



Chant for Mandala Ceremony (Tibetan Gelupa sect).¹

In Tibetan chant, changes in timbre are controlled by sequences of vowels and consonants.

trum. Ululations are common in Bulgarian vocal music and also appear in the music of **Monteverdi** and *goat trills*. The spectrum widens again with jaw trills — wide vibratos created with a relaxed jaw on the phonemes [wi- ɛ i- ɛ i]. The movement to this sound creates a shift in spectral energy to the high end of the spectrum, and the movement of voices and instruments creates a layering of spectral density, leading to a concentration of spectral energy in the high frequency range [i]; gradually descending to [a]. (Fig. 1)

The second segment of the text is presented as a chant. In this section it is the meaning of the words that is structurally significant. The rhythm of the chant follows the natural rhythm of the text. The final section is a traditional (syllabic) setting of text and music, with phrases of the text presented polyphonically in three voices. At this point the text slips in and out of meaning, as phrases alternately emerge from, or are submerged into the texture. The overall shape of the piece is an evolution from a single spectral strand into a continuously changing stream of vowels, percussive vocal sounds, and spoken and sung text.

WINTER TREES

The wet dawn inks are doing their blue dissolve
On their blotter of fog the trees
Seem a botanical drawing —
Memories growing, ring on ring,
A series of weddings.

Knowing neither abortions nor bitchery,
Truer than women,
They seed so effortlessly:
Tasting the winds, that are footless,
Waist-deep in history—

Full of wings, otherworldliness,
In this, they are ledas.
O mother of leaves and sweetness
Who are these pietas?
The shadows of ringdoves chanting,
But easing nothing.

Sylvia Plath⁴

blue	dawn on	wet memories weddings	dissolve	inks ring trees seem
[u]	[a]	[e]	[i]	[i]

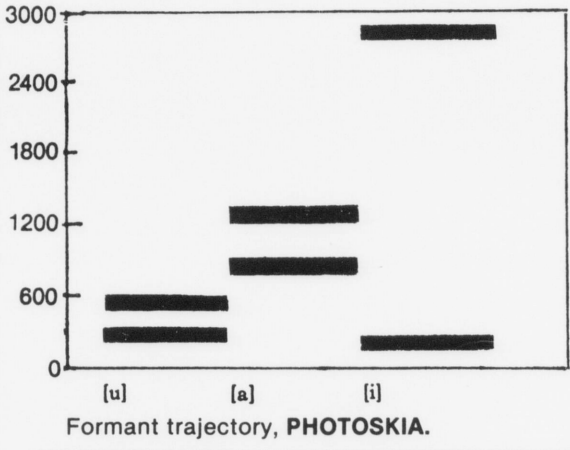
PHOTOSKIA

Photoskia is a work-in-progress for solo tape with a section that is based on the acoustic properties of the vowels [u], [a], and [i], which are treated as a harmonic progression. The term *harmonic progression*, when used in this context refers not to a progression of chords that requires a resolution of dissonance, but to what is perceived as a gradual transition in timbre from the low, grave dark sound of [u] to the high, acute, bright sound of [i]. Where in a more traditional context harmonic progressions are ordered to create tension and release, this progression creates a slow evolution in frequency structure that does not require resolution.

The sound sources for the tape are acoustic instruments: violin, contrabass, bariton saxophone, soprano voice, and tenor voice. The sound colour of individual instruments orchestrates the vowels, *composing* the characteristic timbre within each vowel sound. The acoustic sounds are not electronically modified — changes in timbre result from the layering of sounds into a single entity, or vowel sound.

I did a spectral analysis of each vowel sound with spectrograms, tracing the formant trajectory from [u] to [i]. A series of up to twenty-one harmonics was constructed on the fundamental pitch of each vowel, in this case the pitches **B**, **B**, and **C** within the range of each instrument. Each pitch was then tuned to just intonation, or the overtone series, with the use of the tape-speed variation control on the tape recorder. The tuning of each individual harmonic to an acoustically true interval helps to fuse each individual timbre into what is heard as a single sound. Timbral coherence is achieved through gradual shifts in timbre created by shifting vowel qualities and orchestration.

Photoskia is a Greek word meaning *shadow/light*, and refers to the qualities of spectral elements in the piece.



TIBETAN CHANT AND HARMONIC SINGING

In the tradition of *hoomi* singing in Mongolia and *sacred chant* in Tibet, singers work consciously with the physics of sound vibrations and the perceptual qualities required both to produce the sounds and to hear them. Each singer produces a fundamental note in the extreme bass register (around 60 hz.), and by changing the position of the larynx and jaw, and the shape of the mouth with the tongue, cheeks, and lips, produces a whole spectrum of sound from the harmonic series of the sung fundamental note. Spectral elements are brought into the foreground — they are not simply colouring the fundamental note. The harmonic content of words is then brought to life and experienced physically as sound vibrations. Different harmonics, or areas of resonance are emphasized with different vowel progressions.

David Hykes, founder/director of the *Harmonic Choir*, describes *harmonic singing* as building an architecture of sound above a sung note. The actual practice of harmonic singing involves several stages: the first stage is to produce the sequence [m]-[u]-[a]-[ei]-[i] moving from a nasalized, closed consonant through an ascending progression of vowels. It is important to feel the vibrations physically, in the floor, in the air. Hearing the upper harmonics of the sung vowels is an important prerequisite to actually producing the sounds. Harmonic singing involves a series of timbral transformations through changes in pitch, register, and spectral elements.

Fig. 1 ULULATIONS

