

PREFACE

This monograph addresses the evening twilight period, *bein ha-shemashot*. Much has been written attempting to reconcile the *gemara's* description of astronomical conditions around twilight in the Middle East with the opinion of Rabbeinu Tam, and to a significantly lesser extent with the opinion of the *Gaon* of Vilna. I can reconcile neither opinion with the *gemara's* description of astronomical conditions during the period of *bein ha-shemashot*. Both

- a period of *bein ha-shemashot* occurring approximately one hour after sunset in accordance with the view of Rabbeinu Tam, and
- to a lesser degree, a period of *bein ha-shemashot* beginning precisely at sunset in accordance with the view of the *Gaon*,

face (different) observational challenges. Instead, I propose a hybrid position, separating the beginning of the *bein ha-shemashot* period, (slightly) from sunset, a position rarely found in the contemporary literature. That position on when the period of *bein ha-shemashot* occurs is much closer to that of the *Gaon* than to that of Rabbeinu Tam. I demonstrate that it is consistent with the *gemara's* description of astronomical conditions and supported by various authorities. As well, this approach is useful in attempting to partially justify centuries of practice.

After completing an initial version of this monograph, I read two important works on *bein ha-shemashot*, *Ohr Ha-meir* by R. Meir Posen and *Munah Yoma* by R. Emanuel Gettinger, the former suggested to me by R. Mordechai Willig, and the latter published just a few years ago. Both are to varying degrees supportive of the approach suggested in this monograph. While I have added a few brief footnotes relating to their works to the main body of the monograph, it seemed appropriate to add some summary comments to this preface as well.

Using a different methodology from the one employed in this monograph, R. Posen in *Ohr Ha-meir* argues that a position akin to the hybrid position I

suggest, was, in fact, the position of the *geonim*, whose position he differentiates from that of the *Gaon*. The position he ascribes to the *geonim* separates the beginning of the *bein ha-shemashot* period slightly further from sunset than what I propose, something with which I do not agree in detail. More importantly, however, his arguments closely align the position of the *geonim* with the hybrid position that I develop, adding significant credence to what is suggested in this monograph.

In a recently published work, *Munah Yoma*, R. Gettinger attempts to explain Rabbeinu Tam in a radically different manner, similar, in some respects, to the hybrid position I develop. Though not consequential to this monograph, I disagree with his interpretation of Rabbeinu Tam. More importantly, however, his understanding of two critical sections of the *gemara* in *Shabbat* is identical, albeit differently argued, to what I will attempt to demonstrate:

- First, the *gemara* does not (seem to) dispute the time that *Shabbat* (and the *bein ha-shemashot* period) ends; the *gemara* only (seems to) disputes the time at which the *bein ha-shemashot* period begins.
- Second, when quantitatively specifying the duration of the *bein ha-shemashot* period, the *gemara* is counting back from the end of *Shabbat*, not forward from its beginning.

As should become evident, this reading of the *gemara* is not in any way linked to nor does it depend on the dispute between the *geonim* and Rabbeinu Tam.

Neither R. Posen nor R. Gettinger made use of the actual times at which stars appear during various seasons in the Middle East, something that I found especially useful in reading the *gemara* accurately.

My purpose is not to suggest a change in standard practice. What I do suggest is that treating sunset proper as the start of the *bein ha-shemashot*

period may be recommended practice as opposed to the strict *halakhah*. As such, a decisor might choose to use the hypotheses developed in deciding cases involving various extenuating circumstances. In any case, my goal is not to change practice but to clarify an area with a significant and complex history.

I have benefitted from an extensive literature. R. Yechial Michal Tukitzinsky's work entitled *Bein Ha-shemashot*, combining a deep knowledge of the *halakhic* literature and meticulous observation with a profound awareness of astronomy, provided a solid foundation for my studies. Lastly, I thank my family and friends who have tolerated my obsession with this and related topics where mathematical reasoning and the observation of nature enhance the understanding of *halakhah* and its development.

PROLOGUE

Time is a critical delimiter for many commandments, including the observance of the holy days, permissible and preferred times to pray, adherence to the laws of *niddah* and performing a *brit milah*. Three subjects

1. the beginning of the daytime period, *alot ha-shaḥar*,
2. the point of transition between days¹ of the week, (*ḥashekhah*, and the period of *bein ha-shemashot* that precedes it) and
3. alternatives to calculate various times during the daytime period

are the primary areas of dispute, which involve multiple *halakhic* issues.² Because of the centrality of *Shabbat*, its twilight period, the period of *bein ha-shemashot*, occupies a lion's share of the literature. That focus and its relationship to other aspects of *zemanim* will be our central focus as well.³

Rambam in *hilkhot Shabbat* 5: 4 refers to the period between sunset and the appearance of three stars as "*bein ha-shemashot*." His language, "*hu ha-nikrah bein ha-shemashot*," "that is **called** *bein ha-shemashot*," might imply that Rambam is providing practical guidance instead of a precise definition.⁴

¹ Note that both the terms "day" and "yom" refer to either the daytime period, as in "during the day," and the day of the week, as in "*yom ha-shishi*."

² The relationship between these three areas is addressed at various points in the monograph. While I will argue for their logical independence, others have asserted both logical and practical interdependencies.

³ While *posekim* might apply some of our findings, it is not our purpose to reach definitive conclusions even with respect to our primary area of focus, the *bein ha-shemashot* period. Of course, a period of *bein ha-shemashot* occurs daily preceding the transition between days of the week. The relevance of various times during the twilight period to areas of *halakhah* other than *Shabbat* is not covered in any detail. For example, it is not our intent to suggest any definitive *pesak* from the few instances that the day of a *brit milah* is referenced; on the other hand, the viewpoint developed has relevance beyond those areas addressed.

⁴ Whether "*hu ha-nikrah*" is an approximation referring only to the beginning of the *bein ha-shemashot* period at sunset, only to its end at the appearance of three stars or to both

In any case, if sunset, as meant by Rambam, is identical to what we colloquially call sunset, we would conclude that presently widespread practice is exactly as Rambam suggests:

- *Shabbat* starts Friday evening at sunset and ends Saturday night with the appearance of three stars.⁵

Awaiting three stars before ending *Shabbat* represents customary practice both before and after Rambam's formulation, albeit in later times with a variety of stringencies, i. e., three small stars and stars relatively adjacent to each other.⁶ However, starting *Shabbat* precisely at sunset, while now completely accepted, was not customary practice for much of European Jewry over many centuries.

The normative opinion of the *gemara* in *Shabbat*⁷ states that the duration of the *bein ha-shemashot* period equals⁸ the time needed to walk $\frac{3}{4}$ of a *mil*. One would therefore expect to see three stars, depending on the assumed time it takes to walk a *mil*, between 13.5 and 18 minutes after the beginning of the *bein ha-shemashot* period. Rabbeinu Tam, an older contemporary of Rambam living in France, was, likely, unaware of the impact of latitude on the appearance of stars.⁹ As such, if sunset precisely defines the beginning of *bein ha-shemashot*, Rabbeinu Tam would not have been able to associate

its beginning and its end is debatable. In my view, it is likely that both are intended as suggested practice, as opposed to either being a precise *halakhic* delimiter. Rambam's perspective is addressed at length at the end of section 5.

⁵ R. Avraham ben Ha-Rambam defined sunset, as the ball of the sun descending below the horizon, identically to the way the term is defined in standard secular usage. R. Kapach disputes that even this passage of Rambam refers precisely to sunset, a critical point of focus.

⁶ Perhaps as well, stars appearing towards the western horizon, a requirement that better accommodates the opinion of Rabbeinu Tam.

⁷ *Shabbat* 34b.

⁸ It is more likely that this is only an approximation, and as is argued, a conservative one.

⁹ An early reader of this manuscript, Yitzhak Radner, pointed out that a discussion in *tosefot Gittin* 8a, s.v. Rabi Yehudah might imply Rabbeinu Tam was not entirely aware of how far north his locale was relative to Israel.

the appearance of three stars with so short a duration of time. For that matter, even those living in the Middle East can rarely see three stars 15 to 18 minutes after sunset, and then only under the most ideal conditions. Rabbeinu Tam, especially during the summer months, living at a more northern latitude in France, might not see what he considered three medium stars until approximately an hour or more after sunset, depending on his interpretation of “medium.” However, a second *gemara* in *Pesaḥim*,¹⁰ in apparent contradiction to the *gemara* in *Shabbat*, but perhaps closer to what Rabbeinu Tam observed, discusses the appearance of stars at the time needed to walk 4 *milin*, 72 or 90 minutes, after sunset. For reasons to be explained later, Rabbeinu Tam chose to equate the endpoints of these two *sugyot*. Thus, Rabbeinu Tam postulated that the sunset referred to by the *gemara* in *Pesaḥim* is (approximately) what we today call sunset. However, the *gemara* in *Shabbat*, Rabbeinu Tam explained, is referring not to our normal definition of “sunset,” the sun descending below the horizon, but to a **second** sunset defined by the light of the sun being almost minimal, as would occur well after sunset.¹¹ It is at that point, Rabbeinu Tam asserted, at this **second** sunset, that the *bein ha-shemashot* period begins Friday night. On Saturday night, the *bein ha-shemashot* period ends 13.5 to 18 minutes, the time needed to walk $\frac{3}{4}$ of a *mil*, after that **second** sunset. This theory of Rabbeinu Tam provided the conceptual basis for many Jewish communities in Europe that began *Shabbat* well after sunset.

One might argue, that had Rabbeinu Tam and his contemporaries been more aware of their location relative to the Middle East and of the impact of latitude, they would have understood that the appearance of three stars signifying the end of *Shabbat*, occurs longer after sunset at their more northern location than at locations in the Middle East. More importantly, some might assert, they would never have postulated a *halakhic* approach

¹⁰ *Pesaḥim* 94a.

¹¹ Rabbeinu Tam’s actual language was based on his assumptions about astronomy and is not consequential; reformulating Rabbeinu Tam’s opinions using modern terminology is done throughout. In addition, there are conceptual differences between the actual opinion of Rabbeinu Tam and the way it was formulated by Ramban and many who embraced his approach. These differences are not significant practically. Despite these differences, Ramban’s detailed explanation of Rabbeinu Tam is referred to as the opinion of Rabbeinu Tam throughout this monograph.

that started *Shabbat* so much later. Simply put, Rabbeinu Tam's assumed lack of geographic / scientific knowledge appears to have created an opportunity for the violation of the laws of *Shabbat* for almost an hour every Friday afternoon. Of course, one could argue that since Jews observed *tosefet Shabbat*, a voluntary lengthening of *Shabbat*, the violation was only theoretical. However, this attempt at rationalization is likely incorrect. Centuries later, even after many *posekim* understood the impacts of latitude, the practice of starting *Shabbat* after sunset remained widespread. In the 19th century, R. Moshe Sofer, in his famous *teshuvah* on this subject, plainly states that in his community people normally work well after sunset on Friday.¹² As the opinion of Rabbeinu Tam became the accepted *halakhah*, recorded by both R. Yosef Caro and Rama, it is widely acknowledged that many communities in Europe worked well after sunset on Friday.¹³

Frankly, I am not bothered by how inadequate knowledge of science might have contributed to a questionable *halakhic* approach. Rabbeinu Tam and those who followed his approach marshaled considerable logical and textual support for their point of view. While the *gemara* in *Shabbat* refers to the appearance of three stars and the *gemara* in *Pesahim* refers to *tzait ha-kokhavim*, the *Yerushalmi* in the beginning of *Berakhot* equates *tzait ha-kokhavim* with the appearance of three stars. While many centuries later, the

¹² *Teshuvah* 80 is covered in more detail in subsequent sections. On that basis, R. Sofer ruled that a baby born 27 minutes after sunset on Saturday evening should have his *brit* on the following *Shabbat*. See R. Haim Benish, *Ha-zemanim Be-halakhah*, Bnai Brak, 5756 / 1995, vol. 2, page 242.

¹³ Chapters 46 and 51 in *Ha-zemanim Be-halakhah*, contain dozens of references with some remnants of this practice continuing until the Second World War. In a recent work, <http://www.math.harvard.edu/~shlomo/docs/bein-ha-shemashot.pdf>, Prof. Sternberg argues that prior to the (widespread) appearance of clocks, Rabbeinu Tam was only a theoretical opinion. I avoid drawing any precise historical conclusions. While I strongly agree that the widespread growth of clocks beginning in the 15th century had substantial impact, I find it difficult to conclude that prior to the era of clocks, *Shabbat* always started precisely at or before sunset. If the start of *Shabbat* in the Middle East was some small number of minutes after sunset, migration to areas further from the equator might naturally result in a variety of approaches that might further delay the onset of *Shabbat*. More than likely, prior to the existence of clocks, observation lessened the practical impact of questionable concepts on *halakhic* observance. As clocks reduced the role of observation, it is likely that the impact of problematic concepts increased, an area addressed more extensively in the epilogue.

Vilna *Gaon* demonstrated convincingly that the term *tzait ha-kokhavim* as used in *Pesahim*, is different from its use in *Berakhot*, it is hardly surprising that *rishonim* might assume similar semantics to the term *tzait ha-kokhavim* across its usage in all *sugyot*. We should also remember that Ramban, who agreed in principle with Rabbeinu Tam, lived in Spain and later in Israel.

Even were one to prove that Rabbeinu Tam would never have formulated his approach had he been more aware of geography / astronomy, something that is by its nature plausible but hardly provable, the opinions of Rabbeinu Tam and his followers present a conceptually elegant *halakhic* position.

Furthermore, several subsequent *halakhic* authorities, starting with R. Avraham Pimental, the 17th century author of *Minhat Kohen*, the first comprehensive analysis of this topic, and in modern times both R. Moshe Feinstein as well as R. Joseph Soloveitchik, **all aware of the impact of latitude**, side with Rabbeinu Tam, at least partially. Although each adjusts the commonly assumed 72-minute opinion of Rabbeinu Tam based on latitude, Rabbeinu Tam's approach to the ending of *Shabbat* is considered normative *halakhah* in the case of R. Pimental and R. Feinstein, and a personally practiced stringency for R. Soloveitchik. While each of the approaches of the above authorities to the opinion of Rabbeinu Tam faces almost intractable challenges, it would be erroneous (in addition to arrogant) to dismiss Rabbeinu Tam's approach to the period of *bein ha-shemashot* in its entirety, as simply a result of an inadequate understanding of astronomy. To the contrary, this monograph marshals support for elements of Rabbeinu Tam's approach from the reading of critical parts of the text of the *gemara* in *Shabbat*.

Rabbeinu Tam's opinion remains primarily both a conceptual approach and a stringency that extends the end of *Shabbat*. What is troubling, however, is the start of *Shabbat*. If one rejects the opinion of Rabbeinu Tam, must one then conclude that (inadvertent) violation of *Shabbat*, perhaps even at a biblical level, was commonplace every Friday afternoon for an extended period of our history? Despite multiple conceptual and textual difficulties that the opinion of Rabbeinu Tam must address, **my goal is to explain and defend *halakhic* practice independent of the *halakhic* theory its**

adherents may have assumed. As Abayeh or R. Yosef told Raba bar R. Hanan: “Go forth and see how the public are accustomed to act.”¹⁴ I will outline alternatives based on previous *halakhic* approaches that support different starting times for the beginning of *Shabbat*. Thus, some, or perhaps most of the practice of Jews throughout the ages is defended, despite *halakhic* concepts (that were partially) based on what Rabbeinu Tam suggested. Of course, any such defense depends on just how late various communities started *Shabbat*. Without reliance on the entire opinion of Rabbeinu Tam and avoiding its more challenging elements, I hope to defend those who started *Shabbat* after sunset but not as late as the conceptual viewpoint of Rabbeinu Tam might have allowed.¹⁵

While some communities keep *Shabbat* later Saturday night, largely as a stringency based on the opinion of Rabbeinu Tam, after the second World War, (almost) all begin *Shabbat* exactly as Rambam suggested, at what we refer to as sunset. Under normal circumstances, no one today would ever suggest starting *Shabbat* after sunset. Ironically, what follows from the approach that is developed is that the stringency based on Rabbeinu Tam’s approach is what is problematic given the *gemara*’s description of the end of the *bein ha-shemashot* period. Up to some point after sunset, the leniency that follows from Rabbeinu Tam’s approach, like the assumed practice of European Jewry over the centuries, (but only when coupled with reasonable adjustments based on latitude and season), represents a plausible, if not a preferred, reading of the *gemara*’s assumed beginning for the *bein ha-shemashot* period on Friday evening.

¹⁴ *Berakhot* 45a, Soncino translation.

¹⁵ We simply do not have much of an historical record on precisely when *Shabbat* was started. As a stringency and perhaps to better align with Rabbeinu Tam’s conceptualization of the time at which *Shabbat* ends, the conclusion of *Shabbat* was lengthened from three *medium* stars, stated in the *gemara*, to three *smaller and adjacent* stars. That stringency, based on the opinion of Rabbeinu Yonah (and perhaps a *Yerushalmi*) and meant to include *tosefet Shabbat* as well, was codified in the *Shulḥan Arukh*. The very same logic that would apply a stringency extending the end of *Shabbat* should not have delayed the start of *Shabbat*, at least not past the appearance of three *medium* stars. I doubt that even clocks would have made (most) people comfortable starting *Shabbat* as late as both the theory would support and the time many today pray the *minḥah* service.

Beyond the period of *bein ha-shemashot* discussed above, there are other complex topics associated with the entire area of *zemanim*, independent to some extent, though often interrelated. The area is difficult even absent any issues of inadequate observation or errors in arithmetic obscuring *halakhic* principles. Several possible factors including reticence to

- criticize major authorities and articulate potential errors clearly,
- acknowledge changes in practice or
- consider the impact of an evolving knowledge of science

have not helped to promote clarity in an already complex area. I will be as clear as possible without any of the above hesitations. In doing so, I can defend more accurately what I consider more important, namely both the integrity of traditional Jewish practice as well as the deep *halakhic* insights of generations of *posekim*. It is particularly critical that we identify any misconceptions related to indisputable observation, logic or arithmetic so that one can separate the *halakhic* approach of various authorities from (any errors in) their assumed fact base to (re)apply their *halakhic* insights in practice.¹⁶

¹⁶ Even reading the more recent *halakhic* literature or listening to some popular lectures, with all the necessary science and basic arithmetic already well known, one still finds no shortage of confusion and / or misstatements. Despite a preference for clarity, even in the epilogue, where I am willing to conjecture more freely, I avoid excessive concentration on the origin, cause, and history of errors. Even when an error is prevalent, I typically only mention a few examples. It suffices to recognize that not all authorities recognized the impact of latitude or season or were immune from errors that are more basic; this is compounded by a tendency to rely on texts without sufficient observation. On occasion, poorly reasoned attempts to defend a difficult point of view end up amplifying the problem. Nonetheless, when a viewpoint is plagued by (what appears to be) an obvious error, it behooves us to uncover the circumstances that contributed to its occurrence. Often that enables an appreciation for an underlying *halakhic* principle obscured by the error. For example, there are *teshuvot* that differentiate between diverse types of activity and then address their permissibility at a specific time during the *bein ha-shemashot* period. Inaccuracy in specifying a *zeman* ought not obscure an important concept in differentiating between various activities.

While these laws are clearly unique, they, perhaps even more so than the topics surrounding *shiurim*, clearly stress the importance of a mimetic tradition and force one to consider the nature of how *halakhah* is conceptualized and how its development occurs. I leave it to others to draw whatever philosophic implications they care to make about the relationship between *halakhic* concepts and *minhag Yisroel saba*, the mimetic tradition. My purpose is to render this area as clear as I can, and explain, with focus on both the primary *sugyot* and observable reality, alternative conceptual positions in critical *halakhic* areas with attention as well to centuries of *halakhic* practice.

There is an extensive *halakhic* literature dealing in depth with diverse opinions covering all the multiple facets of this area. *Ha-zemanim Be-halakhah*, a contemporary two-volume work by R. Haim Benish¹⁷ provides a comprehensive summary. This essay does not attempt to be comprehensive or to reiterate and analyze in-depth a wealth of primary sources.¹⁸ Our focus is primarily the period of *bein ha-shemashot*; I cover other topics when they are critical to the period of *bein ha-shemashot* according to some opinions. After a lengthy introduction and followed by an explicit list of assumptions, I outline nine major categories that can act as a checklist¹⁹ when reading the vast *halakhic* literature, and cover

¹⁷ *Ha-zemanim Be-halakhah* and the numerous primary sources it references provide a great deal of the material needed for further study. This monograph should make the reading of those sources easier.

¹⁸ Some fascinating areas adjacent to our focus that are covered only partially include

- the period after sunset in Rambam *hilkhot Shabbat*, *Kiddush Ha-ḥodesh* and other areas of *Mishnah Torah*,
- a plausible approach to the enigmatic opinion of R. Nosson Adler, quoted by R. Sofer,
- options for calculating the opinion of Magen Avraham and
- reconciling the multiple *teshuvot* of R. Israel Isserlein in *Trumat Ha-deshen* and the opinions of R. Yosef b. Moshe, his student, and the author of *Leket Yosher*.

These, as well as numerous other technical aspects of *zemanim*, have not been addressed adequately; all are areas that I hope to address more fully in the future.

¹⁹ I have found that when reading the vast literature, the first **eight** topics are a helpful checklist for classifying viewpoints, identifying assumptions as well as addressing any

- major positions within each of the categories,
- arguments supporting and challenging each position,
- interrelationships between these categories,
- elements within each category that are problematic in terms of observation, arithmetic or logic that complicate the reading of this vast *halakhic* literature and
- an approach with which to analyze each category.

The monograph concludes with an epilogue highlighting areas of innovation and providing summary conclusions for the nine categories discussed in detail.

To that end, the main sections of this essay deal objectively with each of the underlying *halakhic* categories. Only in the epilogue will I return to a more intuitive discussion, including some hypotheses of how practice and its rationale may have evolved.

Both this prologue and the epilogue contain opinion and conjecture that readers will hopefully find compelling or at least highly plausible. I have no way of proving, for example, what knowledge (of geography or science) Rabbeinu Tam possessed. I can only conjecture, based on what he wrote. I cannot even be certain of Jewish practice for beginning and ending *Shabbat* from the 13th through much of the 18th centuries. I hope that historians may one day fill in some more detail; theologians can then deal with implications for the *halakhic* process.

assumed dependencies between the categories. (As I attempt to demonstrate, I do not believe there are as many dependencies between these categories as many claim). The ninth category is personally fascinating and rarely addressed despite its fundamental nature; it is a clear example of the modern *Brisker*, conceptual approach.

Allow me one somewhat repetitive point. An approbation from R. Yitzhak Hutner gently cautions Prof. Levi²⁰ and others against attempting to decide between the “giants of previous generations.” My goal is not to do that; in fact, adjusted for their factual inaccuracies, **almost all the major conceptual approaches of posekim are supportable**, as I hope this monograph will make clear. To that end, this monograph facilitates separating the *halakhic* framework and concepts from any factual errors that may have been made. To my mind, doing otherwise is both dishonest and complicates study of the entire area.

However, in the interest of both completeness and candor, I must admit that I wonder whether some *halakhic* insights are just innovative solutions to problems created by incomplete knowledge. It is difficult not to wonder what changes might have been made by Rabbeinu Tam had he been aware that it turns dark and stars appear much longer after sunset in the north of France than in Israel. I remind the reader that, even in science, great insight may result from flawed data. Knowledge of Rabbeinu Tam’s position and its extensive support from *sugyot* in the Talmud are important, if only as issues to be addressed by those who oppose his viewpoint. Similarly, understanding the approach of generations of *halakhic* authorities apart from any errors they may have made, allows a clearer articulation of their opinions and insights. To do otherwise, would continue to obscure a critical area of *halakhah*.

²⁰ See the approbations at the beginning of his book, *Halakhic Times*, originally published in Jerusalem in 5727 / 1967. R. Hutner was likely reacting to Prof. Levi’s strong opposition to the widely assumed time required to walk a *mil* of 18 minutes as well as, perhaps, his clear bias in favor of the opinion of the *geonim*.

INTRODUCTION: Some current positions

Accessing *zemanim* on an older version of the Orthodox Union's website provided a variety of *halakhic* information, comporting with widespread current practice. Included were two differently calculated times for the end of *Shabbat* at locations around the world. In the New York area, the first alternative, approximately 40 to 50 minutes after what is commonly referred to as sunset, is presented as the opinion of the *geonim*, according to whom *Shabbat* ends the time it takes to walk $\frac{3}{4}$ of a *mil* after the beginning of the *bein ha-shemashot* period. The second alternative, 72 minutes, is presented as the opinion of Rabbeinu Tam, according to whom *Shabbat* ends the time it takes to walk 4 *milin* after sunset. Of course, this is immediately problematic. If the time needed to walk 4 *milin* is 72 minutes, then the time needed to walk one *mil* is 18 minutes and the time needed to walk $\frac{3}{4}$ of a *mil* equals 13.5, not 40 to 50 minutes. Part (but certainly not all) of this discrepancy can be attributed to the fact that the opinion of the *geonim* is normally adjusted based on (location /) latitude and often further adjusted based on season of the year. However, those two adjustments alone applied to 13.5 minutes do not yield a range of approximately 40 to 50 minutes in the New York area. Other factors include

1. the extension of the end of *Shabbat* from the appearance of medium stars to the appearance of small stars,
2. the impact of doubt as applied to a prohibition as serious as the observance of *Shabbat*,
3. the impact of *tosefet Shabbat*,
4. the length of the time needed to walk a *mil* and
5. the beginning of the *bein ha-shemashot* period.

The opinion of Rabbeinu Tam, however, is assumed to be fixed at 72 minutes, at any latitude and during all seasons of the year. (Currently, for reasons I could not even begin to justify, the OU website provides an

alternative that does not adjust the opinion of the *geonim* for the end of *Shabbat*, leaving it at a fixed 42 minutes. Most websites and printed calendars adjust the end of *Shabbat* per the *geonim*).

Halakhic principles, logical consistency, and theory notwithstanding, most of current practice follows one of these two opinions. Unquestionably, widespread practice adjusts the length of the period of *bein ha-shemashot* based on latitude (and even season on occasion) when following the opinion of the *geonim*, while leaving the length of the *bein ha-shemashot* period constant when following the opinion of Rabbeinu Tam. This is not surprising. R. Elijah of Vilna and R. Shneur Zalman of Liadi, the first Lubavitcher Rebbe,²¹ both explicitly require these adjustments in applying the approach of the *geonim*. They were the two most prominent authorities that battled to reinstate the practice of the *geonim* against what had become the practice of an overwhelming majority of European Jewry who had adopted the opinion of Rabbeinu Tam. That majority included many if not most subsequent *rishonim*, both R. Yosef Caro and Rama, and most early commentators on the *Shulhan Arukh*. For those who followed the opinion of Rabbeinu Tam, there is no conclusive evidence²² in either *halakhic* literature or practice, that Rabbeinu Tam or anyone else until **after** the time of the *Shulhan Arukh* ever adjusted the start or the end of the *bein ha-shemashot* period with explicit reference to either latitude or season.²³ Similar to the time needed to walk 4 *milin*, it was assumed to be invariant.

Comporting with practice and consistent with the opinion of the major authorities whose opinion those practices appear to follow, would not normally warrant further analysis. However, as I will quickly illustrate, almost every aspect of *zemanim* involves a challenging mosaic of major and

²¹ In his *siddur*, in a short essay entitled *Seder Hakhnosat Shabbat*, R. Shneur Zalman of Liadi abandoned the position he took in *Shulhan Arukh Ha-rav* that supported Rabbeinu Tam.

²² *Minhat Kohen*, written in the 17th century, provides a comprehensive review of *zemanim*, and when suggesting latitude-based adjustments to the opinion of Rabbeinu Tam, mentions no earlier source supporting that approach.

²³ This disparity in approach, adjusting one measure and not another, has the effect of reducing the period of dispute around the end of *Shabbat* in northern European countries.

minor *halakhic* issues that must be resolved and then applied, consistent with observable astronomical facts.

Consider two other contemporary opinions on this topic, Rabbi Feinstein,²⁴ and Rabbi Willig.²⁵ R. Feinstein cites two alternatives to be followed in the New York metropolitan area: 72 minutes and approximately 50 minutes. Clearly, the practice recommended on many websites is rather consistent with R. Feinstein's ruling. However, R. Feinstein's logic is radically different. First, R. Feinstein argues that latitude is commonly accepted as a determinant in the length of the *bein ha-shemashot* period and is thus to be applied to the opinion of Rabbeinu Tam as well. Second, R. Feinstein observes that while **he waited 72 minutes in Lithuania, in accordance with Rabbeinu Tam**, the sky is equivalently dark and starry in New York after only 50 minutes. Therefore, R. Feinstein adjusts Rabbeinu Tam's opinion based on latitude, and concludes that there is an adequate *halakhic* basis for those living in the New York area and following Rabbeinu Tam to wait only 50 minutes.²⁶ This opinion is like one given by Rabbi Pimental, in *Minhat Kohen*, in applying Rabbeinu Tam's opinion.²⁷ R. Pimental suggested that the Jews living in the low altitude²⁸ of the Netherlands need only wait 48 minutes after sunset (in the spring) to end *Shabbat* according to Rabbeinu Tam. However, the length of time from sunset to darkness (however defined) increases as one moves further away from the equator traversing the latitudes of the Middle East (~30 degrees), the Northern United States (~40 degrees), the Netherlands (~50 degrees) and Lithuania (~55 degrees). Assuming adjustments based on latitude, the end of *Shabbat* occurs at an increased length of time after sunset in New York or the Netherlands than in Israel. Problematically, R. Feinstein's end to *Shabbat* is earlier in the New York area (like the Netherlands in the opinion of R.

²⁴ *Igrot Moshe, O. H.* 4:62.

²⁵ *Am Mordechai on Masekhet Berakhot*, New York, 1992 and 2018, chapter 2.

²⁶ 72 minutes is preferred by R. Feinstein, but only as a recommended stringency.

²⁷ *Maamar sheni*, chapters 4 and 5.

²⁸ R. Pimental was perplexed by the expected impact of latitude and explicitly questions why the twilight period in the Netherlands is not longer than 72 minutes given that the Netherlands is further from the equator than the Middle East. To explain 48 versus 72 minutes, R. Pimental significantly overestimated the effect of elevation and its impact on the twilight period in low-lying Holland.

Pimental) than in the Middle East according to Rabbeinu Tam's understanding of the *sugyot*. Despite the widespread acceptance and application of this opinion of R. Feinstein in many popular and scholarly contexts, analysis and certainly criticism is often muted or absent entirely.²⁹

While many websites and calendars align with R. Feinstein's *pesak*,³⁰ rationales are often entirely different.³¹ When one waits approximately 50 minutes, almost all websites assume one is following the *geonim*, while R. Feinstein assumes that one is still following Rabbeinu Tam. Unlike R. Feinstein's ruling, most websites do not adjust Rabbeinu Tam's opinion for latitude or season. Of course, one could argue that Rabbeinu Tam's times for twilight and nightfall were intended to apply to France and not the Middle East. That would imply that the *sugyot* that Rabbeinu Tam is analyzing defined *zemanim* for Europe and not the Middle East, hardly a supportable position. On the other hand, both historical practice and Rabbeinu Tam's own position made no explicit latitudinal adjustments between the Middle East and France. One can only assume that Rabbeinu Tam assumed his *zemanim* applied uniformly to both the Middle East and France. In that regard, the OU and most other websites that keep 72 minutes invariant are consistent with both Rabbeinu Tam's viewpoint and how it has been practiced.³²

²⁹ Both R. Willig *Am Mordechai*, *Berakhot* chapter 2, in the last section, and R. Dovid Heber in *Shaarei Zemanim*, page 90, raise this fundamental issue with R. Feinstein's position.

³⁰ There are differences, as the *zemanim* provided by many websites adjust for seasonality as well. R. Belsky argues that R. Feinstein would have agreed to that change. See his approbation on the www.myzemanim.com website.

³¹ As we will see on other issues, practice can on occasion be explained to comport with entirely different conceptual positions. Thus, opinions on ending *Shabbat*, while radically divergent in theory, might vary less significantly in practice.

³² While normally no precise latitude-based adjustments were made to Rabbeinu Tam's position, approaches like that of R. Pimental, which use the appearance of stars, regardless of the length of time since sunset, to define the end of *Shabbat*, implicitly incorporate both season and latitude-based adjustments.

In his *sefer, Am Mordechai*, R. Willig, like R. Feinstein, takes as a given that latitude must be a determinant in applying the approach of Rabbeinu Tam as well. However, R. Willig follows that to its logical conclusion:

- The 72-minute practice in Lithuania was not, as R. Feinstein (and probably the clear majority of Orthodox Jewry) assumed, the correct practice of Rabbeinu Tam, but rather just the practice of the *geonim* applied at a location / latitude more than 50 degrees from the equator.

In R. Willig's approach, the logic of Rabbeinu Tam's opinion, regardless of the practice followed by Rabbeinu Tam or those who adhered to his position, must be coupled with the laws of astronomy as currently understood. Thus, the time needed to walk 4 *milin* that Rabbeinu Tam rules as the end of *Shabbat*, only applies around the spring and fall equinox and only at the latitude of Israel and Babylonia (approximately 30 degrees north latitude). Rabbeinu Tam's locale in France, as well as New York and Lithuania would require a significantly later end to *Shabbat*. In fact, R. Willig provides both a slightly shorter (for those following the *geonim*) and a significantly longer (for those following Rabbeinu Tam) end-time to *Shabbat* consistent with the opinion and (private) practice of his mentor Rabbi Joseph Soloveitchik.³³ While their logic and application of basic astronomy to *zemanim* is impeccable, it does not comport with practice. Interestingly, both R. Soloveitchik's personal stringency and R. Feinstein's ruling for the entire community follow Rabbeinu Tam. In addition, both agree that adjustments for latitude must be made. However, their conclusions are radically different. R. Feinstein ends up with a *pesak* that comports with tradition, albeit, employing logic that is, at least to this author, puzzling. R. Soloveitchik, on the other hand, followed (and refined) a family (*Brisker*) practice that is almost unprecedented, coupling a precise understanding of astronomy with a *halakhic* formulation rooted in Rabbeinu Tam's approach.

³³ R. Soloveitchik, as will be explained later, considered the time needed to walk 4 *milin* to be 90 minutes (the *Brisker achtel*, an eighth of a day in Yiddish) as opposed to the 72 minutes used by most *posekim*, and then adjusted 90 minutes by latitude and season. Thus, R. Soloveitchik maintained *Shabbat* with respect to Biblical restrictions until almost 2 and ½ hours after sunset in Boston around the summer solstice.

Thus, R. Soloveitchik ended up waiting considerably longer for the end of *Shabbat* than either Rabbeinu Tam or any of his prior adherents who did not apply latitudinal adjustments to increase the length of time after sunset in establishing Rabbeinu Tam's end to the period of *bein ha-shemashot*.³⁴

³⁴ In a *yarzeit shiur*, (*Shiurim Le-zekher Avi Mori*, volume 1, *yom ve-lailah*) R. Soloveitchik outlined a compelling, albeit highly non-traditional approach that reworked Rabbeinu Tam to a position consistent with astronomical observation. However, even this approach to Rabbeinu Tam must deal with the textual issues in reading the *gemara* in *Shabbat* that are discussed in section 7, a topic that R. Soloveitchik did not address.

INTRODUCTION: The primary *sugyot*, *Shabbat* 34b - 35a and *Pesahim* 94a, and their interrelationship; the basic opinions of the *geonim* and *Rabbeinu Tam*, and some of the fundamental challenges each position must address.

The *gemara* in *Pesahim* discusses whether the period between *alot ha-shahar* and sunrise (and the equivalent period from sunset to *tzait ha-kokhavim*) is the time needed to walk 4 or 5 *milin*.³⁵ The *gemara* in *Shabbat* describes the period of *bein ha-shemashot* in a variety of ways to be outlined below and analyzed in detail in sections 5 – 8. However, when quantified in terms of time, the *gemara* in *Shabbat* sets the length of the period of *bein ha-shemashot* at either the time needed to walk $\frac{2}{3}$ or $\frac{3}{4}$ of a *mil*. Although it is the *tanna* Rabi³⁶ Yehudah whose opinion is quoted in both *sugyot*,³⁷ the contradiction could be resolved, as some have suggested, by assuming that perhaps Rabi Yehudah changed positions. However, given the significant discrepancy, almost all commentators attempt to resolve the inconsistency by postulating that the two *sugyot* are addressing differing intervals.

To ground this introduction, assume that the interval between *alot ha-shahar* and sunrise is the time it takes to walk 4 *milin*, and that the time needed to walk each *mil* is 22.5 minutes.³⁸ On a canonical day, around the spring and fall equinox, sunrise and sunset are at 6:00AM and 6:00PM respectively.

³⁵ We often use the phrase “the time needed to walk X *milin*.” Undoubtedly, a person walking for an entire day will cover fewer *milin* per hour than one who walks for a shorter period. That adjustment is not how this system of specifying time-periods is defined. Instead, if one walks 32 *milin* in a daytime period of 12 hours, the time needed to walk a single *mil* is $(12 * 60 / 32 =)$ 22.5 minutes, even though walking only one *mil* takes significantly less than 22.5 minutes. Similarly, the number of *milin* covered in 90 minutes is $(90 / 720 =)$ $\frac{1}{8} * 32 \text{ milin} = 4 \text{ milin}$.

³⁶ I use “*Rabi*” to denote a *tanna* and “*R.*” for an *amora*.

³⁷ It is Rabi Yehudah quoted explicitly in *Pesahim* specifying that the period of *bein ha-shemashot* is $\frac{1}{10}$ th of a day; in *Shabbat*, there is a dispute between Rabbah and R. Yosef concerning the length of Rabi Yehudah’s *bein ha-shemashot* period.

³⁸ Both the length of time to walk a *mil* and the number of *milin* in the twilight interval are covered in detail in sections 1 and 2. Choosing either 22.5 minutes or the more typical 18 minutes is not consequential. I chose 22.5 minutes as the time needed to walk a *mil* because it is a much more broadly-based opinion than most assume currently.

Under these assumptions, per the *gemara* in *Pesaḥim*, *alot ha-shaḥar* is (4 * 22.5 =) 90 minutes before sunrise, at 4:30AM, and *tzait ha-kokhavim* is 90 minutes after sunset, at 7:30PM.³⁹

The conceptual approach of Rabbeinu Tam posits that the endpoints of the *sugyot* in *Shabbat* and *Pesaḥim* coincide.⁴⁰ The end of *Shabbat* and the *bein ha-shemashot* period in *masekhet Shabbat* is at 7:30PM, 90 minutes after sunset. However, the beginnings of the periods differ; the *gemara* in *Shabbat* refers not to the sunset we commonly define the term, but a **secondary** sunset, not when the sun itself is no longer visible, but when almost all illumination from the sun is no longer visible as well. That occurs at 7:13:7.5PM, more than an hour after what we call sunset, and at that time, the period of *bein ha-shemashot* begins. Until that time, the day continues, **and on Friday night, work is permitted.**

The *geonim*⁴¹ take exactly the opposite position. In their formulation, the beginning points of the two *sugyot* are (almost and according to many commentators exactly) identical. Thus, the period of *bein ha-shemashot* begins at sunset, as is customarily defined.⁴² Shortly thereafter, at 6:16:52.5PM, *Shabbat* ends, and work is again permitted. At 7:30PM, after

³⁹ A careful reading of Rabbeinu Tam (and other *posekim*) might align 6:00PM with the sun beginning to go below the horizon, a few minutes prior to the sun having gone completely below the horizon, which is our usual definition of sunset. Note that this makes the day at the equinox exactly 12 hours, while *ḥatzot* is a few minutes early. I have disregarded this and other minute differences.

