Between music and speech: The relationship between Gregorian and Hebrew chant*

B. Elan Dresher
University of Toronto

This paper looks at two chanting traditions: the Gregorian recitation formula for chanting the psalms and similar texts, and Biblical Hebrew cantillation, the traditional form of public reading of the Torah. The first impression of these kinds of chanting is that they are forms of singing. Both chanting and singing require a manipulation of pitches different from ordinary speaking. But the relation between words and music in chanting is fundamentally different from singing a tune. I will take the view that chanting derives from tendencies inherent in ordinary speech, and is rather a stylized form of intonation. I will discuss the structure of Gregorian recitation formulas known as psalm tones and show their connection with ordinary intonation. I will then consider the Biblical Hebrew cantillation. I will show that the two kinds of chant follow similar principles, though with large differences in the extent to which these principles are elaborated.

1. Introduction

Chanting of texts occurs in different religious traditions. In this paper, I would like to consider aspects of two such traditions: Gregorian chant, or more specifically, the subgenre of such chant known as recitation formulas, used in chanting the psalms, for example; and the Jewish tradition of chanting the Torah, known as cantillation.

First, I will consider whether this kind of chanting is to be considered a type of singing, or a type of speech. Second, I will look at how the ‘melody,’ if we can call it that, of each of these types of chant is constructed. It is often said that Gregorian chant has its origins at least partially in Jewish Torah chanting. When we listen to the two of them, though, they sound quite different, and it is not clear how they might be connected. I will present a hypothesis as to what they have in common that suggests how both might have developed from a common origin.

The study of chant of this kind has connections with phonology. To understand the phonology of Biblical Hebrew, one has to understand the system that lies behind the chant, which makes up part of the study of prosody, that is, the study of the rhythm of speech and the relation between syntax and phonology.

*I am happy to dedicate this paper to Jack Chambers, who has written so insightfully on all aspects of language and music. I do not believe he has written on this exact topic yet.
2. Singing

Because there is a musical aspect to it, we might think that chanting is a bit like singing a tune. Both chanting and singing require a manipulation of pitches that is different from ordinary speaking. But the relation between words and music in chanting is fundamentally different from singing.

Singing a song involves putting together two independent elements: the melody and the words. We say that we sing words ‘to the tune of.’ In principle, we can take the same words and sing them to another tune, or take the same tune and sing different words to it. A tune exists independently of any words we might put to it. It has its own structure: a series of pitches which have their own durations and a particular alternation of strong and weak beats that we call the rhythm of the tune. Below is the tune of *Farewell to Nova Scotia* (Creighton 1950) in modern musical notation.

In Figure 1, the words to the first verse and the chorus are set under the notes. Notice that the relationship between notes and syllables is not one-to-one. In some cases, a single syllable has to be stretched over more than one note; examples in the first line are the second syllable in *setting* and the word *the* before *west*. Less obviously, when there are more syllables than notes a note is subdivided. An example is *singing* in the first line: the melody would be the same if the two eighth notes were replaced by a single quarter note, as indeed happens in other verses, where corresponding to *The birds were singing* we find *I grieve to leave* and *the captain calls*.

Thus, there is a certain flexibility in how syllables are associated to the notes of a melody. In this song, the lines vary from a low of eight syllables to a maximum of 14. For example, the last line of the first verse (*But still there was no rest for me*) has eight syllables,
and the last line of the third verse (For it’s early in the morning I am far, far away) has fourteen; yet they are sung to the same tune. It turns out there are principles for deciding how to align the syllables with notes—though there is variation, many possible match-ups are not permitted.

To indicate the alignment of syllables with musical beats, but not pitch, we can use a metrical grid (Hayes and MacEachern 1998). A metrical tune has a recurring pattern of beats. For example, a tune in 4/4 time, such as Farewell to Nova Scotia, has 4 beats to the bar, where the first and third beats are strong and the other two beats are weak. The 4 beats can be represented on the quarter-note line of the grid, and the strong beats are represented on the line above (half notes). Each beat of the quarter-note line can be subdivided into smaller beats. The first subdivision, into eighth notes, is the smallest unit in which syllables can be comfortably placed, creating room for a theoretical maximum of 16 syllables to a line. In this song, every line must end on the last strong beat, with the last syllable held for at least two eighth notes, reducing the possible maximum to 15; the actual maximum is 14 syllables. The next subdivision, into sixteenths, is used for stylistic variation in placing unstressed notes.

