

Digital Harmony

On the Complementarity of Music and Visual Art

John Whitney

Byte Books/A McGraw-Hill Publication/Peterborough New Hampshire

The Problem:

How Shall Motion Pattern Time?

The Raft of the Medusa, a painting by Theodore Géricault is a tableau of disaster, a scene of pandemonium: under turbulent sky and a thrashing sea, survivors struggle just to remain upon the pitching topsides of a gigantic raft, or to aid one another while some slip under the waves even as the distant rescue vessel is in sight. No spare surface within the canvas is untouched by violent motion and emotion. Nevertheless, Jackson Pollock's fields of abstraction are of an order that would imply still greater activity. His gestural act of painting produces a surface of three-dimensional turbulence. Where, in art, do you find more motion than this? And what is the nature and function of motion in all art? What are the relations of motion and emotion?

A quest for answers to questions such as these led me to study the nature of time and motion in prior visual arts dealing with the visual elements that contribute to a singular design. A painting, regardless of implicit dynamics, still exists passively fixed in time. But a new art might pattern action in time with all elements in motion at all times. The graphic problem, then, will be how to manipulate a field of visual elements so that all parts will contribute purposely to some temporal (time-structured) design.

In this era, preoccupations with action painting, process in art, serialization, pattern, optical phenomena, color fields and light itself, all significantly reflect intensified concern with problems of the dynamics of painting.* Within the community of visual artists, few painters since Kan-

*Popper, *Kinetic Art*; and Rickey, *Constructivism*.

dinsky have remained indifferent to the problem of “time” and “motion” in their still medium. Yet most remained uninterested or innocent of the knowledge that technology lately could provide the possibility of working with real time and real motion; hence their concern with the dynamics of their static medium is in one sense outmoded. The distant rescue vessel figuratively will never arrive in Géricault’s canvas drama.

“As a tone in itself is not yet a melody, so a chord in itself is not yet harmony . . . Music is motion – tonal motion as melody – chordal motion as harmony.”* “A note – A, B, C, D, and so on – has no meaning in itself; it is just a note. It is the combination of the notes which can create music.”^o These are truisms about music, but for me they are more: they possess certain fragments of insight with which to approach the problem of visual motion.

An early intuition about how to control total dynamics led me to activate all graphic elements through a motion function that advances each element differentially. For example, if one element were set to move at a given rate, the next element might be moved two times that rate. Then the third would move at three times that rate and so on. Each element would move at a different rate and in a different direction within the field of action. So long as all elements obey a rule of direction and rate, and none drifts about aimlessly or randomly, then pattern configurations form and reform. This is harmonic resonance, and it echoes musical harmony, stated in explicit terms. I tried this procedure in several films, and was gratified by the consistency of the confirmation it demonstrated. □

Ironically, multiplane animation – the only other differential function ever applied to graphics – is a leap in reverse, because it actually serves to fixate an illusion of the stasis of the natural world by a trick that gives realistic looking differential motions to foreground, middleground and background. Géricault’s various paintings of violence and action show that motion depicted as an event upon this earth is of an order quite different from the conception of motion in the mind’s eye, for example, as implied in the turbulent abstractions of Jackson Pollock. At

*Victor Zuckermandl, *Sound and Symbol* (New York, 1956), p. 109.

^o Claude Levi-Strauss, *Myth and Meaning* (New York, 1979), p. 52.

□ See the films which are illustrated in Figures (6)–(12), pp. 75–80.

the same time, a look at the “real world” demonstrates the static relationship of foreground and background, and the static relation of mountain to sea, tree to house, regardless of the activity thereabout.

