

Abstract: This article looks at the signs in the Hebrew text of the Bible and how they directly translate into Music according to well-defined rules such that a computer program can make a usable draft.

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1 THE ANCIENT CODE

My research has focused on the Hebrew poetry of the Psalms. My examples are from many possible examples treated in the book, *Seeing the Psalter*¹ and its companion volumes, *Hearing the Psalter*, a project with no definite end. In the first volume, I translated and presented the 150 psalms in a two-column diglot format and with corresponding recurrence tables that help the reader to see rhetorical aspects of these poems in new ways. I hand-crafted the database from which I worked, experimenting with format and selection criteria over several years, using the GX-LEAF² software. I developed a routine to derive the tri-literal root of an ancient Hebrew word and ‘trained’ the software with a growing sometimes manually overridden database of values, now including about 40,000 examples. I completed this stage of the work at the University of Victoria as a community fellow of the Centre for Study of Religion and Society.

Using the database, I have examined and presented patterns of word usage in individual psalms and across many combinations of psalms. The database allowed me to test questions of authorial intent and coherence in the Psalter.

Besides these observable patterns of verbal recurrence in the poetry, the Hebrew Bible also is to be sung. The text includes, syllable by syllable, a set of musical instructions. The deciphering of these instructions was done in the last half of the 20th century by the French organist and composer, Suzanne Haïk-Vantoura (hereafter SHV).³ In the winter of 2014, I wrote a computer program with rules based largely on her work, to convert the Hebrew text into Music XML⁴. In contrast to the lexical problem where accuracy of automating the derivation of a lemma may lead to more than one possible result, the music conversion is well defined and once a set of rules is applied, it is unambiguous, indicating that these Scriptures are a programmed art-form from ancient minds.

2 CAN PUNCTUATION BE MUSIC?

Victor Borge⁵ “invented phonetic punctuation”, he says, “a few years ago”. The results are of course very funny, and I leave it to your memory or a visit to you-tube to find out about this relationship between written marks and sound.

In our typical Latin-based texts, we have 26 letters, words, and punctuation. The letters are vowels and consonants, a single letter (like Y or W) occasionally acting in both roles, especially when sung. The punctuation is accomplished through fewer than a dozen marks. In the Hebrew Scriptures, there are 22 consonants, a dozen or so vowels, and the *te’amim*, a set of 22 marks considered for the last 1000 years

¹ Bob MacDonald (2013), *Seeing the Psalter*, Energion Publications.

² GX-LEAF, *Live Enterprise Accountability Framework*, is an interactive development environment for Oracle, .Net, built by Anthony Macauley Associates. GX-LEAF allows the user to define secure, interactive web forms and queries for data collection, experimentation, and presentation without the technical knowledge necessary to set up the full system. See <http://gx.ca/software/leaf.html> for further information and examples of usage in Government, International Development, and Academia.

³ Suzanne Haïk-Vantoura. (1976). *The Music of the Bible Revealed: The Deciphering of a Millenary Notation*.

⁴ XML is extended markup language. Music XML allows a musical score to be described in words. Most music programs support reading such a description and interpreting it into a regular musical score.

⁵ Victor Borge, 1909-2000, pianist and comedian, see for example <http://www.youtube.com/watch?v=6bplbdZhrzA>.

as punctuation, but which David Mitchell⁶ dubs a kind of “punctuation on steroids”. Both vowels and *te’amim* are under and over the letters of the text, like this letter bet with an ‘a’ under it, ב̣ pronounced *ba* or *va*. The *te’amim*, called marks of taste⁷, like this mark, ב̣, can be seen as punctuation but are also of sufficient complexity taken together to be hand signals or chironomy, signs indicating the movements of the hands of a conductor of music.

The article, *The Masoretes and the Punctuation of Biblical Hebrew*,⁸ is typical of the complex entrenched explanations for the system of *te’amim* as punctuation. If a data designer came to me with such a complex proposal, I would ask for a simplification and reduction of the number of signs. The design as described has more symbols and sequences of symbols than would be required for the conjunctions and disjunctions in a system of punctuation.⁹ But it is not too complex for a musical interpretation. And it shows itself capable of sufficient variety of application to the possibilities of musical expression.