⁴⁰ Rabbeinu Tam is likely to have been influenced by the *Yerushalmi* in the beginning of *Berakhot* and other *sugyot* that define *tzait ha-kokhavim*, the term used in *Pesaḥim*, as the appearance of three (medium) stars; in the *sugyah* in *Shabbat*, the appearance of three medium stars indicates the end of the day.

⁴¹ The position of the *geonim* and the *Gaon* in this area are often viewed as identical. While the *Gaon* clearly identified sunset as the beginning of the period of *bein ha-shemashot*, the opinion of the *geonim* is less clear. See footnote 46.

⁴² I do not deal with the isolated opinion of the R. Eliezer mi-Mitz, the author of the *Yeraim* that posits that the interval in *masekhet Shabbat* begins approximately 15 minutes **before** sunset.

the full 4-*milin* period of the *sugyah* in *Pesaḥim*, **all the stars** appear,⁴³ not just the three medium stars that signify the end of *Shabbat*.

Practice has at various times and for a variety of reasons somewhat softened both positions. Nevertheless, it is critical to recognize that the (conceptual) disagreement is significant. In many European communities, Jews who followed Rabbeinu Tam worked well after what we refer to as sunset on Friday evening; many Jews living in Israel and points closer to the equator followed the *geonim* and ended *Shabbat* within 30 minutes after sunset. At least in terms of *halakhic* theory, a period of approximately an hour at both the beginning and end of *Shabbat* is in dispute.

The approach of the *geonim* differentiates the *sugyah* in *masekhet Shabbat*, which equates the end of *Shabbat* with the time at which three stars appear, from the *tzait ha-kokhavim* of *masekhet Pesaḥim*, the time when all the stars appear. It is therefore intuitively obvious why according to the approach of the *geonim*, the period from *alot ha-shaḥar* to sunrise is identical in length to the period from sunset and the appearance of all the stars. **All the stars appear (in the evening) when no remaining light from the sun impair their visibility; equivalently *alot ha-shaḥar* is coincident with the first rays of light (in the morning.)** In the morning, as more illumination from the sun becomes visible, the number of stars that remain visible decreases; in the evening, the reverse occurs and as illumination from the sun disappears completely, all the stars (that can possibly be seen) become visible. An equal length of time between sunset and when light (however defined) disappears and again between the time light reappears and sunrise is a logical consequence of this symmetric definition. However, the approach of Rabbeinu Tam, which equates the *tzait ha-kokhavim* of *masekhet Shabbat* and the *tzait ha-kokhavim* of *masekhet Pesaḥim*, must deal with this fundamental issue of asymmetry. How can one equate

⁴³ The *Gaon* in *O. H.* 459 clarifies this by adding the word “*kol*” to *tzait ha-kokhavim*. *Tzait kol ha-kokhavim* in *Pesaḥim* is not the appearance of just three stars, but the much later appearance of all the stars. The potential *halakhic* consequences, if any, of the appearance of all the stars is discussed in section 9.

- the length of time between *alot ha-shaḥar*, when (almost) all the stars are still visible, and sunrise, with
- the length of time from sunset to the appearance of only three stars?⁴⁴

While the approaches of the *geonim* and Rabbeinu Tam are cited almost exclusively, it is critical to realize that other points of view are possible. The *gemara* in *Pesaḥim* defines a longer interval of 90 minutes. As normally assumed, the short interval of approximately a quarter of an hour that is defined by the *gemara* in *Shabbat* is mapped

- by the *geonim* to the beginning of the 90-minute interval and
- by Rabbeinu Tam to the end of the 90-minute interval.

However, one must also consider **a hybrid or intermediate position where the interval in *masekhet Shabbat* begins somewhere between the points suggested by the *geonim* and Rabbeinu Tam, beginning after sunset at 6:00PM but before 7:13:7.5PM.**⁴⁵ The positions of Rabbeinu Tam, who equates the endpoints of the intervals in *Shabbat* and *Pesaḥim*, and the

⁴⁴ This issue is most fundamental. As will become clear, it is impossible to address the issue fully without radically changing some fundamental element of Rabbeinu Tam's conceptual opinion and / or how it is practiced. R. Soloveitchik did exactly that both in (personal) practice and in the theory developed in his *yarzeit shiur*. Absent so major a change in Rabbeinu Tam's approach, attempts to deal with this issue will introduce other complications. One representative issue is *ḥatzot*, when defined as the midpoint between *alot ha-shaḥar* and the appearance of only three stars. *Ḥatzot* will occur too early, not at the precise point when the sun is directly overhead. Many, as illustrated by R. Benish, simply disregard the issue, or assume that *ḥatzot* need not be precise. *Ha-zemanim Be-halakhah* cites many examples of calendars from major Jewish communities, ostensibly endorsed by their rabbinic leaders, which would calculate *ḥatzot* assuming the appearance of three stars and dawn are symmetric endpoints. In a somewhat similar fashion, R. Feinstein's *teshuvah* allowing early morning prayers 90 minutes before sunrise (*Igrot Moshe O. H. 4:6*) and his *teshuvah* on nighttime *zemanim* (*Igrot Moshe O. H. 4:62*) that established 50 or 72 minutes after sunset as the end of *Shabbat*, are inconsistent and not cross-referenced. Attempts to address this fundamental issue occur in multiple contexts in this monograph.

⁴⁵ Alternatively, at 6:58:30PM, $\frac{3}{4}$ of the time needed to walk a *mil*, 13.5 minutes before *tzait ha-kokhavim*, if the interval is the more customary ($4 * 18 =$) 72 minutes, ending at 7:12PM.

geonim, who equate the initial points, are two extremes. An intermediate position would place the smaller interval of the *gemara* in *Shabbat*, the time needed to walk $\frac{3}{4}$ of a *mil*, somewhere within the much longer interval in *Pesahim*, the time needed to walk 4 *milin*. I raise this not just as a theoretical possibility. Rather, as will become evident, the strongest arguments that have been adduced in favor of the position of Rabbeinu Tam within the classical literature as well as those to be developed in this monograph, imply that the day continues after sunset delaying the **start** to the *bein ha-shemashot* period until sometime after sunset. Conversely, the greatest challenges to the opinion of Rabbeinu Tam result from his position that the **end** to the *bein ha-shemashot* period extends as late as the time needed to walk 4 *milin* after sunset. First, this requires that the astronomic conditions described in *masekhet Shabbat* that define the end of the *bein ha-shemashot* period are observable in the Middle East around the time it takes to walk 4 *milin* after sunset. Second, those conditions must be parallel to conditions that exist around *alot ha-shaḥar*. Observation challenges both assertions.

Therefore, for purpose of analysis, I will separate the argument between the *geonim*⁴⁶ and Rabbeinu Tam into two parts:

- When does the period of *bein ha-shemashot* begin?
- When does the period of *bein ha-shemashot* end?

The length of the period (in the Middle East) is, according to all opinions, (perhaps as most currently assume only around the spring equinox) the time needed to walk $\frac{2}{3}$ or $\frac{3}{4}$ of a *mil*.

⁴⁶ What I call, and is commonly assumed to be, the position of the *geonim*, is more aptly the position of the *Gaon*. R. Posen throughout *Ohr Ha-meir* argues that while the *Gaon* himself considered sunset proper as the beginning of the *bein ha-shemashot* period, the *geonim* maintained a version of the intermediate position developed in this monograph. While a thorough analysis of R. Posen's position is beyond our scope, I concur with his assertion that according to the *geonim*, the start of the *bein ha-shemashot* period begins after sunset proper. However, I do not believe it is quite as late as R. Posen maintains.

The text of the *gemara* in *Shabbat* contains three sections that must be analyzed carefully. Unlike Rabi Yosi, who considers the length of the *bein ha-shemashot* period as instantaneous, the blink of an eye, Rabi Yehudah, in a statement that the *gemara* rules as normative for the beginning of *Shabbat*, defines the period of *bein ha-shemashot* in terms of the appearance of the horizon. Rabi Yehudah's precise wording is challenged by the *gemara* as being inconsistent. It contains three initial phrases

- one referring to the setting sun,
- one referring to the sun's illumination and
- one referring to the darkening horizon,

and then a fourth phrase that defines the end of the *bein ha-shemashot* period. Rabbah, who approximates the period of *bein ha-shemashot* as the time needed to walk $\frac{3}{4}$ of a *mil*, assumes that all three initial phrases apply to the *bein ha-shemashot* period. The difficulty with this approach is the repetitive nature of the description, requiring Rabbah to explain that the phrases refer to the beginning and two intermediate points within the *bein ha-shemashot* period. The need for describing two intermediate points is somewhat forced.⁴⁷ On the other hand, R. Yosef adds a word – “**daytime**” – and he explains that

- the initial phrase describes an interval after sunset that is still daytime,
- the second phrase describes a level of illumination just prior to the beginning of the *bein ha-shemashot* period and
- the third phrase describes a point during the period of *bein ha-shemashot*.

⁴⁷ Perhaps, as is subsequently debated by Ravah and Abaye, the two intermediate points are separately describing conditions in the eastern and western sky or perhaps earlier and later points during the interval of *bein ha-shemashot*.

The difficulty with this approach is that the word “**daytime**” must be added and assumed to be understood implicitly in Rabi Yehudah’s original formulation. This slightly shorter period for *bein ha-shemashot* aligns with R. Yosef’s position that maintains the length of the period is the time needed to walk only $\frac{2}{3}$ of a *mil*, $\frac{1}{12}$ th of a *mil* shorter than Rabbah’s $\frac{3}{4}$ of a *mil* interval.

The *gemara* then records a discussion between Abaye and Ravah debating whether one should be looking at the western or eastern horizon; this passage is critical and must be explained according to the interpretations of both the *geonim* and Rabbeinu Tam.⁴⁸

Both Rabbah and R. Yosef attribute their opinion of the position of the *tanna* Rabi Yehudah to the opinion of the *amora* R. Yehudah in the name of Shmuel. Later, the *sugyah*, without any suggestion of disagreement, quotes another statement of R. Yehudah in the name of Shmuel concerning 1, 2 and 3 stars. I address alternative interpretations of this statement and its relationship to the remainder of the *sugyah*, at length. That analysis is central to the viewpoint developed in this monograph.⁴⁹

With respect to the argument of Rabbeinu Tam and the *geonim*, several other *sugyot* are referenced in support of the *geonim*. One that is representative is the *gemara* in *Zevahim*, which asserts that (sacrificial) blood is disqualified at sunset, seemingly in opposition to the opinion of Rabbeinu Tam.⁵⁰ In such instances, one of two arguments can be invoked:

⁴⁸ This debate between Abaye and Ravah is covered in section 7.

⁴⁹ This statement is analyzed in Section 5.

⁵⁰ *Tosefot*’s answers in *Zevahim* 56a s.v. *menayin le-dam* and the discussion in *Minhat Kohen*, *maamar rishon* chapters 4, 10, 11, 12 and 14 are prototypical.

- The *halakhah* that specifies *precisely* sunset only applies to a unique situation, as in the case of *korbanot*.
- The language is less clear than one might assume, and sunset refers not its precise astronomical definition but to some later point when the sun's impact is diminished.

As these *sugyot* have been extensively quoted and debated,⁵¹ it is unnecessary, except on rare occasion, to review them in this monograph. Instead, I concentrate on analysis of the basic *sugyot* mentioned.

One additional source that bears on these two *sugyot* is the lengthy discussion in the *Yerushalmi*, beginning in *Berakhot* 2b,⁵² that considers the verse in Nehemiah 4:15,

- *Ve-anahnu osim be-melaḥah.... mei-alot ha-shaḥar ad tzait ha-kokhavim,*

as defining the daytime period from *alot ha-shaḥar* until the appearance of three stars. Rabbeinu Tam is entirely consistent with this approach; in fact, the verse provides an explicit *sugyah* that links the appearance of three stars in the evening as the endpoint corresponding to *alot ha-shaḥar* in the morning. How the asymmetry is to be dealt with is quite different from the overall problem of asymmetry that Rabbeinu Tam must address. Unlike the *gemara* in *Pesaḥim*, nothing in the *Yerushalmi*, as well as the other texts that quote the verse in Nehemiah (even remotely) implies symmetry. Those *sugyot* that quote the verse in Nehemiah appear to support a definition of the daytime period that is asymmetric relative to both *ḥatzot* and the time from *alot ha-shaḥar* to sunrise and sunset to *tzait ha-kokhavim*. While this asymmetry may be surprising, it is not, in and of itself, an issue. On the other hand, the *gemara* in *Pesaḥim* explicitly introduces symmetry by asserting equal intervals bracketing sunrise and sunset, each of the same

⁵¹ *Minḥat Kohen* organizes and comprehensively covers the major *sugyot* on this issue.

⁵² Discussion of the verse occurs as well in more abridged form in the *Bavli*, *Megillah* 20a and *Berakhot* 2b.

duration, the time needed to walk either 4 or 5 *milin*. The opinion of Rabbeinu Tam further extends the symmetry of the *gemara* in *Pesaḥim* by equating the endpoints of the *sugyot* in *Shabbat* and *Pesaḥim*. By implication, Rabbeinu Tam equates the endpoint in the *Yerushalmi* as well. **For the *geonim*, however, the *gemara* in *Shabbat* (and the *Yerushalmi* in *Berakhot*) is addressing a different endpoint than the (later endpoint referenced in the) *gemara* in *Pesaḥim*.**

There are two approaches to this later point, referred to by the *Gaon* as *tzait kol ha-kokhavim*, when **all** the (possible) stars appear. According to the *Gaon*,⁵³ the *gemara* in *Pesaḥim* is theoretical; the evening equivalent of *alot ha-shaḥar*, 4 *milin* after sunset, when all the stars appear, is not ascribed any halakhic significance. Alternatively, one can assume that while the appearance of three stars approximates or defines the end of each day of the week, the daytime period extends beyond that point, until all illumination from the sun has disappeared. That later point may apply to specific areas of *halakhah*, where only the daytime period as opposed to the specific day of the week is relevant, a theoretical possibility addressed in section 9.

The *geonim* must deal with several questions. First, since it is universally acknowledged that the day starts with *alot ha-shaḥar*, should it not correspondingly end at an equivalent point after sunset, i. e., *tzait kol ha-kokhavim*? This question is easily addressed. Symmetry is required only according to the approach of Rabbeinu Tam; for the *geonim*, given the two distinct uses of the term day, the day of the week versus the daytime period, symmetry need not be expected.⁵⁴ Second,⁵⁵ and this question is

⁵³ *O. H.* 261.

⁵⁴ R. Soloveitchik in his *yartzeit shiur* previously referenced, developed and advanced an argument that clearly affirmed this type of symmetry as he reformulated the opinion of Rabbeinu Tam. However, as will be discussed, the way Rabbeinu Tam's position was practiced, did not always comply with this principle of symmetry.

⁵⁵ It is somewhat surprising that this question was not broadly discussed until the 20th century. Perhaps, consistent with our central thesis, *Sabbath* did not begin precisely at sunset as most now assume, even according to the *geonim*.

fundamental, after an interval of the time needed to walk $\frac{3}{4}$ of a *mil* after sunset, in the Middle East, three medium stars are barely visible, if at all.

Rabbeinu Tam must address several fundamental questions. First, in the Middle East three medium stars appear well before the time needed to walk 4 *milin* after sunset. Second, the description of the horizon around the end of *Shabbat* as well as the debate between Abaye and Ravah all appear to support the opinion of the *geonim*.⁵⁶ Third, and most fundamentally, how could the time of the appearance of three stars and the time of *alot ha-shaḥar*, when all the stars are still visible, be identically separated (as specified by the *gemara* in *Pesaḥim*) from sunset and sunrise respectively? The analog to three stars becoming visible is not *alot ha-shaḥar* when (almost) all stars are still visible.⁵⁷ This last issue and the debate between Ravah and Abaye present major challenges to the opinion of Rabbeinu Tam.

I return to these two *sugyot* while analyzing the primary *halakhic* categories below, attempting to formulate responses to the above questions throughout the monograph.

⁵⁶ This is covered in more detail in section 7.

⁵⁷ As will be discussed further in detail, only approaches as that of R. Soloveitchik tackle fully the fundamental questions raised by symmetry with *alot ha-shaḥar* that is central to Rabbeinu Tam's position.

INTRODUCTION: Primary *halakhic* categories

1. How many *milin* does one walk during the period from sunrise to sunset? What is the time needed to walk a *mil*: 18, 22.5, 24 minutes, etc.?
2. How long is the period from sunset to *tzait kol ha-kokhavim* (or equivalently from *alot ha-shaḥar* to sunrise) in the Middle East around the time of the equinox: 72 minutes, 90 minutes, 96 minutes, 120 minutes, etc.?
3. How is the period from *alot ha-shaḥar* to sunrise or its equivalent period from sunset to *tzait kol ha-kokhavim* to be adjusted at distinct locations and during different seasons (if at all)?
4. How are we to define the hours of the day: from sunrise to sunset or from *alot ha-shaḥar* to darkness?
5. Of the three criteria given by the *gemara* in *Shabbat* – time, the appearance of stars and darkness (darkening / appearance of the sky / horizon), which, if any, are the definition of night, and which are just approximations or an indication? How do opinions expressed using these three terms compare?
6. How is the duration⁵⁸ of the *bein ha-shemashot* period to be adjusted at distinct locations and during different seasons (if at all)? Might this depend on whether the period of *bein ha-shemashot* is:

⁵⁸ This issue links to both categories 3 and 7. Placed here, it facilitates the flow of the monograph.

- 1) a period of uncertainty that is its own unique *halakhic* category, either
 - a) a combination of both day and night, or perhaps
 - b) a category of its own, or
 - 2) a period with a definitive transition point that we are uncertain how to pinpoint, either
 - a) practically or perhaps
 - b) because of some element of *halakhic* uncertainty, or
 - 3) an example of the Rabbis establishing a fence?

7. When does the period of *bein ha-shemashot* end? How are the criteria specifying the end of the *bein ha-shemashot* period interpreted by various authorities?

8. How does the beginning of the *bein ha-shemashot* period relate to what we call sunset? What alternatives might be considered for the beginning of the *bein ha-shemashot* period?

9. How do the two meanings of day – day as in “day of the week” and day as in “during the daytime” relate? Must the end of the daytime period coincide with the end of a day of the week?

INTRODUCTION: Assumptions

- **Hours as they occur in a *halakhic* context with respect to times during the day are usually *shaot zemaniot*.** Thus, the length of an hour during the day varies with the length of the day calculated either from sunrise to sunset or *alot ha-shaḥar* to *tzait ha-kokhavim*. When the context is unclear, I will refer to standard hours as “clock hours.” Similarly, the term “day” normally is referring to the *halakhic* day of the week; on occasion “day” refers to the interval from sunrise to sunset.⁵⁹
- **Under all circumstances, *ḥatzot* must occur at the (precise) point when the sun is at the highest point in the sky and casts no shadow (the midpoint between what is nominally reported as sunrise and sunset).** This assumption is not universally accepted.⁶⁰ In fact, calendars that use *alot ha-shaḥar* and three stars as the endpoints for defining the daytime period and calculate the hours of the day based on observation of those endpoints always derive a point of *ḥatzot* that is earlier than midday.⁶¹ This deviation from midday is apparent even at latitudes around the Middle East, increasing as one moves further from the equator.⁶²
- **The daytime period begins with *alot ha-shaḥar*.**

⁵⁹ Hours in a lunar month or *tekufah* are standard, clock hours. Other exceptions include the time one waits between meals and possibly, time used as *fence* where the *size of the fence* does not vary logically, e.g., *Trumat Ha-deshen* on the two-hour period before *ḥatzot* on *erev Pesah*. See Sacha Stern in *Time and Process in Ancient Judaism* (Oxford, England and Portland, Oregon, 2003), pages 51 – 53 and particularly footnote 23.

⁶⁰ *Minḥat Yitzḥak* 4:53 strongly supports the necessity to calculate *ḥatzot* accurately.

⁶¹ Note that an assumption of asymmetric endpoints is not, in any way excluded. The epilogue, when discussing *shaot zemaniot*, contains a conjecture that maintains a precise definition of *ḥatzot* despite asymmetric endpoints.

⁶² If both intervals are set to a fixed 72 or 90 minutes, this problem is avoided. However, as I will point out, this raises other issues about *mi-she-yakir* at latitudes further from the equator.

- ***Alot ha-shaḥar* always precedes *mi-she-yakir*, which occurs between *alot ha-shaḥar* and sunrise.**

- **The interval between *alot ha-shaḥar* and sunrise must exactly equal the time from sunset to *tzait ha-kokhavim* as the *sugyah* in *Pesaḥim* clearly states. If the daytime period begins at *alot ha-shaḥar*, symmetry suggests that, in some sense, it ends at *tzait kol ha-kokhavim*.⁶³**

- ***Pelag ha-minḥah* cannot (systematically) occur after sunset at latitudes around the Middle East.**

⁶³ This must be reconciled with the verse in Nehemiah. As noted, the verse in Nehemiah 4:15, even as normally interpreted referring to the interval from *alot ha-shaḥar* until the appearance of three stars, makes no claim that those points are equidistant from sunrise and sunset respectively or how *shaot ha-yom* are to be calculated.

Introduction: Observable natural phenomenon⁶⁴

Variation by latitude: The interval between sunset and darkness, the assumed interval of *bein ha-shemashot*, increases as we move away from the equator. As one moves towards the poles, at some point, given varying definitions of darkness, it never turns dark during the summer. More generally, the degree of variation by latitude is a function of the precise level of darkness. Currently, the degree of darkness is measured using a depression angle, the number of degrees the sun must descend below the horizon to produce a specific level of darkness. A larger depression angle equates to a greater level of darkness. As one goes further from the equator, the time required to reach a larger depression angle increases non-linearly.⁶⁵ In New York versus Jerusalem, for example, it is a longer time after sunset both absolutely and relatively before reaching a greater level of darkness. The reader should examine the table below for various dates and locations to see this explicitly.

⁶⁴ Readers who want a deeper understanding and some intuitive background on the relevant astronomy should consult *Ha-zemanim Be-halakhah* or Halakhic Times. For purposes of this monograph, I assume no familiarity with either astronomy or spherical trigonometry.

⁶⁵ The length of time between sunset and reaching an 8-degree depression angle, versus the time between depression angles of 4 degrees and 8 degrees or 6 degrees and 8 degrees, is less than two and four times as long, respectively. The percentage growth in the shorter intervals (from 4 to 8 or 6 to 8 degrees) is greater than in the longer interval starting from sunset (from 0 to 8 degrees). Concretely, if reaching a depression angle of 9 degrees occurs 54 minutes after sunset at some latitude, then the last degree (going from a depression angle of 8 to 9 degrees) will take more than its proportional share of 6 minutes.

		sunset	6°	min. later	8.5°	min. later	16.1°	min. later
20- Mar	Jerusalem	17:50	18:14	24	18:26	36	19:02	72
	New York	18:07	18:34	27	18:48	41	19:28	81
	Prague	18:14	18:46	32	19:02	48	19:50	96
21- Jun	Jerusalem	18:48	19:15	27	19:30	42	20:15	87
	New York	19:31	20:03	32	20:21	50	21:20	109
	Prague	20:16	21:00	44	21:25	69	23:29	193
21- Dec	Jerusalem	16:39	17:06	27	17:19	40	17:57	78
	New York	16:32	17:02	30	17:17	44	18:00	88
	Prague	16:02	16:40	38	16:58	56	17:49	107

TABLE A

Variation by season: At a given latitude, the interval between sunset and darkness is shortest around (but not exactly at) the spring and fall equinox, longer in the winter and longest in the summer. Some *posekim* inadequately address this variation. Some, perhaps considering the variation

inconsequential, do not explicitly deal with its impact.⁶⁶ Other *posekim* incorrectly assume that the length of the twilight interval varies with the length of sunrise to sunset period.⁶⁷ Thus, the interval is longer in the summer, which is directionally correct, albeit the ratio is incorrect. However, in the winter, the length of the twilight period is longer than in spring or fall. Interestingly, many *posekim* who assert this incorrect variation and assume the twilight period is shorter in the winter, fortunately compensate by only applying it only as a stringency in the summer.⁶⁸ The combined effect of both latitude and season is compounded for larger depression angles. The table illustrates this impact. For example, in Prague, using an 8.5 degrees depression angle to define the end of *Shabbat* equates to 48 minutes after sunset around the spring equinox and grows by around 43% to about 69 minutes around the summer solstice. In Israel, an 8.5 degrees depression angle equates to 36 minutes after sunset at the spring equinox and only grows by about 16% to 42 minutes in the summer. New York, whose latitude is approximately halfway between Jerusalem and Prague the difference is approximately 10 minutes, or 25%. Given the combination of non-linearities, particularly during the summer and further from the equator, larger depression angles are reached noticeably later, if at all.

Variation by altitude: At higher altitudes, the sun will appear to rise earlier and set later than at sea level. The impact in Jerusalem is a few minutes. How and if this variation is to be dealt with in *halakhah*, was, at least until recently, neither controversial nor that material.⁶⁹

⁶⁶ As illustrated in Table A, the impact of season is more consequential at latitudes further from the equator and for stricter definitions of darkness.

⁶⁷ Some have noted that paradoxically this would mean that to calculate *shaot zemaniot* using the opinion of Magen Avraham, one would have to first calculate using the *Gaon*'s endpoints.

⁶⁸ As we will see, this error provides unwarranted support to the position of Ramban and Magen Avraham.

⁶⁹ See *Igrot Moshe O. H.* 1:97 concerning the start of *Shabbat* in the mountains and the *gemara* in *Shabbat* 118b about Tiberius. If, when and how calendars based on sea level ought to be adjusted and differences between a mountain and an elevated plateau are not addressed. There is also significant literature, particularly in recent times, dealing with

Section 1. How many *milin*⁷⁰ does one walk during the period from sunrise to sunset? What is the time needed to walk a *mil*: – 18, 22.5, 24 minutes, etc.?

The *gemara* in *Pesaḥim* debates whether the interval between sunset and *tzait ha-kokhavim* or (*alot ha-shaḥar* to sunrise) is the time needed to walk 4 or 5 *milin*. Assuming⁷¹ the oft-quoted statement, “a person walks 40 *milin* in one day,” most *rishonim* divide the 40 *milin* as follows:

- During each of the (equal) periods from *alot ha-shaḥar* to sunrise and sunset to *tzait ha-kokhavim*, one walks 4 or 5 *milin*.
- During the period from sunrise to sunset, one walks 32 or 30 *milin*.

Those who maintain a 5 *milin* interval, are left with a daytime period of the time it takes to walk 30 *milin*, while those who maintain a 4 *milin* interval, are left with a 32-*milin* daytime period. Given that a day around the spring (or fall) equinox is always assumed,⁷² the interval from sunrise to sunset is 12 hours or (12 * 60 =) 720 minutes. Dividing 720 minutes by 30 yields a time to walk a *mil* of 24 minutes, which is the opinion of Rambam; dividing 720 minutes by 32 yields a time to walk a *mil* of 22.5 minutes, which is the opinion of many other *rishonim*.

views obstructed by mountains at various distances. This topic, often phrased in terms of the ability to see the rising or setting sun, is also not covered.

⁷⁰ The time needed to walk a *mil* arises in multiple contexts including parameters for defining *ḥametz* and salting meat as well as multiple *zemanim* with which we deal. The famous gloss of the *Gaon* on the length of time to walk a *mil* is in *hilkhot Pesaḥ*, O.H. 459.

⁷¹ An alternative to this assumption is considered in the next section.

⁷² Since the length of the day varies by season, (more dramatically as one moves further from the equator), it is universally accepted that the *gemara* in *Pesaḥim* must be referring to those days around the spring and fall equinox where the length of the day and night are (approximately) equal.

Our text of the *gemara* would appear to conclude definitively that the interval between *alot ha-shaḥar* and sunrise is the time needed to walk 4 *milin*. However, the Mishnah in *Pesahim*⁷³ and the final *pesak* of Rambam, state that the sunrise to midday period equates to an interval of the time in which one walks 15 *milin*; hence the sunrise to sunset interval equates to the time needed to walk 30 *milin*. By implication, the *alot ha-shaḥar* to sunrise period would be the time needed to walk 5 *milin* or 120 minutes. Rambam's opinion is addressed in the next section.

While 22.5 and 24 minutes are currently mentioned on occasion, most often, 18 minutes has become the prevailing *halakhic* view as, for example, in the "18-minute *matzah*." Although 18 minutes as the time needed to walk a *mil* was adopted by the *Shulḥan Arukh* and most *aḥronim*, that position has only a few isolated references⁷⁴ prior to *Trumat Ha-deshen*, written by R. Israel Isserlein around the beginning of the fifteenth century. R. Isserlein, in discussing the *halakhot* of *matzah*, describes the time needed to walk a *mil* as $\frac{1}{4}$ of an hour (15 minute) plus $\frac{1}{20}$ th of an hour (3 minutes). To reconcile a time to walk a *mil* of 18 minutes with the *gemara* in *Pesahim*, a second element must be added to the debate. To this point, both sides in the 4 *milin* versus 5 *milin* debate agree that the 40 *milin* that an average person walks in a day occurs between *alot ha-shaḥar* and *tzait ha-kokhavim*. To derive 18

⁷³ This assumes the uncontested interpretation of Ullah specifying the distance to Modiim as the time needed to walk 15 *milin*. How that might be reconciled with presently observed distances is not covered in this monograph.

⁷⁴ Rav Ovadiah Yosef, *Yeḥaveh Daat* volume 2, page 38, attempting to find support for the *Shulḥan Arukh* finds only a few early references, including however, R. Saadyah Gaon. Furthermore, those references are often indirect. Instead of a direct reference to 18 minutes, the reference is to 72 minutes normally expressed as 1 and $\frac{1}{5}$ th hours, which is assumed to be derived from 4 intervals of 18 minutes. That assumption, while highly likely, is not conclusive. Two alternatives to an 18-minute time to walk a *mil* as the definitive inference from a 72-minute interval are presented, one in this section and one in the next section. First, like the possibility raised by Prof. Levi's reading of *Leket Yosher* to be discussed more fully in this section, 1 and $\frac{1}{5}$ th hours can equate to 90 minutes if the *halakhic* hour in question is 75 minutes, counting the hours of the day from *alot ha-shaḥar* until *tzait ha-kokhavim*. Second, in the next section I will cover an interpretation of Rambam suggested by R. Schlesinger that derives 72 minutes independently of an 18-minute time to walk a *mil*. Only if we could rule out both options, does the implication of an 18-minute time to walk a *mil* automatically follow from a 72-minute interval.

minutes, the periods from *alot ha-shaḥar* to sunrise and sunset to *tzait ha-kokhavim*, both lasting the time needed to walk 4 *milin*,⁷⁵ must each occur outside of the 40-*milin* period. Thus, a person walks 4 *milin* between *alot ha-shaḥar* and sunrise, 40 *milin* from sunrise to sunset and 4 *milin* from sunset to *tzait ha-kokhavim*. Dividing 720 minutes by 40 yields our 18-minute *mil*. Under this interpretation, the dispute in the *gemara* is twofold:

1. What period does the time needed to walk 40 *milin* refer to, sunrise to sunset or *alot ha-shaḥar* to *tzait ha-kokhavim*?
2. Is the *alot ha-shaḥar* to sunrise period and its equivalent in the evening the time needed to walk 4 or 5 *milin*?

The *Gaon*⁷⁶ initially strongly attacks *Trumat Ha-deshen*, but not because of the issue of 18 versus 22.5 minutes. Rather, the *Gaon* assumed that the 40 *milin* must mean *alot ha-shaḥar* to *tzait ha-kokhavim* (again limiting the *gemara* to only the second argument). Taking that as a given, he accuses R. Isserlein of calculating based on an assumption that at the spring equinox there are 12 hours from *alot ha-shaḥar* to *tzait ha-kokhavim*. Were that the opinion of R. Isserlein, it would be, as the *Gaon* asserts, inexplicable; during a day around the equinox, there are 12 hours between sunrise and sunset.

The *Gaon*, however, raises an interesting conjecture that provides a strong textual basis for supporting 18 minutes as the time needed to walk a *mil*. When contrasting 5 *milin* to 4 *milin*, the *gemara* uses the fractions $\frac{1}{6}$ th and

⁷⁵ In addition to 4 *milin*, 5 *milin* is also theoretically possible, though that opinion is rarely found. Thus, even if one asserts 5 *milin* is the distance walked from *alot ha-shaḥar* to sunrise, one cannot necessarily assume a time to walk a *mil* of 24 minutes, derived from 30 *milin* walked from sunrise to sunset. Additionally, one must rule out the possibility of a time to walk a *mil* of 18 minutes, if one were to maintain that 40 *milin*, as opposed to 30 *milin*, are walked during the sunrise to sunset period. Thus, in addition to the more usual 90 minutes thought of as 4 intervals of 22.5 minutes, 90 minutes may also be comprised of 5 intervals of 18 minutes. Similarly, as we will discuss in the next section, 72 minutes might also be 3 intervals of 24 minutes, in addition to the more usual 4 intervals of 18 minutes. These rare possibilities are often overlooked.

⁷⁶ *Hilkhot Pesah*, O. H. 459.

1/10th of the daytime period. The *gemara* rejects a 5-*milin* interval for *alot ha-shahar* to sunrise, which it refers to as 1/6th of a 30-*milin* day in favor of an interval corresponding to 1/10th of a day. Clearly, 1/6th means that the 5 *milin* walked between *alot ha-shahar* and sunrise is 1/6th of the 30 *milin* walked from sunrise to sunset. Assuming an identical meaning to the numerator and denominator, then 1/10th must mean that the 4 *milin* walked between *alot ha-shahar* and sunrise is 1/10th of the 40 *milin* walked between sunrise and sunset. Since 1/6th is clearly *mi-le-gav*,⁷⁷ by implication, 1/10th is as well. Many later commentators assume that the *Gaon* himself ends up supporting a time to walk a *mil* of 18 minutes, perhaps influenced, among other factors, by how convincingly the *Gaon* expresses this comment. Others read the *Gaon* differently, i. e., the *Gaon* himself cites this interpretation of 40 *milin* referring to sunrise to sunset period only as the opinion of Rambam, who, in any case, apparently rejected reliance on the *sugyah* as normative.⁷⁸ Thus, despite the *gemara*'s conclusion of 4 *milin*, Rambam maintained his 5-*milin* position. The *Gaon*'s position on the length of time to walk a *mil* is at best unclear.⁷⁹ His argument, assuming like intervals in the denominator, would be more convincing if it were the same person associated with both expressions. As that is not the case and given

⁷⁷ *Mi-le-gav* (from the inside) is the standard way that fractions are currently expressed; e.g., 1/4 of 12 = 3. The alternative is to say that 1/5th of 12 is 3, meaning that if you add 3 to 12 and take 1/5th of the sum, 15, the result is 3. Thus, the biblical term “*ve-hamishiso*” meaning a fifth is what our standard use would call a fourth; in biblical usage, 1/5th of 10 is 2.5. This alternative is referred to as *mi-le-bar* or from the outside, meaning from the sum.

⁷⁸ See the next section for an alternative interpretation proposing that Rambam accepts both the Mishnah and the fraction 1/10th as (*mi-le-gav* and) normative, and, as a result, rejects another statement in the *gemara*.

⁷⁹ Ironically, R. Willig in *Am Mordechai, Berakhot* chapter 2 assumes that an 18-minute time to walk a *mil* is not just the *Gaon*'s position but also fundamental to his viewpoint. Others, including for example R. Feinstein in *O. H.* 4:6, assume that the *Gaon* maintained a 22.5 minutes position. R. Feinstein quotes the *Gaon* as support for his position allowing early morning prayers 90 minutes before sunrise in extraordinary circumstances, relying on a (4 * 22.5 =) 90-minute interval before sunrise for *alot ha-shahar* as opposed to the normative *pesak* of the *Shulhan Arukh*. Two indications that the *Gaon*'s position is 22.5 minutes are often cited. First, the *Gaon*'s gloss to *O. H.* 261 gives the length of the interval from *alot ha-shahar* to sunrise, at latitude around the Middle East, as one and one-half hours (90 minutes). Second, in *O. H.* 459 he specifies that the period from *alot ha-shahar* to *tzait kol ha-kokhavim* is 15 hours, two 90-minute periods added to the 12-hour daytime period. Support for those ascribing to the *Gaon* an 18-minute time to walk a *mil* derives from his commentary on *Berakhot*.

the otherwise substantial number of *rishonim* who support 22.5 minutes, coupled with the fact that there is no hint in the *gemara* of a two-faceted disagreement, despite its widespread acceptance, R. Yaakov Reischer, the author of *Chok Yaakov*, and others⁸⁰ question 18 minutes as the time needed to walk a *mil*. Note however, that those who maintain 22.5 minutes as the time needed to walk a *mil*, must interpret 1/10th as a variant of *mi-le-bar*,⁸¹ 1/10th of 900, adding 90 not once but twice, corresponding to the two 90-minute intervals bracketing the 720 daytime minutes, in both the morning and the evening.

One additional area bearing on this argument is our text in the *gemara* that apparently contains an added “**vav**.” When bringing proof to Rabi Yehudah’s 1/10th, our text of the *gemara* reads “*teidah... “u”-me-alot ha-shaḥar*” in the second such phrase addressing the interval between dawn and sunrise. That “**vav**” would seem to imply that the 4 *milin* is **not** included within the 40 *milin*. It would be important to determine the precise text of most *rishonim* who include the 4 *milin* within the 40 *milin*. Some early texts I have seen do not have the “**vav**.” This possible textual emendation might have been made to support or clarify the separate interval of the time needed to walk 4 *milin*, outside of the 40 *milin* walked during the 12-hour daytime period.

Prof. Levi, quoting R. Yosef ben Moshe, a student of R. Isserlein and the author of *Leket Yosher*,⁸² claims that even R. Isserlein did not mean 18 minutes.⁸³ As discussed below, R. Isserlein measured the day from *alot ha-*

⁸⁰ Those include R. Sofer, many *Brisker* adherents of an “*achtel*” and Prof. Levi.

⁸¹ Normally we would say that 90 is 1/10th of 810 *mi-le-bar*, adding 90 minutes to 810, not to 720, and then taking 1/10th of 900. Given that in this case a 90-minute interval must be added twice, representing the morning and the evening intervals, we say that 90 is 1/10th of 720, adding 90 twice to 720.

⁸² Prof. Levi, *Halakhic Times*, Hebrew section, page 39, quotes *Leket Yosher*, to demonstrate complete opposition to 18 minutes as the time needed to walk a *mil*.

