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Prosodic Modeling for Hymn Translation

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ABSTRACT

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Prosody is known in linguistics as the “suprasegmental” features of language such as syllable stress and intonation. It is also known in the fields of poetics and musicology with alternate definitions and modeling practices. Concepts of prosody are further compounded when considering prosodic phenomena throughout the languages of the world. While the resulting lack of a universal concept of prosody may be tolerable in such a variety of paradigms, there is one paradigm that requires a unified model of prosody. This is the paradigm of hymn translation, which requires prosodic features to align not only musically, poetically, and linguistically, but also cross-linguistically. This thesis compiles existing practices of prosodic modeling in all these areas as well as the prosodic phenomena of a hymn corpus in order to construct a unified model of prosody that can guide the alignment of prosodic features when translating hymns. Though principally designed for the practical purpose of hymn translation, this model also offers theoretical considerations for the definition, nature, and modeling of prosody.

Keywords: prosody, suprasegmentals, phonology, textsetting, scansion

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Chapter 1: Introduction

Prosody is the "sung accompaniment" of language which typically includes phenomena such as syllable stress and intonation. It occupies a complex space that is both multimedial and multilingual, spanning the media of natural speech, metrical poetry, and music as well as the range of linguistic typologies throughout the world. The result is that prosody has been defined from a variety of vantage points, never landing on a cross-medial and cross-linguistic consensus that could be called a unified model of prosody. Hymn translation, however, presents a task wherein a unified treatment of prosody is required, as the prosody of a hymn's text and music must align while being transferred into a new language.

Despite a long-standing awareness of this fact, prosodic misalignments can be found in published hymn translations. For example, a Kekchi translation of the hymn "Come, Ye Children of the Lord" (*Hymns*, 1985)/"Ralal Xc'ajol li Ka̲cua'" (*Eb' li B'ich*, 2012) misaligns musical figures in the opening measure with Kekchi text. This raises the question of whether this translation is intuitively *singable* or if it is effortfully *learnable*—by training and habituation. The answer to this question holds implications as to what resources may be required for a translation to catch on in a community, making a hymn's singability of urgent interest at the outset of any hymn translation project. Given this state of affairs, this thesis proposes four hypotheses:

1) A unified model of prosody is possible—and necessary—within hymn translation.
2) Such a model can be constructed from the prior practices of existing models and from the prosodic manifestations of a hymn corpus.
3) This model can serve the practical purpose of producing prosodically aligned hymn translations.
4) This model can offer theoretical considerations for the definition, nature, and modeling of prosody in general.

To support these hypotheses, this thesis pursues three principal aims. The first aim is to construct a unified model of prosody that can inform the production of hymn translations whose text and musical settings align prosodically. This aim is achieved by conducting research to assemble a cross-disciplinary inventory of prosodic modeling practices in the fields of linguistics, poetics, and musicology. Next, a corpus of hymns is examined to identify the prosodic phenomena therein. Additionally, research is conducted to identify a core collection of prosodic features throughout the languages of the world. All of these precedents are used to ensure that the proposed model of prosody for hymn translation adheres to established best practices and empirically confirmed constraints.

The second aim of this thesis is to gather the results of applying the model to hymn translation in a specific target language, namely, the Kekchi (Q'eqchi') language of Guatemala. These results include a collection of prosodic misalignments that the model can identify and solve for the sake of Kekchi and potentially other languages.

Once constructed and tested on these terms, this model of prosody is not presented as theoretically optimal in terms of a universal concept of prosody, but as heuristically useful for the sake of hymn translation. Nonetheless, the third and final aim of this thesis is to identify where the proposed model does have touch points with areas of theoretical discussion and to point out its potential contribution to these areas. In so doing, this thesis aims to complete a cycle of theory feeding practice and practice feeding theory.

This thesis is divided into five chapters. Following this introductory chapter, <u>Chapter 2</u> contains a cross-disciplinary literature review that outlines practices of prosodic modeling in linguistics, poetics, and musicology, concluding with a summary of general practices in prosodic modeling.

<u>Chapter 3</u> introduces a methodology for constructing the model and then lays out the resulting model with an explanation of all its parts. The chapter then concludes with an explanation of why Kekchi is chosen as the model's test case and provides information about the prosodic properties of that language.

<u>Chapter 4</u> presents the results of applying the model to Kekchi. These results include the identification of challenges that exist in aligning Kekchi with hymn settings and the accommodation of solutions for those problems. Some foresight is also provided as to how these same problems and solutions may apply to other languages.

Chapter 5 is a concluding discussion that reviews the research purposes and how they are fulfilled throughout the chapters of thesis, thus providing final support for this thesis's model. The discussion also presents implications that are of interest in theoretical discussions about prosody's definition, nature, and modeling, and concludes by noting certain research gaps that this thesis leaves open to future study.

Chapter 2: Related Work

This chapter contains a cross-disciplinary literature review that outlines practices of prosodic modeling in linguistics, poetics, and musicology, concluding with a summary of general practices in prosodic modeling.

2.1. Prosodic Modeling and Hymn Translation

Prosody is the "sung accompaniment" of language which typically includes phenomena such as syllable stress and intonation (Fox, 2000). It has proven difficult to define uniformly and consistently (Arvaniti, 2012; Fox, 2000; Jun, 2006). This is because prosody occupies a complex space that is both multimedial and multilingual, spanning the media of natural speech, metrical poetry, and music as well as the range of linguistic typologies throughout the world. The result is that prosody has been defined from a variety of vantage points, never landing on a cross-medial and cross-linguistic consensus that could be called a unified model of prosody.

While the lack of a unified model of prosody may be forgivable and even permissible given such variety, one enterprise in particular requires a unified model of prosody. This is the process of hymn translation, wherein prosody must align not only musically, poetically, and linguistically, but also cross-linguistically, since hymn translations often aim to maintain the same musical settings across languages in order to unify a global body of believers (Gorlée, 2005).

The need for a unified model of prosody in hymn translation originates with the practical need for a hymn to be sung by a congregation of individuals—together—without any musical training, rehearsal, or explicit guidance (Barrett, 2018; Curwen, 1880; Halle & Lerdahl, 1993; Sydnor, 1960). In other words, the musico-linguistic utterance of a hymn must be intuitive at a conventional level. Among practitioners of textsetting (the craft of setting texts to tunes), this musico-linguistic intuitiveness—also called *singability* (Franzon, 2008)—is generally attributed to the alignment of musical and linguistic prosody (E. Bell, 2017; Gordon et al., 2011). This allows the "sung accompaniment" of language to match the actual musical accompaniment, ultimately making "the music of the words and the music itself [to be] one and the same" (Bernac, 1978). Hymn singability, then, requires the unification of linguistic and musical prosody.

Despite a long-standing awareness of this fact among textsetters, it is not always apparent that translators take it into account: prosodic misalignments can readily be found in published hymn translations. For example, a Kekchi translation of the hymn "Come, Ye Children of the Lord" (*Hymns*, 1985)/"Ralal Xc'ajol li Ka̲cua'" (*Eb Li Bich*, 1989) misaligns trochaic musical figures in the opening measure with iambic Kekchi text (see section 4.1 for further descriptions of these patterns). Although this misalignment could represent a conscious use of poetic inversion, it nonetheless raises the question of whether this translation is intuitively singable or if it is instead effortfully learnable—by training and habituation. The answer to this question holds implications as to what resources may be required for a translation to catch on in a community, making a hymn's singability of urgent interest at the outset of any hymn translation project.

Such projects range from an individual translating a single hymn to institutions producing *bilingual hymnals* (Chow, 2006; Ericson, 1974; Rudolf, 2016), *foreign edition hymnals* (Whittle Wrigley, 2012), or an *international hymnbook* that provides a uniform collection of hymns across several languages—a project currently being undertaken by The Church of Jesus Christ of Latter-day Saints (West, 2018). As such projects are wont to enlist diverse translation personnel, including translators and administrators who span a spectrum of prosodic awareness, a concise reduction of all prosodic events in a hymn(al), i.e., a unified model of prosody, could prove useful for establishing training materials and best practices to ensure the natural reception of translated hymns (the necessity of which could be questioned by further studies).

In addition to serving such practical purposes, theoretical purposes can also be served by this examination of prosody in hymn translation. Halle and Lerdahl (1993) have observed that "group singing in church services," as well as similar modalities like folksong singalongs, jump-roping songs, work songs, and marching chants, can function as "controlled environments" for theoretical study. These genres almost always involve the alignment of prosodic features across music and language, while other genres such as art songs or pop songs can make artistic use of prosodic misalignments, making them less reliable for examining how prosodic systems align. As a genre that makes regular use of prosodic alignments, and as a complete intersection of all of prosody's multimedial and multilingual modalities, hymn translation offers unique potential to serve as an ecological model from which to draw theoretical insights about the definition, nature, and modeling of prosody in general.

2.2. Approaches to Prosodic Modeling

Models of various types serve as important theoretical and empirical constructs in human exploration from the sciences to the arts, from architecture to fashion. This thesis builds on two conceptualizations of a model offered by Achinstein (1965) and Bell (1991). Achinstein (1965) describes four characteristics of a model: a set of assumptions, structural components, useful approximations, and analogical comparison. Bell (1991) likewise defines a model based on certain characteristics, including representationalism, specified components, and analogistic/heuristic function. The commonalities between these two researchers' definitions can be reduced to two broad characteristics: constituents and representations. In addition to these two features, models can also be characterized as containing a third feature: typologies. Though this characteristic may not be mentioned in explicit definitions of a model, it can be consistently observed in modeling practices. Typologies, alongside constituents and representations, will thus be included in this thesis's observations of different approaches to prosodic modeling.

2.2.1. Constituents

In support of the notion that a model includes constituents, several prior studies divide prosody into constituent collections, for example prosodic components and prosodic mapping units. These two terms will refer, respectively, to the features of prosody itself and to the segments to which prosodic events are mapped (musical notes, speech syllables, etc.). Table 1 compiles a sampling the different constituents that can be found in various studies of prosody. It demonstrates significant variation not only in the distinction of constituents but also in their naming, with unintended synonymy in terms like *tone* and *pitch*, *stress* and *accent*, and *timbre* and *color*. This inconsistency is perhaps the first issue that a unified model of prosody would need to address.

Table 1: Sample of Prosodic Constituents

Citation	Medium	Components
Crystal (1969)	Natural speech	tone, pitch range, pause, loudness, tempo, rhythmicality, tension
Couper-Kuhlen (1986)	Natural speech	loudness, duration, pitch, pause
Garding (1983)	Natural speech	accent, tone, intonation, boundaries
Ladd & Cutler (1983)	Natural speech	pitch, duration, intensity
Fox (2000)	Natural speech	length, accent, tone, intonation
Shapiro & Beum (1965)	Metrical poetry	timbre, stress, duration, pitch, pause
Palmer (2006)	Music	changes in frequency, amplitude, duration
		Mapping Units
Selkirk (1978), (1981)	Natural speech	feet, prosodic words, phonological phrases, intonational phrases, utterances
Hayes (1989)	Natural speech	words, clitic groups, phonological phrases, intonational phrases, utterances
Ladd & Cutler (1983)	Natural speech	syntactic units, syntactic boundaries
Dominicy (2009)	Metrical poetry	“metrons” (units of meter)
Shapiro and Beum (1965)	Metrical poetry	phones, syllables
Palmer (2006)	Music	notated pitches
Kennedy (1994)	Music	beats, beat groups, measures, phrases

2.2.2. Typologies

A second tendency in existing models of prosody, not mentioned by Achinstein or Bell, is to specify components and their attributes. For example, Kager (2007), among others, divides the component of stress into three values: primary stress, secondary stress, and tertiary stress. Other studies, however, divide the same component into different types, such as fixed or non-fixed stress (R. Goedemans & van der Hulst, 2013a) and phonetic stress or lexical stress (Hayes, 1995). Naming the different types and categories thus becomes useful. Table 2 presents a sampling of such typological categories and how they might be named, applying them to the prosodic components of accent, tone, and pause. A characterization of accent that differentiates between primary, secondary, and tertiary, for example, can be termed a typology of *degree*, while a description that differentiates between fixed and non-fixed stress could be termed a typology of *location*. Table 2 presents these categories and their manifestations as a mere sample of potential groupings—without the scrutiny of more careful definitions.

Table 2: Sampling of Prosodic Typologies

	Function	Degree	Mechanism	Range	Location
Accent	emphasis	primary/strong	stress	word	initial
	contrast	secondary/medium	pitch	phrase	second
	boundary marking	tertiary/weak	intensity		third
			duration		bounded/fixed
					unbounded/free
Tone	phonemic	high	fundamental frequency	word	phrasal
	non-phonemic	low		phrase	syllabic word
		mid			
Pause		strong	voiceless		word boundaries
		weak	voiced		phrase boundaries
			mixed		intermediate

A prosodic component such as accent can thus take on variations based on what function the stress achieves (perhaps semantic contrast), the degree to which the accent is executed (perhaps at a primary level or a secondary level), the mechanism used for achieving that accent (perhaps stress or a pitch change), the range of speech segments the accent covers (perhaps a single syllable or an entire phrase), the location of the accent (perhaps at the beginning, middle, ending of a word), and the sequence in which several accents occur (perhaps in an iambic pattern of alternating stressed and unstressed syllables).

Once a unified model of prosody establishes various existing components of prosody, these categories and their values are the second item to consolidate.

2.2.3. Representations

Representation, the second feature of a scientific model as defined by both Achinstein and Bell, finds a variety of manifestations in studies of prosody. This stems not only from the different vantage points of linguistics, poetics, and musicology, but from alternate perspectives even within these separate fields. Further complexity arises as representations vary both at the analytic level of individual prosodic events and on the synthetic level of prosodic frameworks. This same distinction is described by Trager (1941) with the terms “static” and “kinetic,” respectively.

In analyzing individual prosodic events, the field of music might represent a stress accent with a right angle bracket (>), while a poetic scansion might represent it with a caret (^) or a forward slash (/), and a linguistic annotation might represent it with a plus sign (+). Table 3 provides a further sampling of such representations, where the prosodic feature of stress is represented by Kager (1989) with a plus sign (+) to represent a stressed syllable and a minus sign (-) to represent an unstressed syllable. To indicate the same prosodic feature, but in the paradigm of metrical poetry rather than natural speech, Shapiro and Beum use a forward slash (/) and a dot (•) respectively. Such variety and overlap in analytic representations represent one of the clarifications that could be achieved by a unified model of prosody. Additionally, a unified model of prosody is an opportunity to coin representations that may not have been used to date.

Table 3: Sampling of Prosodic Representations at the Analytic Level

Citation	Medium	Component: Representation
Kager (1989)	Natural speech	Stress: + –
Beckman (1993)	Natural speech	Breaks: 0, 1, 2, 3, 4
O'Connor and Arnold (1970)	Natural speech	Tones: dots and lines
Shapiro and Beum (1965)	Metrical poetry	Stress: •, /
Common Practice	Music	Accent: >

At the synthetic level of prosodic frameworks, however, the variety can be reduced to two main categories: *linear* frameworks and *hierarchical* frameworks. Linear frameworks align prosodic events to sequential segments in a one-to-one relationship, whereas hierarchical frameworks allow prosodic events to span beyond a single segment within a sequence. While linear representations tend to employ left-to-right figures such as the barred measures of musical notation or brackets that delineate the span of a linguistic unit, hierarchical representations tend to employ grids or binary branching trees that can depict a prosodic event occurring across boundaries. More of these representational frameworks will now be outlined in section 2.3 of this thesis. In each case (linguistics, poetics, and music) we begin with standard definitions and various accounts of prosodic description, followed by a discussion of relevant constituents, typologies, and representations.

2.3. Models of Prosody in Linguistics

The definition of linguistic prosody often reflects its etymological origin: the Greek word προσῳδία (prosōidía), interpreted with meanings such as "a 'tune' to which speech is intoned" (Allen, 1973), or "'sung accompaniment,' implying that prosody is the musical accompaniment to … words" (Fox, 2000). Over time, more specific meanings have been identified, such as the "contoured streams of sound by which segments are voiced" (Greene et al., 2012). This latter definition still maintains a concept of musicality, i.e., "streams of sound," being applied to words, but breaks words into a more specified category called *segments*, which category becomes important in definitions of linguistic prosody. Segments, being the "phones … represented by … letters" (Greene et al., 2012) or simply the consonants and vowels represented in writing, are said to interact with *suprasegmentals* which are the sound systems such as accent and intonation that occur "above" the segments—beyond what the written segments alone represent. These suprasegmentals tend to be synonymous with linguistic prosody, and their definition thus correlates with prosody's linguistic definition.

Prosody, or the suprasegmental part of speech, is often defined in terms of its features, its functions, and its relationship to speech segments. As outlined in Table 1 (section 2.2.1), prosody's features can be identified in diverse ways which may include sound systems such as pitch, duration, loudness, and juncture (Greene et al., 2012), or simply stress, pitch, and quantity (Lehiste, 1970). Its functions can include assigning semantic meaning to an utterance and signaling a speaker's attitude (Crystal, 1969) or even producing coherence, making meaningful distinctions, and foregrounding information (Greene et al., 2012). Approached as suprasegmentals, these features and functions are given a relationship to speech segments that is "additional to or surpassing the segment" and are seen as "manipulations of [a segment's] inherent phonetic qualities" (Lehiste, 1970). As similarly stated by Crystal (1969), prosody is the "variables, or 'noninherent features' [of speech] which do not [affect] the identification of particular … segments" (Crystal, 1969). In other words, prosody can be seen as the non-altering variations of speech segments, whether a variation of stressing, lengthening, or changing the pitch level of a speech segment—without altering its fundamental identity.

While such notions support the original idea that prosody is the "music of speech," an autonomous system that is externally applied to language, problems with this view have been cited and alternatives have been suggested. Turk (2009) begins such observations by pointing out that speaking and singing are two different activities that are rarely (if ever) mistaken for the other, and that their purposes are fundamentally different. More specifically, she points out structural differences between music and speech, most notably that "musical structure is built primarily from isochronous [equally spaced] units that are hard to find in speech." Rather than uniting music and speech based on supposedly equal features, Turk (2009) and others such as Kehoe (2013) argue that it is better to define prosody based on its functions. This functional view of prosody results in defining prosody not as a system of features that are shared between language and music and externally applied to language, but rather as extra-lexical mechanisms for achieving such purposes as conveying lexical contrast, non-lexical meaning (surprise, etc.), and grouping or demarcating phrasal boundaries.

Whether defined by its features or its functions, or whether its nature is comparable to music, the modeling of prosody ultimately still involves propositions of its constituents, typologies, and methods for graphically representing prosodic phenomena. Nonetheless, varying practices in modeling prosody also reflect certain definitional approaches to prosody, as will be seen in the following sections of this chapter.

2.3.1. Constituents of Prosody in Linguistics

Comparing models of prosody in linguistics, poetics, and music requires identifying the major constituents into which each field divides prosody. These make up the broader definition of what prosody is, and thus provide the general touch points at which cross-disciplinary comparisons of prosody can be made.

Terminological inconsistencies aside, the major constituents of prosody in linguistic models comprise four main components: stress (force), rhythm (patterning of stress), tone (pitch), and intonation (patterning of tones). These ultimately represent two similar pairings: stress pairing with rhythm, and tone pairing with intonation. The relationship in these two pairs is that of analytic elements being subsumed in a synthetic continuum: stress and tone are analytic (or static) elements that are subsumed in the synthetic (or kinetic) continua of rhythm and intonation, respectively. In other words, stress and tone are single events, while rhythm and intonation are the overall pattern, shape, or contour formed by several such events. This conclusion can be drawn from the fact that some linguistic studies of prosody do not break stress or tone down into sub-constituents (they only assign them segmental mapping units such as the syllable), but rather treat them as the sub-constituents of rhythm and intonation, respectively. An example is in a statement by Arvaniti and Fletcher (2020) saying that “intonation consists of … tones ….” In sum, linguistics often treats stress and tone as isolated events while treating rhythm and intonation as the linear patterning of those events.

2.3.2. Typologies of Prosody in Linguistics

In linguistic studies, typological categories can be identified for all four major components of prosody. As previously outlined in Table 2, some of the categories that emerge in studies of linguistic prosody are categories of function, degree, mechanism, range, location, and sequence. In this section, categories for the four major prosodic components of stress, rhythm, tone, and intonation will be more comprehensively outlined. Importantly, these features are drawn from the languages of the world rather than any one specific language, making them especially relevant to the act of translating hymns into various target languages.

Stress is perhaps the most diverse component of prosody, as it spans all the categories previously mentioned. Table 4 provides a collection of the various types of stress identified in linguistic studies, organized according to typological categories with accompanying definitions.

Of these stress types outlined in Table 4, the most prone to require consideration when translating hymns are those in the categories of function and location. Languages that require stress to occupy a certain location, often in order to fulfill a certain function, present unique constraints in the placement of text with musical stress patterns. Additionally, stress types in the mechanism category can present special challenges in hymn translation, as the mechanisms of stress in certain languages may not align with the mechanisms of stress in the musical settings of hymns.