My early intuition about the problem was correct in visualizing a field of action as Gestalt patterns of moving elements and not as a stage upon which motion events occur. Traditional pattern is constructed from a repertoire of elements. For example, lattices, Islamic mosaics and borders are patterns constructed from elements – stitches, tiles, bricks, beads or brush strokes. The problem of motion, then, directed my attention from the idea of merely rendering an overall landscape as a static stage for motion. I thought to borrow from these traditional practices of pattern construction. I thought of the rhythm of pattern. So, as if they were pattern rhythms in actual motion, I conceived of ways to manipulate a series, family or scale of elements, each with its own action potential. The problem of motion is less like painting landscape and more like herding sheep, or hedgehogs, as in Alice’s croquet.

Continuing to study the problem by comparing prior arts, I asked myself: what are the essential components of time and temporal organization in poetry, dance and music? Metrical order is an important part of the structure of poetry as it is important to harmonic structure of music. Pitch pattern and rhythmic pattern are interrelated and interwoven in music just as syllabic, rhythmic pattern and meaning interweave in poetry.

Twentieth-century art, poetry and music again and again have breached the thoroughly codified rules of meter and harmony. Still, a latter-day ambivalence emerges, perhaps to reign. “The king is dead. Long live the king!” could become a refreshing idea. A late twentieth-century attitude might claim that meter is dead; long live meter! Stravinsky pronounced that harmony is dead; he might have added – long live harmony! Perhaps an end is near to the tiresome reaction against all nineteenth-century giants in the arts and their academies. Within the earliest decades of this century, Dada did a job that was needed. But recent **reaction** in art – anti-art, anti-meter, John Cage’s effort to prove that even a squeaking chair knows structure and is therefore “music” – all of this has grown ever more tedious and inappropriate.

Nearly everyone senses the presence or absence of meter. Regarding

meter and rhythm: “Both are always present simultaneously – the uniformity of the wave, the variegated pattern of durations, of long and short, in the actual succession of tones. Both together make up the rhythm of our music – not the succession of longer and shorter tones as such, but their succession supported, borne along by, the rise and fall of the continuing metric wave.”* Reducing to these words what is instantly felt by the vast majority of mankind (especially the young child) hints at the unfathomable subtlety of the perceptual processes at work within the metrical patterning of time.

Despite seconds and minutes, time is not naturally marked into units; and despite motion picture frames, motion is not broken into static frame units. “We cannot draw boundary lines on a wave; one wave passes into another without a break.”^o My quest for understanding intensified my struggle with seemingly simple problems such as how the mechanical demarcations of frames can be reconciled with the variability of musical rhythm.

I tried to define and manipulate arrays of graphic elements, intending to discover their laws of harmonic relationships. I hoped to sketch the outline of a foundation for metrical order. Early efforts to deal with this problem employed differential functions applied to the motions of each of the elements, as noted above; but other problems radiated in all directions around my primary suppositions.

Overwhelmed by the erudition of musical textbook detail and technique and humbled by my floundering with the staggering graphic problems, nevertheless, I started at last to make some progress. A benchmark was reached when I began to apprehend the relationship of the three terms: **differential**, **resonance** and **harmony**. First, motion becomes pattern if objects move *differentially*. Second, a resolution to order in patterns of motion occurs at points of *resonance*. And third, this resolution at resonant events, especially at the whole number ratios, characterizes the differential resonant phenomena of visual *harmony*.[□]

* Zuckerkandl, *Sound and Symbol*, p. 171.

^o Zuckerkandl, p. 170.

[□] Looking back upon my experience of this “rite of initiation,” I wonder if the composer himself might gain insight were he, too, able to look beyond orthodox harmony into this unconditionally unorthodox view of the Pythagorean “physics” which transcends particularity to define, in the broadest generalized sense, **the harmony**, namely the resonances of differential periodicity.

I had discovered the many significant meanings of the word *resolve*. Among the eighteen numbered definitions in my dictionary are, “to make a firm decision about,” “to find a solution to,” “to deal with conclusively,” “release,” or this sixteenth item in the dictionary: “*Music*. to progress from dissonance to a consonance.” What is more definitive than “release” of tension? What else than “to find a solution to?” What else than exactly what I found in my visual harmonic resonances? This resolve at a resonant event dissipates tension. Dissonance reaches consonance at any moment of resonance. All this is exactly as visible as it is audible. I felt that this was to be a profound discovery.

