Keening as a Cross-cultural Phenomenon

Document

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by

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CHAPTER I
WHAT IS KEENING?

The body, still in the hammock, was moved slightly to one side to accommodate the large number of visitors. His wife lay prostrate with grief in another hammock alongside the body. By noon, eight men were stomping out the dance of mourning. The wailing was stylized; it had a rhythm, and it rose and fell almost as if it were a mournful song. I asked if the sounds they made were "songs of death." "No" they answered, "this is crying." (Wagley 1977:170)

Charles Wagley made this observation in 1939 while visiting the Tapirapé Indians in central Brazil. It illustrates a phenomenon which has been similarly noted worldwide. Many cultures with no evident ethnic or linguistic ties have rituals which involve solo keening. The term "keening" describes, in the present study, solo vocal utterances which occur during funeral rituals and contain elements of speaking, crying and singing.

In order to establish keening as a cross-cultural genre, observations are drawn together with the single question in mind; "What is common among diverse solo vocal funerary utterances?". A methodology must be then developed and tested on various performances. The present study employs a computer program developed for speech science called waves+. This program allows for careful timbral analysis through the use of spectrograms, waveform graphs, fundamental and formant frequency analyses and spectral analyses. (see Appendix A)

Most European scholars are comfortable with the word "lament". "Lament", however, describes both solo and communal utterances which may occur in non-funerary
contexts. Certain Russian laments, for instance, are used for weddings and in military recruitment. Observers of the Amerindian Brazilian cultures have developed the term "ritual wailing". Ritual wailing, however, may signify greeting for long-absent kinsmen, as well as death. Other scholars prefer to use specific indigenous words for this phenomenon. Sacyelab is one of several terms used by the Kaluli of New Guinea to describe their crying. The practice of allowing each culture to describe its version of this phenomenon has appeal, but lacks practicality for the present study. Imagine the difficulties of listing every culture's term each time the subject is mentioned.

None of the above terms, then, accurately describes "solo funerary speaking/crying/singing." As such, when speaking generally, this study will replace "solo funerary speaking/crying/singing" with the term "keening". "Keening" derives from the Gaelic word "caoineadh", meaning "weeping" (MacInnes 81:747). Keening occasionally describes communal funerary performances, but in the interest of space and clarity, the term will stand. When discussed specifically, within the context of a single culture, the accepted indigenous term will be observed.

Several scholars have attempted to define keening. Urban, in his work with Amerindian Brazilian ritual wailing offers what he calls "three code feature commonalities of diverse wailing manifestations: (1) the existence of a musical line, marked by a characteristic intonation contour and rhythmical structure; (2) the use of various icons of crying; and (3) the absence of an actual addressee, which renders the ritual wailing an overtly monologic or expressive device, despite the importance that may accrue to its status as public, with the desired presence of someone to 'overhear' it." (Urban 1988:386) One could use these "code feature commonalities" with slight modifications to describe keening as a whole.

Urban's first commonality suggests that certain aspects of ritual wailing may be culturally specific. Each culture brings its unique musical sensibilities into the creation of
both intonational or melodic contour and rhythmic structure. Mazo similarly notes, "[Lament] is submitted to the rigid rules of each local tradition. These rules control all aspects of musical/poetic/behavioral patterns."(Mazo 1990:122) Feld observes that the Kaluli performers of gana-yelema, a strictly male form of crying, strive to mimic the song of the Muni bird, an icon of considerable religious stature. (Feld 1982:89)

One could add overall structure to Urban's specific melodic and rhythmic stylistic elements. Russian laments, for instance, are generally composed of lines. Each line begins with an inhalation and often ends with a cadential pattern. Usually the performer repeats only a few different melodic fragments during the lament. The texts of these lines may each express a complete idea or may be coupled to express a set of related ideas. The Shavante dawawa, in contrast, has non-lexical vowel sounds instead of text. Like the Russian lament, however, the dawawa performance is divided into lines and employs repeated melodic fragments in these lines.

All of this, however, does little to propel an argument for keening as a cross-cultural phenomenon. Admission that many cultures employ similar musical elements, in this case repetition of melodic fragments, merely records an observation. It says nothing unless it can be proven that these elements are employed for the same reason in different cultures. As such, any attempt to demonstrate keening as a cross-cultural phenomenon must look beyond these considerations.

Discussion of text in the context of a study concerning the cross-cultural nature of keening proves frustrating. A comparison of Russian and Greek lament texts, for instance, reveals many similarities. Caraveli-Chaves lists possible topics including praise/invocation, history of the deceased, mourner's plight, and plight of the deceased, among others. (Caraveli-Chaves 1980:137) Similar topics are covered in Russian laments. There could exist a set of acceptable topics which are common throughout European laments. This paradigm, however, breaks down when taking a wider scope. Both Shavante dawawa and
Kaluli *gana-yelema* employ non-lexical texts. If one were to define the genre according to text alone, these examples would be omitted even though they share many other characteristics with their lexically-texted counterparts. Regardless, detailed analysis of the texts lies beyond the current study's purview.

