# The Experience of Sustained Tone Music

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## INTRODUCTION

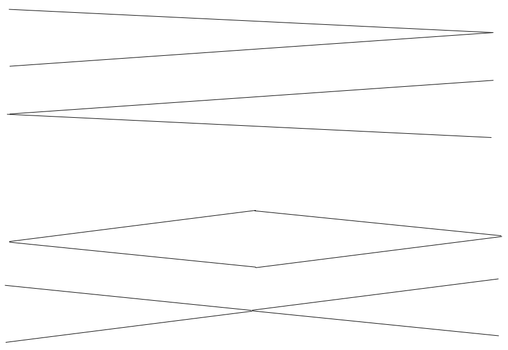
Experimental sustained tone music eschews dramatic contrast in compositional approach for a more gradual, isomorphic result. This music provides immersive auditory environments within which listeners are often able to move around to experience the varied acoustic phenomena which occur as a result of the gradual movement.

The analysis of such music has tended to shy away from investigation into the listeners' experience; this study offers initial work into this experience, and how it relates to the composition and performance of such music.

## PITCH STRUCTURES

Composers of sustained tone music often use very simple pitch structures which allow for gradual transformation often converging to, or diverging from, unisons (see diagram below).

These pitch structures are from American Phill Niblock's orchestral music.

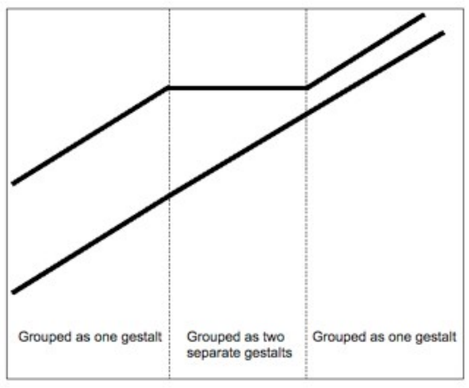


These pitch structures often take place over 20"+ timeframes, allowing for the smaller detail of the resultant auditory environment to be perceived. The pitch fields often use equal temperaments for the unisons, but rely on a wide array of microtonal pitches in the gradual transformation.

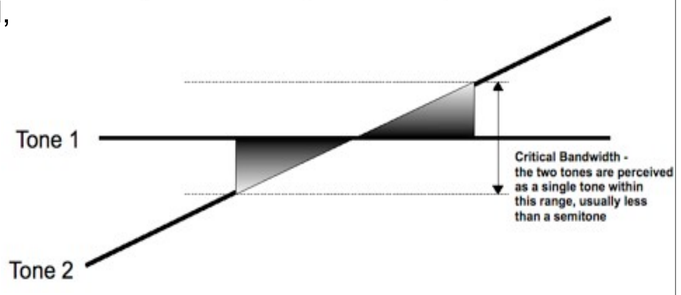
## GESTALT PSYCHOLOGY

Two gestalt grouping principles influence our pitch perception in this music:

**COMMON FATE**, where two gestalt units which move in the same direction are grouped together as the same gestalt. Two glissandi moving at roughly the same speed will be grouped as one gestalt.




**GOOD CONTINUATION**, where gestalt fusion within the critical bandwidth (masking) groups the two pitches as one making the perception of each individual line impossible.




## TEMPORAL EXPERIENCE

The variety in the surface layer provides enough sectional cues for chunking, that recall functions can be employed and hierarchies created through comparative memory.

Moments of instability, with parametric changes occurring, take up more memory space than stable moments of low information.

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Duration experienced during instability is perceived as being shorter, but remembered as being longer.

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Sections of stability are perceived as longer durations, but remembered as shorter.

The flux between parametric change and parametric stasis ensures our perception of both experienced and recalled temporality is also in flux.

## SURFACE PHENOMENA

There are four main types of surface phenomena which may appear within sustained tone music:

**BEATING PATTERNS** occur when two frequencies which are in very close proximity collide and produce constructive and destructive interference patterns. These result in a change of amplitude to the aggregate sound of both pitches and can sound like a 'wave', with the perceived dynamic of the sound continually rising and falling. These speeds constantly change as the pitch of the performed tones varies.

**TRANSITORY HARMONICS** appear from loud dynamic levels of fundamental tones. Stronger harmonics often generate beating patterns with other harmonics and fundamentals

**DIFFERENCE TONES** appear when the speed of a beating pattern moves above the threshold that the human auditory system can perceive (usually around 20 Hz). These tones are produced entirely within the inner ear and tend to only be perceived at high volumes.

**STANDING WAVES** occur when two waveforms approaching each other from opposite directions interfere. This results in the appearance of two kinds of points along the waveforms' trajectory:

- nodes, where destructive interference cancels out the wave and there is no audible output
- antinodes, where constructive interference doubles the intensity of the signal.

The ability to move around the performance space means listeners can identify these standing waves by their clear differences in dynamic: the quiet dynamics of nodes in particular provide engaging material for the listener, in amongst the continuous mass of loud sustained tones.

## CHUNKING

- In sustained tone music, there is very low informational change within primary parameters such as pitch, rhythm, timbre etc., as these tend to remain relatively constant throughout a piece.
- Therefore our ability to arrange hierarchical phrase structures is lost, as is consequently our ability to place events in our memory in the order in which they appeared.

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Chunking can also be applied to the varied extra-notational acoustic phenomena. For instance, beating patterns can be chunked into separate gestalts, and although we remain aware that these indeterminate patterns have no long-term ramifications on the form of the piece, their duration, speed, frequential register and dynamic all contribute to our grouping them differently

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According to the theorist Bob Snyder, a change in a single parameter doesn't constitute a sectional boundary, but rather an articulation or variation *within* a section (Snyder, 2000: 204). So, if we hear a continuous transformation of speed in a beating pattern over a certain period of time, we perceive this as an *articulation* in the gestalt;

## IMPLICATIONS

**COMPOSITION**

As a composer of sustained tone music, the impact this study has towards its creation allows me to design pitch structures which are likely to generate maximum surface activity, such as:

- close cluster harmonies which move towards or away from each
- octave harmonies and slight deviations to generate interaction between harmonics and fundamentals
- multiple simultaneous glissandi which affect our grouping mechanisms

The fact that the surface layer phenomena occur indeterminately (i.e. are not proscribed in the score) means that live instrumental performance, rather than electronically-generated audio, allows for further phenomena due to deviation in human performance, such as the constant change of bow speed on a violin, or the transforming breath pressure of a clarinettist.

**PERFORMANCE**

The intention of the composers is clearly to allow the pitch structures to generate varied surface phenomena themselves (rather than relying on performers to intentionally impose them), and this leads to performers adopting what pianist Philip Thomas has described as a 'non-interventionist' approach (Thomas, 2009: 79). This is an action-centred, rather than an expression-centred, approach to performance, and allows surface deviation to arise naturally from the interaction of the pitches themselves.

**REFERENCES**

Snyder, Bob, *Music and Memory: An Introduction* (Cambridge, 2000).

Thomas, Philip, 'A Prescription for Action', in *The Ashgate Research Companion to Experimental Music,* ed. Saunders, James (Farnham, 2009).