In English, the basic principle of tune-text alignment is that strong stresses must be aligned with strong beats, indicated in bold. Unstressed syllables are squeezed or stretched to fit. Each verse line corresponds to two bars. There are four strong stresses in each line that must be aligned with beats 1, 3, 5, and 7. Some possible ways of placing the other syllables in sample lines are indicated in Figure 2. Lines in the chorus are numbered c1 to c4; verse lines are number 1,1 for verse 1 line 1; 2,1 for verse 2 line 1; and so on.

**Figure 2: Alignment of syllables to beats (English)**

```
<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

The – sun – – was set – – ting – in – the – west (1,1a)
– The sun – was – set – – ting in – – west (1,1b)
– The drums – they do beat – and the wars – to a larm (2,1a)
– The drums – they do beat – and the wars – to a larm (2,1b)

For when I am far a way – on the bri ny o cean tossed (c3)¹

So fare well – – fare well – to – No va Sco tia’s charms (3,3a)

So fare well – fare – well – – to No va Sco tia’s charms (3,3b)

But – still – there – was – no – rest – for – me (1,4)
For it’s ear ly in the mor ning I am far – far a way (3,4)
```

¹The alignment of this and the following lines with the musical beats differs from that in Figure 1. This is because the final syllable of lines 2 and 4 in each stanza is held for an extra two beats in the Figure 1 setting, causing the following lines to be shifted over by that amount. In some versions of the tune the syllables are aligned as in Figure 2, which restores the parallelism of the text to tune alignment.
Not all languages follow the principle of aligning stressed syllables with strong beats. In French folk songs, for example, syllables that are ordinarily stressed in prose may be freely aligned with weak musical beats; conversely, unstressed syllables may be aligned with strong beats. Consider the well-known Canadian song *À la claire fontaine* (adapted from Gagnon 1865):

**Figure 3: Melody of *À la claire fontaine* (traditional)**

A metrical grid of sample lines of this song looks quite different from that of the English song shown in Figure 2.

**Figure 4: Alignment of syllables to beats (French)**

A striking example of misalignment of strong beats and stresses occurs in the first two bars, where the first syllable of *claire* is aligned with a weak beat and the second syllable is aligned with a strong beat. The second syllable here contains a schwa that is unstressed in poetry; in ordinary prose it is not only unstressed but unpronounced. I have seen several other melodies for this song, and though they have different rhythms and tunes, they all align the syllables of *claire* in a similar way, with the second syllable on a stronger beat than the first syllable. Another interesting example of this freedom of alignment can be found in the the third verse, where the word *rossignol* occurs twice, once aligned as *ròssignól* (as it might normally be pronounced in isolation), and once as *rossígnol*, contrary to the usual pronunciation.² This difference between English and

² A comparable setting of an English word like *kangaroo* as *kangároo* would not be considered good form.
French reflects the different status of stress in the phonologies of the two languages. In English, stress is lexical and interacts with other rules of the lexical phonology. In French, stress is phrasal (Dell 1984), and does not play a role in the lexical phonology.

3. Chanting

The English word *chant* comes from French *chanter* ‘to sing’. Even in English the word commonly had the meaning ‘sing’. Due to the influence of its connection with Gregorian chant, the word came to mean ‘to sing with a prolonged or drawling intonation.’ Similarly, a *chant* once meant ‘song’ (as in *sea shanty*), but is now more or less restricted to a measured monotonous song, or a musical recitation of words, implying something less tuneful than an air or song. So chanting is somewhere between speaking and singing. Besides religious contexts, chanting occurs in school games or taunting (as in the *nyah nyah nyah nyah nyah chant*), sports events, political rallies or marches (*hey hey, ho ho, {name here} has got to go*), and other occasions when a group of people want to jointly declaim the same words. As these examples show, chants can be quite varied, ranging from quite tuneful (some being actual songs) to not having any real tune, and having a strong rhythm (as in the above examples) or no particular rhythm (as in the chanting of certain religious texts). The religious chanting we will be concerned with has no independent metrical tune; rather, the ‘tune’ arises from the structure of the verse.

