

# Hearing Type

Frank Armstrong

Her head is bobbing rhythmically between earphones, fingers unconsciously tapping her desktop; her knee and heel are furiously bouncing, like the needle of a sewing machine. At the same time, her eyes and mind race to capture, process and understand fleeting patterns of light displayed on a video screen. Like the form of the media itself, my typography student Amanda shows me that the ways we read and experience information are changing. Complementing our newly acquired multitasking abilities, we've become adept at multisensory perception – hearing and seeing digital media as a single unified experience.

Since the invention of movable type, typography has been a relatively static visual language of letterforms embedded in passive two-dimensional surfaces. However, digital technologies have recently enabled designers to create kinetic typography, letterforms moving fluidly within four dimensions: a virtual three-dimensional space and time. Unfortunately, traditional methodologies for understanding typographic design, based on principles of two-dimensional visual composition, are not adequate for students learning to create dynamic time-based visual communications.

Film, a medium that integrates audio and visual components, provides a model for the macroaesthetics of kinetic typography: structure and narrative. Music would seem to be an excellent paradigm for the microaesthetics: visual and temporal properties, syntactic relationships and interaction between visual elements moving through both space and time. Could analogies between music and typography provide the foundation of a new methodology for perceiving and understanding both kinetic and static typography?

## Music and Typography

Sound is produced by a vibrating object, transmitting waves (alternating high and low pressure areas of molecules) through an elastic medium, such as air.<sup>1</sup> Our ears detect fluctuations in air pressure and translate them into electrical signals that our brain understands.<sup>2</sup> A chaotic group of random sounds, lacking organization, is perceived as noise. Conversely, music could be described as sounds that have been structured by their wavelength (frequency or pitch) and time (duration) in a two-dimensional acoustic field.

One description of typography could be visualizing language through the hierarchical organization of glyphs in a spatial field. Our perception of shapes, such as glyphs or letterforms, is based on the contrast between form and counterform colors, produced by different wavelengths of light. Patterns of light waves influence our ability to recognize the glyphs within a typeface.

Music and typography are temporal experiences and forms of communication, expressing ideas through different languages. Although they occur in different dimensions, aspects of structure, motion and time are common to both languages. Music and typography have a common ancestry: spoken languages. Originally based on the rhythms of speech, music is a form of storytelling that

is structured by phrasing acoustic information. Since typography is the visualization of a spoken language, a notion of time and grammatical syntax are inherent to the process of reading a composition of typographic elements.

Introducing a series of lectures on the correspondences between linguistics and music, composer Leonard Bernstein said, "the best way to 'know' a thing is in the context of another discipline."<sup>3</sup> Verbal languages can be both denotative (a communicative function, as in prose) and connotative (an aesthetic function, as in poetry). Music communicates exclusively as a connotative language. Bernstein reached the conclusion that "Language must therefore reach even higher than its linguistic surface structure, the prose sentence, to find the true equivalent of musical surface structure. And that equivalent must of course be poetry."<sup>4</sup> Like language, typography can also communicate on an aesthetic or semantic level, higher than its syntactic surface structure. As Paul Rand said, "To design is to transform prose into poetry."<sup>5</sup>

Music notation is directly comparable to typography – both are visual notational systems of symbols that represent elements of their respective acoustic languages. Phil Baines and Andrew Haslam have recently defined typography as the "mechanical notation and arrangement of language,"<sup>6</sup> a concept that could also describe music notation. In an article on the graphical score-writing techniques of contemporary composers, John Walters said, "The mark-making of western musical notation has an intrinsic aesthetic appeal generated by elements that are simpler – more primeval perhaps – than the Roman alphabet: a rhythmic procession of thick and thin lines, open and closed ellipses, Arabic numerals, commands and ornaments scattered along a rigid grid."<sup>7</sup>

According to Robert Bringhurst, "Typography is the craft of endowing human language with a durable visual form, and thus with an independent existence."<sup>8</sup> Since spoken languages and music are temporal, their notational systems not only provide a visual documentation, but also create supplemental meaning through visual semantics. Kenneth Hiebert has written, "Musical notation and methods of composition can show the visual artist ways of thinking about formal relationships in another way, as encoded in notation conventions."<sup>9</sup>



Michael Gladstone, student typography project assignment  
A visual translation of "Shed Your Skin," written by Matt Winn and Anita Kelsey (D\*Note)

## **Form, Space and Structure**

The basic unit of sound is a tone, which is equivalent to a pixel or point in a visual field. A single tone exists at a specific position within its native space, an acoustic field. Like a typographic point, a tone interacts with its contextual space in a figure/ground relationship. The position of a tone, relative to the edges of its field, creates tension and conveys meaning.