If it is music, then all the Hebrew Scriptures are written to be sung. The music so revealed tempers our knowledge of the structure and theology of the sacred texts based on words alone, and can teach us hearing and performance in a different way. I have not seen any other reconstructed key to these signs that considers all of them with such beautiful consistency.

Letter	Rough pronunciation	Letter	Rough pronunciation
א Alef	guttural or nothing	ל Lamed	l
ב Bet	b or v	מ Mem	m
ג Gimel	g (hard)	נ Nun	n
ד Daleth	d or th	ס Samech	s
ה Heh	h	ע Ayin	guttural deeper than <i>alef</i>
ו Vav	va va oo ve vo vi və veh v or nothing	פ Peh	p or f
ז Zayin	z	צ Tsade	ts
ח Chet	ch	ק Qof	q
ט Tet	t	ר Resh	r
י Yod	y	ש Shin	sh
כ Kaf	k	ס Sin	s
		ת Taf	t

The Hebrew Letters and vowels (illustrated with the vav)

⁶ <http://home.scarlet.be/~tsf07148/theo/Resinging.pdf> published in the Journal for the Study of the Old Testament 36/3, March 2012.

⁷ The word טעם *ta’am*, taste, from which the name of the signs is derived, can also mean a slight madness. Both these meanings are evident in the alphabetic acrostic poem, Psalm 34, verses 1 and 9 in the Hebrew numbering. In verse 1, David feigns his madness so he can escape from Abimelech, and in the first word of verse 9 (*tet* being the ninth letter of the alef-bet) the poet uses the same word to mean *taste*.

⁸ http://lc.bfbs.org.uk/e107_files/downloads/masoretes.pdf

⁹ It is fair to say that I am slightly overstating the case. The signs could be syntactical (punctuation) if we include parentheses and invent some other signs to bring the required total to 19 or so.

3 THE DECIPHERING KEY

The *te'amim* consist of two overlapping sets of signs, one for the books of Psalms, Proverbs, and the speeches of Job, and one for all the rest of the Hebrew Bible. For convenience, I will distinguish these two sets by the names *poetry* for the three, and *prose* for the remainder.

The first thing to note about the *te'amim* is that there are exactly eight signs below the letters for the prose and seven for the poetry. What a musician immediately notices is that these could be applied to a musical scale, the full octave for the prose, and a modal scale for the poetry. The remaining signs, with some duplication of those used below the text, all occur above the letters. There are eleven in use for the prose and eight for the poetry. The overlap between the sets is quite comprehensible to a musician. It is feasible to learn to sight-read the music, much as a musician can sight-read tonic sol-fa or a musical staff.

Here is the first set, the scale for the prose books as deciphered by SHV.



These sets correspond (reading left to right) exactly to a tonic sol-fa scale with a raised fifth. C D E F, G# A B C. Notice how close the poetry scale is: D# E F# G A B C.



All these pitches are relative to the tonic, the third note of the prose scale and the second note of the poetry scale.¹⁰ The tonic is signified by the *silluq*, under the letter. Readers of Hebrew will recognize that this sign occurs at the end of every verse. Frequently, a verse comes to rest on the A subdominant. Readers of Hebrew will recognize the sign, the *atnah*, as the primary disjunctive mark in a verse.

SHV interpreted the set of signs that occur above the letters as ornaments relative to the current pitch. By default, the starting reciting note is the tonic. The reciting note remains current until a new sign is encountered below the letters. The ornaments return to the reciting note either on the current syllable or on the next syllable. The determination is made based on the placement of the sign and whether the pitch changes on the next syllable.

Here are the ornaments for the prose books as they would be interpreted on a musical staff when the reciting note is A.

And here are the ornaments for the poetry books again based on the current pitch as A.

¹⁰ The choice of E is arbitrary and may be adjusted to a lower pitch if singers or instruments require it.

In all the many examples developed by SHV, she says she has applied these notes *without exception* to decipher the music from the Hebrew text.¹¹ She recommends using the Max Letteris edition (1896). Mitchell (2013)¹² points out that her bias is not justified in that she likely never saw the more reliable Aleppo Codex. Nonetheless, if the signs are perceived as punctuation and as informing a particular reading, then differences in the punctuation marks can result in shifting the meaning of a text. If this destroys the musical interpretation, it may be a clue that the copyist or editor is not taking an expected turn for the better.