Urban's second commonalty, his "icons of crying" could exist at a more cross-cultural level. Several sources mark crying as a cross-cultural human reaction to death. Rosenblatt, *et al* (1976) conducted an extensive survey of grief and mourning among the world's peoples. They found that crying in response to death is noted in 72 of 73 cultures described, the Balinese being the only exception. Furthermore, they found that in roughly half of these societies there is no difference in the frequency of crying between men and women, and that in the other half, women cry more frequently. (Rosenblatt 1976:22)

These icons are vocal gestures which derive from crying, but in keening are presented in a ritualistic context. They could prove more useful as a means of identifying keening in a cross-cultural context than culturally specific melodic or rhythmic elements. If crying in response to death is a cross-cultural phenomenon, then any performance which includes vocal gestures suggestive of crying could be considered as part of a coinciding cross-cultural genre.

Mazo believes that the elements which make laments recognizable all over the world are not formal, but expressive characteristics. This involves both vocal gestures and vocal quality. These vocal gestures are the same as Urban's icons of crying. Vocal quality falls into the realm of timbre. (see Appendix A) The differences between crying, speaking and singing are differences in vocal quality. An experiment by Mazo demonstrates the perceived importance of vocal quality in laments. Russian villagers were asked to listen to recordings of lament performances in which the pitch, rhythm and timbre had been independently manipulated. When pitch or rhythm was manipulated, the listeners gave little notice, but when vocal quality, or timbre was manipulated, they marked the recordings as "bad" or
"improper." (Mazo 1991:14) This suggests that vocal quality holds an important position in their perception and evaluation of purely sonic issues.

Urban's third commonalty defines the genre's context and function: "(3) the absence of an actual addressee, which renders the ritual wailing an overtly monologic or expressive device, despite the importance that may accrue to its status as public, with the desired presence of someone to 'overhear' it." (Urban 1988:386) The absence of an actual addressee marks keening, in the case of the present study, as a funerary genre.

Some cross-cultural gleanings may be gained by examining the dual function of ritual wailing which Urban notes as a corollary to his third commonalty. On one hand, ritual wailing serves as a personal expression of grief. On the other hand, it demonstrates a desire for social acceptance. Urban notes, "The purpose of the individual's action is undoubtedly communicative—to let other members of the community know that the individual has the proper orientation to the dead person, visitor, or whatever life situation occasions the wailing—whether or not it is expressive. In other words, there is a disjuncture between how the ritual wailing represents itself and how it is actually being used. It is a kind of calculated accident, an action designed to appear spontaneous." (Urban 1988:392)

Caravelli-Chaves notes a somewhat different function among Greek laments. "Bonding among women can operate both synchronically and diachronically through the lament ritual. The processes of transmission and collective performance are examples of synchronic bonding. These processes in combination with subject matter can effect diachronic bonding. A lament about a woman—especially a relative—provides in itself ample opportunity for communication (and through it, bonding) across generations of women." (Caravelli-Chaves 1980:145) The contrast with Urban is striking until we note that the Greek lament is a female tradition and that the Shavante dawawa may be performed
by either gender. Both examples, then, suggest that, in addition to being an expression of personal grief, keening serves as a vehicle for community bonding.

Scholars of cultures where keening has been identified agree that each example has distinctive formal features, that in each instance the deceased provides a focal point, and that the act of keening serves a dual purpose of expressing grief and acceptably communicating this grief to the community. Neither these first nor third of Urban’s commonalties, however, identifies keening with certainty. Both emphasize its culturally specific aspects. Given, however, that crying in response to death is a cross-cultural phenomenon, Urban’s second commonalty, that which involves the icons of crying, could also exist cross-culturally. This study will attempt to identify and define keening through these ritualized vocal gestures.
CHAPTER II
THE ICONS OF CRYING

Four scholars in particular (Mazo and Vaughn in their studies of European lamenating, Urban and Graham in Amerindian Brazilian ritual wailing) have pointed out similarities between crying and keening. The presence of these "icons of crying" in the funerary practices of different cultures can most convincingly illuminate keening as a cross-cultural phenomenon. Mazo notes "voiced inhalation", "diplophonia" (a splitting of the fundamental frequency) during inhalation, "exhalatory gasps", "creaky voice", and "AFM" (a combination of amplitude and frequency modulation) on certain vowels in her studies of Russian laments. (Mazo 1991:20-31) Vaughn likewise notes this "combination of amplitude modulation and pitch bend" in Karelian laments. (Vaughn 1990:108) Urban lists the "cry break", the "voiced inhalation", the "creaky voice", and the "falsetto vowel" as cross-linguistic features of the ritual wailing in the Bororo, Shokleng, and Shavante groups he studied in Brazil. (Urban 1988:389) Graham identifies "creaky voice" and "wavering pitch" in her studies of the Shavante. (Graham 1986:89) The obvious problem of correlating these diverse observations lies in their lack of standard terms. By an examination of each, several categories emerge.