Table 4: Typologies of Linguistic Stress

Typological Category	Type	Definition
FUNCTION	Phonemic	Stress used to differentiate the meaning or grammatical class of a word
	Demarcation	Stress used to mark the beginning or ending of a linguistic unit such as a word (R. Goedemans, 2010)
	Emphatic	Stress used to give emphasis to a linguistic unit such as a word or phrase, for expressive purposes
DEGREE	Primary	The relatively strongest stress within a three-tiered measurement of stress strength
	Secondary	The relatively middle stress in a three-tiered measurement of stress strength
	Tertiary	The relatively weakest stress in a three-tiered measurement of stress strength
MECHANISM	Loudness	Stress achieved by increasing the volume of a speech unit
	Duration	Stress achieved by extending the length of a speech unit
	Pitch	Stress achieved by applying a certain pitch or frequency to a speech segment (Bolinger, 1972, 1985)
RANGE	Word	Stress that occurs within the boundaries of a word
	Phrase	Stress that occurs within the boundaries of a phrase
	Sentence	Stress that occurs within the boundaries of a sentence
LOCATION	Free	Stress that does not always occur in the same position
	Fixed	Stress that always occurs in the same position
	Initial	Stress that occurs on the first syllable of a word
	Second	Stress that occurs on the second syllable of a word
	Third	Stress that occurs on the third syllable of a word
	Ultimate	Stress that occurs on the ultimate syllable of a word
	Penultimate	Stress that occurs on the penultimate syllable of a word
	Antepenultimate	Stress that occurs on the antepenultimate syllable of a word (van der Hulst, 2014)

Rhythm, the next feature of prosody after stress, does not take on the categories of function, degree, mechanism, range, or location. While all of these categories can function as features of rhythm, they do not function as types of rhythm. Rather, rhythm has traditionally been treated in terms of timing, with some languages being classified as syllable-timed and others as stress-timed. This timing refers to how the length of speech segments is allocated in a given language. In syllable-timed languages, all syllables are pronounced in full, making the time it takes to speak any given utterance wholly dependent on the number of syllables. Stress-timed languages place stressed syllables at equidistant locations in time, expanding and contracting the pronunciation of intermediary syllables in order to maintain a regular placement of stressed syllables in time. This equidistant placement of stressed syllables is also known as *isochrony*. Though this traditional approach of viewing of rhythm in terms of syllable timing and stress timing has lacked empirical support (Arvaniti, 2012), it has maintained a place in linguistic thought. A more empirically supported view of linguistic rhythm types is provided by Goedemans and van der Hulst (2013b), who, by observing reported rhythmic patterns in the languages of the world, identify two main types of linguistic rhythm, described by two traditional terms: trochaic and iambic. These two rhythm types are most basically defined as patterns composed of two syllables, with trochaic stressing the first, and iambic stressing the second. Just as entire languages have been classified as either stress-timed or syllable-timed, Goedemans and van der Hulst (2013b) classify languages as either trochaic or iambic, with data to show that the majority of languages are trochaic in their rhythmic patterning (though this patterning in natural speech may not always be maintained in poetry and song).

The next feature of linguistic prosody, tone, is more like stress in that it also takes on several typological categories. As pointed out by Hyman and Leben (2020), all languages use tone if what is meant is the pitch variations that are unavoidably present in all speech. Given this unavoidable variation and its different motivation from language to language, the categories of linguistic tone can add up to at least three: function, degree, and range. Table 5 outlines these categories with a definition of certain resulting tone types.

Of the tone categories outlined in Table 5, function and degree are the most important to consider when translating a hymn, as a hymn's musical setting will impose tones of a certain degree onto each speech segment, requiring coordination with any tones that function phonemically or even demarcationally (List, 1961).

Table 5: Typologies of Linguistic Tone

Typological Category	Type	Definition
FUNCTION	Phonemic	Tone used to differentiate the meaning or grammatical class of a speech segment
	Paralinguistic	Tone used to express paralinguistic messages, such as surprise
	Demarcation	Tone used to mark lexical, morphological, or syntactic boundaries
DEGREE	High	The relatively highest tone within a three-tiered measurement of tone
	Mid	The relatively middle tone within a three-tiered measurement of tone
	Low	The relatively lowest tone within a three-tiered measurement of tone
RANGE	Mora	Tone that pertains to a mora
	Vowel	Tone that pertains to a vowel
	Syllable	Tone that pertains to a syllable

The final feature of linguistic prosody, intonation, is like rhythm in that it does not take on typological categories but is nonetheless divided into types. These are also types of patterning, and in the case of intonation, they describe the different sequences that can occur when transitioning from one tone height to another (such a sequence can also constitute a single tone in some languages). These transitional sequences are often referred to as contours, which Trager (1941) divides into three types: *Crescent* contours rise to a higher pitch level, *minuent* contours fall to a lower pitch level, and *constant* contours maintain the same pitch level. Studies have further divided these contours into specific patterns based on which tone heights are involved. Trager (1941) went as far as dividing each of these main contours into three specified contours, totaling nine specified contours including low to mid, low to high, mid to high, etc. Pike (1963), on the other hand, ascribes pitch to four levels, which results in an identification of some thirty contour types as pitches rise and fall from certain levels within this four-tiered tonal system.

In hymn translation, the needed amount of tone tiers and contour types would be determined by the collection of pitches and contours within a given hymn's musical setting. Because each hymn would thus require its own treatment of intonation, identifying a general model of intonation for all hymnody seems unwieldy. However, identifying the needed tiers and contours throughout a defined corpus of hymns could allow an overall system to be identified for that specific corpus. It may be that the tones and contours therein could be reduced to three or four levels, as done in the linguistic models cited here. It may also be that such generalized tone levels could be mapped out by the use of Parsons Code (1975), a simple system for tracking the upward, downward, and repeated motion of pitches in a melody.

2.3.3. Representations of Prosody in Linguistics

In the field of linguistics, prosodic modeling finds its place in the branches of phonology and phonetics. For this reason, prosodic modeling often reflects different phonological theories. As outlined by McCarthy (1982), phonological theories have followed an evolution from linear frameworks to nonlinear frameworks, resulting in four separate approaches: linear phonology, metrical phonology, autosegmental phonology, and autosegmental metrical phonology. Because models of linguistic prosody have followed suit over time, these phonological theories are presented here as being characteristic of prosodic models.

Linear phonology treats speech sounds in a sequence of discrete units, relating any simultaneous phenomena in the one-to-one relationship of a bundled group. An early example is in the work of Kingdon (1959), who paired lines of text with dots and wedge shapes to capture the sequential rising, falling, and contouring of English intonation, typically in a one-to-one relationship with individual words. A more definitive example of linear modeling, however, is the monumental treatise of Chomsky and Halle (1968) entitled *The sound pattern of English* (hereafter SPE). In the SPE model, brackets are used to represent syntactic units such as words and morphemes. The sounds of speech (segments/phones/consonants/vowels) are then placed within those brackets based on which syntactic unit they pertain to. An example of this bracketing framework is presented in Figure 1, which groups all the phonetic events of the sentence "The book was in an unlikely place" into the bracketed units of sentence

(S), noun phrase (NP), determiner (D), noun (N), verb phrase (VP), prepositional phrase (PP), preposition (P), and adjective (A), with the hash tag (#) marking syntactic junctures such as word boundaries and morpheme boundaries.

Figure 1: Bracketing Framework

[S# [NP# [D ***the***]D [N#***book***#]N #]NP [VP #***was*** [pp # [P ***in***]P [NP# [D ***an***]D

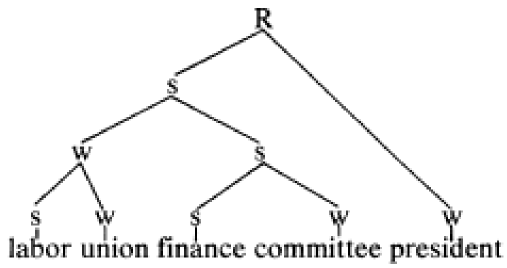
[A #***un*** [A #***likely***#]A #]A [N #***place***#]N #]NP #]PP #]VP #]S

Chomsky, Noam & Morris Halle. 1968. *The sound pattern of English*. pg. 370.

As the linear approach in Figure 1 focused on the organization of sound patterns at the segmental level of consonants and vowels, it was later shown to be deficient in organizing sound patterns at the suprasegmental level of prosody. The deficiency mostly centered around the fact that elements of prosody often need to map to broader units that cross the syntactic boundaries established by linear brackets. Such limitations must be taken into account when considering how to construct a unified model of prosody and are thus outlined in the ensuing sections of this thesis.

As linear systems like Chomsky's tended to restrict the range of prosodic phenomena too tightly to linear structures, new proposals for nonlinear or hierarchical representations emerged, all pertaining to the approach known as metrical phonology. Liberman and Prince (1977), Selkirk (1978; 1981), and Pierrehumbert (1987) advanced the use of binary branching trees as a superior framework for representing linguistic prosody, most especially the prosodic components of stress and rhythm. A nonlinear, binary branching tree introduced the ability to "provide mapping from phonological elements to continuous acoustic parameters" (Ladd, 2008), and it did not restrict phonological events to singular segments of speech. Figure 2 depicts a binary branching tree demonstrating stress of strong (S) and weak (W) mapped at the level of individual words as well as phrases, culminating in an overall rhythm (R).

Figure 2: Tree Framework



Liberman, Mark & Alan Prince. 1977. On Stress and Linguistic Rhythm. pg. 259.

In addition to binary branching trees, metrical phonology also introduced grids as a framework for representing phonological material. Both Prince (1983) and Hayes (1983) have argued for the superiority of the grid for certain representational purposes. Prince argued that "surface structure (words and phrases) should be related directly to the grid, without … trees," while Hayes argued that "aspects of stress … are embodied not in metrical trees … but rather in metrical grids …." In a metrical grid, a set of words is situated alongside tiers of X's that indicate the stress prominence of each syllable. The more stacked/vertical X's to a syllable, the more prominent that syllable is in terms of stress. Figure 3 presents how such a grid would outline the stress prominence of the phrase "labor union strike force."

Figure 3: Grid Framework

```
                    x
x                   x
x        x          x      x
x   x    x    x     x      x
labor union strike force
```

Compare to Prince, Alan S. 1983. Relating to the Grid. pg. 30.

As these contributions of metrical phonology provided a framework especially useful for representing stress and rhythm, autosegmental phonology then provided a framework especially useful for representing tone. SPE lacked tonal data other than referring to the theory of tone by Wang (1967), which was rejected and revised progressively in theories by Woo (1969), Williams (1976), and Leben (1973). In all of these theories, however, tone was associated too inherently with speech segments (consonants and vowels). The resulting solution was proposed by Goldsmith (1976b)) and Haraguchi (1976), who represented different classes of features (such as tone) as occurring on separate tiers where, though they could be correlated, remained independent of the other tiers. In a word, the independence of these tiered features from consonants and vowels was *autosegmental* (autonomous from the segments). An example of the autosegmental framework is presented in Figure 4, which uses the *archisegments* "bababababa" to demonstrate how the segments of a word can be placed on the segmental tier and then correlated with high tones (H) and low tones (L) by connecting lines.

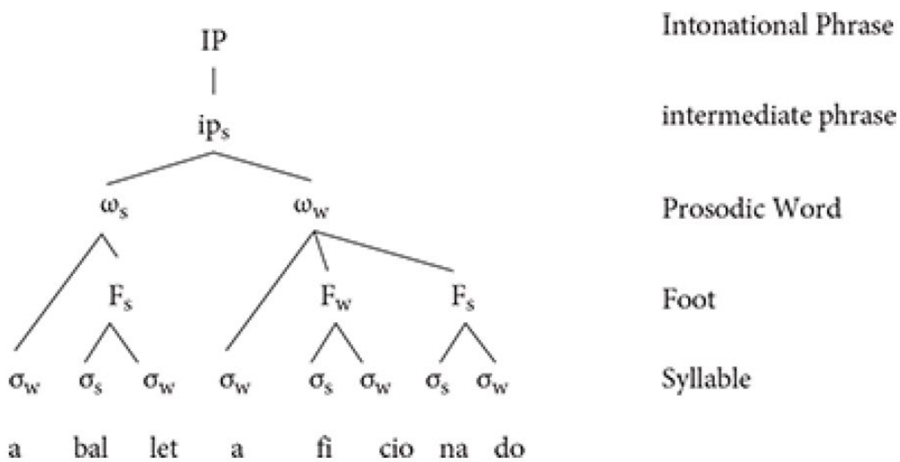
Figure 4: Autosegmental Framework

McCarthy, John J. 1982. Nonlinear phonology: An overview.

In addition to being useful for representing tone, the tiered framework of autosegmental phonology has proven to be useful for representing other phenomena such as nasal harmony (Goldsmith 1976a, 1976b) and vowel harmony (Vergnaud 1977, 1980). This versatility of autosegmental models is of interest in this thesis's aim to create a specialized model of prosody, as it holds potential to correlate various aspects of prosody with text.

To achieve a phonological representation of intonation, metrical phonology and autosegmental phonology were combined in a theory known as autosegmental-metrical intonational phonology. The combination consists of capturing relative prominence (a matter of metrical stress) and phrasing (a matter of prosodic structure) in the same representation. Figure 5 shows the text "a ballet aficionado?!" being captured in this combined representation, in which "syllables are grouped into feet, which in turn are grouped into prosodic words," and in which "prosodic words are grouped into one intermediate phrase (ip)" (Arvaniti & Fletcher, 2020), with constituents marked as either strong (s) or weak (s).

Figure 5: Combined Framework for Metrical Stress and Prosodic Structure



Arvaniti, A., & Fletcher, J. (2020). The Autosegmental-Metrical Theory of Intonational Phonology

Though a model of prosody for hymn translation may not require an analysis of all these levels of prosody, it will nonetheless need to capture more than one level of prosody as musical and textual prosody combine. In this respect, a model of prosody for hymn translation will need to emulate the achievement of the autosegmental-metrical framework (see section 3.2.1 of this thesis).

2.4. Models of Prosody in Poetics

A difference exists in the way linguistics defines prosody and the way poetics defines prosody. While linguistics treats prosody as "suprasegmental" features of speech such as rhythm and intonation (Lehiste, 1970), poetics sometimes addresses prosody solely as the organization of those features and not as those features themselves. This treatment of prosody refers to the different methods of organization as prosodies, which can be broken into different classes such as “verse prosody” or “prose prosody” (Turco, 2012). In this way, poetry that uses fixed patterns of regularized rhythm can be differentiated from poetry that does not use such fixed patterns.

Despite this definitional difference, poetics still yields offerings of prosodic modeling that are comparable to those of linguistics. While treating prosody as distinct methods of organizing suprasegmental features, poetics incidentally offers constituents, typologies, and representations of those suprasegmental features.

With this definitional difference acknowledged, this thesis will proceed by using the term *prosody*, even within the context of poetics, as referring to the suprasegmental features of speech.

2.4.1. Constituents of Prosody in Poetics

An example of a single work that treats poetic prosody in a comprehensive way is Shapiro and Beum’s *A Prosody Handbook* (1965). Here, Shapiro and Beum identify five major components of prosody: color (also termed *timbre*), stress, quantity (also termed *duration*), pitch, and silence (also termed *pause*). They also identify stress, duration, and pause as three of the four major components of rhythm, with phrasing being the fourth. Not only does this align with the major components that linguistic studies tend to identify for prosody, but it also aligns with the tendency in linguistics for rhythm to break into units of its own, as observed in section 2.3.1., further validating the treatment of rhythm as a synthetic feature of prosody in which stress resides as an analytic property.

Poetics also manifests a distinction between the components of prosody and the mapping units of prosody (see section 2.2.1.). Among such mapping units are the phone (a single consonant or vowel), the syllable, and the foot (sometimes called the *metron* (Dominicy & Nasta, 2009)). Perhaps the most unique of such mapping units found in poetry is the *line*, which organizes text according to prosodic patterns rather than syntactic patterns. Fabb and Halle (2009) identify this organization of text into lines as the definitive difference between prose texts and verse texts. This organization by lines ultimately plays a role in the fact that poetics does not map prosodic features to syntactic constituents such as the utterance, the phrase, the clitic group, or the word, as done in the linguistic studies of Selkirk (1981) and Hayes (1983).

2.4.2. Typologies of Prosody in Poetics

Given Shapiro and Beum's five major components of poetic prosody (color/timbre, stress, quantity/duration, pitch, and silence/pause) as well as the prosodic mapping units found generally throughout treatments of poetic prosody (phones, syllables, feet, and lines), certain typologies of prosody can also be identified in poetics. Shapiro and Beum offer typologies of their five major components, and typologies of other components and mapping units can be found interspersed throughout other studies.

Shapiro and Beum's first prosodic component, "color," is given attributes of resonance (prolongation and fulness of sound), harshness (use of velars), plosiveness (use of stops), breathiness (use of aspirates, sibilants, and fricatives), and liquidity. While these categories certainly manifest attention to items of linguistic interest, the overall component of "color" represents a more poetic interest than a linguistic one. Shapiro and Beum's other components of prosody, however, do align more clearly with linguistic components. Shapiro and Beum give stress features of degree, such as primary and secondary stress. They give quantity the binary attributes of long and short. Pitch is similarly divided into a binary attribute of highness and lowness, and one type of rhythm is cited: isochrony (the equidistant spacing of stressed syllables, mentioned in section 2.3.2 of this thesis). These typologies are reflected so universally in other studies of poetics that choosing any specific example as an additional attestation is not required here.

Typologies of mapping units are also present in poetic studies of prosody. One example is in viewing metricality as a unique aspect of the syllable. Kiparsky (1977) calls certain syllables "extrametrical," meaning that they are beyond the assigned syllable count for a certain line of verse, while other syllables that do pertain to the expected syllable count could be called *metrical* syllables. The next mapping unit in poetic studies, the foot, tends to comply with the more traditionally known categories of rhythm, including iambic feet, trochaic feet, anapestic feet, etc. The broadest mapping unit, the line, also tends to manifest traditional categories of length such as tetrameter and pentameter, which express how long the line is in terms of how many feet it contains.

2.4.3. Representations of Prosody in Poetics

Prosodic representation in poetics is found in the practice known as scansion, which superimposes graphic representations of prosodic elements like stress above a line of text to indicate which syllables align with those prosodic features. Classical scansion involving Latin and Greek focuses on capturing syllable length, with a level macron often being used to indicate a long syllable and a curved breve to indicate a short syllable (Randel, 1999). Scansion of English poetry, on the other hand, usually focuses on capturing syllable stress and has used various representational symbols to capture it. Shapiro and Beum (1965), for example, use a dot to indicate a non-stress, a slash to indicate a primary stress, and a double slash to indicate a secondary stress. Table 6 compiles a sampling of such representations, along with those used by other scansionists. These include numeric representations that harken back to the linguistic work of Bloch and Trager (1942).

Table 6: Representations of Stress Used by Various Scansionists

	Hamer (1954)	Shapiro and Beum (1965)	Turco (1986)	Wright (1988)	Corn (1997)
Tertiary/Weakest Stress	X	•	˘	˘	1
Secondary Stress	\	//	\	\	2
Primary/Strongest Stress	/	/	/	/	3

Other scansion methods use a binary representation that designates syllables as only stressed or unstressed without any indication of other stress degrees. Such scansion systems maintain that representing rhythm is different from representing meter, the former being that which requires a fuller representation of phonological possibilities, and the latter being that which is satisfied by a binary system (Brogan, 1981). These binary scansions often use the curved breve to represent unstressed syllables and the slash to represent stressed syllables.

While scansions tend to solely represent stress patterns, Chatman (1956) offers an example of including other prosodic elements such as pitch and pause. To capture pitch, he uses a numerical representation, and to capture pause, or juncture (the relative connectedness of segments), he uses a hashtag (#) for strong breaks and a vertical pipe (|) for weaker breaks, as seen in Figure 6:

Figure 6: Chatman's Scansion including Stress, Pitch, and Juncture

˘	˘	/	˘	˘	^	˘	^	˘	/	˘	/
^{2}There	was	^{3}ne	ver	a	sound^2 |	^{2}be	side	the	wood^2 |	^{2}but	^{3}one#

(Reduced scansion provided by Wikipedia: *Scansion*)

Considering the representational methods of linguistic phonology (see section 2.3.3), poetic scansion qualifies as a linear framework, as it sequentially represents prosodic events in a one-to-one relationship with prosodic mapping units (syllables).

2.5. Models of Prosody in Music

Just as the term *prosody* can have a unique meaning in poetics, it can also have a unique meaning in music. In addressing the definition of musical prosody, Palmer and Hutchins (2006) point out that in both language and music, some "acoustic properties" can "be manipulated without changing the categorical information (the words as they might be written or the musical pitches as they might be notated)," and that in both language and music prosody entails those "acoustic variations" that maintain those "categorical distinctions." In other words, Palmer and Hutchins (2006) define prosody in both language and music as the variations or manipulations that can be applied to fixed elements without altering the identity of those fixed elements. For example, stress can be applied to or removed from a syllable without changing the identity of that syllable just as it can be applied to or removed from a musical note without altering its identity. By this view, stress is a non-altering variable, and thus prosodic.

While this definition of prosody appears to unite linguistic and musical prosody, it instead introduces a serious point of divergence between the two: rhythm and intonation can function as non-altering variables only in language, whereas changing the rhythm or the intonation of a musical passage essentially changes the musical sequence. This effectively removes rhythm and intonation from musical prosody's core constituents. This major compositional difference gives rise to the question of whether prosody can be considered the same phenomenon in both language and music. By the same token, the question also arises of whether linguistic prosody, with its core constituents all manifesting musically, is simply synonymous with music itself, and whether it is thus *suprasegmental* to language—separate from and externally applied thereto. In short, this is the question of whether prosody is an inherent or an autonomous property.

This ambiguity as to whether prosody is synonymous with music makes it questionable to discuss prosody *in* music. As this thesis does not seek to resolve this ambiguity but rather to find points of comparison between linguistic and musical models of prosody, the concept of prosody *in* music will be acknowledged as problematic, but will still be used here for practical purposes.