4. Intonation in ordinary speech

Chant, in the sense of the recitation of religious texts as in the Jewish or Christian traditions, can be viewed as deriving from tendencies already inherent in ordinary speech. Ordinary speech is characterized by *intonation*, the rise and fall of the pitch of the voice. Each language has its own set of intonational patterns. In a typical English statement (declarative sentence), as in the schematic pitch track in Figure 5, the pitch rises on the first stressed syllable and then gradually declines until near the end of the sentence. Then it rises on the final stressed syllable then falls (a). If we end the same sentence with a fall on the stressed syllable followed by a rise, we get a question (b).

Thus, the ordinary natural intonation contours of English (and many other languages) can be analyzed as breaking up a phrase into sections: a short initial rise to a certain level; a stretch in which the pitch remains level or declines gradually; and then a close, or cadence, where something dramatic happens (a rise-fall or fall-rise) to signal the end of the phrase. In longer or more complex sentences, the intonation pattern can be more complex, with more sections.
In chant, we strip away the natural intonation we would use in ordinary speech and substitute something more stylized.

5. Recitation formulas: psalm tones

It had been a Jewish custom to chant the biblical text and Christian chant may have its origins partly in Jewish practice (Idelsohn 1929, Apel 1958: 34–39, Werner 1959, Gradenwitz 1996: Chapter 3). Whatever its origins, it developed in an independent fashion. A very basic kind of chant is called a *recitation formula*, used to chant the psalms as well as other sorts of texts. An example of a recitation formula is given in Figure 6.

![Figure 6: Mode 8, office psalms, Vatican editions (Bailey 2001: §7)](image)

A recitation formula has some of the features of ordinary intonation noted above. It begins with a brief lead-in called an *intonation* (not the same sense of ‘intonation’ as used above), consisting of a few notes (two or three, sometimes up to six), usually rising. The intonation leads to the *reciting note*. This is the pitch that most syllables are sung on. The square note in Figure 6 indicates that this note is repeated as often as needed, depending on how many syllables there are. Skipping to the end of the verse we find the *ending*, which consists of a series of notes. Endings are more elaborate than intonations. An ending is like a musical *cadence*. Sometimes the intonation is only used at the beginning of a group of verses, and not at the start of every verse.

Hebrew poetry, notably the psalms, is characterized by verses that have two more or less equal parts. These halves exhibit *parallelism*, a common device of Hebrew poetry that gives it its characteristic flavour. A typical example is the first few verses of Psalm 114, given in (1).

(1) Parallelism in Hebrew poetry: Psalm 114

1. When Israel went forth from Egypt,
   the house of Jacob from among a people of strange speech,
2. Judah became His holy one,
   Israel, his dominion.
3. The sea saw them and fled,
   Jordan ran backward,
4. mountains skipped like rams,
   hills like sheep.

---

³ But see Hiley (1993: 484–485) who argues that ‘Jewish public worship could have given to Christian worship neither its form nor its content.’

⁴ Here and throughout English translations of biblical verses are from *Tanakh* (Jewish Publication Society 1985).
Perhaps influenced by this binary structure, recitation formulas also have two halves.⁵ Turning again to Figure 6, the first half ends in a mediation, which marks the end of the half-verse. Sometimes the second half also has an intonation, sometimes not. The recitation formulas differ in details from one period to another. The formulas also vary depending on what sort of texts they are used for: psalms, the canticles, or introits.

There are eight psalm tones, each corresponding to a distinct mode, numbered 1 to 8. The recitation formula in Figure 6 is a version of Tone 8, called G-plagal. The modes are named after the tonic note, also called the final. The tonic note of mode 8 is SOL (G).⁶ In a recitation formula, the final is the note on which the phrase usually ends. However, it is not always the case that a recitation formula ends on the tonic. Formulas have a number of different endings, for use in different contexts. In Figure 6, the formula ends on the recitation note, called the dominant, here DO.