The present study examines four performances which were analyzed using the waves+ speech analysis program. (see Appendix A) Two are Russian laments by Mrs. S.
(on condition of anonymity) and Mrs. Gorina, both from the southern Stavropol region. They were recorded by Margarita Mazo in 1989, with the assistance of Olga Velichkina. (Mazo, 1989) A third is a lament by a performer named Tatyana Sat from Tuva, a region in Siberia. (Alekseev, 1990) The fourth is a performance of dawawa, from the central Brazilian Shavante, recorded by Laura Graham in 1981-2. (Graham, 1986) Additionally, an recording of Olga Velichkina crying has been analyzed. (Mazo, 1991) This example should corroborate the assertion that the vocal gestures found in keening stem from crying. It should be noted that the crying was recorded in a studio, out of its natural context. Olga Velichkina, a native Russian, is an ethnomusicology graduate student at The Ohio State University who has studied lamenting.

Voiced Inhalation

Mazo, in her analysis of the lament by Mrs. S., notes that inhalation occurs before nearly every line and describes two general categories of inhalation. Voiced inhalations outnumber their unvoiced counterparts. "If we understand the form of a lament as a process rather than a structure, i.e., as intoning unfolding in the context of a performance, the breathing cycles, including the silences between them, indicate syntactical divisions in lament that are independent of phonological or meaning boundaries. As formal markings, and particularly as boundary markings of a line as a structural unit, they are even more important than other, more familiar, verbal and melodic properties." (Mazo 1991:21)

Voiced inhalations can last as long as 4 sec. and have a generally descending f0 (fundamental frequency). Often, there exists a three-part structure to voiced inhalations, though this structure is by no means stable. (Figure 1. Voiced inhalation, lament by Mrs. S.) The onset of inhalation in Fig. 1 is characterized by a sharply rising f0 in an area of low amplitude. The middle of the inhalation increases sharply in amplitude but with a descending f0. The end of the inhalation is characterized by low amplitude and a
phenomenon known as diplophonia, in which the $f_0$ splits into two discrete pitches. The upper pitch remains stable or rises slightly, and the lower pitch drops rapidly, sometimes as much as 50Hz over a period of .5 sec. or less.

The unvoiced inhalation involves a quick, nearly silent intake of air. The average duration of unvoiced inhalations in the lament by Mrs. S. is 1.05 sec., whereas the average duration of voiced inhalations is 2.24 sec. The average duration of a line following an unvoiced inhalation is 4.22 sec. while that following a voiced inhalation is 4.47 sec. Although exact measurements of the subglottal pressure are not available, these figures suggest that the same amount of airflow is involved in both types of inhalations, but that the glottal conditions which produce voiced inhalations severely restrict airflow.

The lament from Tuva, T. Sat, also produces voiced inhalations. (Figure 2. Voiced inhalation, lament by T. Sat.) They are rather short, in comparison with Mrs. S's, and occur between a set of wails (/ii/) after each line's text. T. Sat produces nearly an equal number of voiced and unvoiced inhalations. The voiced inhalations range in duration between .33 sec. and .23 sec., while the unvoiced inhalations are slightly shorter ranging between .11 sec. and .22 sec. This bears proportional similarity to Mrs. S's inhalations. There is also evidence of diplophonia in T. Sat's lament.

Urban notes that the voiced inhalation, with a characteristically descending $f_0$, is found consistently among Shokleng and Bororo ritual wailing, but not in that of the Shavante. Indeed, Graham's recording of a Shavante dawawa performance includes no voiced inhalations.

"Voiced inhalation in ritual wailing can be compared with a signal associated in American culture, and perhaps elsewhere, with fright or with being startled. However, the intonation contour in this latter case is distinct, and the inhalation is sudden. In both cases, however, the voicing seems to signal something about the individual's intense involvement in the emotional state, which in effect interrupts the ordinary procedure of relaxing the glottal chords during inhalation. It may be this heightened emotional involvement that is signaled by use of the voiced inhalation at the line junctures in the Brazilian cases." (Urban 1988:390)
Mazo suggests with regard to both voiced inhalations and exhalations that "Voiced breathing, so unusual in regular singing, represents a paralinguistic attribute characteristic of emotionally charged utterances, such as wailing, crying, sobbing, and also laughing. (Mazo 1991:28)

From the recording of O. Velichkina crying, one could assert that voiced inhalation is a natural element of that expression. Voiced inhalations appear far more prominently than unvoiced inhalations. Characteristically, the voiced inhalation's f0 and amplitude rise sharply at first, then gradually descend. Duration varies widely, but averages somewhat over 1 sec. In the descending part of the inhalation, diplophonia is common. (Figure 3. Voiced inhalation, crying by O. Velichkina.)