⁸³ An almost identical argument is made in *Hok Yaakov O. H.* 459. However, *Leket Yosher*, page 79, is slightly less clear and could be read to assert that R. Isserlein assumed there are 12 clock hours from *alot ha-shaḥar* to *tzait ha-kokhavim*. In *O. H.* 459, The *Gaon* attacks any such possibility as being completely at variance with reality; I have a tough time believing anyone could have held such a view.

shaḥar to *tzait ha-kokhavim*.⁸⁴ Arguing that R. Isserlein also agreed to 22.5 minutes as the time needed to walk a *mil*, he claims that the hour is not 60 minutes but a *halakhic* hour of 75 minutes. Adding 2 intervals of $(4 * 22.5 =) 90$ minutes for the *alot ha-shaḥar* to sunrise and sunset to *tzait ha-kokhavim* periods to the 720 minutes from sunrise to sunset, yields a daytime period of 900 minutes. In a 900-minute day, $1/12^{\text{th}}$ of the day is $(900 \text{ minutes} / 12 =) 75$ minutes. In a 75-minute hour, $1/4$ of an hour + $1/20^{\text{th}}$ of an hour is $(1/4 \text{ of } 75 =) 18.75$ minutes + $(1/20 * 75 =) 3.75$ minutes = 22.5 minutes.⁸⁵ Accepting this interpretation of *Trumat Ha-deshen*, Prof. Levi concludes that the time needed to walk a *mil* of 18 minutes has no support among *rishonim*.⁸⁶ One can strongly question if R. Isserlein indeed meant an hour as 75 minutes. Though not conclusive as to its use in this context, the first *teshuvah* in *Trumat Ha-deshen* deals with starting *Shabbat* exceedingly early. In that responsa and others the term “hour” occurs repeatedly and clearly means a clock hour of 60 minutes.⁸⁷

⁸⁴ Ironically, this is also debated as noted in *Ha-zemanim Be-halakhah* chapter 13, footnote 1, again quoting *Leket Yosher*, maintaining that R. Isserlein calculated the hours of the day from sunrise to sunset, as will be discussed further in section 4. It is tacitly assumed, that R. Isserlein’s position is to begin counting from *alot ha-shaḥar*, as stated implicitly in the *Shulḥan Arukh* and explicitly in *Minḥat Kohen*.

⁸⁵ To formally complete the argument, one solves for $(720 + 8X) / 12 * (1/4 + 1/20) = X$; the unique solution is $X = 22.5$. For example, if one attempts the same calculation with $X = 18$: $(720 + 8 * 18) / 12 * (1/4 + 1/20) = 864 / 12 * (1/4 + 1/20) = 72 * (1/4 + 1/20) = (18 + 3.6)$, not 18. Note that if one were to do the parallel calculation with 5 *milin*, with the time needed to walk a *mil* of 24 minutes, the sum of $(1/4 + 1/20)$ of an 80-minute hour, $((720 + 2 * 120 =) 960 \text{ minutes} / 12 = 80 \text{ minutes})$, would also equal 24 minutes.

⁸⁶ Regardless of Prof. Levi’s radical position, it is unquestionable that 22.5 minutes enjoyed significant support throughout much of the 13th and 14th century among most *ḥakhmai Sefarad*. Prof. Levi would have to argue that each of R. Yosef’s examples of *geonim* and *rishonim* who he claims held 18 minutes as the time needed to walk a *mil* could be differently interpreted, as noted previously.

⁸⁷ On the other hand, in *teshuvah* 121, concerning the latest time for *ḥametz* on *erev Pesah*, it is more likely that hour means $1/12^{\text{th}}$ of the day from *alot ha-shaḥar* to *tzait ha-kokhavim*. Reconciling the multiple *teshuvot* of R. Isserlein either according to how he was understood by R. Yosef b. Moshe or in the *Shulḥan Arukh* is beyond the scope of this monograph.

In any case, the *Shulḥan Arukh* quoting *Trumat Ha-deshen* accepted 18 minutes as the length of time needed to walk a *mil*, and during the 15th and 16th centuries 18 minutes became the accepted norm.⁸⁸

It should be noted that support from many *rishonim* for 22.5 minutes as the time needed to walk a *mil*, while conclusive, is indirect. Ideally, we would like to have 22.5 minutes expressed as $\frac{3}{8}$ of an hour (or equivalently as $\frac{1}{4}$ of an hour + $\frac{1}{8}$ of an hour) or by explicitly stating that one walks 32 *milin* in the daytime period from sunrise to sunset, from which we could derive 22.5 minutes by dividing 12 hours or 720 minutes by 32. Instead, starting with Ramban and with many subsequent *hakhmai Sefarad* we can derive the length of the *mil* only indirectly, from their specification of the time of *pelag ha-minḥah*. These *rishonim*⁸⁹ assert that *pelag ha-minḥah* occurs at the time needed to walk $\frac{1}{6}$ th of a *mil* before sunset.⁹⁰ Since *pelag ha-minḥah* occurs 1 and $\frac{1}{4}$ hours before the end of the day, they must all define the hours of the day from *alot ha-shaḥar* to *tzait ha-kokhavim* (as opposed to sunrise to sunset).

Now consider a canonical 12-hour day around the spring equinox. If Ramban maintained a time to walk a *mil* of 18 minutes, that would add 72 minutes to both ends of the day. *Alot ha-shaḥar* would be at 4:48AM and *tzait ha-kokhavim* at 7:12PM. A day would be 864 minutes long, and hence an hour would be 72 minutes. *Pelag ha-minḥah* occurs 1 and $\frac{1}{4}$ hours, ($1.25 * 72 =$) 90 minutes, before 7:12PM at 5:42PM, exactly the time needed to walk one *mil* before sunset. Were one to agree with Ramban on calculating the hours of the day from *alot ha-shaḥar* to *tzait ha-kokhavim*, and thus calculate *pelag ha-minḥah* from *tzait ha-kokhavim* as opposed to sunset, while maintaining 18 minutes as the time needed to walk a *mil*, the above calculation would be entirely correct.⁹¹ However, since Ramban and others

⁸⁸ Speculation on possible reasons for this change is addressed in the epilogue.

⁸⁹ These *rishonim* include Ramban, Reah, Ritva, Rashba, etc.

⁹⁰ In an era before clocks, having two *halakhic* times defined so close to each other may be viewed as problematic. However, to these *rishonim*, sunset is not a particularly important *halakhic* time.

⁹¹ This is the assumed position of R. Isserlein, the *Shulḥan Arukh*, Magen Avraham, etc.

maintain that *pelag ha-minḥah* occurs the time needed to walk $\frac{1}{6}$ th of a *mil* before sunset, this cannot be their viewpoint; some parameter above must be wrong. The only parameter chosen was the length of time to walk a *mil*, so let us repeat the calculation with a time to walk a *mil* of 22.5 minutes. Now *alot ha-shaḥar* is at 4:30AM and *tzait ha-kokhavim* is at 7:30PM. The length of the day is 900 minutes and a *halakhic* hour is 75 minutes, and 1 and $\frac{1}{4}$ hours is $(1.25 * 75 =)$ 93 minutes and 45 seconds. Thus, *pelag ha-minḥah* occurs at 5:56:15 or 3 and $\frac{3}{4}$ minutes before sunset at 6:00PM. While not the expected 3 minutes that is $\frac{1}{6}$ th of 18 minutes, 3 and $\frac{3}{4}$ minutes is exactly $\frac{1}{6}$ th of 22.5 minutes. This represents conclusive proof that all *rishonim* who set *pelag ha-minḥah* at the time needed to walk $\frac{1}{6}$ th of a *mil* before sunset must maintain a time to walk a *mil* of 22.5 minutes. I will refer to the former and latter approaches as approaches 1 and 2, respectively.⁹²

Despite conclusive proof, due to an inadvertent arithmetic error, some⁹³ have tried to reconcile Ramban's assertion about *pelag ha-minḥah* occurring the time needed to walk $\frac{1}{6}$ th of a *mil* before sunset and 18 minutes as the time needed to walk a *mil*. They performed the above calculation using a third approach. If the length of time required to walk a *mil* is 18 minutes, *tzait ha-kokhavim* is, as before, at 7:12PM. *Pelag ha-minḥah* is 1 and $\frac{1}{4}$ hours⁹⁴ or 75 minutes before *tzait ha-kokhavim*, occurring at 5:57PM, three minutes, $\frac{1}{6}$ th of 18 minutes, before sunset.

R. Willig points out that this approach contradicts a *gemara*⁹⁵ and is, thus, incorrect. The *gemara* maintains that there is a three-hour period between *minḥah gedolah* and *minḥah ketanah*. Using approach 2, an hour is 75 minutes and on our canonical day, *minḥah gedolah* is at 12:37:30 PM ($\frac{1}{2}$ of

⁹² For a formal proof that only a time to walk a *mil* of 22.5 minutes results in *pelag ha-minḥah* occurring $\frac{1}{6}$ th of the time needed to walk a *mil* before sunset, note that only X = 22.5 is a solution to the equation: $(720 + 8X) / 12 * 1.25 = 4X + \frac{1}{6} X$.

⁹³ *Orot Haim* and others.

⁹⁴ Seventy-five minutes is $(1 + \frac{1}{4}) * 60$ (clock) minutes.

⁹⁵ See *Am Mordechai, Berakhot*, chapter 2. The *gemara* in *Berakhot* 26b specifies that the times of *minḥah gedolah* and *minḥah ketanah* are at six and half and nine and half hour respectively, a three-hour difference.

75 minutes after noon). *Minḥah ketanah*, 2 and ½ hours before *tzait ha-kokhavim* or 1 and ¼ hour before *pelag ha-minḥah* is at 4:22:30PM. The difference between *minḥah gedolah* and *minḥah ketanah* is 3 hours and 45 minutes (225 minutes) or exactly the length of three hours, each 75 minutes long.

Similarly, using approach 1, *pelag ha-minḥah* occurs at 5:42PM and *minḥah ketanah* is at 4:12PM. In this approach, an hour is 72 minutes and *minḥah gedolah* is at 12:36PM. Thus, three hours, each 72 minutes long, or 216 minutes again separates *minḥah gedolah* and *minḥah ketanah*.⁹⁶ However, as R. Willig points out, if we apply approach 3, subtracting 75 minutes from *tzait ha-kokhavim* to arrive at *pelag ha-minḥah* at 5:57PM, and then subtracting another 75 minutes to arrive at *minḥah ketanah* at 4:42PM, the difference from *ḥatzot* at 12:30PM is not 3 hours, but 4 hours and 12 minutes.

R. Willig's demonstrated inconsistency with a *gemara* is only part of the problem. Not only does approach 3 contradict a *gemara*, it is logically and mathematically untenable to count the hours of the day from *alot ha-shaḥar* to *tzait ha-kokhavim* at the spring equinox, and still assume a 60-minute hour. That would imply that the period from *alot ha-shaḥar* to *tzait ha-kokhavim* is 12 hours. This is precisely the blatant error that the *Gaon* attacks⁹⁷ when he assumed that it was the position of *Trumat Ha-deshen*. To illustrate one consequence of this approach, consider the simple task of calculating *ḥatzot*. You should expect that counting back 6 hours from *tzait ha-kokhavim* or alternatively counting forward 6 hours from *alot ha-shaḥar*, we would arrive at the identical point of *ḥatzot* in both cases. Note that both

⁹⁶ This also demonstrates that the time of *minḥah gedolah*, 30 minutes after *ḥatzot*, is not calculated using clock hours, at least for those who calculate *halakhic* hours from *alot ha-shaḥar* to *tzait ha-kokhavim*. It is less clear whether to employ a *shaah zemanit* according to those who calculate *halakhic* hours from sunrise to sunset; on a twelve-hour day, clock hours and *shaot zemaniot* coincide. Note that if the three-hour period between *minḥah gedolah* and *minḥah ketanah* is meant to apply not just on a twelve-hour day but all year round, it would imply that the use of *shaot zemaniot* for the calculation of *minḥah gedolah* is required even according to those who calculate from sunrise to sunset.

⁹⁷ *O. H.* 459.

approaches 1 and 2 calculate *ḥatzot* at exactly 12:00 noon. Using approach 3, if we count back from *tzait ha-kokhavim*, we arrive at *ḥatzot* at 1:12PM, and if we count forward from *alot ha-shaḥar*, we arrive at *ḥatzot* at 10:48AM. The missing 144 minutes (72 minutes on both sides of 12 noon) is exactly the 12 minutes from each of the twelve hours of the day that this calculation omitted incorrectly. Approach 3 does not need to contradict a *gemara* to be wrong; it is both fundamentally illogical and provably incorrect, nothing more than an inadvertent arithmetic sleight of hand. To define the day from *alot ha-shaḥar* to *tzait ha-kokhavim* means **that you divide the length of time in that interval by twelve** to derive an hour. When you define the day from *alot ha-shaḥar* to *tzait ha-kokhavim* and assume a time to walk a *mil* of 18 minutes, you must calculate using approach 1 above. Approach 3 that asserts both Ramban's position that *pelag ha-minḥah* occurs the time needed to walk $\frac{1}{6}$ th of a *mil* before sunset as well as 18 minutes as the time needed to walk a *mil*, proposed in multiple places, is fundamentally in error.⁹⁸

R. Pimental, despite his encyclopedic work covering almost all aspects of *zemanim*, never takes on this entire issue. He simply applies $\frac{1}{10}$ th to the daytime period of 720 minutes and derives a 72-minute twilight period and a time to walk a *mil* of 18 minutes.⁹⁹

⁹⁸ Another significant issue influencing the calculation of *ḥatzot* will be addressed when we cover defining the hours of the day. R. Feinstein (*Igrot Moshe O. H. 2:20*) insists that we do not calculate *ḥatzot*; it is the same time every day. R. Adler and others maintained (see *Ha-zemanim Be-halakhah* vol. 1, chapter 13, footnote 14) that the calculation of *ḥatzot* need not be astronomically precise. While this mistaken approach would result in an inaccurate calculation of *ḥatzot*, this rather grievous error is unlikely to have contributed to the above positions. Other potential rationales for those positions are addressed in the section on calculating the hours of the day, and more speculatively, in that section of the epilogue.

⁹⁹ One can only speculate about his lack of discussion of this issue, particularly because he quotes the position of several *ḥakhmai Sefarad* as supportive of the position of *Trumat Ha-deshen*. He does not draw the implication that they held that the time needed to walk a *mil* was 22.5 minutes from their position on *pelag ha-minḥah*.

In summary, there is definitive support for each of the three opinions. However, as several *ahronim*¹⁰⁰ and more recently Prof. Levi, argue, a time to walk a *mil* of 18 minutes, though now the prevalent opinion, has limited direct support prior to (probably) R. Isserlein.¹⁰¹

¹⁰⁰ Among *ahronim*, this appears to have begun most notably with R. Yaakov Reischer in his commentary *Chok Yaakov, O. H.* 459.

¹⁰¹ Interestingly, *Hatam Sofer*, who finds the arguments of R. Yaakov Reischer conclusive both in his commentary on *Shabbat* 35a as well as in *teshuvah* 80, points out at the end of his commentary on *Shabbat* 35a that some geographic distances described in the Talmud seem to support a time to walk a *mil* of 18 minutes.

Section 2. How long is the period from sunset to *tzait kol ha-kokhavim* (or equivalently from *alot ha-shahar* to sunrise) in the Middle East around the time of the equinox: 72 minutes, 90 minutes, 96 minutes, 120 minutes, etc.?

Given the prior discussion on the time it takes to walk a *mil*, it is normally assumed that for each alternative length of time to walk a *mil* there is a corresponding interval for the periods of *alot ha-shahar* to sunrise and sunset to *tzait ha-kokhavim*:

- A time to walk a *mil* of 18 minutes associates with a 72-minute interval.
- A time to walk a *mil* of 22.5 minutes associates with a 90-minute interval.

A 96-minute interval, 4 times the time needed to walk a *mil* of 24 minutes, is mentioned on occasion.¹⁰² However, a 96-minute interval is unsupportable since to derive a time to walk a *mil* of $(720 / 30 =)$ 24 minutes requires an interval of the time needed to walk 5 and not 4 *milin* between *alot ha-shahar* and sunrise, given that in the sunrise to sunset period there is only the time needed to walk 30 *milin*. Those who, in opposition to the conclusion of our text in the *gemara*, insist that the interval between *alot ha-shahar* and sunrise is the time needed to walk 5 *milin*, must maintain an interval of 120, not 96 minutes.

Interestingly,¹⁰³ in Israel at the spring equinox, scientists have determined that the sun produces no measurable light approximately 80 minutes after sunset, corresponding to a depression angle of approximately 18 degrees. Since the *halakhah* often disregards minuscule, non-visible quantities, this provides observational support for the classic 72-minute period (and by

¹⁰² See *Igrot Moshe O. H.* 4:62 and *Melamaid Le-hoil* 30.

¹⁰³ *Ha-zemanim Be-halakhah*, chapter 16, provides necessary background.

implication for the time needed to walk a *mil* of 18 minutes). In any case, 72 and 90 minutes are both reasonably close approximations to this scientific observation.¹⁰⁴

However, taking for granted Rambam's astute observation of the natural order, and given his position of only 30 *milin* travelled between sunrise and sunset, his assumed 120-minute period from *alot ha-shahar* to sunrise is puzzling. It is difficult to imagine that Rambam could have added a full 40 minutes prior to the earliest point of any possible light being visible in the Middle East. Unexpectedly, rather than maintain a 120-minute interval, Rambam in *Peirush Ha-mishnayot*¹⁰⁵ asserts a 72-minute interval.

This apparent contradiction has not been resolved definitively. It is highly unlikely¹⁰⁶ that Rambam simply changed his mind about the time needed to walk a *mil*, since he maintains the 24-minute interval both in his commentary on the Mishnah as well as in *Mishnah Torah*. Some of the efforts to resolve this apparent contradiction are themselves instructive.

First, the *Gaon*¹⁰⁷ in a different context suggests that Rambam was giving *shiurim* that were to apply at the equator. The *Gaon* uses this possibility to explain a smaller discrepancy. In our context, this would remain problematic as 72 minutes at the equator adjusts to less than 90 minutes in the Middle East, and certainly not 120 minutes.

¹⁰⁴ R. Boorstyn, in *Zemanim Ke-hilkhatam*, suggested that the 90-minute period should not be used where it would create a leniency, since it is counter-indicated by current scientific observation that cannot discern any light at so early a point. While I might be accused of apologetics, it may be the case, that at 90 minutes before sunrise people begin their day in anticipation of visible light about 20 minutes later.

¹⁰⁵ See the first Mishnah in *Berakhot*.

¹⁰⁶ The assumption of R. Karelitz; see section 13 of *Hazon Ish O. H.*

¹⁰⁷ *O. H.* 261 and *Y. D.* 262.

Second, R. Sofer¹⁰⁸ suggests that perhaps when Rambam wrote 72 minutes he meant the interval from a slightly later point to sunrise and not from *alot ha-shahar*, and that later point occurs the time needed to walk $\frac{3}{4}$ of a *mil* after *alot ha-shahar*.¹⁰⁹ This approach also only addresses the use of 72 minutes versus 90 minutes; a 90-minute interval that R. Sofer ascribes to Rambam, is rarely attributed to Rambam. Furthermore, R. Sofer's approach faces two other issues. First, this explanation assumes that Rambam's terminology was imprecise writing *alot ha-shahar* although he meant later point. Second, even using 90 minutes¹¹⁰ and a 22.5-minute¹¹¹ time to walk a *mil*, subtracting $\frac{3}{4}$ of 22.5 from 90 leaves 73 and $\frac{1}{8}$ th minutes, to which 72 minutes is only an approximation, a point R. Sofer makes. Ascribing imprecision in both language and arithmetic to Rambam, as well as a change in his overall position, is less than convincing.

R. Y. Schlesinger¹¹² suggested a third, rather novel approach. In addition to explaining the 72-minute interval, it also explains Rambam's rejection of the *sugyah* in *Pesahim*. R. Schlesinger suggests that the *gemara* could not possibly mean to question the distance from Modiim to Jerusalem; it was a known distance, not subject to debate.¹¹³ Hence, Rambam took it as a non-debatable statement of R. Akiva in a Mishnah that the length of time from sunrise to *hatzot* was the time needed to walk 15 *milin*. Rambam also took as the final view of the *gemara* that the ratio of the *alot ha-shahar* to sunrise

¹⁰⁸ *Hiddushim al Shas, Shabbat 34a.*

¹⁰⁹ Perhaps, R. Sofer was trying to establish a morning analogue to *bein ha-shemashot*, something that R. Weiss objects to in *Minhat Yitzhak* 4:53, paragraph 18, and attributes to R. Pimental in *Minhat Kohen*.

¹¹⁰ While I have never seen 90 minutes and 120 minutes interchanged, I have seen $\frac{3}{8}$ th of an hour or 22.5 minutes and $\frac{2}{5}$ th of an hour or 24 minutes used as if they were identical. While this is not critical to the issues discussed, readers should be aware of this occasional occurrence.

¹¹¹ 90 minutes equates to 5 times 18 minutes, a position rarely seen, or 4 times 22.5 minutes, the quite common position of many *rishonim*. A time to walk a *mil* of 24 minutes, which would make subtracting ($\frac{3}{4} * 24 =$) 18 minutes from 90 minutes precise, is incompatible with 90 minutes.

¹¹² *Yeshuran 5695.*

¹¹³ Ironically, the distance from Jerusalem to Modiim (if one assumes the Arab town of Al Midya) is approximately 16 miles. Depending on how one defined a *mil*, it would favor either of the other two opinions on the distance walked in 6 hours. These geographic issues are not addressed in this monograph.

period to the entire day was 1:10, based on the statement of another *tanna*, Rabi Yehudah. **If one assumes that both assertions of *tannaim* are normative, then approximating the length of the day as the time needed to walk 40 *milin* must be discarded.** The distance that a person walks in one day would then be the 30 *milin* during the sunrise to sunset period in addition to two intervals of the time needed to walk 3 *milin* (1/10th of 30) - one in the period between *alot ha-shaḥar* and sunrise and a second between sunset and *tzait ha-kokhavim*. Prior to R. Schlesinger's article, I know of no one who ever suggested disagreement with the commonly assumed assertion that the average person walks 40 *milin* in a day. Perhaps more troubling than its originality, is Rambam's own ruling in *Hilkhot Aveilut* 7:4 that *derekh reḥokah*, a distant place that that cannot be reached in one day's walk, is 40 *milin*. Not to be so easily defeated, R. Schlesinger suggests that while for standard purposes Rambam uses a 36 *milin* distance for what one can typically walk in a day, Rambam's use of 40 *milin* is just an application of the principle of deciding leniently with respect to the laws of *aveilut*.^{114 115} Note that this approach, while rejecting both the conclusion of the *gemara* that the twilight period is the time needed to walk 4 *milin*, as well as the normally assumed distance traveled in a day of 40 *milin*, reestablishes the similarity of the fractions 1/6th and 1/10th, noted by the *Gaon*.¹¹⁶

Other than the difficult position of R. Karelitz, which claims that Rambam changed his mind, I know of no other way to explain Rambam's 72 minutes.¹¹⁷ It is ironic that Rambam and other *ḥakhmai Sefarad* who support

¹¹⁴ It is also possible that a person hurrying to join the other *aveilim* will travel more than 30 *milin* in a day.

¹¹⁵ R. Willig cites a proof from the *Orḥot Haim* that purports to prove the 18-minute time to walk a *mil* conclusively from a similar *pesak* by the Rif concerning *aveilut*. The fact that Rambam likely did not maintain an 18-minute time to walk a *mil* and nonetheless records a similar position to that of Rif, makes the proof less conclusive. An alternative interpretation of both Rambam and Rif is discussed in section 9.

¹¹⁶ As mentioned at the end of the last section, generations prior to R. Schlesinger's approach, R. Pimental simply applies 1/10th to the daytime period of 720 minutes and derives a 72-minute twilight interval.

¹¹⁷ In practice, a 120-minute period has few definite followers other than R. Ovadiah mi'Bartenra. Some have suggested R. Shneur Zalman of Liadi, who suggests 3 hours before sunrise as the beginning of *asarah be'tevet* and *ḥatzot ha-lailah* as time of *alot ha-shaḥar*, after which *sefirah* should not be counted *with a berakhah* closer to the summer.

Rabbeinu Tam and are often associated with a 72-minute interval maintained a 90-minute interval. Thinking of 72 minutes as 4 intervals of 18 minutes and / or as 1/10th of the day is almost universally accepted from at least the time of the *Shulhan Arukh*; thinking of 72 minutes as three intervals of 24 minutes was, to my knowledge, never mentioned prior to R. Schlesinger.

Section 3. How is the period from *alot ha-shaḥar* to sunrise or its equivalent from sunset to *tzait kol ha-kokhavim* to be adjusted at distinct locations and during different seasons (if at all)?

However, neither *zeman* implies a 120-minute period. His use of *ḥatzot ha-lailah* as the time for *alot ha-shaḥar* is likely just a latitudinal adjustment of 72 minutes during the summer at his very northern location, approximately 53 degrees north latitude. At that latitude, *alot ha-shaḥar* is never less than 100 minutes before sunrise. His use of 3 hours before sunrise as the beginning of the fast of *asarah be'tevet*, is too short an interval if he were adjusting a 120-minute interval. R. Menaḥem Mendel Schneerson and others argue that a different *zeman* for the start of the fast is being used. See *Ha-zemanim Be-halakhah*, chapter 21, footnotes 39-43, where the position of R. Shneur Zalman of Liadi is examined in detail.

Despite our habitual focus on clocks and time, it is important to stipulate that both intervals are likely defined by physical events to which an interval of time is associated, rather than defined by time itself.

To apply these *zemanim* at other latitudes and during other seasons of the year, we can utilize depression angles, by first establishing the number of degrees below the horizon, that the sun is located 72, 90 and 120 minutes after sunset (or equivalently before sunrise) in the Middle East, around the spring (and fall) equinox.¹¹⁸ The shorter 72-minute interval corresponds to the sun being approximately 16 degrees below the horizon, while the longer 90-minute interval corresponds to a depression angle of approximately 20 degrees.

As noted earlier, we normally adjust times associated with the opinion of the *geonim*'s end to *Shabbat* to correlate to observed physical events.

There are five possible approaches for calculating *alot ha-shahar* as well as its nighttime equivalent, which is of interest at least according to the opinion of Rabbeinu Tam:

1. Uniformly adjust using depression angles to correlate with observed physical events.
2. Make no adjustments and use the intervals of the Middle East (Jerusalem) at the spring and fall equinox uniformly on a global basis, throughout the year.

¹¹⁸ The location chosen is Jerusalem, although it should not be assumed that statements in the Talmud always refer to Jerusalem. It would be of minimal consequence if instead of Jerusalem another location in Babylonia, whose latitude is close to that of Jerusalem, were assumed.

3. Adjust the times based on the time of the year in the Middle East and then use those times globally.
4. Adjust based on latitude but use that time constantly, independent of the time of year.
5. Adjust the twilight interval under the assumption that it varies linearly with the length of the day from sunrise to sunset.

Even though approach 3 appears preferable to approach 2, I know of no instance where it was ever used or even suggested. Approach 4 results either from a *posek*'s desire to simplify approach 1 and use a fixed, conservative interval uniformly throughout the year,¹¹⁹ or approach 4 might be the result of a *posek* not realizing the impact of seasonal variation. At a latitude as far north as New York, the variation is only about 15 minutes. I deal with approach 5 later in this section; it is significantly at variance with observation.

With minor exception, only approaches 1 and 2 are used in practice. Approach 2, which treats time as defining as opposed to only providing an approximation, is implausible and is likely a result of the popularity of clocks in modern times. The *sugyah* in *Pesahim*, which uses the term *oveyo shel rakia*, the entirety of *masekhet Tamid*, which refers only to the appearance of varying levels of illumination and notions like *mi-she-yakir* all argue strongly against a “time to walk 4 or 5 *milin*” as providing a definition.¹²⁰ The *Gaon*'s clear support for adjustment, given his assertion that *alot ha-shahar* and its evening equivalent do not occur during the summer at very northern latitudes, is rarely quoted. In any case, it is critical to avoid two pitfalls:

¹¹⁹ Several rabbis, well versed in this area, have expressed the need to “keep practical *pesak* simple.”

¹²⁰ One might argue that the ostensible accuracy of clocks contributed to this type of anachronistic reasoning promoting time as definitional.

1. Making some adjustments based on physical observation and leaving other times fixed. Invariably this will lead to some anomaly, often an observable challenge to the assumptions that were stipulated.
2. While attempting adjustments that are meant to correlate to observed physical events, inadvertently do so incorrectly, as occurs, for example, in approach 5 above.

Some calendars and *posekim* have not avoided one or the other of these pitfalls.

Despite a strong preference for *zmanim* that equate to physical observations, many still argue in favor of an unadjusted interval; perhaps we simply use intervals around sunrise and sunset that equate to the duration of those intervals in Israel (and only in the spring and fall). Some defend this practice either based on the eventual breakdown of any methodology as one approaches the north and south poles, or by an appeal to tradition that in many cases made no adjustments. Thus, at least in theory, one could not begin the day prior to 72 or 90 minutes before sunrise, regardless of the amount of light that is present; similarly, *Shabbat* might end once a fixed 72 or 90-minute interval has passed, regardless of the number of stars visible. Again, I find such an approach entirely implausible; you might ask how such an approach would have been practiced prior to the widespread use of clocks?

For *tzait ha-kokhavim*, calendars commonly provide Rabbeinu Tam's normally assumed 72-minute interval, rarely publishing latitudinal and seasonal adjustments. However, when calendars publish the times for *alot ha-shahar*, often a seasonal and latitudinal adjustment of 72 minutes is (also) given. This inconsistent treatment is required to avoid *mi-she-yakir* occurring before *alot ha-shahar*. For standard definitions of *mi-she-yakir*, in areas further north of the equator, *mi-she-yakir* will occur more than 72

minutes before sunrise.¹²¹ As an example of the consequence of making neither adjustment, leaving both *alot ha-shaḥar* and *tzait ha-kokhavim* fixed at 72 minutes, consider the calendar entry taken from the OU website, several years ago, for London on June 22, 2007:

Alos	3:35 A
Talis	3:01 A
Sunrise	4:47 A
Sof Zman Shema	8:56 A (GRA) 8:20 A (MA)
Sof Zman Tefila	10:19 A (GRA) 9:55 A (MA)
Chatzot (Midday)	1:05 P
Mincha Gedolah	1:46 P
Mincha Ketana	5:55 P
Plag Mincha	7:39 P
Sunset	9:23 P
Tzeis Hakochovim	10:36 P (Gaonim) 10:34 P (Rabbeinu Tam)

¹²¹ I do not cover the precise definition of *mi-she-yakir*, but it typically equates to a depression angle of approximately 11.5 degrees, with *posekim* in northern Europe typically implying a smaller angle (greater illumination) and some *posekim* in the Middle East implying a larger angle. It is fair to speculate on the impact on many *poskim* of when they would assume *alot ha-shaḥar* occurs. Whether *mi-she-yakir* is considered more than simply a *harḥakah*, or how its multiple physical definitions relate, is not covered.

Thus, a common, but highly questionable practice is using an unadjusted 72 minutes before sunrise as the start of fast days at latitudes farther from the equator than Israel, and especially for fast days like the 17th of Tammuz, occurring in the summer. In the New York area, the use of 72 minutes without adjustment allows eating when it is, according to some opinions, approximately the point of *mi-she-yakir*.¹²²

Alot ha-shaḥar is always a critical *zeman* as it is the halakhic beginning of the daytime period according to all opinions. Its analogue in the evening is relevant only for those who follow the Rabbeinu Tam. While equating both *alot ha-shaḥar* and *tzait ha-kokhavim* to depression angles has many adherents, practice in this area remains inconsistent. **Adjusting *alot ha-shaḥar* for latitude and season but not *tzait kol ha-kokhavim* lacks any conceptual rationale.** Despite that, many calendars¹²³ abandon logical consistency, and give the morning times adjusted while leaving the nighttime a constant 72 minutes. The OU website makes neither adjustment and ends up with *mi-she-yakir* (denoted by the line “*talis*”) occurring before *alot ha-shaḥar*. Those who calculate the hours of the day from *alot ha-shaḥar* to *tzait ha-kokhavim*¹²⁴ often make neither adjustment and simply add / subtract 72 (or 90) minutes to / from sunset and sunrise.

Some, who acknowledge the need to adjust both periods consistently, have made technical errors in calculating those adjustments. Two errors are most common. First, some assume that the period of *alot ha-shaḥar* to *tzait ha-kokhavim* varies with the length of the day from sunrise to sunset.¹²⁵

¹²² Of course, this depends on the precise definition of *mi-she-yakir*.

¹²³ A calendar commonly posted in many synagogues by R. Mordechai Premock is representative. On the other hand, www.myzmanim.com uses depression angles consistently, but also gives times based on a fixed 72 minutes.

¹²⁴ This is discussed further in the next section.

¹²⁵ This position is widespread; see for example R. Schachter’s notes on R. Soloveitchik’s *shiurim* on *masekhet Pesahim*, pages 14 – 15, where this position is attributed to R. Soloveitchik’s grandfather. R. Haim Soloveitchik also interpreted Rambam as specifying the twilight period as 120 minutes and acted that way as a personal *ḥumrah*. This

Second, some calculate using *alot ha-shaḥar* and three stars as equivalent endpoints. Both positions can be traced at least as far back as the 17th century to R. Pimential, in *Minḥat Kohen*.¹²⁶

This first error adjusts the interval from sunset to *tzait ha-kokhavim*, and equivalently the interval from *alot ha-shaḥar* to sunrise, proportionally to the length of the day between sunrise and sunset. Several *aḥronim* adopt this approach.¹²⁷ The 72 or 90 minutes that, by observation, is longer in the winter, is shortened in the case of an 8-hour day by 8/12 or 2/3. Thus, 72 minutes becomes 48 minutes and 90 minutes becomes 72 minutes. A time to walk a *mil* of 22.5 or 18 minutes is similarly “reduced” by 2/3 to 15 minutes and 12 minutes, respectively.¹²⁸ When this adjustment is used the previous times for both approaches 1 and 2 for calculating *pelag ha-minḥah*

opinion, referred as a *szekstel*, a sixth (120 / 720) of a day in Yiddish, was supplemented a generation later by the *Brisker achtel*, an eighth of a day (90 / 720). I assume that R. Soloveitchik differed with his grandfather on two counts, first, using the *achtel* and second, using adjustments based on depression angles not *shaot zemaniot* measured from sunrise to sunset.

¹²⁶ Two problematic opinions of R. Pimential are referenced in this monograph. His masterful *sefer* was the first comprehensive treatment of the overall subject of *zemanim*. To the best of my knowledge, he was the first rabbinic author to discuss the impact of latitude and season, albeit with errors. It is a testament to his influence, that his concepts became widely accepted, unfortunately including the few problematic opinions he held.

¹²⁷ See *Minḥat Kohen* and R. Pimential’s precise calculation based on this approach for the end of *Shabbat* in the summer in the Netherlands. R. Pimential assumed that on a 12-hour day, three small stars appeared in the Netherlands 48 minutes, 1/15th of the (720-minute) day, after sunset. Similarly, on a 16 and 1/2 hour summer day (990 minutes) he observed that three small stars appeared 66 minutes after sunset, again 1/15th of a day. Unfortunately, he seems to have generalized (to a linear equation, correlating 1/15th of the daytime period between sunset with the appearance of three stars) based on these observations, apparently without verifying during the winter months. As is the case with almost all who make this error, he did not apply this approach as a leniency in the winter months. R. David Tzvi Hoffman, (*Melamaid Le-hoil* 30), is among the first to have questioned this mistaken approach explicitly.

¹²⁸ Of course, the time needed to walk a *mil* is not adjusted; the interval is shortened and referred to imprecisely as an “adjusted” *mil*. Shortening the time needed to walk a *mil* and then applying a shortened time to walk a *mil*, has also been suggested; such an approach is completely unwarranted, as will be discussed. Our language, imprecisely referring to a “shortened” *mil*, reflects what is sometimes found in the literature and is misleading; hence, the use of quotation marks.

are exactly maintained.¹²⁹ Thus, the 90-minute interval from sunset to *tzait ha-kokhavim* reduces to 60 minutes and the *alot ha-shaḥar* to *tzait ha-kokhavim* period is exactly 600 minutes, occurring at 7:00AM and 5:00PM respectively. Continuing with a 50-minute hour, (the time from *alot ha-shaḥar* to *tzait ha-kokhavim* divided by 12), *pelag ha-minḥah* occurs at 3:57:30PM, 2.5 minutes before sunset, which is exactly $\frac{1}{6}$ th of an “adjusted” ($\frac{2}{3} * 22.5 =$) 15-minute *mil*. Likewise, 72 minutes is reduced by $\frac{1}{3}$ rd to 48 minutes; *pelag ha-minḥah* is at 3:48PM, exactly the time needed to walk one “adjusted” *mil* of ($\frac{2}{3} * 18 =$) 12 minutes before sunset. This creates *zmanim* that do not in any way correlate with reality. Specifically, when applied in the morning, *alot ha-shaḥar* occurs well after *mi-she-yakir*.¹³⁰

A second problematic approach uses *alot ha-shaḥar* and *tzait ha-kokhavim* to calculate the hours of the day. Violating two of our assumptions above, using this approach sets *ḥatzot* to a point before midday, since *alot ha-shaḥar* occurs longer before sunrise than *tzait ha-kokhavim* occurs after sunset. As well, an interval between *alot ha-shaḥar* and sunrise that is longer than the interval between sunset and *tzait ha-kokhavim* conflicts with the *sugyah* in *Pesaḥim*.¹³¹ R. Pimental, who adjusts Rabbeinu Tam’s end to a day to when three stars are observed, provides implicit support for this approach. As indicated, this approach is untenable as *Shabbat* or any day ends earlier in the Netherlands than in the Middle East. Since Rabbeinu Tam equates the endpoints of the *sugyot* in *Pesaḥim* and *Shabbat*, its adherents then used an assumed (often fixed) point of *alot ha-shaḥar* as the other endpoint to three stars for calculating the times of the day. This

¹²⁹ This type of apparently confirming arithmetic may well have provided further support for a factually untenable approach. Equivalence resulting from nothing more than basic arithmetic is mistakenly taken as confirmation of a *halakhic* position.

¹³⁰ The period from sunset to *tzait ha-kokhavim* is also too short. However, since this approach was never used to create a leniency and as discussed below, many assumed that three stars are defining in the evening, the error had no real consequence.

¹³¹ Independent of the argument of the *geonim* and Rabbeinu Tam, and the strong implication from the *gemara* in *Pesaḥim* that asserts equivalent intervals for the morning and evening twilight period, the *Yerushalmi* in *Berakhot* mentioned earlier, that discussed *alot ha-shaḥar* and the appearance of three stars, is often incorrectly cited as justification for this approach. As I have noted, while the *Yerushalmi* delimits a day by those endpoints, in no sense does it declare them equidistant from either *ḥatzot* or from sunrise and sunset.

approach was widespread throughout Europe. R. Tukitzinsky tells the history of how the calendar in Jerusalem was calculated this way until it was changed.¹³²

In summary, making no adjustments for both *alot ha-shaḥar* and *tzait ha-kokhavim*, though hardly justifiable, is in widespread use and often creates anomalies, as is apparent in the OU calendar. Using depression angles, as has become more prevalent in recent years, is consistent with both the physical events described by various *sugyot* and, more than likely, with practice in the generations before clocks.

¹³² *Ha-zemanim Be-halakhah* quotes several accounts varying in minor details concerning the circumstances around this change. The Jerusalem calendar used during the last century uses *tzait kol ha-kokhavim* as opposed to just three stars. See *Minḥat Yitzḥak* 4:53 as well, for a lengthy discussion where he concludes that any approach that does not calculate *ḥatzot* accurately is flawed. The approaches that used *alot ha-shaḥar* and three stars shortened slightly the *halakhic* hour, and thereby created a minor (unwarranted) *ḥumrah* for morning *zemanim*, in addition to an early point of *ḥatzot*. Footnote 51 in the epilogue elaborates on this point in detail. This and his other more famous dispute over the dateline (and perhaps his work on the *heter mekhirah*) may have motivated some to quibble with R. Tukitzinsky over minutiae in the calendar he established for Jerusalem. More than any contemporary *posek*, his insights and observations were fundamental, allowing many, myself included, to understand the laws of *zemanim* consistent with astronomic observations.

