A Corpus-Based Model of Harmonic Function in Shape-Note Hymnody

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Abstract. This study proposes an empirical model of harmonic function in American shape-note hymnody, a body of music generally known as Sacred Harp. Using a computer-generated harmonic analysis of chords in the 1991 *Sacred Harp* tunebook, machine-learning techniques produced hidden Markov models with three states for songs in major and minor that can be interpreted as harmonic functions. While the major-key model looks somewhat similar to widely accepted models of tonal harmony, the minor-key model highlights the peculiar modal characteristics of this music. Further, the major-key model confirms that in this music tonal progression through the three functions is not the norm. Instead, Sacred Harp harmony tends to spend long periods of time on tonic-function chords, with brief forays away from tonic, more often to dominant-function chords than to subdominant-function harmonies. Based on these harmonic-functional models and a statistical study of the types of chords found in *The Sacred Harp*, I propose an analytical symbology for this music and demonstrate it in examples from several different subgenres of shape-note hymnody.

1 The Unique Characteristics of Sacred Harp Harmony

In Figure 1 (the shape-note song "Fillmore" found on p. 434 of *The Sacred Harp* tunebook), all four parts move freely up and down, crossing one another and intersecting in both consonant and dissonant sounds drawn primarily from the major pentatonic scale. As is true in all music of this genre, the tenor part carries the melody, and, along with the treble part, is sung by both men and women in octaves. This results in even more part-crossing, including moments where the male treble or male tenor sometimes drops below the bass part. Despite the harmonic variation and occasional dissonance that the free pentatonic melodies create, one would categorize the vast majority of the chords as tonic function, with the remainder being largely passing chords. Classically trained musicians who have encountered this music have perjoratively termed songs like this "one-chord wonder" songs.[1] This rather extreme example demonstrates that, while shape-note hymnody is predominantly tonal, this music's harmonic priorities are clearly different than common-practice tonality's.

[1] After giving a succinct introduction to the American shape-note tradition, Bruce (2011) explores this static harmonic idiom in depth.

Fillmore. L.M.D.

"I will sing unto the Lord as long as I live." -- Ps. 104:33.

F Major. Ottiwell Heginbothom, 1794. J. P. Reese, 1869.

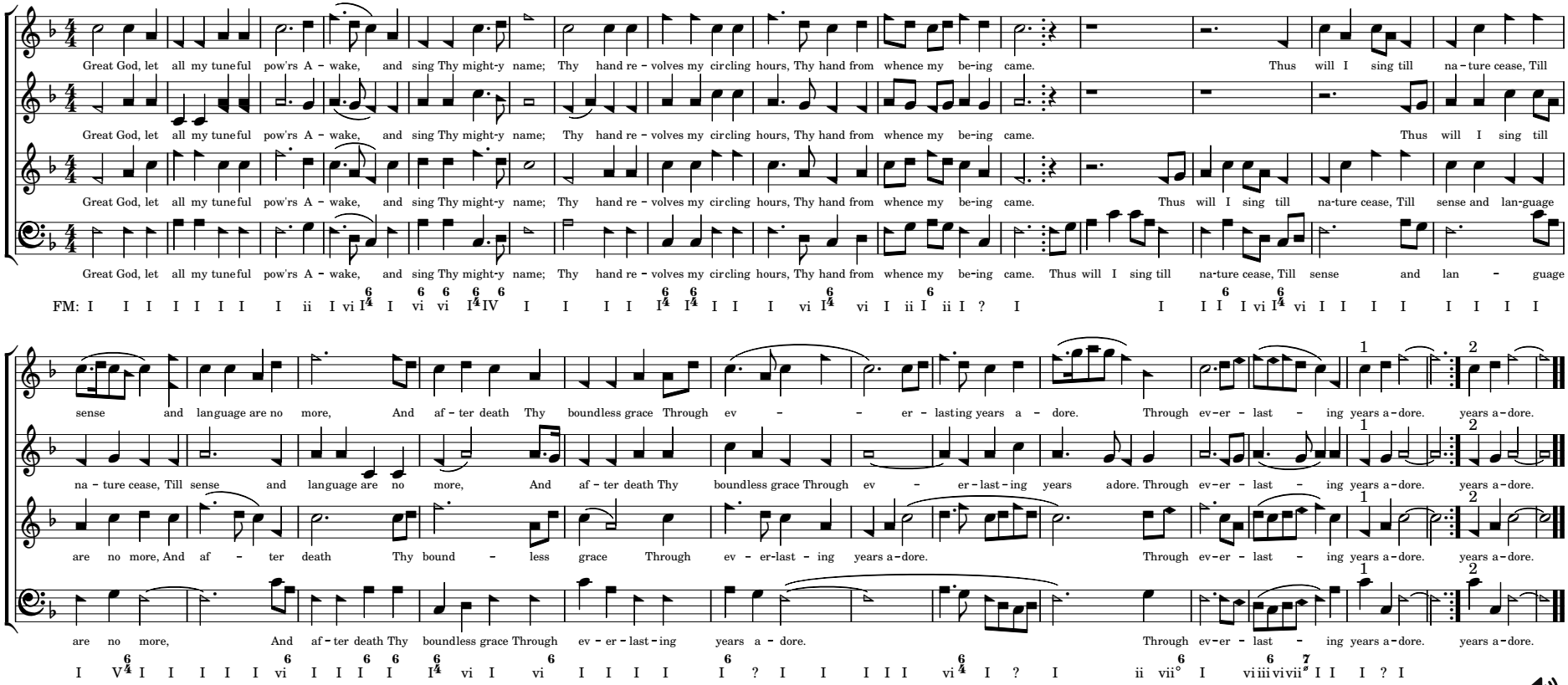

Figure 1: Analysis of “Fillmore”, as published on p. 434 of *The Sacred Harp*

Not only is the harmonic syntax of this music distinct from eighteenth- and nineteenth-century music of European origins, but many scholars of the past have also pointed out how this music breaks nearly every rule that has been set down for the construction of modal and tonal counterpoint.[2] Rather than approach this music's compositional practice by comparison with European norms, however, in Kelley 2009 I studied shape-note compositional practice from within the tradition (both writings and teaching). I addressed compositional technique and the harmonic idiom's pentatonic basis, and I provided a list of chords to use exclusively in order to emulate the style. Table 1 reproduces this list. What my earlier work did not address was harmonic syntax. I will now rectify this omission by proposing an empirical model of harmonic function and harmonic syntax for American shape-note hymnody.

Table 1: Kelley's (2009) List of Chords to Use in Shape-Note Composition

Major Key	I	ii	V*	vi
Minor Key	i*	III	v	VII*

*Omit the chord's third

2 The Data Set and Machine-Learning Techniques Used

In order to build a model of harmonic syntax for this genre of music, I applied machine-learning algorithms to a data set drawn from *The Sacred Harp* 1991 Denson Revision.[3] MusicXML files of all songs in the book were derived from music notation files on Terre Schill's http://www.shapenote.net/ website. First, a computer algorithm sliced the MusicXML files up into chords and analyzed each chord to determine its root, its inversion, and the presence or absence of the chord's third and fifth.[4] The algorithm encapsulated this chord analysis into chord symbols consisting of a roman numeral plus figured bass to indicate inversion and chord completion. Then the computer program added each song's chord-symbol string to a text file (example in Table 2) suitable for applying machine-learning techniques.

