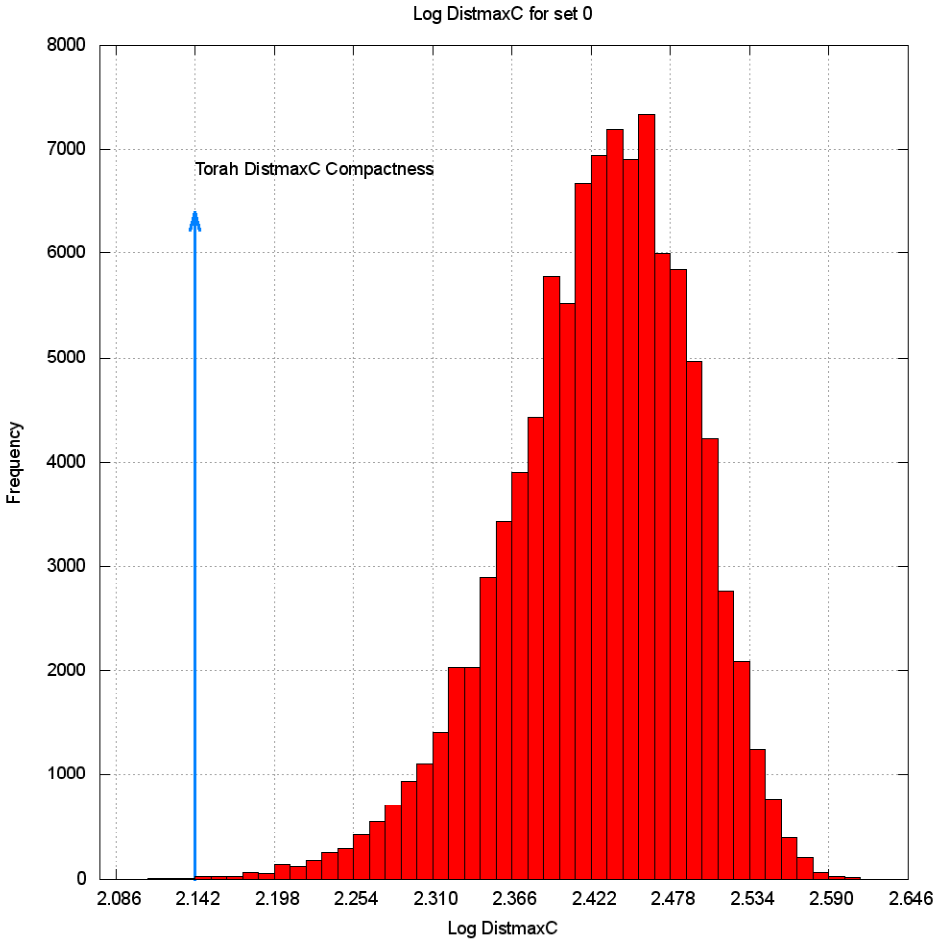
Cylinder Size 222 City Block Distmax Compactness

Key Word	Skip	Rowspan	Colspan	City Block Distmax
פלשתין	-222	6	1	0
פלשתים	1	8	14	20
מדינת	222	6	28	32
ישמאל	1	7	6	11
תשעא	2	6	34	37
איום	-1	6	13	15

Table of Pairwise City Block Compactnesses

The total compactness score is the sum of the pairwise city block compactnesses which for this table is135. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 42.5/100,000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, the ELS of **ישמאל** had its second minimal meeting with the axis ELS. The ELS of **מדינת** had the fourth minimal meeting with an axis ELS. The ELSs of **פלשתים** had the fifth minimal meeting with an axis ELS.

A histogram of the base 10 logs of the perimeter compactness scores for the Torah text and each of the monkey texts is shown below.



Using the distmax compactness formed by a pair a ELSs, for the pairwise compactness, and then selecting that set of smallest distmax ELSs that form the smallest area table, the following table results. Note that even though the Euclidean distmax compactness measure was used, the table has considerable differences from the table in which the total compactness is measured as the sum of the Euclidean distmax values. What we saw in that table was that even though the Euclidean distmax values were in each case smaller than the ones we find in the table below, the table area was larger. This happened because the non-axis ELSs were scattered in all different directions from the axis ELS. In this table we see that the ELSs for **מדינת** and **תשעא** are in the same direction with respect to the axis ELS.

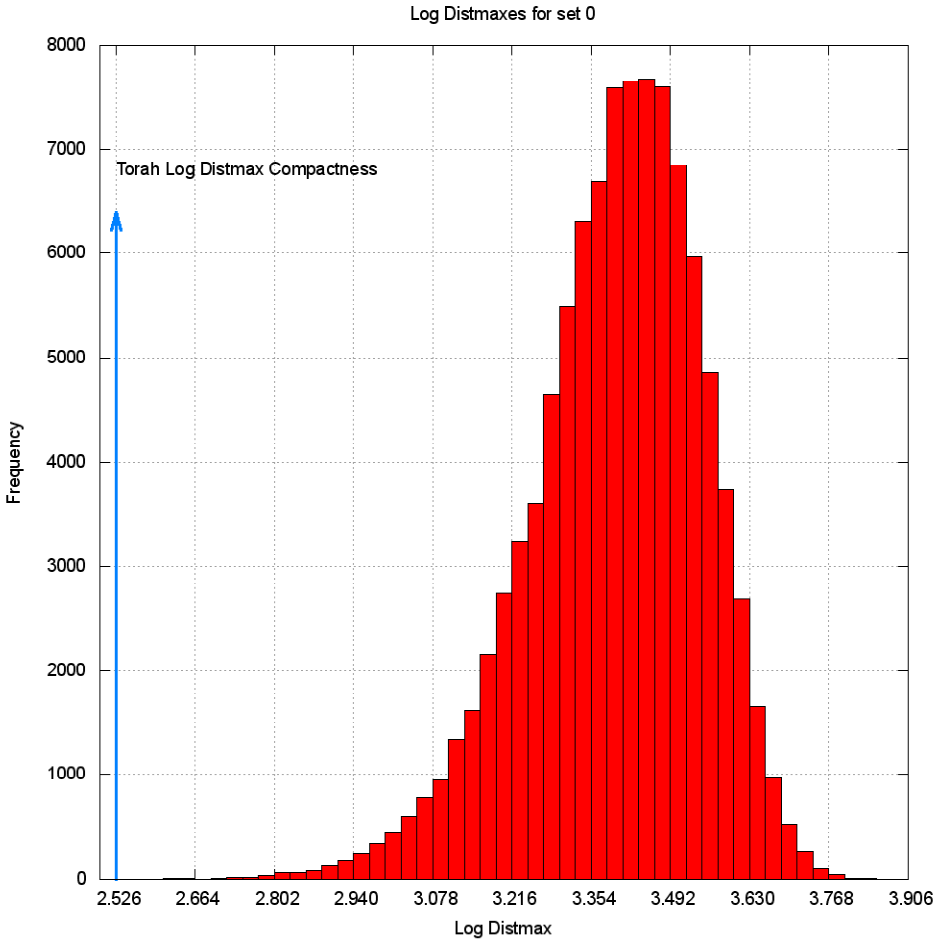
Cylinder Size 221 Distmax Area Compactness

Key Word	Skip	Rowspan	Colspan	Euclidean Max Distance
פלשתין	-222	6	6	50
פלשתים	1	8	14	449
מדינת	222	6	28	977
ישמאל	1	7	6	72
תשעא	-7	27	22	1385
איום	-1	6	13	200

Table of Pairwise Euclidean Max Distance Compactnesses

The total compactness score is the smallest area of the resulting table arising over all axis ELSs, over resonant cylinder sizes and over all the smallest Euclidean max distance of non-axis ELSs to the axis ELSs. The smallest area table is the one shown above: 9 rows by 31 columns for an area of 279. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 2.5/100,000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, none of the ELSs in this table had near minimal meeting with the axis ELS.