2.5.1. Constituents of Prosody in Music

Lerdahl and Jackendoff (1983) define five basic constituents of Western music: rhythmic organization, pitch organization, dynamic differentiation, timbral differentiation, and motivic-thematic processes. Though not a treatment of musical prosody per se but rather of music itself, these constituents reflect the same constituents discussed in linguistic and poetic studies of prosody, which respectively use alternative terms like rhythm, intonation, loudness, color, and phrasing (though the linguistic concept of phrasing may more closely align with Lerdahl and Jackendoff's concept of *grouping*). These constituents, while not called *prosody* in music, can more precisely be described as *linguistic prosody* in music.

As with linguistics and poetics, some studies in music focus not on a wholistic description of prosody but on specific elements of prosody, and in doing so specify subcomponents of prosody. One such study in music is by Cooper and Meyer (1963), who divide rhythm into three main components: pulse (regular identical beats), accent (markedness), and stress (intensification). These three components of rhythm have the same identity in linguistics and poetics, but not the same manifestation: pulse relates only to metrical poetry, not to natural speech. Nonetheless, these similarities also allow musical rhythm to be classified as an element of linguistic/poetic prosody in music.

Given the definitional difficulties described above, elements of prosody can be identified in music when musical prosody is defined as the non-altering variables of music. Functioning from this vantage point, Palmer and Hutchins (2006) identify frequency (pitch/tone), amplitude (loudness), and duration (length) as the main constituents of musical prosody (which are interestingly the same components that linguistics often identifies as the "suprasegmentals" of language). However, they do not identify these three items as prosodic elements per se. Rather, they identify *changes* in these elements as musically prosodic. In other words, Palmer and Hutchings identify changes in frequency, amplitude, and duration as the three manifestations of musical prosody. In this view, musical prosody is reduced to techniques of expressivity that, by changing frequency, amplitude, or duration can achieve functions of segmenting, highlighting, coordination, and emphasis. This effectively defines musical prosody not as an entity of features (components), but as an entity of functions, as advocated by Turk (2009).

However they are defined, prosodic events in music also include mapping units with which they are associated, as seen in the overall constituents of linguistic and poetic prosody. As already cited from Palmer and Hutchins (2006), these musical mapping units can include "musical pitches as they might be notated" as well as "beats, accents, measures, … [and] phrases" (Kennedy, 1994). Such mappings and their units are demonstrated in section 2.5.3, wherein methods of representing prosody in music are discussed.

2.5.2. Typologies of Prosody in Music

While the prosodic features of stress, rhythm, tone, and intonation find counterparts in music, definitional differences do arise. This interplay of counterparts and varying definitions results in typologies that are both comparable and contrastive with those observed in linguistics and poetics.

As is true for linguistics and poetics, music also recognizes that stress and accent can be defined differently. Simply put, the difference is that stress is a matter of physiological force (Allen, 1973; Randel, 1999) and accent is a matter of contrastive emphasis or markedness (Bolinger, 1986; Randel, 1999). For this reason, stress tends to be subsumed as a mechanism of the broader category of accent. Randel (Randel, 1999) divides accent into three categories: dynamic accent including stress (based on volume), tonic accent (based on pitch), and agogic accent (based on duration). Thus identified, musicology does not divide stress (dynamic accent) into any variations of degree (loud, louder, etc.) but rather into duration and contour. Duration includes two types of stress: an unnamed category that could be called a default stress, which is not lengthened or shortened beyond what the notation naturally indicates, and the marcato stress, which involves shortening the duration of the stressed note (Randel, 1999). Contour in stress also involves just two types: another unnamed type that could be called the default contour, meaning that it involves no rising or lowering amplitude, and the sforzando stress, which is a stress that takes on a sharp contour of loudness falling immediately to quietness (Randel, 1999). In sum, stress takes on two binary properties in music: default/marcato (duration) and default/sforzando (contour).

The broader prosodic feature of rhythm stems from a common practice in music of defining it as the organization of time, or temporal organization (Cooper & Meyer, 1963; Randel, 1999), resulting in essentially different methods of organization that fall into two broad categories: strictness and concurrency (a term coined here in this thesis). Strictness divides into two rhythmic types: strict rhythm (also called metrical rhythm or even “verse rhythm”) and free rhythm (also called non-metrical rhythm or even “prose rhythm”) (Kennedy, 1994). Strict rhythm organizes beats and accents into regular units of two or three pulses, while free rhythm involves “no perceptible unit of measurement” (Kennedy, 1994). Since regularly spaced stresses are what define the sequence of these units, strict rhythm in music is comparable to the concept of isochronic or stress-timed rhythm in linguistic prosody. The property of rhythm that is more unique to music, however, is that of concurrency. Concurrency refers to how many rhythmic sequences occur at once, with the possibility of being either homorhythmic or polyrhythmic. While polyrhythms are broadly used throughout all kinds of music (Kennedy, 1994; Randel, 1999), they do not have a documented place in language other than in sung texts wherein music becomes the means of introducing the polyrhythmic context.

Music does not distinguish tone, in the sense of pitch, into components of function (phonemic, nonphonemic, etc.) or of level (high, low, etc.) as is done in language and poetry. Only in the sense of “the character of sound” (Randel, 1999) does music offer values of tone, such as “sweet tone,” “harsh tone,” or “dry tone” (Kennedy, 1994). The result is that tone in music is more analogous to the prosodic component of “color” identified by Shapiro and Beum (1965) for poetry, whose properties of harshness and resonance correspond with those just mentioned.

Intonation in music likewise fails to find a direct analog in language or poetry, as music does not make the linear flow of pitch changes into a distinct property as is done in language or poetry. The linear flow of pitch changes is rather seen as the music itself, making it an inherent property rather than an autonomous property, as attested by the fact that the term *intonation* is often used in music to mean the very act of sounding music (Kennedy, 1994). For this reason, intonational characteristics of ascending or descending contours are not identified for music as they are for language. For this same reason, an argument arises for prosody relating synonymously to music and suprasegmentally to language.

2.5.3. Representations of Prosody in Music

Given the question of whether prosody is synonymous with music, the question also arises of whether musical notation in its entirety is a representation of prosody. As a result, all features of musical notation must be considered when surveying representations of prosody in music. In the conventionalized practices of Western music, Randel (1999) identifies four major elements that are represented in musical notation: pitch, duration, timbre, and loudness, with pitch and duration being the principal interests of the system.

In representing the two principal elements of pitch and duration, Randel (1999) points out that the familiar five-lined musical stave is in effect a graph with a horizontal axis for representing duration in a left-to-right spatiality and a vertical axis for representing pitch in an up-and-down spatiality. This grid, as it were, is a synthetic framework that hosts the analytic representation of several other musical phenomena. Both duration and pitch are depicted thereon with "the rounded head of a symbol termed a note" (Randel, 1999) whose shape or coloring, along with adjoined stems and flags, specify its duration, while its vertical placement on a given line or space within the grid indicates its pitch. This musical pitch differs from linguistic pitch/tone in that is a fixed frequency that does not vacillate, so much so that it can be defined with an absolute F0 (fundamental frequency) measurement, whereas linguistic tone is not "uttered on a fixed pitch" but with "continuous rise and fall" (Kingdon, 1959). Musical duration also differs from linguistic duration in that it can be either relative (longer or shorter than surrounding material) or absolute (metronomically measured by the precise passage of time), the latter being represented by a numeric count of beats per minute.

Randel (1999) identifies timbre as a matter of instrumentation and articulatory techniques, and as such it does not necessarily find graphic representation on the musical stave. Instrumentation is rather indicated in textual notes near to the stave or off the musical score altogether, while articulatory techniques such as certain violin bowings can be indicated symbolically above the corresponding notes on the stave—or not represented at all. A parallel with linguistic timbre or poetic "color" (Shapiro & Beum, 1965) can be seen here: articulatory measures for timbre in language can be represented either symbolically with diacritical marks such as a tilde for nasalization, or not at all, as in the lack of a tilde to differentiate between the nasalized vowel in *fang* and the non-nasal vowel in *fat*.

Loudness, Randel's third major element of musical notation, is what he calls the "least specified" of them all, with its representational symbols being left to a "relatively small number of words and abbreviations" placed above or below the stave, such as ***pp*** (softer), ***p*** (soft), ***mp*** (less soft), ***mf*** (less loud), ***f*** (loud), and ***ff*** (louder). Analogous representations of loudness are not to be found in linguistics or poetry unless it be in the context of analytical observations beyond standard writing, such as poetic scansion.

Music also makes use of certain representational symbols beyond those found in standard notation for the purpose of more macro-level analyses. One example is the marking of musical units known as phrases—a unit of musical syntax that evidences "our strong instinctive feeling that that speech and music … are closely analogous" (Lidov, 1975). Though standard musical notation uses bar lines at regular intervals to divide the music into the rhythmic units known as measures or bars (Kennedy, 1994), it is recognized that musical phrases both extend beyond these bar lines and occur within them. One graphic representation commonly used to illustrate the musical phrase is an arc, whose boundaries and curves effectively represent the beginning, development, and conclusion of musical phrases.

Ultimately, the representational devices used in musical notation share commonalities with the representational practices of linguistics and poetics. These commonalities lie in what phenomena are selected for representation and whether they are designated as standard or extra notation. As music selects pitch and duration for standard notation and relegates timbre and loudness to optional or extra notation, language likewise selects intonation (including pitch) and rhythm (including duration) as standard elements of prosody and excludes color (timbre) and force (loudness) from standard orthography. Such representational designations indicate whether properties are considered inherent or autonomous and how language and poetry relate with the concept of prosody.

2.6. Summary of Prosodic Modeling Practices

As noted throughout this chapter, the differences between linguistic, poetic, and musical models of prosody involve differences in the definition, nature, constituents, typologies, and representations of prosody. The most divergent differences are those involving prosody's definition and nature, while the other differences are often justifiable based on varying contexts and purposes.

The definition of prosody differs across all three fields of linguistics, poetics, and musicology. Linguistics tends to treat prosody as those properties of speech that can be varied without changing the identity, semantics, or grammatical role of phonemes and words (Crystal, 1969). These tend to include features such as stress (physiological force), rhythm (the pattern of stresses), tone (pitch), and intonation (the pattern of pitches). Poetics treats prosody not as those features themselves, but as the organization of those features, whether as a fixed organization (as in verse writing) or a non-fixed organization (as in prose writing) aimed at a certain artistic intent (Turco, 2012). Similar to linguistics, musicology includes non-altering variables in its definition of prosody—variables such as tempo, amplitude, and duration—but does not define prosody as those features themselves. It rather defines prosody as changes in those features, which changes are designed to achieve expressive and segmenting functions (Palmer & Hutchins, 2006). As a result, definitions of prosody differ overall in whether they define prosody by its features or by its functions (Turk, 2009).

The nature of prosody evokes one major question: Is it an inherent property or an autonomous property? The issue is mostly confined to language and music, wherein linguists ask whether properties like stress and tone are "suprasegmental" (externally added to consonants and vowels) or "segmental" (inherently part of consonants and vowels), and whether those features of speech are synonymous with music (Turk, 2009).

With these differences of definition and nature still unresolved, and with a broad variety of terminology and representational devices still intact, the commonalities of prosodic modeling in all three fields of study are most readily observed at a general level. These commonalities, or principles, are listed in Table 7.

Table 7: Principles of Prosodic Modeling

1. Models of prosody include constituents.
2. Constituents of prosody include prosodic components and prosodic mapping units.
3. Models of prosody include typologies of constituents.
4. Constituent typologies can be divided into typological categories.
5. Models of prosody include graphic representations.
6. Graphic representations of prosody include analytic symbols and synthetic frameworks.

In the next chapter of this thesis, these principles set the foundation for constructing a model of prosody specifically for the context of translating hymns.

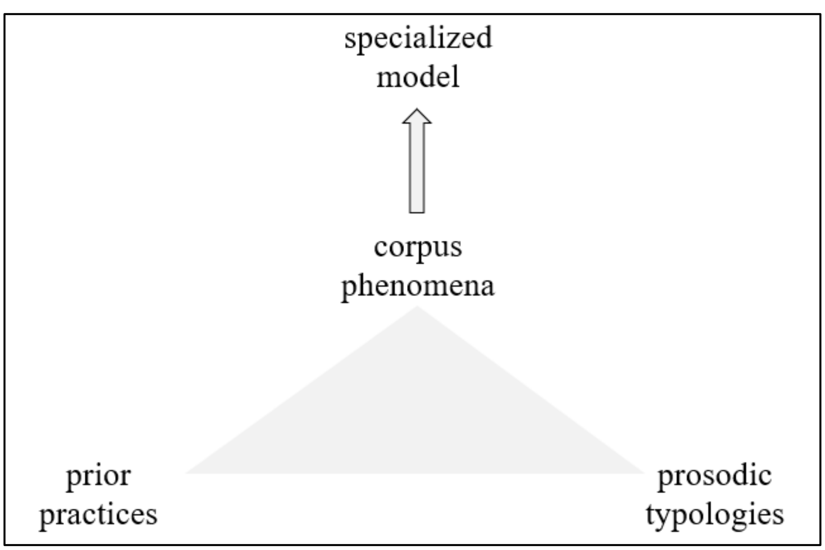
Chapter 3: Constructing and Applying the Model

This chapter introduces a methodology for constructing the model of prosody for hymn translation, and then lays out the resulting model with an explanation of all its parts. This chapter concludes with an explanation of why Kekchi is chosen as the model's test case and provides information about the prosodic properties of that language.

3.1. How the Model Is Constructed

This thesis constructs a model of prosody for hymn translation based on a process of input and output. The primary input is the set of prosodic phenomena observed in a hymn corpus, which motivates the prosodic constraints to which a hymn translation must conform. This input is informed by two secondary inputs: the prior practices of prosodic modeling and a core collection of prosodic typologies found throughout many languages of the world. The prior practices of prosodic modeling offer devices that may be used depending on how well they conform to the corpus content. The prosodic typologies ensure that the final model will be linguistically versatile enough to accommodate the act of translation. The ultimate output of these three inputs is a specialized model of prosody for hymn translation. This system of input and output is illustrated in Figure 7.

Figure 7: Input and Output for Constructing the Specialized Model



3.1.1. Choosing a Hymn Corpus and Identifying Its Prosodic Phenomena

The model of prosody constructed in this thesis will be applied specifically to the genre of Western Christian hymnody. Accordingly, a representative corpus of hymns will be analyzed here that conforms to the norms of that genre. Lovelace (1965), Eskew and McElrath (1980), and Sydnor (1983) attest to the general consensus that two of these norms are metrical text (text with fixed rhythm and meter) and homophonic music (music whose harmonic voices and sung text all move simultaneously in a shared rhythmic pattern). The 341 hymns in the hymnal entitled *Hymns* (1985) largely conform to these norms. In addition, this corpus has a history of being aimed at worldwide translation and selections of its contents have now been translated into nearly 40 languages (Holman Prescott, 2018), having demonstrated the goal of unification by preserving text-to-tune uniformity across languages. Such globality and uniformity make this corpus especially suitable for a model of prosody specialized for hymn translation, especially as certain revisions it is currently undergoing are aimed at making it even more globally uniform (West, 2018). For these reasons, *Hymns* (1985) is the corpus chosen for this thesis.

The prosodic phenomena of the chosen hymn corpus reflect features that regularly occur in the prosody of the 341 hymns of *Hymns* (1985). Though a full inventory would require creating prosodic profiles of both the musical settings and the texts, this thesis relies on an assessment that the musical prosody is sufficiently reflected in the text with which each musical setting has already been aligned. Thus, this thesis does not create prosodic profiles of the musical settings of *Hymns* (1985). This thesis also foregoes a full analysis of tone and intonation because the English source texts lack lexical tone and their intonation patterns are dependent on the melodies to which they are sung. As a result, the prosodic phenomena gathered from the texts essentially address stress and rhythm. These limitations are necessary because capturing the broad range of musical patterns and linguistic tones would make it difficult to achieve the basic level of uniformity needed in this model. As stated by Lewis (1969), "[i]f the scansion of a line meant all the phonetic facts, no two lines would scan the same way."

The method for gathering the prosodic phenomena of the corpus employs Liberman and Prince's (1977) system for representing linguistic rhythm, which involves aligning linguistic materials with a metrical grid that outlines the traditional features of poetic scansion (stress, feet, etc.). By performing such a grid-scansion of every text in the corpus, certain patterns of stress, pause, and rhythm are revealed. These in turn trigger the constituents, typologies, and representations to be used in the proposed model of prosody for hymn translation. The complete collection of grid-scansions can be found online[1], and partial examples are provided as this chapter unfolds. Figure 8 (section 3.2.1) explains the design and features of these grid scansions.

3.1.2. Prior Practices Adopted in the Model

The prior practices adopted in the model are synonymous with what Fabb (2008) calls "licensed" practices, meaning practices that are already "observed by a … school or tradition." In this case, the "school" or "tradition" is the wide array of prosodic studies found in linguistics, poetics, and musicology. Any practice therein that offers constituents, typologies, or representations of prosody is considered "licensed" for use in this thesis's proposed model of prosody for hymn translation. Such practices are selected, adopted, and adapted for use in the model according to how well they capture the prosodic phenomena of the hymn corpus. The most important of these prior practices are described in Chapter 2 of this thesis and are specifically cited in section 3.2 of this chapter whenever they are incorporated into the proposed model.

3.1.3. Linguistic Coverage Accommodated in the Model

Although the prosodic features of the hymn corpus are the ultimate constraint that a translation must follow (be they features of musical or textual prosody), the act of translation requires the model to accommodate additional prosodic features found throughout the languages of the world. While no study has identified these features comprehensively at a global scale, and while this thesis will not attempt such

[1] See https://linguistics.byu.edu/thesisdata/MichaelPeckGridScansions.pdf

a feat, certain core typologies can be identified to capture a broader range of global prosodic features. This core collection will be sufficient for the preliminary testing that this thesis offers and is comprised of features described in section 2.3.2 of this thesis.

3.2. The Model

As a result of creating a grid-scansion of all the texts in *Hymns* (1985), consulting prior practices of prosodic modeling, and accommodating a core collection of prosodic typologies in the languages of the world, this chapter now presents a model of prosody for hymn translation. Like other models of prosody, this model is dependent on a certain definition of prosody which then yields certain constituents, typologies, and representations. This definition and its subsequent constituents, typologies, and representations of prosody are outlined as this chapter unfolds.

In this model, prosody is defined as the features of music that are imposed upon a sung text. This is because in all cases the musical setting will remain constant regardless of the text, making the music the ultimate constraint to which the text conforms. Whether or not natural speech patterns agree with the musical patterns, the language will be constrained to adopt those musical patterns. As a result, prosody in this model takes on an unambiguously autonomous relation to language and fully supports the notion that prosody is “the music of speech” (Turk, 2009).

While treating music as a fixed constraint to which text conforms, this model avoids the production of texts that require modified musical settings. Although modifying musical settings for translated texts is precedented, this thesis recognizes it as a potential obstacle to the goal of intuitive singability. Such an obstacle may occur when a community’s resources for learning the hymn involve audio recordings that are based on how the hymn is executed in the source language. For this reason, the model proposed in this thesis restricts modifications such as the addition of extra musical notes to accommodate additional syllables. These restrictions are codified into the model as Text Placement Rules 9–11 (see Table 8 in section 3.3 of this chapter).

3.2.1. Snapshot of the Model's Features

The model proposes six major prosodic components: pulse, stress, rhythm, pause, juncture, and tone. These are the features that must align between the music and the text in order to produce an intuitively singable hymn. Each is assigned certain mapping units and takes on typological varieties, all of which are represented by analytic symbols within the synthetic framework of a grid. This grid and all the prosodic phenomena it represents, along with their proposed symbols and meanings, are outlined in Figure 8. Further explanations of these features are provided in the ensuing sections of this chapter.

Figure 8: Grid and Symbols for Hymn Prosody

H	M	L
+	–	–
s (s)	‖ (‖)	s (s) ǀ
s (s)	// (//)	s (s) /

Legend	
|___| = metrical foot	‖ = strict pause
H, M, L = high, mid, low tone	(‖) = non-fillable, non-crossable pause
+, – = stressed, unstressed	// = non-fillable, crossable pause
s = syllable	(//) = fillable, crossable pause
(s) = ornamental syllable	| = non-crossable juncture
	/ = crossable juncture

In Figure 8, the grid's principal part is a horizontal line at its head. This head line serves as the backbone from which the rest of the grid's structure and contents branch. Vertical bars project from this line to delineate metrical feet, within which are housed syllable slots that are marked as stressed (+) or unstressed (–) and as high toned (H), mid toned (M), and low toned (L). The hymn text is placed beneath this head line, with syllables fitting into corresponding syllable slots. It should be noted that the symbols (s) and ((s)) are solely used in the outline above as placeholders for any allowable syllables. When applying a hymn text to the grid, the actual syllables of the text would be written where those placeholders appear. The grid also accommodates pauses within syllable slots and juncture points after certain syllables. Figure 9 presents an example of one hymn being applied to the grid, whose text contains an unusually rich array of these elements. This and all subsequent hymns are cited according to their number assigned in *Hymns* (1985).

Figure 9: Prosodic Reduction for a Hymn Text (*Hymns* #243)

+	-	+	-	+	-	+	-
Fear	//	not	though (the)	en- (em-)	y (de-)	ride;	
Cour-	//	age	for (the)	Lord (is)	on (our)	side.	

The use of a grid framework puts this model in agreement with Couper-Kuhlen (1993), Hayes (1983; 2009), and Prince (1983), who argue that a grid is superior to brackets or trees for representing elements of prosody such as stress and rhythm. By means of this grid, the prosodic components of pulse, stress, rhythm, pause, juncture, and tone are captured in a single representation, making the grid an apt reduction of all the essential prosodic events within a hymn.