With computers, it is now possible to repeat her experimentation and derive statistics on usage far more easily than her manual methods. It is from her own statistics that she derived the most likely shape of the ornaments. For example, the *shalsholet*, ׀, as a prose ornament, occurs only 4 times in Torah and although excluded by SHV from her prose deciphering key, it also occurs at least once in the Prophets. Similarly, though the *pashta*, ׃, is included in both her prose and poetry lists, it is often doubled on consecutive syllables in the prose books and never doubled in the Psalms. Is there a relationship between usage, interpretation, and mode that may help fit the pieces of the puzzle together?

4 THE MUSIC OF THE PSALMS

A portion of the text of Psalm 18 shows the consonants and cantillation.

The score (Figure 1) was created in Music XML by automation from the Hebrew text of the Westminster Leningrad codex¹³ and edited where necessary to agree with the Aleppo codex¹⁴ or, where Aleppo is damaged, the edition of Max HaLevi Letteris

<p>וּיִצְיָאֵנִי לַמְרֻחָב אֲחַלְצֵנִי כִּי תִפְּצֵן בְּיָ יִגְמְלֵנִי יְהוָה כַּצְדָּקָי כִּבְרֵי יָדַי יִשִּׁיב לִי כִּי־שָׁמַרְתִּי דַרְכֵי יְהוָה וְלֹא־רָשַׁעְתִּי מִאֱלֹהֵי כִּי כָל־מִשְׁפָּטָיו לִנְגִדִי אֲחַקְתִּיו לֹא־אֶסִּיר מִנִּי וְאֲנִי תָמִים עִמּוֹ אֲשַׁתְּמֵר מִעוֹנֵי וְיִשָּׁב־יְהוָה לִי כַצְדָּקָי כִּבְרֵי יָדַי לִנְגַד עֵינָיו</p>	<p>20 He has brought me out into a spacious room he will rescue me for he delighted in me 21 יהוה will reward me for my righteousness for the purity of my hands he will turn to me 22 יהוה and I have not been wicked with my God 23 for all his judgments are before me and his statutes I will not put aside from me 24 and I am complete with him and I have kept myself from my iniquity 25 יהוה turned to me for my righteousness for the purity of my hands before his eyes</p>
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(1946). The transcription software, using the facilities of GX-LEAF (www.gx.ca) was done 2014.05.06. The automation process saves an estimated half-day or more of manual work *for each 10 verses*. Editing and underlay in English remains a manual task, though an automated translation support system could, with an interlinear mapping, draft some of the text into a second libretto line.

¹¹ But she is quite subjective at some points especially in mode 4 rejecting the A# where it suits her taste. Nonetheless, her consistency is very high if not as rigid as a computer program must be.

¹² David Mitchell (2013). *How can we sing the Lord's Song? Deciphering the Masoretic Cantillation in Jewish and Christian Approaches to the Psalms: Conflict and Convergence*, ed. Susan Gillingham, OUP.

¹³ www.tanach.us/Tanach.xml

¹⁴ www.aleppocodex.org

The Hebrew text in the music of Figure 1 includes the vowels. The music is an automated representation of the cantillation according to the deciphering key. The first line of the libretto is an automated transcription of the consonants and vowels, syllable by syllable. The English was added by hand. Notice how each verse except verse 23 begins and ends on E. Each verse in this section also rises to the rest point on A. The Hebrew syllable below the first A on each line shows the resting point of the verse. In this section, the repeated words of verses 21 and 25 are set to the same music. This section is identical in Mode 1 or Mode 3 except for verse 22 which directly uses the G as a reciting note.

