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Rhythmic and Structural Aspects of the
Masoretic Cantillation of the Pentateuch

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This paper is, on the one hand, an interim report on the project I have begun with Professor Chaim Cohen, Chair of the Department of Hebrew Language at Ben-Gurion University, and on the other, a review of the performance and transcription implications of some rhythmic and structural conclusions at which we have already arrived. I will focus here on the underlying rhythmic structure of the *ta'amei ha-miqra*, proposing a revised structural template for analysis and discussion of the individual cantillation signs and submitting transcription paradigms for rhythmic signs present in the text but widely ignored.

To our knowledge, this work represents the first time that two scholars from areas as disparate as language and musicology have taken a cooperative interdisciplinary approach to cantillation study. We have three goals: a diachronic description of what we can discover about the masoretic musical intent, establishment of prescriptive recommendations for faithful, unambiguous transcription of the music regardless of the particular melodic system (*nusach*), and reconstruction of one particular melodic tradition that could serve as a synchronic model for practical application in the synagogue. This research begins from masoretic studies because contemporary informants only tell us what we already know, and collections of historical examples go back no further than the Christian humanists at the turn of the sixteenth century. The approach has been to turn to the logic underlying the music as reconstructed by contemporary masoretic scholarship.

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The sequence of *te'amim* proceeds according to a system carefully worked out by the masoretes on the basis of a hierarchy of word accent, syllable count, sentence structure, and textual logic, providing a kaleidoscopic rotation of pre-existing melodic gestures which have little or no "expressive" function.² The function of those cantillation motives can be summed up under three general headings: musical, syntactical, and phonological. Israel Yeivin (1980, 158) tells us:

Their primary function . . . is to represent the musical motifs to which the Biblical text was chanted in the public reading. This chant enhanced the beauty and solemnity of the reading, but because the purpose of the reading was to present the text clearly and intelligibly to the hearers, [emphasis added] the chant is dependent on the text and emphasizes the logical relationship of the words. Consequently, the second function is to indicate the interrelationship of the words in the text. . . . [T]he third function of the accents is to mark the position of word stress.

The historical development of the masoretic cantillation system took a course, between the sixth and tenth centuries, that conforms to what one might expect by analogy with what we know of other cantillation systems. Yeivin (1980, 166, ¶193) cautions that the pattern of development of the accents was "undoubtedly more complex" than a straight-line chronology; nonetheless, a general pattern is evident. The first signs to appear with any consistency were the so-called "*keisarim*" (Yeivin, 1980, 165, ¶192), marking the most important divisions of the text: the *silluq* (end of verse), for example, and the *etnachta* (end of hemistich). Later developments included specific signs to indicate standard motives for logical subdivisions, dubbed in descending order of importance: *melachim*, *mishnim*, and *shalishim*. These signs were sparser and less consistently applied in Babylonian and Palestinian manuscripts than in Tiberian.

It appears that at first readers connected the music prescribed at those points by improvisation; but as no less a social observer than Max Weber pointed out, it is the nature of

²Breuer emphasizes this point, noting, for example, that the same sequence of *te'amim* is used for the awesome opening of Genesis (1:1, "When God began to create the heavens and the earth") as for the mundane listing of genealogy in Genesis 36:26 ("And these are the sons of Dishan: Chemdan and Eshban and Yitran and Keran").

magic and ritual music to prescribe as many details of performance as possible (Weber: 1958, 40) therefore we soon find the systemization of connecting motives as well. Those *mechabrim* appear later and reach their greatest development in Tiberian notation. Fewer are designated in Babylonian MSS³ and a smaller number yet in the latest Palestinian MSS. Even in Tiberian MSS, what later became the designation specific to *merkha* was used at some point simply as a generic term for "conjunctive accent" (Yeivin, 99, ¶132).

It was over a thousand years later--not until 1957--that the first comprehensive music-analytical work on the te'amim was essayed by Solomon Rosowski in his book, The Cantillation of the Bible.⁴ It was followed only two years later by one of the most widely used books published for the study of cantillation: Abraham Wolf Binder's Biblical Chant (New York, 1959). The number of books on music of the *te'amim*--almost all didactic--increased exponentially between then and now: far too many to list here. In his seminal work, Rosowski wrote that "The problem of the rhythmical structure of Biblical cantillation is still awaiting its solution." (Rosowsky: 1977, 517) He himself struggled with expressing the relationship of the accented syllable to the melodic content of the ta'am:

The bar itself in our cantillation differs to a certain extent from the usual bar owing to the fluctuating position of the main and secondary accents. . . . The main accent in the bars of our cantillation is found rather at the first note of the tropal syllable (i.e., the syllable visually associated with the tropal sign).⁵

Rosowski's thinking, though, was bound to the concept of the bar-line as a marker of down-beat accents.⁶ In order to maintain the pre-eminence of the downbeat, he declared that

³Later Babylonian MSS adopt Tiberian signs for the conjunctives and *maqgef*, using a hybrid notation.