Table 2: Sample from the Data Set: Computer Analysis of Figure 6, "Liverpool"

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#37b.xml
I53 VI53 II4 VI53 III6 VI53 V5 VI53 VII53 I53 I53 D1246 I3 IV4 III53 D356 D145 D1457 II53 D2346 I64 II63 I64 I53 I53 D1235 VI64 V64 VI63 V4 VI64 I3 II4 V5 I53
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Before using the data set to examine the harmonic syntax, I performed a statistical analysis of the chord content in *The Sacred Harp* in order to confirm and refine the chord list from Kelley 2009 (Table 1). The statistical analysis indeed found the chords in Table 1 to be the most prevalent in *The Sacred Harp*. It is possible, however, to produce a more nuanced chord list using the chord inversion and chord completion data. This revised chord list appears in Table 3.

[2]Seeger 1940 is among the most thoroughgoing of these critiques.

[3]This is the most commonly used oblong tunebook in the shape-note tradition and is mostly true to the eighteenth- and nineteenth-century sound of shape-note hymnody.

[4]There is no theory of seventh chords in shape note compositional practice. Any chord containing adjacent scale degrees is considered a dissonance. For more on this matter, see Kelley 2009, p. 9.

Table 3: Revised List of Chords to Use in Shape-Note Composition

Melody Note	$\hat{1}$ Fa	$\hat{2}$ Sol	$\hat{3}$ La	$\hat{4}$ Fa	$\hat{5}$ Sol	$\hat{6}$ La	$\hat{7}$ Mi
Preferred	I5(3) I63 I64	V5	I53 I63 I64	ii(5)3	I5(3) I63 I64	vi53 vi63	V53
Alternate	vi53 vi63	ii(5)3	vi53	IV64 IV53	V5 iii(5)3	ii53 ii63	iii63 iii53
Melody Note	$\hat{1}$ La	$\hat{2}$ Mi	$\hat{3}$ Fa	$\hat{4}$ Sol	$\hat{5}$ La	$\hat{6}$ Fa	$\hat{7}$ Sol
Preferred	i5	v5	i53	VII5(3)	i5(3)	iv53	III53
Alternate	iv5 iv4	VII53	III53	iv4	III53	iv63 ii°53	v53 VII5

53 = root position complete, 5 = root position no third, 3 = root position no fifth
63 = first inversion complete, 6 = first inversion no fifth
64 = second inversion complete, 4 = second inversion no third

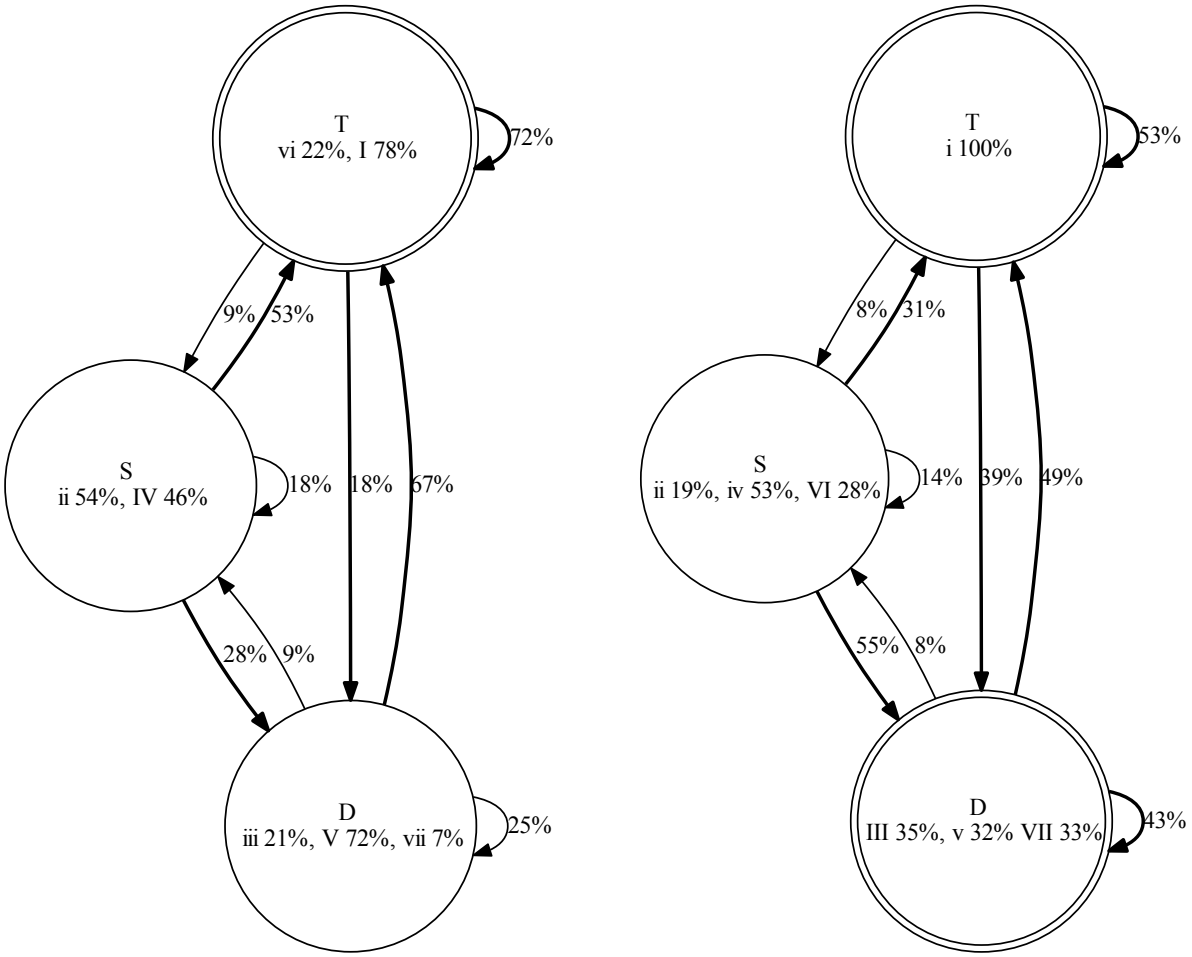
A hidden Markov model (HMM) can be applied to the data set in order to determine the harmonic functions used in this corpus and their syntax. HMMs use context-based analysis to categorize the chords into groups that can be thought of as harmonic functions. By looking at which chords tend to follow which other chords, HMMs can be used to decide how many chord classes will provide the optimum model of the harmonic language in the corpus, and which chord types belong to each of these harmonic function classes.

Using information about each chord's scale-degree content would be a viable way of grouping chords into harmonic functions, but the machine-learning algorithms for HMM analysis do not use this method. In other words, HMM analysis would not group IV and ii into a single chord class based on the fact that they both contain $\hat{4}$ and $\hat{6}$. It would, however, group IV and ii into a single chord class given a progression such as I ii I IV I, since both IV and ii are both preceded by and followed by I chords. HMM analysis therefore only looks at the harmonic context, and not the harmonic content of chords in order to assign them to harmonic functions.

3 The HMM-Derived Model of Harmonic Function

Figure 2 shows the HMMs produced by the machine-learning techniques. The model that emerged has three harmonic functions whose content remarkably resembles the three functions typically used in the analysis of common practice tonality. This similarity ends with the content of the three functions, however. The arrows in Figure 2 that describe the harmonic syntax show a very different picture of this music's tonal system than that of common-practice tonality.