6. **Aligning syllables with the notes of a recitation formula**

Let’s consider more closely how syllables are aligned with the notes of a recitation formula, using Richard Crocker’s chant of Psalm 2 in mode 8 as an example (Crocker 2000: CD, Track 20). Crocker chants the intonation only in the first verse of every group. (At the end of a group, he chants an antiphon, *Dominus Dixit*). In every such verse, the first two syllables (e.g., *Qua-re (1)*) are sung to the two notes of the intonation.

(2) Psalm 2: Selected verses

1. Quare fremuerunt gentes,  
   et populi meditati sunt inania?

2. Astiterunt reges terrae, et principes convenerunt in unum,  
adversus Dominum et adversus Christum eius.

7. Dominus dixit ad me:  
   Filius meus es tu, ego hodie genui te.

9. Reges eos in virga ferrea,  
et tamquam vas figuli confringes eos.

10. Et nunc, reges, intelligite:  
erudimini qui iudicatis terram.

The mediation is a bit more complicated. In Figure 6, there are three notes in the mediation: a filled note with an accent on RE (d), an unfilled note, and another filled note, both on DO (c). The accented note must be sung to a stressed syllable. When the half-verse ends in a two-syllable word in which the first syllable is stressed, the first syllable is sung to the accented note, and the second is sung to the following filled note.

---

⁵ ‘The *parallelismus membrorum*, that poetic dichotomy of biblical diction...is the foundation of psalmody’ (Werner 1959: 129).

⁶ Recitation formulas can begin on any pitch; what is important is the relation between pitches. Thus, DO can be set at any pitch, but the relation between DO and SOL is always the same. In examples, DO is conventionally set to C.
(the unfilled note is not used); e.g., gén-tes (i), ü-num (2). When the half-verse ends with a monosyllable, as in verse 7 (ad mé), Crocker sings only the stressed note. When the half-verse ends in a dactyl (stress on the antepenultimate syllable), the stressed syllable goes on the accented note, and the unfilled note is used along with the following filled note: fër-re-a (9), in-tel-li-gi-te (10). As with English text setting, the alignment of syllables to notes depends on the position of the stressed syllable. The same may not have been true in earlier plainchant, however.⁷

The ending has four notes plus one optional (unfilled) note: from the recitation note DO (c), the ending drops to LA (a), then goes back to DO, then (in the version used by Crocker, shown in Figure 6; there are other variants) rises to RE for the accented note, then ends on DO. As before, the last stressed syllable is aligned with the accented note: to know where to begin the ending, we count back two syllables from the last stress: sunt i-ná-ni-a (1), (con-) frín-ges é-os (9), etc.

7. Notation

The earliest musical notation is found in manuscripts of Gregorian chant dating from the ninth century (Hiley 1993: Chapter IV). The earliest forms of the notation indicate the general direction of the melody, but not very precisely. They were probably intended as reminders for singers who already knew the melodies. Eventually the notation was made more elaborate, and ledger lines and clefs were added to show the pitch levels more precisely.

The musical marks were called neumes. There were distinct neumes for single notes as well as for groups of notes. The latter were used when one syllable was stretched over several notes. Neumes had the effect of grouping notes, indicating to singers which notes went with which syllables.

Let’s now go back in time and imagine a system of notation that might predate even the neumes. Consider again the recitation formulas. If someone knows the mode in which it is to be sung, all that is really needed is to mark the beginning (intonation), the mediation, and the termination. These marks would not have to represent pitches, but could simply be reminders of the general shape of the figure: rising, or falling, or resting, for example. Just such a system of notation is still found in Torah chanting, to which we now turn.

