Bar Mitzvah Drasha (translated from Hebrew)

Yair Sirote

28.5.2012

Book of Numbers
ספר הפקודים

My Parsha is Parshat Bamidbar, which is the first in the book called, "The Book of Numbers". The reason that is it called that is that in it, the Jewish People are counted in a census - not just once, but twice; once in Parshat Bamibar and again at the end, in Parshat Pinchas. The Torah lists the number of people, "from the age of 20 and up", for each and every tribe.

Here are the two listings:

פ' פנחס	פ' במדבר	שבט
43,730	46,500	ראובן
22,200	59,300	שמעון
40,500	45,650	גד
76,500	74,600	יהודה
64,300	54,400	יששכר
60,500	57,400	זבולון
32,500	40,500	אפרים
64,300	32,200	מנשה
45,600	35,400	בנימין
64,400	62,700	דן
53,400	41,500	אשר
45,400	53,400	נפתלי

As you can see, all the census figures end in "00", with the exception of one number in each listing - Gad (50) and Reuven (30).

It seems that these numbers are rounded. However, they are not rounded to the nearest hundred, nor to the nearest 50. So what is the rounding method?

There are 5 different suggestions among the commentaries regarding the rounding method. We will examine each one using Probability, and see if they are at all realistic.

It makes sense to use Probability in order to analyze these numbers because it was intended for large numbers such as population figures, and that is exactly what we have here.

We will also assume that the last two digits of each figure are random. That means that before they were rounded, perhaps they looked like this:

שבט	פ' במדבר	פ' פנחס
ראובן	46,538	43,742
שמעון	59,300	22,262
גד	45,651	40,584
יהודה	74,620	76,511
יששכר	54,465	64,334
זבולון	57,432	60,543
אפרים	40,574	32,574
מנשה	32,218	64,339
בנימין	35,486	45,673
דן	62,764	64,439
אשר	41,516	53,467
נפתלי	53,428	45,453

Binomial Distribution

Probability of obtaining exactly "k" successes out of "N" trials, where the probability of each trial succeeding is "p":

$$\binom{N}{k} \cdot p^k \cdot (1-p)^{(N-k)}$$

In order to test the probability of each suggestion, we will use the Binomial Distribution formula. The inputs of this formula are: the probability of a specific outcome (for instance, the probability of the last 2 digits being exactly 30 is 1:100); the number of times that this outcome appears (1), and the number of total "trials" - 12, the number of tribes.

Let's start.

The first suggestion is that of the Steipler, who said that the numbers are not rounded at all, but rather the numbers written in the Torah are the exact population figures of the tribes - and it was a miracle.

There are 11 cases of the numbers ending in '00. The probability of it coming out exactly 00 is 1:100. We input the numbers into our formula, and get that the probability of it coming up 11 times out of 12 is 10 to the 21st power. That is really improbable!

Probability of 11 of 12 ending in 00

$$\binom{12}{11} \cdot (1/100)^{11} \cdot (1 - 1/100)^{(12-11)}$$
$$= 12 * 0.01^{11} * 0.99 = 10^{-21}$$

$$= 0.000000000000000000001$$

1,000,000,000,000,000,000,000

In order to show just how improbable it is, we will do a brief demonstration. On each of 12 tables there is a 10-sided die. Please take the 10-sided die that is on your table and roll it twice - once for the 10s digit and again for the units.

Whoever got 0 twice, please raise your hand.

I do not see 11 hands. Should we try again? Please go ahead. Maybe it will work next time.

Whoever got 0 twice, please raise your hand.

We don't have 11 hands up? Oh well, I thought it would work this time.

The truth is that in order to get this result, we would have to make 10^{21} attempts. If each attempt takes a minute, and we didn't take any breaks, it would take us 2 quadrillion years.

Too bad, we'd miss dessert.

So if this actually did happen, this wasn't just a miracle, it was a huge miracle! If the Makkot (plagues) were called "the finger of G-d", and the Splitting of the Sea was called "the hand of G-d", than this would be - "the Bazooka of G-d"!

If such a great miracle took place, why didn't the Torah say so? Why didn't G-d take credit for it? Moreover, what could have been the purpose of this miracle? Whom did it help that the census figures ended in hundreds? The truth is, it helped me that I had fewer words to read in the Torah. But that does not justify a miracle of this magnitude. So why did the Steipler insist that these numbers are exact? a) because it's written this way in the Torah and b) because how can one round the Jewish People and not count each and every one? It says, "count the heads of ALL of Bnei Yisrael".

The second suggestion is that of the Meshech Chochma, who said: "the heads of all of Bnei Yisrael" refers to the heads of groups, who were the "commanders of tens". Therefore, "only the tens were counted, not the units.. and from each smaller number they made a more general number". This means that the Meshech Chochma agrees that there is some kind of rounding, and suggests that the rounding is to the nearest 10.