A histogram of the base 10 logs of the perimeter compactness scores for the Torah text and each of the monkey texts is shown below.



Al Awlaki

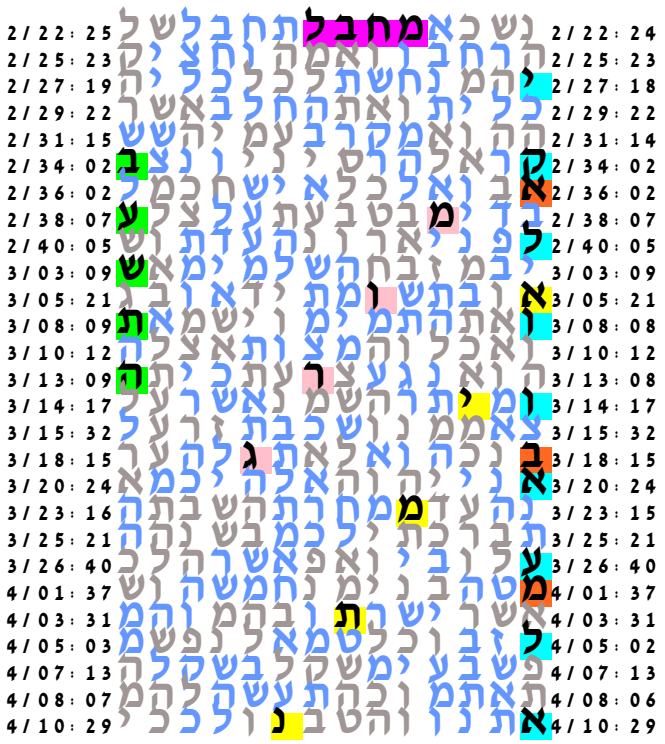
We use the following key word set related to the Predator drone assassination of the American citizen Al Awlaki in Yemen on September 30,2011. This key word set was suggested by Barry Roffman. The first key word is the axis key word.

Al Awlaki	אלעאוולקי	Obama	אובמא
Terrorist	מחבל	5772	התשעב
Terrorist	אימתן	Predator	מורג

Key Words

We set the expected number of ELSs for the axis key word to be 100 and the resonance specification to be a maximum of a rowskip of 3 and a maximum column skip of 3. For the non-axis key words, the expected number of ELSs is set to 200 and the resonance specification is set for a maximum rwo skip of 7 and a maximum column skip of 7.

Using the area of the bounding box formed by a pair a ELSs, for the pairwise compactness, and the sum of the pair compactnesses as the total compactness, the following table results.



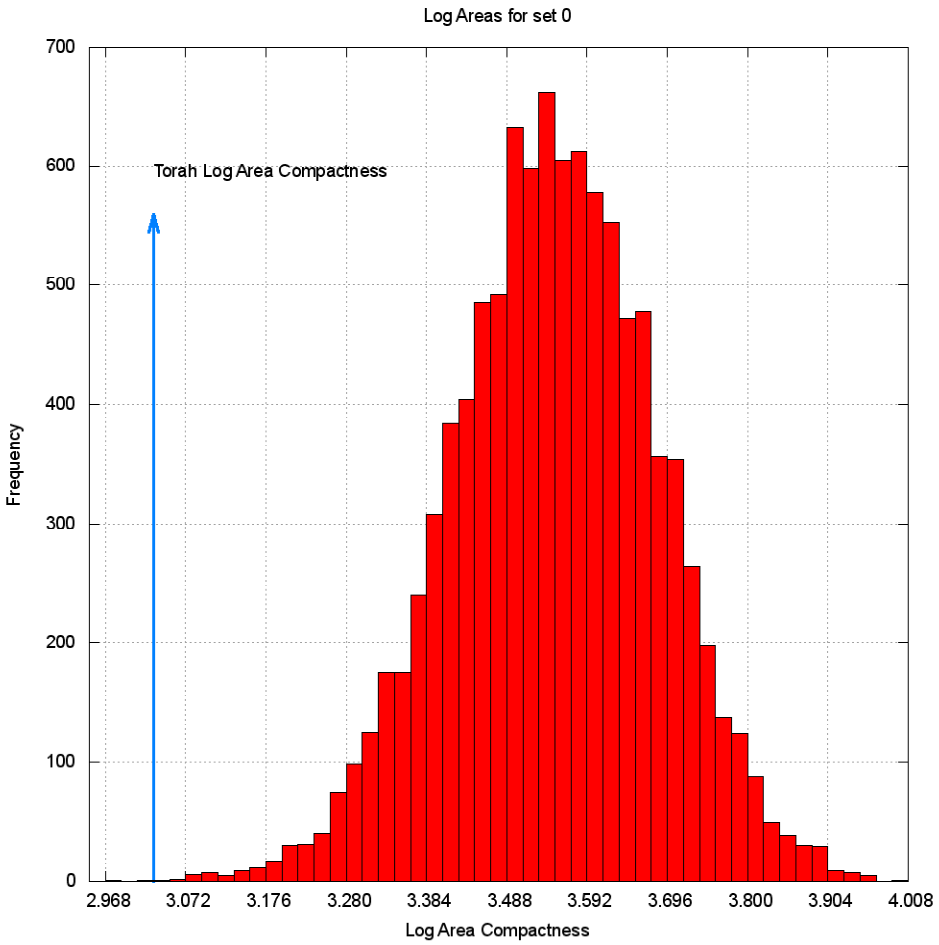
The cylinder size is 3677. Best table using pairwise area compactness.

Key Word	Skip	Rowspan	Colspan	Area
אלעאוולקי	-11031	25	1	25
מחבל	1	27	8	216
אימתן	14710	25	9	225
אובמא	18385	25	1	25
התשעב	-7354	25	14	350
מורג	11033	25	10	250

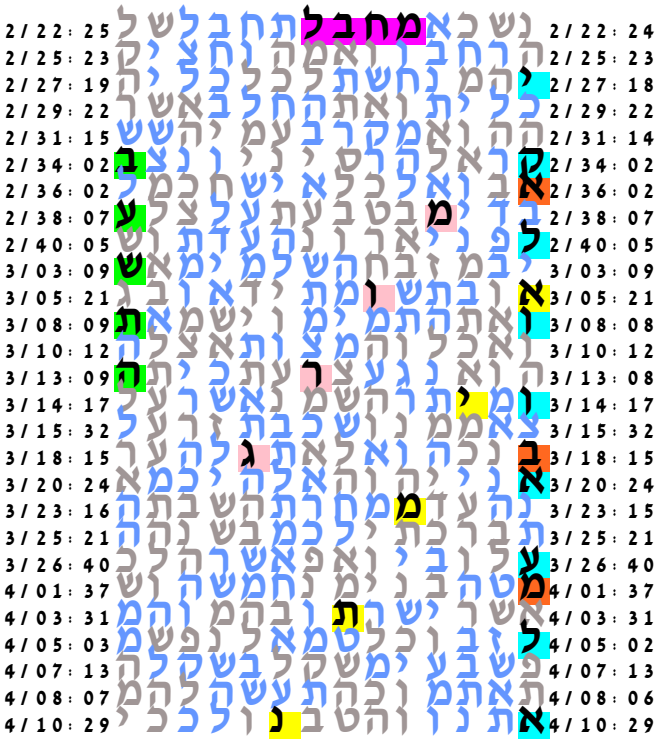
Table of Pairwise Area Compactnesses

The total compactness score is the sum of the area compactnesses which for this table is 1091. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 2.5/10,000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, the ELSs in this best table for **אימתן**, **אובמא**, **התשעב** and **מורג** had the minimal area compactness to the axis ELS **אלעאוולקי**.