It followed that if moments of resonance resolve tension, certain factors must be at work as complementary forces to build tension. Though I little understood the details, it seemed clear I had discovered a clue to a force-field of visual perception. What I knew about music confirmed for me that emotion derives from the force-fields of musical structuring in tension and motion. **Structured motion begets emotion.** This, now, is true in a visual world, as it is a truism of music.

My search for a scale or alphabet was stimulated at this time by Noam Chomsky’s book, *Language and Mind*. There I read, almost as a fact incidental to the point of his writing, a quotation from the text of the Port Royal *Grammar*, a seventeenth-century view of language: “...[we] make infinite use of finite means [with our alphabet]... that marvelous invention by which we construct from twenty-five or thirty sounds an infinity of expressions.”*

It was not at all clear what might constitute the computer’s graphic “alphabet.” Yet Chomsky’s brief history of the devious directions taken in a search for an understanding of the origins and the nature of language stimulated my endeavor, where perhaps the very scope of that search should have been discouraging. I felt wiser and derived confidence in my own quest, having learned of the succession of wrong turns and blind alleys that have already been taken in classic scientific studies. Chomsky’s description of a major turn in a wrong direction that was pursued for more than a century by a large faction of linguists led me to wonder if a considerable faction of composers in this century might have

*Noam Chomsky, *Language and Mind* (New York, 1968), p. 18.

taken a similar turn in some wrong directions.

I sensed that Chomsky's concept of the deep structure of language applied almost miraculously to music.* The details did not seem important. I was encouraged just to know that there was speculation about "innate human dispositions" in regard to our speech competence. Therefore it appeared to me that musical dispositions must surely follow. I entertained the outrageous presumption of leaping beyond all constraint of logic to conceive a visual world of harmony to which there must be innate human responses, just as in the aural world of music.

Reflecting further, I observed that language, this greatest and most complex intellectual achievement of collective mankind, came to us "naturally," so to speak. Nobody, no committee planned a babel of tongues. In fact, efforts to synthesize, improve upon or even redirect the development of any language have always floundered. (French grammarians have merely struggled against "Franglais.") Whatever parallels exist between language and music are bound to include the probability that music, too, would defy synthesis by plan or committee – or by myself, of course. Such thoughts somewhat tempered my reflections on the very idea of innovation in art.

Yet I began to discover the dynamics of graphic pattern arrays and their harmonic interrelationships. I began to detect the subtle charge and discharge of tension related to order/disorder dynamics in these arrays. The problem now seemed to define itself in such terms. I was beginning to conceive of the basis for a graphic "scale" evolving from harmonies, and I saw that here was a way beyond the monolithic emotional stasis of so much abstract film and video with which I was familiar.

For years, I had detested a quality of stasis that permeated and spoiled a broad variety of pattern in motion compositions. Video wallpaper or video-Valium are two of the more popular "expletives" used frequently with no slight derision to express what I had observed. The emotional blandness of these films derives from a pattern of movement that neither gathers nor discharges tension. Many films exhibit total ignorance of the function of tension. Forces at work in an image moving

*In the first three chapters of *The Unanswered Question*, Leonard Bernstein grasped the metaphor in deep-structure of linguistics *vis a vis* music much as I did.

without purpose cancel one another. This becomes a ludicrous stand-off of force/counterforce, an equilibrium of pointlessness even while the screen may boil with activity. Now it was obvious: only **structured** motion begets emotion.

The composer – mindlessly, intuitively or with careful deliberation – concatenates one element of harmonic cohesion onto another and another. And so he builds structures which literally lead us by the ear along a pathway of emotional continuity. I became acutely aware that these forces prevail whether classical harmony or “atonal” musical constructions were involved. With insight transformed since my earliest filmstrip experiments, I now grasped the pervasive function of harmony: I could feel harmonic forces either working or failing to work in every graphic dynamic, whether the motion had been structured knowingly or not.