Section 4. How are we to define the hours of the day: from sunrise to sunset or from *alot ha-shahar* to darkness?

Most daily calendars provide two alternative methods for defining the hours of the day:

- The method normally referred as that of the Vilna *Gaon* calculates the hours of the /day from sunrise to sunset.
- The method normally referred as that of Magen Avraham calculates the hours of the day beginning at *alot ha-shahar* until *tzait kol ha-kokhavim*.¹³³

This disagreement, however, traces back to at least Ramban, and perhaps, as some maintain, Rambam.

Ramban in *Torat Ha-adam*¹³⁴ strongly supports the position of Rabbeinu Tam. Ramban argues that *tosefet Shabbat* could only begin after sunset during an interval that is still considered completely part of the daytime period; *tosefet Shabbat* prior to sunset is not meaningful, equated by Ramban to the value of illumination from a candle during daylight. Further Ramban asserts that *pelag ha-minhah* occurs at the time that it takes to walk $\frac{1}{6}$ th of a *mil* prior to sunset. This has two obvious and important consequences. First, Ramban is clearly calculating the hours of the day from *alot ha-shahar* to *tzait ha-kokhavim*. Second, as was discussed previously, Ramban maintained that the time needed to walk a *mil* is 22.5 minutes.

Calculations based on this approach of Ramban, even computed correctly, encounter an issue at latitudes further from the equator. Consider a place

¹³³ A century prior to the *Gaon*, R. Pimental, a contemporary of Magen Avraham, cites this disagreement as between the *Levushim*, authored by R. Mordekhai Yaffe, and R. Isserlein in *Trumat Ha-deshen*.

¹³⁴ Pages 251 - 252, Chavel edition, Mossad Ha-rav Kook.

where the daytime period is only eight hours from 8:00AM to 4:00PM. Assume that two unadjusted 72-minute intervals are added to the daylight period of (8 hours =) 480 minutes. Note that adjusting for latitude or season or both, and / or using a 90-minute interval that I demonstrated to be the position of Ramban, would each add to 72 minutes; using 72 minutes demonstrates the issue *a fortiori*.

If the daytime period is only eight hours, then the *halakhic* day is $(480 + 2 * 72 =) 624$ minutes and the *halakhic* hour is $(624 / 12 =) 52$ minutes. *Hatzot* is at noon, *tzait ha-kokhavim* is at 5:12PM and *pelag ha-minḥah* occurs $((1 + \frac{1}{4}) * 52 =) 65$ minutes before *tzait ha-kokhavim* at 4:07PM, **7 minutes after sunset**. Clearly, on its own this is not entirely problematic. While the approach that measures the hours of the day from sunrise to sunset cannot encounter this problem, we can simply assert that this is another example of some laws of *zemanim* requiring different treatment as we move further away from the equator.¹³⁵ A *posek* can then choose to allow *pelag ha-minḥah* to occur after sunset,¹³⁶ consider *pelag ha-minḥah* to be undefined or artificially set *pelag ha-minḥah* to either sunset or $\frac{1}{6}$ th of a *mil* prior to

¹³⁵ Like the end of *Shabbat* defined by the sun going 16 degrees below the horizon, which does not occur during the summer at latitudes in northern Europe, the calculation of *pelag ha-minḥah* must be different during other months when the daytime period is short. For the end of *Shabbat*, some suggest (*Minḥat Yitzḥak* 4:53, for example) midnight. To my knowledge, *posekim* have not addressed how to define *pelag ha-minḥah* under these circumstances. Perhaps these types of complexities may have contributed to the current overall preference for the approach of the *Gaon* in northern Europe.

¹³⁶ Consistent with our overall position, sunset may not be that critical a *zeman* particularly for Magen Avraham. Perhaps, *pelag ha-minḥah* falling after sunset is not that disturbing; implications to the contrary in the *gemara* might only apply to the Middle East.

sunset, during certain months of the year at latitudes further from the equator.^{137 138}

While it is indisputable that Ramban is an early source for the position of Magen Avraham, some assert that Rambam calculated the hours of the day via the method later prescribed by R. Mordekhai Yaffe and the *Gaon*.¹³⁹ Surprisingly, beyond this (disputed) source in *Mishnah Torah*, this approach does not have much if any explicit support among *rishonim*. Since *mitzvot* restricted to the daytime period can be performed from *alot ha-shahar* (at least *be-di-avad*), this approach must address why we do not calculate the

¹³⁷ Hypothetically, based on Ramban, one could canonically set the twilight period to $1 + \frac{1}{4} - (\frac{1}{6} * 22.5 / 75)$ or 1 and $\frac{1}{5}$ hours and calculate the length of remaining 9 and $\frac{3}{5}$ hours from sunrise to sunset. Hours during the sunrise to sunset period would be shorter than the hours during twilight. In the epilogue on this section, an alternative method to calculate the approach of Magen Avraham is outlined. It provides a mechanism that solves this issue for almost all inhabited regions. That approach will be covered in depth in a planned monograph on *Shaot Ha-yom*.

¹³⁸ Yet more problematic is using 90 versus 72 minutes when calculating per Magen Avraham even at latitudes like that of Jerusalem. Note that for those who maintain a 90-minute interval, *pelag ha-minḥah* occurs 3.75 minutes before sunset in the spring. However, in the winter, when the *halakhic* hour is approximately 10 minutes shorter, *pelag ha-minḥah* occurs at least ten minutes later and a few minutes after sunset. Were 90 minutes to be adjusted by season, to approximately 96 minutes in the winter in Jerusalem, as would be normally assumed, *pelag ha-minḥah* would occur yet another 5 minutes later. However, readers can verify that even in the winter, when the *halakhic* hour is 10 minutes shorter, using an adjusted 72 minutes, approximately 78 minutes, still leaves *pelag ha-minḥah* occurring just prior to sunset. Again, the conjecture in the epilogue, outlining a different method to calculate the approach of Magen Avraham, places *pelag ha-minḥah* prior to sunset in Jerusalem even assuming an adjusted 90-minute interval.

¹³⁹ See, for example, R. Schachter's argument in *Mi-pininei Ha-rav*, page 31, ascribed by R. Soloveitchik to his grandfather, which draws an implication from Rambam's calculation of *derekh reḥokah* for *korban Pesah* only beginning at sunrise, that Rambam agrees with the position ascribed to the *Gaon* and R. M. Yaffe. Rambam is clearly assuming one calculates leaving at sunrise, and while certainly indicative of how the hours of the day might be calculated, it is not compelling and strongly disputed by R. Kapach throughout his commentary on *Mishnah Torah*. R. Kapach maintains that Rambam calculated the hours of the day from *alot ha-shahar*, claiming support as well from the ancient customs of *Teiman*. Reconciling Rambam *teshuvah* 51 concerning *shaot zemaniot* to R. Kapach's position is challenging.

hours of the day from that point. Like R. Yaffe, the *Gaon* answers¹⁴⁰ that the intrinsic definition of hours relates to the sun and is therefore defined only during the sunrise to sunset period. The *Gaon* and his school would likely argue that such a definitional notion was inherently understood in previous generations.

Despite attempted attribution of the approach of the *Gaon* to Rambam and support claimed from other earlier authorities, the approach of Rambam and others gained such widespread acceptance, that it is possible that R. Isserlein was not even aware of an alternative viewpoint. The first *teshuvah* in *Trumat Ha-deshen* deals with starting *Shabbat* in the summer 3 to 4 hours before *tzait ha-kokhavim*. R. Isserlein offers no basis for this practice other than mentioning that it was the practice of notable Rabbis of his time. While 4 hours is always problematic, a calculation of *pelag ha-minḥah* from sunset (as opposed to *tzait ha-kokhavim*) on a 17-hour day places *pelag ha-minḥah* 106.25 minutes before sunset and approximately 3 hours prior to *tzait ha-kokhavim*. Since R. Isserlein does not offer this as a possible justification, one might conjecture that he may not even have been aware of this viewpoint. In *Sefer Levushim O. H. 267*, R. Yaffe questions why R. Isserlein did not proffer this explanation.

Ironically, R. Benish notes an attempt by R. Isserlein's student R. Yosef ben Moshe, the author of *Leket Yosher*, to demonstrate from two *teshuvot* in *Trumat Ha-deshen* that R. Isserlein also calculated from sunrise to sunset.¹⁴¹ One *teshuvah* considers whether eating *ḥametz* until the end of the 4th hour must be measured using *shaot zemaniot*, or is it sufficient to stop eating

¹⁴⁰ *O. H.* 261.

¹⁴¹ See *Ha-zemanim Be-halakhah* volume 1, page 113. Paradoxically, as noted in section 1, in the paragraph adjacent to footnote 83, it is also claimed that R. Yosef ben Moshe disputes the view that R. Isserlein maintained that the time needed to walk a *mil* was 18 minutes. That argument in favor of 22.5 over 18 minutes is entirely dependent on the fact that R. Isserlein counted the hours of the day from *alot ha-shaḥar* until *tzait ha-kokhavim*. Thus, in an entirely contradictory manner, based on *Leket Yosher*, both positions normally associated with R. Isserlein have been disputed,

- counting hours of the day from *alot ha-shaḥar* to *tzait ha-kokhavim*, and
- maintaining 18 minutes as the time needed to walk a *mil*.

ḥametz two clock hours before midday. As was outlined in the *teshuvah*, this became relevant in practice during a leap year, when *erev Pesah* occurred in late April.¹⁴² That year, at the end of the 4th hour, there were still approximately 3 clock hours until *ḥatzot*. R. Isserlein adopts the more lenient approach and allows eating *ḥametz* until 2 clock hours before *ḥatzot*. Since sunrise and *ḥatzot* were at approximately 5:00AM and 12 o'clock noon respectively, it would imply that R. Isserlein is calculating seven hours from sunrise to *ḥatzot*. This purported “proof” is rather problematic. First, as R. Benish himself asks, when the *teshuvah* is discussed, *Leket Yosher* writes explicitly that it was 4 hours after *amud ha-shaḥar*. It is much more likely that *amud ha-shaḥar* refers *alot ha-shaḥar* than to sunrise. Second, to create the issue and calculate from sunrise at 5:00AM, it appears you must use unadjusted clock hours. Using clock hours, an unlikely assumption, the end of the 4th hour is at 9:00AM, 3 hours before *ḥatzot*. Third, were you to calculate instead from sunrise at 5:00AM until sunset at 7:00PM, using *shaot zemaniot* as must be assumed, the end of the 4th hour, the time to stop eating *ḥametz*, is at 9:40AM. Would one refer to 2 hours and 20 minutes as “approximately” 3 hours before noon? I doubt the question would ever have been raised. However, if we calculate using the practice that R. Isserlein is normally assumed to have followed, then *alot ha-shaḥar* was at 3:48AM (even assuming an unadjusted 72 minutes) and the end of the 4th hour of the day was at 9:16AM, approximately 3 hours (2 hours and 44 minutes) before *ḥatzot*.¹⁴³ This is much more likely and leaves the *teshuvah* consistent with the standard assumption of R. Isserlein’s position of calculating from *alot ha-shaḥar*. A second *teshuvah*¹⁴⁴ on reading the *Megillah* early in a special situation presents no direct indication of R. Isserlein’s position. However, an account of the circumstances in *Leket Yosher*¹⁴⁵ is assumed by many to

¹⁴² At his northern location, the daytime period was already approximately 14 hours.

¹⁴³ Though highly unlikely, if R. Isserlein, in opposition to the opinion of his view by the *Shulḥan Arukh*, supported a 22.5-minute time to walk a *mil* then the approximation to 3 hours is even closer. What is more plausible is that R. Isserlein used an observed *alot ha-shaḥar* that at his location also occurred approximately 90 minutes before sunrise. In that case, three hours is almost exact. The day begins at 3:30AM, and the end of the 4th hour, at 9:10AM, is approximately 3 hours before *ḥatzot*.

¹⁴⁴ *Trumat Ha-deshen, teshuvah* 109. Analysis of this *teshuvah* is critical to the approach referenced in footnote 137.

¹⁴⁵ *Leket Yosher*, page 157 - 158, where the time of *pelag ha-minḥah* is quoted as being a few minutes before 5:00PM, certainly at variance with the assumed position of R.

support the view that R. Isserlein would calculate *pelag ha-minḥah* from sunset, at least in this case of need. In a yet unpublished manuscript on the position of Magen Avraham, we show that R. Isserlein was likely using a variant of what is normally considered the position of Magen Avraham.¹⁴⁶ In any case, the opinion normally ascribed to R. Isserlein was widely followed.

Some have argued that anyone who calculates from *alot ha-shaḥar* until *tzait kol ha-kokhavim* must follow the opinion of Rabbeinu Tam as opposed to the *geonim*.¹⁴⁷ While I am not aware of any major *halakhic* authority who maintains that the hours of the day be calculated from *alot ha-shaḥar* until *tzait ha-kokhavim* and followed the *geonim*, many communities in Jerusalem, who end *Shabbat* according to the view of the *geonim*, observe the times of Magen Avraham for morning prayers. Conceptually, this combination of views is easily justified as follows: Since almost all *mitzvot* of the day can be performed from *alot ha-shaḥar*, it would seem at least plausible to count the hours of the day from that point.¹⁴⁸ In order to

Isserlein, if he was calculating *pelag ha-minḥah* from a late point of *tzait kol ha-kokhavim*. See *Ha-zemanim Be-halakhah*, volume 1, page 113.

¹⁴⁶ The alternative for the how the hours of the day may have been calculated, mentioned in footnote 137, addresses this issue as well, even assuming R. Yosef ben Moshe's assertion that *pelag ha-minḥah* occurred slightly before 5:00PM on that day.

¹⁴⁷ R. Kotler, R. Willig and others have argued for this position. R. Kotler raised the issue of the practice of Jerusalem, as noted in the next sentence, questioning his own approach.

¹⁴⁸ In *Am Mordechai*, R. Willig goes further:

1. R. Willig draws the implication in the other direction as well, i. e., that those who follow Rabbeinu Tam must define the hours of the day from *alot ha-shaḥar* to *tzait ha-kokhavim*.
2. He argues that the dispute over 18 versus 22.5 minutes as the time needed to walk a *mil* also links to the basic argument of the *geonim* and Rabbeinu Tam.

Both of those claims have known counterexamples. As R. Schachter points out R. Soloveitchik maintained a personal *ḥumrah* based on Rabbeinu Tam, but he did not concern himself with the opinion of Magen Avraham, as was the *minhag* of much of Lithuania. In his *yarzeit shiur*, (see the section in the *shiur* adjacent to footnote 8), R. Soloveitchik argues strongly in favor of the *Gaon* versus Magen Avraham and indicates that Rabbeinu Tam and his followers might also calculate from sunrise to sunset, as R. M. Yaffe maintained in practice. Regardless of whether one agrees with R. Soloveitchik's view, it would make it difficult to maintain a logical

maintain a precise calculation of *ḥatzot*, one might use *tzait kol ha-kokhavim* as the other endpoint for purposes of calculation. However, that need not imply that *tzait kol ha-kokhavim* is the endpoint for any *halakhah*; the end of the day and the endpoint for various *mitzvot*, may still occur earlier with the appearance of three stars or even before that time. As mentioned earlier, this asymmetric day is strongly suggested by the *Yerushalmi* in *Berakhot* 2b based on the verse in Nehemiah. One might also choose to distinguish between the definition of the daytime period, from *alot ha-shaḥar* until *tzait kol ha-kokhavim*, from the definition of the day of the week that begins and ends at or around the time of the appearance of three stars, as I will explore further in section 9.¹⁴⁹

Despite its apparent logical necessity, one cannot assume that *tzait kol ha-kokhavim* was (commonly) used prior to the last century to calculate the hours of the day. Many calendars, including the calendar of Jerusalem mentioned in a previous footnote,¹⁵⁰ used *alot ha-shaḥar* and three stars violating our assumption about the necessity to calculate *ḥatzot* accurately.^{151 152}

implication in direct opposition. The second implication again has R. Yaffe as a counterexample. It may also be contrary to the *Gaon* himself who, according to many sources, also maintained 22.5 minute as the time needed to walk a *mil*. More critically, the 18 versus 22.5-minute argument is likely completely independent of the argument around the end of *Shabbat*, perhaps largely independent of *halakhic* theory as well and centered only on the length of time that is associated with a specific phenomenon. In the new edition of *Am Mordechai*, R. Willig modified his position significantly.

¹⁴⁹ This viewpoint is raised by R. Isser Zalman Meltzer quoted at length by R. Tukitzinsky in *Bein Ha-shemashot*, pages 37 - 41, albeit differently than will be addressed in sections 5 and 9. As already noted, when the *Gaon* introduced the notion of *tzait kol ha-kokhavim*, he did not propose any specific *halakhah* that might depend on that *zeman*.

¹⁵⁰ See footnote 132, as well as footnote 333 in the epilogue.

¹⁵¹ It is left as an exercise to the reader to demonstrate that such an approach does not violate the observation that *minḥah gedolah* and *minḥah ketanah* are separated by exactly three hours.

¹⁵² As already noted in footnote 137, the epilogue contains a conjecture of a practice that used asymmetric endpoints while calculating *ḥatzot* accurately, from which this approach may have evolved.

As noted earlier, R. Schachter quotes an opinion of R. Soloveitchik that Rambam calculated *halakhic* hours from sunrise. Interestingly, if one were to maintain that Rambam considered the *alot ha-shaḥar* to sunrise and the sunset to *tzait ha-kokhavim* period as 120 minutes, a viewpoint that some maintain, then Rambam could not count the hours of the day from *alot ha-shaḥar* to *tzait ha-kokhavim*. Assume a time to walk 5 *milin* of 120 minutes on a canonical 12-hour day; *alot ha-shaḥar* is at 4:00AM and *tzait ha-kokhavim* is at 8:00PM. An hour is $((720 + 240) / 12 =)$ 80 minutes and *pelag ha-minḥah*, 1 and ¼ hours (100 minutes) before 8:00PM, is at 6:20PM, **20 minutes after sunset even on a 12-hour day**. While there is no logical dependency between how hours are calculated and either a 72 or 90-minute *alot ha-shaḥar* to sunrise interval, the 120-minute alternative apparently¹⁵³ forces calculating the hours of the day from sunrise to sunset.

There is scant evidence from the Talmud supporting either position and what evidence exists is not unassailable.¹⁵⁴ Two *sugyot*, one relating to an early *maariv* one afternoon after which the clouds lifted, and the sun reappeared and a second tolerating inaccuracy by witnesses on the second versus the third hour of the day, are somewhat less forced when one assumes the position of R. Yaffe. Interestingly, rather than reliance on either of these *sugyot*, instead, early opinions make fundamental arguments, either,

- the day begins at *alot ha-shaḥar* and hours should be calculated from the *halakhic* beginning of the day, or
- hours are defined by the rising and setting sun.¹⁵⁵

¹⁵³ The conjecture referenced in the previous footnote creates the possibility of defining *alot ha-shaḥar* at 120 minutes before sunrise, counting the hours of the day from *alot ha-shaḥar* but using an asymmetric point in the evening at, for example, 40 minutes after sunset. This avoids *pelag ha-minḥah* occurring after sunset, and it can be implemented preserving the accuracy of *ḥatzot*.

¹⁵⁴ See *Minḥat Kohen, maamar sheni*, chapters 6 to 9, who carefully examines the relevant *sugyot*; his conclusion is that the position of the *Levushim* is to be preferred.

¹⁵⁵ R. Soloveitchik, in the previously mentioned *yartzeit shiur*, argues for the position of the *Gaon*, without supporting sources.

While the method of R. Yaffe has only one primary method of calculation, the method of R. Isserlein has spawned multiple methods of calculation along three quasi-independent variables:

1. Is the interval between *alot ha-shaḥar* and sunrise in the Middle East around the spring and fall equinox 72, 90 or some other number of minutes?
2. As one changes location or in different seasons, is the interval invariant, or does it vary either in proportion to the length of the day or as defined by depression angles?
3. Is the evening endpoint used for calculation and *alot ha-shaḥar* equidistant from sunset and sunrise respectively, or is it earlier, coincident with the appearance of three stars.¹⁵⁶ Implementing an earlier evening endpoint has several computational alternatives.¹⁵⁷

¹⁵⁶ Those who would use three stars would still have to determine the exact time to use in practice. Interestingly, the greatest stringency for morning *zemanim* results from the earliest assumed time for three (medium) stars.

¹⁵⁷ Not all these theoretical alternatives have specific proponents.

Section 5. Of the three criteria given by the gemara in *Shabbat* – time, the appearance of stars and darkness (darkening / appearance of the sky / horizon), which, if any, are the definition of night, and which are just approximations or an indication? How do opinions expressed using these three terms compare?

This long section is temporarily omitted while being reviewed.

Section 6. How is the duration of the *bein ha-shemashot* period to be adjusted at distinct locations and during different seasons (if at all)? Might this depend on whether the period of *bein ha-shemashot* is:

- 1) **a period of uncertainty that is its own unique *halakhic* category, either**
 - a) **a combination of both day and night, or perhaps**
 - b) **a category of its own, or**
- 2) **a period with a definitive transition point that we are uncertain how to pinpoint, either**
 - a) **practically or perhaps**
 - b) **because of some element of halakhic uncertainty,**
or
- 3) **an example of the Rabbis establishing a fence?**

While there is extensive debate on the theoretical nature of the period of *bein ha-shemashot*, our attention is only on the practical: when is the period of *bein ha-shemashot*? In section 3, we discussed alternatives on whether to adjust, based on latitude and season, the period between *alot ha-shaḥar* and sunrise where both endpoints relate to natural occurrences, making the case for adjustment straightforward. In the case of the *bein ha-shemashot* period, the issues are not nearly as clear-cut. While the end of the *bein ha-shemashot* period is defined by a natural event, it is unclear whether its beginning is as well, as will be explained.

In the following two sections, we will cover various opinions about when the period of *bein ha-shemashot* begins and ends.¹⁵⁸ Leaving the endpoints of

¹⁵⁸ I previously discussed the rare practice of adjusting the end of *Shabbat* according to Rabbeinu Tam, as opposed to the more usual custom of using a fixed 72 or 90 minutes after sunset. On the other hand, the view of the *geonim* has almost always incorporated at least an adjustment based on latitude. While there does not appear to be any clear rationale for this disparity, that issue is not our focus here. Regardless of adjustments to the end of the period of *bein ha-shemashot* as certainly occurs according to the view of

bein *ha-shemashot* aside for a moment, the issue addressed in this section is whether the length of the *bein ha-shemashot* interval itself should be adjusted based on latitude and season or should its length be invariant.

The conceptual approaches to the period of *bein ha-shemashot* do not determine conclusively how the period of *bein ha-shemashot* is to be calculated; at best, they are suggestive. The various two approaches can be expressed as an interval defined or approximated by two distinct physical occurrences such as,

1. the interval from sunset to three stars, as is almost universally practiced today and as I began this monograph with the citation from Rambam,
2. the interval from the appearance of two stars to the appearance of three stars, an option that is impossible to support as discussed in the previous section, or more generally
3. the interval either from or after *mi-she-tishkeh ha-ḥamah* equivalently expressed as **depression angle A** until, at or just after *ḥashekhah* expressed as **depression angle B**. This formulation encompasses multiple options for both angle A and B including the approach of most modern calendars where $A = 0$, in other words, sunset, and $B = 8.5$, the depression angle equating to three small stars, relatively adjacent to each other.¹⁵⁹

If one is defining an interval, it is reasonable to assume, like the discussion in section 3, that its duration adjusts based on location and season, as is often practiced today. Thus, for those living further from the equator than the

the *geonim*, the focus here is whether the length of the *bein ha-shemashot* interval itself should be adjusted.

¹⁵⁹ As one goes further from the equator, the time between a smaller and larger depression angle grows (non-linearly). Thus, any such formulation, unconstrained by any other criteria, will lengthen the period of *bein ha-shemashot*.

Middle East, and during the summer and winter even at distances from the equator like the Middle East, the period of *bein ha-shemashot* is longer.

Especially since the widespread acceptance of the position of the *geonim*, a longer period of *bein ha-shemashot* has become common practice in locations further from the equator than the Middle East. However, regardless of its conceptual framework, one could argue that the *gemara*'s description of the beginning of the *bein ha-shemashot* period was intended only for the Middle East. Assuming invariance to the length of the *bein ha-shemashot* period is at least as plausible, and as I will argue significantly more so, than leaving invariant the period from *alot ha-shaḥar* to sunrise.

Conceptually, even moving in the direction of a *harḥakah*, it remains plausible that the duration of the *bein ha-shemashot* period does not lengthen based on season and latitude.¹⁶⁰ Particularly those who followed Rabbeinu Tam, and did not have an obvious anchor for the beginning of the *bein ha-shemashot* period, tended to limit the length of the *bein ha-shemashot* to the time needed to walk $\frac{3}{4}$ of a *mil*, without adjustment. For example, R. Yaakov Lorberbaum¹⁶¹ in his commentary, *Derekh Ha-ḥaim*, sets the beginning of the *bein ha-shemashot* period 13 and $\frac{1}{2}$ minutes before the end of *Shabbat*.¹⁶² R. Sofer also states categorically that the period of *bein ha-*

¹⁶⁰ This is like the opinion of R. Isserlein limiting the interval during which *ḥametz* is forbidden on *erev Pesah* to two hours before midday.

¹⁶¹ He is better known as the *Nesivos*, so named, after the famous *sefer* he authored.

¹⁶² The precise opinion of R. Lorberbaum is subject to debate. Some have suggested that the numbers printed in the *Derekh Ha-ḥaim*, in the section on the beginning of *Shabbat*, are in error. I have no reason to doubt that the numbers are correct as printed but require an appreciation of how R. Lorberbaum was calculating. I assume, following the opinion of R. Pimental, R. Lorberbaum ended *Shabbat* based on the appearance of stars versus waiting a full 72 minutes; that would typically occur around 45 to 60 minutes after sunset according to *Ha-zemanim Be-halakhah*, volume 2, chapter 46, depending on the exact location for which he was writing. Assuming he was writing for the area whose latitude was like Lissa or even Zolkiev, where *Derekh Ha-ḥaim* was first published, an end to *Shabbat* at 51 minutes after sunset, like Pressburg and Frankfurt although 2-3 degrees further north, is plausible. Under that assumption, his beginning of the period of *bein ha-shemashot* at 37.5 minutes after sunset is exactly 13.5 minutes prior to the end of *Shabbat*. This assumption is consistent with what he then suggests that 57 minutes earlier (approximately 20 minutes before sunset and approximately 72 minutes prior his

shemashot begins at most 17 minutes¹⁶³ prior to the end of *Shabbat*. His community ended *Shabbat* using an approach like that of R. Pimental. On the *Shabbat* addressed in his famous *teshuvah*, a baby was born at 8:30PM, 27 minutes after sunset and 25 minutes before the end of *Shabbat*.¹⁶⁴ Thus, two *posekim*, whose communities followed a *modified* version of the approach of Rabbeinu Tam,¹⁶⁵ limited the *bein ha-shemashot* period to about ¼ of an hour.

On the other hand, neither the argument in the previous section where the time needed to walk ¾ of a *mil* was considered a maximum nor thinking of the period of *bein ha-shemashot* as a *harhakah* necessarily imply that at locations further from the equator the interval of *bein ha-shemashot* should not lengthen. The time needed to walk ¾ of a *mil*, even **when considered as a maximum, was perhaps intended only to apply in** the Middle East. However, when we encounter a significantly longer period of twilight and thus, a lengthened period of uncertainty, the period of *bein ha-shemashot* might lengthen as well. Thus, even if *bein ha-shemashot* is rooted in

assumed end of *Shabbat*) is when one can begin *Shabbat* without explicit declaration. From *pelag ha-minhah*, a yet earlier point, one can start *Shabbat* only with an explicit declaration. His use of 57 and hence approximately 72 minutes appears original, perhaps a variant of R. Eliezer mi-Mitz. His calculation of *pelag ha-minhah* apparently used a seasonal variation that correlates the time between *pelag ha-minhah* and *tzait ha-kokhavim* to the length of the daytime period, like the approach of R. Pimental that was addressed previously. A discussion concerning those who amend the times given in the *Derekh Ha-haim* was covered in my paper that appeared in the Torah U'Maddah Journal, vol. 16, 2013

¹⁶³ In *teshuvah* 80, he supported 22.5 minutes as the time needed to walk a *mil* and ($.75 * 22.5 =$) 16.875 (rounded to 17) minutes as the maximum length of the *bein ha-shemashot* period.

¹⁶⁴ Like R. Benish, I assume that the *teshuvah* contains an error where “an hour” must be replaced by “a *mil*,” otherwise, the *teshuvah* makes little sense. R. Benish’s attempt in the additions at the back of volume 2 of *Ha-zemanim Be-halakhah*, to defend the original text under the assumption that *Hatam Sofer* did not know of the *geonim*’s position but only that of R. Eliezer mi-Mitz is difficult to accept for two reasons. First, his *rebbe*, R. Adler appears to have followed the custom of Frankfurt and the *geonim* for the start of *Shabbat*. Second, in his commentary on *Shabbat* 34a, R. Sofer refers to R. Eliezer mi-Mitz’s position as the **third** alternative. (Parenthetically, while Frankfurt ended *Shabbat* at the appearance of three stars, apparently, R. Adler personally followed the standard *zeman* of Rabbeinu Tam for determining the end of *Shabbat*.)

¹⁶⁵ These communities were more closely following the position of the *geonim*.

harhakah, one could still argue, that the **fence** was intended to begin at some defined level of darkness around the point that *penai mizrah maadimin* ceases, the opinion of R. Yosef, or the time needed to walk 1/12th of a *mil* earlier, the opinion of Rabbah. Nonetheless, the *Shulhan Arukh* implies a fixed period of *bein ha-shemashot*, and that comports with generations of practice, as well. Both current practice that equates the period of *bein ha-shemashot* to the variable period between two physically defined endpoints, sunset and the appearance of three small stars, and a practice that limited the period of *bein ha-shemashot* to a fixed-length interval are both well supported.

Whether or how the period of *bein ha-shemashot* should be adjusted based on latitude and season appears:

- independent of the basic dispute of the *geonim* and Rabbeinu Tam and
- only weakly linked to how the period of *bein ha-shemashot* is conceptualized.

One could argue that since both R. Lorberbaum and R. Sofer viewed themselves as following Rabbeinu Tam's opinion, their invariant interval of the period of *bein ha-shemashot* is somehow linked to that opinion. However, I fail to see any conceptual linkage between a variable versus invariant length to the *bein ha-shemashot* interval and the fundamental dispute between the *geonim* and Rabbeinu Tam. It should also be noted that both R. Lorberbaum and R. Sofer, following a *pesak* like R. Pimental, were implementing an end to *Shabbat* essentially in line with the opinion of the *geonim*.¹⁶⁶

In two complex and controversial opinions, R. Nosson Adler and R. Feinstein, both vary the length of the *bein ha-shemashot* period.¹⁶⁷ Prior to

¹⁶⁶ Unless one insists that the period of *bein ha-shemashot* begins at exactly sunset according to the *geonim*, these same positions should be valid according to the *geonim* as well.

¹⁶⁷ If the beginning of the period of *bein ha-shemashot* were a point after sunset, then calculating its variation by season and latitude would likely require a precisely defined

both of these two *posekim*, R. Pimental explicitly supported a variable length to the *bein ha-shemashot* period, using a problematic method (based on the length of the daytime period between sunrise and sunset).¹⁶⁸ Details of his approach are not pursued further.

In the *teshuvah* in which he established 50 minutes after sunset as the end of *Shabbat* in the New York area, R. Feinstein took R. Pimental's approach¹⁶⁹ one-step further. Like R. Pimental, R. Feinstein adjusts Rabbeinu Tam's end to *Shabbat* based on the appearance of stars, equating 50 minutes after sunset in New York to 72 minutes after sunset in Lithuania. However, R. Feinstein then goes further, adjusting the time needed to walk a *mil* so that the time needed to walk 4 *milin* equals the number of minutes after sunset at which *Shabbat* ends. Thus, based on his 50-minute period for Rabbeinu Tam's end of *Shabbat* in the New York area, R. Feinstein calculated the time needed to walk a *mil* for New York as 12.5 minutes ($\frac{1}{4}$ of 50 minutes), and the time needed to walk $\frac{3}{4}$ of a *mil*, at slightly more than 9 minutes. Using that shortened *mil*, he maintained that the *geonim's* end to *Shabbat* remained the time needed to walk $\frac{3}{4}$ of a *mil*, or 9.375 minutes after sunset. In addition to the issues previously raised that are common to the approaches of both R. Pimental and R. Feinstein, R. Feinstein's methodology raises two additional issues, one fundamental and one computational.

First, and most fundamentally, the time needed to walk (one or) 4 *milin* is not linked to location or latitude or to the length of time between sunset and the appearance of stars. Intervals defined by physical phenomena are currently measured by clock-time; in the times of the *gemara*, they were approximated by the interval required to walk a certain distance or perform a specific activity. We might adjust an interval based on latitude and season and then recalculate its clock or *mil*-based equivalent; the reverse, adjusting the length of time required to walk a *mil* and then expecting physical phenomena, like the appearance of three stars to correspond is

appearance of the sky, equated in modern terms to a specific depression angle. This area has received scant attention from *posekim*; I return to this point in the epilogue.

¹⁶⁸ For further discussion of R. Pimental's approach, see footnote 127.

¹⁶⁹ I covered R. Feinstein's approach in both the introduction and section 3.

inexplicable.¹⁷⁰ As a result, the time R. Feinstein ascribed to the *geonim*'s end to *Shabbat*, less than 10 minutes after sunset, is so early that at most one star may be visible, only during certain seasons of the year and only to an expert, who knows precisely where to look. **This cannot be the opinion of the *geonim* applied to New York.** Similarly, it would follow that *alot ha-shaḥar* is 50 minutes before sunrise as well, again contradicted by reality and drastically different from R. Feinstein's own *teshuvah*¹⁷¹ on the topic. To be clear, adjusting the time needed to walk a *mil* is akin to saying that 72 minutes on clocks in Lithuania equals 50 minutes on clocks in New York; this approach is significantly more disturbing than allowing one to end *Shabbat* after 50 minutes in New York according to Rabbeinu Tam. I have not read nor can I conceive of a defense of this position.¹⁷² Surprisingly, I have not seen this issue even raised, despite widespread use of both the *teshuvah* and its methodology.

Second, computationally, using a linear approximation is problematic since extrapolation from smaller to larger depression angles is not linear.¹⁷³ Assume two latitudes, for example, 30 and 40 degrees, and two depression angles, for example, 4 and 8 degrees. Assume that the number of minutes after sunset required to reach a 4-degree depression angle is only 3 minutes greater at 40 degrees than at 30 degrees. Nonetheless, the number of minutes after sunset to reach a depression angle of 8 degrees can be, not 3, but 10 minutes greater at 40 degrees than at 30 degrees. Thus, the end of a “ $\frac{3}{4}$ *mil* equivalent” interval prior to *ḥashekhah* is of longer duration than the initial “ $\frac{3}{4}$ *mil* equivalent” interval after sunset. Disregarding this subtle non-

¹⁷⁰ As discussed at end of section 3, R. Feinstein may have seen language that talked in terms of adjustments to the time needed to walk a *mil* to demonstrate, as mentioned previously, that *pelag ha-minḥah* always occurs at the time needed to walk $\frac{1}{6}$ th of a *mil* before sunset, not only on 12-hour days. He may have extended that approach that is itself, as previously indicated, imprecisely worded.

¹⁷¹ *Igrot Moshe O. H.* 4:6.

¹⁷² What was intended was to reduce the time after sunset that *Shabbat* ends relative to Lithuania. That remains problematic, like the issue raised with R. Pimental's approach.

¹⁷³ Latitude, seasonality and the magnitude of the depression angle all affect the length of time between sunset and reaching a specific depression angle in a non-linear manner. R. Feinstein uses the same invariant interval of about ten minutes at both the beginning and end of the *bein ha-shemashot* interval.

linearity becomes more consequential at locations further from the equator, particularly when applied as the basis for a leniency. Despite these difficulties, R. Feinstein clearly assumes adjustment based on latitude to the length of the *bein ha-shemashot* period.

R. Sofer transcribed R. Adler's rulings for the period of *bein ha-shemashot*,¹⁷⁴ without providing either an explanation or justification. Prior attempts¹⁷⁵ to explain R. Adler's conceptual basis have never been entirely satisfactory; some appear completely unsustainable. R. Adler ruled that the *bein ha-shemashot* period is either 24 or 35 minutes, choosing whichever is the greater stringency in the case of a *de-oraysah*, and the greater leniency in the case of a *de-rabbanan*. I can only speculate on the rationale used to derive those numbers.¹⁷⁶

Independent of its rationale, there is significant uncertainty even on how to understand the calculation that R. Adler suggested. Four options present themselves:

- Options 1 and 2: R. Adler is **counting forward** from the beginning of the period of *bein ha-shemashot*, either **option 1) from sunset** or **option 2) from some other start to the *bein ha-shemashot* period** after sunset.

- Options 3 and 4: R. Adler is **counting back** from the end of the *bein ha-shemashot* period, either **option 3) from the appearance of three**

¹⁷⁴ *Hiddushai Hatam Sofer*, at the end of *Seder Moed*. As argued below, it does not comport entirely with R. Sofer's position in the *teshuvah* referenced.

¹⁷⁵ *Ha-zemanim Be-halakhah*, pages vol. 2, chapter 46, footnote 77.

¹⁷⁶ Several options are mentioned by *Ha-zemanim Be-halakhah*. Some, quoted by R. Benish, try to equate 24 to 35 minutes in Frankfurt with various intervals for the period of *bein ha-shemashot* in the Middle East. It is also unclear why or if the numbers are invariant year-round; it may be the result of R. Adler having calculated an upper bound. However, as noted below, however, the numbers appear to align with practice.

small stars, 50 to 55 minutes after sunset, as practiced in Frankfurt or option 4) from an invariant 72 minutes after sunset.

Three of the four options can be easily excluded. If R. Adler were counting forward from sunset, as some who censored this passage may have thought, he would be ending *Shabbat* exceedingly early.¹⁷⁷ As well, the passage seems to be trying to establish the start of the *bein ha-shemashot* period, implying that it is not an obvious point like sunset. Furthermore, were that option even remotely possible, his student, R. Sofer **would never have allowed a *brit* for a baby born *Shabbat* afternoon, 27 minutes after sunset, to take place on the following *Shabbat*.**¹⁷⁸ R. Adler could also not be counting from some unknown beginning of the period of *bein ha-shemashot*; that would be entirely circular, since it is that beginning point to the *bein ha-shemashot* period that he is attempting to specify. Thus, the times are counting back not forward. From his language, it seems clear that R. Adler was counting back from a well-known point to establish the beginning of the period of *bein ha-shemashot*. If that point was the practiced time at which three small stars appear, approximately 50 to 55 minutes after sunset, or approximately 25 minutes after the time the baby in *teshuvah* 80 was born, again one must assume that R. Sofer would at least explicitly consider the possibility of the opinion of R. Adler, his revered

¹⁷⁷ In a taped lecture on Jewish censorship in literature in modern times, recorded 05/12/99, Prof. Leiman uses this practice of R. Adler that *Hatam Sofer* transcribed, as an example of something that was deleted by a Satmar *Hasidic* group who considered it too troublesome for publication. It is unclear whether Prof. Leiman is criticizing the interpretation or acknowledging its correctness and only criticizing the audacity of its censorship. The latter appears more reflective of his tone.