In a model of most tonal corpora, one would expect the T function to move most often to the S function, but in shape-note hymnody, T chords most often move to other T chords. Moreover, T chords are more likely to move to D chords than S chords in this music. Figure 2 shows that instead of interpreting the harmonic syntax of shape-note music based on a phrase model, it is more useful to view the music in terms of the opposition between stasis on Tonic and purposeful chord changes. The music in *The Sacred Harp* tends to use chord changes to highlight cadences, important events in the text or music, and the stress patterns of the text.



(a) Major-Key Harmonic Function Model (b) Minor-Key Harmonic Function Model

Figure 2: Hidden Markov Models Representing Harmonic Function in Shape-Note Hymnody

4 Example of Chord Changes Emphasizing Cadences

Figure 3, John Plunkett's "Oak Grove", will serve to demonstrate how harmonic changes both help the listener to locate cadence points and serve to enhance the song's lyrics. Because John Plunkett composed the song in Figure 3 in 2000 after *The Sacred Harp* was published in 1991, the data set used to build the harmonic model does not include this song. First, we shall examine how cadences work in this song, and then in shape-note hymnody generally.

To categorize this music's cadences, the analyst should determine whether each line of poetry ends on a root-position tonic chord (I53, I5, I3, or I0), or some other chord type. When a root-position tonic ends the phrase, the phrase is called *closed*. Otherwise, it is called *open*. Regardless of the chord type or harmonic function, the last chord in open phrases and the penultimate chord in closed phrases operates just as cadential or pre-cadential dominants in music of the classical era do. A common feature of shape-note hymnody is that a phrase's final non-tonic chord is often a new chord type that has not yet been heard in that phrase of music.

Fresh-sounding chord types can be heard at the cadences ending all four phrases of Figure 3 "Oak Grove". Because the song's first phrase is closed, we must look at the penultimate syllable in the first line of eight syllables (m. 4, b. 3) and find that it is the phrase's first iii chord (iii63). The

second line's last chord (m. 9) is the first complete V chord (V53) in this open phrase. The third line ends with the same chord as the second (m. 13), saving its first complete V chord for the cadence as well. And the song's last "cadential dominant" (m. 15, b. 3) is not even a dominant-function chord. I have labeled this chord with a question mark because, as a discord, the computer algorithm that I used for chord analysis would not be able to assign it a Roman numeral. (The chord happens to be a ii^6_5 chord.) I can nevertheless combine both context- and content-based analysis techniques to extrapolate the harmonic function of the discord serving as the last cadential dominant.

5 Two Examples of Chord Changes Inflecting the Text

The harmonic analysis in Figure 3 demonstrates how variety in chord types and harmonic functions can not only highlight the music's cadence points, but can also draw the listener's attention to important words in the text. Harmonic function changes can create marked moments in a shape-note tune in the following ways:

- Change of function after harmonic stasis (e.g. T T T T ***S***)
- Change of function after a return to harmonic stasis (e.g. T T T T S D T T ***D***)
- Change to a previously unused function or chord type (e.g. T T D ***S***)
- Break in a regular pattern of function changes or denial of expectations (e.g. S D T T D, S D T ***D S***)

In Figure 3, a noticeable departure from a tonic stasis occurs on the second syllable of the word "beneath" (m. 7, b. 1). After the song returns to tonic stasis in the next measure, it departs again on the cadential dominant, highlighting the word "tree". The first phrase contains a weaker example, where a move away from tonic stasis, return to tonic stasis, and then a second divergence draw the listener's attention to the word "river" (m. 3, b. 1). The first divergence from tonic stasis in the first phrase is gradual, achieving two previously unused harmonic functions on the words "us" and "cross", which gives the word "cross" (m. 2, b. 1) the most emphasis. The last phrase's first D chord on the word "days" (m. 15, b. 1) provides another example of a fresh harmonic function illuminating a particular word.

An example of harmonic expectation denial occurs in the third phrase of Figure 3 on the word "harm" (m. 12, b. 1), where the second phrase sets up the expectation of an S D T T D pattern, and the third phrase's S D T ***D S*** pattern denies this expectation. In sum, Oak Grove's harmonic design emphasizes all of the following words: "cross", "river", "beneath", "tree", "harm", "flee", "days", and "soon".

A better example of harmonic expectation denial appears in the third phrase of Raymond Hamrick's "Humility" (Figure 4), where the word "ashamed" (m. 12, b. 3 – m. 13, b. 1) interrupts an alternation between T and S. Harmonic changes in Figure 4 also highlight the words "live" (breaks tonic stasis), "peace" (breaks the return to tonic stasis), "thee" (previously unused function), "all" (previously unused chord type), "men" (cadential dominant), and "what" (previously unused function).

Oak Grove. L.M.

F Major. Adapted from T.J. "Stonewall" Jackson, 1863. John H. Plunkett, 2000.

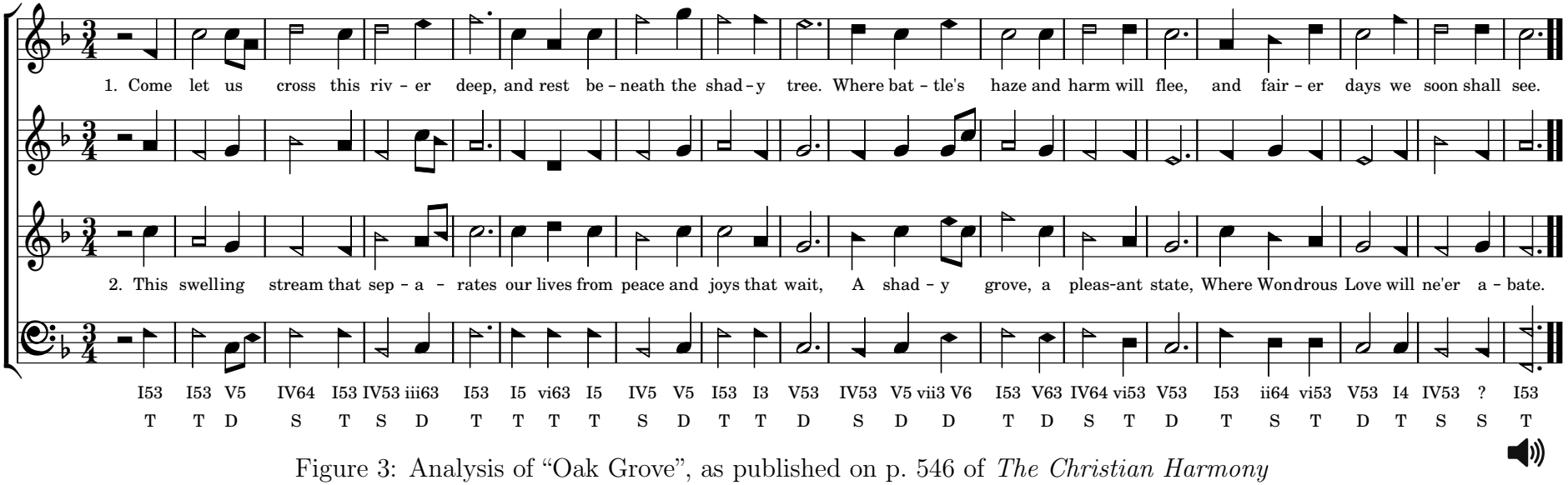


Figure 3: Analysis of “Oak Grove”, as published on p. 546 of *The Christian Harmony*

Humility. C.M.

B♭ Major. Raymond C. Hamrick. Raymond C. Hamrick, 2000.