20 וַיּוֹצִיאֵנִי לְמַרְחָב יְהוָה יִחַלֶּצֵנִי כִּי תַפְצֵץ

va - yo - tsi - ei - ni la - mer - chav ye - chal - tsei - ni ki cha -
 He has brought me out into a spac - ious room. He will res - cue me for he de -

5 כִּי יִגְמַלְנִי יְהוָה קִצְדָּקָי קִבְר

feits bi yig - me - lei - ni ado - nai ke - tsid - qi ke -
 lighted in me. Yahweh will re - ward me for my / / righteousness, for the

8 וְיָדֵי יָשִׁיב לִי כִּי אֲשַׁמְרֵתִי דְרָכָי יְהוָה וְלֹא

vor ya - dai ya - shiv li ki sha - mar - ti dar - kei ado - nai ve -
 purity of my hands he will turn to me. For I have kept the ways of Yahweh And

13 לֹא שָׁעֵרְתִּי מֵאֱלֹהֵי כֹל 23 מִשְׁפָּטָיו לִנְגִדִי

lo ra - sha - ti mei - e - lo - hai ki kol mish - pa - tav le - neg -
 I have not been wick - ed with my God. / For all his judg - ments are be -

15 וְיִחַלֶּצֵנִי אֶסְרֶה לֹא מִנִּי וְאֵהִי 24 עִמּוֹ תָּמִים

di ve - chu - go - tav lo a - sir me - ni va - e - hi ta - mim i -
 fore me and his sta - tutes I will not put aside from me. And I am com - plete with

19 וְאֲשַׁמְרֵךְ מִיְמֵי מִי 25 וְיָשִׁיב לִי קִצְדָּקָי

mo va - esh - ta - meir mei - a - vo - ni va - ya - shev ado - nai li ke - tsid -
 him and I have kept myself from my in - iquity. And Yahweh turned to me for my /

22 קִבְר וְיָדֵי לִנְגִדִי עֵינָיו

qi ke - vor ya - dai le - ne - ged ei - nav
 righteousness, for the purity of my hands be - fore / his eyes.

Figure 1 Psalms 18: 20-25

4.1 SYLLABLES

SHV suggests two differing approaches to the singing. For the prose, she assumes an imprecise word based rhythm. It does not require 'precision, seeing that it is framed on verbal discourse'.¹⁵ In rather vague terms, she insists on a syllabic pulse after the manner of plainchant for the poetry. In practice, there is little to differentiate these. And the performances indicate that syllables are important in a word based free rhythm as words are important in a syllable-based rhythm. That is, in all texts, syllables 'gather themselves together equally' in ones, twos, threes, fours, fives, and so on, each group creating a 'beat' in the musical line subdivided into syllables of equal duration with little if any additional word stress. Ornaments (written in 8th notes) will naturally extend a syllable's length and will interpret the words. This is true whether one is thinking of the 'words' or of their syllables. In modern notation, recitation may be spelled out in 'notes' but note values are not to be slavishly interpreted. Having noted this, it is possible that some psalms were sung rhythmically. Where this may be the case for Hebrew, an equivalent English rhythm may be found. SHV writes that there is to be a constant duration for a syllable in the poetry. It is clear from attempted musical reconstructions of performance today that this claim is an approximation.

4.2 PULSE

In my transcriptions, a dashed bar line immediately precedes a change in reciting note. The direction of the vocal line and its pulse is thus signaled by the bar-line. The underlay of the English translation has been done with consideration for this musical impulse. For example, in verse 24 above, 'and I *am* וְאָנֹכִי complete וְתָמִים with *him* וְעִמּוֹ'. The stress is thus not on *complete* but on *am*. The word *him*, occurs on the resting note in the verse.

The subdominant A is signaled by the sign called *atnah*, or place of rest. In mode 4, the A is sharpened and acts against any suggestion of rest or repose. Note also that some verses have no rest point and may sometimes be chanted as a single phrase.¹⁶ Some verses have multiple phrases, but never more than one rest point. The rest point is marked with a caesura indicating the appropriateness of a pause – even in the middle of a sentence, as one would pause in plainsong to allow consideration of the words. Continuing with verse 24 above, there are 7 beats after the breathing mark at the rest point, all on the same reciting note. The variation in pitch is determined in this section through the ornaments, which always return to the reciting note. The musical line in this verse will lead to the stress on the second syllable of *iniquity*.

The Hebrew pulse and accents may suggest other possible performance ideas or word underlay to the choir director. Such performance ideas are encouraged. Since many of the psalms are 'for the choir director', choir directors may of course use their discretion in suggesting alternatives with respect to mode, rhythm or pitch or even the interpretation of ornaments.