A histogram of the base 10 logs of the scores for the Torah text and each of the monkey texts is shown below.



Using the half perimeter formed by a pair a ELSs, for the pairwise compactness, the following table results. This is the same table as the one produces by the area compactness measure.

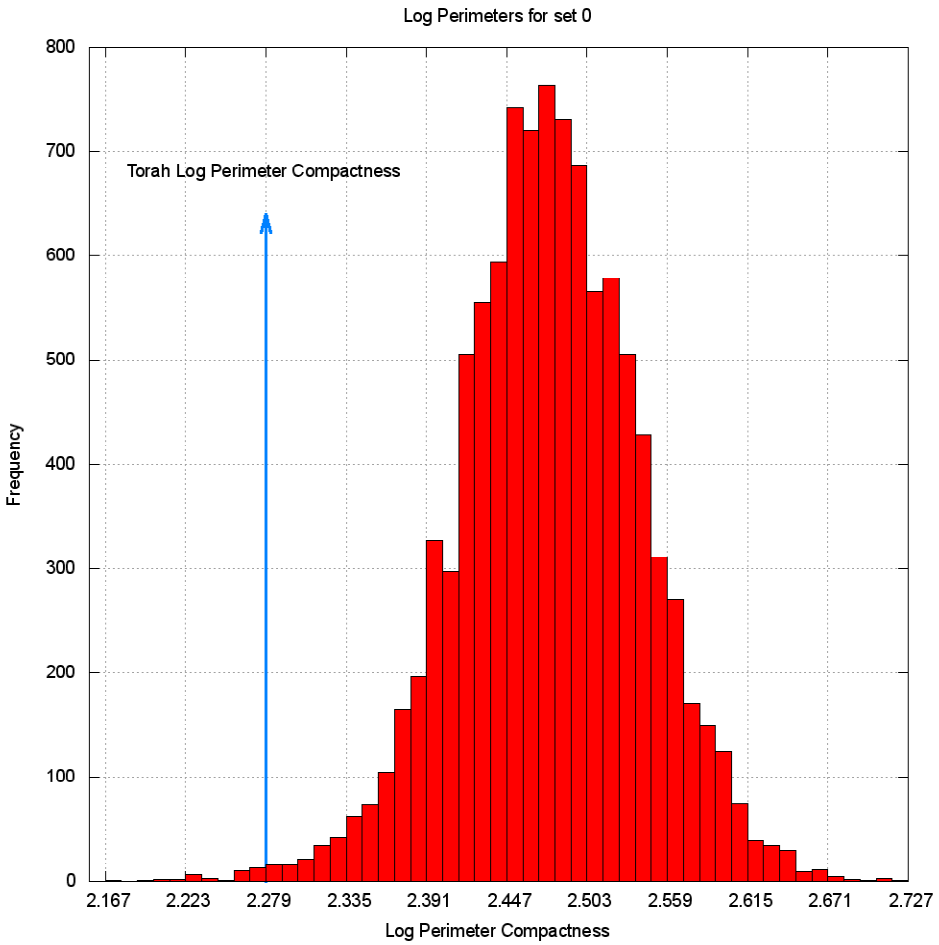


Key Word	Skip	Rowspan	Colspan	Half Perimeter
אלעאוולקי	-11031	25	1	26
מחבל	1	27	8	35
אימתן	14710	25	9	34
אובמא	18385	25	1	26
התשעב	-7354	25	14	39
מורג	11033	25	10	35

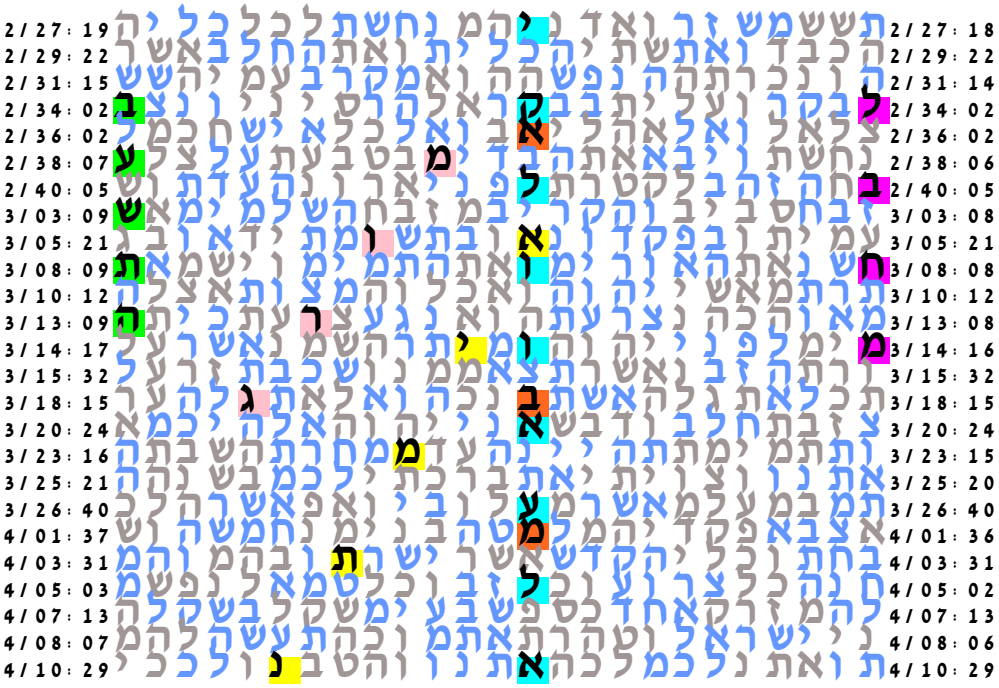
Table of Pairwise Area Compactnesses

The total compactness score is the sum of the pairwise perimeter compactnesses which for this table is 1091. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 52/10,000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, the ELSs in this best table for **אימתן**, **אובמא**, **התשעב** and **מורג** had the minimal area compactness to the axis ELS **אלעאוולקי**.

A histogram of the base 10 logs of the scores for the Torah text and each of the monkey texts is shown below.



Using the distmax compactness formed by a pair a ELSs, for the pairwise compactness, the following table results.