A tone contains the potential to exhibit properties and become, by extension, the equivalent of a linear or planar form. The lack of sound or a tone, at any moment of time in an acoustic space, is silence – similar to the negative space or counterform in a visual space.

As we observe the interaction of typographic elements in a visual composition, we hear myriad tonal interactions in music compositions. Tones and their extensions interact with each other and the spaces around them. Writing about typographic rhythm, Carl Dair stated, “The regular repetition of the same form in intervals of space is no different in essence from the regular repetition of a musical beat at intervals in time.”<sup>10</sup>

Referring to typographic composition, Willi Kunz remarked, “Space is visually subdivided by the tension that develops between an element and the boundaries of the space.”<sup>11</sup> A similar effect occurs in acoustic space as the position of a tone subdivides the pitch and time dimensions, creating tension and structure. The proportional relationships of the subdivided areas determine the harmony of the composition. In both music and typography, the tension created by contrasting elements, or the intervals of space between them, provides a sense of motion and depth.

In a discussion about vertical motion, Bringhurst wrote, “Space in typography is like time in music. It is infinitely divisible, but a few proportional intervals can be much more useful than a limitless choice of arbitrary quantities.”<sup>12</sup> Typographic grids are visual structures, based on spatial units of measurement, that describe the scales (“a modest set of distinct and related intervals”<sup>13</sup>) and proportions of a composition. In music, grids provide a framework for acoustic events described by proportional intervals of pitch (frequency of wave cycles) and time (patterns of pulses).

## **Properties of Sound**

A sound or tone has four properties: amplitude, duration, pitch and timbre. From a qualitative perspective, these properties are analogous to the formal characteristics of typographic elements.

Amplitude (magnitude of a tone’s waveform, measured in decibels) describes the intensity or loudness of a tone. In typography, the size or weight of a glyph conveys amplitude. Through contrast, a relatively larger or heavier glyph creates emphasis. Extreme contrasts in amplitude create the illusion of depth or an implied advancing/receding motion relative to the audience.

Duration (interval of time, measured in pulsations or beats per minute) describes the length of time that a tone or silence exists. Intervals of time are normally represented on the horizontal axis of an acoustic field or music notation. Since western languages are usually written and read horizontally from left to right, the width of an individual glyph or the length of a series of glyphs (as in a word or phrase) implies duration over a period of time. Modifying the tracking value of a series of glyphs influences our perception of time and velocity of motion.

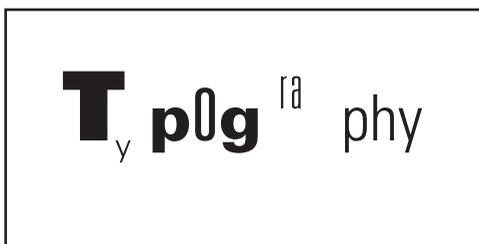
Pitch (frequency of a tone's waveform, measured in hertz or wave cycles per second) describes the relative highness/lightness (as produced by a flute) or lowness/heaviness (as produced by a tuba) of a tone. Intervals of pitch are normally represented on the vertical axis of an acoustic field or music notation. In a typographic composition, our visual perception is influenced by our sense of gravity. Corresponding to pitch, a typographic element positioned near the top of a composition seems to appear lighter (floating or ascending) than it would near the bottom (sinking or descending).

Timbre is the "color" or quality of a tone (an instrument's genome, defined by a particular set of overtones) that distinguishes one instrument from another. In 1939, the American composer Aaron Copland wrote, "Timbre in music is analogous to color in painting."<sup>14</sup> On a macroaesthetic level, typographic timbre is the textural quality (including color) of a typeface. Timbre could also be described, on a microaesthetic level, as the semantic quality of a typeface – a particular combination of characteristics (ie, serif shape) that determine its uniqueness.

### Interaction of Tones

Music is the organized interaction of multiple tones in a time-based experience. There are three fundamental aspects of music composition: rhythm, melody and harmony. Similar visual interactions are present in the experience of reading a typographic composition.

Rhythm is a temporal pattern formed by various durations of rests (silence) and tones with different degrees of emphasis (accented or stressed beats). Musician Wynton Marsalis remarked, "No motion, no rhythm. No rhythm, no music."<sup>15</sup> Motion is essential to both music and typography, propelling the listener/reader forward through a composition. The rhythms that create motion are pervasive in typography – contrasting stroke shapes and widths; sporadic punctuation; ascenders and descenders protruding beyond the x-height; and the tremendous variety of counterforms within and between glyphs.