Given this snapshot of the model's features, a more detailed discussion of each feature is called for. The following sections discuss each of this model's major components of prosody in terms of their definition, their typological variations, and their symbolic representations.

3.2.2. Pulse in the Model

Pulse in this model follows the definition of Cooper and Meyer (1963), who identify it in its musical context as beats that are both identical and regularly occurring. In other words, these are beats that are spaced equally in the passage of time and that are undifferentiated in terms of stress or duration. Because these pulsating beats function as a regular, unchanging default, the analogy of a heartbeat is appropriate. Chatman (1965) cites this metaphor as he refers to pulse as "cardiac rhythm" or "primary rhythm." Lerdahl and Jackendoff (1983) refer to it as the "tactus," and describe it as "the level [of metrical structure] at which the conductor waves his baton." This pulse is most clearly derived from musical properties, as its counterpart in language is much less cited.

When applying pulse to text, this model equates the musical entity of a beat with the linguistic counterpart of a syllable, as is intuitive when juxtaposing music and text (Palmer & Hutchins, 2006). As a result, pulse in this model maps to the unit of a linguistic syllable. The regular occurring, identical beats of pulse are thus captured in the grid by regular occurring, identical syllable slots. Though not visibly represented in this model's graphic conventions, Figure 10 reveals where the grid implies the presence of slots that occur at regular time intervals in order to establish a pulse: underneath the head line. As previously mentioned, these slots are ultimately filled with the syllables of a hymn text; they are represented here with a syllable symbol (s).

Figure 10: Pulse in the Grid

s s s s s s s s

In addition to this steady pulse of equally spaced syllables, the model also allows syllable slots to take on a second, irregular syllable in the same way that steadily pulsing quarter notes in music can take on an occasional eighth note that subdivides the rhythm. These non-fundamental syllables are captured in parentheses to indicate that they are optional and are referred to as *ornamental* syllables. Their optional nature is determined by two factors: they disrupt regular patterns of syllable grouping and they can be omitted without affecting the compatibility of a text with its musical setting (in many cases, they are in fact omitted from one verse to another). They can be detected when stress patterns require certain syllables to be shortened as brief subdivisions of the pulse rather than as steady continuations of the pulse. Examples of ornamental syllables can be seen in Figure 9, which contains a text that cannot be pronounced with a regular rhythmic pulse unless some syllables are pronounced as though they were eighth-note subdivisions in a musical line. No text in *Hymns* (1985) requires a slot to contain more than one ornamental syllable[2].

[2] See collection of grid scansions: https://linguistics.byu.edu/thesisdata/MichaelPeckGridScansions.pdf

3.2.3. Stress in the Model

Stress in this model follows Allen (1973) and Randel (1999), who identify it as a matter of physiological force, making it a purely motor function. As such, it refers to executing any given beat in the pulse with stronger articulation. Allen (1973) notes that this does not necessarily result in any acoustic or auditory effect, making that beat sound stronger to a listener. It is purely a matter of production, not perception, and thus only involves the way a beat is executed. While it is more controversial to treat linguistic stress in these terms, it is not so controversial in music. Thus, the musical definition of stress is favored in this model.

This model then emulates poetic scansion by mapping stress to syllables and by utilizing a binary typology that distinguishes syllables as either stressed or unstressed. A subset of the more ample typologies that divide linguistic stress into primary, secondary, tertiary, and other levels, it is nonetheless a suitable fit with the binary distinction of stress in musical meter (Cooper & Meyer, 1963). Because of this binary nature, the use of the plus sign to indicate a stressed syllable and the minus sign to indicate an un-stressed syllable is deemed theoretically sufficient and amply precedented (Greene et al., 2012; Kager, 1989). Figure 11 demonstrates how the plus and minus signs are used in the grid to indicate stressed and unstressed syllables in one line of a specific hymn text.

Figure 11: Stress in the Grid (*Hymns* #195)

-	+	-	+	-	+	-	+
How	great	the	wis-	dom	and	the	love

As in all the grid scansions presented in this thesis, the stressing of syllables in Figure 11 does not necessarily represent the stress patterns of natural speech. Rather, it represents the stress imposed by rhythmic patterns which are explained in the following section.

3.2.4. Rhythm in the Model

Rhythm in this model follows the definition used by Cooper and Meyer (1963), which identifies it in its musical context as the grouping (or patterning) of stressed and unstressed beats. In Western music, these groupings are typically of either two or three beats, one of which being stressed. This same stress patterning is consistently manifest in the texts of *Hymns* (1985), which allows this model to follow the conventions of poetic scansion that similarly organize syllables into feet, or syllable groups, which likewise contain either two or three syllables.

Although poetic scansion can identify feet that contain all stressed or all unstressed syllables (the spondee and the pyrrhic, respectively), this model requires feet to contain only one stressed syllable. This is because the musical settings impose a stress pattern that forces only one syllable in each foot to be more prominent. For this reason, this model makes use of poetic feet that only include one stressed syllable, namely, the iamb (- +), the trochee (+ -), the dactyl (+ - -), the amphibrach (- + -), and the anapest (- - +), even if the text in isolation doesn't strictly conform to those rhythmic classifications.

To graphically represent these rhythmic patterns, this model makes use of vertical pipes to delineate foot boundaries. While this veers from the practice of Fabb (2008) and other linguists who mark foot boundaries with parentheses, it is a common practice of poetic scansionists such as Shapiro and Beum (1965). Figure 12 demonstrates how these vertical pipes are used to delineate a rhythmic grouping, which in this case is the iambic grouping of two syllables, the first being unstressed and the second being stressed.

Figure 12: Rhythm in the Grid (*Hymns* #195)

-	+	-	+	-	+	-	+
How	great	the	wis-	dom	and	the	love

The use of vertical pipes is also comparable to musical notation which uses vertical lines to mark musical measures, which, like poetic feet, are also groupings based on rhythmic stress patterns. As used in this model, these vertical pipes maintain yet another musical analogy by sometimes omitting vertical pipes at the beginning or ending of a line in order to leave a foot open ended, without a full syllable count therein. The syllables that do appear therein then function the same way as musical *upbeats* or *pickup notes* which occur in partial musical measures that lead into full musical measures. This pickup function becomes necessary in this model as many text lines from *Hymns* (1985) cannot align uniformly within the grid's rhythmic pattern unless certain syllables are placed in open ended or partial feet. Notably, syllables that are given this pickup function often align with pickup notes in the music. Figure 13 shows an example of using vertical pipes to designate one foot as open or partial so that the syllable therein can be treated as a *pickup syllable*, without which the different text lines could not fit uniformly beneath the same rhythmic structure. In this case, the word "I" on the first line can fit in the grid only if it functions as a pickup syllable housed within a partial, open foot.

Figure 13: Vertical Pipes and "Pickup Syllables" (*Hymns* #98)

-	+	-	+	-	+	-
I	need	thee,	oh,	I	need	thee
	ev'-	ry	hour	I	need	thee

3.2.5. Pause in the Model

Rather than the pause that occurs in the expressive or motoric functioning of natural speech, pause in this model aligns with the concept of a musical rest, which involves a beat that is not occupied by a sounding note. This concept also finds an analog in metrical poetry, where it is sometimes termed a metrical pause, meaning a syllable slot within a foot that is not occupied by a syllable. The term "null event," used by Lerdahl and Jackendoff (1983), is also applicable to this kind of pause. It is triggered when the lexical stresses of a given line cannot align with the line's fixed rhythmic pattern unless a syllable slot is skipped, as shown in Figure 14. The metrical pause is marked with a double bar and can be spotted in this text after the word “right.” In other models, this double bar is used to represent a “caesura,” which most often refers to a pause that occurs in the expressive or motoric functioning of natural speech. Its use here as a metrical pause should thus be noted.

Figure 14: Pause in the Grid (*Hymns* #237)

+	-	-	+	-	-	+	-	-	+	-	-
Do	what	is	right;	||	the	day	dawn	is	break-	ing,	

Because of the interplay with musical settings, these metrical pauses can be handled in different ways when translating, and this results in classifying the metrical pauses into four types. First, there is the strict pause, which aligns with the musical setting in such a way that a multisyllabic word should not break across the pause, nor should the pause be filled with the addition of a new syllable. This kind of pause is demonstrated in Figure 14, where the vertical bars maintain an upright posture to capture a sense of being non-crossable.

The second kind of metrical pause is also non-crossable, but it is fillable. This is because the accompanying melody contains an unoccupied musical note that can accommodate the syllable and does indeed do so in other stanzas of the text. But, though fillable on these terms, a multisyllabic word cannot break across this pause because doing so would create a serious misalignment with the phrasal structure of the music. The non-crossable nature of this pause, as in Figure 14, is still indicated by the upright position of the double bars, while its fillable nature is indicated by encasing the bars in parentheses, as shown in Figure 15. There, the fillable pause appears in the sixth syllable slot of the hymn’s fifth stanza, which pause is indeed filled in the hymn’s seventh stanza. It should be noted that parentheses, whenever used in the symbolic conventions of this model, generally indicate optionality.

Figure 15: A Fillable, Non-crossable Pause (*Hymns* #85)

Stanza 5

```
 -   | +     -    -   | +      -     -   | +     -    -   | +       -
 Thy   dross  to  con-   sume,  (||)  thy   dross  to  con-   sume,
```

Stanza 7

```
 -   | +     -    -   | +     -    -    | +     -    -   | +     -
 I'll  nev-  er,  no    nev-  er,  I'll   nev-  er,  no    nev-  er
```

The third kind of metrical pause is crossable, but not fillable. It is crossable because the syllables involved pertain to a shared musical phrase that allows them to maintain their intuitive relation to one another when sung. It remains non-fillable for the same reasons mentioned for Figure 14. Because it is non-fillable, it is not parenthesized to indicate optionality. Because words may break across it, the vertical bars are slanted to indicate crossability. This crossable, non-fillable pause is exemplified in Figure 16, after the syllable "lov-."

Figure 16: A Non-fillable, Crossable Pause (*Hymns* #270)

```
 -    | +      -    -    | +     -   -   | +
 And    know-  ing  thou   lov-  //  est   me,
```

Finally, the fourth kind of pause is both fillable and crossable. As established by the logic of the previous types, this pause is fillable because the musical setting accommodates it and because other stanzas of the text do in fact fill it, and it is crossable because the musical setting permits it. This fillable, crossable pause is indicated by slanted vertical bars that are parenthesized, as shown in Figure 17, after the syllable "one."

Figure 17: A Fillable, Crossable Pause (*Hymns* #223)

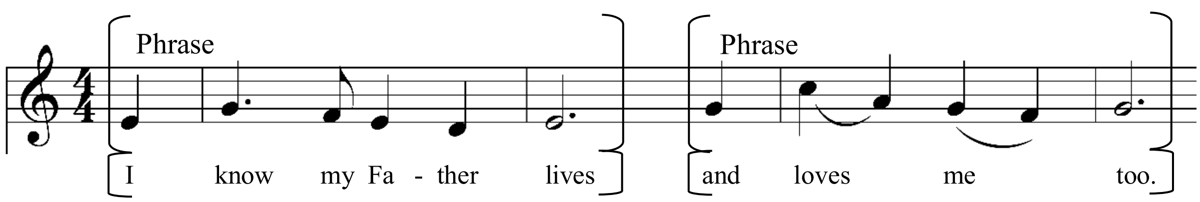
```
| -     -   +       | -    -   +     | -      -    +      |
  Have  I   helped    an-  y-  one     (//)   in   need?
```

3.2.6. Juncture in the Model

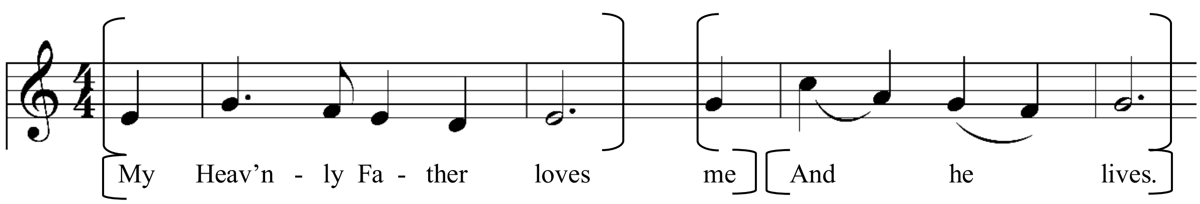
Linguistics defines juncture as the fluidity of transition between morphological boundaries. In this model, juncture is the fluidity of transition between musical phrases. This fluidity is imposed upon the text of a hymn because the natural singability of the text depends upon it transitioning from phrase to phrase in concert with the music. For example, when a musical phrase is ending but a textual phrase is not, it creates a clash between a sense of musical closure and a sense of textual continuation, and the intuitions of a singer are thus conflicted. An example of such phrasal alignment and misalignment is outlined in Figure 18, which plots both musical phrases and textual phrases[3]. Musical phrases conclude based on rhythmic and melodic contours (as well as harmonic progressions which are not shown in Figure 18), while textual phrases conclude based on grammatical patterns. These phrasal endings are considered juncture points that play an important role in the natural singability of the text.

Figure 18: Alignment of Musical and Textual Juncture (*Hymns* #302)

Aligned juncture points



Misaligned juncture points



hypothetical Text

[3] Musical passages are from or based on notation available at https://www.churchofjesuschrist.org/music/text/hymns?lang=eng and https://www.churchofjesuschrist.org/music/text/hymns?lang=kek.

Typically, the end point of every musical phrase aligns with the end of the text lines in the grid, making the end of each text line a default juncture point with no need of any special marking. However, *Hymns* (1985) does contain some musical phrases that end within the line of text, and thus need special marking so that a translator can be aware of these otherwise hidden juncture points. These juncture points are marked with a superscripted vertical bar within the line of text, as demonstrated after the word "lives" in Figure 19.

Figure 19: A Marked Juncture Point (*Hymns* #302)

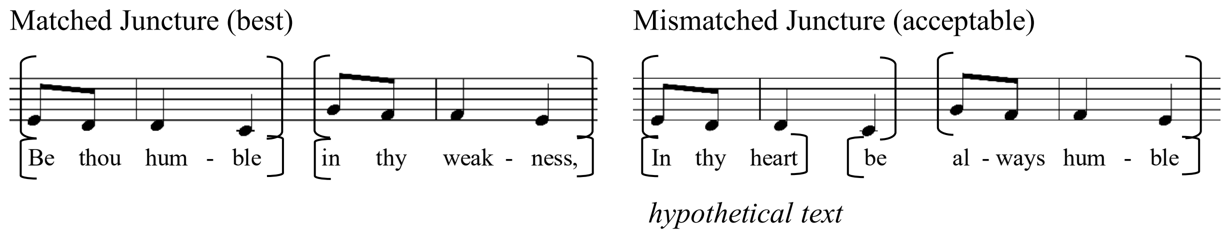
-	+	-	+	-	+	-	+	-	+
I	know	my	Fa-	ther	lives$^{|}$	and	loves	me	too.

Since instances of mismatched junctures could be classified as misaligned prosody, the strength of a juncture point is evaluated to characterize the severity of the problem. The stronger the musical phrasal ending, the more serious the consequences of breaking a textual phrase across it. The strength of these musical junctures derives from their cadential strength, which involves the degree of resolution implied by harmonic and rhythmic patterns. For example, a strong juncture might involve harmonically arriving at an authentic cadence (transitioning from the dominant chord to the tonic chord) which implies a strong arrival point in the music. Even if a strong harmonic cadence isn't reached, the resolution of rhythmic themes in the melody line can imply a strong juncture. Figure 19 is an example of a juncture point whose closure is strong both for harmonic and rhythmic reasons, as the harmony involves an authentic cadence and the melodic rhythm lands on a whole note whose length strongly implies a settled arrival. For this reason, breaking a textual phrase across this juncture point would create a serious misalignment in the musical and textual juncture, likely resulting in the loss of intuitive singability. That juncture point can thus be classified as a non-crossable juncture.

On the other hand, a juncture point that involves weaker cadential strength in the music's harmonic and rhythmic resolution can be classified as a crossable juncture. An example is presented in

Figure 20, wherein crossing a textual phrase beyond a musical juncture point does indeed create mismatched junctures, but the mismatch is less serious because the sense of closure at each ended phrase is complemented by an overarching sense of continuation as the rhythmic figures repeat.

Figure 20: A Crossable Juncture (*Hymns* #130)



In such cases, the superscripted vertical bar for marking a juncture point can be slanted to indicate that the juncture is crossable, as done after the word "humble" in Figure 21.

Figure 21: Representation of a Crossable Juncture (*Hymns* #130)

+	-	+	-	+	-	+	-
Be	thou	hum-	ble /	in	thy	weak-	ness,

The treatment of juncture in terms of crossability, with the binary distinction of being either crossable or non-crossable, is the full extent to which juncture is represented in this model. This contrasts with other models (such as the ToBI model) that treat linguistic juncture in terms of connective strength with up to four levels of strength (Beckman & Ayers Elam, 1993; Trager & Smith, 1965). There are also musical models that can be referenced in determining both the presence and the strength of musical juncture points, such as Lerdahl and Jackendoff's (1983) principles of musical *grouping structure.* While this thesis recognizes the need to apply such systems in identifying of the presence and the relative strength of juncture points more objectively, it leaves that substantial task to future studies. The juncture points cited throughout this thesis are thus recognized as debatable, with the current priority being to simply demonstrate juncture as a required element in any model that aims to achieve natural singability.

3.2.7. Tone in the Model

Although the source corpus of this model, *Hymns* (1985), does not call for the representation of lexical tone, applying the model to translation into other languages does require the accommodation of lexical tone (List, 1961). But because *Hymns* (1985) does not provide any patterns of lexical tone, the model's treatment of tone must instead rely on external attestations as found in existing studies and prior practices, as gathered in Chapter 2 of this thesis. As a result, the treatment of tone in this model is a hypothetical placeholder that will still require further assessment and testing. It is, nonetheless, given a place in the model now to recognize its essential presence.

Whatever the linguistic scenario, tone in hymns is ultimately imposed by musical settings, and so it is the tone patterns of the music that require principal assessment. In comparison to linguistic tones that do not fixate upon a specific frequency (Kingdon, 1959) and that are limited in existing studies to a maximum of four pitch levels (Pike, 1963), musical tones do fixate upon a specific frequency and cover a range of twelve fundamental pitches. This makes it difficult (if not impossible) to align musical pitches with linguistic tones. Instead, general pitch ranges and shifts from higher levels to lower levels can be more feasibly aligned between music and text. For this reason, this thesis adopts the practice of identifying the three general tone levels of High, Low, and Mid (Trager, 1941), trusting that both the musical tones and the linguistic tones can sufficiently correlate on these levels.

Given the grid framework used for this model with the horizontal line at is head, placing tone symbols above the grid's head line on their own tier, as done in autosegmental phonology, is the chosen method of representing tone in this model. It should be noted that these tone symbols do not represent linguistic tones, but rather musical tones imposed upon the text. For this reason, it is suitable to couple these tone symbols with an English example from *Hymns* (1985), as done in Figure 22. These tone symbols do not represent specific musical pitches, but they indicate relative pitch ranges within the contour of the melody. A system for objectively identifying those pitch ranges within a musical melody is yet to be developed. Figure 22, then, is a representation of this thesis's hypothesis for how tone might best be modeled for hymn translation. A musical representation of the melodic line is also provided for reference. Observe that the lowest notes correlate in placement with the L (low) tone level, the highest nodes with the H (high) tone level, and the notes between them with the M (mid) tone level.

Figure 22: Tone Captured in the Grid (*Hymns* #191)

L			H		M		L
-	+	-	+	-	+	-	+
Be-	hold	the	great	Re-	deem-	er	die,

Though the modeling practices of autosegmental phonology use a line to link each tone symbol to the syllables that carry that tone, this model considers it acceptable to omit such linking lines and to instead imply that a tone applies to all subsequent syllables until a different tone symbol is provided.

3.3. Well-formedness Rules

As both a summary and a final compliment to this model of prosody for hymn translation, Halle and Lerdahl's (1993) practice of accompanying the model with a collection of well-formedness rules is adopted. These well-formedness rules guide the formation of the grid as well as the placement of text therein. Halle and Lerdahl (1993) address the proper formation of the grid with "Metrical Well Formedness Rules" and the proper placement of text therein with "Textsetting Well-formedness Rules." This model adopts and adapts these practices by providing a set of Grid Construction Rules (GCR) and Text Placement Rules (TPR), as outlined in Table 8. As implied by their name, the Grid Construction

Rules identify constraints to ensure that the grid is constructed as intended, while the Text Placement Rules identify constraints that ensure that text is placed in the grid as intended.

Table 8: Grid Construction Rules and Text Placement Rules

Grid Construction Rules	
GCR 1	A horizontal line establishes the foundational backbone of the grid.
GCR 2	Equally spaced slots comprising a steady pulse are implied beneath the line.
GCR 3	Slots are either stressed or unstressed.
GCR 4	Slots pertain to a High tone, a Low tone, or a Mid tone.
GCR 5	Stressed slots are consistently placed in the same slot in each foot.
GCR 6	Slots group into sets of two or three, comprising metrical feet.
GCR 7	A foot may be either closed or open.
GCR 8	A closed foot is enclosed by vertical pipes.
GCR 9	An open foot is not enclosed by vertical pipes.
GCR 10	An open foot can only occur at the beginning or ending of a line.
GCR 11	A foot never contains more than one stressed slot.
Text Placement Rules	
TPR 1	Slots may contain one syllable, two syllables, or a metrical pause.
TPR 2	Slots may contain two syllables only when accommodated by two musical notes.
TPR 3	Slots may contain a metrical pause only to accommodate lexical stress patterns.
TPR 4	Metrical pauses are disfavored in stressed slots (Hayes, 2009).
TPR 5	The contents of each slot should be consistent in each stanza.
TPR 6	Lexically stressed syllables must be placed in stressed slots.
TPR 7	Lexically unstressed syllables must be placed in unstressed slots.
TPR 8	Lexically toned syllables must correspond with slots of similar tone designation.
TPR 9	Target language should fill slots as they are filled in the source language.
TPR 10	Target language should not add new musical notes to accommodate new syllables.
TPR 11	Target language should not add metrical pauses.