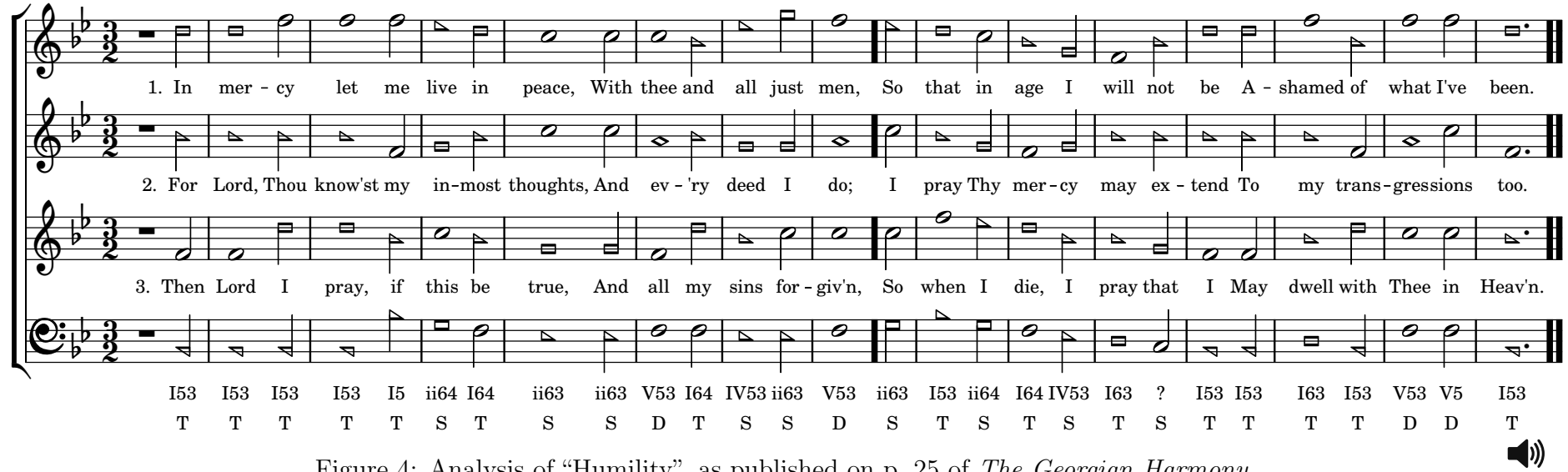


Figure 4: Analysis of “Humility”, as published on p. 25 of *The Georgian Harmony*

6 Example of Changes in Harmonic Rhythm

While harmonic changes can serve to enhance the text's meaning, harmonic changes also interact strongly with the metrical forces at play in both the music and the text, as illustrated in Table 4. Much like in common-practice harmony, harmonic function changes in shape-note hymnody tend to happen at barlines, or, more generally, when moving from a weak beat to a strong beat.[5] This music's harmonic-function changes can also occur on every syllable of text, like in the third phrase of Figure 4 "Humility". Tonic stasis over multiple measures forms the last way in which harmonic function and meter commonly interact in this music. Analysis of Figure 5 "Villulia" will demonstrate the musical value of shifting from barline harmonic changes to syllabic harmonic changes.

Table 4: Types of Harmonic Rhythm in Sacred Harp Harmony

1. Harmonic function changes only from weak syllables to strong syllables.
2. Harmonic function changes with every new syllable.
3. Harmonic function remains static across multiple syllables.

The first four measures of Figure 5 "Villulia" establish both a harmonic and rhythmic pattern. The harmonic functions change approximately at the barlines, and a long-short-short-long rhythmic pattern appears twice. The long-short-*long-short* rhythm in mm. 5–6 breaks this rhythmic pattern. These two measures also contain irregularities in the function-change pattern. The harmonic function does not change across the barline into m. 5, and m. 5 is the song's first long-short dominant-dominant measure. These harmonic irregularities serve to get the listener's attention before presenting the "problem measure" (m. 6), with its misplaced long-short rhythmic pattern. The fact that m. 6 is the first measure that contains a true strong-to-weak harmonic change serves to enhance the sense that the long-short pattern in m. 6 is out of place.

The sudden denial of expectation that placing a long-short rhythmic pattern into an even-numbered measure in m. 6 causes represents a problem that is worked out over the course of this short song's second half. First, mm. 9–10 serve to rectify the problem by reprising m. 5 exactly, followed by a correctly placed short-long measure in the even-numbered m. 10. These two measures also correct all of the earlier harmonic-rhythm irregularities. Now that mm. 9–10 have corrected mm. 5–6, the music then restates mm. 3–4 exactly in mm. 11–12, and then mm. 1–2 in mm. 13–14. Finally, the last piece of repair work takes the originally misplaced music from the even-numbered m. 6 and restates it exactly in m. 15, where its placement in an odd-numbered measure no longer creates any disturbance.

The changes between the two rhythmic patterns used in this song (long-short-short-long and long-short-long-short) correspond to the changes between dialogue (Bartimeus's plea) and plot narration in the first verse.[6] The types of changes in harmonic rhythm that accompany the changes in rhythmic pattern and serve to enhance this text painting are a common feature of Sacred Harp songwriting.

[5] White 2014 combines music cognition studies with corpus studies to confirm the tendency for chords to change across barlines in common-practice tonality.

[6] Songs in this era are crafted closely around the first verse and audiences were expected to forgive any dissonance between music and subsequent verses. For a more complete explanation of this practice, see Tawa 1995.

Villulia, 8,7.

"Because of the blindness of their heart." -- Eph. 4:18.

F♯ Minor. John Newton, 1779. J.M. Day, 1850.

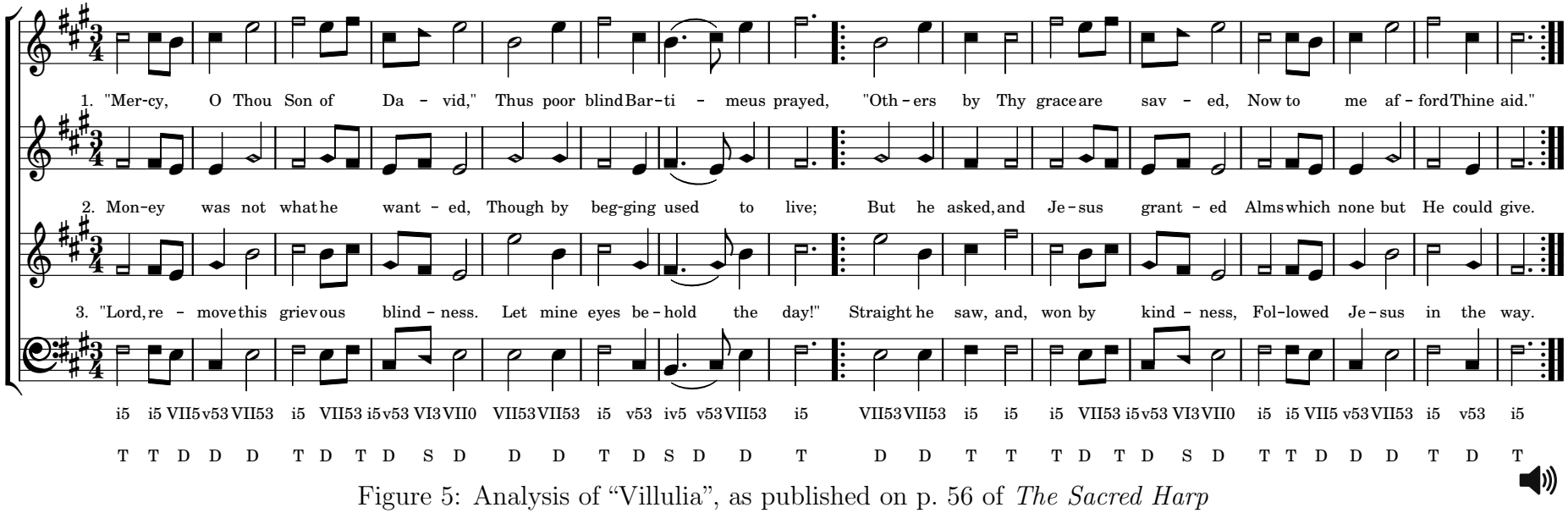


Figure 5: Analysis of “Villulia”, as published on p. 56 of *The Sacred Harp*

Liverpool. C.M.