4.3 AWKWARD INTERVALS

There are some awkward intervals but they can be learned and often are surprising annotations on the text. Psalm 4 provides a good example. The rising augmented fifth in verse 7 (Hebrew numbering)

¹⁵ Suzanne Haïk-Vantoura, op. cit. page 54, French edition.

¹⁶ Part 1 of the Song of Solomon contains a rare example of eleven verses in a row without a resting point.

colours the extreme rudeness and provocation in the words. The music confirms the quotation marks noted in the English. The next rising perfect fifth contrasts faith with provocation.

רָבִים אֲמַרִים מִי יֵרְאוּנוּ טוֹב גָּסָה אֶלֵינוּ אֹר פְּנֵיהֶ יְהוָה יִתְּנָה
 ra - bim om-rim mi yar - ei - nu tov ne - sah a - lei - nu or pa - nei - ka ado - nai na -
 Ma - ny / say "Who will show us good? Prove to us / the light of your face / Yah - weh. You have
 9 שְׂמֵחָה בְּלִבִּי מֵעַתָּה דִגָּנָם וְתִירוֹשָׁם רַבּוּ
 ta - tah sim - chah ve - li - bi mei - eit de - ga - nam ve - ti - ro - sham ra - bu
 giv - en glad - ness in my heart more than when their / grain and their new wine multi - plied.

Figure 2 Psalms 4:7-8

4.4 ENGLISH UNDERLAY

In the English libretto, the symbol / indicates that the note is not needed and has therefore a zero time value. If the English libretto has multiple syllables for a single note, then subdivide all the syllables and gather them equally into the current reciting note. Slurs apply to the English libretto to assist the singer. A slur with a syllable below each note may be sung as a slur on the first syllable with the second syllable appended to the second note. Sometimes a slur will extend over additional notes to allow the English to resolve the ornament back to the reciting note. The underlay has been designed so as to preserve with the least compromise the line and stress of the Hebrew. So wherever possible, without distorting the English word order beyond recognition, ornaments are on an equivalent syllable and slurred as in the Hebrew and the change in reciting note reflects a similar word and stress as in the Hebrew.

4.5 THE NAME

In many translations, the Name, יהוה the four letters yod, heh, vav, heh, is rendered as the LORD. Such a rendering fails both grammatically and theologically: theologically because the Name is intimate, grammatically, because the Name must behave as a proper name, not as title or rank. Debate is extensive over how the Name was pronounced or when it stopped being said as a name. In my translations, the mid-20th century rendering Yahweh has been used. This may be sung as two or three syllables as needed. There is a suggestion from the stresses in the music that it was three syllables with the stress on the third. There are no consonants in the name. Sing it as Ee-aa-oo-eh with the oo bordering on an O. It is a good singing exercise.

4.6 WORD PAINTING

The music is not there for its own sake, but for the words. Psalms 32 provides a good example. Note the bucking horse and mule. Note also the words on the *atnah* or rest point in the verse. There is no *atnah* in verse 1. Words on the *atnah* in the following verses are: *iniquity, bones worn out, changed, Yahweh, many waters, security, walk, curbed, Yahweh, righteous ones*. There is a progression in this psalm from trouble to release including the reference to the judgment of many waters and the need for a secure guided walk for the poet / singer.

4.7 MODES

Psalmody 7 note scale SHV p.349



Prosody 8 note scale



Figure 3 Modes

Determining the mode of a particular psalm is subjective at the current stage of research. It may be that some note patterns are unacceptable in some modes. This is an uncertain decision, since instrument and voice can each be tuned to each of these modes. Equally, it may be that some psalms even if sung consecutively were sung in two differing modes. If different tuning is required, then two instruments may be prepared. The *Selah* may give the player a chance to change instruments.