8. Torah chanting

Recall that a recitation formula requires us to divide a verse into two parts, and to assign a cadence to the end of each part. Torah chanting starts in the same way. Instead of notating the cadences by a series of notes that represent the actual pitches, as in modern musical notation, each cadence is notated by a sign called an accent (Hebrew: ṭámam

---

⁷ ‘...endings, in the Vatican editions, are usually adjusted for the accent; the medieval practice is elusive’ (Bailey 2001: §7); cf. Hiley (1993: 48–49).
‘sense’ or ‘flavour’). According to Idelsohn (1929: 67), in the Talmudic period only three names of accents were known: qadma (‘ascending’) to mark the beginning of a verse; ethnahta (‘resting’) to mark the middle; and silluq or sof pasuq (‘end of verse’) to mark the end of a verse. There is evidence that the written marks were themselves preceded by a system of hand signs (chironomy), which are still used today in various traditions, including Gregorian chant.⁸

In the system now in use in Jewish communities, there are about 30 different signs, ten times as many as we would need to mark only the beginnings, middle, and ends of verses.⁹ The number of marks indicates a fundamental difference between Torah cantillation and Gregorian recitation formulas.

A disadvantage of the recitation formula style of chanting is that it indicates only the ends of verses and half-verses. No other details of internal phrasing are indicated, meaning that the chant does not give a good guide to the internal organization of a verse. But Torah chant aims to bring out all the details of how a verse is to be phrased.

To this end, Torah cantillation takes the principle of division further. In a psalm tone, we divide a verse into two parts, and stop there. The Hebrew system starts the exact same way, but this is only the very beginning. It then repeats the process for each half-verse, dividing up each half-verse into halves, then each resulting half into halves, until phrases of only one or two words result. The accents are then assigned in predictable fashion, based on the position of a word in the division structure of the verse.¹⁰

Consider the first verse of the Torah, given in (3).¹¹

(3) Genesis 1:1

bərɛ́ʃɪ́θ bərɔ́ ?ɛlɔ́hɪm ?ɛθ həʃʃəmájɪm vəʔɛθ hɔʔʔɛʃɛṣ
in.the.beginning created God acc the.heaven and.acc the.earth
‘When God began to create heaven and earth.’

We know that the last word in the verse is assigned sof pasuq. The main division in the verse, on syntactic as well as rhythmic grounds, comes after ?ɛlɔ́hɪm ‘God’, so this word receives ethnahta.

---


⁹ The system of accents and vocalization of the Hebrew Bible currently in use was developed by a group referred to as Masoretes, who worked in the vicinity of Tiberias from around the seventh to the tenth centuries (Dotan 1971). Hence, this is known as the Masoretic or Tiberian text of the Hebrew Bible.

¹⁰ This way of characterizing the Tiberian system goes back to Wickes (1887). For modern accounts, see Dresher (1994), Jacobson (2002), and the references therein.

¹¹ English words that correspond to a single Hebrew word are separated by dots in the word-for-word gloss. acc is the accusative marker, used with definite objects. Biblical Hebrew forms are based on the reconstruction of the Tiberian pronunciation by Khan (1997). IPA symbols are used, except that an underdot indicates an emphatic (velarized or uvularized) consonant. Vowel length, which is largely predictable in this dialect, is not indicated. I depart from Khan in indicating schwa (ə) and hɛtɛf (ᵉ) vowels.
Now consider the first half of the verse: **bərə'orth ɛəlothim** 'in.the.beginning created God’. This has more than two words, so we have to divide it. On grounds of syntax and meaning, the main division comes after the first word. This word receives the accent that divides a phrase ending in **etnahta**, which is **tippeha**. The word **bərə'orth** forms a two-word phrase with **ɛəlothim**. It therefore receives the accent that precedes **etnahta**, called traditionally the **servant of etnahta**, which is **munah**. We now have the complete sequence of accents for the first three words: **tippeha munah etnahta**.

Consider now the second half of the verse: **ʔéθ həʃʃə'májim vəʔéθ ɦəʔóres** 'the heaven and.the earth'. We have four words, so we have to divide the phrase. Since **ʔéθ** is an accusative marker associated with the following word, the natural division is after the second word, **həʃʃə'májim**. This word receives the accent that divides a **silluq** phrase, which is the same as the one that divides **etnahta**, namely **tippeha**. The first word in the phrase, **ʔéθ**, is in a two-word phrase with **həʃʃə'májim**, so it receives the servant of **tippeha**, which is **merekha**. The word **vəʔéθ** receives the accent that is the servant of **silluq**, which is also **merekha**. Thus, the sequence of accents for the second half of the verse is **merekha tippeha merekha silluq**. The accents assigned to the whole verse are shown in (4).