¹⁷⁸ I assume that R. Sofer would not allow a *brit* for a baby born *Shabbat* afternoon during the period of *bein ha-shemashot* even prior to the period of *safek hashekhah*. It is possible that in practice R. Sofer did not make any distinction between *bein ha-shemashot* and the period of *safek hashekhah*; perhaps he treated them as identical even conceptually. In general, I assume that *bein ha-shemashot* represents a longer interval extending beyond *safek hashekhah*. Often in practical contexts, the two terms, *bein ha-shemashot* and *safek hashekhah*, are treated as coincident. Given the lack of any easily defined events for the beginning of the period of *bein ha-shemashot*, the ability to distinguish it from the point of *safek hashekhah* may have led to the two *zmanim* being fused at least in practice, certainly by those following Rabbeinu Tam. Whether and how that might have then influenced modern practice that follows the *geonim* would require a detailed study.

rebbe. This leaves only one alternative: R. Adler was counting back from the conventional time to walk 4 *milin*, 72 minutes after sunset. A point 35 minutes earlier, or 37 minutes after sunset, is one possible beginning to the period of *bein ha-shemashot*, and 24 minutes earlier, or 48 minutes after sunset, is the other. Computationally, 37 minutes after sunset almost coincides with what we assume is R. Lorberbaum's position¹⁷⁹ for the beginning of the period of *bein ha-shemashot*, and 48 minutes after sunset is a few minutes earlier than the practiced end of *Shabbat* in the Frankfurt community, perhaps subtracting a few minutes that correspond to *tosefet Shabbat*. Note that both these *zemanim* might vary by season in a manner that is unexplained. Even though this suggestion has both textual and conceptual challenges, I find it the only explanation that at least corresponds to both the 18th century practice of many cities in that region (other than Frankfurt¹⁸⁰) and the later *pesak* of R. Sofer. Independent of rationale, R. Adler apparently specified the beginning of the period of *bein ha-shemashot* with consideration for both the latest accepted time in many communities, 37 minutes after sunset, but where that represents a leniency, one must wait until close to the end of the day.

The application of either R. Sofer's or R. Lorberbaum's *pesak* to another location is straightforward; one would simply subtract an invariant period of time equal to time required to walk $\frac{3}{4}$ of a *mil*, either 16.875 or 13.5 minutes, from the varying point at which *Shabbat* ends at that location.¹⁸¹ R.

¹⁷⁹ I am unsure of the location that R. Lorberbaum was writing for, but if it was Zolkiev as I hypothesized, it is at approximately the same latitude as Frankfurt.

¹⁸⁰ Frankfurt was one of the few cities that even prior to the time of the *Gaon* started *Shabbat* around sunset, and R. Adler probably followed that custom as well. If R. Adler was addressing the beginning of *Shabbat* as opposed to other biblical commandments, then he was likely not directing his comments to the Frankfurt community. Additionally, starting *Shabbat* around sunset may have been viewed as a stringency that would not apply to situations where an early start to the period of *bein ha-shemashot* would be a leniency.

¹⁸¹ One issue common to many responsa in this area is establishing the beginning of the period of *bein ha-shemashot* by counting back from the time that three small, adjacent stars appear, the practiced end of *Shabbat*, as opposed to counting back from the earlier point when three medium stars appear, the actual end of *Shabbat*. It is both more logical and consistent with the *sugyah* in *Shabbat* to determine the beginning of the period of *bein ha-shemashot* by subtracting from the (approximate) appearance of three medium

Adler's *pesak* is more problematic since using 72 minutes and a period of *bein ha-shemashot* beginning 24 to 35 minutes earlier, appears to be an unwarranted *leniency* in the spring and fall seasons unless again 24 to 35 minutes was a yearly maximum.

In summary,

- both R. Lorberbaum and R. Sofer clearly support an invariant interval of *bein ha-shemashot*, while
- current practice adjusts the length of the *bein ha-shemashot* period, as did R. Pimental, R. Adler and R. Feinstein.

Neither the basic argument of Rabbeinu Tam and the *geonim* nor the alternative conceptualizations of the period of *bein ha-shemashot* necessarily imply whether the *bein ha-shemashot* interval is to be adjusted or left invariant.

stars than to subtract from the practiced end of *Shabbat*, the appearance of three small stars, which incorporates various stringencies. This delayed starting point to the period of *bein ha-shemashot* often creates an unintended leniency and has no apparent defense. The magnitude of the leniency increases as one moves to latitudes further from the equator where the time between the first appearance of three medium and three small stars grows further apart, particularly in the summer. This problematic method of calculation occurs (frequently) in both scholarly and popular publications.

Section 7. When does the period of *bein ha-shemashot* end? How are the criteria specifying the end of the *bein ha-shemashot* period interpreted by various authorities?

As explained earlier, the *Gaon* distinguished *tzait kol ha-kokhavim*, the end of the evening twilight period mentioned in *Pesahim*, from *tzait ha-kokhavim* discussed in *Shabbat* (and the beginning of *Berakhot*). According to Rabbeinu Tam, they coincide. According to the *Gaon* and the *geonim*, *Shabbat* ends when there is still residual illumination from the sun. From the conceptual viewpoint of Rabbeinu Tam, the end of *Shabbat* coincides with the point at which illumination from the sun is either extremely minimal or has disappeared completely.

The thesis to be developed is that for the *gemara*, the time when *Shabbat* ends is not in dispute. Fundamental to any discussion of the end of the period of *bein ha-shemashot* is recognizing that despite the significant disagreement between Rabbeinu Tam and the *geonim* that has dominated discussion for centuries, the *Bavli* does not record any significant disagreement on this point. Reading the *Bavli* in *Shabbat* and most opinions of the *Yerushalmi* in *Berakhot*,¹⁸² **the issue in dispute is not when the period of *bein ha-shemashot* ends but rather when it begins; the focus of the *Bavli* in *Shabbat* is on Friday night.** The two physical descriptions, “*hihsif ha-elyon ve-hishveh le-tahton*” and three medium stars, while subject to debate between Rabbeinu Tam and the *geonim*, are accepted by the *gemara* as the definitive point at which the period of *bein ha-shemashot* and *Shabbat* concludes. With only a few alternative viewpoints, most commentators do not see any significant disagreement about the end of *Shabbat* among the three major opinions¹⁸³ cited:

¹⁸² In the *Yerushalmi* there is a single opinion supporting two stars versus three stars as the end of the period of *bein ha-shemashot*. There is also one opinion that Rabi Yosi’s end of *Shabbat* occurs during R. Nehemiah’s *bein ha-shemashot* interval of the time needed to walk $\frac{1}{2}$ *mil*, a position not supported by any of the *rishonim* commenting on Rabi Yosi in the *Bavli*.

¹⁸³ The *gemara* decides in favor of Rabi Yehudah as far as the start of *Shabbat*. Whether that is just stringency and we definitively follow R. Yosi as a matter of law, or there is an

1. Rabi Yehudah who defines the end of *Shabbat* as the point when “*hihsif ha-elyon ve-hishveh le-tahton.*”
2. Rabi Yosi who maintains that the period of *bein ha-shemashot* is exceedingly short, or perhaps just a point along a continuum.
3. R. Yehudah in the name of Shmuel who specifies that the appearance of three stars signify the beginning of *lailah*.

Most *rishonim* maintain that Rabi Yosi and Rabi Yehudah argue about an interval at most equal to the time needed to walk 50 *amot*,¹⁸⁴ at most 36 seconds. The *gemara* cites the opinions of Rabi Yosi and Rabi Yehudah together with a discussion of the appearance of three stars without any suggestion that they are in conflict.

The one possible exception is the opinion of Rabi Nehemiah¹⁸⁵ who states that the duration of the period of *bein ha-shemashot* is the time needed to walk ½ of a *mil*. Associated with Rabi Nehemiah’s position in the *Bavli* in *Shabbat* and in a more detailed story in the *Yerushalmi* in *Berakhot* is a scenario involving the sun, *har Carmel* and one immersing himself in the

extended period of uncertainly, relates to the options defining *bein ha-shemashot* addressed in the previous section.

¹⁸⁴ One of the *baalei tosefot* disagrees and places the point at which nightfall occurs according to Rabi Yosi significantly later. However, see *Ha-zemanim Be-halakhah*, chapter 40 where he lists a significant group of commentators that place Rabi Yosi’s end of *Shabbat* either very slightly later (less than the time needed to walk 50 *amot*, the opinion of various *baalei tosafot*, Ramban, R. M. Yaffe, etc.) or coincident with that of Rabi Yehudah (the opinion of Rashi, *Tur*, *Gaon* of Vilna, etc.).

¹⁸⁵ Unlike the *rishonim* mentioned above, an opinion in the *Yerushalmi* suggests that the point Rabi Yosi considers nightfall falls either somewhere during the *bein ha-shemashot* interval of Rabi Nehemiah or at its conclusion. The former point of view clearly places the end of *Shabbat* in dispute. The latter makes Rabi Yosi’s and Rabi Nehemiah’s end of the period of *bein ha-shemashot* identical. Clearly, the *Bavli* seems to side with the latter opinion but only if Rabi Nehemiah is just arguing about the start of the period of *bein ha-shemashot*, a point I clearly support. That point is implicitly disputed by those who assume that Rabi Nehemiah starts *Shabbat* precisely at sunset.

Mediterranean Sea.¹⁸⁶ The scenario in the *Bavli* is uncertain along multiple dimensions:

- Where was the person when the scenario begins - on top of the hill or on the shore below?
- Is he looking up at the sun's illumination to the east on the top of *har Carmel*, or is he watching the sun as it sets to the west from the top of *har Carmel*?
- If he is on the hill, does that imply that because of his elevation, he can see the sun for about 2 to 3 minutes longer than one at sea level, or does the story begin before or at sunset?
- If he is on the beach looking towards the hill, has the eastern horizon already darkened, but only *har Carmel* is still light because of its elevation, or has no part of the eastern sky darkened?
- Does he stand up (*oleh*) from his immersion in the sea, or does he (*oleh*) return to the top of *har Carmel*?
- When he returns, is that the beginning or the end of Rabi Nehemiah's period of *bein ha-shemashot*?

I could go on, but this suffices to demonstrate how difficult it would be to determine Rabi Nehemiah's viewpoint since

- he does not position his interval relative to that of Rabi Yehudah, and
- almost every relevant detail of the story is ambiguous.

Furthermore, Rabi Nehemiah uses the term *mi-she-tishkeh ha-ḥamah*, a term that Ramban reads as different from *shekiyah* (see the next section) and hence we do not know for certain when his period of *bein ha-shemashot* begins.

¹⁸⁶ I assume as described in the additional notes to *Ha-zemanim Be-halakhah*, volume 2, page 660, that *har Carmel* refers to a hill about 900 feet from the summit to the base with its base is situated another 300 feet from the Mediterranean Sea.

While the story that is summarized succinctly by the *Bavli* in *Shabbat* is unclear, a similar story in the *Yerushalmi Berakhot* is somewhat clearer. Ramban equates the two stories and thus we know that

- the person is on top of *har Carmel*,
- the sun (or its bright illumination) is still visible in the west, at least from that elevation,
- he goes down to the Mediterranean Sea,
- immerses himself in the sea,

and he can be certain that he has immersed himself prior to the beginning of the *bein ha-shemashot* period.

Ramban's interpretation is consistent with (though not definitively supportive of) the viewpoint that the end of *Shabbat* is not in dispute. Despite Ramban's interpretation, some assume¹⁸⁷ that the period of Rabi Nehemiah, like that of Rabbah, begins at sunset. This viewpoint would create a dispute as to the end of *Shabbat* as well. That would mean that according to Rabi Nehemiah (as interpreted by the *geonim*) *Shabbat* ends at most 12 minutes after sunset before two stars are visible (even to an expert knowing precisely where to look). This would have placed his view¹⁸⁸ in dispute with many of the views in the *Yerushalmi* in *Berakhot* where his opinion is assumed consistent with those who end *Shabbat* when three stars are visible. Thus, starting Rabi Nehemiah's period exactly at sunset is likewise impossible to maintain. However, one cannot eliminate the possibility that Rabi Nehemiah's interval of *bein ha-shemashot* starts after sunset but still ends earlier than the other viewpoints. For example, the

¹⁸⁷ See for example Rashba, *Shabbat* 34b.

¹⁸⁸ According to an opinion in the *Yerushalmi* that places Rabi Yosi's point of *ke-heref ayin* during Rabi Nehemiah's interval of the time needed to walk $\frac{1}{2}$ *mil*, the end of *Shabbat* is also in dispute.

beginning of Rabi Nehemiah's period, could match that of R. Yosef and end slightly earlier (the time needed to walk $\frac{1}{6}$ th of a *mil*), after or coincident with the appearance of the second star.¹⁸⁹ However, were that Rabi Nehemiah's position, it is again somewhat surprising that the *Yerushalmi* does not correlate two stars with his viewpoint. Alternatively, perhaps Rabi Nehemiah ends *Shabbat* when only an expert can see three stars, but that approach also places the beginning of Rabi Nehemiah's period of *bein ha-shemashot* after sunset. While both rather remote possibilities cannot be dismissed unequivocally, neither is plausible.

However, even including the position of Rabi Nehemiah, whose opinion is rejected in any case, it is very plausible, and likely even convincing, to read the texts of the *gemara* assuming that the end of the period of *bein ha-shemashot* and *Shabbat* is largely undisputed. Certainly, excluding the position of Rabi Nehemiah, the dispute centers only on when the period of *bein ha-shemashot* begins.

To a contemporary reader this is often surprising (and often overlooked entirely.) Both in western and Moslem culture, either by coverage (by the newspaper or internet) or announcement (by the call of the *mugrab* approximately 10 minutes after¹⁹⁰) the time of sunset is widely reported. **Sunset is the time known to all of us as the beginning of the period of both *bein ha-shemashot* and *Shabbat*; however, when *Shabbat* ends is in dispute. To the *gemara* it appears that the opposite was the case.**

In modern times, we tend to discuss the period of *bein ha-shemashot* with sunset as the anchor point. For the *gemara*, the anchor point was nightfall. The period of *bein ha-shemashot* extends back from the point of nightfall,

¹⁸⁹ See Prof. Levi's table in section 5, to verify that the time needed to walk $\frac{1}{6}$ of a *mil* (the difference the time needed to walk $\frac{1}{2}$ *mil* and $\frac{2}{3}$ *mil*) is very close to the time between the second and third star again varying based on how visible stars need be.

¹⁹⁰ There are references to *posekim* who used of the call of the *mugrab* for determining if the period of *bein ha-shemashot* has begun. In an earlier era, the "Arab clock" began its 24-hour period around sunset, around which time the call of the *mugrab* was heard.

when *Shabbat* ends, to the beginning of the period of *bein ha-shemashot*. Of course, if we assume that we know the starting point for the period of *bein ha-shemashot*, then we could derive the time when *Shabbat* ends. However, it is that start to the period of *bein ha-shemashot* that the *gemara* in *Shabbat* appears to be debating, an issue that I address in the next section.¹⁹¹

The *gemara* provides two descriptions of the end of *Shabbat*,

- the point at which the sky has reached a specific configuration, (the opinion of Rabi Yehudah and according to almost all *rishonim* within 36 seconds or less¹⁹² of Rabi Yosi's opinion as well), and
- the appearance of three (medium) stars.

Despite debate concerning the appearance of one and two stars and the beginning of the period of *bein ha-shemashot*, the two points describing the end of *Shabbat* are approximately consistent, one providing the definition and the other an indication that *Shabbat* has ended.¹⁹³

Those who follow the practice of the *geonim* assume that three medium stars appearing anywhere in the sky represent the end of *Shabbat*. As Prof. Levi's

¹⁹¹ See the last three chapters of *Ha-zemanim Be-halakhah* for a discussion of the terms used by the early *mishnayot*. The term sunset occurs only four times in early *halakhic* literature; the prevalent term is *hashekhah*, denoting a level of darkness as the sun's illumination dissipates after sunset.

¹⁹² As stated previously, most *rishonim* assume the two points are coincident or that Rabi Yosi's interval is less than the time needed to walk 50 *amot* later. Since, a *mil* is 2000 *amot*, the time needed to walk 50 *amot* is at most $50 / 2000$ or $1/40$ of the maximum time to walk a *mil* which is $1/40$ of 24 minutes or $(24 * 60 / 40 =)$ 36 seconds. Assuming the more standard time to walk a *mil* of 18 minutes, the interval reduces to $(18 * 60 / 40 =)$ 27 seconds.

¹⁹³ As was dealt with extensively in section 5, perhaps one is providing a definition of the end of the period of *bein ha-shemashot* and the other is a close approximation, indicating that the period of *bein ha-shemashot* has ended. For current purposes, we need only assume that the two descriptions of the end of *Shabbat* are approximately equivalent.

chart indicates,¹⁹⁴ even a casual observer in Jerusalem will likely see three stars, depending on the season of the year, 20 to 30 minutes after sunset. The phrase defining the end of *Shabbat* in the *gemara*, “*hihsif ha-elyon ve-hishveh le-tahton*,” is interpreted as meaning that looking towards the eastern half of the sky, the sky’s apex has gotten as (**pale** or) **dark** (or perhaps **deep blue** as Prof. Levi suggests) as the eastern horizon. The term *hihsif* means darkened¹⁹⁵ and *elyon* refers to the high point of the sky while *tahton* refers to the eastern horizon.¹⁹⁶ R. Tukitzinsky¹⁹⁷ made numerous observations of this period in Jerusalem and states that *hihsif ha-elyon ve-hishveh le-tahton*, as described above, always occurs between the appearance of the second and third star. Both these definitions remain applicable as one moves from the latitude of the Middle East, going either closer or further from the equator. Of course, as one travels much further from the equator, well before one can reach either the North or the South Pole, during some months of the year, *hihsif ha-elyon ve-hishveh le-tahton* will not occur and three stars will not appear; the sky never becomes sufficiently dark.¹⁹⁸

For Rabbeinu Tam, both the appearance of stars and the definition of *hihsif ha-elyon ve-hishveh le-tahton*, as defined above, present almost insurmountable challenges, as they both occur in the Middle East well before 72 minutes after sunset. Some who defend Rabbeinu Tam focus on a discussion in the *gemara* between Abaye and Ravah, looking to the west as opposed to the east. They are then forced to read the complete set of descriptions given by the *gemara* as referring not to the eastern horizon but to the western horizon, where the sun’s illumination is still discernable around an hour after sunset.

¹⁹⁴ See section 5.

¹⁹⁵ Precise semantics of the term *hihsif* is an argument between Rashi and the *Arukh*.

¹⁹⁶ We are not measuring illumination as we would in the morning with *alot ha-shahar* or *mi-she-yakir*; we are observing the appearance of the sky.

¹⁹⁷ *Bein Ha-shemashot*, pages 17 - 21.

¹⁹⁸ As noted previously, some propose *halakhic* midnight, *hatzot ha-lailah*, as an alternative for the end of *Shabbat* under those circumstances.

For the *geonim*, the discussion between Ravah and Abaye is explained by looking to the side of the horizon that is the cause, the west, as opposed to (just) the east, where one normally observes the effect. Both the appearance of stars and the darkening eastern sky result from the sun descending further below the horizon in the west, thereby providing less illumination. Though not stated explicitly by the *gemara*, Ravah could probably tell by looking to the west that the sun was so far below the horizon that its illumination was sufficiently reduced. The reason that necessitated looking to the west was, perhaps, the presence of clouds that obscured the view of the eastern side of the sky. Note that even on a cloudy day, the extent of the sun's illumination on the western horizon is often visible.¹⁹⁹

To accommodate Rabbeinu Tam's viewpoint, each of the *gemara's* statements must be interpreted differently. Raavyah²⁰⁰ suggests that the stars referred to must appear in the western sky. In the Middle East, the sun continues to provide some illumination in the west until approximately an hour past sunset; therefore, stars positioned close to the western horizon would not be visible until then. I have not read accounts of the observation of stars in the western horizon around this point in time, but for those who maintain that the time needed to walk 4 *milin* is 72 minutes, this solution is plausible. However, for those who maintain that the time needed to walk 4 *milin* is **90 minutes**, this is **problematic**; three stars are visible even in the western sky well beforehand. Given that even the western sky is completely dark at least ten minutes earlier, 80 minutes after sunset, all stars that are in position to be visible are visible **before** then.

A more complicated issue is *hihsif ha-elyon ve-hishveh le-tahton*. The *gemara*, as interpreted, states that the apex (*ha-elyon*) darkens to the level of the horizon (*ha-tahton*). **That occurs only in the eastern sky**. In the west, exactly the opposite occurs; the last point to **darken** is the western horizon

¹⁹⁹ It is not critical to decide whether Ravah and Abaye were observing the sky at the beginning of the period of *bein ha-shemashot* on Friday or at its conclusion on Saturday night; the former is clearly much more consistent with the focus of the *gemara*.

²⁰⁰ Raavyah, *Shabbat* 199, in vol. 1 page 268, is discussed in *Ha-zemanim Be-halakhah*, chapter 43, footnotes 64 and 66.

itself. It has been suggested²⁰¹ that Rabbeinu Tam would have to read the entire statement as referring not the sky, but to the sun. The top (*elyon*) refers to the top of the sun as it sets while the bottom (*tahton*) refers to the bottom of the sun. What the *gemara* is telling us under this interpretation is that night begins when the top of the sun ceases to provide illumination just as the bottom had ceased providing illumination earlier. A brilliantly original but difficult reading of the *gemara*.

Most difficult, however, is the disagreement between Abaye and Ravah looking to the eastern and western horizon. For the *geonim*, while the impact of the setting sun that defines both the beginning of the *bein ha-shemashot* period as well as *hashekhah* occurs in the east, the cause of the continuously reduced illumination is the sun setting in the west. Therefore, we can understand the reason for looking in either direction. However, according to the opinion of Rabbeinu Tam, Abaye and Ravah are looking towards the eastern and western horizon at least 50 minutes after sunset. **Looking to the east at that time provides no relevant information; the eastern sky has been dark and completely unchanged to the naked eye for a significant period.** Only observation of the western sky is still relevant; observing in both directions at that time is inexplicable. **Evidently, the disagreement between Abaye and Ravah validates the opinion of the *geonim* with respect to the end of *Shabbat*.**²⁰²

Rabbeinu Tam himself, living in France, might have read the *gemara* similarly to the *geonim*. He likely assumed what he saw around the period of *bein ha-shemashot* was not different from observations in the Middle

²⁰¹ See *Ha-zemanim Be-halakhah*, chapter 43, pages 210 and 211.

²⁰² Like aligning the argument of Rabbah and R. Yosef with the argument of the *geonim* and the Rabbeinu Tam referenced in *Am Mordechai*, chapter 2, some have tried to address this issue, as well. Aligning the dispute between Abaye and Ravah on which direction to turn with the dispute between Rabbeinu Tam (looking west) and the *geonim* (looking east) is difficult to reconcile with the text. More fundamentally, it does not address the issue of the lack of any utility in looking east close to the time of Rabbeinu Tam's interval of *bein ha-shemashot*. **I have not seen any discussion of this issue; I believe it is the greatest observational challenge to the opinion of Rabbeinu Tam.**

East. What is of course problematic is reconciling Rabbeinu Tam's opinion with observations in the Middle East.²⁰³

Independent of the significant issue of reading the *gemara* to comport with the opinion of Rabbeinu Tam, (an issue that neither of the options below addresses,) it remains necessary to apply Rabbeinu Tam's position to other latitudes and seasons. As discussed above, this drives one of two options (collapsing the multiple options detailed in the beginning of section 3):

- **Option 1:** Apply latitude (and season) adjustments to the opinion of Rabbeinu Tam as was practiced as a personal stringency by R. Soloveitchik and only a few others. This option has no record of ever having been practiced except by a small number of individuals and only in recent generations. I am aware of no one who has even hinted that this could have been the practice of either Rabbeinu Tam or the *Shulhan Arukh*. While this approach harmonizes the position of Rabbeinu Tam with our current understanding of the impact of latitude and season, **it still does not reconcile Rabbeinu Tam's reading of the *gemara* in *Shabbat* with observations in the Middle East.**

- **Option 2:** Make no latitudinal adjustment to Rabbeinu Tam's opinion. This latter approach clearly corresponds to established practice in many communities, supported by several authorities.²⁰⁴

²⁰³ The historical record around two major figures that immigrated to Eretz Israel and followed Rabbeinu Tam, Ramban and R. Yosef Caro, is unclear. I have seen nothing written of Ramban. Some have suggested that R. Yosef Caro's *hilkhot milah*, *Y. D.* 262:4-6, written in Israel, reflects a changed point of view; it does speak more of the appearance of stars than intervals of time. However, that is not conclusive, and is perhaps an early version of R. Pimental's approach. It is also entirely plausible that prior to the widespread use of clocks, observable events were more critical than an expression of time. His use of the term *mi-she-tishkeh ha-ḥamah* in *Y. D.* 266:9 does not imply support for any specific approach.

²⁰⁴ *Ha-zemanim Be-halakhah*, chapter 46 summarizes practice in various locations. Making no latitudinal adjustment is the prevalent practice by those following the opinion

In conversation, I have heard two related arguments advanced in defense of not adjusting for latitude. First, we are simply keeping times equivalent to those practiced in Israel. Second, since the laws of *zemanim* will break down as we approach the north or south poles, using times as practiced in Israel is a credible alternative. Linking to practice in Israel would be more compelling if Jewish communities in and around Israel²⁰⁵ actually followed Rabbeinu Tam as opposed to the *geonim*. It is only in recent times that some, who returned to Israel from Europe, instituted the practice of Rabbeinu Tam. Even R. Karelitz followed the opinion of the *geonim*, albeit with several stringencies.²⁰⁶ As well, even in Israel, adjustments for seasonality must be made. Thus, given actual practice in and around Israel, this rationale is at best theoretical and more likely a *post facto* rationalization. As well, not employing adjustments because *zemanim* break down near the poles where the very notion of day and night is not well defined is hardly compelling.

The approach of making no latitudinal adjustment, but making seasonal adjustments applied consistently to both the morning and the evening *zemanim*, can be maintained at least in theory if one is willing to disregard the textual challenges from the *gemara*'s description of the end of *Shabbat*. As noted earlier, this might imply disallowing prayers prior to the time needed to walk 4 *milin* before sunrise even if the point of *mi-she-yakir* has passed. More critically, it would allow ending *Shabbat* the time needed to walk 4 *milin* after sunset even if three medium stars have not yet appeared. I have never read or heard of a compelling justification for such a practice. Additionally, an unadjusted 72 or 90 minutes must address issues discussed previously, resulting from the required symmetry between the interval from

of Rabbeinu Tam in the United States and was apparently common in northern Europe, while in other parts of Europe, *Shabbat* ended (earlier not later) with the appearance of three small, adjacent stars, typically about 20 minutes earlier. *Ha-zemanim Be-halakhah* does not mention option 1.

²⁰⁵ See *Ha-zemanim Be-halakhah*, chapter 45.

²⁰⁶ See *Ha-zemanim Be-halakhah*, chapter 51, page 534.

sunset until the conclusion of *Shabbat* (and other days of the week) with the interval from *alot ha-shahar* until sunrise.

On the other hand, R. Soloveitchik's approach to Rabbeinu Tam, while an elegant conceptual solution, is inconsistent with generations of practice, and again, does not address the challenges already mentioned that are raised by the text of the *gemara* in *Shabbat*.

Claiming to uphold the approach of Rabbeinu Tam, R. Pimental suggests that the appearance of three stars always take precedence over the time needed to walk 4 *milin* (72 minutes). While this and similar suggestions, including R. Feinstein's, have gained acceptance in many communities, they cannot be reconciled with the conceptual approach of Rabbeinu Tam who equates the endpoints of the *sugyot* in *Pesahim* and *Shabbat*. As indicated, this approach often introduces other anomalies regardless of how one chooses to deal with the morning *zmanim*. Even if one were to unilaterally define *alot ha-shahar* as the morning period counterpart to three stars, it will occur after *mi-she-yakir*. As far as I know, the most stringent time for ending *Shabbat* in Israel according to the *geonim*, taking the equivalent of R. Karelitz's practice of waiting 40 to 45 minutes after sunset, corresponds to only a depression angle of 9.7 (or according to some perhaps 10.1) degrees. On the other hand, the latest time for *mi-she-yakir* is normally a depression angle of 10.2 degrees.²⁰⁷ The more typical *pesakim* for *mi-she-yakir* and *hashekhah*, expressed using depression angles, differ by 2 or more degrees:

- *mi-she-yakir* according to most *posekim* occurs prior to reaching a depression angle of 10.5 degrees, while
- three stars with various *humrot* appear earlier than a depression angle of about 8.5 degrees.

While R. Pimental and R. Feinstein both assume they are working within the context of Rabbeinu Tam's opinion, they are in practice adopting the

²⁰⁷ The opinion of R. Feinstein for *mi-she-yakir*, 35 to 40 minutes before sunrise in New York, is well outside the limits of customary *pesak*.

position of the *geonim*. Only positions like R. Soloveitchik's or an invariant interval of 72 or 90 minutes comport with the conceptual viewpoint of Rabbeinu Tam.

In a practice going back at least to the students of Rabbeinu Yonah, the end of *Shabbat*, either because of uncertainty over the definition of a medium star or because of *tosefet Shabbat*, was extended from the appearance of three medium stars to the appearance of three small stars, relatively adjacent to each other.²⁰⁸ Translated into a depression angle, three medium stars appear when the sun is approximately 6 degrees below the horizon. The appearance of three small adjacent stars is currently associated with a depression angle of 8.5 degrees, the stringent opinion of R. Tukitzinsky and the basis of most modern calendars. Because of non-linear growth in the twilight period, by increasing the depression angle that defines the end of *Shabbat*, these stringencies have a more pronounced effect both in the summer and winter and especially at latitudes further from the equator.²⁰⁹

In summary, unless one is willing to accept inventive but exceptionally forced suggestions that,

1. assume the term *hihsif ha-elyon ve-hishveh le-tahton* is referring to the sun and not the sky,

²⁰⁸ This opinion requiring closely aligned stars is discussed in the *Yerushalmi*, but it appears to have been followed only because of Rabbeinu Yonah. See R. Tukitzinsky's lengthy discussion in the second chapter of *Bein Ha-shemashot*. Another potential motivation, to better align Rabbeinu Tam's position with observation, cannot be dismissed. If one assumed a requirement to wait 72 minutes, stars seen before that time must be discounted as either large or not meeting some additional condition by appearing in the wrong part of the sky or being too dispersed.

²⁰⁹ At the equator for example, the difference between the time of appearance of three medium stars and three small stars is approximately 10 minutes. In London that difference is almost 16 minutes in the spring and yet longer in the summer.

2. require that the three stars referred to by the *gemara* appear close to the western horizon, perhaps a more reasonable, albeit unstated assumption, and
3. in any case, still need to explain what would possibly be gained by looking to the east more than 50 minutes after sunset,

the *gemara* strongly supports the opinion of the *geonim*. Furthermore, the focus of the *gemara* is on *erev Shabbat*, attempting to determine the time when the period of *bein ha-shemashot* begins. Despite it being central to the dispute between Rabbeinu Tam and the *geonim*, for the *gemara*, when the period of *bein ha-shemashot* ends is not in dispute.

It is ironic that while we have two clear, well established times for the end of *Shabbat* according to Rabbeinu Tam, 72 and 90 minutes corresponding to depression angles of 16 and 20 degrees respectively, for the *geonim*'s end to *Shabbat*, there is little consensus on how to determine the point of *hashekhah*. Unlike Rabbeinu Tam, whose position on the end of *Shabbat* corresponds to a point when light has (almost) disappeared completely, the continuous change around the point of *hashekhah* makes a precise definition more difficult. While the most widely followed current *pesak* for the end of *Shabbat* is when the sun is 8.5 degrees below the horizon, relative to practice in many European communities,²¹⁰ 8.5 degrees is a stringency for calculating what is already an acknowledged stringency, the appearance of three small, adjacent stars. Indicating the end of *Shabbat* by the appearance of three small, adjacent stars was used both by those who followed the opinion of the *geonim* as well as those using R. Pimental's (re) definition of the opinion of Rabbeinu Tam. The depression angle that equates to the end of *Shabbat*, absent any stringencies, is approximately 6 degrees and the period of *bein*

²¹⁰ See *Ha-zemanim Be-halakhah*, chapter 46. In the modern day, because of extensive illumination resulting in a limited ability to observe stars, many not perceiving an 8.5-degree depression angle as a stringency. My sense is that *hihsif ha-elyon ve-hishveh le-tahton* is not impacted as significantly by illumination and occurs before the time that a depression angle of 8.5 degrees is reached. R. Benish gives many depression degree equivalents for various *zemanim* observed in Europe; a clear majority are less than 8.5 degrees, particularly during various seasons of the year.

ha-shemashot precedes that point. Alternatives for the calculating the beginning of the *bein ha-shemashot* period follow in the next section.

Section 8. How does the beginning of the *bein ha-shemashot* period relate to what we call sunset? What alternatives might be considered for the beginning of the *bein ha-shemashot* period?

This topic is normally considered uncomplicated. The *geonim* and most of their followers, at least as a stringency with respect to the start of *Shabbat*, follow the opinion of Rabbah. That opinion is assumed to equate the beginning of the period of *bein ha-shemashot* with sunset as defined by R. Avraham Ben Ha-Rambam, and identical to the way sunset is defined in a newspaper. R. Feinstein and many other *posekim* over the previous century tacitly assume that the beginning of the period of *bein ha-shemashot* and sunset coincide, at least under normal circumstances.²¹¹ As mentioned earlier, in the Middle East seeing three stars as early as 13.5 minutes after sunset is impossible under normal circumstances, and then only with the use of a telescope.

If the end of *Shabbat* in the spring is between 18 and 21 minutes after sunset, then one can either assume

- a longer period for the time needed to walk a *mil* of 24 or perhaps 22.5 minutes,
- separate slightly the beginning of the *bein ha-shemashot* period from sunset,
- or both.

Additionally, if we assume the appearance of three stars includes being seen with difficulty and only by one who knows where to look, something that I

²¹¹ This assumption is so deeply rooted, that a recent booklet distributed in Jerusalem attacks those in a valley who use the calendar's defined time for sunset at sea level even though their view of the sun is obscured. Alternate opinions that were followed in Jerusalem for setting the day of a *brit milah*, for a baby born slightly after sunset are not cited.

find less than plausible, then we can maintain the equivalence between sunset and the start of the period of *bein ha-shemashot*.²¹²

According to the *geonim* the position of Rabbah is assumed to equate the beginning of the period of *bein ha-shemashot* with sunset. However, according to the conceptual approach of the Rabbeinu Tam and his school, the beginning of the period of *bein ha-shemashot* occurs, at the earliest, 54 minutes after sunset.²¹³ The *Shulḥan Arukh* assumes the time needed to walk a *mil* is only 18 minutes, and therefore sets the start of the period of *bein ha-shemashot* according to Rabbeinu Tam 4.5 minutes later, 58.5 minutes after sunset. Regardless of how the various phenomena described in the *gemara* are to be interpreted, under no circumstances can *mi-she-tishkeh ha-ḥamah* refer to sunset. Those who follow the opinion of the Rabbeinu Tam read the *gemara* that states that the period of *bein ha-shemashot* begins *mi-she-tishkeh ha-ḥamah* to mean not *shekiyah* but some point thereafter. Ramban²¹⁴ stresses the difference between *shekiyah ha-ḥamah*, sunset, and *mi-she-tishkeh ha-ḥamah* referring to some later point after the sun has set. Of course, all that this language motivates is distancing sunset from the beginning of the period of *bein ha-shemashot*; it can be applied as well and presumably even better²¹⁵ to argue for a (slightly) delayed start to the period of *bein ha-shemashot* even according to a view as or similar to that of the *geonim*. Thus, even if we insist that we are to follow the opinion of Rabbah per the *geonim* and reject Rabbeinu Tam's opinion as to the end of *Shabbat*, we can still accept that ***mi-she-tishkeh ha-ḥamah* is referring to a point after sunset**. Reading Rabbah under that circumstance is no more difficult than for those who follow the opinion of the Rabbeinu Tam; Rabbah begins the period of *bein ha-shemashot* some number of minutes after sunset.

²¹² It should be noted that if the appearance of three stars is viewed as defining the end of *Shabbat*, observation by an expert is more plausible. In any case, the inability to align Shmuel's assertion with the main conclusions of the *gemara* and the other issues raised in section 5 would remain.

²¹³ 54 minutes equates to a 72-minute interval after sunset until the end of the day, with the period of *bein ha-shemashot* beginning ($\frac{3}{4} * 24 =$) 18 minutes earlier.

²¹⁴ *Torat Ha-adam* Mossad Ha-rav Kook edition, pages 251 - 255.

²¹⁵ Referring to a point as being after sunset is more likely to refer to a point directly after sunset, approximately 10 minutes later, than to a point approximately one hour later.

While some communities still use the opinion of Rabbeinu Tam when setting times for afternoon and evening prayers, there are no remaining communities that (openly) start *Shabbat* well after sunset. How late communities started *Shabbat* in the past, and when that might have involved a violation at a biblical or a rabbinic level is rarely addressed. I will return to this issue in the epilogue; in any case, it is difficult to specify precisely, and this area still awaits an extensive historical study. It is entirely likely that four related factors would have resulted in beginning the period of *bein ha-shemashot* well before 50 minutes after sunset even according to those professing that they are following Rabbeinu Tam:

1. Positions like that of R. Pimental and R. Feinstein were adopted in various communities. While conceptually aligned with Rabbeinu Tam, in practice these communities equated the end of *Shabbat* with the appearance of three stars that occurred well before 72 minutes after sunset; on *erev Shabbat* the period of *bein ha-shemashot* would normally begin at the very least 13.5 minutes earlier.
2. Given uncertainty about the definition of a medium star, it is likely that the appearance of **any** two or three stars would have indicated that the period of *bein ha-shemashot* had begun, and work must cease.
3. Given uncertainty, the lack of clear observational definitions and for many generations without the *benefit* of clocks, observant Jews would err on the side of safety when starting the period of *bein ha-shemashot*.
4. *Tosefet Shabbat* would almost always extend the beginning of *bein ha-shemashot*.

Our focus is to discover what flexibility exists for the start time of *Shabbat*, even assuming the opinion of the *geonim*. The three phrases in Rabi Yehudah's formulation of the period of *bein ha-shemashot*, Rabbah and R. Yosef's approximations to the length of the period of *bein ha-shemashot*, as

well as Shmuel's statement about 1, 2 and 3 stars must all be considered in attempting to specify the start of the *bein ha-shemashot* period.

The three phrases of Rabi Yehudah do not in and of themselves specify the beginning of *bein ha-shemashot* conclusively.

1. *Mi-she-tishkeh ha-ḥamah* according to Ramban means some point **after** sunset; anything more precise cannot be concluded.
2. *Kol zeman she-penai mizrah maadimin*, all the time (including a short interval after *mi-she-tishkeh ha-ḥamah*) when illumination from the sun situated below the western horizon is still causing a glowing (reddish) impact (in the east or in clouds) is suggestive of a point approximately ten minutes after sunset.
3. *Hihsif ha-tahton ve-lo hihsif ha-elyon*, the paleness / darkness of the sky, moving from east to west, has not progressed to the apex of the sky, is the period of *bein ha-shemashot* according to everyone. However, it describes the sky during the *bein ha-shemashot* period as opposed to describing the point when the period of *bein ha-shemashot* begins.

Fortunately, the statement of Shmuel and both Rabbah and R. Yosef's approximations to the length of the period of *bein ha-shemashot* help identify more precisely the point at which the period of *bein ha-shemashot* begins.