"Remember now thy Creator in the days of thy youth." -- Eccl. 12:1.

F Major. *Hall's New Collection,* 1804. M. C. H. Davis, 1835.

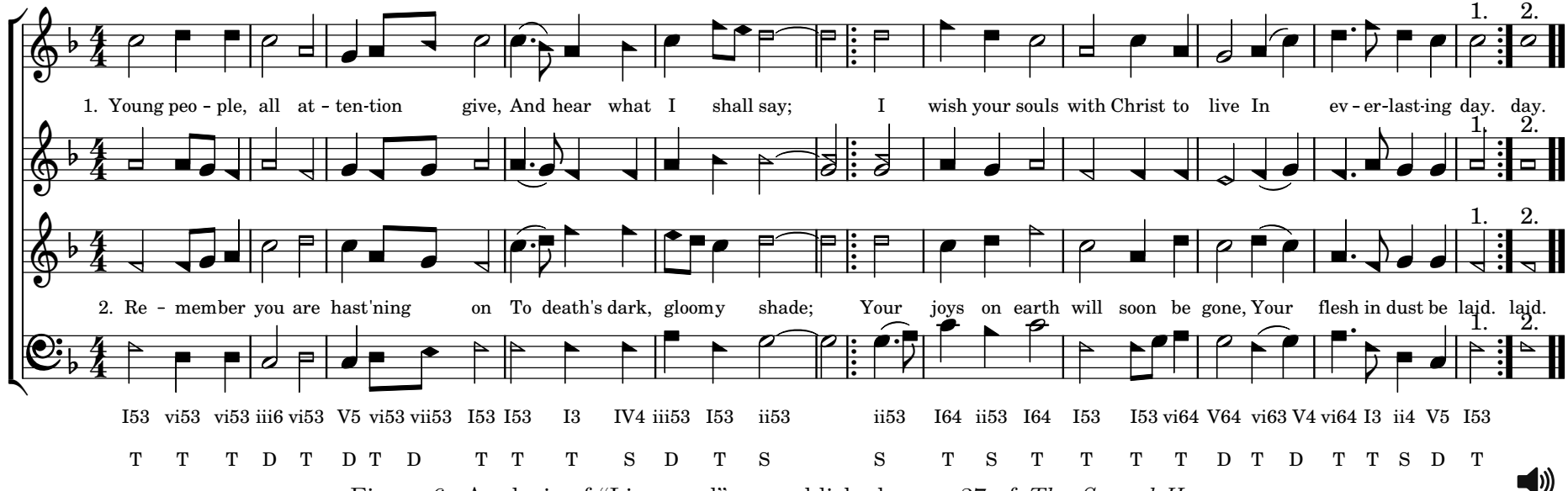


Figure 6: Analysis of “Liverpool”, as published on p. 37 of *The Sacred Harp*

7 Example of Harmonic Rhythm Clarifying Metrical Dissonance

Not all songs in *The Sacred Harp* are as rhythmically straightforward as the foregoing examples. The song "Liverpool" presented in Figure 6 will serve to demonstrate that the principle of changing harmony from weak to strong can overcome metrical conflicts by emphasizing the accent pattern of the text over any conflicting musical layers.[7]

All of the songs that we have examined so far are what Crawford (1984) calls common tunes. Common tunes align the number of syllables in a measure with the number of syllables in a poetic foot. In other words, in a common tune, iambic and trochaic texts would have two syllables in a measure, and anapestic and dactylic texts would have three syllables in a measure. Like many eighteenth- and nineteenth-century American hymn tunes, "Liverpool" (Figure 6) uses a long-short-short pattern of rhythmic values, causing Crawford (1984) to call this type of song a dactylic tune.

Although Crawford's use of the term dactylic corresponds only with the length of the rhythmic values, it is nevertheless a potentially confusing term because it does not reflect the stress pattern of either the text or the music. To demonstrate the typical rhythmic pattern used in a dactylic tune, Figure 7 transforms the traditional common-tune presentation of the familiar psalm tune "Old Hundred" into a dactylic presentation. In accordance with early American hymn tradition, Figure 7 presents the notation for the dactylic version of "Old Hundred" in common time ($\binom{4}{4}$), despite the rhythmic pattern's clear triple-time ($\binom{3}{2}$) feel.

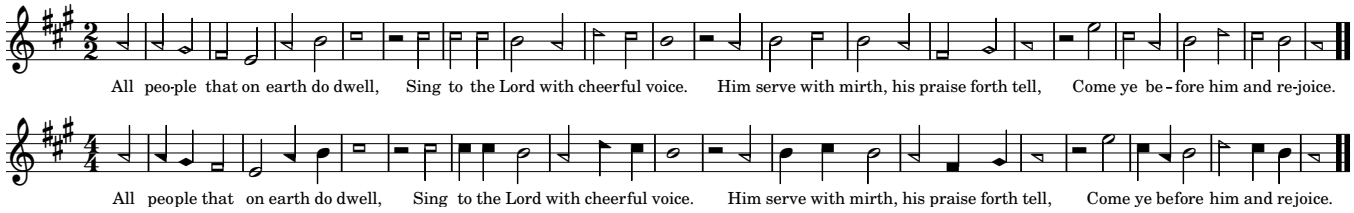


Figure 7: Common-Tune and Dactylic Presentations of "Old Hundred"

The conflict between notated and heard rhythmic patterns in a traditional dactylic tune is only the first layer in the metrical dissonance. In Figure 6, "Liverpool" has a much more complex rhythmic structure. Table 5 presents the rhythm of Liverpool in contrast to normative common-tune and dactylic-tune renderings of the text accentuation pattern.

In the first half of the tune, there are three moments of conflict between text accent and strong and weak metrical positions in the measure. The first conflict occurs on the first two syllables of the text ("Young peo-"), where the weak-strong iambic stress pattern of common meter occurs on beats 1 and 3 of the first measure of common time. The text stress inversion that occurs in the first two syllables of the first verse ("Yo$\bar{u}$ng p$\check{e}$o-"), however, makes the first foot of this verse trochaic and ameliorates this first conflict between textual and musical stress patterns.

The second metrical conflict in the first half of the tune presents the strong-weak syllable pattern "give, and" on beat 3 of m. 3, and beat 1 of m. 4. Despite the discrepency between the text stress pattern and the metrical placement of the two syllables, the change in harmonic function at the strong syllable "give" reinforces the text accentuation and then begins a Tonic stasis across the barline that deemphasizes the downbeat of m. 4.

[7]White 2014 shows empirically that harmonic changes have the most powerful influence over the perception of meter.