**Exhalatory Gasp/Cry Break**

The sonic elements of Mazo's exhalatory gasp correspond to those of Urban's cry break. Mazo notes that Mrs. S. terminates certain lines of her lament with a final extended vowel and one, two or three exhalatory gasps. (Figure 4. Exhalatory gasps, lament by Mrs. S.) When the gasps are coupled, they descend in pitch. The occurrence of these gasps (voiced exhalations) corresponds to topical segments of the lament's text. Three gasps at the end of a line signal a major shift in the text's topic. In this 66-line lament, the three-gasp cadential formula occurs only three times. Two-gasp and one-gasp cadences happen more frequently, and signal regressively smaller shifts in the text's topic.

A relationship seems to exist between exhalatory gasps and voiced inhalations. Just over half of the lines in the lament by Mrs. S. are followed by voiced inhalations. Yet all of the two- and three-gasp cadences, those which meaningfully correspond to topical shifts in the text, are included in this number. The performer may, therefore, employ a voiced inhalation after any line, but voiced inhalations always follow cadential patterns.
Urban's description of the cry break closely resembles that of Mazo's exhalatory gasps.

"From an articulatory point of view, the cry break involves a pulse of air initiated by a push from the diaphragm. Pressure from the pulse is built up behind the closed glottis, which is then released with the glottal chords vibrating to produce any of various non-distinct vowels. This vibration is often accompanied by friction noise, as the air is forced out of the mouth and/or nose. In addition, the sound is typically produced with a falling tone. The pulse is then checked through a second closure of the glottis, the entire process lasting a fraction of a second. Two variants of the cry break involve the absence of glottal closure at either the beginning or the end of the sound." (Urban 1988:389-90)

Urban notes, once again, that the cry break is found among the Bororo, but not the Shokleng or Shavante. He describes the Bororo cry break as a sobbing action which occurs at the end of a line and may be chained together in groups as large as three.

Figure 5 shows exhalatory gasps in crying by O. Velichkina. As in the lament by Mrs. S., O. Velichkina produces an extended vowel followed by a chain of three gasps. The gasps have progressively diminishing amplitudes. (Figure 5. Exhalatory gasps, crying by O. Velichkina.)

**Creaky Voice**

Mazo, Urban and Graham all mention the creaky voice. Best seen with a narrowband spectrogram, creaky voice may be characterized as having two distinct sets of harmonic series, one stemming from a strong sub-harmonic, usually at half of f0. The creaky voice, or vocal fry "is heard at the end of utterances where the fundamental frequency falls to a low level and is characterized by the interspersion of larynx cycles of abnormally long duration; sometimes such cycles alternate with cycles of shorter period, so that there is a short cycle followed by a long cycle, followed by a short cycle and so on. If the period of these long cycles is converted to frequency, they represent fundamental frequencies in the range from 20 to 60Hz." (Fry 1979:68) "In creaky voice the arytenoid
cartilages are [held] tightly together, so that the vocal cords can vibrate only at the other end. This is a very low pitched sound that occurs at the ends of falling intonations." (Ladefoged 1975:123).

Mazo finds examples of the creaky voice near the ends of several lines in Mrs. Gorina's lament, where one would expect the airflow to be weak and the pitch to drop. It occurs most prominently on final, extended vowels. The different instances of creaky voice in Mrs. Gorina's lament appear in almost exactly the same place within different lines and have very similar durations. (Figure 6. Creaky voice, lament by Mrs. Gorina.)

Urban describes creaky voice in Amerindian wailing:

[It] involves the production of sounds with the glottal chords vibrating at a lower than normal rate. There is variation again as regards (1) just how much lower than normal the rate is, and (2) how frequently the creaky voice is used.

In the Shokleng examples, the glottal chords vibrate quite slowly, and the creak occurs throughout the entire line. Among Shavante, the creak is very light throughout, becoming more noticeable at some points than at others (e.g., around the falsetto vowels). However, the voice is clearly distinct from normal speaking voice. Among the Bororo, there is light creaking during the level onset, which, as among Shavante, becomes heavier with the protracted vowels.

If sadness and grief are in fact associated with this signal cross-linguistically it would be of interest to study its semiotic functioning more closely. Use of creaky voice in these contexts may have to do with its association with various abnormal states of the organism, particularly sickness or physical exhaustion, where the organism lacks the energy to produce a normal robust sound. Under this hypothesis, creakiness would be related to showing that the person engaged in ritual wailing or crying is afflicted by the situation that occasioned it, much the way an organism is afflicted by external disease or injury." (Urban 1988:390)

There is no evidence of creaky voice in Graham's recording of dawawa. To the naked ear, however, creaky voice and AFM (discussed below) sound similar. Urban may be mistaken. Additionally, there is no evidence of creaky voice in the lament by T. Sat, or in the example of O. Velichkina crying.
AFM

In her discussion of the lament by Mrs. Gorina, Mazo describes a fourth icon of crying, a combination of amplitude and frequency modulations which she calls AFM. (Mazo 1991:30) She tracks AFM to show the performer's emotional involvement in the lament.

