



## ENGLISH ABSTRACTS

### LOGICAL MODEL FOR TALMUDICAL HERMENEUTICS — PART TWO

*Michael Abraham, Dov Gabbay, Uri J. Schild*

This is the second part of a paper published in a previous issue of *B.D.D.* (*B.D.D.* 23, July 2010). In the first part we presented a mathematical model representing the three Talmudic Inference rules: Argumentum a Fortiori (*Kal Vachomer*), Single Analogy rule (*Binyan Av* from one Source) and three kinds of Double Analogy rules (*Binyan Av* from two sources). We also studied the methods of refuting such inferences. In this second part we continue our investigations and apply our model to more complex inference structures and their refutations. We present a new kind of refutation method (Microscopic Refutation) for such inferences. In the later sections of our paper we analyse special types of inferences, such as Annulment of a Pair of Refutations, the Abduction of Pairs of Missing Assumptions, Two Stage Derived Consequences, the Turning Around of a *Kal Vachomer* and more.

In this second part we again demonstrate that our model fulfills all rationality requirements, and faithfully represents all of these Talmudic inference types. We are also able to explain logical inferences in the Talmud which seem puzzling at first sight.

These results strengthen our claim that our logical model represents a formal system which can analyse all non-deductive inferences of such types occurring in all areas of common sense and scientific reasoning and not necessarily only those used in the Talmud.

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## KAL VACHOMER AND ITS DISPROVINGS

*Avraham Lifshitz*

This article seeks to study the nature of the *Kal VaChomer* by examining those issues for which the *G'mara* disproves the *Kal VaChomer* in different ways.

The argument raised in the first part of the article is not only that the *Kal Vachomer* is not a necessary condition, but that it also not a sufficient condition. This is the conclusion drawn from the distinction between two disprovings: an inner disproving which undermines the relations of the *Kal VaChomer*, and an external disproving which demonstrates from an external data that the *Kal VaChomer* does not work. The invalidation of the *Kal VaChomer* as a sufficient condition stems from the ability to disprove it in an external fashion. Thus we have solved a severe *Kushiya* of the MaHaRil Diskin about the *Tashbitu* commandment.

In the second part of the article we raise the new insight that every internal disproving is in fact also an external disproving to the contradictory manner of the *Kal Vachomer*. By doing so we propose an answer to the *Kushiya* why the *G'mara* does not save *Kal Vachmer* from being disproved by means of its reversal.

## THE USE OF CONTINUED FRACTIONS FOR CALCULATING THE JEWISH LEAP YEAR CYCLE

*Amos Altshuler*

Two authors, Ch.Y. Bornstein and B. Ben-Yehuda, made use of a mathematical tool, the Continued Fraction, for calculating the Leap Year Cycle in the Jewish Calendar. Though both authors arrived at the right conclusion (which, of course was known a-priori), nevertheless there is a defect in the way they did it - it seems that they attributed to the Continued Fraction a property which it does not have. We point out the defect, and correct it.

## ON RECURRING DATES AND IDENTICAL YEARS

*Rahamin Sar-Shalom*

In the following article the author points to the different possibilities of the coinciding of the Hebrew calendar dates with the dates of the Christian Gregorian calendar and classifies them into three classifications:

1. The known phenomenon of dates that recur and coincide occasionally (after 8, 11, 19, 30... years).
2. The phenomenon of *identical dates*. Dates that *recur* and *coincide* also on the same day of the week.
3. The phenomenon of *identical years*. Years when the calendar including all its components/elements recurs throughout the entire year.

Study of the new tables for comparison of the Hebrew and the Christian calendars found in the new edition of the book *She' arim La' luah Ha' ivri* reveals the extent of the phenomenon of *identical years* to be surprising and astonishing. One can see that the probability of identical years at intervals of 220 years can reach 50% of the years! In addition, the author presents in this article his new method of comparing Hebrew and Christian dates, a method that enables one to discover the identical years by quick reference to tables.

## THE ADDITION OF A LEAP-SECOND TO THE COORDINATED UNIVERSAL TIME (UTC) AND ITS IMPACT ON THE DETERMINATION OF THE *MOLAD*: A SUGGESTION TO SEPARATE THE DETERMINATION OF THE *HELEK* FROM THE DETERMINATION OF THE SECOND

*Ariel Cohen*

Since 1972, 24 leap seconds were added to UTC, a uniform time-scale kept by atomic clocks around the world based on Cesium 133, which replaced the previous clocks based on a second determined as  $1/(3600 \times 24)$  part of the day.

In this article we show that the new definition of the second would have an impact on the exact time of the day in which the average Jewish new moon (*Molad*)

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takes place, if the mean length of the Jewish month is determined as 29.5 days of 24 atomic hours plus 793 “parts” (=Halakim) equaling each 3 and 1/3 seconds.

We suggest that in order to prevent such a discrepancy we should distinguish between the determination of the second used for measuring time in our clocks and the determination of the “part” used in the Jewish calendar’s calculations and state that the “part” continues to be related to the length of the yearly average day as the 1080th part of the 24th part of the time from one sunset to the consecutive sunset.

Such a determination is dependent on the slowly increasing length of the day in contradiction to the constant value of the second used in our clocks.

The impact of the new determination of the second on the length of the average Jewish month is also discussed.

## OCCAM’S RAZOR AND THE REQUIREMENT OF LENIENT JUDGMENT: ONTOLOGICAL TRUTH AND EXISTENTIAL TRUTH IN THE INTERPRETATION OF REALITY

*Matan Benjamin*

A well-known Mishnah in Tractate Avot instructs every person to judge his fellow leniently. To a certain extent, this ruling parallels a separate ruling, pertaining to the philosophy of science — Occam’s razor. Both attempt to direct reality towards a certain goal, either ethical or methodological, despite the fact that these attempts lack essential data required to define them as ontological truths. It would seem that this neglect of reality and minimal interpretation makes these methods illegitimate: they lack proper foundations. However, were we to view the issue from an existential standpoint, rather than an ontological one, these rulings may be understood — the broad interpretation given to reality may break away from reality so long as it does not contradict reality, provided the interpretation has existential meaning, either ethical-religious or methodological. Thus, both Occam’s razor and the requirement of lenient judgment may receive the legitimacy to stray from reality, so long as they have existential meaning.

REREADING THE CENSUSES IN THE BOOK OF NUMBERS

*Yitzhak Meitlis*

Two censuses were organized in the desert. The first one was in the second year after the children of Israel went out of Egypt and the second one some forty years later, close to the time of their entrance to the Land of Israel. The results were quite similar. In both, the number of men over the age of twenty was more than six hundred thousand. According to these numbers it appears that the Israelites were able to form an army numbering hundreds of thousands of fighters. But from the Book of Joshua it seems that the number of warriors was only forty thousand. It would seem that only about 8% of men participated in the fighting, a fact that does not make sense. But a careful reading of the description indicates that there were significant differences between the two censuses. In the second census there was no instruction to count only the males. The second census mentioned women like 'Serah daughter of Asher'. In light of this and additional data it appears that the method of the second census was to count the heads of family by name but to add all the family members, including men, women and children. Although the numbers obtained in the second census were similar to those of the first census, the results are entirely different. The total number of the people of Israel before entering the country was only six hundred thousand, but in the first census, men over the age of twenty were counted.

In light of this new knowledge we can understand why the army of Joshua consisted of approximately forty thousand fighters only and was not an army of hundreds of thousands.

It is interesting that the data from the War of Independence is most similar. During this period the number of Jewish residents in the Land of Israel was just a little over six hundred thousand and the army consisted of about thirty-six thousand fighters.