Table 5: Accentuation Patterns in "Liverpool", Compared with Normative Accentuation

	⏑	–	⏑	–	⏑	–	⏑	–	⏑	–	⏑	–	⏑	–
Iambic Text Stress Pattern	2	1	2	1	2	1	2	1	2	1	2	1	2	1
Normative Dactylic Triple Feeling	3	1	&	2	3	1	&	2	3	1	&	2	3	1
Printed First Two lines	**1**	**2**	&	1	2	1	&	2	**1**	**2**	&	1	&	**2!**
Printed Second Two lines	2	1	&	**2**	**1**	2	&	1	2	1	&	2	&	1

The same technique subverts the third accentuation disagreement between text and tune on beat 3 of m. 5 on the word "say". A change of harmonic function on the strong syllable bolsters the musical stress of that chord, and the chord stays the same through the weak syllable ("I"), postponing any chord change until the next strong syllable ("wish"). What is interesting about this particular moment of metrical conflict is that the syllable "say" would have arrived on the downbeat of m. 6 if the music had continued the dactylic rhythmic pattern initiated at the outset. The shift of the strong syllable onto a weaker metric position occurs because the rhythm of text presentation speeds up in m. 5.

There is only one conflict between text accentuation and metrical stress in the second half of "Liverpool", between measures 7 and 8 on the words "souls with", where the strong metric placement of the weak syllable "with" is downplayed by the beginning of a Tonic stasis on the previous syllable ("souls"). "Liverpool" therefore exhibits a decrease in metrical dissonance over the course of the tune, and in all cases the placement of harmonic-function changes mitigates the metrical conflict. Because of their potential to influence the perception of metrical stress, the patterns of harmonic rhythm that are common to Sacred Harp harmony (listed in Table 4) play a vital role in this genre's tonal and stylistic coherence.

8 Chord Variety Substituting for Harmonic Function in Tonic Stasis

Let us now return our attention to the so-called "one-chord wonder" songs and how we still might understand the harmony of these tonic-stasis songs despite their absence of harmonic-function changes. Figure 8 shows an example of this type of song with analysis. One can find the shape-note version of a cadence at the end of every line of text in the verse and the chorus, and also at the end of each "Hallelujah" refrain line throughout the song. This interpretation produces cadences in mm. 3, 5, 7, 9, 11, 13, 15, and 16. Even if this seems as though the cadences happen too frequently, an analysis of only the cadences in mm. 5, 9, 13, and 16 would still reveal that this Tonic-stasis song uses changes in chord type (root, inversion, consonance, voicing) to create its harmonic effects where another Sacred Harp song might use harmonic-function and chord-root changes.

Let us now examine each of these cadences in order to further refine our concept of cadence in this music. The cadence in measure 3 ends with a I5 chord, making it closed, and the two chords before it are both previously unused harmonies and could both be considered the "cadential dominant" of the first phrase. The refrain ends in m. 5 with a I53 chord. (The male trebles sing the lowest note in this chord.) Again, both the penultimate and antepenultimate chords are viable candidates for "cadential dominant" of this phrase.

The next cadence in m. 7, however, ends on a I64 chord. In this case, the variance from having $\hat{1}$ in the lowest voice makes this phrase sound open. It should be noted in this regard that Sacred Harp composers have a rule that the lowest voice of the last chord of any song must be the tonic.[8] It makes sense in Tonic-stasis songs to continue the practice of restricting closed cadences to those with $\hat{1}$ in the bass. Whether the use of I64 as a "cadential dominant", however, means that it should be assigned Dominant function is a matter to which we shall return after examining the other cadences in this song. Continuing to the next cadence in m. 9, we can see that a I64 serves as the "cadential dominant" here as well, which is why I am inclined to analyze the cadence on I64 in m. 7 as open.

The chorus on the second line of this song continues to use unusual harmonies in place of the cadential dominant. The I53 chord at the end of m. 11 is preceded by a discord as its "cadential dominant", and the following "hallelujah" (m. 13) has two "cadential dominant" candidates, one of them a I6, before it closes on I3. The penultimate cadence in m. 15 closes on I53 preceded by I64 and a discord, and the final cadence in m. 16 uses I64 again as its "cadential dominant". An analyst might be tempted to use the Dominant function label for all of these "cadential dominants", whether they are actually V chords, inversions of I, or discords.

The cadences in this Tonic-stasis piece all therefore act like cadences in most other Sacred Harp songs, despite the dearth of harmonic function changes in this subgenre. In order to analyze this type of piece, one must focus on more subtle harmonic changes than in most other types of music. Even different inversions of the tonic triad might serve a non-tonic role in a phrase of Sacred Harp music that features a Tonic stasis.

The idea that the I chord's inversions may exhibit different harmonic functions from its root position undermines the categorization of chords among the harmonic functions as was presented in Figure 2. It may also explain why the machine-learning algorithms converged less definitively on a model than when given corpora from common-practice tonality. The freedom to assign Dominant function to chords other than iii, V, and vii°, however, can be used to strengthen the analytical power of these abstractions and can be used to give a more compelling analysis of Tonic-stasis songs like "Fillmore" (Figure 1) and "Struggle On" (Figure 8) and of unusual cadences that appear throughout *The Sacred Harp*.

Beyond chord inversion, even subtler features of shape-note harmony may play a role in distinguishing cadence closure and chord-type variation. These factors include chord voicing and melodic shape. For example, one might argue that m. 5 of Figure 8 sounds more like an open cadence because of the rising melodic shape and high tessitura at the cadence, along with the unusual voicing of the I53 chord relative to the other cadences on this song's first line. Likewise, the cadence in m. 13 sounds open when compared to the final cadence in m. 16. In this case, the only difference is the tenor part's rising inflection and high tessitura in mm. 12–13, since the other three parts are basically the same in mm. 13 and 16. While this example demonstrates the use of chord inversion, voicing, and range to determine harmonic function in shape-note hymnody, the next two examples suggest that the analyst may profit from considering a chord's scale-degree content as well.

[8]See Kelley 2009, p. 8, for this and other procedures to follow in order to emulate this style of music.