The causes of AFM are still unclear. Rapid perturbation of the airflow causes amplitude modulation. Rapid innervation of the cricoarytenoid muscle (or another laryngeal muscle) could cause the frequency modulation. Although these are two fairly separate systems, it seems unlikely that the combination of amplitude and frequency modulation is accidental. They are more likely caused by some overriding physiological condition.

Vaughn provides some evidence for sympathetic action among separate systems in a discussion of "Phase Locking and Altered States in Musical Performance." (Vaughn 1990:116-18) She gives an example of a runner whose breathing and strides quickly phase lock and compares this to rocking or swaying and breathing in laments. She suggests that the combination of amplitude and frequency modulation in laments could be similarly linked.

The entire performance of Mrs. Gorina's lament consists of twenty-four lines. Throughout the lament, the performer repeats several similar melodic patterns. Mazo found that AFM occurs most prominently during the top pitch of this melody, and only after a certain point in the lament. It is not until line 8 that AFM is detectable even though the performer sings this top pitch several times prior. After line 8, AFM becomes progressively more common, but only during the highest pitches. One can hear the performer begin to sob at the same time that AFM becomes prominent. In this sense, AFM could be connected to emotions associated with crying.

It is possible to categorize AFM occurrences in the lament by Mrs. Gorina by their f0 distributions. Type A examples generally range between 340-390Hz and span entire
vowels. They have a clear, steady periodicity. Type B examples generally range between 240-390Hz and effect parts of syllables with a less pronounced and unsteady periodicity. The phenomenon of AFM, then, is generally stronger between 340-390Hz and weaker in the 240-340Hz range.

Placement within the melodic contour also affects the type of AFM. Type A instances are invariably approached upward by a step or skip and resolved downward by a step or skip. Type B AFM plays a role similar to that of a passing tone in tonal music—approached or resolved by a step. The syllables unaffected by type A AFM in line 8 have f0 ranging from 235-302Hz, while the area affected by Type A AFM, timecode 2.9-3.15, ranges from 340-390Hz. Line 8 also provides an example of type B AFM. The affected area, timecode 3.65-3.75, has an f0 of approximately 300Hz. (Figure 7. AFM, lament by Mrs. Gorina, line 8)

The distribution of AFM throughout the lament by Mrs. Gorina, shown in Table 1, points to possible conclusions. AFM exists in fourteen places, spread evenly through lines 8-22. More importantly the seven instances of type A AFM occur in these same lines. Yet Mrs. Gorina sings pitches seven other times in the 340-390Hz range: lines 1 (340Hz), 2 (365Hz, 391Hz), 3 (371Hz), 4 (374Hz), 5 (373Hz), 6 (358Hz) and 13 (375Hz). All but one occur in the opening six lines, before sobbing gives evidence of the performer's emotional involvement. AFM in Mrs. Gorina's lament is not connected with a specific vowel. In line 8, AFM occurs on the vowels "I matushka ty moya".
Table 1. Distribution of AFM, lament by Mrs. Gorina.

<table>
<thead>
<tr>
<th>line number</th>
<th>type of AFM</th>
<th>range of f0 in Hz</th>
<th>syllable affected</th>
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<tr>
<td>8</td>
<td>A</td>
<td>340-390</td>
<td>tush</td>
</tr>
<tr>
<td>8</td>
<td>B</td>
<td>290-310</td>
<td>moya</td>
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<tr>
<td>10</td>
<td>A</td>
<td>364-390</td>
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<td>363-410</td>
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<td>242-314</td>
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<td>22</td>
<td>A</td>
<td>340-390</td>
<td>nas</td>
</tr>
</tbody>
</table>

One of the unquestionable characteristics of the lament genre is its emotional intensity. In this performance, Mrs. Gorina begins calmly, almost as if she were talking and gradually works into a state of sobbing. It is possible that AFM is a product or result of her emotional intensity. This would account for the fact that the first seven lines remain unaffected by AFM. She does not feel emotionally involved at the beginning of the lament, so her performance does not show the affects of a constricted throat or shallow breathing, for instance, which one would experience while crying. The higher vocal register, then, coupled with altered conditions in the vocal tract which accompany emotional involvement may lead to AFM.

The lament by Tatyana Sat from Tuva displays AFM similar to that in Mrs. Gorina's lament. (Figure 8. AFM, lament by T. Sat.) The lament consists of 6 lines. Each line of text ends with either two or three sustained wails on the vowel /i/. Between lines 4
and 5 there are three wails with no accompanying text. Each line has a gradually ascending pitch contour which leads to the wails. The pitch of the wails themselves begins sharply ascending then gradually descends.

Table 2. Duration and peak f0 of wails (/i/), lament by T. Sat.