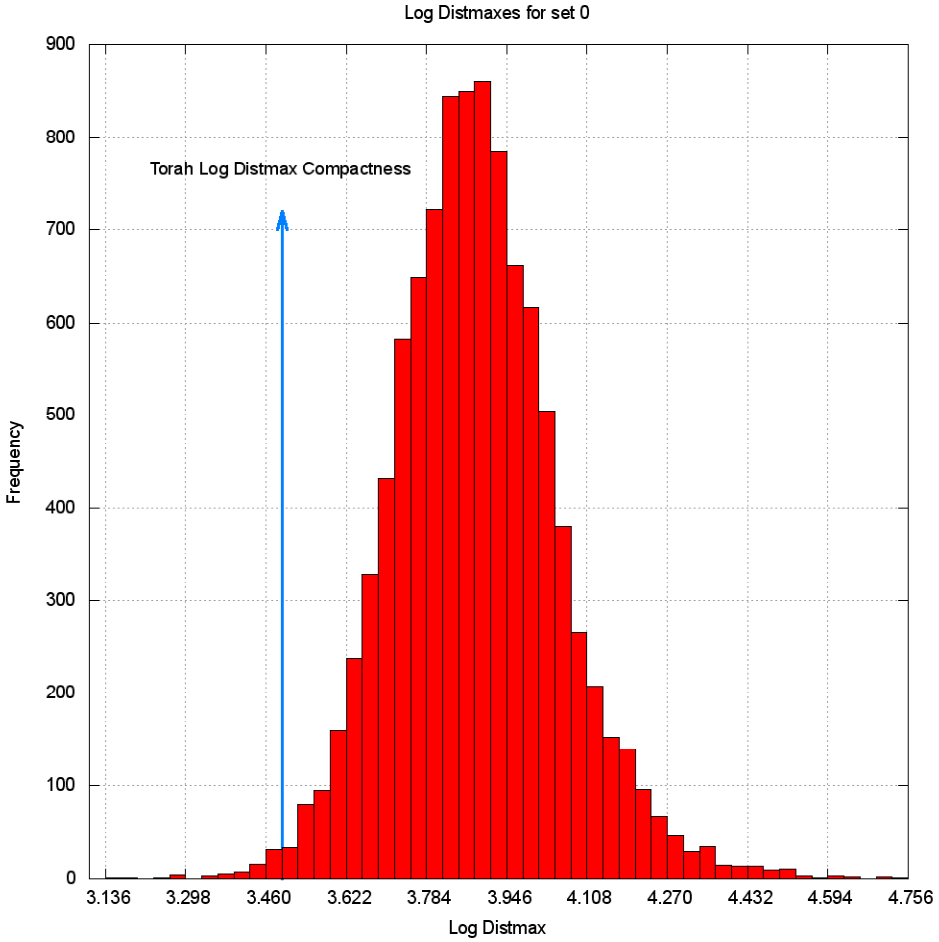
The cylinder size is 3677. The is the best table formed using the Euclidean dismax compactness measure.

Key Word	Skip	Rowspan	Colspan	Euclidean Distmax
אלעאוולקי	-11031	25	1	576
מחבל	-11031	25	12	562
אימתן	14710	25	9	640
אובמא	18385	25	1	576
התשעב	-7354	25	14	610
מורג	11033	25	10	370

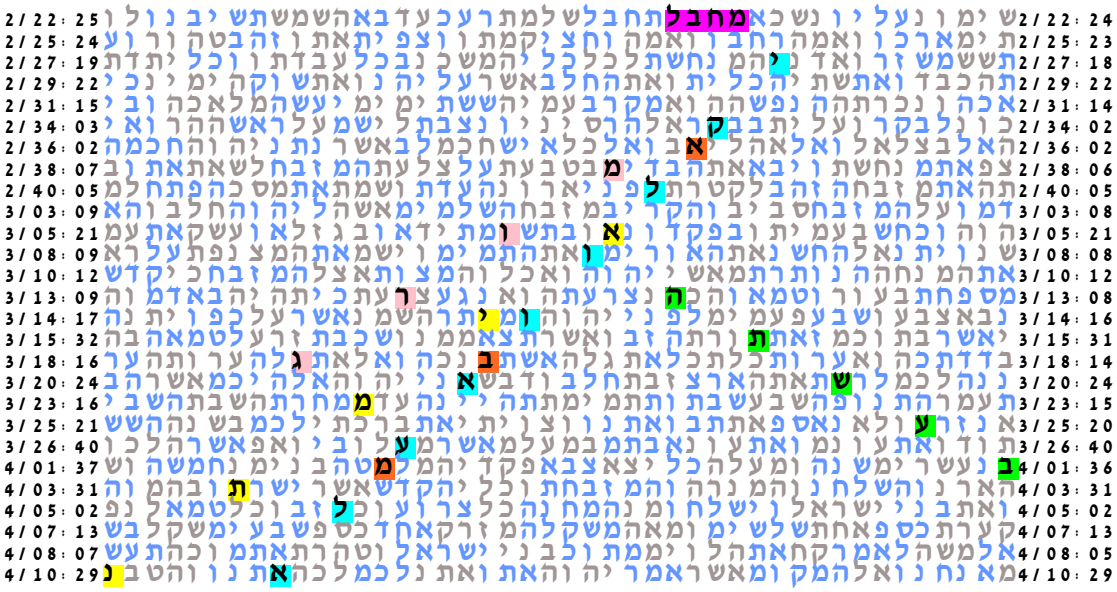
Table showing the pairwise Euclidean distmax compactnesses.

The total compactness score is the sum of the Euclidean distmax compactnesses which for this table is 3334. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 100.5/10,000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, the ELSs in this best table for **אימתן** and **התשעב** had the minimal area compactness to the axis ELS **אלעאוולקי**.

A histogram of the base 10 logs of the scores for the Torah text and each of the monkey texts is shown below.



Using the Euclidean distmin formed by a pair a ELSs, for the pairwise compactness, and the sum of the pair compactnesses as the total compactness, the following table results.



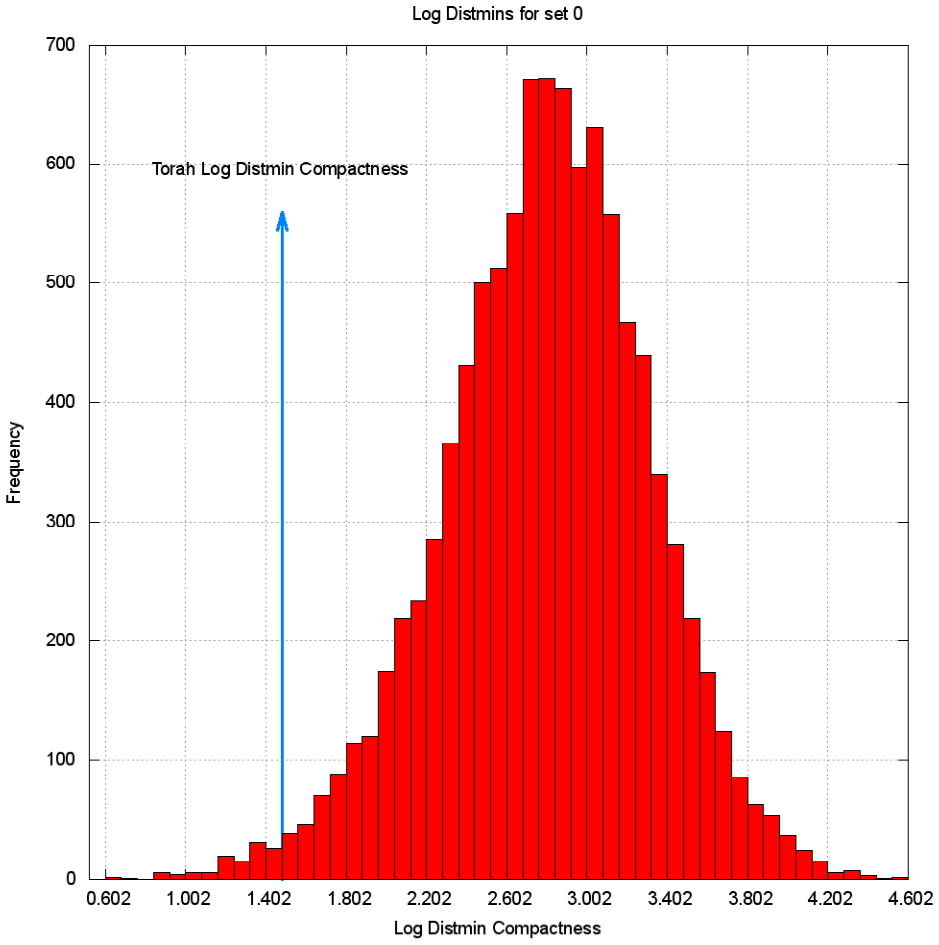
The cylinder size is 3676. The total compactness measure the sum of the Euclidean distmin pairwise compactnesses.