(4) Genesis 1:1 with accents

\[
\text{bərə'orth} \quad \text{hərə'orth} \quad \text{ɛəlothim} \quad \text{ʔéθ} \quad \text{həʃʃə'májim} \quad \text{vəʔéθ} \quad \text{ɦəʔóres} \\
\text{tippeha} \quad \text{munah} \quad \text{etnahta} \quad \text{merekha} \quad \text{tippeha} \quad \text{merekha} \quad \text{silluq}
\]

The parsing of this verse coincides with the divisions we would make on syntactic and logical grounds. Nevertheless, I have argued (Dresher 1994) that the structures to which the accents are assigned are **prosodic** divisions, which represent the way the verse is to be phrased (see also Janis 1987). The prosodic structure of Genesis 1:1 is shown as a tree diagram in (5). Words enclosed in parentheses constitute a **phonological phrase**. A non-final word in a phonological phrase is assigned a servant, or **conjunctive** accent; words that are final in a phonological phrase are assigned **disjunctive** accents. The tree shows the higher-level organization of the phonological phrases.

(5) Prosodic structure of Genesis 1:1

\[
\text{Verse} \\
\text{Half-verse} \quad \text{Half-verse} \\
\text{tippeha} \quad \text{etnahta} \quad \text{tippeha} \quad \text{silluq} \\
(bərə'orth) \quad (hərə'orth ɛəlothim) \quad (?éθ həʃʃə'májim) \quad (vəʔéθ ɦəʔóres)
\]

This verse is relatively short and simple. In longer verses, we follow the same general procedure, but with more complex results. Consider the next verse in the Torah, Genesis 1:2, shown in (6).
Between music and speech: The relationship between Gregorian and Hebrew chant

(6) Genesis 1:2¹²

\[
\begin{array}{cccccccc}
\text{w1} & \text{w2} & \text{w3} & \text{w4} & \text{w5} & \text{w6-w7} & \text{w8} \\
\text{vhaʔɔ́res} & \text{həj05} & \text{ə0hu} & \text{vov0hu} & \text{vəh0ʃex} & \text{ʃal-panəj} & \text{əəh0m} \\
\text{and.the.earth was} & \text{formless} & \text{and.void} & \text{and-darkness} & \text{on.the.face} & \text{of.the.deep} \\
\text{w9} & \text{w10} & \text{w11} & \text{w12-w13} & \text{w14} \\
\text{vəruiah} & \text{ʔəlohim} & \text{mərahéfeθ} & \text{ʃal-panəj} & \text{hamməjim} \\
\text{And.the.spirit of.God} & \text{moved} & \text{on.the.face} & \text{of.the.waters} \\
\end{array}
\]

‘And the earth was without form, and-void; and darkness was upon the face of the-deep. And the spirit of God moved upon the face of the waters.’

For ease of exposition I have numbered the words in this verse w1–w14. As before, our first task is to divide up the verse. The principles of division can be complex (Breuer 1982, Aronoff 1985, Price 1990, Dresher 1994), but in this verse syntactic, semantic, and prosodic criteria tend to coincide, so that the divisions are rather intuitive. Thus, the major division in the verse comes after w8, corresponding to the main division, marked by a period, in the English translation.

The main division of the first half is after w4, again corresponding to the main division indicated by the English punctuation. The first part of the first half has four words. An initial noun phrase, such as w1, vəh0ʔɔ́res ‘and.the.earth’, is in focus, and attracts the main division of its phrase. The division of w2–w4 is after w3, grouping the verb with its first complement NP, a common phrasing pattern.¹³ Because w2 and w3 constitute a two-word phrase, it is not divided further.