<table>
<thead>
<tr>
<th>line #</th>
<th>dur. of line</th>
<th># of /i/s</th>
<th>total dur. of /i/</th>
<th>dur. of /i/</th>
<th>peak f0 of /i/</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11.07</td>
<td>2</td>
<td>2.62</td>
<td>1.97</td>
<td>615Hz</td>
</tr>
<tr>
<td>2</td>
<td>11.34</td>
<td>3</td>
<td>5.58</td>
<td>1.09</td>
<td>533Hz</td>
</tr>
<tr>
<td>3</td>
<td>9.04</td>
<td>3</td>
<td>5.94</td>
<td>2.2</td>
<td>615Hz</td>
</tr>
<tr>
<td>4</td>
<td>9.37</td>
<td>2</td>
<td>5.17</td>
<td>1.33</td>
<td>615Hz</td>
</tr>
<tr>
<td>x</td>
<td>3</td>
<td></td>
<td>5.17</td>
<td>1.75</td>
<td>615Hz</td>
</tr>
<tr>
<td>5</td>
<td>7.45</td>
<td>3</td>
<td>3.42</td>
<td>1.18</td>
<td>615Hz</td>
</tr>
<tr>
<td>6</td>
<td>8.49</td>
<td>3</td>
<td>5.04</td>
<td>1.63</td>
<td>533Hz</td>
</tr>
</tbody>
</table>

AFM becomes progressively more evident throughout the lament. It exists, to a very small degree, in the first wail of line 1 and becomes increasingly prominent in the wails of the remaining lines. The wails without an accompanying text, between lines 4 and 5, show little evidence of AFM, but they are produced at a lower pitch level than those with accompanying texts. In lines 5 and 6, AFM is very pronounced in the wails and, to a lesser extent, in the texted segments of the lines.
AFM in T. Sat's lament differs slightly from the type A AFM in Mrs. Gorina's lament. In the latter, AFM effects the entire syllable. AFM in T. Sat's lament, like type B AFM in Mrs. Gorina's lament, appears to come and go within the individual wail. On the other hand, they both occur on the highest pitches in the performance, and they both appear gradually, as the lamentor becomes more emotionally involved in the performance.

AFM also appears in Graham's recording of *dawawa*. This may be the phenomenon which she calls "wavering pitch." (Graham 1986:89) The AFM in *dawawa* differs from that in the laments by Mrs. Gorina and T. Sat in two ways. (Figure 9: Falsetto vowel, AFM, *dawawa*.) First, the *dawawa* AFM occurs at odd times during the performer's final extended vowels, while the type A AFM in Mrs. Gorina's lament takes place over an entire vowel. Second, the Russian and Tuva examples of AFM occur most prominently during the highest pitches of the lament. AFM in *dawawa*, following this example, should occur during the falsetto vowel (discussed below). Instead, it is found on the final vowel which lies near the middle of the overall pitch contour.

Laura Graham's recording of *dawawa* is actually a compilation of several performances by the same individual. It is regrettable that she does not mention which parts of the *dawawa* performances were recorded. There is no way to determine whether AFM exists from the start of the performance, or becomes gradually more prominent, as in the laments described above.

Vaughn, in her work with Karelian lamens also notes a combination of amplitude and frequency modulation which bears some similarity to AFM. Both Vaughn and Mazo attribute the phenomenon to the performer's emotional involvement with the lament. Vaughn describes what she calls "a prominent vocal shaking which initially appears at the end of each phrase cycle." (Vaughn 1990:108) This vocal shaking borders between a form of vibrato and a combination of amplitude modulation and frequency modulation. Vaughn determines with MusicMapper, her analysis program, that the periodicity, the duration
between amplitude peaks, in the lament she studied lies between .3 sec. and .25 sec. This is somewhat different from AFM in the lament by Mrs. Gorina which has a periodicity of approximately .025 sec. Periodicity of other utterance is similar to that in Mrs. Gorina's lament by T. Sat., .02 sec.; dawawa, .03 sec.; O. Velichkina crying, .028 sec. This discrepancy may demonstrate a difference between two distinct phenomena, or may highlight a difference in analytic techniques.

Though different from the other laments, the AFM in Vaughn's Karelian laments is similar to that in dawawa. While Mazo's type A AFM occurs only during the highest pitches, without regard to placement within the line, both the Karelian laments and dawawa have AFM near the end of a line. In Karelian laments, this represents one of the lowest pitches in the overall pitch contour.

AFM also appears in the example of O. Velichkina crying. (see Fig. 3) It occurs rarely, but always high in the register compared with surrounding pitches. Like AFM in dawawa, T. Sat's lament and type B AFM in Mrs. Gorina's lament, it does not necessarily affect an entire vowel. An example which Mazo made of herself demonstrating a vocal tract condition brought on by emotional distress contains AFM. It occurs on any vowel in nearly any register and, like Mrs. Gorina's lament, occurs over an entire vowel.

Falsetto Vowel

Dawawa consists of three distinct vowel sounds (/a/, /i/, /e/) roughly correlating to four or five pitches. As in other instances of keening, this basic formula is repeated throughout the performance. (see transcription Graham 1986:101-107) Urban mentions the falsetto vowel as common among Bororo and Shavanie ritual wailing.