These rules are fully adhered to in the grids presented in this thesis and are fully implemented in the online collection of grids mentioned in section 3.1.1. Furthermore, these rules function as axioms that can be further developed into language-specific rules, as seen in Table 9 (section 4.1.6).

3.4. How the Model Is Applied

Once constructed, this model is intended to help produce translated texts that conform to the prosody of settings in *Hymns* (1985). This is achieved by examining how the model's prosodic requirements interact with the prosodic requirements of a specific target language. It is anticipated that the model will be useful in revealing where prosodic misalignments lie between the target language and the hymn settings, and that it will accommodate solutions to those misalignments.

3.4.1. Consideration of a Target Language

In order to observe the model's ability to identify and resolve prosodic misalignments in various languages, the target language in this thesis must exhibit prosodic properties that differ from those of English (the source language that this model is built upon). Such differences introduce the potential for misalignments and solutions unfamiliar to the source language, but that must nonetheless be resolved within the parameters of the model. Because the varieties throughout the world's languages in prosodic categories such as stress, rhythm, and tone are numerous and nuanced, an attempt to observe all of these features in a single study could quickly become unwieldy. For this reason, this thesis selects just one target language with minimal but marked differences with the prosodic properties of English. Based on these criteria, the target language that is selected for this thesis is Kekchi (Q'eqchi'), one of the Mayan languages spoken in some areas of Guatemala and Belize (ISO 639-3, Glottocode kekc1242). Kekchi does not demonstrate significant typological differences with English tone or intonation but does carry significant differences in its properties of stress. Those properties are explained in section 3.4.2.

An additional criterion for selecting the target language is the availability of hymn translations that exist in the language, which allow observations to be made as to where the proposed model could make a difference in existing translation practices. Kekchi also meets this criterion: a Kekchi translation of 206 hymns from *Hymns* (1985) was published in 2012. This Kekchi hymnal, entitled *Eb' li B'ich* (2012), will be referred to throughout this thesis when observing prosodic phenomena for Kekchi hymn translation.

3.4.2. The Prosody of Kekchi

Though Kekchi-specific studies are not extensive, basic observations about its prosodic features can be identified. These observations tend to focus on Kekchi stress, rhythm, tone, and intonation, and will be summarized here[4]. Chapter 4 of this thesis will then provide concrete examples.

Stress in Kekchi is consistently classified as fixed final (Bennett, 2017; Berinstein, 1979; Campbell, 1974; Caz Cho, 2004; Goedemans et al., 2015; Mayers, 1966; Stewart, 1980; van der Hulst et al., 2010; Wagner, 2014), with existing verifications that duration is not a cue for stress in Kekchi (Berinstein, 1979) and that there are pitch accents associated with Kekchi stress (Berinstein, 1979; Wagner, 2014). Rhythm has not been the target of any Kekchi study, though it has been passingly identified as "different from the syllable-timed rhythm of Spanish" (Mayers, 1966), implying its potential classification as a stress-timed language whose spoken syllable lengths contract and expand in order to maintain equal intervals between stressed syllables.

Tone in Kekchi also has a consistent classification, specifically that it is non-phonemic, non-contrastive, or non-lexical (Bennett, 2017; van der Hulst et al., 2010), being tied to prosodic phrases and not to lexical items (Wagner, 2014). Intonation in Kekchi, as uniquely studied by Wagner (2014), exhibits dominant contour patterns according to sentence type, with declarative and imperative sentences usually manifesting a falling contour and certain interrogative sentences manifesting a rising contour.

Although this thesis uses the prosodic features of Kekchi to observe how the proposed model of prosody can accommodate a target language in translation, the focus here will be on the one prosodic feature that makes Kekchi most different from the prosody of the English source language: stress. Given that Kekchi stress is fixed final, difficulty exists in matching Kekchi text to musical phrases of non-final stress. This can be more easily done in English because of its wide array of non-finally stressed words, all

[4] The prosodic feature of length is also an attested feature of Kekchi prosody, in that the length of its vowels carries a phonemic function (Campbell, 1974; Caz Cho, 2004; Stewart, 1980; Wagner, 2014). Although this feature could potentially make a difference in how Kekchi texts should be set to music, the texts in *Eb' li B'ich* (2012) do not seem to require a restriction in this regard, as both long and short vowels are placed on both long and short notes. This thesis thus leaves the matter of Kekchi vowel length to future studies. Such studies could even reveal that length deserves a place as one of the prosodic components in this thesis's proposed model.

stemming from a system of phonological stress rather than fixed stress. The way these difficulties play out within the proposed model are outlined in the following chapter of this thesis.

Chapter 4: Results of Applying the Model

This chapter presents the results of applying the model to Kekchi. These results include the identification of challenges that exist in aligning Kekchi with hymn settings and the accommodation of solutions for those problems. Some foresight is also provided as to how these same problems and solutions may apply to other languages.

4.1. Problems and Solutions in the Target Language

As mentioned in section 3.4, the model of prosody in this thesis targets prosodic misalignments between a hymn setting and a target language and then accommodates solutions for those problems. This chapter presents how this is achieved for the target language of Kekchi. While merging the prosodic requirements of Kekchi with the prosodic constraints outlined by the proposed model, three specific problems are revealed, all of which revolve around Kekchi's requirement for fixed final stress.

The first of these problems is an ideological one that requires clarifying the meaning of fixed final stress. The second and third involve how rhythmic patterns at the beginnings and endings of lines require specified treatment. These problems, their varieties, solutions, and specified contexts are all outlined throughout this chapter.

Hymns are cited in this chapter according to their assigned number in the English hymnal *Hymns* (1985) or its partially corresponding Kekchi translation *Eb' li B'ich* (2012), mentioned in section 3.4.1.

4.1.1. Interpreting "Fixed Final Stress"

The fact that Kekchi employs fixed final stress in all its words presents a conceptual problem when aligning Kekchi text with the grid scansions of *Hymns* (1985). One possible solution would entail that only the word-final syllable can be placed in a stressed slot of the grid scansion. However, Kekchi words that extend beyond two syllables would then not fit into iambic or trochaic patterns in the grid, which require every other syllable to be stressed. Figure 23 demonstrates how this complication arises when translating the hymn "God Be with You Till We Meet Again" (*Hymns* #152). This hymn uses a trochaic grid scansion, which alternates from stressed to unstressed syllable slots in a binary pattern. In such a trochaic setting, the trisyllabic Kekchi word *aawik'in* 'with you' presents a challenge: there is nowhere in the grid to place the initial syllable *aa-* or the penultimate syllable *-wi-* while identifying the ultimate syllable *-k'in* as the only candidate for a stressed slot. Apparently, this Kekchi word requires two unstressed slots followed by one stressed slot, which is nowhere to be found in the trochaic grid pattern. Figure 23 places the word *aawik'in* on various lines in order to demonstrate the various locations where it could land beneath the grid's head line. As can be seen in that figure, any location results in the stress of *aawik'in* mismatching the trochaic rhythm of this hymn's grid.

Figure 23: Complication When Treating Word-final Syllable as the Only Stressed Syllable

+	-	+	-	+	-	+	-	+	-
God	be	with	you	till	we	meet	a-	gain	
–	–	+							
Aa-	wi-	k'in							
	–	–	+						
	aa-	wi-	k'in						
		–	–	+					
		aa-	wi-	k'in					
			–	–	+				
			aa-	wi-	k'in				
				–	–	+			
				aa-	wi-	k'in			
					–	–	+		
					aa-	wi-	k'in		
						–	–	+	
						aa-	wi-	k'in	
							–	–	+
							aa-	wi-	k'in

The solution to this problem lies in a clarification pointed out by Goedemans (2010), which allows classifying languages as either trochaic or iambic. The clarification is that languages can be treated as trochaic or iambic based on their *secondary stress* rather than their *primary stress*, with primary stress being the most stressed syllable of a word, secondary stress being the less-stressed syllable, and all other syllables being unstressed. This tiered approach to stress gives a word like *aawik'in* the potential to contain two stressed syllables rather than one, with one being more stressed than the other, rather than one being stressed and the other unstressed. Such an interpretation of this Kekchi word is presented in Figure 24, which attributes secondary stress to the initial syllable *aa-*, non-stress to the penultimate syllable *wi-*, and primary stress to the ultimate syllable *-k'in*. Secondary stress is indicated by one plus sign (+) above the syllable, non-stress by a minus sign (-), and primary stress by two stacked plus signs. It should be emphasized that this stress pattern of alternating stress at the secondary level has not yet been examined by any studies dealing specifically with Kekchi, and that it is being presented here as a potential application of principles outlined by Goedemans (2010) for all languages in general. Textsetting patterns throughout *Eb' li B'ich* (2012) also indicate the potential plausibility of this stress pattern for Kekchi.

Figure 24: Primary, Secondary, and Non-stress in a Kekchi Word

Primary stress level			+
Secondary stress level	+	–	+
	aa-	wi-	k'in

Given a trisyllabic word like *aawik'in*, the statement that Kekchi has "fixed final stress" can be clarified by saying that Kekchi has "fixed final *primary* stress." On the level of secondary stress, Kekchi can be said to have trochaic stress in trisyllabic words, allowing the word *aawik'in* to fit into a trochaic grid scansion. Figure 25 shows how this ultimately works out for the hymn "God Be with You Till We Meet Again," with the word *aawik'in* occupying the first three slots of the grid. Whether a syllable be stressed at the primary or secondary level, it may occupy a stressed slot.

Figure 25: Primary and Secondary Stress in Stressed Slots (*Hymns* #152, *Eb' li B'ich* #92)

+	-	+	-	+	-	+	-	+	-
God	be	with	you	till	we	meet	a-	gain	
		+							
+	–	+	–	+	–	+	–	+	
Aa-	*wi-*	*k'in*	chi-	wanq	li	Dios	raj-	lal	

Having clarified that fixed final stress in Kekchi specifically means fixed final *primary* stress, one more needed clarification remains: defining the "final" location of the primary stress. In several examples from *Eb' li B'ich* (2012), the "final" syllable can be not only the final syllable of a word, but also the final syllable of a syntactic constituent, such as a noun phrase or a verb phrase. Figure 26 shows two examples from *Eb' li B'ich* (2012) that do not place primary stress on the final syllable of a word, which initially seems problematic until it is recognized that the primary stress is instead placed on the final syllable of the syntactic constituent. In the hymn on the left, the final syllable of the word *Qasantil* 'our holy' is left unstressed while instead stressing the subsequent syllable *Rey* 'king', which is the final word of the noun phrase *Our holy King*. In the hymn on the right, the final syllable of the word *Maawa'* ''tis not' is likewise left unstressed in order to favor stress on the subsequent syllable *yaal* 'true', which is the final syllable of the verb phrase *'tis not true*. These stress patterns can also be observed in the way these phrases are executed in natural speech.

Figure 26: Primary Stress Placed on Final Syllable of Syntactic Constituent

	–	+	–	+
Hymns #113	Our	heav'-	nly	King
				+
	–	+	–	+
Eb' li B'ich #65	Qa -	sant -	il	Rey

	+	–	+
Hymns #30	'Tis	not	so
			+
	+	–	+
Eb' li B'ich #18	Maa-	wa'	yaal

Given this second clarification about fixed final stress in Kekchi, a finalized description of fixed final stress in Kekchi states the following: Kekchi always places *primary* stress on the final syllable of *words* or *certain syntactic constituents*. A thorough examination of when final stress is applied to a word or to a syntactic constituent in Kekchi is set aside in this thesis as a matter for future study. This thesis proceeds by using the term *constituent* to cover all possibilities of where final stress may occur in Kekchi, whether at the end of a word or at the end of a phrase.

4.1.2. Constituent Length and Line Beginnings

The observation of Goedemans (2010) concerning the secondary level of stress allows entire languages to be classified as either iambic or trochaic. Because of fixed final stress, Kekchi would seem to be an iambic language. At the word level, however, the observations in the previous section of this thesis suggest that Kekchi words can be either iambic or trochaic, depending on their syllable count. Because the final syllable is where a fixed primary stress must occur, the alternation of stressed and unstressed syllables (at the secondary level) starts on the final syllable and moves from the right edge of the word to the left. Then, moving the opposite direction from left to right, the result is a pattern that is either iambic or trochaic, based on how many syllables the word spans. Figure 27 shows how this alternating of patterns allows Kekchi words of a certain syllable count to be consistently classified as either iambic or trochaic. In sum, Kekchi words of an even syllable count are potentially always iambic while those of an odd syllable count are potentially always trochaic. Because these rhythm types require at least two syllables, monosyllabic words are not included in this outline.

This right-to-left alternation of stress can begin not only on the final syllable of a word, but also on the final syllable of certain syntactic constituents, such as noun phrases and verb phrases. This can even result in words within the constituent whose final syllable is unstressed, demonstrating the importance of phrasal stress in Kekchi. Because Kekchi phrasal stress has not been the subject of any study to date, this thesis only cites apparent attestations of it in *Eb' li B'ich* (2012). Figure 28 shows certain Kekchi phrases from *Eb' li B'ich* (2012) that place phrase-final syllables in a stressed slot, resulting in word-final syllables landing in unstressed slots. None of these noun phrases and verb phrases stress the final syllable of their first word, but instead place the final stress on the final word of the phrase. This is also a plausible pattern for how these phrases are executed in natural speech. Thus, at the phrasal level, Kekchi constituents (not just words) can be consistently trochaic or iambic, based on their total phrasal syllable count.

Figure 27: Right-to-Left Alternation of Stress in Kekchi Words

← right-to-left alternation of stress

Two syllables						-	++	
Iambic						*chi -*	*wanq*	*may he be*
Three syllables					+	-	++	
Trochaic					*aa -*	*wi -*	*k'in*	*with you*
Four syllables				-	+	-	++	
Iambic				*chi -*	*xjun -*	*il -*	*eb'*	*all of them*
Five syllables			+	-	+	-	++	
Trochaic			*wu -*	*la -*	*je -*	*naq -*	*at*	*you have arrived*
Six syllables		-	+	-	+	-	++	
Iambic		*chi -*	*ros -*	*ob' -*	*te -*	*sin -*	*kil*	*to its blessing*
Seven syllables	+	-	+	-	+	-	++	
Trochaic	*chi -*	*ros -*	*ob' -*	*te -*	*sin -*	*kil -*	*eb'*	*to their blessing*

Figure 28: Right-to-Left Alternation of Stress in Kekchi Constituent Phrases

← right-to-left alternation of stress

Three syllables			+	-	++	
Trochaic	*Eb' li B'ich* #20		*chaa -*	*b'il*	*iq'*	*pleasant wind*
Four syllables		-	+	-	++	
Iambic	*Eb' li B'ich* #10	*chex -*	*xu -*	*wa*	*ru*	*fear ye him*
	Eb' li B'ich #69	*taa -*	*tz'aq -*	*lo'q*	*ru*	*it will be fulfilled*
	Eb' li B'ich #20	*chix -*	*sik' -*	*b'al*	*ru*	*to choose it*
	Eb' li B'ich #152	*qa -*	*sant -*	*il*	*Rey*	*our holy King*

The consistency of this stress alternation pattern means that a Kekchi constituent's ability to fit within an iambic or trochaic sequence will always depend on its syllable count. Figure 25 illustrates where the trisyllabic word *aawik'in* must be situated in a trochaic sequence and where the disyllabic words *chiwanq* and *rajlal* must be placed in iambic sequences. Also shown is the ability of monosyllabic words like *li* and *Dios* to be either stressed or unstressed, functioning as figurative wildcards that can occupy any slot in the grid.

Because iambic and trochaic sequences can be found at any point *within* a scansion line on the grid, Kekchi constituents of any syllable count can be made to fit within a line. However, at the *beginning* of a line the rhythmic pattern is fixed and can thus only fit Kekchi constituents of certain syllable counts. For this reason, this thesis posits rules that must be implemented at the beginning of textual lines based on, and derived from, the axioms mentioned in Table 8. Figure 29 and Figure 30 define and exemplify two such derived rules: the rule of trochaic beginnings and the rule of iambic beginnings. The former states that the grid requires trochaic beginnings to use Kekchi constituents of an odd syllable count. The latter states that the grid requires iambic beginnings to use Kekchi constituents of an even syllable count. Words from Figure 27 are used to demonstrate the misaligned stress that occurs when words of certain syllable counts are set on iambic or trochaic beginnings. The misalignments can be observed by comparing the stress indicated on the head line above the text with the stress annotated above each syllable of the words. As already mentioned, monosyllabic Kekchi words are considered wildcards that can be placed either in stressed slots or unstressed slots and are thus not included in these rules.

Figure 29: The Rule of Trochaic Beginnings

Rule: Trochaic lines must start with constituents of an odd syllable count.

Misaligned Stress: words of even syllable count

+	–	+	–	+	–
_	+				
chi -	wanq				
–	+	–	+		
chi -	xjun -	il -	eb’		
–	+	–	+	–	+
chi -	ros -	ob’ -	te -	sin -	kil

Aligned Stress: words of odd syllable count

+	–	+	–	+	–	+
+	_	+				
aa -	wi -	k’in				
+	_	+	_	+		
wu -	la -	je -	naq -	at		
+	_	+	_	+	_	+
chi -	ros -	ob’ -	te -	sin -	kil -	eb’

Figure 30: The Rule of Iambic Beginnings

Rule: Iambic lines must start with constituents of an even syllable count.

Misaligned Stress: odd syllable count

–	+	–	+	–	+	–
+	_	+				
aa -	wi -	k’in				
+	_	+	_	+		
wu -	la -	je -	naq -	at		
+	_	+	_	+	_	+
chi -	ros -	ob’ -	te -	sin -	kil -	eb’

Aligned Stress: even syllable count

–	+	–	+	–	+
_	+				
chi -	wanq				
–	+	–	+		
chi -	xjun -	il -	eb’		
–	+	–	+	–	+
chi -	ros -	ob’ -	te -	sin -	kil

Though these rules function in all contexts of duple rhythm, contexts of triple rhythm present a new complication. Here, a challenge opposite to that described in section 4.1.1 arises. Rather than a trisyllabic word like *aawik’in* being unable to align its primary-level anapestic rhythm (– – +) with iambic (– +) and trochaic (+ –) rhythms, it now seems unable to align its secondary-level trochaic rhythm with any triplet rhythm, whether dactylic (+ – –), amphibrachic (– + –), or anapestic (– – +). Figure 31 demonstrates this problem by placing the word *aawik’in* in dactylic, amphibrachic, and anapestic grids while showing how its stress at the secondary level does not align with these triplet patterns.

Figure 31: Misalignment of Duple Secondary Stress with Triple Rhythm

dactyl

+	–	–
		+
+	–	+
aa -	wi -	k’in

amphibrach

–	+	–
		+
+	–	+
aa -	wi -	k’in

anapest

–	–	+
		+
+	–	+
aa -	wi -	k’in

While it may seem reasonable to solve this problem by a return to interpreting stress at the primary level, which would allow *aawik’in* to cleanly fit its naturally anapestic rhythm, it would only solve the problem for similarly trisyllabic or hexasyllabic words that naturally divide by three. To find a place for words and constituents of other syllable counts, and to do so in other triplet patterns, a different solution is required.

The globally applicable solution to this problem involves reinterpreting the triplet nature of these rhythms. This is done by treating the occurrence of any two consecutive unstressed slots as one stressed slot. The appertaining syllables are then placed together in that slot, with one being the main metrical syllable and the other being the ornamental syllable, captured in parentheses (see section 3.2.2). This results in reinterpreting the triple rhythms essentially as iambs and trochees containing ornamental material. Figure 32 shows how this can be achieved with quadrisyllabic and heptasyllabic words in dactyls and amphibrachs.

Figure 32: Reinterpreting Consecutive Unstressed Slots in Triple Rhythms

mismatched

dactyl					
+	–	–	+	–	–
			+		
–	+	–	+		
chi -	xjun -	il -	eb’		

amphibrach					
–	+	–	–	+	–
				+	
+	–	+	–	+	
wu -	la -	je -	naq -	at	

reinterpreted

trochee				
+	–	(–)	+	– (–)
			+	
+	–	(–)	+	
chi -	xjun-(il-)		eb’	

trochee			
–	+	– (–)	+
			+
–	+	– (–)	+
wu -	la -	je-(naq-)	at

With this solution in place and stress patterns at all levels accounted for, more derived rules can be formulated to ensure that triplet rhythmic patterns are properly followed in the Kekchi text. As with the rules for duple rhythms, these rules dictate what constituents can be placed at the beginning of a line and are based on how many syllables a constituent contains. Monosyllabic words continue to function as wildcards that evade the rules and are thus not mentioned in these rules. The derived rules specified for triplet rhythms are defined and demonstrated in Figure 33, Figure 34, and Figure 35.

Figure 33: The Rule of Dactylic Beginnings

Rule: Dactylic lines must start with constituents of four or seven syllables.