Consider now the second part of the first half-verse, w5–w8. As in the first part, the main division comes after the first word, here w5. This leaves w6–w8, which seems to be three words, but is in fact two, because w6, the preposition ʃal ‘on’, is cliticized to the first word of its complement, joining the two into a single prosodic word.¹⁴ Because there are now only two prosodic words left, they make up a single phonological phrase.

Let us turn now to the second half-verse, words w9–w14. The main division is between the subject and the verb phrase. The subject consists of only two words, w9 and w10, and forms a single phrase. The remainder of the half-verse consists of three prosodic words, since once again the words ʃal-panəj are joined by cliticization. The last division is between the verb and the prepositional phrase, forming the phrases (w11) and (w12–w13 w14).

The prosodic structure of this verse is thus as shown in (7) (the numbers that label the nodes are explained directly below).

¹² Hyphens in the gloss correspond to hyphens in the Hebrew text, indicating cliticization.

¹³ See Dresher (1994: 18–19), where it is argued that this phrasing is the consequence of aligning a phrase boundary with the right edge of a maximal projection, dividing a coordinate structure (XP and-XP). Note that the English translation, ‘was without form, and-void’, follows the accentual parse. It is possible that the second complement is extraposed, in which case the syntax would align with the prosody here, too.

¹⁴ The principles governing cliticization are complex and closely bound up with the procedure for deriving the prosodic phrasing in general; see Dresher (forthcoming) for discussion.
So far we have assigned a prosodic structure to the verse, but we have not yet assigned any accents. In the first example (Genesis 1:1), we were able to assign the accents directly as we parsed the verse. Genesis 1:2 is more complex, with a greater depth of structure. Because of this complexity, it is better to assign the accents more abstractly than we have been doing, using numbers rather than the accents themselves (Cohen 1969).

The numbers indicate the disjunctive force of the accents, as follows. We will call ethnahta and silluq accents of level 0: D0a for ethnahta, and D0b for silluq (D for ‘disjunctive’). An accent that divides a phrase that ends with D0 (a D0 phrase) is given the number 1. An accent that divides a D1 phrase is assigned 2, and D2 phrases are divided by accents of level 3.¹⁵ Once we have a prosodic structure, these numbers can be assigned mechanically, as in (7).

Notice that more than one accent of a given level can be assigned within the same phrase. For example, w4 is assigned D1 because it divides the whole D0a phrase, and w5 receives D1 because it divides the second half of the D0a phrase. Similarly, w1 and w3 are both assigned D2 accents, and so on. In the Tiberian system, the final accent in such a sequence is distinguished from the rest, and these final accents are designated as D1f and D2f in (7). With this refinement, we can now assign the actual accents as in the table in (8). Applying these values to (7), we derive the sequence of accents in (9).

---

¹⁵ The accents stop at level 3. If a D3 phrase needs to be divided, it is divided by another D3 accent, corresponding to a ‘flattening’ of the prosodic distinctions at this level of embedding.
(9) Genesis 1:2 with accents

\[\text{vəho?rəs həjəs həhu vəho?ex ūal-pənêj əḥom} \]
\[\text{revia' mérekha pashṭa zaqef ʕippeha munah ethnahta} \]

\[\text{vərúah ʔəlōhîm mərahêfeθ ūal-pənêj hamməjim} \]
\[\text{munah zaqef ʕippeha mérekha silluq} \]

To chant the verses, we must learn the melodic value of each accent. An accent does not correspond to a single note, except in rare cases, but more usually to a cluster of notes (recall the recitation formula’s intonation, mediation, and ending). Like Gregorian chant, Hebrew cantillation has a number of different modes: in addition to different modes for chanting the Torah, the Prophets, and certain other books (Esther, Ruth), there are special modes for particular festivals.¹⁶ On top of that, different communities have their own versions of each mode. In Figure 7 I give a possible musical realization of the chant of Genesis 1:2 in a North American mode of Eastern European origin (Jacobson 2002). The rhythmic values are only approximate, as cantillation is not metrical and has more rhythmic freedom than it is practical to attempt to annotate here. Each accent has a designated note which must be aligned with the stressed syllable of its word.