The falsetto vowel possesses some unusual characteristics. Falsetto vocal production, in general, lacks the clearly defined harmonic structure of normal vocal production for the vowel /i/. Because of this, the formant tracking program is unable to find
any stable formant frequencies for the falsetto vowel. F0 of the falsetto vowel in figure 9 is 330Hz with an amplitude 81dB. The next most prominent frequency band is 550Hz with an amplitude of 57dB.

Additionally, the front vowel /e/ which precedes and follows the falsetto vowel generally has a more prominent f1 (first formant) than f0. Spectrum analysis shows that f0, at approximately 175Hz has an amplitude of 68dB while f1 at 390Hz has an amplitude of 80dB. (Figure 10. Spectrum envelope of falsetto and following vowel, *dawawa*) The formant tracking program confuses f1 with f0; mistaking f0 for a subharmonic.
CHAPTER III
TOWARD A CROSS-CULTURAL GENRE

The present study attempts to demonstrate that societies with no obvious ethnic, cultural or linguistic ties employ similar expressive vocal gestures in keening, a solo vocal funerary genre. There is no attempt here to reflect a comprehensive survey of world keening practices. In many cultures, keening as an expression has died out completely. In most, if keening is practiced, it is done so by the elderly. Furthermore, funeral rituals rank among the most personal of expressions—not easily witnessed or recorded by outsiders. Very few recordings exist outside of personal collections. Regardless, no amount of effort could present keening as a universal human expression—it does not exist in the author's own culture.

Urban's three code feature commonalities help to define keening. Each of the performances analyzed have culturally-specific melodic, rhythmic and structural characteristics. Their texts vary from non-lexical vowels to coherent topical structures. They each have a dual personal/communal function, but the specific nature of that function varies. Each of the performances analyzed, however, share distinct expressive vocal gestures which their performers derive from the cross-cultural expression of crying.

An analytic and transcriptional methodology using speech analysis computer programs has been adopted for this study. This methodology enables the investigator to
minutely examine the audible elements of a performance. With spectrographic analysis, timbral features, difficult to capture with traditional transcriptions, may be clearly seen.

These timbral features lie at the essence of keening. Most prominent among them are the voiced inhalation, the exhalatory gasp/cry break, the creaky voice, the falsetto vowel, and different kinds of amplitude/frequency modulation (AFM). These phenomena have primarily two things in common. 1) They all fall into the realm of vocal quality or timbre, as opposed to pitch, rhythm or dynamics. They are noticed because of their contrast with normal speaking or singing vocal production. 2) They are found in human crying.

Not all of these vocal gestures are found in each performance analyzed. AFM, although its causes are not entirely understood, occurs most frequently. However, evidence of any of the icons of crying, coupled with a function and context consistent with funerary rituals, should alert the observer that a given solo utterance is keening.

Beyond the Present Study

This study serves as a point of departure for several issues. It is possible that some of the icons of crying may be described in terms of physiological changes resultant from extreme emotion. Voiced inhalation, exhalatory gasps, creaky voice and AFM all fit loosely into the category of vocal production altered by shallow breathing and laryngeal restriction—signs of extreme emotion. Only careful clinical studies can determine the physiological origins of these vocal gestures and correlate these findings with field observations.

Regardless of their physiological origins, evidence suggests that elements of keening are, to a greater or lesser extent, affected by performers. It is known that professional Russian lamenters, for instance, are capable of performing at will, affecting the outward signs of lamenting. Keeping in mind that keening functions, in part, as
acceptably communicated grief, the cross-cultural vocal gestures which are characteristic of keening may hold some equally cross-cultural semiotic meaning.

Mazo maintains that the vocal gestures of keening, ephemeral at best, are symptomatic of an overall vocal quality or timbre which is cross-culturally characteristic of keening. Certainly one feature of lament vocal quality is a "nasal" or "whiny" tone. Vocal quality in *dawawa*, on the other hand, could be characterized by its use of front vowels, which produce a prominent first formant. Regardless of the culture, and even without hearing the icons of crying, which serve as signals, the trained observer can quickly identify keening. This may be the result of an, as yet undetermined, cross-cultural vocal quality. These are topics for further study.
APPENDIX A
TOOLS FOR ANALYSIS
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Vocal Production

The vocal tract may be understood as a complex and flexible resonator. As with any object through which sound is passed, the shape of the resonator effects the resultant sound. Depending on the shape of the resonator, certain components of the sound are amplified, or allowed to pass, and certain components are dampened, or filtered. The changes which a sound undergoes when projected through a resonator are, for the most part, timbral changes.

With regard to the voice, the difference in vowel sounds, provided that they are produced at the same pitch, reflect differences in timbre. To produce contrasting vowel sounds, an individual simply changes the shape of her or his vocal tract. The most prominent frequencies in vowel sounds, those amplified by the vocal tract, are called formant frequencies. Formants are not single frequencies, but bands of frequencies. Each vowel sound has a "signature" configuration of formant frequencies. The vowel /e/, spoken by the same individual, will always have the same formant frequencies, virtually regardless of its fundamental frequency.