⁴Time and space do not permit the exploration here of the fascinating history of writings on the music of cantillation which, except for a flash of mystically-inspired interest on the part of the sixteenth-century humanists and a handful of their Jewish contemporaries, received remarkably little attention until the nineteenth century.

⁵Ibid., p. 518. That, in turn, is further explicated in an even more confusing footnote: "The expression 'note of the tropal syllable' stands instead of 'note of the tonal material of the tropal syllable.'"

⁶Rosowsky cites Moritz Hauptmann's Die Natur der Harmonik und Metrik (Leipzig, 1873) as the

"The number of up-beat notes grows with the numerical increase of syllables. The total time value of the up-beat, however, is always an eighth."⁷

There is no documentation justifying this widely-accepted practice. The masoretic rules for application of the *te'amim* are based on sentence structure, the placement of word stress and the counting of syllables, not the occurrence of metric accents. Since the primary concern of the masoretes was clear and accurate transmission of the text, features that shaped the logogeny to that end became a dominant feature of the system. Mispronunciation, as much as outright error, was, and still is, cause for a reader to be stopped and corrected. In this connection, it is interesting to note that the only physical handicap that can disqualify a person from being a *ba'al qriah* is a speech defect that impairs pronunciation.

Rosowsky and Binder, and before them Baer and Nathan, all aver that as the number of syllables preceding the accented syllable increase, syllables preceding the word accent must be pronounced faster and faster in order to preserve the rhythmic placement of the "down-beat." That tradition, though, is of relatively recent vintage in view of the millenia-long practice of cantillation, pre-dating even the masoretes themselves. It is not warranted by anything in Ben-Asher's *Diqduq ha-te'amim* (tenth century) nor is there any masoretic note that suggests it.

Where did the practice come from, then? The answer has always been, "tradition," but as Avenary has shown, the Western melodic tradition cannot with certainty be traced back earlier than the Christian humanists at the turn of the sixteenth century. The assumption of rhythmically measured downbeats in unmeasured music is inconsistent with musical practices of both East and West for the period in which the *te'amim* were codified; however, it does reflect rhythmic assumptions current at the time of the sixteenth century revival on interest in the *te'amim*: recurrent accent patterns accumulating harmonic tension toward strong-beat dissonances and weak-beat resolutions. Monophonic ritual chant of the Middle Ages, whether European or

model on which his rhythmic thinking is based (p. 518).

⁷Ibid., p. 34.

Middle Eastern, was not posited on such patterning.

This, then, summarizes the background considerations shaping our work. Four months has hardly brought a project of this scope to fruition; but at this point we can share some conclusions that, while not yet final, are well beyond being preliminary.

Each *ta'am* is comprised of still smaller components. Rosowsky, indeed, noted two parts: the "up-beat," or anacrusis, and what he called the "bar content;" i.e., the melodic motive identified with the graphic sign. Building on that insight, let me suggest a structural template that should clarify discussion and analysis of the te'amim in all their configurations.

In this scheme, each ta'am is visualized as consisting of three potential segments: A central melodic **nucleus**: the distinctive musical motive applied to the accented syllable; and two segments optionally enclosing the nucleus that may vary, if present at all, according to the number and dynamic value of syllables in the word (or "word-unit," in the case of words connected with a *maqfef*)

. The accented syllable receives the nucleus, which may be anything from one or two pitches to an extended melisma. Pitches required for syllables preceding the nucleus would then be termed the prefix, which is usually intoned on a repeated, melodically neutral, tone. Any notes required by the word's structure to follow the nucleus would be called, by analogy, the suffix. Such a template provides nothing more than a standardized format for analysis of individual *te'amim*; but simply to agree upon such a format would greatly clarify discussion of the music.

Using that template now allows us to make clear analytical statements about the *te'amim*. In an immediate departure from today's general practice, the first of those That I will venture is that pitches of the "prefix" were intended to be equi-rhythmic, regardless of their number. By contrast, Binder's (1959) notation for up-beats varies from a grace note to a quarter-note and Rosowski, as we have seen, averred that "The total time value of that up-beat. . . is always an eighth." Both he and Binder use the word "anacrusis" to mean "a fixed-length pick-up beat," as does every other recent instruction book based on them. This means that as the number of

syllables preceding the nucleus grows to 3, 4, or more, diction must necessarily suffer as the reader enunciates more and more syllables within the space of that single eighth-note.