Misaligned Stress: two or five syllables

+	–	(–)	+	–	(–)
+	–				
chi -	*wanq				
+	–	(–)	+	–	
wu -	la -	(je-)	naq -	*at	

Aligned Stress: four or seven syllables

+	–	(–)	+	–	(–)	+
+	–	(–)	+			
chi -	xjun	(-il) -	eb’			
+	–	(–)	+	–	(–)	+
chi -	ros -	(ob’-) -	te -	sin -	kil -	eb’

For constituents of two or five syllables, the dactylic pattern causes their final syllable to land in an unstressed slot, which breaks the one fixed rule of Kekchi stress that requires the final syllable to always be stressed. For this reason, the syllables -*wanq* and -*at* are marked with asterisks to indicate a violation in stress placement. Constituents of four or seven syllables, on the other hand, are able to land their final syllable on a stressed slot in the dactylic pattern.

Figure 34: The Rule of Amphibrachic Beginnings

Rule: Amphibrachic lines must start with constituents of two or five syllables.

Misaligned Stress: three, four, six, or seven syllables

–	+	–	(–)	+	–	–
–	+	–				
aa -	wi -	*k’in				
–	+	–	(–)			
chi -	xjun -	il -	*eb’			
–	+	–	(–)	–	+	–
chi -	ros -	ob’ -	(te-)	sin -	kil -	*eb’

Aligned Stress: two or five syllables

–	+	–	(–)	+	–
–	+				
chi -	wanq				
–	+	–	(–)	+	
wu -	la -	je -	(naq-)	at	

An amphibrachic pattern causes the final syllable of trisyllabic, quadrisyllabic, hexasyllabic, and septasyllabic constituents to land on an unstressed slot, which is always unacceptable in Kekchi. Only constituents of two or five syllables properly land their final syllable in a stressed slot in the amphibrachic pattern.

Figure 35: The Rule of Anapestic Beginnings

Rule: Anapestic lines must start with constituents of three or six syllables.

Misaligned Stress: two, four, five, or seven syllables

–	(–)	+	–	(–)	+	–
–	(–)					
chi -	(*wanq)					
–	(–)	+	–			
chi -	(xjun-)	il -	*eb’			
–	(–)	+	–	(–)		
wu -	(la-)	je -	naq -	(*at)		
–	(–)	+	–	(–)	+	–
chi -	(ros-)	ob’ -	te -	(sin-)	kil -	*eb’

Aligned Stress: three or six syllables

–	(–)	+	–	(–)	+
–	(–)	+			
aa -	(wi-)	k’in			
–	(–)	+	–	(–)	+
chi -	(ros-)	ob’ -	te -	(sin-)	kil

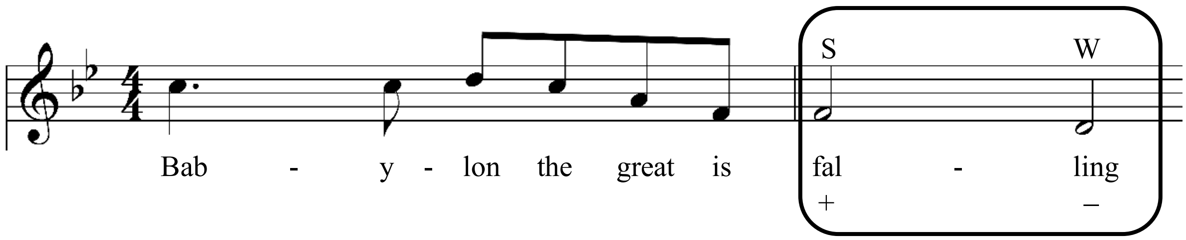
In an anapestic pattern, constituents of two, four, five, or seven syllables are constrained to land their ultimate syllable in an unstressed slot, whereas words of three or six syllables are set on a clean trajectory to properly land their final syllable in a stressed slot.

4.1.3. Falling Endings

In addition to requiring certain procedures at the beginnings of lines, Kekchi’s need for fixed final primary stress also requires certain treatments for the endings of lines—as well as the endings of phrases that may occur before the end of the line. At such endings, a problem arises whenever a stressed syllable is followed by an unstressed syllable, which pattern typically cannot conform to Kekchi text. Lines that end with this pattern are referred to as *falling endings* because of the falling sensation that is produced by the transition from a stressed syllable to an unstressed syllable. Traditionally, falling endings have been referred to as *feminine endings*. Their counterpart of an unstressed syllable followed by a stressed syllable has similarly been referred to as a *masculine ending*. More recent practice, as seen in Turco (2012), has instead used the terms *falling ending* and *rising ending*, respectively. This thesis adopts the use of these updated terms.

Falling endings are revealed throughout the grid scansions of *Hymns* (1985) whenever the last two syllables of a line occupy a stressed syllable slot (+) and then an unstressed syllable slot (–). In each case, these correspond to musical phrases that similarly conclude with strong-to-weak beats. An example is from the hymn "Israel, Israel, God Is Calling," shown in Figure 36, which in one verse coincidentally places the word "falling" on a falling ending.

Figure 36: A Falling Ending (*Hymns* #7)



S = stronger beat W = weaker beat

Although a Kekchi translator could in fact end a Kekchi phrase (but not a Kekchi word) on an unstressed syllable, there are few circumstances under which it is done in natural speech. One is when ending a phrase with one of two monosyllabic words: *chaq* (a preposition indicating distance in time or space) or *chan* (a quotation marker indicating that the previous statement is what someone else said). Another is when ending a phrase with a loanword from Spanish whose ultimate syllable is unstressed. But because Spanish loanwords are limited in Kekchi and because ending each line of a hymn with *chaq* or *chan* would become excessively repetitive, neither of these options is a viable translation solution. As a result, Kekchi's norm of fixed final word stress (see section 3.4.2.) creates a recurring challenge when translating *Hymns* (1985), which contains a total of 105 hymns that use falling endings.

The solution to this challenge for a given instance depends upon the kind of falling ending and the kind of phrasal juncture it occurs on. This thesis documents two kinds of falling endings: a multitone falling ending and a monotone falling ending. The former involves at least two different musical pitches, whereas the latter is sung on one repeated pitch. The different juncture points on which these falling endings can occur are those described in section 3.2.6 of this thesis, namely, crossable or non-crossable junctures. For monotone falling endings, an additional feature referred to as *suspended motion* also affects which solution is applied in translation. These varieties and their corresponding solutions are described in the following sections of this chapter.

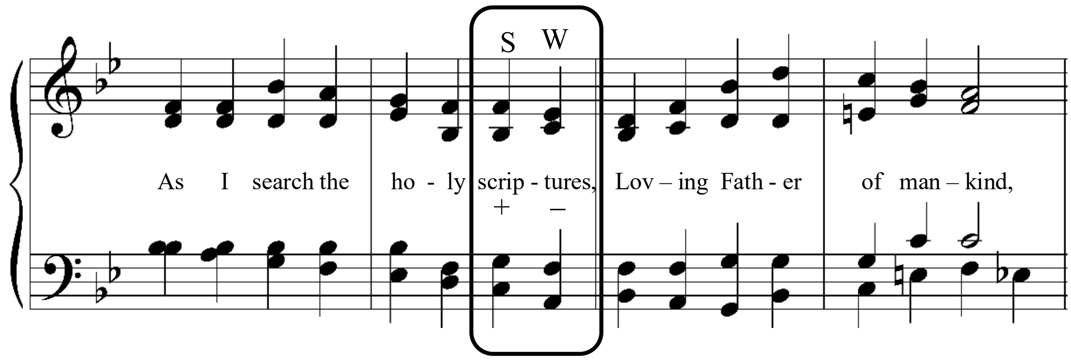
4.1.4. Multitone Falling Endings

For multitone falling endings, this thesis identifies two solutions: *slurring* and *elision*. Slurring involves omitting the falling syllable and prolonging the remaining syllable so that it is sung over both the stressed pitch and the unstressed pitch. Because a slur by definition involves more than one pitch (Randel, 1999), this solution only applies to multitone falling endings. The second solution, elision, also involves omitting the falling syllable, but instead replacing it with the first syllable of the next phrase. Because the beat on which this phrase-initial syllable is placed usually represents a phrase-final position in the music, the ending point of the music becomes merged with a beginning point in the text. This merge of beginning and ending points reflects the kind of elision described in musicology which involves musical phrases alone (Hutchinson, 2021). As used here, however, elision refers to merging beginning and ending points between textual and musical phrases together.

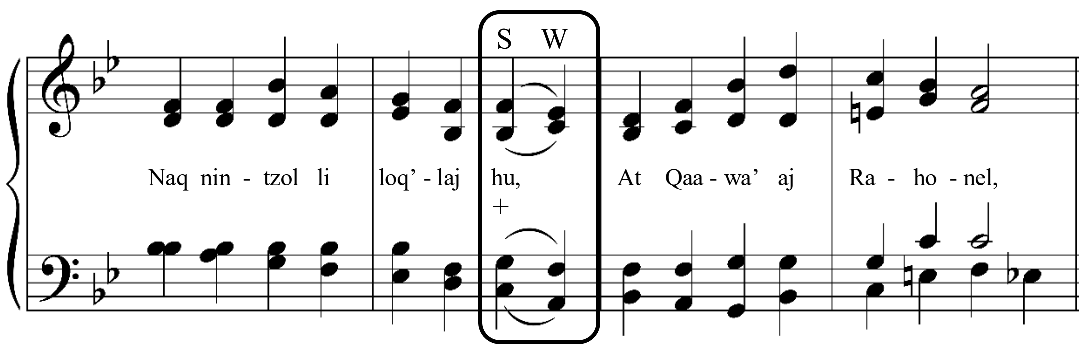
Figure 37 demonstrates both slurring and elision and how either solution could play out in the hymn “As I Search the Holy Scriptures” (*Hymns* #277). In this hymn, a multitone falling ending appears at the end of the second measure in the musical notation. To achieve a slur with a hypothetical Kekchi translation, the text concludes on the stressed syllable “hu” while connecting the falling pitches with curved lines to indicate that this syllable is sung across both pitches. On the other hand, to achieve an elision in the actual Kekchi translation the final pitch is instead occupied by the unstressed syllable *At*, which begins the next textual phrase. As shown by brackets above and below the musical notation, that phrase-initial syllable occupies a phrase-final position in the music (where the harmonies are still resolving) and the result is a merging—or elision—of musical and textual phrases. Note that the two translation variants differ by one word—*Qaawa'* 'Lord' versus *Kolonel* 'Savior'—virtual synonyms.

Figure 37: Slurring and Elision on a Multitone Falling Ending

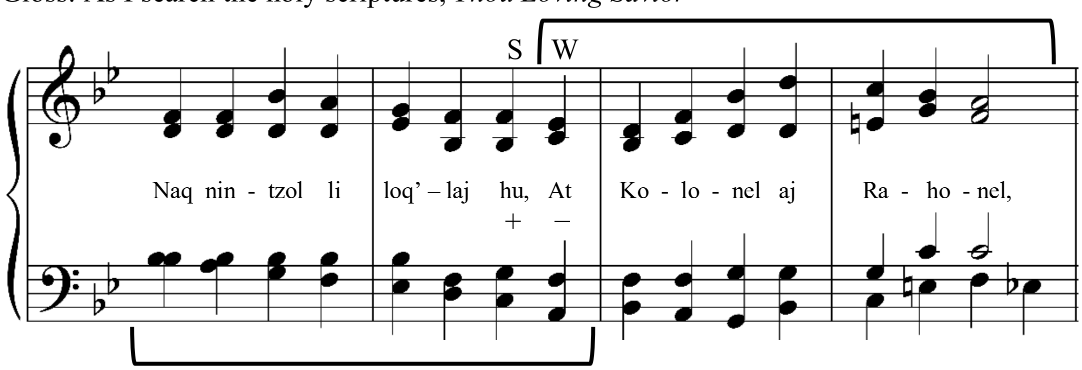
<u>*Hymns* #277: Falling ending in text and music</u>



<u>Hypothetical Kekchi text: Slurring</u>
Gloss: As I search the holy scriptures, *Thou loving Lord*



<u>*Eb' li B'ich* #179: Elision</u>
Gloss: As I search the holy scriptures, *Thou Loving Savior*



Importantly, this multitone falling ending occurs at a crossable juncture. It is crossable because the melodic and rhythmic motion between these phrases do not imply a strong sense of closure, even though the harmonic motion remains subtly unresolved on the final beat of the phrase. Were it a non-crossable juncture with a strong sense of closure, elision would prove problematic. This is because by its very nature an elision involves crossing a juncture point. Consequently, whenever a multitone falling ending occurs at a non-crossable juncture, slurring is the only way it can be translated into Kekchi with the kind of prosodic alignments needed for intuitive singability.

Figure 38 shows a multitone falling ending that occurs at a non-crossable juncture point (at the conclusion of the second measure in the musical notation). It is non-crossable because the music comes to clear arrival points in its melodic, rhythmic, and harmonic motion all at once. Specifically, the melodic contour in the first phrase is clearly differentiated from that of the second phrase, a rhythmic halt sustains prolonged half notes, and the harmony stays firmly on the tonic chord before shifting to new harmonic territory in the next phrase. As this strong closure rules out the option of crossing the juncture point via elision, the use of a slur in the Kekchi text cleanly honors this boundary. Under these multitonal, non-crossable circumstances, a slur is the only way Kekchi can achieve prosodic alignment with the music.

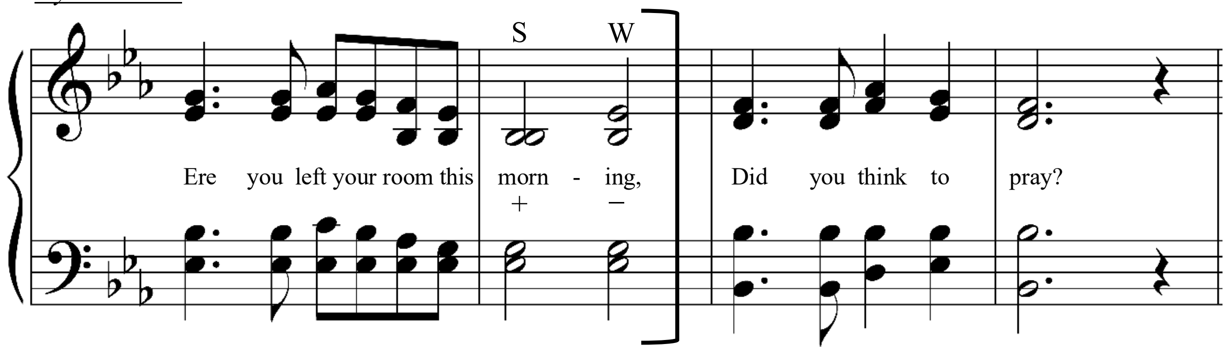
Kekchi's options for multitone falling endings thus consist of slurring or elision, depending on the crossability of juncture points.

4.1.5. Monotone Falling Endings

When a falling ending is monotone, another solution is required. While elision remains an option so long as the juncture is crossable, slurring is no longer an option because of its requirement for at least two different pitches. But another possibility emerges that is not available to multitone falling endings. Because of the repeated pitch involved in a monotone falling ending, the option arises to omit the repeated pitch without notably changing the musical setting. This solution, referred to in this thesis as *omission*, involves omitting the falling syllable as well as its corresponding musical note, adjusting the musical notation so that its pitch is no longer sounded as a separate event.

Figure 38: Required Slur in Kekchi

Hymns #140



Eb' li B'ich #81

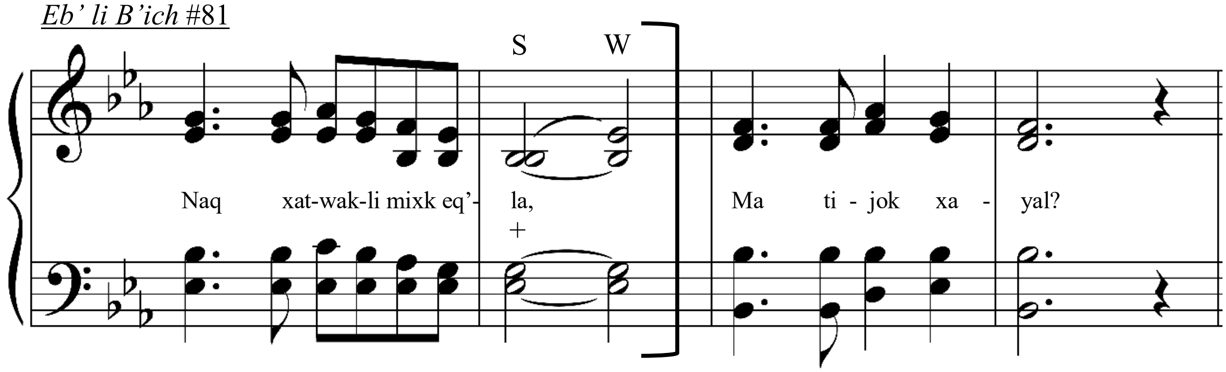


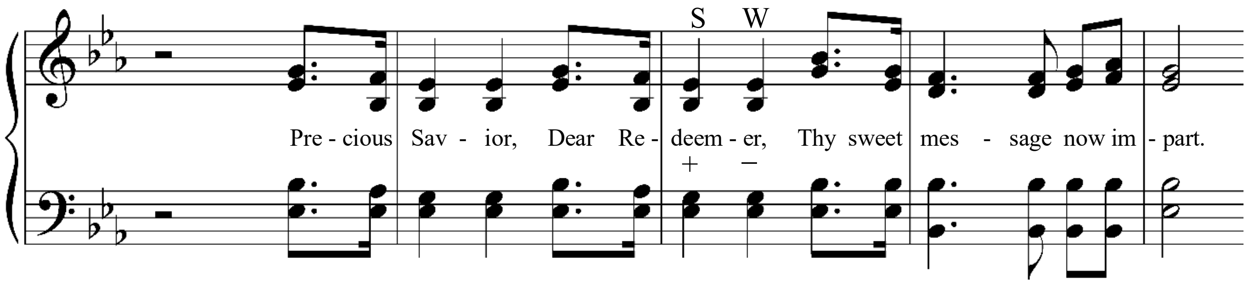
Figure 39 shows how either elision or omission can be applied to the hymn "Precious Savior, Dear Redeemer" (*Hymns* #103). In this hymn, the monotone falling ending occurs at the beginning of the second English measure on the syllables "-deem-er," which are annotated in Figure 39 for syllable stress and beat strength. Because all the musical voices on this falling ending are monotone, it is technically defensible to interpret the falling beat as either the ending of the previous musical phrase or the beginning of the following musical phrase (so long as no cues are taken from the English text). The juncture point is thus crossable and an elision can be used, as illustrated in the actual translation. Alternatively, because of the monotonality here, the falling beat can be omitted while converting the remaining beat into a half note that sounds longer on one syllable rather than sounding twice on two syllables, as illustrated in the hypothetical translation using the same synonym substitution employed in the previous figure.

The example of omission in Figure 39 may not be the preferrable solution, as it may result in a sense of suspended motion (although it may create a more parallel rhythmic scheme). The question of whether such a sense is conditioned by a bias towards the way the English text is sung is a matter for another study. However, this thesis does recognize certain monotone falling endings in *Hymns* (1985) where the use of omission is likely to cause a sense of suspended motion in any language, due to the length of pause it would cause. This possibility of excessive suspended motion, then, becomes the next criterion (in addition to juncture crossability) in deciding whether elision or omission is used for a monotone falling ending. Suspended motion is defined in this thesis as a halt in melodic activity that is not countered by a continuation of harmonic activity for three or more beats. Because the suspended motion in Figure 39 lasts for only two beats, it is deemed permissible until further studies indicate otherwise.

Whenever translating a monotone falling ending via omission would result in three or more beats of suspended motion, elision becomes the preferred (and only) solution. Such a scenario is demonstrated in Figure 40, where the monotone falling ending is located in the second measure of the music. As can be seen there, when an omission is applied in Kekchi, the syllable *-wa'* is followed by an excessive gap wherein four beats of suspended motion are extended. Because this is likely to interrupt the natural singability of this hymn, and because this juncture is crossable, an elision becomes the better solution.

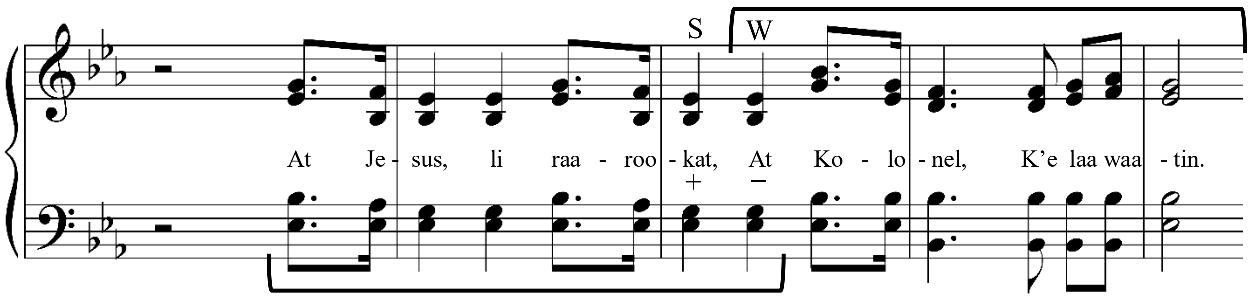
Figure 39: Elision and Omission on a Monotone Falling Ending (*Hymns* #103)

Hymns #103



Eb' li B'ich #57: Elision

Gloss: Thou Jesus, thou beloved, *Thou Savior*, speak thy word.



Hypothetical Text: Omission

Gloss: Thou Jesus, thou beloved, *Thou Lord*, speak thy word.