The Ohio State University Department of Speech and Hearing Sciences uses a computer program called waves+, which runs on a SUN4OS computer. This program (actually a series of programs) allows for digital analysis and digital signal processing
(DSP) of speech. The signal or any parameter of the signal can be viewed through a number of displays—narrow and wideband spectrograms, waveform graphs, fundamental and formant frequency plots, spectrum analyses—and interpreted.

For her studies of Russian laments, Margarita Mazo has adapted this analytic methodology developed by speech scientists. Mazo, like many ethnomusicologists, was frustrated by the difficulty of adequately transcribing non-Western music with Western notation. Nuances in pitch, rhythm, and most importantly the timbral features of laments, are difficult to capture with conventional Western notation. With the spectrographic analyses provided by waves+, the audible elements of a lament performance could be viewed as a synthcretic whole, bypassing the segmenting lens of conventional transcription. Analysis with waves+, however, works best on monophonic sounds. It is nearly impossible with waves+ to identify individual voices in an instrumental ensemble—something which is perfectly clear with traditional Western notation.

Waves+

The SUN405 uses the UNIX operating language. Waves+ needs a digital signal processing board installed in the SUN. Waves+ was designed by David Talkin of AT&T Bell Laboratories (Murray Hill) with ESPS and other enhancements by Rodney Johnson and John Shore of Entropic.

A sound file is sampled by waves+ through a program called wrecord. A digital audio tape player is attached to the SUN. Mazo, for instance, recorded her laments in the field with a portable DAT player so that no quality was sacrificed in the transfer to the computer.

The waves+ environment can create wideband and narrowband spectrogram displays of sampled data. Spectrographic analysis depends upon the use of filters and filters are examples of resonant systems. Such systems may be sharply tuned and have little
damping, or they may be more highly damped and not so sharply tuned. Another way of expressing sharpness of tuning is by specifying the bandwidth of the system, since a resonator which is sharply tuned can be driven by only a narrow band of frequencies; it will not respond to frequencies outside this narrow band. A resonator which is not sharply tuned, on the other hand, will respond to a much broader band of frequencies. A filter is a resonator and if it has a narrow bandwidth, it is sharply tuned. In this context a filter with a bandwidth of 45Hz and a resolution of 20 ms can be regarded as having a narrow bandwidth and as being therefore quite sharply tuned." (Fry 1979:100.) On the other hand, a filter with a bandwidth of 300Hz and a resolution of 3 ms is called a wideband spectrogram.

Wide and narrowband spectrograms, then, have contrasting uses. To measure the durations of speech elements, one would use a wideband spectrogram. At 3 ms per sample a plosive consonant such as /t/, with a duration of perhaps 12 ms is easily identifiable. A narrowband spectrogram would display the same consonant as a 20 ms blur. On the other hand, a narrowband spectrogram more clearly defines fundamental frequencies, the harmonic series and formant frequencies.

A waveform graph, as the name suggests, displays the actual waveform of a sound. Waves+ has the capacity to "zoom in" on a waveform to the point of displaying a single period of that waveform, or to "zoom out" and view the compressed waveforms of an entire soundfile. The waveform graph displays the overall amplitude of a sound.

A program called formant, an attach program to waves+ produces the fundamental frequency analysis, the formant frequency analysis, a fourier frequency analysis (for DSP) and a number of other analyses, creating new sound files which represent each of these. The formant frequency analysis may be superimposed on a spectrogram, displayed as a set of asterisk lines. The fundamental frequency plot displays time against frequency. Where a Western transcription might indicate a single pitch, the fundamental frequency plot displays
a complex of several discrete pitches. Not all of the attach programs give accurate information. The fundamental frequency analysis, for instance, has difficulty with female voices, often displaying them at half of the proper fundamental frequency.

A final tool provided by waves+ is a spectrum analysis. Spectrum, like formant, is an attach program to waves+. It displays the spectral envelope of a specific region of sound (.025 sec. is the default). The spectral envelope plots amplitude against frequency and shows which frequencies are the most prominent over the entire spectra at any given time. It has great use in the comparison of different timbres.
APPENDIX B
FIGURES
Figure 1. Voiced inhalation, lament by Mrs. S.
Figure 3. Voiced inhalation, AFM, crying by O. Velichkina.
Figure 4. Exhalatory gasps, lament by Mrs. S.
Figure 5. Exhalatory gasps, crying by O. Velichkina.
Figure 6. Creaky voice, lament by Mrs. Gorina.
Figure 7. AFM, lament by Mrs. Gorina, line 8.
Figure 8. AFM, lament by T. Sah.
Figure 10. Spectral envelope, comparison of falsetto and following vowel.
DISCOGRAPHY

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