If that were the case, we would expect to see numbers that look like the ones in the first column, where the numbers are rounded to 10, but are usually not 100s:

פנחס	במדבר	Rounded to 10	שבט
43,730	46,500	46,540	ראובן
22,200	59,300	59,300	שמעון
40,500	45,650	45,650	גד
76,500	74,600	74,620	יהודה
64,300	54,400	54,470	יששכר
60,500	57,400	57,430	זבולון
32,500	40,500	40,570	אפרים
64,300	32,200	32,220	מנשה
45,600	35,400	35,490	בנימין
64,400	62,700	62,760	דן
53,400	41,500	41,520	אשר
45,400	53,400	53,430	נפתלי

and not like the actual numbers in the second two columns. What is the probability that there is only 1 number out of 12 that is not 100? 1 in 10^{10} (1 in 10 billion). That is still a huge miracle.

The third suggestion is from R' Yaakov Kaminetzky who said that it is rounded to the nearest 50. But in Pinchas we see that Reuven ends in 30? R' Yaakov explains that those 20 people died with Korach, and this number is not rounded so that we would remember their sin.

If it is indeed rounded to the nearest 50, what would we expect to see?

פנחס - 50	במדבר - 50		שבט
43,750	46,550		ראובן
22,250	59,300		שמעון
40,500	45,650		גד
76,500	74,600		יהודה
64,350	54,450		יששכר
60,500	57,450		זבולון
32,550	40,550		אפרים
64,350	32,200		מנשה
45,600	35,400		בנימין
64,450	62,750		דן
53,400	41,500		אשר
45,450	53,450		נפתלי

- about half the numbers ending in 50 and half 00. The probability of this method yielding our outcome is 0.29% or 1:350. That is not high enough to be probable.

The fourth suggestion is that of R' Chaim Kanievsky. He says that it is rounded to 100 unless the number happens to be exactly 50, because 50 is right in the middle and it is not clear which way to round. We have a convention that we round up, but that is just a convention. (As in the previous approach, we will not consider the 30 of Reuven in the second census.)

The probability of this method is 11%. If we were to try it, we probably would get to eat dessert.

The fifth and final suggestion is by Professor Eli Merzbach of Bar Ilan University who wrote that the rounding is to the nearest 100, unless the units digit is exactly 0. That is, if we get a number like 73, we would round it to 100, but if we get 70, we would leave it as 70.

Let's try it out. Please roll the dice one more time - just for the units.

If you got 0, please raise your hand.

You there are the tribe of Gad! The rest of you are the other tribes, and we will round you to 100, as we actually have here, in the numbers as they appear in the Torah.

פ' פנחס	פ' במדבר	שבט
43,730	46,500	ראובן
22,200	59,300	שמעון
40,500	45,650	גד
76,500	74,600	יהודה
64,300	54,400	יששכר
60,500	57,400	זבולון
32,500	40,500	אפרים
64,300	32,200	מנשה
45,600	35,400	בנימין
64,400	62,700	דן
53,400	41,500	אשר
45,400	53,400	נפתלי

This worked because the probability of this method is 38%, about 1:3.

According to the most likely method, the Torah rounds to the nearest 100, but does not round numbers if they end exactly in 0.

But why? Why use this very strange rounding method?

As the Meshech Chochma said, the commandment to count the census was to count "the heads of Bnei Yisrael". The heads of the people were the commanders of 10s, commanders of 50s, commanders of 100s, and commanders of 1000s. Perhaps, the Torah rounds to the commanders of 100s, unless there is a whole unit of 10s.

Now - is being distinguished as a unit of 10 considered to be positive or negative?

Unlike the Book of Exodus which counts 70 people - individuals - that went down to Egypt, the Book of Numbers counts the Bnei Yisrael as the Nation of Hashem. From that point on, we have no standing as individuals - our prayers are said in plural, our destiny of being a Nation of G-d in the

Land of Israel is a national destiny. As a nation, the greater the number, the more our individual strengths are magnified, while our human imperfections are ignored.

There is a Midrash on the Haftara of Bamidbar that says: "When the Jewish People do NOT do the will of Hashem, they ARE countable, but when they DO the will of Hashem, they are NOT countable". A large rounded number is actually a sign of the strength of the Jewish People as the army of Hashem, as the representatives of G-d in His world. A small and precise number is then a sign of some form of weakness or division.

 Perhaps it is not a coincidence that the two tribes whose census figures end in 10 and not 100 are Reuven and Gad. They were the ones who decided not to enter the Land of Israel and settled on the other side of the Jordan. G-d gave them permission to do so, but it was not exactly "the will of Hashem". And indeed, ultimately they were exiled before all the other tribes.

Through the rounding method of the Book of Numbers, the Torah hints to us that in the future, Reuven and Gad will distance themselves from Klal Yisrael.

Now that I am Bar Mitzvah, I have joined Klal Yisrael, and have committed to do the will of Hashem. I hope that I will succeed, and that all my strength and abilities will be used for the benefit of Klal Yisrael.