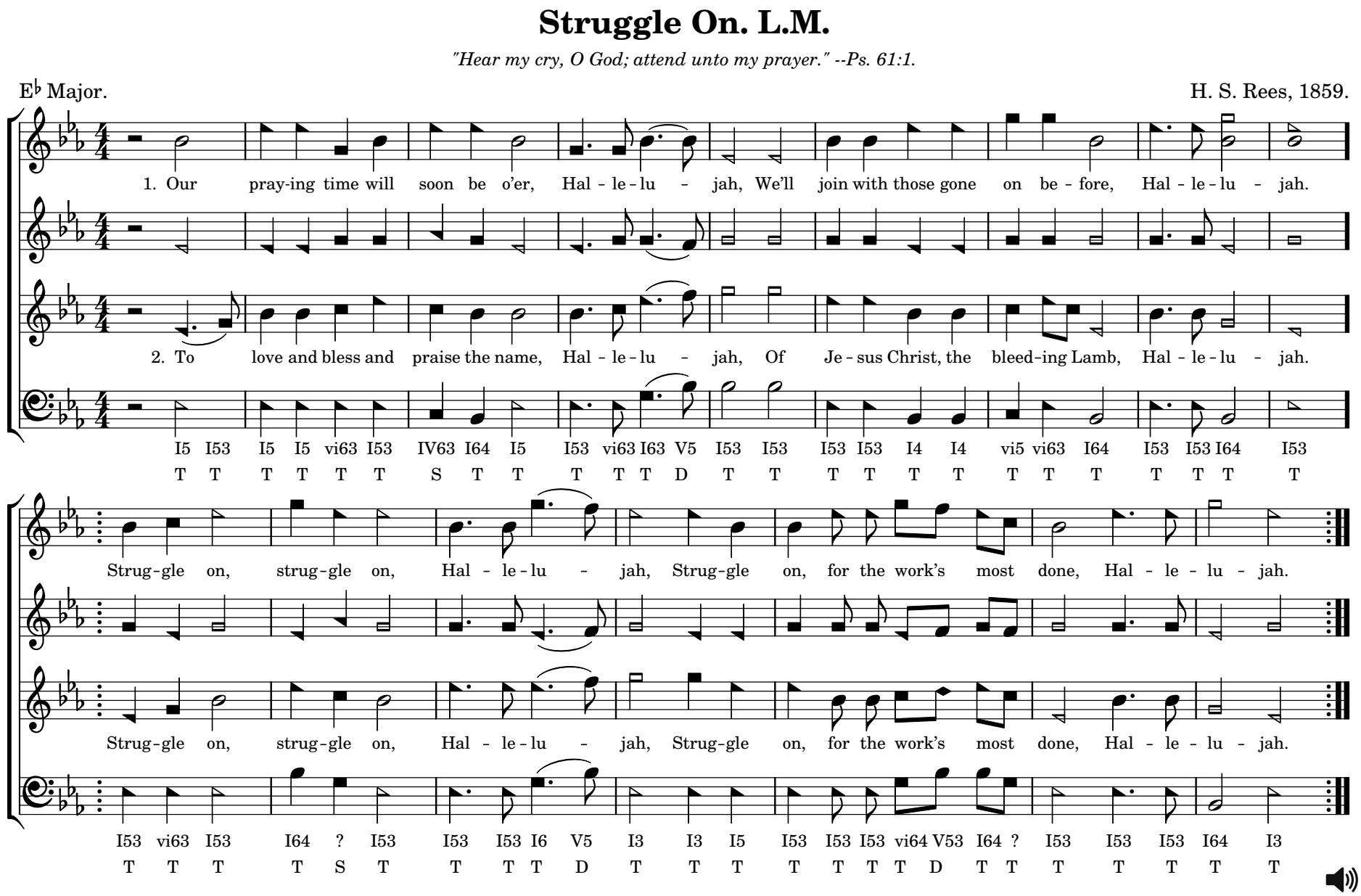


Figure 8: Analysis of "Struggle On", as published on p. 400 of *The Sacred Harp*

9 Two Examples of Dissonant Shape-Note Harmony

The following two examples will show how one might use scale-degree content to extrapolate the harmonic function of dissonant chords in shape-note hymnody. In the song "Fight On" (Figure 9), 42% (14) of the 33 chords in the song are dissonant. This is by far the most dissonant song in the corpus. In order to posit harmonic functions for every chord in "Fight On", I have extended the technique of combining harmonic context and chord content that I used in "Oak Grove" (Figure 3), "Humility" (Figure 4), and "Struggle On" (Figure 8). Figure 9 shows the scale-degree content of every chord below the music so that the reader can explore the reasoning behind my harmonic-function choices.[9]

Certain chords in this piece are truly a judgment call, where another interpretation would be arguably as valid as mine. This does not, however, invalidate the usefulness of the exercise. In fact, harmonic-function changes play as important a role in this song's interpretation as they did in the previous examples. With the exception of the first two chords, the six-syllable first line of this short-meter text (6.6.8.6) changes harmonic function with each syllable of text (Table 4's harmonic rhythm scheme 2). In the second line of six syllables, the harmonic-function changes coincide with the barlines (Table 4's harmonic rhythm scheme 1). The decrease in the speed of harmonic-function changes here matches the pivot in tone between the first and second lines of the text as the constant struggle of life is ending.

The third line of short-meter text has eight syllables and begins with harmonic-function changes at the barlines. But mm. 11-12 contain the extra two syllables beyond first two lines' six syllables and feature a harmonic-function change on each of these syllables. The last six-syllable line of the song returns to a slower harmonic rhythm with the exception of the "cadential dominant" of the last phrase. The brief interruption of the barline-change harmonic rhythm scheme at the end of the third line in mm. 11–12 corresponds with a brief shift of topic in the text back to the struggle of life ("thy parting breath") before the last line returns to further talk of heaven.

The vast majority of the discords in "Fight On" were created when a newly composed alto part was added to the originally three-part song (along with hundreds of other three-part songs in *The Sacred Harp*) in 1911. Although the song "Fight On" clearly retains the marks of the consonant harmonic language from which it has diverged into dissonance, the song "Jargon" (Figure 10), where only the first chord is consonant, was clearly conceived as a dissonant composition from its outset.[10] As a result, the process for extrapolating harmonic functions for "Jargon" (Figure 10) is more complex and speculative than for any of the previous analysis examples.

In my harmonic-function analysis of this song's chords in Figure 10, I have striven to be consistent whenever a particular combination of scale degrees recurs. The result does not seem to follow the harmonic rhythm schemes in Table 4, although one might argue that the chords do in fact change

[9]This technique of writing out the scale degrees of the four parts comes from within the compositional tradition of *The Sacred Harp*, as I have described in Kelley 2009, pp. 9–10.

[10]Not only are Billings's intentions to write an entirely dissonant piece evident from examining the scale-degree analysis below the song in Figure 10, but Billings's own prefaratory remarks to the song are addressed "To the Goddess of Discord". Brewer (2001) gives further information about the song's publication and historical context and explains the probable motivations behind this unique 18th-century example of diatonic atonality.

substantially with every new syllable, even if the extrapolated harmonic function does not. Like in previous examples, however, there is consistency of function-change patterns between phrases.

Billings sets the first and third lines of text in this song in a dactylic rhythm. Like in "Liverpool" (Figure 6), the third line is shifted by half a measure relative to the first line, resulting in more metrical dissonance in the first line than in the third. Along with the congruence of rhythm in these two lines, the pattern of harmonic function changes is similar between them. To see this, one must ignore the identities of the individual harmonic functions and focus on when the harmonic functions either stay the same or change. The first line's function-change pattern is same-change-change-change-same-change-change, and the third line's is same-change-change-same-change-change-change.

The second and fourth lines also exhibit a nearly identical pattern pattern of harmonic function changes (without regard for the individual harmonic functions involved): change-change-change-same-same-change, and change-change-change-same-change-change. The iambic texts of lines two and four are presented in uneven and even common-tune styles, respectively. Like in the first and third lines, there seems to be a smoother metrical profile in the fourth line than in the second, making a general decrease in metrical dissonance over the course of the song.

While the metrical dissonance is decreasing in "Jargon", the harmonic dissonance is gradually increasing. In the first half of the song, a half-step discord between $\hat{7}$ and $\hat{1}$ appears on the words "Jargon" and "asunder", and a $\hat{3}$-against-$\hat{4}$ half-step discord appears on the word "Nerves". Otherwise, the discords are generally milder whole-step discords. In the second half, the highly dissonant chords $\hat{1}\hat{1}\hat{6}\hat{7}$, $\hat{1}\hat{2}\hat{6}\hat{7}$, and $\hat{1}\hat{5}\hat{6}\hat{7}$ appear on the words "Ear" and "terrible as", and the final chord of the song ($\hat{3}\hat{4}\hat{5}\hat{6}$) on the word "Thunder" is the most dissonant chord in the entire piece.[11] Furthermore, the four cadences in this piece are arranged in a mild-mild-harsher-harshest pattern of dissonance. It is likely that Billings intended this increase in harmonic dissonance as a bit of text painting, an audible representation of the desire for increasing inner discord expressed in the text.