Now I objected to the word “abstract” because it serves to misdirect emphasis onto the object that moves and so to obscure the idea of motion as dynamic pattern. Dynamics interested me in the sense that music is motion, tonal motion, chordal motion. Here, abstraction is not at issue. Any image must be an ephemeral conveyance of patterns of motion. Within their limits of mass and inertia, dancers also perform “musical” patterns of motion, and of course the human body is hardly an abstraction.

My early distress with “film symphonies” came to mind. The determination to find a more fluid vision than was possible by using a cine camera pointed at the world (rivets in iron plate on the high sea) continued as the subject of much reflection. By contrast the recurring resonant events with computed differential structures of elements in motion were producing valid, generative and fluid patterns. I was satisfied that here was the beginning of an architecture of motion that might be made to blossom the way musical architectonic pattern blossomed, in the Baroque era for instance.

At the same time as I gained new control of fluid graphic harmony, some composers in search of new musical resources were beginning to compose with magnetic tape and electronic synthesizers; but their “new” compositions were often immobilized through loss of harmonic structural control. Mono-melodic, sustained tones and tiresome slow

motions became cliches that often dominated electronic music from mid-twentieth century onward.

It seemed, ironically, as if their loss was my gain. Just as my new way beyond stasis of the graphic field through applied harmonics came into view, many electronic music composers seemed to lose touch with harmonic fundamentals and dynamic pattern and seemed to lose dexterity of figuration. The natural fluidity of music seemed to thicken to molasses, in their aural electronic world.

On the other hand, as my graphic elements progressed through one point of resonance or through a fraction of a harmonic cycle, motion was indeed patterned. When, infrequently, one of the sequences in my harmonic films was composed effectively, the results of these resonances or this cycling, were characterized by a diversity of rise and fall of tension, of highs and lows of tension, and a metrical rhythm and order such as we expect and receive everywhere within the vast diversity of pre-electronic music.

Among other practical considerations these observations resulted in a decision. For the time being, I elected to put aside the musical problem as it bore upon my own long-term plans while I would concentrate upon new prospects for optical differential dynamics. I would settle for whatever music I might find for each new graphic composition since my optical studies were the immediate challenge.

Clearly, the study of electronic and computer musical potentials would be far more generously endowed than my graphic work. At universities and electronic music centers around the world, long established funding of music studies had been generous. Investment in the newest electronic instruments went on and on despite a new-to-obsolete life cycle of about three years, throughout the past thirty years.

With a plan and a perspective upon the past and a sense of future, the direction of my life work was now clarified. Here is a summary of the problem as I found it:

Music, as the true model of temporal structure, is most worthy of study among prior arts. Music is the supreme example of movement become pattern. Music is time given sublime shape. If for no other reason than its universality and its status in the collective mind, music invites imitation. A visual art should give the same superior shape to the temporal

order that we expect of music. As with the twenty-six elements of the alphabet, music's hierarchical pattern of tones provide the model for a visual art with which to "make infinite use of finite means" to construct "architecture."

The unassailable fact remains that a work whose principal dimension is time must faultlessly reckon with time. The only way we can deal with time is to construct along time's dimension. There are ways to give shape to time's rule upon human experience. This means that there are ways to anticipate the next moment and to gratify expectations raised by the moment just past; for example, in the human experience of music, expectations do arise moment by moment. As listeners, we are engaged in a musical intercourse with the composer. How we engage him, and are engaged in turn by the composer, marks the very life of the matter of music.

The problem, then, of a visual art of motion centers on that same vital engagement. The dialogue between composer and whoever responds to his work is tied somehow to a give and take, step for step in time. This is what we mean by "giving shape to time." "Music is temporal art in the special sense that in it, time reveals itself to experience."* Otherwise time is shapeless or mechanical or lifeless, or time is fixed into catatonic rigidity.

*Zuckerlandl, *Sound and Symbol*, p. 200.