5 PROSE EXAMPLES

5.1 DAVID'S LAMENT FOR ABSALOM

This verse from 2 Samuel 18:33 is a favorite for composers and performers. It illustrates how well the music fits the text. An English underlay is feasible. Note the ironic word painting in descending a major sixth on the word up.

va - yir - gaz ha - me - lek va - ya - al al a - li - yat ha -
and greatly moved was the king and he went up, up to the upper chamber of the

sha - ar va - yeiv - ke ve - koh a - mar be - lek - to be -
gate / and wept. / and thus he said as he went, 'My

ni av - sha - lom be - ni ve - ni av - sha - lom mi yi -
son, Ab - sa - lom, my son, my son, Ab - sa - lom, would that he had

tein mu - ti a - ni tach - tei - ka av - sha - lom be - ni ve - ni
giv - en death to me instead of you, Ab - sa - lom, my son, my son.'

Figure 4 David's lament on the death of Absalom, his son

How did the deciphering key yield the above vocal line? The Hebrew text is:

וַיִּרְגַּז הַמֶּלֶךְ וַיַּעַל עַל-עַלְיֹת הַשָּׁעַר וַיִּבְרַךְ
 וַיֹּאמֶר בְּלִבּוֹ
 בְּנֵי אֲבֻשָׁלוֹם בְּנֵי בְנֵי אֲבֻשָׁלוֹם
 מִי-יִתֵּן מוֹתֵי אֲנִי תַחְתֵּיהֶם אֲבֻשָׁלוֹם בְּנֵי בְנֵי

The text is from the prose books and therefore uses the eight-note scale with the raised fifth. The default applies to the starting note. On the third syllable, the ₃ indicates that the current pitch rises a fifth to the dominant. On the second syllable of the second word, there is an appoggiatura, ₁.

5.2 MOSES' COMPLAINT OVER ISRAEL

Numbers 11:11-12 illustrates a poignant dialogue. Moses begins by raising his voice. The song is punctuated at key points by a high C reminding us of the opening statement. The ornamentation carries the C to a D three times at the emotional high points: 1. the initial lament, 2. the weeping of the people for flesh, 3. Moses conditional request to be slain.

Note the movement of notes up and down is governed by ornament in the first two phrases. Only one change of note (E to C) is governed by the sub-linear signs. In the second two phrases, note movement is by change in the base note, and only one ornament is found.

11 מִיָּאמַר מֹשֶׁה אֶל יְהוָה לָמָּה הָרַעְתָּ לַעֲבָדֶיךָ וְלָמָּה
 va - yo - mer mo - sheh el ado - nai la - mah ha - rei - o - ta le - av - de - ka ve -
 And said / Mo - ses to Yah - weh Why do you do ev - il to your ser - vant? And

3 לָמָּה לֹא מָצַאתִי לָאֵל בְּעֵינֶיךָ חַן לְשׁוֹם מִשָּׂא אֶת כָּל הָעָם הַזֶּה אֶלַּי
 la - mah lo ma - tsa - ti chein be - ei - nei - ka la - sum et ma - sa kol ha - am ha - zeh a -
 why do / / I not find grace in your eyes? / to lay / the bur - den of all this people on

12 הֲאֵנֹכִי הָרִיתִי הָעָם כָּל אֶת הָאֵל אֲנֹכִי אִם יִלְדִיתִהוּ
 lai he - a - no - ki ha - ri - ti eit kol ha - am ha - zeh im a - no - ki ye - lid - ti - hu
 me. / / Did I con - ceive all this / / peo - ple? as if I had be - gotten them

16 כִּי תֹאמַר אֵלַי שְׂאוּהוּ בְחִיקְךָ כַּאֲשֶׁר יִשָּׂא
 ki to - mar ei - lai sa - ei - hu ve - chei - qe - ka ka - a - sher yi -
 for you to say to me bear them in your lap? / As / though the

18 הָאֲמֹן הָאֵת הַיִּנֹּק הָאֲדָמָה עַל אֲשֶׁר נִשְׁבַּעְתָּ לְאֲבוֹתָי
 sa ha - o - mein et ha - yo - neiq al ha - a - da - mah a - sher nish - ba - ta la - a - vo - tav
 fos - ter - mo - ther bears the suck - ling to / the soil that you / swore to their / / ancestors.

Figure 5 Moses' complaint to Yahweh

In quite a different fashion, reading from Deuteronomy 8:11 (below), the song of Moses reflects the tenderness of God. The music in these two contrasting examples shows different human emotions than we might have imposed on our reading with words alone.