10 How to Analyze Shape-Note Hymnody

As the foregoing examples have shown, the use of my chord labeling system and identification of harmonic functions can offer the analyst insights into the reasons for the music's sound and a basis for interpretation of relationships between the text and the music. I hope that the updated chord chart in Table 3 will offer composers a useful tool in emulating the style of *The Sacred Harp* and analysts a reference for identifying unusual chord choices in shape-note hymns. There are many fascinating compositions in this genre that have never received rigorous analytical scrutiny, and new beauty and richness will certainly be found through analysis and interpretation of this music. Through examination of chord types, harmonic functions, text analysis, stress patterns, and metrical dissonance in shape-note hymnody, an analyst can bring much of this music's meaning into sharper focus. I hope that the analytical tools that I have provided will provide the means for other scholars and Sacred Harp enthusiasts to explore this music more fully.

[11] This chord is perhaps equally dissonant to the "Nerves" chord in m. 6, and both chords share the property of being the only chords in the piece to contain a $\hat{3}$ against $\hat{4}$ discord.

Fight On. S.M.

"I have fought a good fight, I have finished my course, I have kept the faith." -- 2 Tim. 4:7.

E Minor. George Heath, 1781. J. P. Reese, 1859.

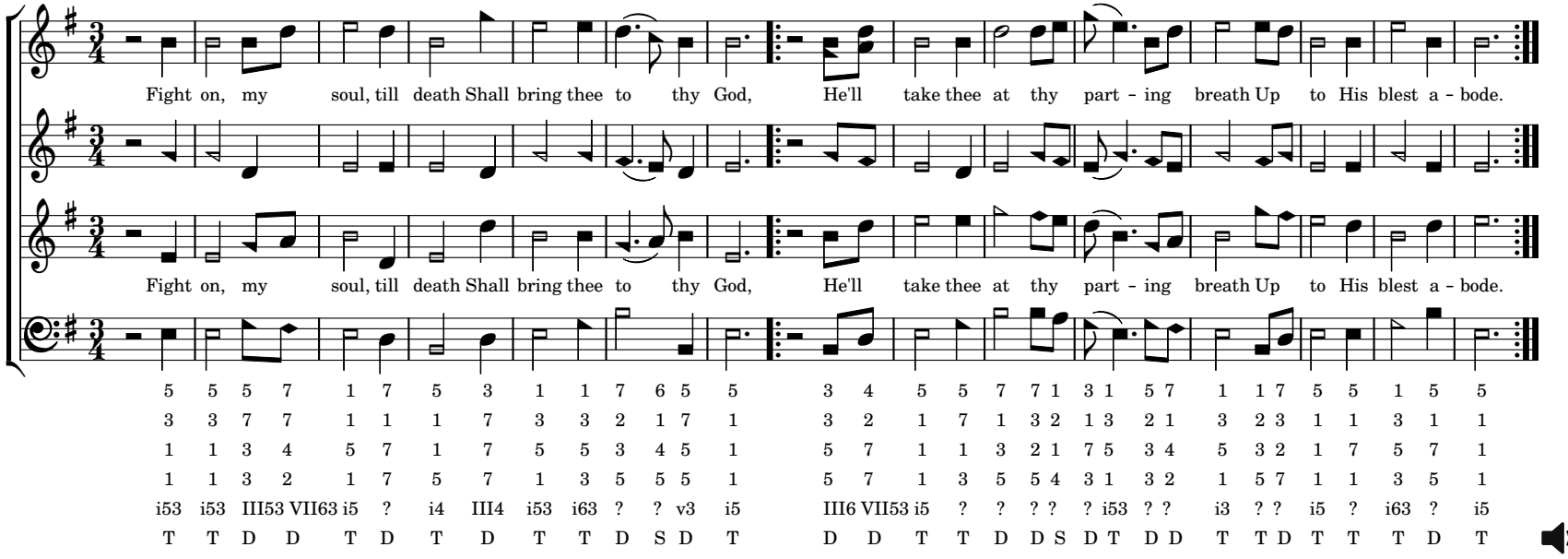


Figure 9: Analysis of "Fight On", as published on p. 385 of *The Sacred Harp*

Jargon. 8.7.

"Let us go down, and there confound their language, that they may not understand one another's speech." -- Gen. 11:7.

G Major. William Billings, 1778. William Billings, 1778.

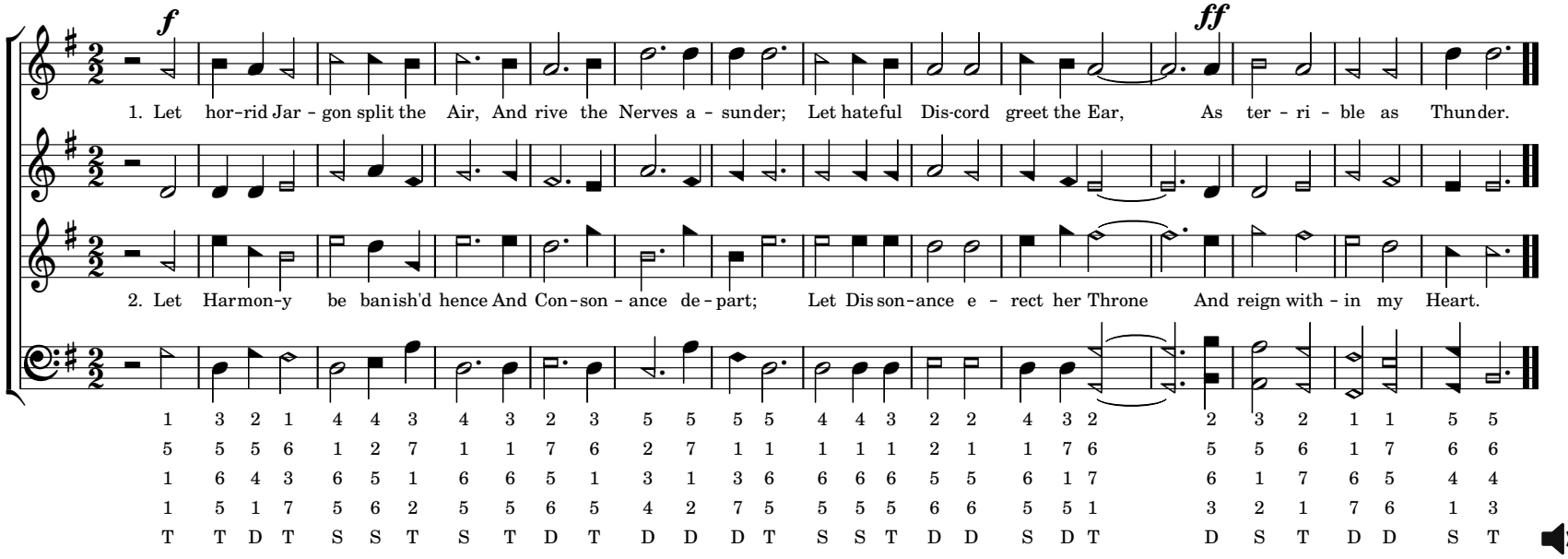


Figure 10: Analysis of William Billings, "Jargon", as published on p. 102 of *The Singing Master's Assistant*, 1778

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