Key Word	Skip	Rowspan	Colspan	Euclidean Distmin
אלעאוולקי	-11031	25	25	0
מחבל	1	27	25	8
אימתן	14710	25	33	2
אובמא	18385	25	25	0
התשעב	7348	25	36	20
מורג	11033	25	25	5

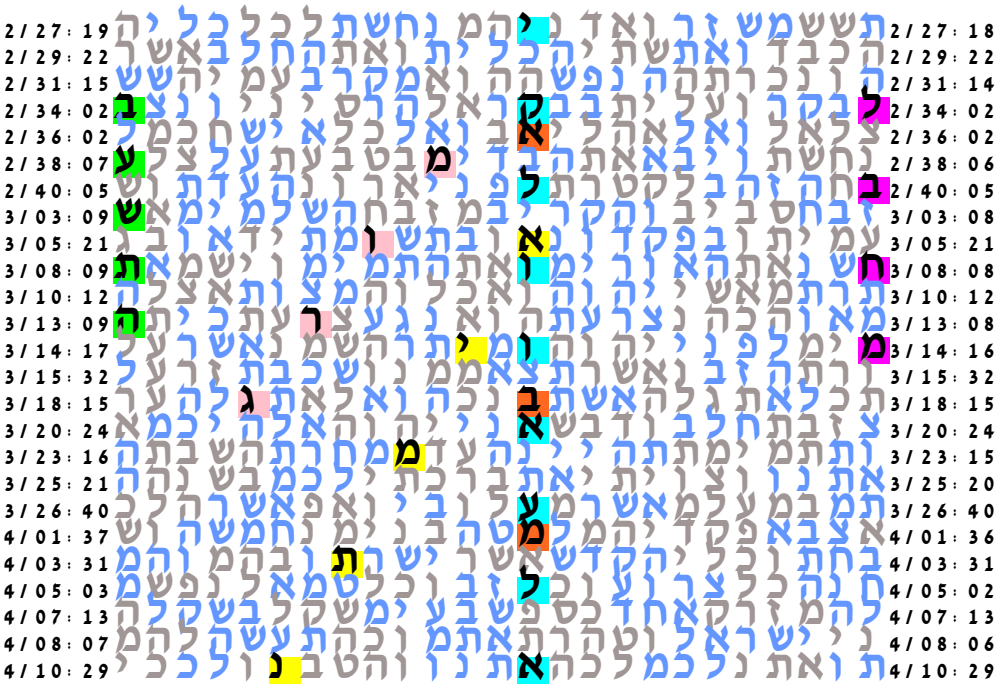
Table showing the pairwise Euclidean mindist compactnesses.

The total compactness score is the sum of the Euclidean distmin compactnesses which for this table is35. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 145.5/10,000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, the ELS in this best table for **התשעב** had the third minimal area compactness to the axis ELS **אלעאוולקי**.

A histogram of the base 10 logs of the scores for the Torah text and each of the monkey texts is shown below.



Using the city block distmax for a pair of ELSs, for the pairwise compactness, and the sum of the pair compactnesses as the total compactness, the following table results. This is similar to the table produced by the perimeter compactness measure.



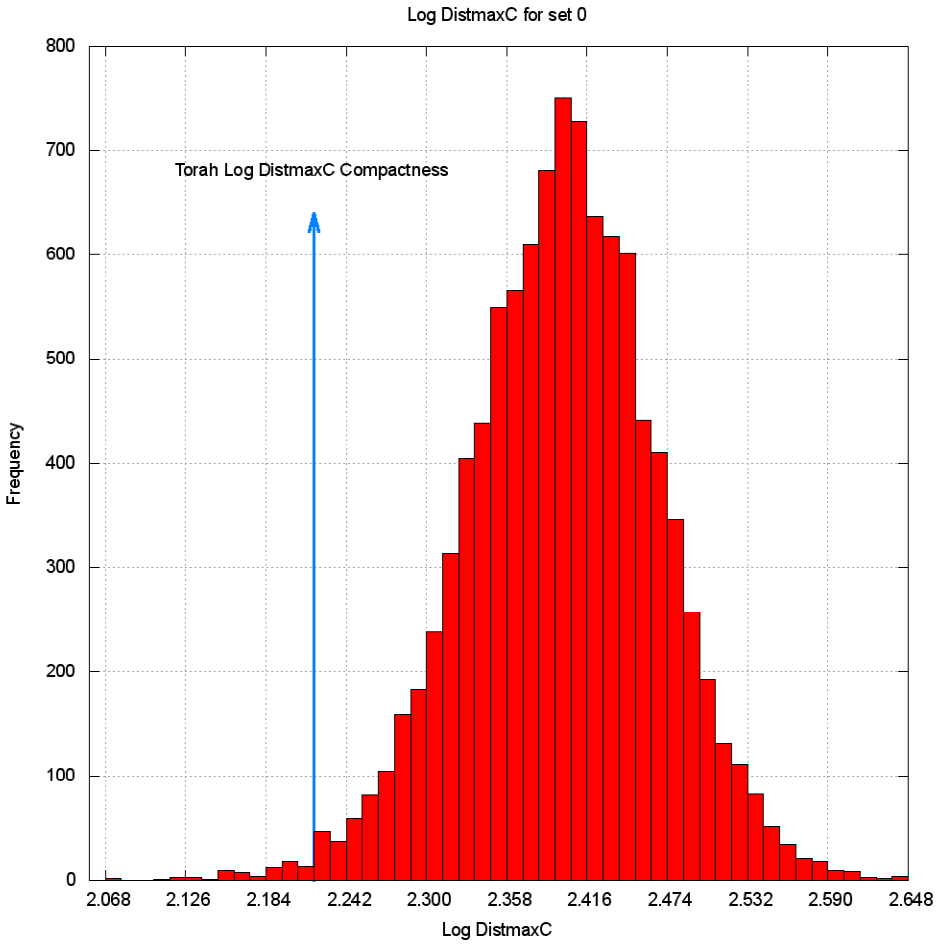
The cylinder size is 3677. This is the best table produced by the city block max distance.