Variations in weight and space increase the inherent rhythmic activity; variations in scale and vertical displacement enhance the melodic activity; variations in the width of glyphs indicate contrasting velocities of motion through time and space.

Melody is created by adding a second dimension, pitch, to a rhythmic sequence. Motion proceeds in both dimensions concurrently, resulting in a more complex angular or organic path. As in gestalt theory, melodic paths may be continuous or seemingly nonlinear (implied by applying the principle of closure). Typographic syntax, the spatial or temporal arrangement of glyphs into meaningful units (words, phrases, sentences, etc), can appear to be fluid or discontinuous, reflecting the dynamics and phrasing patterns of speech.

Harmony is the simultaneous occurrence of multiple tones (vertical orientation) and the modulation of their intervals, through time. The duration of a harmonic structure (chord) creates a two-dimensional planar texture, based on the density of the intervals between tones. Although motion proceeds

both horizontally and vertically, like a melodic path, variations in texture can be equally apparent. Horizontal lines of type, and the vertical intervals of space (leading) between them, create a surface texture. Variations in leading, between adjacent columns of type, represent harmonic modulation in a typographic composition.

According to Hiebert, "Rhythm is certainly also a visual term. Yet when we look at visual qualities from another standpoint – the vantage point of music – we gain a fresh insight for applying rhythm to design."<sup>16</sup> There seem to be numerous analogies between music and typography that could provide a different frame of reference or context for students like Amanda to understand both kinetic and static typography. Envisioning these correspondences may provide affordances for her to clarify dense information structures and create more coherent communication spaces – transforming typographic prose into poetry.

### Notes

- 1 Challoner, Jack. *The Visual Dictionary of Physics*. New York: DK Publishing, 1995. 21.
- 2 Harris, Tom. "How Hearing Works." *How Stuff Works*. 15 December 2002 <[www.howstuffworks.com/hearing2.htm](http://www.howstuffworks.com/hearing2.htm)>.
- 3 Bernstein, Leonard. *The Unanswered Question*. Cambridge, MA: Harvard University Press, 1976. 3.
- 4 Ibid. 79.
- 5 Rand, Paul. *Design, Form, and Chaos*. New Haven: Yale University Press, 1993. 3.
- 6 Baines, Phil and Andrew Haslam. *Type & Typography*. New York: Watson-Guption Publications, 2002. 7.
- 7 Walters, John L. "Sound, Code, Image." *Eye* 26, Autumn 1997: 24.
- 8 Bringhurst, Robert. *The Elements of Typographic Style*. Vancouver: Hartley & Marks, 1997. 11.
- 9 Hiebert, Kenneth. *Graphic Design Sources*. New Haven: Yale University Press, 1998. 93.
- 10 Dair, Carl. *Design with Type*. Toronto: University of Toronto Press, 1993. 103.
- 11 Kunz, Willi. *Typography: Macro- and Micro-Aesthetics*. Zurich: Verlag Niggli, 2000. 50.
- 12 Bringhurst, Robert. *The Elements of Typographic Style*. Vancouver: Hartley & Marks, 1997. 36.
- 13 Ibid. 45.
- 14 Copland, Aaron. *What to Listen for in Music*. New York: McGraw-Hill, 1939. 78.
- 15 Marsalis, Wynton. "Why Toes Tap: Wynton on Rhythm." *Marsalis on Music*. New York: WW Norton, 1995. 20.
- 16 Hiebert, Kenneth. *Graphic Design Sources*. New Haven: Yale University Press, 1998. 95.

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Frank Armstrong is a senior Lecturer in the Communication Design department at California State University, Chico. His research and teaching integrate music, as an acoustic time-space system, with dynamic information design and typography.

Armstrong's professional work has been published in numerous books and journals, including "Meggs' History of Graphic Design" and "American Typography Today." His Kinetic Typography course syllabus and assignments, coauthored with Barbara Sudick, were published in "Teaching Motion Design."

Armstrong has 20 years of experience as a design consultant and 15 years of experience as a design educator, teaching at Boston University, California State University Chico, Carnegie Mellon University, North Carolina State University, the University of Connecticut and Yale University. He holds a BA in Economics from UCLA and an MFA in Graphic Design from Yale University. He is a member of AIGA.