However, before addressing this issue further, it is useful to summarize the discussion in Section 6 on how the beginning of the period of *bein ha-shemashot* could be set (according to both Rabbeinu Tam and the *geonim*). Two conceptual approaches exist, each with a variety of implementation alternatives:

1. Some physical event triggers the beginning of the *bein ha-shemashot* period. In modern terms, we would further specify that event with an associated depression angle. In the opinion of many current *posekim*, that event is sunset; some have improbably asserted that it is the emergence of two stars, a view that was strongly challenged in section 5. That same physical event applies at various latitudes and across all seasons. Thus, the length of time between the beginning of the period of *bein ha-shemashot* and *hashekhah* would vary, lengthening both at locations further from the equator and during the summer and winter seasons.
2. The intent of the period of *bein ha-shemashot* is to establish a *fence* around *hashekhah* and the Rabbis chose a physical event that specifies or conservatively approximates the beginning of the period of *bein ha-shemashot* meant only for the Middle East. The duration of that interval was intended to be invariant, providing an upper-bound for the length of the *bein ha-shemashot* period everywhere. Thus, the start of the period of *bein ha-shemashot* could always be established by subtracting that upper-bound on the length of the *bein ha-shemashot* period from the varying point of *hashekhah*.²¹⁶

I leave this question open. Not surprisingly, I found no reference in the *halakhic* literature by anyone following the opinion of Rabbeinu Tam to any physical triggers for the start of the *bein ha-shemashot* period.

As noted earlier, in the modern era of clocks and as a result *zemanim* being specified using time intervals, both R. Adler and R. Feinstein clearly adopted varying intervals. R. Lorberbaum and R. Sofer, however, both considered the duration of the *bein ha-shemashot* period invariant. For even R. Lorberbaum and R. Sofer who assumed they were working within the framework of Rabbeinu Tam, I see no reason not to apply their position, fixing the length of the period of the period of *bein ha-shemashot* to the opinions of the *geonim* as well. As has been noted, three of the four *posekim*

²¹⁶ Clearly, given a longer period of twilight, the length of the *fence* could be increased; that option is accounted for in the first approach above.

referenced above utilized approaches like that of R. Pimental, which were consistent with the *geonim*'s end time for *Shabbat*, adjusted to the location of their communities.

We now turn to alternatives for the beginning of the period of *bein ha-shemashot* according to the approach of the *geonim*. While the same two options apply for the opinion of the *geonim*, there is a somewhat richer literature both from a small number of European authorities, and from *posekim* in the Middle East where the opinion of the *geonim*, with few if any isolated exceptions, was always followed.

Disregarding for a moment the precise times involved, our assumption is that at the biblical level one cannot work past *ḥashekhah*. The period Friday night prior to *ḥashekhah*, referred to as *safek ḥashekhah*, represents a classical *safek de-oraysah*. The start of the period of *bein ha-shemashot* is yet earlier and work during any part of the period of *bein ha-shemashot* prior to the point of *safek ḥashekhah* is (at least) a rabbinic level violation.²¹⁷

Since the *gemara* decides that we follow the opinion of Rabi Yehudah with respect to the beginning of the period of *bein ha-shemashot*, it is critical to determine the alternatives to which he might subscribe. First, let us consider the opinion of R. Yosef who defines the beginning of the period of *bein ha-shemashot* just after *penai mizrah maadimin* ends, approximately the point at which the lower part of the eastern horizon pales or darkens. Again, there is some ambiguity as to the exact point in time to which that description applies. What precisely defines the subsiding level of illumination or exactly how high above the eastern horizon has the sky darkened at the start of R. Yosef's period of *bein ha-shemashot*? For those who assert that Rabbah's start to the period of *bein ha-shemashot* is exactly at sunset, we

²¹⁷ As discussed in footnote 211, several opinions assume *bein ha-shemashot* and *safek ḥashekhah* are identical, a position many adopt at least practically. That would imply that the entire *bein ha-shemashot* period is a *safek de-oraysah*. Some even assume *safek ḥashekhah* begins prior to the period of *bein ha-shemashot*, a difficult opinion that is not considered.

can determine the meaning of R. Yosef's statement by observing the sky above the horizon the time needed to walk $1/12^{\text{th}}$ of a *mil* after sunset. Other than that, it is difficult to determine the exact time implied based only on the language of R. Yosef's formulation.²¹⁸

While we normally decide like Rabbah in disagreements with R. Yosef, commentators who equate *mi-she-tishkeh ha-ḥamah* with sunset, some commentators decided in favor of the opinion of R. Yosef.²¹⁹ The reason for preferring R. Yosef is his assumed alignment with the statement of Shmuel that considered it (possibly) day when only one star is visible after sunset. Under the assumption that Rabbah begins *Shabbat* at sunset proper, we must reject Rabbah in favor of R. Yosef. However, as was noted in section 5, the appearance of the first star over Jerusalem occurs, at the earliest, visible only to an expert, 6 minutes after sunset; that first star is more broadly visible only several minutes later. This implies that choosing R. Yosef gains nothing, since his position is inconsistent with Shmuel as well. However, if we move Rabbah's start of the period of *bein ha-shemashot* to 4 or 5 minutes after sunset, then R. Yosef's start to the period of *bein ha-shemashot*, approximately two minutes later, is 6 or 7 minutes after sunset. This would align R. Yosef, but not Rabbah, with Shmuel, but only if you assume that potential visibility by an expert is included in what Shmuel meant by one star being visible. While visibility by an expert who is aware of exactly where to look is strained as an indicator for the end of *Shabbat*, since we interpret "*one star - daytime*" as "if you see one star, do not assume that the day is over," then visibility by an expert, while still unlikely is more plausible. This slight 4 or 5-minute advance also allows Rabbah's time to walk $3/4$ *mil* to better align with the ability to observe three stars in the spring without assuming telescopes or other less than intuitive circumstances.²²⁰

²¹⁸ Nonetheless, to assume that R. Yosef's interval of *bein ha-shemashot* starts approximately 10 to 15 minutes after sunset appears reasonable given observation of *penai mizrah maadimin*.

²¹⁹ For a more complete analysis of this topic, see Rashba *Shabbat* 34b - 35a. Note that since Rashba is working within the context of Rabbeinu Tam it is not directly relevant to this discussion.

²²⁰ Prof. Levi, *Halakhic Times*, Hebrew section, page 39.

This slight delay in the beginning of the *bein ha-shemashot* is supported by both

- the reported practice in Jerusalem for the *brit milah* of a baby born slightly after sunset,²²¹ and
- R. Shneur Zalman of Liadi's²²² support for *bein ha-shemashot* starting 4 minutes after sunset.

Both provide the same reason: at 4 to 5 minutes after sunset, the sun is no longer visible from the highest elevations around Jerusalem.²²³

Going yet a bit further, R. Haim Volozhin sets the beginning of the *bein ha-shemashot* period at (more than) 6 minutes²²⁴ after sunset based on the statement of Shmuel that the appearance of one star can occur during the daytime.

Particularly in the Middle East, where the *geonim* were followed, there were multiple views among *posekim* during the 19th century that extended the start of the period of *bein ha-shemashot*, some going as far as approximately 10 minutes after sunset, when the *mugrab* announces the time for (the fourth) prayer.²²⁵

²²¹ See *Minhagei Eretz Yisroel* by R. Yaakov Gliss, pages 102 and 282.

²²² The *siddur* of R. Shneur Zalman of Liadi specifies four minutes, not five.

²²³ Lacking visibility of the sun even from even the highest elevations around Jerusalem as an indicator for the beginning for the period of *bein ha-shemashot* is no less intuitive than the use of conditions at sea level, particularly given the fact that sea level is a more modern concept. Regardless of rationale, this approach provides an identifiable beginning for the period of *bein ha-shemashot*.

²²⁴ See the addition to *Maaseh Rav* section 19. Six minutes is expressed as 1/10th of an hour to be applied in both the morning and evening, although “*one star - daytime*” is given as the reason for the slight delay after sunset. I assume that this applies to Israel, but no reference to any adjustment is given. At 6 minutes after sunset, any adjustments by use of an equivalent depression angle would be minimal in any case. One can speculate that his divergence from the standard opinion of the *Gaon* may result from his asserting the normative *halakhah*, while the *Gaon* may have insisted on sunset proper only *le-migdar miltah*.

²²⁵ See the second chapter, third section of *Zemanim Ke-hilkhatam* by R. Dovid Burstyn and chapter 10 of *Ha-zemanim Be-halakhah* for a variety of sources that went beyond the

Assuming either of the latter two views, Shmuel's statement is consistent with Rabbah as well. However, if one insists that the time needed to walk $\frac{3}{4}$ of a *mil* is a minimum length to the period of *bein ha-shemashot* applicable around the spring equinox, the latter two views also begin to constrain²²⁶ the length of time to walk a *mil* to 18 minutes and require the very clear visibility of three stars.

According to R. Kapach's interpretation of Rambam, the period of *bein ha-shemashot* begins 15 minutes after sunset. I see no clear justification for so late a start to the period of *bein ha-shemashot*, and I disagree as well with the detailed rationale that R. Kapach provides.²²⁷ Nonetheless, R. Kapach makes a convincing case that according to Rambam, the start of the period of *bein ha-shemashot* begins several minutes after sunset.

Any viewpoint that starts the period of *bein ha-shemashot* between 10 and 15 minutes after sunset provides yet another reason for rejecting the time needed to walk $\frac{3}{4}$ *mil* as a lower-bound on the length of the *bein ha-shemashot* interval applicable only in the spring, beyond what was argued in section 5.²²⁸ In the Middle East in the spring, by 22 or 23 minutes after

4 to 5 minutes quoted in *Minhagei Yisroel*. Those sources often discuss obstructed views and sea level in justifying their positions. While these views are supportive of the position developed in this chapter, their justifications are different and are not within the scope of this monograph.

²²⁶ Adding 6 + 13.5 is still reasonable but 6 + 16.875 is slightly later than the third entry in Prof. Levi's table. As discussed below, this also provides support to considering the time needed to walk $\frac{3}{4}$ *mil* period as a maximum.

²²⁷ His use of two stars as defining the start of the period of *bein ha-shemashot* is particularly difficult. However, I can easily recast (and hopefully improve) his viewpoint using degrees of darkness as I have argued in section 5. R. Kapach expresses this view throughout his commentary on *Mishnah Torah*; see his commentary on relevant *mishnayot* in *hilkhot Shabbat* and *Kiddush Ha-ḥodesh*.

²²⁸ As I argued earlier: What possible value could there be in introducing a time-based approximation that is a lower bound, that is season dependent, rarely applicable, and then only under idealized conditions? In what context would such information be useful?

sunset *Shabbat* has ended, implying a beginning to the period of *bein ha-shemashot* before 10 minutes after sunset.

Carefully consider a day in Israel close to the summer solstice where we assume *Shabbat* ends between 24 and 29 minutes after sunset, without the normalization to spring that Prof. Levi introduces in his table, copied in section 5. Now assume the time needed to walk $\frac{3}{4}$ of a *mil*, either 13.5 or 16.875 minutes, is taken as the maximum length of the period of *bein ha-shemashot*. This gives a range for the start of the period of *bein ha-shemashot* from 7 to 15 minutes after sunset, a figure that I believe represents a preferred reading of the *gemara*. This provides another mechanism for defining when the period of *bein ha-shemashot* begins. For example, if the time of *hashekhah* in the summer is precisely 25 minutes after sunset, then using the *Shulhan Arukh*'s position of 13.5 minutes as the time needed to walk $\frac{3}{4}$ *mil*, the period of *bein ha-shemashot* would begin 13.5 minutes earlier, approximately 11 to 12 minutes after sunset. Note however, that in the spring and fall, this same level of darkness (and appearance of the sky) will occur approximately 1 minute earlier at about 10 to 11 minutes after sunset. However, in the spring and fall, *hashekhah* occurs approximately 2 to 3 minutes earlier. Thus, the period of *bein ha-shemashot* is longest in the summer, by approximately 1 to 2 minutes. For all of us accustomed to clocks and sunset, this example, both consistent with the *gemara* and astronomically accurate, requires concentration before appearing straightforward.²²⁹

This alternative meets both objectives stated in the prologue. First, the explanation of the *gemara* is straightforward,

- given the more natural interpretation of the time needed to walk $\frac{3}{4}$ *mil* as a maximum,²³⁰

²²⁹ Once it is understood that larger depression angles (the point of *hashekhah*) exhibit more seasonal variation than smaller depression angles (the beginning of the period of *bein ha-shemashot*), this approach will feel more intuitive.

²³⁰ Furthermore, if Rabbah meant sunset precisely, it is puzzling why the language of the *gemara* would have been so complex? This would motivate any of the three approaches.

- reconciling Rabbah completely with the statement of Shmuel and
- without assuming visibility only by an expert.

Second, this approach helps with our second objective of creating as late a start to the period of *bein ha-shemashot* as possible, partially justifying practice in Europe over the centuries. The few extra minutes are not what is most valuable; more importantly (only) this approach completely justifies the opinions of R. Lorberbaum and R. Sofer among others, who implicitly treat the time needed to walk $\frac{3}{4}$ of a *mil* as an invariant maximum, and subtract the end of the period of *bein ha-shemashot* in order to determine the beginning of the period of *bein ha-shemashot*.

Consider the application of these approaches to other seasons and latitudes. The first conceptual approach would calculate the depression angle associated with a level of darkness at some small number of minutes after sunset, around the spring equinox in the Middle East, and then use that angle at other latitudes and during other seasons. This would not justify practice that began *Shabbat* more than 10-15 minutes after sunset except at latitudes in the very northern regions of Europe.

Assume that we were to choose a beginning to the period of *bein ha-shemashot* in the Middle East 12 minutes after sunset around the spring equinox. Again, we would equate that to a depression angle and apply that angle at other latitudes and seasons. On its own, this would imply a start to the period of *bein ha-shemashot* less than 20 minutes after sunset at all major European locations. This would still be inadequate to defend the practice that we saw in the case of R. Sofer, with a *brit* for a baby born on *Shabbat* at 8:30PM, 27 minutes after sunset, being held on the following *Shabbat*. However, if we,

- conclude that **the time needed to walk $\frac{3}{4}$ mil is a seasonal maximum** to the period of *bein ha-shemashot*, and
- treat **the time needed to walk $\frac{3}{4}$ mil as latitude invariant as well**,

a position that has unequivocal support from some *posekim*, **then we can calculate the beginning of the period of *bein ha-shemashot* by subtracting its invariant length from the end of the period of *bein ha-shemashot*, the time of *hashekhah*.**

Computationally, we can now specify the beginning of the period of *bein ha-shemashot* in four separate ways:

- 1) Equate a depression angle to the beginning of the period of *bein ha-shemashot*.
- 2) Calculate the beginning of the period of *bein ha-shemashot* by subtracting the time needed to walk $\frac{3}{4}$ of a *mil* from the point of *hashekhah*.²³¹
- 3) Take the earlier of 1 and 2 as the beginning of the period of *bein ha-shemashot*.
- 4) Take the later of 1 and 2 as the beginning of the period of *bein ha-shemashot*.

²³¹ We could even subtract a slightly lesser amount if a method for such approximation is developed. One could theoretically calculate the length of the period of *bein ha-shemashot* during any season in the Middle East and then apply that shorter interval everywhere. Again, I suggest this detail only as method to defend prior practice yet more aggressively. Similarly, other detailed variants of the four alternatives can be specified; the four listed establish the fundamental alternatives that would apply both closer to and further from the equator than the Middle East.

Note that for much of northern Europe, options 2 and 4²³² provide a start to the period of *bein ha-shemashot* approximately 25 to 35 minutes after sunset, depending on location and season.

When the time needed to walk $\frac{3}{4}$ of a *mil* is defined as a minimum, applicable only in the spring, then the standard method for calculating *the start of the period of bein ha-shemashot* by subtracting from *hashekhah* would more than likely must be adjusted by latitude as well as season. Regardless of precisely how that process might be defined, it would imply an earlier start to the period of *bein ha-shemashot* in Europe, given that the length of the period of *bein ha-shemashot* would have to be lengthened before being subtracted. However, defining the time needed to walk $\frac{3}{4}$ of a *mil* as a maximum is a preferred reading of the text and provides the basis for maximal leniency, supporting a later start to the period of *bein ha-shemashot*.

Note however, that defining the time needed to walk $\frac{3}{4}$ of a *mil* as a maximum in the Middle East does not in any way imply that the maximum is invariant and does not adjust with changing latitude. To justify subtracting an invariant interval from *hashekhah* it is necessary, but not sufficient, to interpret the time needed to walk $\frac{3}{4}$ of a *mil* as a maximum. Both R. Lorberbaum and R. Sofer supported this further step, by assuming that the time needed to walk $\frac{3}{4}$ of a *mil* is a maximum that can be subtracted from *hashekhah* **at any latitude** to determine the beginning of the period of *bein ha-shemashot*. **Such a ruling could not derive from the text of the *gemara***, which did not include awareness of anything even remotely related to latitude. What is perhaps less obvious, is that defining the time needed to walk $\frac{3}{4}$ of a *mil* as a minimum more than likely precludes any approach that treats the length of the period of *bein ha-shemashot* period as invariant.

In practical terms, *posekim* can decide to opt for any of the four options and perhaps decide differently in various situations based on a multiplicity of

²³² Options 2 and 4 are identical at European latitudes.

factors.²³³ Current custom for the start of *Shabbat*, as Rambam, quoted at the outset, stated, regardless of the particular *halakhic* position adopted, should not necessarily be viewed as the precise beginning to the period of *bein ha-shemashot* but as the beginning of an accepted period of *tosefet Shabbat*, with the full force of accepted practice.

In summary, we have multiple approaches to the beginning of the period of *bein ha-shemashot* coupled with multiple options on how to conceptualize the *bein ha-shemashot* period. With each of the approaches, from sunset to some number of minutes thereafter, we might equate a depression angle that would naturally vary the beginning of the period of *bein ha-shemashot* by latitude and season. As well, conceived of as a minimum, the time needed to walk $\frac{3}{4}$ *mil* has limited practical significance. **However, when conceived of as the maximum length of the *bein ha-shemashot* period throughout the year in the Middle East, and even more so when considered as latitude invariant as well, the time needed to walk $\frac{3}{4}$ *mil* has major import.**²³⁴ In latitudes farther than the Middle East from the equator, it limits the length of the period of *bein ha-shemashot* to the time needed to walk $\frac{3}{4}$ *mil*.

Unfortunately, the opinions of R. Lorberbaum and R. Sofer face a significant logical challenge, invalidating their reasoning if not their *pesak*. **The method of subtraction from the end of *Shabbat* must use not the practiced end of *Shabbat*, but the end of *Shabbat* on a *de'oraysah* level, as specified in the *gemara*. Fortunately, both *posekim* used times that equate to less than a depression angle of 8 degrees, meaningfully less**

²³³ Questions around a *brit* both on a weekday and especially on *Shabbat*, *niddah*, special situations at the start of *Shabbat*: a delayed traveler, delayed *hadlakat ha-neirot*, *amirah le-akum*, etc. all occur with some frequency and might be treated differently by a *posek*, dictating varying degrees of leniency.

²³⁴ Note that if the time needed to walk $\frac{3}{4}$ *mil* is considered only a seasonal maximum but assumed to vary by latitude, the interval between the beginning of the period of *bein ha-shemashot* and *hashekhah*, the end of the period of *bein ha-shemashot*, would grow proportionately faster than the earlier interval between sunset and the beginning of the period of *bein ha-shemashot*. As such, its practical impact in justifying practice is significantly reduced; practically it would be essentially identical to option 1, given previously.

stringent than we practice today. Had they used the end of *Shabbat* on a *de'oraysah* level, the period of *bein ha-shemashot* would have started about 10 minutes earlier. This logical era was implanted into the methodology of *posekim*, a topic which is addressed in the epilogue.

Thus, as I have indicated throughout, we can fuse some of the notions of Rabbeinu Tam and his followers to the position of the *geonim* and create a hybrid that is

- a preferred reading of the text of the *gemara*,
- consistent with astronomic observation and
- (to some extent partially) justifies generations of practice.

Section 9. How do the two meanings of day – day as in “day of the week” and day as in “during the daytime” relate? Must the end of the daytime period coincide with the end of a day of the week?

In the previous sections, we have dealt with both,

- the undisputed start of the daytime period, *alot ha-shaḥar*, and
- the focus of much of our attention, the beginning and end of the *bein ha-shemashot* period, the latter being the transition point between days.

When the *Gaon* defined *tzait kol ha-kokhavim*, even though *alot ha-shaḥar* is a fundamental point in *halakhah*, he gave no examples of *halakhot* dependent on its evening counterpart, *tzait kol ha-kokhavim*. Given the *Gaon*'s approach, calculating the hours of the day from sunrise to sunset, *tzait kol ha-kokhavim* also has no computational relevance. However, as we have seen, those who calculate the hours of the day following the approach of Magen Avraham (and make latitudinal and seasonal adjustments) are apparently forced to use *tzait kol ha-kokhavim* as the evening endpoint corresponding to *alot ha-shaḥar*.

Although the *Gaon* gives no examples of such *halakhot*, this section focuses on finding potential *halakhic* import to the time of *tzait kol ha-kokhavim*.

Some²³⁵ have noted the two different meanings of the term *day* both:

- the day of the week, and

²³⁵ These include R. Meltzer, R. Zimmerman and others identified with the *Brisker* methodology.

➤ the daytime period.²³⁶

In secular terms, days of the week currently begin and end at midnight, while the daytime period is an interval defined by sunrise and sunset or a somewhat longer period where there is some degree of light. To this point, most, if not all, of the end-of-day *halakhot* we encountered depended on the day of the week. According to the *geonim*, the day of the week transitions around *ḥashekhah / tzait ha-kokhavim*, and at least theoretically according to Rabbeinu Tam, the day of the week transitions at *tzait kol ha-kokhavim*. Conceptually,²³⁷ according to Rabbeinu Tam, **both** uses of the term **day** terminate at the identical point of *tzait kol ha-kokhavim*. For the *geonim* however, the end of a day of the week is *ḥashekhah / tzait ha-kokhavim*, while the end of the daytime period is perhaps *tzait kol ha-kokhavim*.

Per *the geonim*, the daytime period could have at least three endpoints,

1. a point around sunset,²³⁸
2. *ḥashekhah / tzait ha-kokhavim*, the transition point between days of the week, as well as
3. *tzait kol ha-kokhavim*.

²³⁶ It is probable that this distinction can explain why one can advance a holy day like the *Shabbat* on Friday afternoon, while one cannot eat the Passover meal until nighttime. While there is flexibility in defining the start of a day of week, such flexibility cannot turn daytime into nighttime. See, for example, *tosefot* s.v. *ad she-teḥshakh* on *Pesaḥim* 99b where the term *lailah* is emphasized.

²³⁷ R. Soloveitchik's fundamental reformulation of the approach of Rabbeinu Tam explicitly equated his end to *Shabbat* to the point of *tzait kol ha-kokhavim*, both in theory and in practice.

²³⁸ Theoretically, from the point the sun begins to disappear until it goes completely below the horizon at normal elevations, a span of about three minutes, or perhaps a few minutes later as in the position of R. Shneur Zalman of Liadi.

According to both viewpoints, *halakhot* related to *korbanot*,²³⁹ for example, may utilize an endpoint related to sunset as opposed to either *hashekhah* or *tzait kol ha-kokhavim*. Note that the possibility of additional transition points²⁴⁰ makes it difficult to attack either the position of Rabbeinu Tam or the *geonim* using the existence of *halakhot* that depend neither on sunset, *hashekhah* nor *tzait kol ha-kokhavim*.

For Rabbeinu Tam, given the conceptual alignment between both meanings of the end of the day, clearly *tzait kol ha-kokhavim* is important.²⁴¹ However, for the *geonim*, it remains an area of conjecture.

According to the *geonim*, it is at least plausible that specific *halakhot* that depend only on the daytime period, and not the day of the week, might use *tzait kol ha-kokhavim* as a delimiter. I am not aware of any uncontested examples.²⁴² However, I will mention some areas where the possible applicability of *tzait kol ha-kokhavim* as a delimiter cannot be summarily

²³⁹ Other *halakhot*, whose *zmanim* are tightly tied to *korbanot* like specific *zemanai tefillah*, may be dependent on a time around sunset as opposed to some later point.

²⁴⁰ Both the beginning of the period of *bein ha-shemashot* and the earliest point of *safek hashekhah* represent two additional points. Yet other defined points, the point that a poor man begins his evening meal, the point that people go to sleep, etc. may be yet additional points or may correlate precisely to the other transition points, a topic that is not covered.

²⁴¹ One area not covered in this monograph is alternatives for the latest time of *minḥah*. It is normally assumed that the argument of Rabi Yehudah and the Rabbis in *Berakhot* coupled with the argument on how to calculate the hours of the day, imply two pairs of possible points for *ad ha-erev* and *pelag ha-minḥah*. According to the *Gaon* we have sunset and 75 minutes before sunset and according to Magen Avraham we have *tzait kol ha-kokhavim* and shortly before sunset. Sandwiched between those alternatives, there is another possibility. A simple reading of the *gemara* in *Berakhot*, might lead to the possibility that even according to Magen Avraham, *minḥah* cannot extend past some point around the end of each day of week, the end of the *geonim's bein ha-shemashot* period. This position is a modification of Magen Avraham as currently implemented and reminiscent of an older method of calculation that was abandoned. Whether and how that might create another potential calculation of *pelag ha-minḥah* as well as a third way to calculate the hours of the day, has been rarely considered. A related notion is rejected by R. Weiss in his *teshuvah* on *pelag ha-minḥah* in *Minḥat Yitzḥak* 4:53; a major variation of such an approach is outlined in the summary of section 4, in the epilogue.

²⁴² Finding such uncontested examples, given that the *Gaon* did not provide any, would be more than surprising.

dismissed. Our approach is to isolate *halakhot* that have one or both attributes:

- They have an affinity only to the daytime period versus any specific day of the week.
- There is some textual basis that might suggest support for allowing an extension beyond *hashekhah*.

Each of the four examples is highly speculative; the fourth satisfies neither attribute.

Perhaps the clearest example is the construction of the temple. Undoubtedly, work is not in any sense tied to any specific day. Additionally, Rambam *Hilkhot Beit Ha-behirah* 1:12 uses unique language, defining the time when work is permitted as both in the day and not in the night as well as from *alot ha-shaḥar* until *tzait ha-kokhavim*. Perhaps this implies that work can continue past *hashekhah*, the appearance of only three stars, until the night or complete darkness. On the other hand, it is more likely that Rambam was only referring to the verse in Nehemiah, and one should not draw any implication from the fact that “three” did not modify the word “stars.” However, since there is not even a stated preference for work to begin only after sunrise, one might conjecture that work can continue until the point corresponding to *alot ha-shaḥar* in the evening, until *tzait kol ha-kokhavim*.

A second possibility is Rif and Rambam who both rule that a mourner who is within the time needed to walk 40 *milin* on the day of burial observes *shivah* with the leader of the family assuming he arrives prior to the end of the *shivah* period. R. Willig²⁴³ supports the assertion in *Orot Haim* who uses this as proof that Rif held that the entire 40-milin distance is walked in the interval from sunrise to sunset, and hence the time needed to walk a *mil* is 18

²⁴³ R. Willig, *Am Mordechai, Berakhot*, chapter 2.

minutes. Rambam, however, must allow the interval to walk 40 *milin* to extend from *alot ha-shahar* until *tzait kol ha-kokhavim* as Rambam clearly maintains that one walks only 30 *milin* during the sunrise to sunset period.²⁴⁴ It is certainly possible that Rif is to be interpreted similarly.²⁴⁵ For Rambam and perhaps for Rif as well, that arrival time might extend until *tzait kol ha-kokhavim*. While hardly compelling and in opposition to practiced *halakhot* that count the first day of mourning only if it includes a brief period before either *bein ha-shemashot* or *hashekhah*, it represents a remote possibility, perhaps implied by Rambam's interval of the time needed to walk 40 *milin*. Alternatively, as mentioned earlier in section 2, a mourner and / or a messenger might be assumed to walk faster or perhaps during an extended period given the pressing circumstances of a death.

A third possibility relates to courts that must rule in the daytime. Rambam clearly states that the court must complete a declaration of *rosh hodesh* prior to *hashekhah*. It is also likely that certain deliberations, like capital cases, like *negaim* that must be examined during sunlight must only occur between sunrise and sunset. However, we can also argue that parallel to allowing specific judgments as early as *alot ha-shahar*, *tzait kol ha-kokhavim* might be the delimiter at the other end of the day. Thus, there may be a stricter definition requiring daytime for specific deliberations, nightfall with respect to the declaration of a new month²⁴⁶ and perhaps *tzait kol ha-kokhavim* for other matters. The Rambam's language allowing civil judgments to continue into the night, ostensibly past *hashekhah*, might still be delimited by *tzait kol ha-kokhavim*. This case is also tentative at best.

²⁴⁴ The view of Rambam, *Hilkhot Aveilut* 7:4, was discussed earlier in Section 2.

²⁴⁵ See as well Rosh MK 22b. He allows for a three-day interval. The logic of his ruling appears to assume that even if burial occurs at the end of the day, a messenger travels on the next day, and the mourner can still arrive by the end of the third day. His use of the term *hashekhah* is not supportive of this conjecture.

²⁴⁶ A *hodesh* is intrinsically tied to days of the week and entirely unrelated to the daytime period.

Finally, Ramban²⁴⁷ indicates that prior to sunset there cannot be *tosefet Shabbat*. For those following either Rabbeinu Tam or the *geonim*, *pelag ha-minhah* is normally assumed the earliest point on Friday afternoon for the start of *tosefet Shabbat*. On Saturday night perhaps, *tzait kol ha-kokhavim* might act as the post *Shabbat* endpoint for *tosefet Shabbat* for those following the opinion of the *geonim*. While this use of *tzait kol ha-kokhavim* relates to the day of week as opposed to the daytime period, it has the advantage of having been suggested previously.^{248 249}

²⁴⁷ This is a part of Ramban's argument in support of Rabbeinu Tam. The same argument would also support starting *Shabbat* (much) earlier than the opinion of Rabbeinu Tam if a meaningful period of *tosefet Shabbat* after sunset still exists.

²⁴⁸ See R. Shechter's notes on the *shiurim* of R. Soloveitchik on *masekhet Shabbat* page 87. I have also heard this quoted in the name of R. Moshe Soloveitchik.

²⁴⁹ This assumes that it becomes sufficiently dark for *tzait kol ha-kokhavim* to occur; otherwise, in locations further from the equator when only *tzait ha-kokhavim*, but not *tzait kol ha-kokhavim* occurs, *hatzot ha-lailah* has been suggested for both the end of *tosefet Shabbat* according to the position of the *geonim* and *Shabbat* itself according to the position of Rabbeinu Tam.

Epilogue

The epilogue summarizes major areas of suggested innovation and then briefly re-examines the nine sections covered, taking wider latitude for conjecture. Two basic assumptions²⁵⁰ underlie many of those conjectures:

- First, both *halakhic* practice and its conceptualization were influenced by the migration of Jews from the Middle East to Central and Northern Europe during a period well before the impact of latitude on *zemanim* was understood.
- Second, centuries later, with the subsequent growth of clocks, *halakhic* practice was slowly but increasingly specified using time in preference to the observation of natural events.²⁵¹

It is probable that both factors, particularly in combination, were consequential.

²⁵⁰Readers who believe that these assumptions are incorrect are unlikely to find this epilogue useful.

²⁵¹Increasingly, time replaced observation as the basis for specifying *halakhot*. Preference for a time-based *halakhic* rule (72 minutes before sunrise or after sunset, for example) over the underlying event from which the interval of time was derived has become increasingly common. Disputed or more subjectively defined phenomena, like *mi-she-yakir* or the (approximate) boundary between a medium and a small star, were less often utilized and, thus, became less well understood.

Before proceeding, it is useful to reiterate two²⁵² areas where specific *posekim*'s insufficient understanding and / or observation of basic astronomy likely caused errors, more often in conceptualization, but also in *pesak*.²⁵³

1. **Calculating using *alot ha-shaḥar* as the counterpart to the emergence of three stars, as if that the interval between *alot ha-shaḥar* and sunrise is of the same duration as the interval between sunset and the emergence of three stars.**²⁵⁴ Though associated with the opinion of Rabbeinu Tam,²⁵⁵ assuming that these intervals are of

²⁵² There are several more technical errors of which one should be aware. First, one cannot assert 18 minutes as the time needed to walk a *mil* while also maintaining Ramban's calculation that *pelag ha-minḥah* occurs the time it takes to walk $\frac{1}{6}$ th of a *mil* prior to sunset; this error has had minimal practical consequence. Second, while failure to distinguish 22.5 minutes from 24 minutes ($\frac{3}{8}$ th of an hour from $\frac{2}{5}$ th of an hour) may have resulted from the desire to assert "not 18 minutes" without differentiation, on occasion the two numbers appear to have been treated as being the same. Third, an oft recurring and practical error is determining the beginning of the *bein ha-shemashot* period by subtracting from the practiced end of *Shabbat*, three small stars, which is later than the more accurate endpoint of the day that occurs (approximately) with the appearance of three medium stars. Fourth, starting *Shabbat* after sunset does not imply agreement with the position of Rabbeinu Tam. Other errors or inaccurate observations are more isolated.

²⁵³ Prior to the existence of clocks, independent of conceptualization, it is likely that in practice conservative approximations would compensate.

²⁵⁴ Though considered only hypothetically, creating a morning *zeman* corresponding to the appearance of three stars and calculating *shaot zemaniot* between those two points is an interesting theoretical possibility raised by R. Weiss in *Minḥat Yitzḥak* 4:54 and rejected; it may also factor into R. Sofer's commentary on *Shabbat* 34b.

²⁵⁵ Nehemiah 4:15, "Ve-anahnu osim be-melakhah ... mei-alot ha-shaḥar ad tzait ha-kokhavim," as explicitly interpreted in the *Yerushalmi* at the beginning of *Berakhot*, may have contributed to this approach. Even taking for granted the *Yerushalmi*'s interpretation that the verse describes a normal daytime period from *alot ha-shaḥar* until the appearance of three stars, the verse does not claim that those two points are equidistant from sunrise and sunset respectively nor does it necessitate that *ḥatzot* be calculated inaccurately.

equal duration impacted the calculation of the hours of the day and thereby other *zemanim* as well.²⁵⁶

2. **Improperly or inconsistently adjusting *zemanim* for latitude or season.** One can on occasion justify (or even prefer) instances where an interval of time is left invariant. However, when making adjustments, it is important that they be made accurately and consistently. A common error in this area is the correlation of the length of the twilight period with the length of the daytime period from sunrise to sunset. As well, inconsistencies resulting from adjusting one *zeman* but not another that is conceptually linked occur in several different contexts.²⁵⁷

²⁵⁶ When *alot ha-shaḥar* and three stars are used as the endpoints to calculate the hours of the day, the morning *zemanim* are slightly earlier than when using a later evening endpoint; the calculations of *pelag ha-minḥah* and *ḥatzot*, however, are inaccurate. A conjecture on how this approach may have been practiced prior to the existence of clocks, avoiding these issues, is suggested in the review of section 4.

²⁵⁷ The OU website illustrates the conspicuous inconsistency that results from adjusting *mi-she-yakir* but not *alot ha-shaḥar* based on both season and latitude. (A change to the OU website, several years ago, to also not adjust the end of *Shabbat* according the *geonim*, is odd and troubling.) While latitude is more often acknowledged as a basis for the need to adjust *zemanim*, the use of seasonal adjustments is more varied. Some *posekim* seasonally adjust the end of *Shabbat* but not *alot ha-shaḥar*. Others seasonally adjust *alot ha-shaḥar* but keep an invariant length to *Shabbat*; still others make neither adjustment. At latitudes in northern Europe, the need to adjust, based on seasonal variation, to *alot ha-shaḥar*, which equates to a larger depression angle, is more pronounced than the need to adjust the end of *Shabbat*, which equates to a smaller depression angle. Furthermore, while physical measures such as three stars incorporate a seasonal adjustment implicitly, a fixed time-based calculation, e.g., the time needed to walk 4 *milin*, or its clock-based equivalent of 72 or 90 minutes does not.

It is likely that the influence on practice of these and other errors accelerated with the introduction of clocks and the reduced reliance on observation that followed.

Some suggested innovations:

Well beyond identifying the impacts of poorly understood phenomena, the application of basic astronomic observation led to insights that helped to clarify several areas. Before reviewing the nine sections, I will list, without reiterating supporting arguments in complete detail, suggested innovations (partially) based on these insights:²⁵⁸

1. The dispute between the *geonim* and Rabbeinu Tam revolves around placing the interval of *bein ha-shemashot*, whose length is (at most) the time needed to walk $\frac{3}{4}$ *mil*, within the interval between sunset and *tzait kol ha-kokhavim*, whose length is the time needed to walk 4 *milin*. It is normally assumed that
 - the opinion of the *geonim* locates the *bein ha-shemashot* period at the start of the interval, while
 - Rabbeinu Tam locates it at its end.

Those alternatives are two opposite extremes. Two modifications were suggested throughout this monograph.

²⁵⁸ Other, more speculative areas are covered when discussing the nine sections.

- First, separate the dispute between the *geonim* and Rabbeinu Tam into **two distinct components**:
 - The **first concerns the beginning** and the **second the end of the *bein ha-shemashot* period**, subject to a constraint on the length of the *bein ha-shemashot* interval.
- Second, assume that **there are multiple hybrid / intermediate positions**, bracketed by these two alternatives.²⁵⁹

This allows

- an interpretation of the *gemara* in *Shabbat* similar (or according to some identical) to that of the overwhelmingly compelling position of the *geonim* relative to the end of the *bein ha-shemashot* period,
- while defining the beginning of the *bein ha-shemashot* period identical to the textual approach of the *Shulhan Arukh* and Rabbeinu Tam.

While I have not seen this conceptualization formulated explicitly²⁶⁰ in the classic *halakhic* literature, practice and several pragmatic opinions are supportive of such an approach. This approach impacted sections 5 to 8 and is central to many of the suggested innovations.

²⁵⁹ These positions are more properly characterized as variants of the position of the *geonim* as they are all much closer to their *bein ha-shemashot* interval. As noted, R. Posen argues that a position like what I propose was the position of the *geonim*, as opposed the *Gaon*.

²⁶⁰ Throughout R. Kapach's commentary on *Mishnah Torah*, however, he asserts that this is the position of Rambam.

The opposite implication:

- Anyone who rejects the start of *Shabbat* precisely at or even a few minutes after sunset must embrace the approach of Rabbeinu Tam,

which does not follow either logically or *halakhically*, is found in the literature.

2. It is preferable to read the *gemara* in *Shabbat* assuming that all opinions vary insignificantly concerning the end of *Shabbat*. This is the position of almost all *rishonim* and is independent of the opinion of Rabbeinu Tam. **The *gemara*'s focus is on Friday evening and the point at which the period of *bein ha-shemashot* begins; only that point, as opposed to the end of *Shabbat*, is being disputed.**
3. Modern practice, contemporary *halakhic* literature, as well as colloquial idiom, typically refer to time intervals calculated from sunset. Assuming that way of thinking when reading specific sources, we fail to consider that the *gemara*, various *rishonim* and *aḥronim* (I referenced R. Lorberbaum, R. Adler and R. Sober) **refer, as well, to intervals of time counting backward from the point at which *Shabbat* ends, not always counting forward from sunset or some other point at which *Shabbat* begins.**²⁶¹

²⁶¹ R. Gettinger in *Munah Yoma*, page 139, makes this point, as well as the previous point, albeit in the context of the opinion of Rabbeinu Tam. Both this point and the next may have resulted from the *Gaon*'s view. This area requires a careful historical study.