Nothing in the masoretic literature supports that conjecture. Unfortunately, neither have I been able to find an unequivocal statement of its opposite. There is, however, convincing indirect evidence for this revisionist view, most of which centers about the excessive compunction with which the masoretes treated the whole question of pronunciation. I will cite only one such piece of evidence here, from Ben-Asher's *Diqduqe ha-te'amim*, where he writes:

When there is a *gaya gedola* or *ketanah* under the letter preceding the first of two double letters of the word, [e.g., as in "*hitpal'lu*," where a *meteg* would be placed under the *peh*] the *shva* should be read as if it had a *chataf-patach* (orig: *yiftach bakriah*) . . . and if there is no *gayah k'tanah* or *g'dola*, then do not read as if there were a *chataf-patach* (orig: *lo yipatach*).⁸

This passage clearly supports the case for careful, and if necessary, slower reading, because the entire purpose of the *gaya* in this case (here described as serving a function similar to the *chataf-patach*) is to "force" pronunciation of the *shva na*. On the face of it, it would appear strange that if, in fact, prefix notes accelerated with each increase in syllables, the question of excessive speed of the prefix and resulting slurring of pronunciation never once came up in what may have been as many as twenty generations of masoretic scholars, in spite of their constantly expressed concern with "swallowed" syllables and crystalline diction. It is, of course, dangerous to argue from omission; but given their reiterated attention to articulation and careful counting of every syllable, it seems unlikely that those meticulous workers would have simply overlooked that consideration for almost half a millenium.

The problem may not have occurred to them because there may not, in fact, have been a

⁸Aaron Dotan, ed., *Sefer Diqduqe Ha-Ta'amim* of Aaron ben-Asher, Part Gimel, 286. Dotan goes on to remark that those MSS that vocalize such cases with a *chataf-patach* are, in fact correct; however, Ben-Asher himself seems never to have used the *chataf-patach*, but instead the *gaya (meteg)*. Dotan explains that had Ben-Asher been one of the scribes who used the *chataf-patach*, there would have been no need for this rule.

problem. Much more consistent with medieval practice is a cantillation procedure in which repercussive syllables are declaimed on notes of equal length, such as we find in the Gregorian psalm tones, Syriac, Coptic, or Byzantine chant, to mention only a few possible parallels. Such a practice also guarantees clarity of pronunciation which, as we have seen, was a primary interest of the masoretes.

The most important rhythmic consideration in cantillation is the distinction between conjunctive and disjunctive *te'amim*. Disjunctives, as their name implies, were intended to interrupt the flow of declamation. From Ben-Asher in the tenth century to Breuer, Dotan, and Yeivin in the twentieth, there is universal agreement that disjunct *te'amim* end with a separation from the next word, yet how often have we all heard that rule breached? For that matter, how long a separation is required to signify each of the levels of disjunctives?

Each of the four "ranks" of disjunctives is assigned its own "*koach pisuq*"--pausal, or separating, power. Most modern musicologists understand that ambiguous term to mean a "rest" in musical notation;⁹ however, our notation was developed for mathematically-grounded European music, and denotes such rests only as a multiples or fractions of an implied "beat." Rosowski complained:

If . . . we were to express the pausal power of "emperors" by, let us say, a quarter rest, an obvious arrangement of pauses with gradually decreasing duration would suggest itself as an eighth rest for the "kings", a sixteenth for the "dukes", a thirty-second for the "counts" [ambassadors], and a sixty-fourth for the single "petty lord". . . . I have therefore limited myself to a single and uniform rest for the "lords" of these four categories.¹⁰

There is no reason, though, to assume a regular beat in cantillation, so that unmodified modern notation, instead of clarifying the situation, carries us into uncharted territory. There is no reason to express those rests as a fixed ratio just because Western notation has that feature.

⁹I should also express here that I currently have some reserve about that understanding of the term, but am not yet prepared to argue for its reinterpretation.

¹⁰The Cantillation of the Bible, pp. 23-4.

Yeivin (1980, 168-70, ¶195-98) makes the point that the pauses are "relative," depending on the context. In place of rests, I would recommend adoption of a notational device developed for Gregorian Chant and codified in the editions of the Benedictine monks of Solesme: the use of vertical lines of varying length to represent the "*koach pisuq*" of each of the four levels of disjunctives as I have used on the accompanying examples. Thus we would draw verticals crossing all four spaces of the staff for the two "emperors," crossing three spaces for "kings," two spaces for "ambassadors," and one space for the "petty lords." This practice would be a vast improvement over current transcription methods.¹¹ At the very least it would enable visualization of the "principle of continuous dichotomy" in our transcriptions; at best, it would prompt the *ba'al qria*'s attention to the various levels of *koach pisuq*.

Millel words, of course, always have a suffix--they are defined by having a syllable following the primary accent. Those suffixes, though, may be of two types: "additive" and "integrative." Additive suffixes, as their name suggests, are formed by the addition of a supernumerary pitch to the end of the nucleus, usually repetition of the final pitch of the nucleus. In the case of disjunctive *te'amim* those notes are infixes after the nucleus but before the rest that marks the disjunction.¹² By contrast, integrative suffixes for *millel* words are formed by putting the final syllable on the last pitch of the existing nuclear motive, or to put it another way, by "borrowing" the last pitch of the nucleus to use as the suffix.