Key Word	Skip	Rowspan	Colspan	City Block Distmax
אלעאוולקי	-11031	25	1	24
מחבל	-11031	25	12	32
אימתן	14710	25	9	32
אובמא	18385	25	1	24
התשעב	-7354	25	14	34
מורג	11033	25	10	23

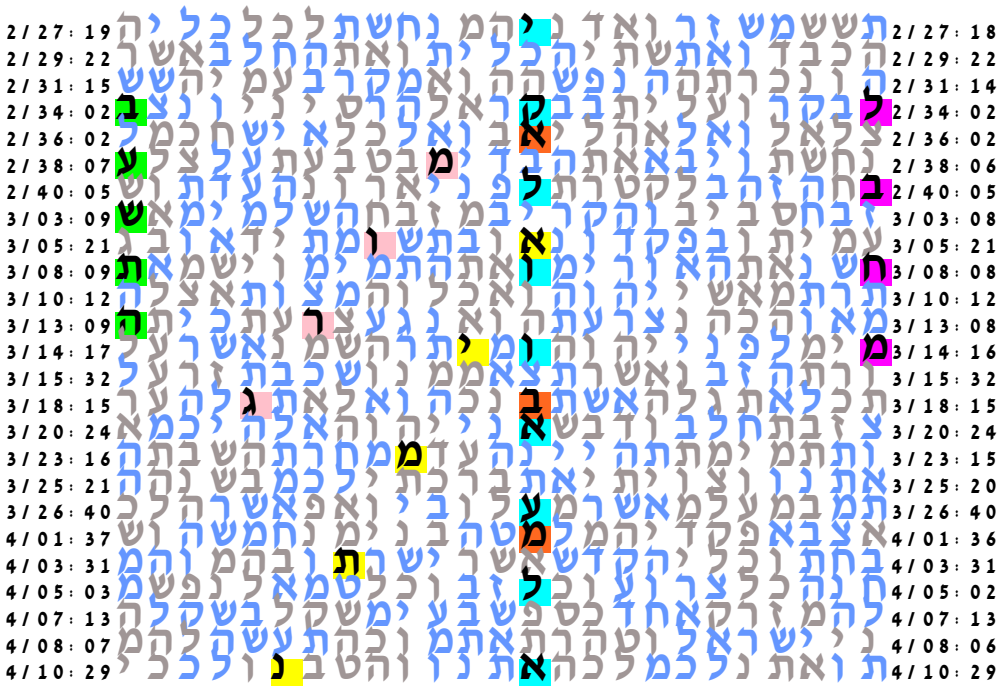
Table of Pairwise city block distmax Compactnesses

The total compactness score is the sum of the city block maxdist compactnesses which for this table is169. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 110.5/10,000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, the ELSs in this best table for **אימתן**, **אובמא**, and **התשעב** had the minimal city block distmax compactness to the axis ELS **אלעאוולקי** and the ELS had the third minimal city block distmax compactness to the axis ELS **אלעאוולקי**.

A histogram of the base 10 logs of the scores for the Torah text and each of the monkey texts is shown below.



Using the distmax compactness formed by a pair a ELSs, for the pairwise compactness, and then selecting that set of smallest distmax ELSs that form the smallest area table, the following table results. This table is the same as the table produced by the Euclidean distmax measure and the city block distmax measure.



The cylinder size is 3677. The best table produced by the Euclidean distmax pairwise compactness measure with the total measure being the area of the table.

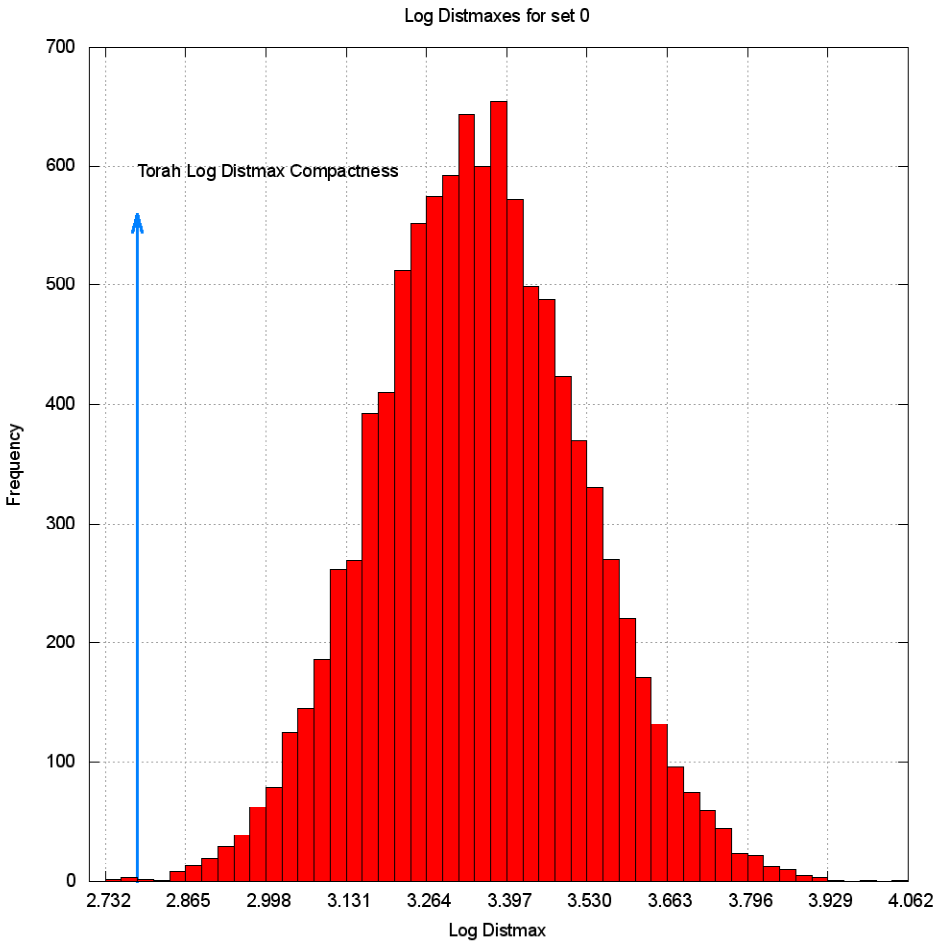
Key Word	Skip	Rowspan	Colspan	Euclidean Distmax
אלעאוולקי	-11031	25	1	576
מחבל	-11031	25	12	562
אימתן	14710	25	9	640
אובמא	18385	25	1	576
התשעב	-7354	25	14	610
מורג	11033	25	10	370

Table showing the pairwise Euclidean distmax compactnesses.

The total compactness score is the area of the table formed from the best Euclidean distmax compactnesses. This area is 625. The probability that a text from the ELS random placement monkey text population would have a better compactness score is 6.5/10,000. Over all axis ELSs found in accordance with the axis ELS search specification, over all resonant cylinder sizes to the axis ELS, and over all non-axis ELSs found in accordance with the non-axis ELS search specification, the ELSs in this best table for **אימתן** and **התשעב** had the

minimal area compactness to the axis ELS **אלעאוולקי**. The ELS for **אובמא** had the second minimal compactness. The ELS **מורג** for had the fourth minimal compactness.