4. **Rabbah's interval, the time needed to walk $\frac{3}{4}$ mil, is more likely an upper bound on the length of the *bein ha-shemashot* period** (the length of the *bein ha-shemashot* period in the summer) counting back from the point of *hashekhah* **versus a lower bound** (the length of the *bein ha-shemashot* period in the spring) counting forward from sunset (or some other point). Treating the *gemara* in *Shabbat* like the *gemara* in *Pesahim* as referring only to days around the spring (but not the fall) equinox²⁶² is unnecessary when thinking of the interval as a practical upper bound. All the descriptions in the *gemara*, either the appearance of the sky / horizon or the visibility of three stars, apply year-round. Some of the arguments in favor of such a position are:

- The *gemara* in *Shabbat* is primarily focused on Friday night and the beginning of the *bein ha-shemashot* period, as opposed to its end. If the time needed to walk $\frac{3}{4}$ of a *mil* were a minimum, counting forward from the beginning of the *bein ha-shemashot* period, it would address the end of the *bein ha-shemashot* period and the end of *Shabbat*, as opposed to its beginning on Friday night.

²⁶² First suggested by the *Gaon* in *O. H.* 261, this approach is widely assumed in recent *halakhic* literature. Note that the *gemara* in *Pesahim* assumes an average day, which occurs in both the spring and fall around the equinox. However, the *Gaon's* argument assumes, not an average interval, but a minimum interval and one that occurs only in the spring, but not in the fall; stars are not visible as early in the fall as in the spring. On the other hand, as suggested, a maximum would apply year-round. Furthermore, *rishonim*, who limit the *gemara* in *Pesahim* to the equinox periods in the fall and spring, **make no such assertion with respect to the *gemara* in *Shabbat***. One might conclude from the lack of commentary that *rishonim* assumed that the *sugyah* applies year-round.

- The three fractions (each expressed as the time needed to walk a part of a *mil*) given as alternatives for the length of the period of *bein ha-shemashot* would all have identical semantics, counting back from the assumed point of *hashekhah*.
- The length of the *bein ha-shemashot* interval provides a practical upper-bound as opposed to a theoretical lower-bound.
- If someone were countering the position of Rabi Yosi, who says the period of *bein ha-shemashot* is instantaneous, it is more likely that he would say that it can be “as **long** as” opposed to “as **short** as.”

5. According to the opinion of **Rabi Yehudah**:

- **Sirius and Canopus are medium stars.** This is consistent with the opinion that only planets are considered large stars, what the *gemara* calls “*kokhavei lehet*” or “moving stars,” that can, on occasion, be seen before sunset.
- **Even assuming²⁶³ the appearance of three stars as the precise criterion that defines** the end of the *bein ha-shemashot* period, the appearance of **2 stars is only an indicator** that the *bein ha-shemashot* period has begun; the appearance of **2 stars cannot define** the beginning of the *bein ha-shemashot* period.

6. The *Yerushalmi* does not provide a compelling answer as to the question of **why the end of the day is defined by the appearance of three as**

²⁶³ I admit to being biased strongly against this opinion.

opposed to the more typical two stars, two normally being considered the smallest plurality. If three stars defined the end of *Shabbat*, I have not seen any better alternative than the answer that the *Yerushalmi* provides. However, consistent with our preference for defining *zemanim* based on a level of darkness, with *hashekhah* (as opposed to three stars) defining the end of *Shabbat*, then the reason for requiring three versus only two stars is much more fundamental:

- When Sirius and Canopus are visible after sunset, several minutes before *hashekhah*, only a third star, of much less intensity, which appears after *hashekhah*, indicates that *Shabbat* has ended.

The fact that the *Yerushalmi* does not provide this answer might indicate that the *Yerushalmi* considers stars as defining. The *Bavli* mentions stars only once at the end of a *sugyah* that revolves around darkness and the appearance of the horizon and sky; the *Bavli* may therefore consider darkness as defining.

7. Given Prof. Levi's observations of the appearance of stars over Jerusalem and the Middle East, the customary definition of sunset proper as the assumed beginning of *Shabbat* according to both Rabbah's interpretation of Rabi Yehudah's position (and *a fortiori* Rabi Nehemiah's position) is impossible to reconcile with the opinion of Shmuel.
8. Moving the beginning of the period of *bein ha-shemashot* forward from sunset even according to Rabbah, a variant of the generally assumed opinion of the *geonim*, successively solves the following issues:

- **At 4 to 5 minutes**, the minimum time reported as the custom of Jerusalem²⁶⁴ as well as the opinion of R. Shneur Zalman of Liadi,²⁶⁵ the point when the sun is no longer visible even from the highest elevations around Jerusalem, Shmuel is consistent, at least in a limited sense, with R. Yosef, while remaining entirely inconsistent with Rabbah.²⁶⁶
- **At 6 minutes**, an opinion that R. Haim Volozhin bases on Shmuel's statement concerning the appearance of a single star that is visible in the spring to an expert observer at that time, Shmuel is more easily consistent with R. Yosef but consistent even with Rabbah, but only in a very limited sense.²⁶⁷
- **At 7 or 8 to 15 minutes**, depending on a variety of factors, Shmuel is entirely consistent with Rabi Yehudah; further, the time needed to walk $\frac{3}{4}$ *mil* can be easily considered a practical upper bound.²⁶⁸

9. Shmuel's information-rich assertion about 1, 2 and 3 stars is likely telling us that:

²⁶⁴See *Minhagei Eretz Yisrael* by R. Gliss, pages 102 and 282.

²⁶⁵ A letter included in his *siddur* specifies 4 minutes.

²⁶⁶See *Zemanim Ke-hilkhatam* by R. Boorstyn, chapter 2, section 3, where he summarizes different 19th and 20th century *posekim* in the Middle East who supported times beyond 4 to 5 minutes and up to approximately 10 minutes after sunset. The rationale he and many of these *posekim* used is different from that which is addressed in this monograph, with heavy reliance on the notion of sea level in addition to visibility from higher elevations.

²⁶⁷ How these first two options deal with the time needed to walk $\frac{3}{4}$ of a *mil* depends on one's position on the time needed to walk a *mil* and the precise time at which *Shabbat* ends. As well, to be more precise, R. Haim Volozhin says **minimally** 6 minutes.

²⁶⁸ This option is consistent with the famous *pesak* of R. Feinstein for the New York area extending the day for approximately 9 minutes after sunset under certain circumstances, albeit using a completely different conceptual basis.

- **One (medium) star may appear during the daytime.**
- **However, two stars only²⁶⁹ appear following the beginning of the *bein ha-shemashot* period** (whose start may also precede the appearance of the first star).
- **Three stars confirm that the transition to the next day has occurred.**

10. While many equate and then struggle to resolve Rambam's approach to *Shabbat* and *Kiddush Ha-ḥodesh*, I assume they are in a number of ways dissimilar.²⁷⁰ As noted, the word *vadai* ending Mishnah (5:4) in *hilkhot Shabbat* proves conclusively that Rambam considers *ḥashekhah* as defining the end of a day. For a *beit din* declaring the beginning of a new month, Rambam sees no need to impose an interval of *bein ha-shemashot*. Thus, Rambam in *hilkhot Kiddush Ha-ḥodesh* first states the *halakhah* in (2:8) and then states the recommended practice in (2:9.) However, in *hilkhot Shabbat*, as noted in the opening paragraph of the prologue, when dealing with a community, to which the period of *bein*

²⁶⁹ If we assume that the period of *bein ha-shemashot* begins 14 to 15 minutes after sunset, then “only” should be replaced with “almost always.” Though proposed by R. Kapach in his interpretation of Rambam, it would make Shmuel's assertion slightly less precise or perhaps a *harḥakah*. The suggested meaning of Shmuel's statement is more elegant if we assume that the period of *bein ha-shemashot* starts at the latest 12 to 13 minutes after sunset in the Middle East.

²⁷⁰ Why so obvious an approach was not considered may be related to the assumption that the periods of *safek ḥashekhah* and *bein ha-shemashot* are coincident. Though the two notions may be practically coincident, they are certainly not conceptually the same. For those following an opinion akin to the *geonim* for the end of *Shabbat*, they may not even be practically coincident. Within the *halakhic* literature there are differing opinions about the relationship between the periods of *safek ḥashekhah* and *bein ha-shemashot*.

ha-shemashot applies, Rambam utilizes the notion of *bein ha-shemashot*, an interval that he defines practically as opposed to theoretically.²⁷¹

11. While both the appearance of the horizon and the visibility of stars are difficult to reconcile with the opinion of Rabbeinu Tam, the argument between Abaye and Ravah, looking east and west at the same point in time, is particularly challenging. I cannot conceive of anyone detecting any change looking towards the eastern sky 50 to 60 minutes after sunset in the Middle East. This is the greatest observational challenge from the *sugyah* in *Shabbat* to Rabbeinu Tam's demarcation of the end of *Shabbat*.

12. **It is likely that R. Adler's 24 / 35-minute period of *bein ha-shemashot* is calculated counting back from Rabbeinu Tam's conceptual end of *Shabbat*.** The alternatives, either counting back from the time that the Frankfurt community typically observed as the end of *Shabbat* or counting forward from any point in time, are less plausible. While this formulation faces textual challenges, other attempts to explain R. Adler's opinion including that assumed by the "*editors*" referenced by Dr. Leiman, as well as multiple suggestions of R. Benish, face far more difficulty.²⁷²

²⁷¹ In *hilkhot Shabbat*, Rambam would appear to use sunset and three stars practically (in both 5:3 and 5:4), with *hashekhah* (in 5:3) defining the end of a day.

²⁷² Frankfurt was one of a few communities that observed a start to *Shabbat* around sunset before the 19th century. Clearly, R. Sofer did not impose that view in Pressburg where he was rabbi, and I have seen no record of his personal practice. I can only assume that R. Sofer did not feel that R. Adler's observance of *Shabbat* beginning at sunset was normative as opposed to perhaps either a personally practiced stringency, or perhaps observed only in deference to the Frankfurt community.

13. A few recent essays on *zemanim*, including those by R. Kotler²⁷³ and R. Willig,²⁷⁴ suggest specific dependencies linking

- the dispute between the *geonim* and Rabbeinu Tam,
- the dispute whether *shaot zemaniot* are calculated from sunrise or from *alot ha-shaḥar* and
- in the case of R. Willig, even the dispute over the length of time needed to walk a *mil*.

I see no such logical dependency and found that custom and / or authorities supported almost all combinations of alternatives.²⁷⁵

14. It is puzzling that when **calculating the opinion of Magen Avraham / *Trumat Ha-deshen*, attention to the impact of latitude and / or seasonality is rarely considered.**²⁷⁶ When accounting for the impact of latitude and / or seasonality, morning *zemanim*, like the latest time for

²⁷³ In *Shut R. Aaron 2:2*, R. Kotler himself mentions that the practice of the Jerusalem community contradicts his assumed dependency.

²⁷⁴ *Am Mordechai, Berakhot*, chapter 2; as mentioned, R. Willig has since modified his position.

²⁷⁵ The one exception is that anyone who might maintain a 120-minute interval for *alot ha-shaḥar* to sunrise (a rare position maintained perhaps by R. Ovadiah of Bartenura or R. Shneur Zalman of Liadi in *Shulḥan Arukh Ha-rav*, though it is unclear whether R. Shneur Zalman continued to maintain this position) must perforce calculate the hours of a day starting at sunrise; otherwise, *pelag ha-minḥah* would **always** occur after sunset. However, the conjecture in section 4 below that provides an alternative method to calculate *shaot zemaniot* per those who calculate from *alot ha-shaḥar*, could be used in this case as well. *Pelag ha-minḥah* would then occur before sunset, removing this last dependency as well. After reading the approach suggested in the summary of section 4, this will be clear since the afternoon *zemanim* are set independently of the time of *alot ha-shaḥar*.

²⁷⁶ That would entail using depression angles as opposed to a fixed 72 or 90 minutes.

kriat shema are earlier than commonly provided; this approach would also provide an alternative for *plan ha-minḥah* (that many communities in US latitudes might find useful). Similarly, adjusting *alot ha-shaḥar* would often imply an earlier start for those fast days that start at daybreak (particularly the 17th of Tammuz).²⁷⁷ That would avoid a practice that allows eating on the morning of a fast as late as (or even after) the time of *mi-she-yakir*.

15. Possibly, *tzait kol ha-kokhavim* could have practical significance for activities whose performance must occur during the daytime period but are not tied to a specific day of the week, as for example the construction of the *beit ha-mikdash*.

A review of the nine sections:

We now revisit the nine sections taking greater latitude for conjecture.

10. How many *milin* does one walk during the period from sunrise to sunset? What is the time needed to walk a *mil*: 18, 22.5, 24 minutes, etc.?

²⁷⁷ While not a Magen Avraham specific issue (since *alot ha-shaḥar* is applicable according to all opinions), invariance of the 72 or 90-minute interval is likely inherited from similar practice applied to the position of Rabbeinu Tam with respect to the end of *Shabbat* which then influenced the calculation of *shaot zemaniot* according to Magen Avraham. (See the summary for section 3, where this is further explained.) Though conceptually challenging in both contexts, a fixed 72 or 90 minutes does not create obvious observational issues, except for *alot ha-shaḥar*, and only at latitudes further from the equator, as in northern Europe.

Except for Rambam and R. Ovadiah of Bartenura, few maintain 24 minutes as the time needed to walk a *mil*. However, both other major opinions have significant support. Some *geonim* and *rishonim* likely maintained an 18-minute interval.²⁷⁸ However, many *rishonim*, particularly those following Ramban, adhere to 22.5 minutes. Interestingly, by the time of the *Shulḥan Arukh* most authorities are united around 18 minutes, with a small number of *aḥronim* strongly supporting 22.5 minutes.

When I began studying this topic, I was convinced by the overwhelming arguments presented by Prof. Levi based on both the text of the *gemara* and the opinion of many *rishonim*, that 22.5 minutes should be strongly preferred. However, 18 minutes also appears to be well supported; albeit in each case, the argument in favor is not definitive.

1. Geography (the distance from Modiin to Jerusalem, for example) seems to support more *milin* walked per day.²⁷⁹

²⁷⁸ R. Yosef's attempt (*Yeḥaveh Daat*, volume 2, page 38) to marshal support for R. Karo's 18 minutes versus either 22.5 or 24 minutes yielded only a few sources. Given the author's encyclopedic knowledge, one can assume that his list is (nearly) exhaustive.

²⁷⁹ This is entirely tentative given that there are dozens of *sugyot* that would have to be analyzed, many with complexity in identifying the locations in addition to controversy over the length of the units involved. Particularly significant is the opinion of Rabbeinu Tam in *Yuma* 67a, which recent archeological evidence seems to support; see the article by Daniel Levi in *Tehumin* 30, pages 418 – 426. Rabbeinu Tam's opinion assumes that 2000 *amot* is *amot be-alakhson*, the length of the diagonal of a square where each side is 2000 *amot*, or 2000 multiplied by the square root of 2, (approximately 1.414), or 2828 *amot*. Under that scenario, walking 40 *milin* in a day is less likely. However, according to Rashi's more standard assumption that a *mil* is 2000 *amot*, 32 *milin* is only about 20 miles, and appears to be insufficient as the amount of distance covered in a day's journey.

2. The assumed similarity of the fractions $1/10^{\text{th}}$ and $1/6^{\text{th}}$ used by the *gemara* in *Pesaḥim* would place the twilight period of either the time needed to walk 4 or 5 *milin* outside of the daytime period of the time needed to walk 40 or 30 *milin*; since 5 *milin* is external from 30 *milin* ($1/6^{\text{th}}$), then 4 *milin* should be external from 40 *milin* ($1/10^{\text{th}}$).
3. Arguments in favor of 18 minutes from anyone maintaining 72 minutes as the length of the interval from *alot ha-shaḥar* to sunrise, a view that I also prefer slightly, and the basis of almost all of R. Yosef's examples, while not conclusive, are highly likely.
4. An assumed added “*vav*” to the text of the *gemara* in *Pesaḥim*²⁸⁰ when referring to the twilight periods might have been intended to clarify or to lend further support to 18 minutes.

Since many if not almost all *rishonim* supported 22.5 minutes, the change to 18 minutes is puzzling. As I demonstrated, a basic mathematical / logical error allowed some to misread the opinion of all *ḥakhmai Seared* as not necessarily supporting 22.5 minutes. Perhaps limited availability of many of the writings of *ḥakhmai Sefarad*, as well as the error, contributed to the dominance of 18 minutes as the time needed to walk a *mil*. However, I suspect that this might also be an example of the impact on *halakhic* reasoning from the increasing availability of clocks beginning in the 15th century. In central and southern Europe, clocks made 90 minutes after sunset, as the time that three stars appear, untenable. Perhaps as a result,

²⁸⁰ Our text of the *gemara* reads “*teidah... “u”me-alot ha-shaḥar*” in the second such phrase addressing the interval between dawn and sunrise. The *vav* does not appear in certain older texts. Of course, one can also make the exact opposite point - the absence of a “*vav*” tends to support the 22.5-minute alternative.

opinion shifted to a somewhat more reasonable 72 minutes after sunset, and the associated time needed to walk a *mil* of 18 minutes. Prior to the widespread use of clocks, it is likely that observation of the skies, as opposed to an interval of time, was used to determine the end of *Shabbat*.

11. How long is the period from sunset to *tzait kol ha-kokhavim* (or equivalently from *alot ha-shaḥar* to sunrise) in the Middle East around the time of the equinox: 72 minutes, 90 minutes, 96 minutes, 120 minutes, etc.?

Four intervals of 24 minutes totaling 96 minutes, referenced in a few *teshuvot*, is unsupportable since whoever would maintain a time needed to walk a *mil* of 24 minutes must also consider the period from *alot ha-shaḥar* to sunrise as the time needed to walk 5, and not 4, *milin*. A longer interval of 120 minutes, while theoretically possible, is rarely encountered in *halakhah* and is inconsistent with the point at which light is first visible in the Middle East, approximately 80 minutes before sunrise. While both 72 and 90 minutes intervals are good approximations to 80 minutes, I maintain a slight preference for 72 minutes for four reasons:²⁸¹

²⁸¹ How adherents of Rabbeinu Tam's approach reconciled the difference in the length of the interval between dawn and sunrise versus sunset and three stars is unclear. The former would suggest 90 minutes in Europe, the opinion of many later *rishonim* who lived there. On the other hand, the latter would support 72 minutes. I suspect that given both the subjective nature of determining what constitutes the first light and the additional stringencies of three small, adjacent stars, the difference may have been less evident. With the advent of clocks, 72 minutes was perhaps easier to assume if a single number had to be chosen for both. This in turn may have caused observation to be less trusted and viewed yet less authoritatively.

1. The amount of light present at 72 minutes is so minimal that it was likely disregarded in *halakhah*.
2. R. Saadyah *Gaon* and Rambam, who both lived in the Middle East, support 72 minutes.
3. The simple meaning of 1/10th of the (720 minute) day is 72 minutes; assuming 1/10th is 90/900 requires a unique variant of the notion of *mi-le-bar*, adding not one but two intervals of 90 minutes to 720 minutes.
4. Around the winter solstice in Jerusalem, using an adjusted (or even fixed) 90 minutes²⁸² when calculating according to Magen Avraham, *pelag ha-minḥah* occurs after sunset. In the winter, when the daytime period is approximately 10 hours and the sun is 20 degrees below the horizon about 96 minutes after sunset, *pelag ha-minḥah* ($1.25 * 66 (= (600 + 2 * 96) / 12) \sim 83$ minutes prior to 96 minutes after sunset) occurs approximately 13 minutes after sunset. However, our conjecture in in section 4 of the epilogue concerning an asymmetric approach to calculating according to Magen Avraham provides an alternative that eliminates this challenge to a 90-minute interval, making this point moot.

3. How is the period from *alot ha-shaḥar* to sunrise or its equivalent from sunset to *tzait kol ha-kokhavim* to be adjusted at distinct locations and during different seasons (if at all)?

²⁸² Using a fixed 90 minutes, the difference is only 6 minutes and *pelag ha-minḥah* is still approximately 6 to 7 minutes after sunset.

This is a heavily debated area in which many *posekim* leave both the morning and evening intervals invariant. The *Gaon's* comment that the points of *alot ha-shaḥar* and its evening equivalent, *tzait kol ha-kokhavim*, do not occur during the summer at very northern latitudes, (and are set to *ḥatzot ha-lailah*), is rarely quoted in support of the need for adjustments to both *alot ha-shaḥar* and *tzait kol ha-kokhavim*.

Prior to the widespread use of clocks, adjustments based on latitude and seasons were made naturally, as they were embedded in levels of darkness or the appearance of stars; the use of depression angles is just a mechanism that calculates those adjustments with precision. Unfortunately, the widespread use of clocks and the subsequent growth of time-based expressions of *halakhah* reduced the dependence on observation.²⁸³

Some calendars exhibit inconsistent behavior, defining *mi-she-yakir* based on physical observation, while maintaining an unadjusted period for *alot ha-shaḥar*, a position that creates anomalies at most European latitudes.²⁸⁴

In practical terms, the end of a day of the week, when defined either by a measure of darkness or the more common appearance of three stars naturally embed both latitudinal and seasonal adjustments. However, with only a few

²⁸³ A somewhat related and more conceptual point, concerning not clocks but time in general, is argued with multiple examples by Stern in *Time and Process in Ancient Judaism*, chapter 2.

²⁸⁴ Moving beyond 60 degrees latitude from the equator, where during specific seasons it is never becomes completely dark, (creative) artificial *zmanim* like midnight (*ḥatzot ha-lailah*) for the end of *Shabbat* or perhaps the beginning of the third *ashmorah* for the earliest time for morning prayers are required.

isolated exceptions, those waiting 72 minutes²⁸⁵ after sunset for the end of *Shabbat* never made upward adjustments.²⁸⁶ By waiting 72 minutes, they would naturally wait longer than those watching for darkness or the appearance of stars at least until one is at approximately 50 degrees latitude or greater, regardless of the season of year. At latitudes below 50 degrees, even a depression angle of 8.5 degrees, which exceeds the observance of most communities, equates to less than 72 minutes. As a result, 72 minutes after sunset remained invariant. Given the location of most of Jewish communities between 55 degrees north latitude and the equator, those who observed 72 minutes had limited physical motivation to make either latitudinal or seasonal adjustments; three stars, most often even small ones, are visible by that time.^{287 288}

²⁸⁵ Similar arguments would hold *a fortiori* for those waiting 90 minutes after sunset.

²⁸⁶ To my knowledge, no major figure except R. Soloveitchik applied precise latitudinal and seasonal adjustments in practice to extend further the end of *Shabbat*, when following the opinion of Rabbeinu Tam.

²⁸⁷ To the contrary, not just were intervals not adjusted upwards, those who maintained the position of Rabbeinu Tam, either waited exactly 72 minutes or **less, not more**. As noted previously and first mentioned explicitly by R. Pimental in the 17th century *sefer Minhag Kohan* and practiced in many communities, those following the opinion of Rabbeinu Tam reduced 72 minutes (often to around 50 minutes) based on the observation of three stars. Except for the view of R. Dovid Shapiro, and others in the 20th century who have made similar, rather tenuous, arguments that Rabbeinu Tam's interval begins well before sunset, conceptual views that I choose not to address, I have never read an explanation of how this was reconciled with assumed equivalence to the time of *alot ha-shahar* for those following the Rabbeinu Tam.

²⁸⁸ Even for St. Petersburg and certain communities in Scandinavia, given significant variance in how to interpret three small stars, smaller depression angles (but still greater than that which would equate to three medium stars) would allow 72 minutes to remain viable. See *Ha-zemanim Be-halakhah*, chapter 46 on European observance in several (very) northern European communities that used the equivalent of a depression angle of approximately 7.5 degrees for the end of *Shabbat*. In Vilna for example, using a depression angle of 8.5 degrees, the end of *Shabbat* occurs approximately 95 minutes after sunset in the summer, 40 minutes later than in the spring.

On the other hand, unlike the end of *Shabbat* (or any day of the week), the beginning of the daytime period, *alot ha-shaḥar*, should not have been left invariant. In Prague during June, for example, using a depression angle of 8.5 degrees, **the end of *Shabbat* occurs about 70 minutes after sunset, while *alot ha-shaḥar*, specified by a depression angle of 16 degrees, occurs over three hours before sunrise.**²⁸⁹ However, based on Rabbeinu Tam's interpretation of the *sugyah* in *Pesaḥim*, it was often axiomatically assumed, that the length of the interval between *alot ha-shaḥar* and sunrise must exactly equal the length of interval between sunset and *tzait ha-kokhavim*; **either both or neither could be adjusted.** Particularly in the age of clocks, adjusting one and not the other would violate that assumption noticeably. Thus, I suspect that the opinion of Rabbeinu Tam may have contributed to a tradition of not adjusting the time of *alot ha-shaḥar*, to maintain equivalence with a fixed 72 minutes after sunset for *tzait ha-kokhavim*. The amount of illumination that defines the point of *alot ha-shaḥar* was simply assumed to be greater.²⁹⁰ When this phenomenon became more widespread would require a careful historical study. In any case, in the last few generations, it

²⁸⁹ In Prague, the shortest time to reach a depression angle of 8.5 degrees is about 48 minutes after sunset in March, and the time to reach a depression angle of 8.5 degrees grows to almost 70 minutes towards the summer. *Alot ha-shaḥar*, which is about 95 minutes before sunrise in March, is about 192 minutes in June and 107 minutes in December.

²⁹⁰ The times for *mi-she-yakir* may be reflective. The rulings of Middle Eastern *posekim* tend to equate to depression angles of 11.5 degrees and higher, while European *posekim* tend to a range between 10 and 11 degrees, as is clear from *Ha-zemanim Be-halakhah*, vol. 1, pages 211 - 215. A later point of *alot ha-shaḥar* would force a yet later point of *mi-she-yakir*. It is also highly likely that a relatively short duration (6 minutes) between *alot ha-shaḥar* and *mi-she-yakir* mentioned by the *Pri Megadim* in *O. H.* 58:1 is not the result of so early a point of *mi-she-yakir*, but a later point of *alot ha-shaḥar*. Thus, combining such a *pesak* with an accurate (adjusted) time for *alot ha-shaḥar* cannot be justified.

appears that a fixed 72-minute interval between *alot ha-shaḥar* and sunrise has become (yet) more prevalent.

In summary, three potential impacts of increased reliance on clocks have been suggested in this and preceding sections of the epilogue:

1. Reduced reliance on observation and natural skepticism concerning its accuracy,²⁹¹ particularly relative to a clock, eventually led to decreased practical knowledge of the meaning of specific physical entities,²⁹² which in turn further increased reliance on clocks.
2. A clear preference for 72 over 90 minutes as the point at which three (small) stars appear, and the related preference for 18 versus 22.5 minutes as the time needed to walk a *mil* emerged.²⁹³
3. The invariance of the interval from *alot ha-shaḥar* to sunrise resulting from its assumed equivalence to the interval from sunset to *tzait ha-kokhavim* according to the prevalent opinion of Rabbeinu Tam, created observational challenges. While the duration of the interval from sunset to *tzait ha-kokhavim* rarely exhibits a need to increase beyond 72 minutes because of either season or latitude, the point of

²⁹¹ At more northern latitudes, the lack of alignment with physical observations could also have been rationalized as the result of specific aspects of *zemanim* breaking down as one approaches the north and south poles.

²⁹² Arguably, *alot ha-shaḥar*, *mi-she-yakir* and a medium versus small star have all been impacted.

²⁹³ This second conjecture is significantly less clear than the other two. It would have occurred in a period from approximately the 15th to the first half of the 16th century when clocks became more prevalent and for which there are few sources. Validating any of these conjectures, including a sense of how the changes developed, will require a careful, historical look at responsa in the five to six centuries following the proliferation of clocks.

alot ha-shaḥar clearly does. I suspect that the assumption that the two intervals are identical weakened reliance on observation and trust in one's ability to judge levels of darkness, both further contributing to the use of clocks.

4. How are we to define the hours of the day: sunrise to sunset or *alot ha-shaḥar* to darkness?

The identification of the opinion of Magen Avraham only as far back as R. Isserlein as opposed to Ramban²⁹⁴ and his school who clearly counted the hours of the day from *alot ha-shaḥar* remains puzzling.²⁹⁵ Given that the position of Magen Avraham was held by all *ḥakhmai Sefarad* and was the accepted custom of Jerusalem, in spite of the influence of the students of the *Gaon*, coupled with a lack of any unambiguous reference to the position of R. Yaffe and the *Gaon* amongst *rishonim*, provides additional support of that alternative.²⁹⁶ The argument that time is defined by the angles of the sun is compelling,²⁹⁷ but not entirely convincing.²⁹⁸

²⁹⁴ See R. Schachter's explanation that R. Soloveitchik was completely unconcerned about the opinion of Magen Avraham because of an implication from Rambam that was viewed as a supporting source for the *Gaon*. It is puzzling that R. Soloveitchik would dismiss an opinion of all *ḥakhmai Sefarad*.

²⁹⁵ I assume that this was primarily the result of limited availability of the *seforim* of *ḥakhmai Sefarad*.

²⁹⁶ R. Kapach maintained throughout his commentary on *Mishnah Torah* that it was the opinion of Rambam as well, although this is challenging given Rambam in *Teshuvot Peair Ha-dor*, 44.

²⁹⁷ The argument that counting from well before and after sunrise and sunset is difficult to implement, and hence could not have been widely used before the availability of clocks, is similarly compelling.

²⁹⁸ However, as was illustrated, the position of Magen Avraham runs into issues calculating *pelag ha-minḥah* at approximately 50 degrees, even if accurate adjustments are applied. One could argue that according to the overall position developed in this monograph, the precise point of sunset loses some of its *halakhic* significance.

As noted in the past section, current practice, which sets times for Magen Avraham's *zeman* based on a fixed 72 or 90 minutes for both *alot ha-shaḥar* and *tzait kol ha-kokhavim*, is a divergence from *zemanim* based on observations that were practiced prior to the advent of clocks. For those who wish to maintain the times of Magen Avraham, their precise approximation / calculation would seem warranted. As hypothesized, the opinion of Rabbeinu Tam and the observance of a fixed 72 (or 90) minutes at the end of *Shabbat* might have contributed to a tradition of not adjusting 72 (or 90) minutes in this context as well.

While the use of a fixed 72-minute calculation is a troubling consequence of clocks replacing observation, the current (modern) alternative to calculate the approach of Magen Avraham is also a bit disconcerting. That method, introduced by R. Tukitzinsky in the calendar of Jerusalem at the beginning of the 20th century, and increasingly used by many Internet sites, uses a depression angle defined by *alot ha-shaḥar* and a symmetric point after sunset, the point of *tzait kol ha-kokhavim* as defined by the *Gaon*. The apparent logical necessity of utilizing *tzait kol ha-kokhavim* versus the more accepted use of *tzait ha-kokhavim*, defined by three (medium or even small) stars, which occurs much earlier, while logical and consistent with Ramban and other *ḥakhami Sefarad*, remains bothersome. Assuming the verse in Nehemiah, “*Ve-anahnu osim be-melakhah.... men-alot ha-shaḥar ad tzait ha-kokhavim,*” as normally interpreted, it is conceivable that **the daytime**

Alternatively, the thesis to be developed shortly, creating an alternative mode of calculation using three stars as the nighttime endpoint, would solve this issue until one approaches the poles where (all) the standard laws of *zemanim* break down, in any case.

period is simply asymmetric with respect to both *ḥatzot* and sunrise and sunset. Assume that it was conclusively determined that,

- *tzait ha-kokhavim* in its usual sense, was the normative endpoint to be used operationally to calculate the approach that became known as Magen Avraham, and
- *ḥatzot* must be defined precisely.

I can think of only one solution to calculate the approach of Magen Avraham; separate calculating the hours of the day into three steps:

- First, calculate (or more likely, observe) *ḥatzot*.
- Second, calculate the morning *zemanim* from *alot ha-shaḥar* until *ḥatzot*.
- Third, calculate the evening *zemanim* from *ḥatzot* until *tzait ha-kokhavim*.

While this three-step process preserves *ḥatzot*, **it creates a different length to the hours before and after *ḥatzot* – hours are slightly longer in the morning.** Might this have been the mode of calculation prior to the precision that came with the use of clocks? I suspect so. It is at least as plausible as the use of *tzait kol ha-kokhavim* that clearly has no record of actual use for many centuries prior to its use in recent times.²⁹⁹ This

²⁹⁹ As demonstrated in section 1, all *ḥakhmai Sefarad* who calculated that *pelag ha-minḥah* occurs at the time needed to walk 1/6th of a *mil* before sunset, were using *tzait kol ha-kokhavim* and not just the appearance of three stars. However, it is possible that they may have been articulating only a conceptual approach versus one that was practiced.

approach creates another methodology for defining the hours of the day, following precisely the three steps listed; it provides an alternative to the calendar of R. Tukitzinsky.^{300 301} If this mode of determining *shaot zemaniot* was in fact used prior to the advent of clocks,³⁰² one can easily speculate that it was transformed by the introduction of clocks and time-based calculations. The resulting calculation created uniform hours

³⁰⁰ To illustrate assume a day where sunrise is at 6:00AM and sunset is at 8:00PM, with *alot ha-shahar* 96 minutes before sunrise at 4:24AM and nightfall 42 minutes after sunset at 8:42PM; the day models times for Jerusalem. R. Tukitzinsky's attack was focused on the calculation of *hatzot*, calculated as the midpoint between 4:24AM and 8:42PM, at 12:33PM, 27 minutes earlier than the actual time of *hatzot* at 1:00PM. The latest time for reciting *kriat shema* was at 8:28:30AM. The approach that uses a corresponding point to *alot ha-shahar* at 9:36PM in the evening, delays the latest point for reciting *kriat shema* by 13.5 minutes to 8:42AM, correctly calculates *hatzot* at 1:00PM and establishes *pelag ha-minhah* at 7:48:30PM. The alternative calculation, using asymmetric endpoints, produces the same latest time for reciting *kriat shema* at 8:42AM and *hatzot* at 1:00PM with the same length hour of 86 minutes used only for morning *zemanim*. The morning *zemanim* until *hatzot* are identical; the afternoon hour is slightly shorter (by 54 / 6 or 9 minutes) at 77 minutes. *Pelag ha-minhah* would be 96 minutes and 15 seconds before 8:42PM at 7:05:45PM. What should be observed is that none of the alternative times for *alot ha-shahar* will impact the time of *pelag ha-minhah* a surprising result that some will find troubling and others rather appealing. For completeness note that the fixed 72-minute calculation, calculates *hatzot* correctly, establishes an end time for reciting *kriat shema* at 8:54AM, and *pelag ha-minhah* is at 7:29:30PM; a fixed 90-minute calculation also calculates *hatzot* correctly, establishes an end time for reciting *kriat shema* at 8:45AM, and *pelag ha-minhah* is at 7:43:45PM.

³⁰¹ This approach is further complicated by the need to specify the precise time that three medium stars appear, as opposed to the time that three small stars appear that traditionally indicate the end of *Shabbat*.

³⁰² This method also addresses completely the major questions raised by R. Pimental in the seventh and eighth chapter of the second *maamar* of *Minhat Kohen* against counting from *alot ha-shahar* versus sunrise. This topic is beyond the scope of this monograph, and is covered in a separate monograph on *Shaot Ha-yom*.

throughout the day but an inaccurate point of *ḥatzot*, a calculation that had adherents in Europe and was successfully opposed by R. Tukitzinsky.^{303 304}

5. Of the three criteria given by the *gemara* in *Shabbat* – time, the appearance of stars and darkness (darkening / appearance of the sky / horizon), which if any are the definition of night and which are just approximations or an indication? How can opinions expressed using these three terms be compared?

I maintain a clear bias towards levels of darkness and light defining both the end and the beginning of the *bein ha-shemashot* period, as well as almost all other *zemanim*. What is not yet fully recognized is that relying on depression angles for defining the level of darkness is akin to relying on clocks to tell time.³⁰⁵ More importantly, depression angles naturally incorporate adjustments based on season and latitude, something that clocks more than likely obscured. A clock is just an artifact; depression angles are a mechanism for accurately specifying the *halakhic* notion of darkness.

³⁰³ This alternative also eliminates the most obvious use of *tzait kol ha-kokhavim*; were it substantiated, one might consider the hypothetical examples of section 9 even less plausible.

³⁰⁴ The practice in Jerusalem instituted by R. Tukitzinsky faces challenges, particularly in setting the afternoon *zemanim* when coupled with a 90-minute interval. As indicated earlier in the summary to section 2, in the winter where the day is only ten hours long, *pelag ha-minḥah* occurs approximately 83 minutes before *tzait kol ha-kokhavim* or about 13 minutes after sunset. Using 72 minutes, adjusted or otherwise, or the method suggested avoids such an occurrence.

³⁰⁵ I have seen calendars that while using depression angles choose to write three small or medium stars, presumably to make people more comfortable, avoiding marketing challenges and the need to explain or justify their use.

While both the appearances of stars and multiple levels of darkness vary naturally with seasons and latitude, clocks likely had impact with their introduction. As time became an easier and preferred method for specifying observance, it is likely that darkness levels and the appearance of stars became less often observed, less well understood and, thus, of reduced relevance.

Motivated by the desire to understand the observations and findings of R. Tukitzinsky directly, I have carefully observed the appearance of stars and the darkening of the horizon at various latitudes and during different seasons of the year. As best as I can observe, the point at which the apex of the sky appears as dark as the eastern horizon slightly precedes the appearance of three or more stars. However, it is not yet as dark as the eastern half of the sky will become if one waits longer; the (eastern half of the) sky darkens further until sometime after a point in the evening comparable to the point in the morning of *mi-she-yakir*. Even at that point, there is still some remaining illumination from the sun visible on the western horizon. Though this level of darkness that occurs around the appearance of three stars is, likely, what is described in the *gemara* and has been the *pesak* of generations of *posekim* for the end of *Shabbat*, it may still leave one feeling uncertain about the time at which *Shabbat* ends. Unlike *alot ha-shahar* where there is minimal (or no light) light, the end of *Shabbat* occurs when there is significantly more illumination. Furthermore, without the use of depression angles, many might feel that the point of *hashekhah* is difficult to specify with precision relative to three (small, adjacent) stars, perhaps influencing many to consider stars as defining.

If one insists that the appearance of three stars and *alot ha-shaḥar* are equidistant from sunrise and sunset, that also makes it nearly impossible to regard darkness as defining; one would expect it to be equally dark at those two points, and it most certainly is not. We end *Shabbat* when there is significantly more illumination than at *alot ha-shaḥar*. As a result, many preferred instead to think of both

- stars as defining, and
- clocks as more reliable and precise than observation.³⁰⁶

6. How is the duration of the *bein ha-shemashot* period to be adjusted at distinct locations and during different seasons (if at all)? Might this depend on whether the period of *bein ha-shemashot* is

- 1) an interval of uncertainty that is its own unique halakhic category, either**
 - a) a combination of both day and night, or perhaps**
 - b) a category of its own, or**
- 2) an interval with a definitive transition point that we are uncertain how to pinpoint, either**
 - a) practically or perhaps**
 - b) because of some element of *halakhic* uncertainty, or**

³⁰⁶ Clocks and related time-based definitions suffer from their uniformity across latitude and season. However, stars are more subject to variability based on

- the knowledge and acuity of the observer,
- arguments about what constitutes a small, medium or large star and
- the use of telescopes or other artificial means to improve observation.