11 הַשְׁמֵר לְךָ פֶּן תִּשְׁכַּח אֶת יְהוָה אֱלֹהֶיךָ
 hi - sha - mer le - ka pen tish - kach et ado - nai e - lo -
 Take care to your - self lest you for - get / Yah - weh / your
 5 לְבַלְתִּי לְשַׁמֵּר מִצְוֹתָיו וּמִשְׁפָּטָיו
 hei - ka le - vil - ti she - mor mits - vo - taiv u - mish - pa -
 God / so as not to keep his com - mand - ments and his
 7 וְחֻקָּיו אֲשֶׁר אֲנִי מִצְוֶה הַיּוֹם
 tav ve - chu - qo - tav a - sher a - no - ki me - tsau - ka ha - yom
 judg - ments and his stat - utes which I my - self have com - manded you this day.

Figure 6 Moses' warning to the people

5.3 THE DECALOGUE

The music of the Ten Commandments in both Exodus 20 and Deuteronomy 5 stands out as exploiting the possibilities of music accompanying and interpreting the words. In both these passages there are many examples of two 'punctuation' marks under a single syllable. These become in the music a unique form of emphasis rather more poignant than an exclamation point followed by a question mark, a semicolon following a colon, or a comma following a period. Figure 7 gives an example, magnified so that the multiple marks can be seen.

14 לֹא תִנְאָף 15 לֹא תִגְנוֹב
 lo t - in - af lo t - ig - nov
 You will not commit a - dul - tery You will not steal

Figure 7 Exodus 20:14-15 – poetry and music in law

Here we see on each of the first three words two sub-linear marks, and on the last syllable an ornament together with a change in reciting note. The font does not allow the distinguishing of the proper order of these marks. In many cases the fonts are unreadable because of the imposition of one sign on another. My program interprets them in the sequence in which they were coded in the input text. Note also the somewhat strange syllabification caused by an unknown mark above the taf on words two and four.

6 MANY QUESTIONS

A transcription from signs to a musical score requires much more than notes. Even with the notes, how do we know that ornamentation was fixed as SHV has suggested? Yet her ornaments work (to a degree). Then there are questions of mode and rhythm, of multi-voice possibilities, responsive psalms, harmony, and accompaniment.

SHV suggests several modes. Are there clues in the inscriptions (of the psalms that have them) that would allow us to associate a mode with a psalm? Are there clues in the music? Certain patterns are the same in more than one mode. Some patterns may be harder to sing in one mode rather than another.

The more serious question of the history of the signs is raised in Mitchell (2012): how did the Masoretic system of the *te'amim* come into being? There is no history of this fully formed symbol system. His summary is very helpful:

Since this alternative view of the origin of the *te'amim* is essential to Haïk-Vantoura's theory, let us summarize the evidence.

- 1) Cantillation marks per se are found in 2nd millennium BCE in Sumerian literature. They are found on biblical texts in the Dead Sea Scrolls and in the Babylonian and Palestinian accent systems, and are referred to in the Talmud.
- 2) However, the Masoretic system stands apart from its predecessors in its sudden appearance as a highly perfected system.
- 3) By the testimony of Mosheh Ben Asher himself, the Masoretes received the *te'amim* from the second-century BCE Elders of Bathyra. This conforms to the Masoretic credo of not innovating but preserving.
- 4) The Masoretes' rabbanite contemporaries – Natronai b. Hilai and Sa'adia – objected to the Masoretes' work not because the *te'amim* were a novelty, but because they thought them ancient but sealed.
- 5) The similarity of the Masoretic *te'amim* to the symbols of a third-century BCE text of Euripides¹⁷ shows that they are indeed musical symbols of pre-Christian times. For the Masoretes to have invented them would be as anachronistic as for us to annotate a Bible in runes.

Mitchell's article also contains the example of *Tonus Peregrinus*, a known melody used in several traditions. SHV never mentions this tune, yet her deciphering key applied to Psalm 114, demonstrates a tune that is very close to *Tonus Peregrinus*. Mitchell concludes: *It follows that the Tonus Peregrinus is our best remaining fragment of Temple Psalmody*. In an upcoming volume on the Psalms of Ascent, he uses the *Tonus Peregrinus* as a test for alternative interpretations of the *te'amim*.