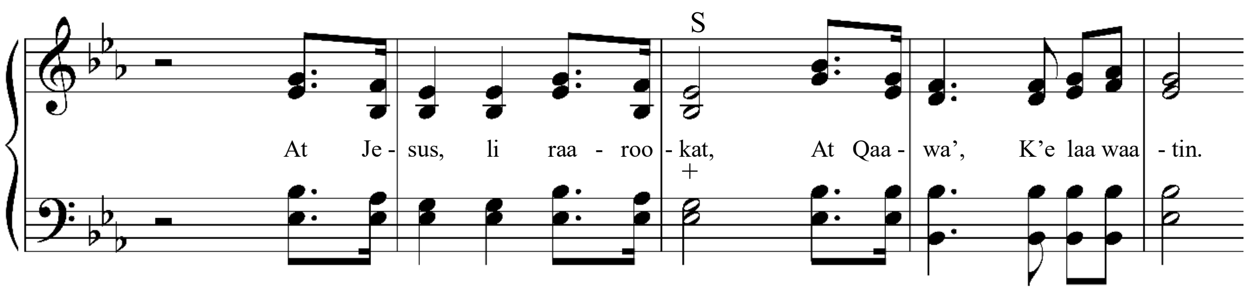
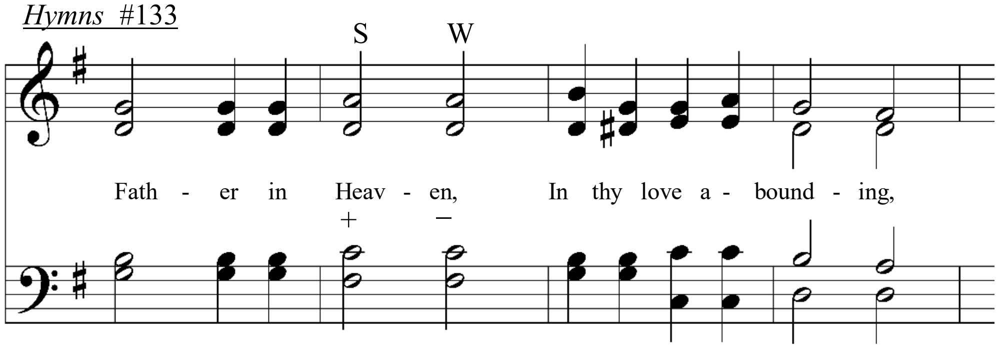
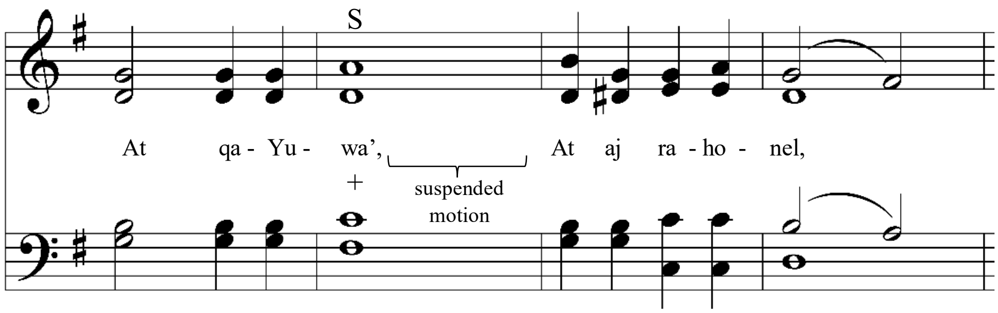


Figure 40: Required Elision in Kekchi (*Hymns* #133)

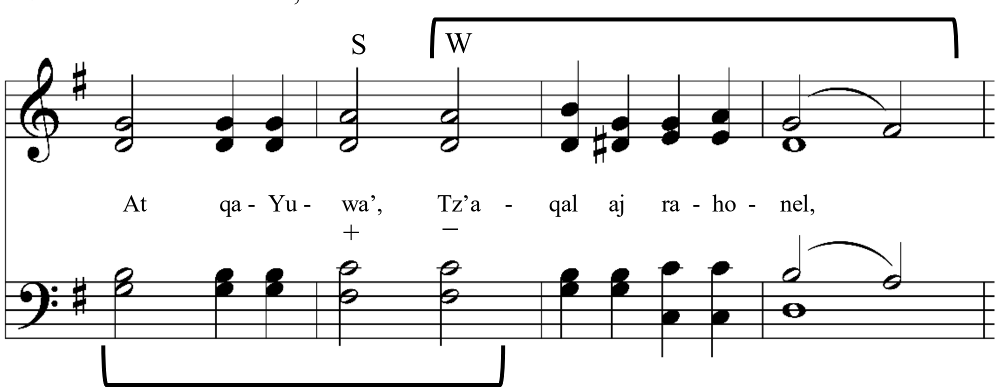
Hymns #133



Hypothetical text: Omission
Gloss: Thou our Father, *Thou lover*



Eb' li B'ich #57: Elision
Gloss: Thou our Father, *True lover*



4.1.6. Summary of Solutions and Their Manifestation in *Eb' li B'ich* (2012)

The result of these proposed solutions, including the derived rules discussed above, is an established set of well-formedness rules for Kekchi hymn translation. A complete summary of these well-formedness rules is provided in Table 9, which uses the acronym KWR to stand for Kekchi Well-formedness Rule. These rules are a necessary addition to the Source Text Placement Rules listed in section 3.3, and they exemplify the need for any target language to develop its own set of well-formedness rules based on the constraints established by the model in this thesis.

Table 9: Summary of Well-formedness Rules for Kekchi Hymn Translation

KWR 1	Monosyllabic words can be placed in stressed or unstressed slots.
KWR 2	Monosyllabic words can be placed at the beginning of any line. Multisyllabic words must follow rules 3–7.
KWR 3	Trochaic lines must begin with constituents of an odd syllable count.
KWR 4	Iambic lines must begin with constituents of an even syllable count.
KWR 5	Dactylic lines must begin with constituents of four or seven syllables.
KWR 6	Amphibrachic lines must begin with constituents of two or five syllables.
KWR 7	Anapestic lines must begin with constituents of three or six syllables.
KWR 8	Multitone falling endings at a non-crossable juncture must use a slur.
KWR 9	Multitone falling endings at a crossable juncture must use either a slur or an elision.
KWR 10	Monotone falling endings at a non-crossable juncture must use omission.
KWR 11	Monotone falling endings at a crossable juncture must use either omission or elision.
KWR 12	Monotone falling endings at a crossable juncture must use omission if an elision would cause suspended motion for a minimum of three beats.

The application of rules 3–7 in the 206 hymns of *Eb' li B'ich* (2012) can be observed by identifying all the texts therein as trochaic, iambic, dactylic, amphibrachic, or anapestic and then assessing whether the lines begin with syntactic constituents of a fitting syllable count. Doing so yields a count of 74 hymns that use trochaic text, 96 that use iambic text, 21 that use dactylic text, 23 that use amphibrachic text, and 5 that use anapestic text (noting that some hymns use a combination of these from line to line). Examining the syllable counts of Kekchi constituents that begin the lines of these hymns reveals a total of 32 hymns that contain violations of Kekchi Well-formedness Rules 3–7. The majority of these violations occur in triplet rhythms, with a total of fourteen hymn translations that violate dactylic rules (KWR 5) and eight that violate amphibrachic rules (KWR 6). Trochaic rules (KWR 3) are also violated in eight hymn translations, and iambic rules (KWR 4) are violated in only two. Anapestic rules (KWR 7) are never violated in *Eb' li B'ich* (2012). Table 10 lists the hymns that violate these rules in order of the rhythm type in which they most frequently occur, starting with dactylic. The table also provides each hymn's number in the respective English (E#) and Kekchi (K#) hymnals, as well as the specific words that appear at the beginning of a line in violation of Kekchi Well-formedness Rules. The degree to which these violations pose a challenge to intuitive singability is left to future studies, as are the reasons for which certain rhythmic patterns are violated more frequently than others in the translated hymnal.

The application of Kekchi Well-formedness Rules 8–12, which deal with line endings rather than beginnings, can be observed in *Eb' li B'ich* (2012) by identifying all the grid scansions that use a falling ending, assessing whether their musical accompaniment is monotone or multitone, whether the musical juncture is crossable or non-crossable, and then observing whether slurring, omission, or elision was used in the translation. Doing so yields a count of 61 hymns that contain a falling ending in *Eb' li B'ich* (2012) and reveals that, strikingly, Kekchi Well-formedness Rules 8–12 are never violated. Table 11 provides a list of all multitone falling endings and divides them into those that occur at non-crossable and crossable junctures. While providing no indication of KWR 8–12 violations, this collection does validate the optionality in KWR 9, which allows either slurring or elision by showing that both options are in fact used in *Eb' li B'ich* (2012). Potential alternates to the options actually used in *Eb' li B'ich* (2012) are already illustrated in Figure 37.

Monotone falling endings are markedly fewer in number than multitone falling endings throughout *Eb' li B'ich* (2012). Table 12 lists all the hymns containing this class of falling ending, while at the same time validating the optionality in KWR 11, by showing that either elision or omission are both possible and that in fact both are used in *Eb' li B'ich* (2012). Potential alternates to the options actually used in *Eb' li B'ich* (2012) are already illustrated in Figure 39.

Table 10: Line-initial Constituents That Violate Kekchi Well-formedness Rules 3–7

Rhythm	E#	K#	English Hymn Title	Rule-breaking Constituents
Dactylic: Line must start with syntactic constituent of 4 or 7 syllables	303	196	Keep the Commandments	Verse 1: *Jo'-kan*
	27	16	Praise to the Man	Verse 1: *Tee-pal*
	67	36	Glory to God on High	Verse 1: *Che-ra*; *Xrii-qa*. Verse 2: *Raa-lal*; *Che-ril*. Verse 3: *K'a'-jo'*
	72	39	Praise to the Lord, the Almighty	Verse 1: *B'i-chan*; *B'i-chan-qex*. Verse 2: *Chan-ru*; *Ri-k'in*. Verse 3: *Ju-ne-lik*; *Ree-tal*
	100	54	Nearer, My God, to Thee	Verse 2: *Wan-kin*. Verse 3: *Chi-wil*; *Xb'aa-neb'*. Verse 4: *Xaq-xo*; *Jo'kan*
	105	59	Master, the Tempest Is Raging	Verse 1: *Qaa-wa'*
	129	67	Where Can I Turn for Peace?	Verse 3: *Raj-lal*
	212	131	Far, Far Away on Judea's Plains	Verse 2: *Re-sil*
	221	142	Dear to the Heart of the Shepherd	Verse 1: *Loq'-eb'*
	255	165	Carry On	Verse 1: *Kaw qib'*; *Xaq-xo*
	264	171	Hark, All Ye Nations!	Verse 1: *Xma-ril*
	304	197	Teach Me to Walk in the Light	Verse 1: *Tzo-lin*. Verse 2: *Raj-lal*
	308	201	Love One Another	Verse 1: *Jo'-kan*
	213	134	The First Noel	Chorus: *Xyo'-la*
Amphibrachic: Line must start with syntactic constituent of 2 or 5 syllables	3	3	Now Let Us Rejoice	Verse 2: *Tqa-yo'o-ni*
	6	5	Redeemer of Israel	Verse 1: *Qa-xam-at*. Verse 2: *Tix-k'a-meb'*
	52	27	The Day Dawn Is Breaking	Verse 2: *Te'-ch'ut-laaq*. Verse 3: *Qa-ya-laq*
	85	45	How Firm a Foundation	Verse 3: *Aa-Dio-sin*
	89	47	The Lord Is My Light	Verse 4: *Woch-b'ee-neb'*
	193	118	I Stand All Amazed	Verse 1: *Nin-sik-sot*
	266	170	The Time Is Far Spent	Verse 1: *Che-see-b'a*
	319	203	Ye Elders of Israel (Men)	Verse 1: *Chix-sik'-b'al*
Trochaic: Line must start with syntactic constituent of odd syllable count	301	194	I Am a Child of God	Chorus: *Chin-aa-ten-q'a*
	58	28	Come, Ye Children of the Lord	Verse 1: *Ra-lal Xk'a-jol*
	94	49	Come, Ye Thankful People	Verse 1: *Chal-qex*; *Xok-b'il*
	163	97	Lord, Dismiss Us with Thy Blessing	Verse 1: *Choo-haa-ten-q'a*. Verse 2: *Chi-qa-taa-qe*
	185	110	Reverently and Meekly Now	Verse 2: *Ree-tal*
	246	157	Onward, Christian Soldiers	Verse 4: *Kaw-aq*
	249	159	Called to Serve	Chorus: *U-b'ej*; *Too-xik*
	250	160	We Are All Enlisted	Verse 2: *A-b'i*
Iambic: Lines must start with constituent of even syllable count	141	82	Jesus, the Very Thought of Thee	Verse 4: *Ju-nes-at*
	134	75	I Believe in Christ	Verse 1: *Tin-taq-si*

Table 11: Conformity of Multitone Falling Endings in *Eb' li B'ich* (2012) to KWR 8–9

Non-crossable Juncture: should use slurring

E#	K#	English Hymn Title	Violation
7	6	Israel, Israel, God Is Calling	No
19	12	We Thank Thee, O God, for a Prophet	No
27	16	Praise to the Man	No
60	30	Battle Hymn of the Republic	*No
62	31	All Creatures of Our God and King	*No
72	39	Praise to the Lord, the Almighty	No
86	46	How Great Thou Art	No
96	51	Dearest Children, God Is Near You	No
98	53	I Need Thee Every Hour	No
106	63	God Speed the Right	No
117	68	Come unto Jesus	No
131	74	More Holiness Give Me	No
140	81	Did You Think to Pray?	No
149	88	As the Dew from Heaven Distilling	No
156	90	Sing We Now at Parting	No
152	92	God Be with You Till We Meet Again	No
175	104	O God, the Eternal Father	No
200	122	Christ the Lord Is Risen Today	No
202	124	Oh, Come, All Ye Faithful	No
205	125	Once in Royal David's City	No
203	126	Angels We Have Heard on High	No
226	139	Improve the Shining Moments	No
220	141	Lord, I Would Follow Thee	No
221	142	Dear to the Heart of the Shepherd	No
232	148	Let Us Oft Speak Kind Words	No
237	149	Do What Is Right	No
239	151	Choose the Right	No
255	165	Carry On	No
259	167	Hope of Israel	No
273	177	Truth Reflects upon Our Senses	No
276	178	Come Away to the Sunday School	No
280	180	Welcome, Welcome, Sabbath Morning	No
289	186	Holy Temples on Mount Zion	No
291	187	Turn Your Hearts	No
299	192	Children of Our Heavenly Father	No
303	196	Keep the Commandments	No
307	200	In Our Lovely Deseret	No
322	205	Come, All Ye Sons of God	No
335	206	Brightly Beams Our Father's Mercy	No

Crossable Juncture: can use slurring or elision

E#	K#	English Hymn Title	Violation
3	3	Now Let Us Rejoice	No (slur)
35	21	For the Strength of the Hills	No (slur)
45	24	Lead Me into Life Eternal	No (slur)
48	25	Glorious Things Are Sung of Zion	No (slur)
52	27	The Day Dawn Is Breaking	No (slur)
130	73	Be Thou Humble	No (slur)
216	138	We Are Sowing	No (slur)
234	147	Jesus, Mighty King in Zion	No (slur)
251	161	Behold! A Royal Army	No (elision)
266	170	The Time Is Far Spent	No (slur)
277	179	As I Search the Holy Scriptures	No (slur)
287	185	Rise, Ye Saints, and Temples Enter	No (slur)
301	194	I Am a Child of God	No (elision)
309	202	As Sisters in Zion	No (slur)

* Rule is maintained not by the use of slurring, but by the use of a loanword (*alleluia*) that needn't follow Kekchi stress patterns.

Table 12: Conformity of Monotone Falling Endings in *Eb' li B'ich* (2012) to KWR 10–12

Crossable Juncture & Suspended Motion: should use elision

E#	K#	English Hymn Title	Violation
133	70	Father in Heaven	No
159	95	Now The Day Is Over	No
281	181	Help Me Teach with Inspiration	No

Crossable Juncture & No Suspended Motion: can use elision or omission

E#	K#	English Hymn Title	Violation
69	35	All Glory, Laud, and Honor	No (elision)
103	57	Precious Savior, Dear Redeemer	No (elision)
292	188	O My Father	No (elision)
199	121	He Is Risen!	No (elision)
308	201	Love One Another	No (omission)

4.1.7. Potential Application of Solutions in Future Kekchi Translations

Given these known problems and solutions in the translation of hymn texts into Kekchi, and given the fact that many hymns in *Hymns* (1985) have not yet been translated into Kekchi, an example may be provided of how these solutions could be applied to produce a previously untranslated hymn. One such hymn is "As the Shadows Fall" (*Hymns* #168). In English it contains a trochaic text and each verse contains two multitone falling endings at non-crossable junctures, requiring the application of KWR 3 and KWR 8. And, of course, the general rule of always placing stressed syllables in stressed slots at any point within the line will be followed. By using a grid scansion and applying these Kekchi Well-formedness Rules, a Kekchi text can be produced with relative confidence that it will match the musical setting with intuitive singability. Figure 41 demonstrates how the English text ends every other line on a falling ending while Kekchi can convert those lines into rising endings that will be sung as slurs, or as elisions with optional pickup syllables marked in parenthesis. This is due to the musical accompaniment at these line endings employing a multitone falling ending at a crossable juncture. Additionally, Figure 41 underlines the full length of the syntactic constituents at the beginning of each line to show that they conform to Kekchi Well-formedness Rules 2 and 3, which respectively state that monosyllabic words can be placed at the beginning of any line, and, trochaic lines must begin with constituents of an odd syllable count.

Figure 41: Applying Grid Scansion and KWRs to a Potential Kekchi Hymn Translation

Hymns #168

+	–	+	–	+	–	+	–
As	the	shad-	ows	fall,	O	Sav-	ior,
Turn	our	thoughts	and	minds	to	thee.	
Help	us,	Lord,	that	we	may	strive	for
Peace,	and	find	our	rest	in	thee.	
Fath-	er,	please	watch	o'er	our	loved	ones
As	the	eve-	ning	round	them	flows.	
Lord,	acc-	ept	our	sup-	pli-	ca-	tions;
Be	with	us	in	our	re-	pose.	

Potential Kekchi Translation

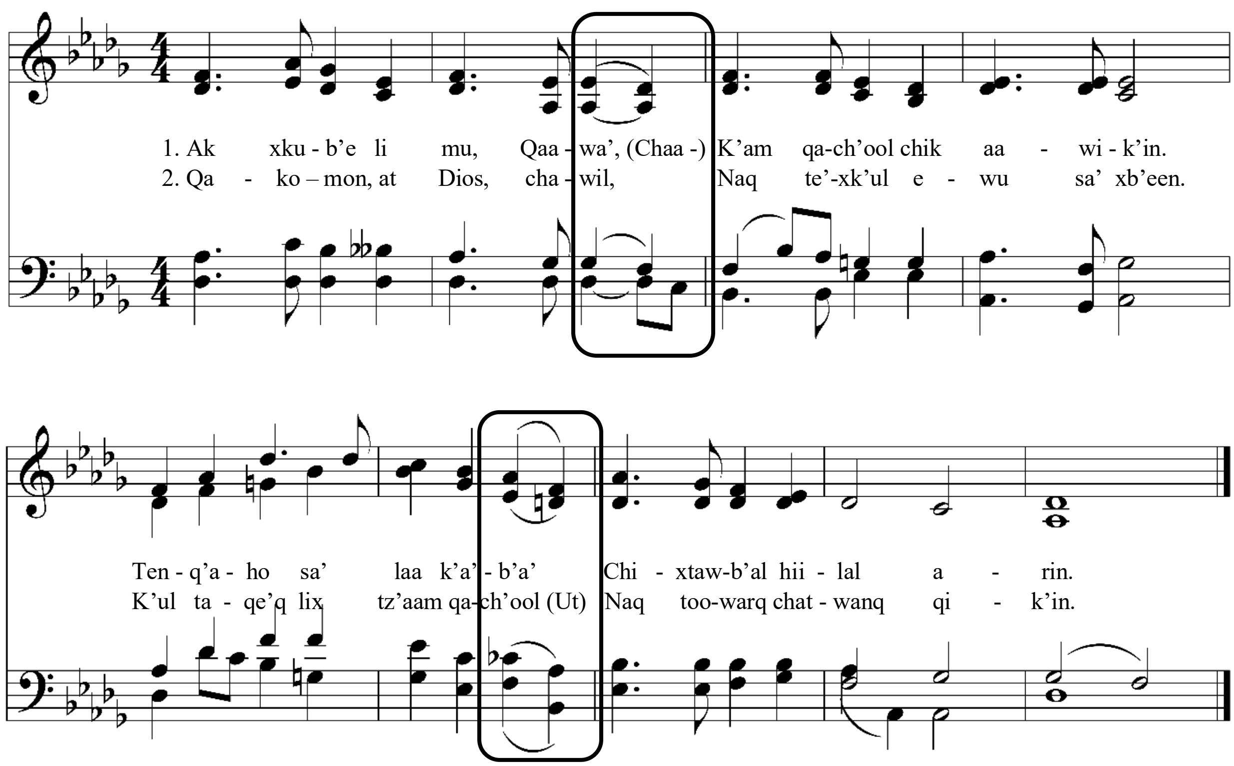
+	–	+	–	+	–	+	–
Ak	*xku-*	*b'e*	*li*	*mu,*	*Qaa-*	*wa',*	*(Chaa-)*
K'am	*qa-*	*ch'ool*	*chik*	*aa-*	*wi-*	*k'in.*	
Ten-	*q'a-*	*ho*	*sa'*	*laa*	*k'a-*	*b'a'*	
Chix-	*taw-*	*b'al*	*hii-*	*lal*	*a-*	*rin.*	
Qa-	*ko-*	*mon,*	*at*	*Dios,*	*cha-*	*wil*	
Naq	*te'x-*	*k'ul*	*e-*	*wu*	*sa'*	*xb'een.*	
K'ul	*ta-*	*qe'q*	*lix*	*tz'aam*	*qa-*	*ch'ool;*	*(Ut)*
Naq	*too-*	*warq*	*chat-*	*wanq*	*qi-*	*k'in.*	

Once translated in the grid, the potential Kekchi translation fits cleanly into the musical setting, with falling endings adjusted by adding slur marks, as shown in Figure 42 in the second and sixth measure of the musical notation. Figure 42 also maintains parenthesized syllables in these measures to indicate the option of using elision rather than slurring. A gloss for the text in this figure (as well as figure 41) reads as follows:

English:	Kekchi Gloss:
As the shadows fall, O Savior,	Already the shadow has descended, Lord, (May you)
Turn our thoughts and minds to thee.	Take our hearts now to you.
Help us, Lord, that we may strive for	Help us in thy name
Peace, and find our rest in thee.	To find rest here.
Father, please watch o'er our loved ones	Our people, thou God, watch over
As the evening round them flows.	As they receive evening upon them.
Lord, accept our supplications;	Receive on high the plea of our hearts; (And)
Be with us in our repose.	As we sleep, be with us.