On the other hand, if one has a clear definition of *hiḥsif ha-elyon ve-hishveh le-taḥton*, as indicated previously, I believe it would be less subjective (and subject to the effects of increased illumination.)

3) an example of the Rabbis establishing a *fence*?

In this and the following two sections, the approach of the *geonim* is assumed and options for the length, end and beginning of the *bein ha-shemashot* period are discussed within their framework. It is easiest to begin with the length of the *bein ha-shemashot* period. This turns out to be a critical method to estimate the beginning of the *bein ha-shemashot* period given the assumption that the end of the *bein ha-shemashot* period is not in question. The interval of *bein ha-shemashot* can be specified either as

- the interval between two precisely defined physical events / depression angles, or
- an interval of time prior to the end of the day.

Despite the potential dependence of these alternate specifications on the theoretical alternatives for defining the period of *bein ha-shemashot*, I have argued that the issues are independent. The discussion that follows concentrates only on these two alternatives; other specifications are either variations or combinations.

One issue briefly outlined is the difference between *safek ḥashekhah* and *bein ha-shemashot*. I assume that the period of *safek ḥashekhah* is shorter than the period of *bein ha-shemashot* and represents a period of real doubt about whether *ḥashekhah* and the beginning of *Shabbat* at a biblical level

has occurred.³⁰⁷ Similarly *safek ḥashekhah* creates an equivalent period of doubt regarding the end of *Shabbat* as well. The period of *bein ha-shemashot* represents a longer interval, where *Shabbat* is mandated, but only at a rabbinical level, and is discussed primarily relative to the beginning of *Shabbat*.³⁰⁸

The following discussion is not meant to identify a normative position, rather one that presents a highly plausible, if not preferred, reading of the *gemara* that also (partially) justifies the practice of Jewish communities in Europe that started *Shabbat* well after sunset. Seeking to justify practice even at a rabbinical level requires a relatively brief period of *bein ha-shemashot*. Using either sunset or even a minimal depression angle would

³⁰⁷ The remainder of this section could be rewritten independent of this assumed relationship between the periods of *bein ha-shemashot* and *safek ḥashekhah* if one were to feel that this assumption is not justified.

³⁰⁸ A related topic is the practical as well as conceptual relationship between sunset, the beginning of the period of *bein ha-shemashot*, the beginning of the period of *safek ḥashekhah* and *ḥashekhah*. According to Rabbeinu Tam, both sunset and *ḥashekhah* are distinct from the other two *zemanim*. However, while both the beginning of the period of *bein ha-shemashot* and the beginning of the period of *safek ḥashekhah* are conceptually distinct, for those following Rabbeinu Tam, the two are likely to have been practically treated as coincident for a few reasons. First, neither *zeman* has a clear astronomical definition. Second, the interval of *bein ha-shemashot* is relatively short and practicing two separate *zemanim* in that interval would be difficult. According to the *geonim*, the situation is more complex. If the period of *bein ha-shemashot* is assumed to begin after sunset according to any of the options that were developed, then it being coincident with the period of *safek ḥashekhah*, at least practically, remains reasonable. However, if *bein ha-shemashot* is assumed to begin precisely at sunset, it is difficult to imagine that sunset can be viewed as the beginning of the period of *safek ḥashekhah*. Investigation of how practice may have developed, and other practical alternatives are not pursued further. I suspect that given the dominance of the opinion of Rabbeinu Tam, even as practice for beginning the period of *bein ha-shemashot* moved to sunset, the assumed coincidence of the beginning of the period of *bein ha-shemashot* and the period of *safek ḥashekhah* may have remained.

mean that most communities who followed *Rabbeinu Tam* started *Shabbat* during the period of *bein ha-shemashot* or worse.

As an illustrative example, assume that a community ends *Shabbat* 50 minutes after sunset with the appearance of three small stars. Assume further that while three small stars equate to a depression angle of approximately 8 degrees, three medium stars, the *gemara*'s end to both the *bein ha-shemashot* period and *Shabbat*, equates to a depression angle of approximately 6 degrees, and occurs 35 minutes after sunset. The period of *bein ha-shemashot* begins approximately 15 minutes before that, at 20 minutes after sunset. To justify practice, two elements must be considered:

- At the biblical level, our focus is on the point of *hashekhah*, slightly prior to the appearance of three medium stars.
- At a rabbinical level, our focus is on the interval from the beginning of the period of *bein ha-shemashot* until *hashekhah*.

As listed in item 8 above, three alternative opinions, each to be adjusted by latitude and season, advance the beginning of *bein ha-shemashot* by 4 to 15 minutes from sunset. At a minimum, one would naturally maintain that a level of darkness calculated for each of those alternatives must be achieved (to create an element of doubt that is required) to begin the period of *bein ha-shemashot*. Furthermore, one can maintain that the time needed to walk $\frac{3}{4}$ *mil* is an absolute upper bound, invariant with respect to latitude and season. Thus, the period of *bein ha-shemashot* cannot begin prior to the

time needed to walk $\frac{3}{4}$ *mil* before the point of nightfall. To be as lenient as possible,³⁰⁹ one would

- subtract from the point of *ḥashekhah* the time needed to walk $\frac{3}{4}$ of a *mil*, and
- note the time at which a requisite level of darkness is reached,

and then use whichever point is later. Thus, the period of *bein ha-shemashot* begins at the earliest when a specific level of darkness is reached, (for example, a depression angle of three degrees) but the length of the entire length of the *bein ha-shemashot* interval cannot be longer than the time needed to walk $\frac{3}{4}$ *mil*. Using the minimum level of darkness is required around the latitude of the Middle East and further south approaching the equator. In those locations during certain periods of the year, subtracting the time needed to walk $\frac{3}{4}$ of a *mil* from *ḥashekhah* might yield time X.

However, the time at which a specific level of darkness, which must also occur prior to the start of the period of *bein ha-shemashot*, is Y minutes later, at time X+Y. For example, if the time needed to walk $\frac{3}{4}$ *mil* is the maximum length of *bein ha-shemashot* attained only in the summer, in the spring and fall, the *bein ha-shemashot* period may begin only 12, not 13.5, minutes before *ḥashekhah*, when the requisite level of darkness is achieved.

Moving from the Middle East to European latitudes, the focus of this discussion, reaching a defined level of darkness always occurs at an earlier point than subtracting the time needed to walk $\frac{3}{4}$ *mil* from the point of

³⁰⁹I would argue consistent with the *gemara* in *Shabbat*, as well.

ḥashekhah. Thus, one obtains the latest (and most lenient) starting point for the *bein ha-shemashot* period by subtracting the time needed to walk $\frac{3}{4}$ *mil* from the point of *ḥashekhah*, assuming that interval represents an invariant maximum for the period of *bein ha-shemashot*. Support for an invariant interval of *bein ha-shemashot* came from both R. Lorberbaum and R. Sofer, and in the case of R. Lorberbaum that was coupled with an 18-minute time needed to walk a *mil*, yielding a period of *bein ha-shemashot* of 13.5 minutes.³¹⁰ Problematically, in both of those cases the beginning of the period of *bein ha-shemashot* was derived subtracting from an end of *Shabbat* that was determined by the appearance of three small stars. Although their practice was not as stringent as our current practice, which equates to a level of darkness associated with a depression angle of 8.5 degrees, it was still somewhat greater than the level of darkness associated with a depression angle equating to three medium stars. An approach that subtracts from the time that three small stars appear, as opposed to an approach that subtracts from the earlier appearance of three medium stars, creates an unintended leniency that appears impossible to justify.³¹¹

To determine what was the practiced beginning of the period of *bein ha-shemashot* requires a detailed historical analysis beyond that begun by R. Benish.³¹² It should be obvious that an early practiced point of *ḥashekhah*

³¹⁰ While, some might argue that all those maintaining this fixed interval for the period of *bein ha-shemashot* follow Rabbeinu Tam, I see no reason for that dependence. The derivation of the time needed to walk $\frac{3}{4}$ *mil* as a maximum follows from the text of the *gemara* and applies to the approach developed by the *geonim* as well.

³¹¹ R. Feinstein, as outlined below, ruled similarly. This is particularly challenging in more northern locations, as for example in Prague, where three small stars appear approximately 25 minutes later than three medium stars in the summer.

³¹² *Ha-zemanim Be-halakhah* records the practices of many communities in chapter 46.

together with a lengthy period of *bein ha-shemashot* is likely to avoid both biblical and rabbinic violation on *erev Shabbat*, while a later practiced point of *ḥashekhah* and a short interval of *bein ha-shemashot* would create the highest likelihood of even a biblical violation on *erev Shabbat*. The two other possibilities, a longer *bein ha-shemashot* period prior to a later point of *ḥashekhah* or an early point of *ḥashekhah* preceded by a shorter *bein ha-shemashot* period, make a biblical violation less likely, but may involve a rabbinic violation. To the extent that the theoretical opinion of the Rabbeinu Tam was used, *ḥillul Shabbat* occurred. However, more commonly, the opinion of Rabbeinu Tam was equated to three stars with various stringencies, and the period of *bein ha-shemashot* began at some point before that. That would make it very likely that violations which occurred were only rabbinic. Given a large body of evidence including

- R. Pimental's redefinition of Rabbeinu Tam to the earlier point of three small stars,
- the proposed times for the period of *bein ha-shemashot* of both R. Lorberbaum and R. Adler,
- the question concerning the *brit* of a baby born about 25 minutes after sunset, posed to R. Sofer,
- the advice from R. Shneur Zalman of Liadi in his *siddur*³¹³ and
- the natural cautiousness that one would expect prior to the existence of clocks,

³¹³ R. Shneur Zalman of Liadi suggested that maximal protest be restricted to those who go past approximately 30 minutes, if they refuse to listen initially.

I doubt that **any** communities (as opposed to individuals) ever started *Shabbat* as late as the theory of Rabbeinu Tam would have permitted.

While I have scant evidence, one can only assume that **any** (two or) three stars appearing would likely be taken as indicating that *Shabbat* had begun. All of this, together with the *halakhic* literature only partially referenced above,³¹⁴ would seem to point to a beginning to the period of *bein ha-shemashot*, absent *tosefet Shabbat*, at worst between 30 and 40 minutes after sunset. In northern European communities, beginning *Shabbat* around that time likely avoided *hillul Shabbat* at least at the biblical level. Unfortunately, it is also probable that some individuals started *Shabbat* even later; the letter of R. Shneur Zalman of Liadi on the beginning of *Shabbat* is particularly telling.

While knowledge of the impact of latitude remains poorly understood even to this very day, the growth of accurate time measurement was likely responsible for greater tendency for a later beginning for *Shabbat*. It is not surprising that concomitantly rabbinic opposition to Rabbeinu Tam grew as well. I believe a careful historical study will show that beginning as early as the end of the 17th century, in some (isolated) communities arguments for a return to the much earlier practice of the *geonim* had begun.

7. When does the period of *bein ha-shemashot* end? How are the criteria specifying the end of the *bein ha-shemashot* period interpreted by various authorities?

³¹⁴ See the many calendars as well cited in *Ha-zemanim Be-halakhah*.

Of course, we assume adjustments for latitude and season. We need to specify two quantities:

1. the degree of darkness associated with the approximate appearance of three medium stars (the time given in the *gemara*), and
2. the degree of darkness associated with the approximate appearance of three small, adjacent stars (what has become universally accepted practice).

The former occurs at a depression angle of approximately 6 degrees, and the latter at about 8 degrees. Practice included many variants around those two points. Currently, a depression angle of 8.5 degrees suggested by R. Tukitzinsky, supported by R. Belsky's interpretation³¹⁵ of R. Feinstein's 50-minute *pesak*, is widely used.

Some will find the intensity with which the opinion of Rabbeinu Tam was found inconsistent with the *gemara's* description of the end of *Shabbat* excessive. Many might perhaps prefer giving greater credence to difficult and forced efforts at reconciliation.³¹⁶ However, current practice, including

³¹⁵ See the letter of approbation listed on the website www.myzmanim.com.

³¹⁶ As we noted in the introduction, both the *gemara's* description of the end of *Shabbat* and its equivalence to *alot ha-shahar* present insurmountable challenges to the opinion of Rabbeinu Tam. Attempts like that of R. Soloveitchik address the latter, while that of R. Pimental and the many *posekim* who followed a similar approach address the former. Attempts to address both issues invariably end up claiming that Rabbeinu Tam's opinion and that of the *geonim* was similar; this argument has been made several times in the last century. The first such attempt by R. Shapiro in *Shut Benei Tziyyon* and those that followed do not address the opinion of Rabbeinu Tam as he was understood. I do not believe these approaches are sustainable either factually or

that of R. Karelitz and others, which disregards Rabbeinu Tam's opinion on the end of *Shabbat*, even for absolute biblical restrictions, is consistent with the conclusions reached. I do not know of another comparable instance where the uncontested opinion of the *Shulhan Arukh* was overturned so completely.

8. How does the beginning of the *bein ha-shemashot* period relate to what we call sunset? What alternatives might be considered for the beginning of the *bein ha-shemashot* period?

This most controversial topic was summarized in the list of innovations above. As stated in the preamble to this monograph, **sunset is the established time to start *Shabbat***. However, based on multiple expressions in the *gemara*, some more quantitative than others, a beginning to the period of *bein ha-shemashot*

- between the earliest appearance of the first and second medium star,
- shortly before the end of *penai mizrah maadimin* and
- *a time to walk 3/4 of a mil* subtracted from the (latest) point of *hashekhah*,

conceptually; in any case, since they do not address the opinion of Rabbeinu Tam as it has been interpreted for generations, they are not addressed further.

can be estimated. Taken as a whole, these different expressions suggest a point between 7 and 12 minutes after sunset, in the Middle East around the fall and spring equinox.

Where there is a need for greater precision in various circumstances, a *posek* might consider a construct like that postulated by R. Adler, specifying two points on Friday afternoon. Until the earlier point even biblical prohibitions may be violated, while only rabbinic prohibitions are allowed after that point until some number of minutes later. Thus, a *posek* can choose to adjust by season and latitude the equivalent of two points, given for the Middle East around the spring and fall equinox, the earlier point between 7 to 9 minutes after sunset and the later point between 10 to 12 minutes³¹⁷ after sunset. The point chosen in a specific circumstance would provide greater stringency with respect to a biblical obligation and greater leniency with respect to a rabbinic obligation.³¹⁸ In cases of (extreme) need at locations much further from the equator than the Middle, one might also consider limiting the length of the *bein ha-shemashot* period to **at most** 13.5 minutes prior to the appearance of three medium stars, a depression angle of approximately 6 degrees. In yet more extreme need, one could allow prohibited activities

³¹⁷ For a host of reasons, if forced to a single number, I would choose 11 minutes after sunset. Approximately (8 or) 9 minutes after sunset probably has broadest support. The numbers chosen are based on personal conjecture and observation.

³¹⁸ Practically speaking this would be implemented by selecting a depression angle that designates the level of darkness in the Middle East at those times around the spring or fall equinox and then using that depression angle uniformly at other latitudes and during different seasons.

until the beginning of the period of *safek ḥashekhah*. This area has significant *halakhic* ramifications.³¹⁹

Rabbeinu Tam's late start to *Shabbat* is yet more difficult to imagine if, prior to its formulation, the start of *Shabbat* was precisely at or before sunset. I find it highly implausible to imagine Rabbeinu Tam proposing, even as a purely conceptual position, a notion so fundamentally at variance with practice! Even if the practice had been to start *Shabbat* at or before sunset, it would make more sense that the period was only considered a non-mandated interval of *tosefet Shabbat*. Emergencies that occurred would have clarified the nature of practice. This would lend support to my conclusion: sunset was viewed at most as a non-obligatory start to (*tosefet*) *Shabbat*. As Jews migrated to Northern Europe, the start of *Shabbat* started to separate further from sunset. Most likely, the start of *Shabbat* remained at least 15 minutes prior to the appearance of three medium stars. It is for such a practice that Rabbeinu Tam provided a conceptual framework. Increased reliance on clocks centuries later may have resulted in even a (slightly) later start to *Shabbat* for two reasons. First, the opinion of Rabbeinu Tam could be formulated more precisely. Second, a clock had the unfortunate effect of reducing any period of uncertainty that observation would naturally introduce.

³¹⁹ Even if one were to insist on the period of *bein ha-shemashot* beginning precisely at sunset, the later of the above *zmanim* might at the very least be considered as rather strict alternatives for defining the start of *safek ḥashekhah*.

9. How do the two meanings of day – day as in “day of the week” and day as in “during the daytime” relate? Must the end of the daytime period coincide with the end of a day of the week?

It would be surprising if the different meanings of the term day in both Hebrew and English had no *halakhic* consequence. On the other hand, one might view aspects of this distinction as a modern innovation due to *Brisker* conceptualization and entirely tenuous given that the *Gaon* did not attach any *halakhic* significance to *tzait kol ha-kokhavim*.³²⁰ Despite insurmountable challenges to Rabbeinu Tam’s position, the fact that, unlike the position of the *geonim*, both meanings of the term day terminate at the same time, (at *tzait kol ha-kokhavim*) remains a particularly appealing feature of Rabbeinu Tam’s position. Whether both meanings of the term day terminate at the same time according to the *geonim* as well, is unclear, but in my mind, unlikely.

A concluding example:

The migration of Jews from the Middle East to other locations required adjustment in practice that often necessitated creating concrete concepts in areas that might have otherwise been left unexplored. That process contributed to a wealth of material with which many *posekim* have had to grapple. Both the categorization and the unfamiliar approaches that have

³²⁰ I suspect that prior to the widespread existence of clocks, multiple different events were used to indicate various *halakhic* times. Over time, fewer *zmanim* emerged with the necessary stringencies applied to those that became normative.

been proposed should make this vast *halakhic* literature more understandable.

As I mentioned in the preamble, criticism within the rabbinic literature has been muted,³²¹ and potential inaccuracies have often not been identified and discussed adequately. As a result, it is impossible (perhaps even for great *posekim* who are unacquainted with astronomy or the impacts of season and / or latitude) to read the literature without intense effort. The writings of a *posek* like R. Weiss, who lived in the United Kingdom and Israel, are of significant relevance and importance, and demonstrate his relentless effort to align sources with observation.

Let me illustrate using the most widely followed *posek* of our times and conclude with a few words that I hope will be taken as they are meant. I choose R. Feinstein because I assume most will conclude that if his responsa illustrate my concerns, I could have chosen the writings of various other major *posekim* as well, exhibiting either similar or other issues.

Consider five decisions of R. Feinstein:

1. In the New York area, *Shabbat* ends 50 minutes after sunset even in accordance with Rabbeinu Tam.
2. One may recite the morning prayers as early as 90 minutes before sunrise under exceptional circumstances.

³²¹ There are a few notable and important exceptions. While I have identified almost all the errors found in the literature, I have refrained from identifying all of the instances where they occur,

3. One performs a *brit* the following week on Wednesday, for example, for a baby born late Wednesday afternoon, until 9 minutes after sunset.
4. In the New York area, specific activities forbidden on *Shabbat* only at a rabbinic level are permissible under extraordinary circumstances until (30 to) 40 minutes after sunset on Friday.
5. Unlike other *zemanim*, *ḥatzot* is always at the same time (that varies by location) and does not vary throughout the year.

Summarizing issues discussed previously, the arguments in these *teshuvot* can be challenged in six³²² different areas:

1. Like R. Pimental's approach to Holland, R. Feinstein's derivation of 50 minutes for New York, reasons by analogy from the appearance of stars, using Lithuania as his base for 72 minutes. Were R. Feinstein to have used Israel / Babylonia, certainly a more logical choice,³²³ he would undoubtedly have reached a radically different conclusion. R. Willig expresses a similar point, albeit less directly.³²⁴ Generally, this *pesak* is quoted without hesitation or comment.³²⁵

³²² R. Feinstein's mention of the time needed to walk 4 *milin* as 96 minutes, while given no practical consequence, is also problematic. R. Feinstein's view of *mi-she-yakir* and a few of his passing comments may shed light on part of his unstated reasoning; this highly speculative area is not addressed.

³²³ However, Israel is a location where he had no mimetic tradition.

³²⁴ This issue was raised directly (and respectfully) in a recent *sefer* by R. Heber, *Shaarei Zemanim*, page 90.

³²⁵ Perhaps new meaning for the term *ḥasid shoteh* can be ascribed to the publishers of a sheet that I picked up at the *Kotel*, which presents R. Feinstein's 50-minute *zeman* for New York for use in Jerusalem.

2. As R. Feinstein is following the conceptual approach of Rabbeinu Tam, then the end of *Shabbat* and the time for *alot ha-shaḥar* ought to be symmetric, both separated by the same number of minutes from sunset and sunrise, respectively. Instead, R. Feinstein:
- Relies on a 22.5 versus 18-minute time needed to walk a *mil* for *alot ha-shaḥar* but never even suggests a 22.5-minute based stringency for *Shabbat*.
 - Adjusts only the end of *Shabbat* but not *alot ha-shaḥar* based on latitude.³²⁶
 - Never addresses the relationship between his rulings, which, according to the opinion of Rabbeinu Tam whom he is following, are conceptually linked.
3. Adjusting *zemanim* based on latitude to correlate to physical occurrences, like the appearance of stars or the degree of light, is strongly supported. However, adjusting by location the length of time to walk a *mil* that is not in any way linked to latitude,³²⁷ has no logical basis and leads to conclusions that are in fundamental conflict with observation.³²⁸

³²⁶ R. Feinstein mentioned briefly the possibility of adjustments based on latitude for setting the time of *alot ha-shaḥar* but chose not to use them.

³²⁷ In *Igrot Moshe O. H.* 4:62, R. Feinstein suggests (50 / 4 =) 12.5 minutes for the length of time needed to walk a *mil* in the New York area.

³²⁸ While there exists imprecise language in the literature that speaks in terms of such adjustments maintaining certain ratios, using it as a basis for a *pesak* that reduces / equates 13.5 minutes to 9.375 minutes is inexplicable. As noted, this is logically equivalent to asserting that a watch that measures 72 minutes in Lithuania, only measures 50 minutes in New York.

4. Deriving the beginning of the *bein ha-shemashot* period by subtracting from the time that *Shabbat* ends is common in *pesak* and rooted in the text of the *gemara*. However, it requires that the end of *Shabbat* be established accurately. The time that R. Feinstein uses for the end of *Shabbat* is his (and R. Tukitzinsky's) calculation, which is among the most stringent methods for calculating what is already a stringency based on three small stars and not the point that the *gemara* uses, three medium stars. This is further impacted by R. Feinstein's use of a "truncated / adjusted" time needed to walk $\frac{3}{4}$ *mil* of 9.375 minutes (as opposed to 13.5 minutes) for the New York area, resulting in a significant leniency. To be concrete, as opposed to the 40 minutes (50 minutes and subtracting 9.375 minutes for the *bein ha-shemashot* interval) after sunset that R. Feinstein derives, three medium stars are visible approximately 27 to 32 minutes after sunset. *Safek hashekhah* and certainly the period of *bein ha-shemashot* precedes that point by some number of minutes. Of course, R. Feinstein, operating within the framework of Rabbeinu Tam, may not consider 50 minutes as a stringency.
5. *Hatzot* varies slightly day to day (given the tilt of the earth in its orbit) according to all the methods for calculating the hours of the day. The variation is approximately 20 minutes in the New York area.
6. At a very exacting level, R. Feinstein calculates adjustments based on latitude without regard for the non-linear relationship that exists between the duration of different sub-intervals of *bein ha-shemashot*.³²⁹

³²⁹ This issue becomes more consequential at latitudes further from the equator. In a society that provides times for *vasikin* using fractions of seconds, perhaps there is a need

In all but the third item above, R. Feinstein had an extensive literature from which to derive support. As was noted, R. Soloveitchik carefully recast the opinion of Rabbeinu Tam to avoid these and other issues. However, he maintained a conceptually elegant approach to Rabbeinu Tam as well as a personal stringency, which is unheard of in the *halakhic* literature, widely divergent from practice and, nonetheless, does not address the observational challenges to Rabbeinu Tam from the *gemara* in *Shabbat*. However, given that this is an area with a long tradition of practice, great *posekim*, of whom R. Feinstein is a unique example, exhibit an impeccable sense³³⁰ that guides them in how to decide. I remain struck by the accuracy of R. Feinstein's major decisions, independent of their problematic rationale. Let us re-examine the five decisions and how they might be alternatively justified:

1. *Shabbat* ends 50 minutes after sunset in the New York area. Despite this not being the conceptual opinion of Rabbeinu Tam, as R. Feinstein assumes, it is precisely³³¹ the opinion of the *geonim* as calculated by R. Tukitzinsky, the first major contemporary figure to write extensively on this topic combining knowledge of both *halakhah* and astronomy.

for such precision. Specifically, because of the non-linearity, the beginning of the twilight period exhibits less variance based on latitude or season than the twilight period's end.

³³⁰ In addition to or perhaps because of *siyattah di-Shemayah*.

³³¹ R. Belsky's (re)interpretation of R. Feinstein makes this correspondence precise. See his letter of approbation for www.myzmanim.com available on the website and the website's detailed explanation of their use of depression angles in computing the position of R. Feinstein.

2. One may recite the morning prayers as early as 90 minutes before sunrise in exceptional circumstances. A latitudinal and seasonal adjustment of 90 minutes provides a basis for yet greater leniency. Beyond reliance on a time needed to walk a *mil* of 22.5 minutes, 90 minutes in New York is close to both the scientific point of first light (approximately 90 to 120 minutes before sunrise), and, more importantly, a latitudinal and seasonal adjustment applied to 72 minutes (approximately 80 to 110 minutes). The fact that R. Feinstein was willing to rule so differently on the end of *Shabbat* and *alot ha-shahar* aligns completely with practice,³³² albeit in conflict³³³ with the conceptual viewpoint of Rabbeinu Tam.
3. One performs a *brit* the following week, for example, on Wednesday for a baby born late Wednesday afternoon, until 9 minutes after sunset. Clearly, this *pesak* is in perfect alignment with the analysis developed in this monograph and like the tradition of Jerusalem over the generations that assumed that a baby born a few minutes after sunset has his *brit* on the same day the following week.³³⁴ Even rejecting Rabbeinu Tam's late end of *Shabbat* based on the overwhelming arguments of the *Gaon* and others, a start to a day a

³³² Maintaining a briefer interval between sunset and the end of *Shabbat* than between *alot ha-shahar* and sunrise is strongly supported by many who follow the approach of either the *geonim* or R. Pimental, including the custom of Jerusalem where *alot ha-shahar* begins the daytime period 90 (adjusted) minutes before sunrise while *Shabbat* is concluded at most 42 minutes after sunset.

³³³ Often implicit and perhaps unrecognized, this was exhibited concretely in calendars where, as discussed, the calculation of Magen Avraham was flawed.

³³⁴ See *Minhagei Eretz Yisrael* by R. Gliss, pages 102 and 282, who mentions 4 to 5 minutes and *Zemanim Ke-hilkhatam* by R. Boorstyn, chapter 2, section 1, footnote 7, who claims that R. Shmuel Salant would rule that a baby born after sunset but before the call of the *mugrab*, seven to ten minutes after sunset, has his *brit* on the same day the following week.

few minutes after sunset is supported by generations of practice. Currently, R. Feinstein's slightly delayed beginning to the period of *bein ha-shemashot* is often rejected.

4. In the New York area, specific activities forbidden on *Shabbat* only at a rabbinic level are permissible under extraordinary circumstances until (30 to) 40 minutes after sunset on Friday. Perhaps the most challenging, given the undisputed assumption that the *gemara* meant the beginning of the *bein ha-shemashot* period to extend back from three medium stars (a depression angle of about 6 degrees) versus R. Feinstein's roughly 8.5 degrees, and R. Feinstein's use of a "truncated / adjusted" 9.375 minutes as the time needed to walk $\frac{3}{4}$ *mil*. Nonetheless, being exceedingly liberal with respect to a rabbinic prohibition, especially in the face of need, has a long tradition. Unfortunately, in the New York area, in most, if not all seasons of the year, 40 minutes after sunset is well past the point of *hashekhah*. Even 30 minutes is likely past the point of *hashekhah* in the New York area during part of the spring and fall.
5. *Hatzot* is always at the same time. Like R. Feinstein's 50 minutes for the end of *Shabbat*, there is a need for seasonal adjustment. Like several rabbis who oppose this type of complexity in *pesak*, though differently motivated, R. Feinstein's tradition was to use a single time.³³⁵

³³⁵ I wonder if the earlier practice that I hypothesized, where *hatzot* was simply observed and hours were reckoned from that point, may have had a role implying a non-calculated approach.

On the first three rulings, R. Feinstein's *pesak* can be easily justified on other grounds.³³⁶ The latter two are somewhat less critical and more problematic. However, it is often dangerous for Rabbis to apply or extend elements of R. Feinstein's logic to other areas where *zemanim* are critical without his innate sense of how to *pasken*.³³⁷

Final Comments:

The intent of this monograph is to address seminal issues relevant to the period of *bein ha-shemashot* without covering in depth many important sub-topics. Hopefully, the approach and observations will make this vast literature easier to study. While I did not want to address explicitly either philosophic issues or practical issues of *pesak*, I suspect that my idiosyncratic opinions on both are clear. I was strongly motivated to defend *minhag Yisroel*, a mimetic tradition that for many centuries, up until the Second World War, relied on the opinion of Rabbeinu Tam in many parts of Europe.

As I studied this topic, I was repeatedly revisiting three issues:

- If in ancient times, sunset, a very easily identified occurrence, was considered the precise starting time for *Shabbat*, how could it have

³³⁶ These first three opinions have broader support beyond the authorities briefly quoted, as I have repeatedly demonstrated throughout this monograph.

³³⁷ There are several examples in the recent *halakhic* literature where either 40 minutes is applied as a basis for a leniency, or one (unknowingly) subtracts from a point of *hashekhah* incorporating various stringencies (and hence creating an unintended leniency) where use of the earliest point of *hashekhah* would clearly be appropriate.

- ever been forgotten and / or abandoned? If *Shabbat* started sometime after sunset, then the position of Rabbeinu Tam and an overwhelming number of *rishonim* is more plausible. As Jews migrated northward, the required beginning to *Shabbat* separated even further from sunset, particularly if the period of *bein ha-shemashot* was thought to have an unchanging maximum length - the time needed to walk $\frac{3}{4}$ of a *mil*.³³⁸
- If observation challenged only Rabbeinu Tam's opinion of the time for the period of *bein ha-shemashot* while leaving use of sunset proper as the beginning of the period of *bein ha-shemashot* free of any issues, why did major figures living in southern Europe and even the Middle East, including Ramban and R. Yosef Caro, adhere to Rabbeinu Tam's opinion?
 - How could generations of practice that relied on various alternatives based on the opinion of Rabbeinu Tam be so easily and completely discounted? In my mind, the modern predisposition to treat sunset proper as the beginning of the *bein ha-shemashot* period, rejecting, for example, even R. Feinstein's limited reliance on (elements of) the approach of Rabbeinu Tam is unwarranted.

I hope that what I have written, at least partially, addresses these questions.

The approach developed posits that the period of *bein ha-shemashot* begins after sunset, later than many assume, while its end is somewhat earlier than

³³⁸ Whether Jews in various locales voluntarily started *Shabbat* earlier during various periods of history is not our focus. It is also hardly surprising that the practiced interval of *bein ha-shemashot* has lengthened (slightly) over the generations.

current practice.³³⁹ While some will contend that the criticism, suggested innovations and conclusions do not exhibit sufficient deference to generations of *pesak*, I hope that this monograph demonstrates a commitment to integrity, clarity, simplicity, consistency with basic astronomic observations, faithfulness to basic texts and *halakhic* insights and respect for generations of practice.

In summary, a fulsome defense for a later start to *Shabbat* is anchored on three points:

1. *Mi-she-tishkeh ha-ḥamah* refers to a point after sunset.
2. The time needed to walk $\frac{3}{4}$ of a *mil* is the maximum length of the period of *bein ha-shemashot* in the Middle East, not the minimum.
3. When applying the *gemara*'s maximum interval of *bein ha-shemashot* to other locations, its length need not be extended.

³³⁹ R. Y. C. Sonnenfeld's *teshuvah* 33 (an approbation to a *sefer* on *zemanim*) on this topic is remarkably supportive. While speculating that we may have to wait for Elijah to defend the fundamental difficulties with Rabbeinu Tam's end to the period of *bein ha-shemashot* and *Shabbat*, he raises issues with the approach of the *Gaon* as to the beginning of the period of *bein ha-shemashot* from *sugyot* that imply that the day extends past sunset. While suggesting that we follow both *humrot* and stating a personal preference not to attempt to decide on a matter so long in dispute, he expresses hope that this will be clarified one day. I believe that I have taken a step in that direction. In any case, regardless of his suggested practice, like this monograph he acknowledges issues with the end time of *Shabbat* according to Rabbeinu Tam and raises issues with the start time of *Shabbat* according to the *geonim*. While not surprisingly, R. Sonnenfeld suggests that one adopt the stringencies of both positions; the approach developed, attempting to justify generations of practice, did the opposite, making use of the leniencies of a hybrid approach. Reiterating, in remarkable alignment with historical practice, the challenges to Rabbeinu Tam relate primarily to his period of *bein ha-shemashot* well over an hour after sunset, while the challenges to the *Gaon* relate to his beginning the *bein ha-shemashot* period precisely at sunset.

The first is the preferred reading of the *gemara* in *Shabbat* in accordance with most *rishonim*. The second is strongly supported by simple logic and arguably by the statement of Shmuel, though certainly at variance with the prevalent contemporary interpretation based on the approach of the *Gaon*. The third is clearly debatable but represents the implicit viewpoint of some major *posekim* and is a plausible approach to what is more than likely only a *harhakah*. All three are needed to defend fully historical practice. However, even the first, or certainly the first two points, should influence contemporary *pesak*, particularly in extenuating circumstances.³⁴⁰

Those familiar with R. Kapach's approach to Rambam throughout *Mishnah Torah*, will recognize that his conclusions as to Rambam's position on the twilight period and much of this monograph are consistent. While R. Kapach's approach tacitly assumed stars, as opposed to darkness, as defining both the beginning and the end of the period of *bein ha-shemashot*, something I believe that Rambam did not support, R. Kapach's practical

³⁴⁰ Beyond conjecture, lacking any textual or historical basis, and more in the realm of speculation, I wonder if the *Gaon*'s identification of sunset as the precise point when the period of *bein ha-shemashot* begins had an overriding religious objective of preventing serious desecration of *Shabbat* that any slightly later point might have weakened. As was noted, R. Zalman of Liadi was slightly more lenient both in his assertion that the period of *bein ha-shemashot* begins 4 minutes after sunset and at a later point, around 20 to 30 minutes after sunset, where he felt there was no option other than strong protest and rebuke. R. Haim Volozhin delayed the start of the period of *bein ha-shemashot* beyond 4 minutes, by at least 2 additional minutes. Current practice has adopted sunset precisely, almost without reservation; it seems appropriate that strict adherence to sunset as the beginning of the period of *bein ha-shemashot*, particularly in cases of need, be examined more carefully.

conclusions and insights into Rambam aligns Rambam across *Mishnah Torah*³⁴¹ with the ideas that have been developed.^{342 343}

While their rationales were entirely different, many of the *posekim* who agreed with an approach like R. Pimental's in defining Rabbeinu Tam, supported a position akin to what has been suggested throughout the monograph. In practice, they allowed work after sunset proper and awaited only three (small) stars, not a full 72 minutes. Most importantly, they would never allow work on Friday, anywhere nearly as late as Rabbeinu Tam's conceptual position would suggest.³⁴⁴

³⁴¹ R. Kapach asserts that the period of *bein ha-shemashot* begins 15 minutes after sunset, somewhat later than I believe Rambam necessarily maintained.

³⁴² As has been mentioned previously, objections to the approach of the *geonim* derive from *sugyot* where sunset does not appear to be a precise delimiter. Similarly, despite Rambam's clear identification with the position of the *geonim*, some try to align his position with Rabbeinu Tam since he did not consider sunset as critical as many assumed that an approach like that of the *geonim* had to maintain. As has been argued throughout this monograph, the “**either-or**” assumption of either Rabbeinu Tam or the *geonim*, without intermediate positions, is an assumption that I find neither conclusive nor correct.

³⁴³ Building on R. Kapach's approach, a future paper will attempt to demonstrate that Rambam maintained a hybrid / intermediate position, like the position of the *geonim*, consistent with the text of the *gemara*, astronomic observation and supportive of the approach taken in this monograph.

³⁴⁴ Additionally, R. M. Posen throughout *Ohr Ha-meir* argues that while the *Gaon* himself considered sunset proper as the beginning of the period of *bein ha-shemashot*, the *geonim* maintained a position like the hybrid position developed throughout this monograph. However, unlike this monograph,

- his proofs derive primarily from analysis of *geonic* texts and how they are referenced by *rishonim*,
- his interpretation of the primary *sugyah* in *Shabbat* differs in specific details,
- he assumes stars, not darkness, as defining without any mention of a dispute or its relevance and
- he is more definitive about the exact beginning of the period of *bein ha-shemashot*.

Interestingly, R. Posen notes that R. Zalman of Liadi, who maintained a slightly delayed start to the period of *bein ha-shemashot*, quotes the *geonim*, while the *Gaon* does not. His discussion of the *gemara* in *Pesahim* also differs from the analysis in this monograph. He also does not raise the possibility, given the opinion of R. Haim

Both the practice suggested by many of the *posekim* who decided similarly to R. Pimental, as well as R. Kapach's interpretation of Rambam are in conceptual alignment with the approach developed throughout this monograph. Prior to the widespread use of clocks, and even after as evidenced by both R. Sofer and R. Feinstein among others, it is entirely plausible that despite agreement with Rabbeinu Tam's conceptual position, R. Pimental's approach was practiced by some / many communities. Perhaps even for Ramban, R. Yosef Caro, or others who lived in (southern) Europe, who moved or travelled to the Middle East, practice that is so divergent from observation cannot be tacitly assumed.³⁴⁵

Clearly, in the study of *zemanim*, one should "look up" as well as "look in." Over the past two hundred years, careful observation of nature has often been replaced by a fixation with time and timepieces. While observation could often temper conceptualization, and moderate its practical application, clocks and time measurements offer no such constraints. The precision of

Volozhin, that perhaps the *Gaon* was asserting sunset only *le-migdar miltah*. Additionally, supportive of R. Posen's view of a slightly delayed start to the period of *bein ha-shemashot*, is the absence of anyone questioning the ability to observe three stars at time to walk $\frac{3}{4}$ of a *mil* after sunset proper, something that was raised after the position of the *Gaon* became more widespread.

³⁴⁵ This divergence between practice and conceptualization is something I cannot fully explain; in any case, it can also not be denied. It is an area that would require a careful historical analysis concentrating on the periods of history in which clocks became more prevalent and knowledge of notions like the impact of latitude became an established part of *pesak*. Other aspects including depression angles, degree of conceptualization, the geographic location of the *posek*, a *posek's* experience with various geographies, etc. are all factors that such a study would have to consider carefully. Broadly speaking, the transition from astronomic observation, that dominated the period prior to 15th century, was slowly replaced by the specifications of the last 200 years, which have been dominated by clock-based calculations.

clocks contributed a misleading and often mistaken sense of accuracy and did little, if anything, to enhance clarity in an already complex area. In more modern times, depression angles restore a bias towards observation based *zemanim* albeit with much greater accuracy.