A histogram of the base 10 logs of the scores for the Torah text and each of the monkey texts is shown below.



Torat Moshiach

With the Torat Moshiach study, we present only abbreviated findings. And this will be the case for the all the future studies unless something very interesting happens in one of them.

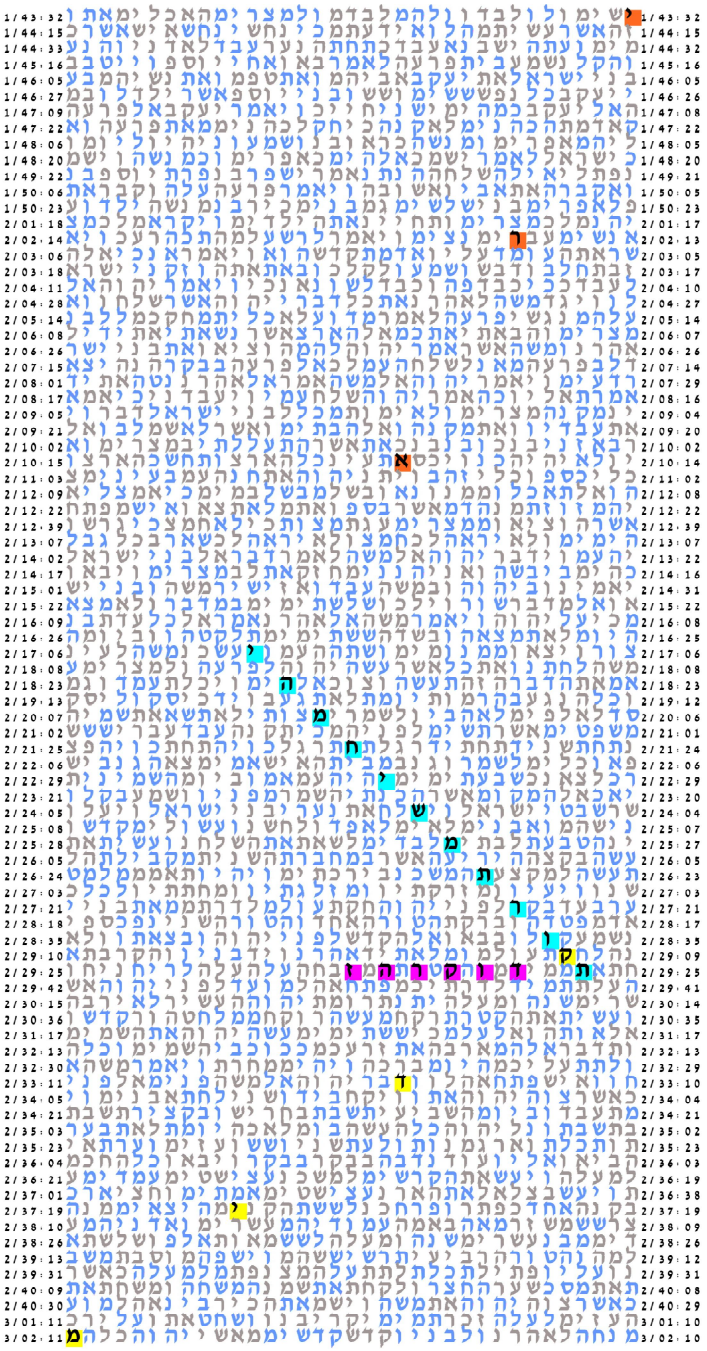
The Torat Moshiach study is based on the key word set suggested by Rabbi Glazerson. He chose for the axis word **תורת משיח**. On this axis word, there is an extension **מהי** and for this study we take the axis word with the extension as a priori. With or without the extension, it only has one ELS and therefore either way, we will get the same p-values in the ELS random placement population. The key word The Ari refers to the mystic and Kabbalist Rabbi Isaac Luria who developed what is known as Lurianic Kabbalah.

What is Torah of Moshiach	**תורת משיח מהי**	Codes	**קודם**
Zohar Code	**זהר קוד**	The Ari	**האריי**

The axis compactnesses: axis perimeter, Euclidean distmax, Euclidean distmax area, and city block distmax all produced the same table with of course different p-values. The Euclidean distmin and the area measures produced different tables. The two different tables are interesting. The table produced by the area measure, is a table that is located in a different place. Three of the ELSs are the same as the table the four compactness measures produced. However, the area table has many more rows. And when we examine why we see that the axis ELS has in the same column an ELS of **האריי** . The area of this pair is 1 column by 53 rows = 53. When we examine the area of the axis with the ELS of in the first table below we see that it is 10 columns by 13 rows = 130. Since the other ELSs are the same, it is clear that the area table has a smallest total area score than the table produced by the four other compactness measures. Also interesting is the fact that the area table had the smallest p-value. The tables and the p-values are shown below.

The cylinder size is 1834. The table produced by the perimeter, Euclidean distmax, and Euclidean dismax are compactness measures; Below is the table produced by the area measure.

The table produced by the Euclidean Distmin compactness measure.



In a 100,000 trial experiment we obtained the following p-values.

Area	**5.5/100,000**
Perimeter	**12.5/100,000**
Euclidean Distmax	**13.5/100,000**
City Block Distmax	**34/100,000**
Euclidean Dismin	**375.5/100,000**
Euclidean Distmax Area	**28/100,000**

P-value table

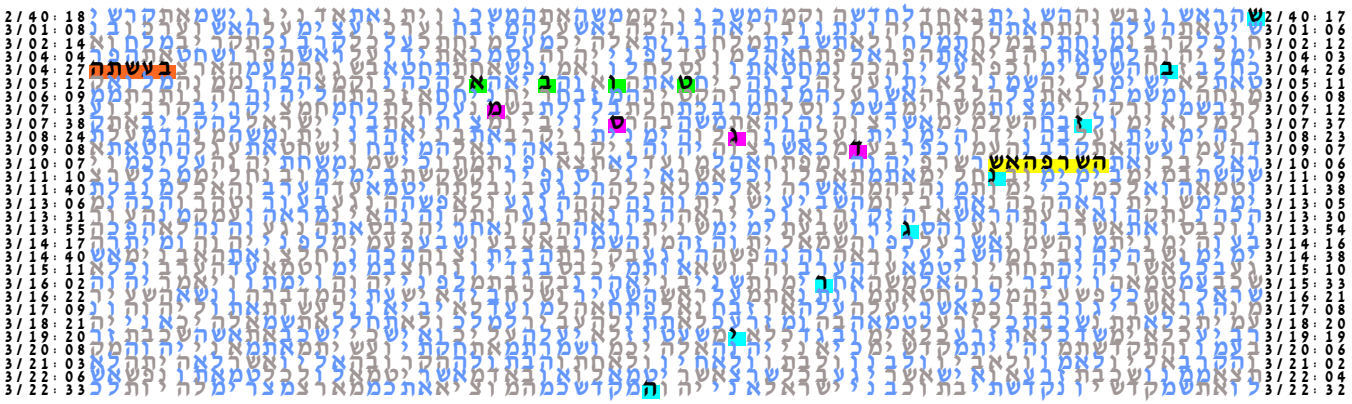
Tuva Zangaria Mosque

The Tuva Zangaria Mosque study is based on the key word set suggested by Rabbi Glazerson. He chose for the axis word **זנגריה**, Zangaria. This key word has a prefix extension of **שב**. We take the axis with its extension as a priori. The key word list is shown below.