Though the intuitive singability of this translation would require further testing with human subjects, it can be anticipated with relative confidence based on the known prosodic alignments achieved by this thesis's method of prosodic modeling for hymn translation.

Figure 42: Potential Kekchi Hymn Translation in Musical Setting (*Hymns* #168)



4.1.8. Potential Problems and Solutions in Other Target Languages

The problems and solutions outlined here for Kekchi allow similar problems and solutions to be anticipated for other target languages. Because the challenges in Kekchi arise entirely around the linguistic feature of fixed stress (and the resulting distribution of secondary stress), other languages that also have fixed stress can benefit from these Kekchi findings. Goedemans and van der Hulst (2013a) identify six kinds of fixed stress throughout the languages of the world, along with a catalog of languages that exemplify each type. Aligning these six types of fixed stress with the five rhythm types in hymn texts (trochaic, iambic, dactylic, amphibrachic, and anapestic) is likely to pose challenges like those in Kekchi. What seems most likely is that the challenges will also occur most regularly at the beginnings and endings of lines where initial and final syllables must be placed, regardless of their compatibility with the stress occurring there. In such circumstances, the terms used in this thesis such as *iambic beginnings* and *falling endings* are likely to continue to play a role in defining the problems and solutions manifested in other fixed-stress languages.

Table 13 lists the six types of fixed stress provided by Goedemans and van der Hulst (2013a), with examples of languages for each pattern, and identifies the types of beginnings and endings of lines that potentially pose problems for these languages. While it is reasonable to assume that these languages will benefit from solutions like those used for Kekchi (differentiating between primary and secondary stress; identifying iambic and trochaic patterns at the level of secondary stress; differentiating between word boundaries and constituent boundaries; using monosyllabic words, slurring, omission, and elision), no attempt is made here to suggest which of these solutions may be useful for each of these languages, as this thesis is not backed by an investigation into the finer details of these languages. It is recognized that the actual state of affairs may be more complicated than implied by the simplified tablature of Table 13.

Table 13: Potential Problems in Other Fixed-Stress Languages

Fixed-Stress Type	Potential Problems
Fixed Initial Stress (on the first syllable of all words): Czech, Finnish, Icelandic, Hungarian, etc.	Iambic Beginnings Amphibrachic Beginnings Anapestic Beginnings Rising Endings
Fixed Second Stress (on the second syllable of all words): Dakota, Stoney, Mapundungun, Southern Paiute, etc.	Trochaic Beginnings Dactylic Beginnings ↓ Rising Endings ↓
Fixed Third Stress (on the third syllable of all words): Winnebago	↓
Fixed Antepenultimate Stress (antepenultimate syllable): Macedonian, Greek, Paamese, Cree, etc.	↓
Fixed Penultimate Stress (penultimate syllable of all words): Quechua, Polish, Swahili, Zulu, Malagasy, Tagalog, etc.	↓
Fixed Ultimate Stress (on the last syllable of all words): K'iché, Armenian, Persian, West Greenlandic, etc.	↓ Falling Endings

4.2. Problems in the Source Text

While focusing on the results that can be attained in a target language, an additional finding of this thesis is that the proposed model of prosody also reveals prosodic problems in certain hymns in the English source text. Such findings suggest that the model of prosody could be useful not only for hymn translation but also for hymn composition, or that a translator could rightly be instructed to avoid certain weaknesses in the source text for an appropriately improved result in the target language.

Since these problems are only an incidental finding of this thesis, their full extent is not quantified here. Rather, two examples are briefly mentioned and demonstrated to mark them for further investigation. The first is the problem of misaligned juncture points, which can be classified as either major or minor misalignments. The second is the problem of inconsistent textual patterns from one verse to another. Though this latter problem does not qualify as a prosodic misalignment (the specific problem this thesis's proposed model aims to assist), it does qualify as an obstacle to intuitive singability (the ultimate problem the proposed model aims to assist), and is recognized as a breach of Text Placement Rule 5, mentioned in section 3.3 of this thesis.

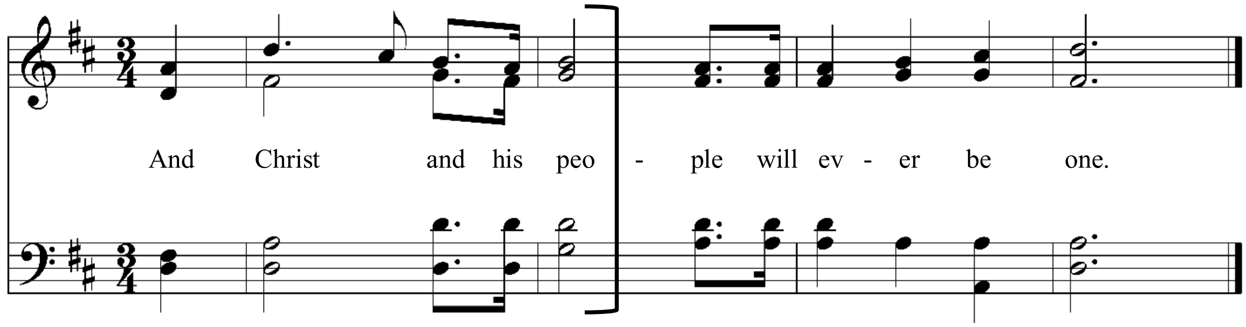
4.2.1. Misaligned Juncture in the Source Text

The severity of a misalignment between the juncture points of the text and music is assessed here, based on the same features that this thesis uses to qualify a juncture point as crossable or non-crossable, namely, the strength of phrasal demarcation implied by melodic, rhythmic, and harmonic patterns in the music. Whenever these features render a juncture point non-crossable, crossing that juncture point in the text would constitute a major misalignment.

One such major misalignment of juncture is found in the hymn "Now Let Us Rejoice" (*Hymns* #3). Figure 43 shows how one passage of this hymn contains a moment of strong phrasal demarcation in the music, the boundaries of which are respected in the first two verses of the text. The third verse, however, crosses this boundary with the hyphenated word "peo - ple." The phrasal demarcation in the music is strongly implied by what occurs rhythmically. After several measures of evenly spaced, continuous quarter notes, the rhythm here breaks into dotted figures that lead into a half note whose extended duration makes it difficult to interpret as anything but an arrival point. Landing an unfinished word on this note thus contradicts that strong sense of (non-final) arrival and constitutes a major misalignment of juncture.

A misalignment such as this could merit being pointed out to a translator as one to avoid duplicating in the target language. Although it may have been successfully learned by the source language audience to the point that no member of that community would recognize it as problematic, the problem could be immediately transparent when a target language community attempts to sing it as a congregation without any previous habituation.

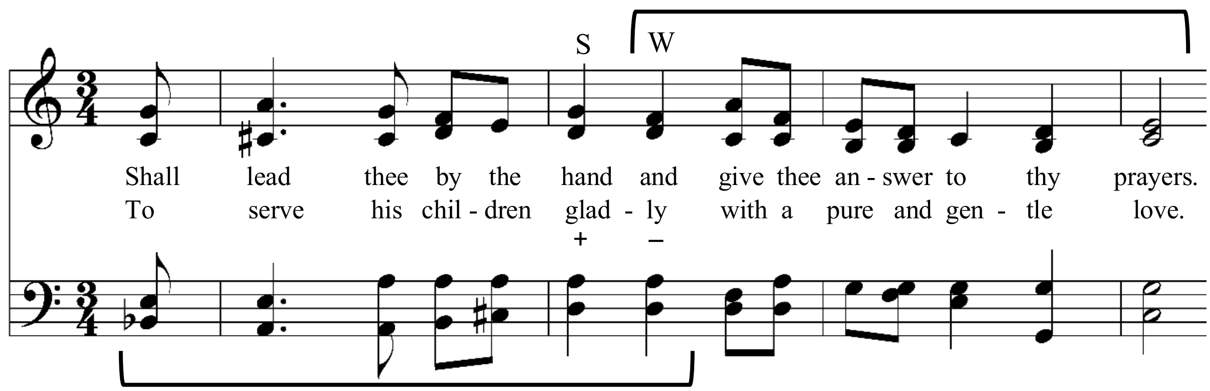
Figure 43: Major Misalignment of Juncture in the Source Text (*Hymns* #3)



A minor misalignment of juncture involves a juncture point in the music that is considered crossable because the rhythmic, melodic, and harmonic patterns afford some ambiguity in the interpretation of phrasal boundaries. One such crossable juncture occurs in the hymn "Be Thou Humble" (*Hymns* #130), and the English source text does indeed cross it. This occurrence of a minor misalignment is shown in Figure 44, where the musical phrase concludes with a falling ending in the second beat of the second measure. This falling rhythmic pattern as well as the clearly differentiated rhythmic motion that ensues make it clear to an analyst that this does indeed mark the end of a musical phrase. However, because the melodic motion here lacks any sense of halt, a lay singer would not necessarily have any intuition to end the textual phrase here. As a result, a text that crosses this juncture may not result in a singability problem. Indeed, both options are present in this hymn's English text, as the first verse crosses the boundary by eliding phrases on the conjunction "and," and the second verse obeys the boundary by finishing the phrase on the word "glad-ly."

A misalignment such as this could merit being pointed out to a translator as one to *preferably* avoid in the target language. Just as it may not have required habituation for the source language community to learn it, it may not require habituation for the target language community. Nonetheless, respecting this junctural boundary would reduce the risk of any singability problem and could even be considered a cleaner artistic achievement.

Figure 44: Minor Misalignment of Juncture in the Source Text (*Hymns* #130)



4.2.2. Inconsistent Material in the Source Text

Though not a prosody problem, inconsistent textual material from one verse to another in the English text poses a potential a singability problem. Because singing a hymn text successfully for the first time requires quickly catching onto an intuitive pattern and then repeating it, a first-time sing-through is likely to experience challenges when unexpected variations arise in the text from one verse to another. In *Hymns* (1985), such inconsistencies can be seen in the placement and quantity of syllables from one verse to another. Figure 45 and Figure 46 show two examples of this, with Figure 45 being a milder example and Figure 46 being a more extreme example. However, it may be that the singability problem posed by the milder example is just as serious as the more extreme example.

In Figure 45, the color gray marks a textual inconsistency in the initial syllable slot of the final two lines of each verse. The ornamental syllables in the second verse are parenthesized to indicate that they are optional. Empty parentheses are provided in the analogous location in the first verse, indicating that the musical setting permits ornamental syllables to be similarly used in the first verse. This gives a translator four choices: 1) preserve the same inconsistency, 2) use a different inconsistency, 3) create consistency by using every ornamental syllable slot, 4) create consistency by using no ornamental syllables.

Figure 45: Textual Inconsistency in *Hymns* #19

	-	+	-	-	+	-	-	+	-
Verse 1	We	thank	thee,	O	God,	for	a	pro-	phet
	To	guide	us	in	these	lat-	ter	days.	
	We ( )	thank	thee	for	send-	ing	the	gos-	pel
	To ( )	light-	en	our	minds	with	its	rays.	
Verse 2	When	dark	clouds	of	trou-	ble	hang	o'er	us
	And	threat-	en	our	peace	to	des-	troy,	
	There (is)	hope	smil-	ing	bright-	ly	be-	fore	us,
	And (we)	know	that	de-	liv-	'rance	is	nigh	

Due to their quantity, Figure 46 does not mark the textual inconsistencies in the color gray as done in Figure 45. The same options presented to a translator in Figure 45 are also presented to a translator in Figure 46, though in this latter case the decision may be more complicated due to the number of syllabic inconsistencies.

Figure 46: Textual Inconsistency in *Hymns* #213

	-	+	-	+	-	+	-	+
Verse 1	The	first	No-	el	the	an-	gel (did)	say
	Was (to)	cer-	tain (poor)	shep-	herds (in)	fields	as (they)	lay,
	In	fields	where	they	lay	keep-	ing (their)	sheep
	On (a)	cold	wint(-er's)	night	that	was	so	deep.
Verse 2	They	look-	ed	up	and	saw	a	star
	Shin(-ing)	in	the	east	be-	yond	them	far,
	And	to	the	earth	it	gave	great	light,
	And	so	it (con-)	tin-	ued (both)	day	and	night.

Though solutions to these inconsistencies need not be seriously pursued in the English source text due to generations of habituation, solutions could be usefully applied to a target language whose community may not have a background of habituation with these textual inconsistencies. For this reason, the model proposed in this thesis supports marking such inconsistent syllables as parenthesized ornamental syllables to emphasize to a translator that preserving them is optional, thus creating an opportunity to produce a translation that achieves greater textual consistency than the source text.

Chapter 5: Discussion and Conclusion

This chapter is a concluding discussion that reviews the research purposes described in chapter 1 of this thesis and how they are addressed throughout the subsequent chapters. This chapter also presents implications that are of interest in theoretical discussions about prosody's definition, nature, and makeup, and concludes by noting certain research questions that this thesis leaves open to future study.

5.1. Original Research Purposes and Final Results

As described in chapter 1, this thesis proposed four hypotheses:

1) A unified model of prosody is possible—and necessary—within hymn translation.
2) Such a model can be constructed from the prior practices of existing models and from the prosodic manifestations of a hymn corpus.
3) This model can serve the practical purpose of producing prosodically aligned hymn translations.
4) This model can offer theoretical considerations for the definition, nature, and modeling of prosody in general.

The first and second hypotheses are supported in tandem throughout chapters 2 and 3 of this thesis, as chapter 2 presents an inventory of existing modeling practices and chapter 3 uses those practices as well as the prosodic features found in a hymn corpus to construct a specialized model for hymn translation that accounts for a unified interplay of speech, poetry, and music. Section 3.2 most especially outlines these results by presenting all the prosodic components, types, and representations that are used in the proposed model.

The third hypothesis is supported in chapter 4 which applies the proposed model to hymn translation in Kekchi and thereby identifies both problems and solutions for ensuring prosodic alignment in Kekchi hymn translations. Section 4.1.6 contains the most direct summary of these results by outlining a set of Kekchi Well-formedness Rules that are produced by the model.

The fourth hypothesis is supported at interspersed locations throughout the thesis. To bring all those observations together into one place and to demonstrate that this hypothesis is supported, those observations are compiled and discussed in the ensuing section of this chapter.

5.2. Theoretical Implications

As clarified in chapter 1, the model of prosody in this thesis is not necessarily presented as theoretically optimal, but principally as a useful heuristic for the act of hymn translation. Nonetheless, it contains touch points with theoretical discussions of prosody that are mentioned here as part of the final inventory of what this thesis offers. Three touchpoints with theoretical discussions of prosody are pointed out here: the definition of prosody, the nature of prosody, and the modeling of prosody.

Definition of Prosody. The first theoretical implication in this thesis regards the definition of prosody. As shown throughout chapter 2, definitions of prosody differ as to whether the original Greek notion that προσῳδία (prosōidía) is the "sung accompaniment" of language follows through. Section 3.2 takes an unambiguous side in this matter, pointing out that the context of hymn translation fully supports (and even requires) the treatment of prosody as the imposition of musical properties onto text. In short, this thesis defines prosody as musical properties that are present in, applied to, and/or aligned with speech.

Nature of Prosody. As a consequence of the foregoing definition of prosody, this thesis supports the notion that prosody is autonomous in nature, that it exists outside of language and can be both applied to it and removed from it, and that it is a system of its own. This view is further supported as this thesis breaks down this system into its own constituents, typologies, and representations in section 3.2.

Modeling of Prosody. The third theoretical implication of this thesis concerns the modeling of prosody, most specifically regarding the components of prosody that the proposed model outlines. As various theories break prosody into differing components (see Table 1), this thesis settles on a set of components unique to the context of hymn translation. As outlined in section 3.2, this model proposes six major prosodic components: pulse, stress, rhythm, pause, juncture, and tone. While this collection contains features that would be deemed irrelevant or incomplete in the isolated contexts of natural speech, poetry, or music, they represent the features that allow these contexts to coexist in a unified concept of prosody. As such, they provide potential clues as to the essential properties of an autonomous prosodic system that can be applied from one medium to another.

5.3. Remaining Topics and Future Studies

As noted throughout this thesis, certain questions are left unanswered because they are beyond the scope of this thesis. These topics involve further defining needed in the model, further application of the model, further testing of the model's results, and further assessments of the target language (Kekchi).

Further Defining in the Model. Two parts of the model remain inadequately defined: the criteria for assessing the strength of musical juncture points (see 3.2.7) and the treatment of tone (see 3.2.8). Concerning the former, this thesis does mention basic criteria such as the sense of closure achieved by rhythmic patterns, melodic contours, and harmonic motion. Given the boundaries of working within a single corpus of hymns, though, it remains possible to catalogue all such patterns and to rank them in terms of degree. Once fully outlined, it may be possible to advance the binary classification of "crossable" and "non-crossable" junctures into more extended tiers of strength, as done in the ToBI model for juncture in natural speech patterns (Beckman & Ayers Elam, 1993).

Concerning the treatment of tone, this thesis is limited to a basic recommendation that it can be represented above the grid's head line with symbols for three tone levels—high (H), mid (M), and low (L)—writing each symbol only once for whatever quantity of syllables it may map to, as done in the framework of autosegmental phonology (see 2.3.3). To assess the needed quantity of tone levels more fully, and to add such tone markings in the grid scansions of this hymn corpus, the pitch range of each melody in the corpus can be examined. By creating a "tone profile" for each individual hymn, the collection of all tone profiles could result in a tone profile for the corpus in general, allowing for the creation of a more thorough treatment of tone in this model.

Further Application of the Model. The model's results are currently limited by the fact that the model is only applied to one target language (Kekchi) and only partially applied to the source language (English). Further results are needed by applying the model to target languages that cover a broader variety of prosodic constraints, including different mechanisms and patterns for stress and rhythm and different requirements for tone and intonational contours. Additionally, a thorough application of the model to identifying problems in the English source text, as exemplified in section 4.2, would provide the benefit of identifying problems not to be repeated in translation. Finally, the model can yet be applied to hymns outside the corpus of *Hymns* (1985) to test how well its current conventions hold up in the broader body of hymnody, even including other genres of music that do not conform to the patterns of homophonic music and metrical text.

Further Testing of the Model's Results. Intuitive singability, the ultimate goal of the model presented in this thesis, is only projected by this model. To move beyond projecting it and to test it, human subjects are required. Such testing would certainly involve the actual singing of translated hymns, ideally by groups of monolingual native speakers who are encountering a given hymn for the first time without the aid of rehearsal or guidance or reading the musical accompaniment.

In addition to testing the overall singability of a hymn in a congregational setting, two specific prosodic intuitions could be tested: 1) the intuitiveness of musical junctures, especially in cultures whose musical traditions may involve different sensibilities around melodic closure and harmonic resolution, and 2) the acceptable duration of suspended motion, which section 4.1.5 of this thesis preliminarily suggests to be no more than two beats.

Further Assessments of Kekchi Prosody. This thesis relies on two notions of Kekchi stress that are unrepresented and untested in existing literature. The first is the notion that on the secondary level of stress, Kekchi alternates in a regular pattern of stressed to unstressed syllables from the right edge of a word, resulting in words that are iambic or trochaic from the left edge of the word, depending on how many syllables the word contains (see Figure 27). The second is the notion that this patterning can also start at the right edge of syntactic phrases, resulting in words within the phrase with an unstressed final syllable, contrary to the general expectation for Kekchi words to always bear fixed final stress (see Figure 28). While these patterns seem to hold up in a metrical context and are backed by similar observations in other languages (Goedemans, 2010), they remain to be tested in the context of natural Kekchi speech. The results of such testing could certainly make a difference in gauging the singability of these patterns even in a metrical context.

Additionally, the prosodic feature of vowel length in Kekchi requires further assessment as to whether it requires restrictions when setting Kekchi texts to music. As mentioned in footnote 2 of this thesis (section 3.4.2), *Eb' li B'ich* (2012) places both long and short vowels on long and short musical notes. Because it is not certain whether this represents a problem in Kekchi hymns, further studies would be needed to assess that question. The results of that question could even make a case for adding length as the seventh component the proposed model of prosody.

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