**Figure 7: Chant of Genesis 1:2, based on Jacobson (2002)¹⁷**

This much more elaborate system also has its roots in ordinary intonation. When we said that the intonation of a sentence typically involves an initial rise followed by a relatively flat stretch followed by an ending, that was a bit of a simplification. It is true of simple sentences, but in more complex sentences—and even in simple sentences in some languages—the intonation contour is more complex. Martin (1987), for example, has proposed that French intonation works on a principle of dependency just like the biblical chant. A sentence is divided into two parts, A and B, where the intonation of A depends on that of B: if B goes down, A goes up, and vice-versa. If the parts are complex, they are divided in the same way. An example is given in (10), where the arrows indicate whether the pitch rises or falls; the size of the arrow indicates the relative amplitude of

¹⁶ For comparisons between Jewish and Gregorian modes see Idelsohn (1929). Werner (1959: 469–470) claims that the Gregorian mode 8 seen in Figure 6 is found in many Jewish cantillation traditions; moreover, he argues that it tends to be used for praise and thanksgiving, as in Gregorian tradition.

¹⁷ In Figure 7 the transcription represents a type of Modern Hebrew pronunciation.
the pitch movement. This system is strikingly similar to the Tiberian one. If (10) were a half-verse and A, B, C, D represented phonological phrases, the accents assigned in the Tiberian system from left to right would be D2, D1, D1f, and D0.

(10) Intonational structure of French (Martin 1987)

A
La-soeur ↓

B
de-Paul ↑

C
adore ↑

D
les-cerises ↓

9. Conclusion

I have argued that the Gregorian psalm tone recitation formula and Torah cantillation both arise out of tendencies present in ordinary prosody. Although these kinds of chant may sound like singing, I have tried to show that they differ fundamentally from ordinary singing in that they lack an independently given melody that must be aligned with the syllables of the text. Rather, the melody is derived from the prosodic structure of each verse. In Gregorian recitation formulas this is not immediately apparent, because only limited aspects of the prosodic structure of a verse must be assigned specific melodies: the intonation, the mediation, and the ending. In Torah cantillation all aspects of the verse structure participate in determining the shape of the chant.

The above comments raise the question of what historical connections there may be between the Gregorian and Hebrew types of chant. Though most commentators agree that there are historical connections between them, what these were, and how exactly one type of chant influenced the other, is harder to determine. I have suggested above that the Hebrew cantillation represents an elaboration of the simpler recitation formula, reiterating the binary division of the verse, creating more elaborate prosodic structures. Werner (1984: 65–66) suggests rather that the simpler shape of plain psalmody is a consequence of choral performance: the elaborately detailed cantillation is more suitable to a single cantor than to a group.¹⁸ However, he presents no direct evidence for this historical sequence.

Whether the simpler plainchant was elaborated into cantillation or the cantillation was simplified to plainchant, the two traditions had very different futures. The modes of Gregorian chant were formalized and served as the basis of Western musical theory. Along with these developments the notation of Western music evolved to the modern notation in use today.

¹⁸ ‘The plain psalmody of the Gregorian chant and the Byzantine chant must be considered the result of a regressive anti-melismatic movement which itself originated with the advent of choral intonation...the more florid texture of solo psalmody that once existed became gradually polished down to the bare framework of initium, tenor, flexa, and punctus of group-singing.’
The Hebrew cantillation was never, to my knowledge, systematized the way the Christian chant was, and the old accents remain in use. In fact, the transmission of the cantillation remains largely an oral enterprise. Students learning to chant typically learn by repetition, seldom from musical notation. The oral character of the cantillation is reinforced by the fact that Torah scrolls contain no accents, vowel signs, or punctuation of any kind. Therefore, the reader must memorize the chant as well as details of pronunciation not indicated in the Torah scroll.

Perhaps the relative simplicity of the Gregorian plainchant made for a better vehicle for abstraction of musical melodies and modes, and facilitated the development of musical theory and notation. If so, this is an interesting example of how simplification in one domain can allow for complexity of a different order to emerge in another.

References