If indeed these are indications of scale and ornaments, here are some questions for research.¹⁸

1. How accurately did the signs survive copying and transmission to the present time?¹⁹ They are almost without redundancy. It may be that the punctuation role has preserved them to some degree but Hebrew Bible editions vary. SHV preferred the Max Letteris edition (1896). There are differences that significantly weaken the music in the *te'amim* of the Snaith edition (1958). The Westminster

¹⁷ http://www.persee.fr/web/revues/home/prescript/article/crai_0065-0536_1973_num_117_2_12889

¹⁸ Adapted from MacDonald (2013), *Seeing the Psalter*, Energy Publications.

¹⁹ There is a short introduction by her translator, Jonathan Wheeler at this site.

<http://musicofthebiblerevealed.wordpress.com/2012/07/29/lecture-on-the-musical-notation-of-the-hebrew-masoretic-text/>. Wheeler responds to the transmission question in the comments on this lecture.

Leningrad codex²⁰ has very cleanly coded data, but if accurately transcribed, it shows some errors in the codex itself. These may be verified from the Aleppo codex.²¹

2. What rhythmic possibilities are reasonable? Is there a syllable pulse as in plainsong? Or are more regular rhythms possible? Mitchell maintains that SHV's (and Wheeler's) insistence on a plainsong style is not justified.
3. Do the ornaments and degrees of the scale relate to the meaning of the poems? If so, how? For example, a double *pashta* repeats several times in the book of Jonah and signals an important feature of the story-teller's thought. Much word-painting is evident in the rendition.²²
4. What mode is appropriate for each psalm? For example, a major minor mode for Psalm 32 is apt for the combination of fear and joy expressed in the Psalm, and highlights, like a donkey braying, the horse and mule image in the poem.
5. Does the music shed any light on words in the inscriptions such as mode, melody, or author?
6. Is it possible using these signs to translate and sing the psalms in a foreign tongue (like English)? Could such music be adapted for congregational singing? Experiments show this to be possible, but it is clear that the underlay will not always correspond to the musical line of the Hebrew.²³
7. Are there patterns in the usage of the *te'amim* that would support reading the Psalter as a unit as my first volume has suggested? How might such patterns relate to the words under study in that volume?
8. Would they support sequences of psalms like the Psalms of Ascent? For example, how many different melodies and modes are to be found in any particular set of psalms? Mitchell will address this question head on in his forthcoming volume.
9. When did the word become part of the musical tradition? It seems unlikely that the prophets sang their prophecies. But it is likely that the poets sang their songs. To what extent did prophetic word and music evolve together?
10. How can we make the deciphering of the text easier using digital media? There is still a gap between music and text in the digital world, but from the text in a database, the music in XML with Hebrew transliterated underlay has been proven to be a computable process.²⁴

It is difficult to believe that an unexplained and self-contradictory system of 'punctuation' could give rise to such beautiful and appropriate music. The musical interpretation of the signs never varies.

For more examples, type "The Music of the Bible Revealed" into a search engine. There are at least 50 very fine performance recordings available of examples of this music as reconstructed by SHV. This analysis and performance only scratches the surface of the implications and possibilities for this reading of the ancient texts.²⁵

²⁰ Online at <http://www.tanach.us/Tanach.xml>.

²¹ Online at <http://www.aleppocodex.org/newsite/index.html>, regrettably with many sections unavailable.

²² A draft of Jonah is online at <http://meafar.blogspot.com> under the tag, Singing the Bible.

²³ An example of Psalm 32 is available at <http://meafar.blogspot.com> under the tag, Singing the Psalter.

²⁴ All the Music XML that I have so far created is available at this link:

<https://drive.google.com/folderview?id=0BzkrfxErEx0Ca3lzQ1ZkMktROTg&usp=sharing>

²⁵ E.g.: <http://www.youtube.com/watch?v=mlwgafUj9D8> Psalm 1,

<http://www.youtube.com/watch?v=PexZW0ZKZ6E> Genesis 1, <http://www.youtube.com/watch?v=qK4iKMQcmYQ>

Psalm 150, <http://www.youtube.com/watch?v=mCi92lwdaE0> Psalm 29.