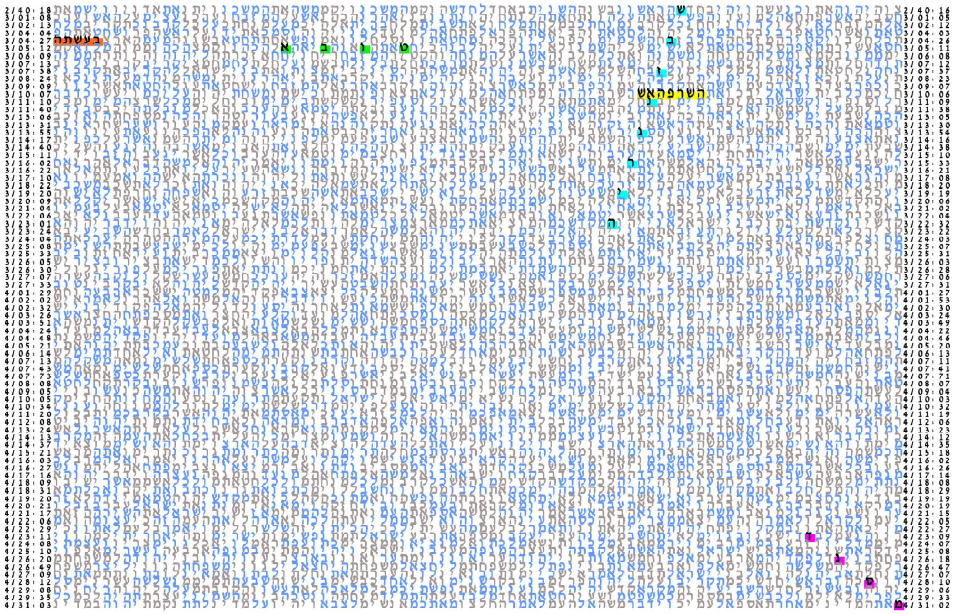
In Zangaria	**שבזנגריה**	The Burning Fire	**השרף האש**
Tuva	**טובא**	5772	**התשעב**
Mosque	**מסגד**		

Five of the six compactness measures produced the same table, but with different p-values. The area compactness measures produced a different table. This table is interesting in that the pairwise area compactness between all but one of the non-axis ELSs with the axis ELS is smaller than the table produced by the other measures. Only the ELS for has a larger pairwise area, 2370 versus 1305. Since the area measure optimizes the sum of the pairwise areas, it is indeed the case that the sum for the area compactness is 5937 and is smaller than the corresponding sum for the non-area compactness measures. And yet the total area of the table produced by the area compactness measure is larger, 6794, than the total area of the table produced by the non-area compactness measures. We show this in the table below.

	Pairwise Area in Area Compactness	Pairwise Area in Non-Area Compactness
שבזנגריה	232	1044
טובא	1189	1334
השרף האש	290	1044
מסגד	2370	1305
התשעב	1856	1972
Sum of Pairwise Areas	5937	6699
Area of Table	6794	1972



The cylinder size is 1266 and is the table produced by the non-area compactness measures. The table below is the table produced by the area compactness meassure. Its cylinder size is 1267.



The table below gives the p-values produced by a 100,000 trial experiment.

Measure	P-value
Area	30.5/100,000
Perimeter	23.5/100,000
Distmax	12.5/100,000
Distmin	5.5/100,000
Distmaxc	10.5/100,000
Distmaxa	1.5/100,000

Summary

The table below summarizes the p-value results of the experiments using the six kinds of compactnesses over four different key word sets.

	Area	Half Perimeter	Euclidean Distmax	Euclidean Distmin	City Block Distmax	Area with Euclidean Distmax
Abuhatzirah	880.5/1000	43.4/1000	3.5/1000	53.5/1000	20/1000	3.5/1000
Elenin	30.5/1000	21.5/1000	9.5/1000	32.5/1000	18.5/1000	9.5/1000
Palestinian State	3.5/100,000	22.5/100,000	178/100,000	2117/100,000	42.5/100,000	2.5/100,000
Al Awlaki	2.5/10,000	52/10,000	100.5/10,000	145.5/10,000	110.5/10,000	6.5/10,000
Torat Moshiach	5.5/100,000	12.5/100,000	13.5/100,000	375/100,000	34/100,000	28/100,000
Zangaria Mosque	30.5/100,000	23.5/100,000	12.5/100,000	5.5/100,000	10.5/100,000	1.5/100,000

P-value table from all the experiments.

Discussion

For the first two experiments, the distmax compactness measure is the best of the five compactness measures studied. Also it was observed that different compactness measures sometimes produced the same best table but the associated p-values differed widely. On the AbuChatzirah experiment, the area compactness measure, the distmax compactness measure and the city block distmax compactness measure all produced the same tables. The p-value for the area compactness measure was 80.5/1000. The distmax compactness measure had a p-value of 3.5/1000 and the city block distmax compactness measure had a p-value of 20/1000.

On the Elenin experiment the area compactness measure and the perimeter compactness measure produced the same tables and the distmax and city block distmax produced the same table. The p-value for the area compactness measure was 30.5/1000 while that of the perimeter compactness measure was 21.5/1000. The p-value for the distmax measure was 9.5/1000 and the p-value for the city block distmax measure was 18.5/1000.

On the Palestinian state experiment the area, perimeter, and city block distmax compactness measures produced the same table but the respective p-values were 3.5/100,000, 22.5/100,000, and 85/100,000, a ratio of almost 1:25 from the smallest p-value to the largest p-value. The distmin measure produced the worst p-value of 2117/100,000 and the distmax measure produced a p-value of 178/100,000. Is is instructive to see the comparison between the table produced by the city block distmax compactness measure compared to the table produced by the area, perimeter, or the distmaxc compactness measure and the distmax compactness measure. Examining the different tables we see that the difference is associated with the ELS was selected for the key word **תשעא** (5)771. For the distmax measure, the furtherst apart letters between the **תשעא** ELS and the **פלשתין** ELS had a row difference of 26 and a column difference of 11. Hence the value of distmax was 26*26+11*11 = 797. But for the table produced by the area, perimeter and city block distmax compactness measure, the furthest apart letters between the **תשעא** ELS and the **פלשתין** ELS is a 4 row difference and a 33 column difference. Hence the value of the distmax measure is 4*4+33*33 = 1105. Indeed it is the case, as it should be, that the table produced by the distmax compactness measure has a better distmax score than the distmax score of the table produced by area, perimeter, or city block distmax compactness measures.

For the Al Awlaki and Torat Moshiach experiment, the area compactness measure produced the smallest p-value.

For the Zangaria Mosque experiment, the area measure produced the smallest sum of the pairwise areas, but the largest table area. All the other measures produced the same table, but of course had different p-values. The distmaxa compactness measure produce the best p-value.

From this limited sample of comparisons, our results suggest that the distmin compactness measure is the worst. It never produced the smallest p-value. When the p-value is small, only a few out of 100,000, the area compactness measure was near the best. But when the p-value is not so small the distmax measure or the distmaxa measure is best.