Several masoretic signs have been ignored or dismissed by musicians because they do not represent melody. Some of them, however, have rhythmic implications that often go unmentioned in modern books and are inadequately or inconsistently transcribed, if at all. Two major considerations have shaped my suggestions for a notation to transcribe those signs:

¹¹Current transcriptions either omit notation of the rests of disjunction altogether, note them as bar lines, or represent them with some configuration of fixed (usually equal) mathematical rests.

¹²In the system that we present in our work, the last note of the nucleus is sometimes lengthened in these circumstances in order to mark the accented syllable more clearly and avoid any chance of ambiguity.

accurate representation of what we believe to have been the masoretic intent, and use of existing notational symbols in their commonly accepted meaning.

The first of these that I will suggest concerns the *meteg*, also called *gaya*. Our concern here is not with the complex rules for placement of the *meteg*, but with its effect on the cantillation. Yeivin (1980, 243, ¶315) cites the tenth-century *Horayat ha-qore* as affirming that a *meteg* indicates a slight lengthening of the syllable.¹³ The pace is momentarily slowed in order to emphasize what would otherwise be an unaccented, and perhaps inadvertently slurred or swallowed, syllable in a word such as *Ya'akov*. It does not carry the weight of what we might normally indicate by a *fermata*, nor does it imply that syllable length be increased by some mathematical ratio, as modern notation would demand. In my own transcriptions I have indicated the a *meteg* with a "tenuto" sign.

The *paseq* also serves an important rhythmic function. The *paseq*, a vertical stroke between words, has the purpose of clarifying textual ambiguities by inserting a disjunction following a conjunctive *ta'am* where no interruption of the melodic stream would ordinarily occur. In effect this was a later "corrective" added by the masoretes in places where the meaning might have gotten distorted by an unbroken flow from a conjunctive to the following *ta'am*. (On the handouts, a *paseq* occurs following "*elohim*" in Gen. 1:5; possibly to avoid any possible implication the God might be, or be called, "light.") Since this does, in fact, introduce an indeterminate "rest" into the notation, I have differentiated it from the *meteg* by transcribing it with a slightly thicker vertical stroke extending half the depth of the musical staff; i.e., $2\frac{1}{2}$ spaces.

The last of these non-melodic signs carrying rhythmic implications is the *mappiq*, which indicates pronunciation of a consonantal final "*he*" as a voiceless glottal fricative. That sharp

¹³Yehoash Hacoen, as long ago as 1890, made the point that the biblical meaning of the word *meteg* is "bit," and references Psalm 32:9, "Be not like a senseless horse or mule, whose movement must be curbed by bit and bridle" ("*meteg v'resen*"). The "bit," which forces a running horse to slow down, is indeed a good metaphor for this sign.

aspiraton necessarily acts as the equivalent of accent accent and tenuto marks in musical notation; that is, it would be virtually impossible not to slow down when using the recommended articulation. I recommend transcribing that with the sign of a musical "weight accent" (>) above or below the appropriate note. In the cantillation notation of Numbers 8:1-4 on your hand-outs, you will find two examples of this in verse 4 (eighth line at the end of the line).

One objection certain to be raised against this approach is that such a practice, with its changes of tempo, artificial lengthening of prefix notes, and constant interruptions in the musical phrase, is "unnatural." It interferes with the melodic flow of cantillation, this argument continues, and destroys it as a form of song. To this I must reply that it was never intended as a form of song: it is logogenic, not pathogenic, music. To the extent that our melodic "traditions" are song-like, they are not those of the masorettes, but of the last few centuries of Western art music. Cantillation was not intended to be "natural;" rather, it is explicitly artificial and ritualistic. Turning once again to sociologist Max Weber, we find that the system of *te'amim* precisely parallels what he terms "apotropaic" music, defined as "music used in the service of magical [for which we may choose to read "sacred"] practices [for which] it tends to assume rigidly stereotyped [i. e., ritualized] formulae" (Martindale *et al.*: 1958, xxxvi)

This paper has addressed some questions of rhythmic realization, transcription techniques, and structure in masoretic cantillation and in doing so has made a strong case, I think, for an interdisciplinary approach. It may appear at first that we have dodged the question of the archaic cantillation melody, but I would like to point to our conclusion that the actual melodies do not really matter to the masoretic plan. It would be quite possible and halachically correct to compose new melodies for the *te'amim*, as long as they obeyed the rules of the masoretic system. The rhythmic and structural considerations outlined here, on the other hand, are intrinsic to that system and, as has been shown, go to the very heart of the masoretic intent.