Synesthesia, Ordinary and Extra-Sensory Perception, and the Audio-Visual Interface

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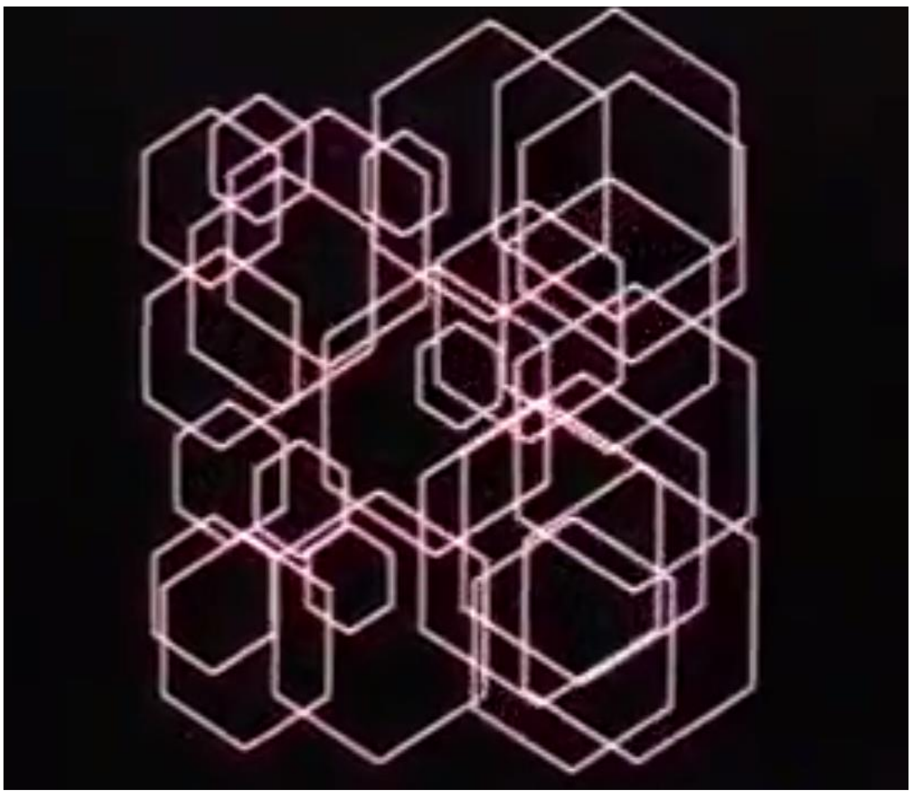
> *"Incredible, incredible*
> *Inanimate objects proclaiming dharma is inconceivable*
> *It can't be known if the ears hear it*
> *But when the eyes hear it, then it can be known."*

- *Zen Master Dogen, 13th Century*

> "Seeing and hearing were not separate in the place I now was."

- *Eben Alexander, M.D.*



MATRIX III, John Whitney, 1974
http://www.youtube.com/watch?v=ZrKgyY5aDvA

The problem of finding a mathematical system (and currently an electronic system) to explain the connection between music and color has both inspired and frustrated artists and scientists throughout the ages. It still does. It seems to make sense that there should exist a scientific method to correlate music to visuals, and visuals to music. But only in realm of the art of sacred geometry is there a full unfolding of that idea. Unfortunately I knew almost nothing of Sacred Geometry until Richard's classes, and his last class, which touched on the symbolism and correlations between music and spirituality in the architecture of Chartres has amazed me. This paper was well underway when I took that class, however, and I have based my investigations on current, popular culture, which has a deep fascination with synthesizing music and visual movement together. In this paper I seek to identify, and tease out a thread, about the desire for a unified experience in the perception of sound and visual images. I believe the desire for this unified experience is a deep, human longing.

The philosophy of the Music of the Spheres incorporates the metaphysical principle that mathematical relationships express qualities or 'tones' of energy, which manifest in numbers, visual angles, shapes and sounds – all connected within a pattern of proportion. Pythagoras proposed that the Sun, Moon and planets all emit their own unique hum (orbital resonance) based on their orbital revolution, and that the quality of life on Earth reflects the tenor of celestial sounds which are physically imperceptible to the human ear. Subsequently, Plato described astronomy and music as "twinned" studies of sensual recognition: astronomy for the eyes, music for the ears, and both requiring knowledge of numerical proportions. Plato believed that these were discoveries of pure, elemental properties that were inherent in both music and the heavens. At the same time as Pythagoras, in Confucius-era China, the five tones of the musical scale were seen as harmonizing with the five elemental properties of water, fire, wood, metal, and earth, and also correlate with actions, colors, and properties. This five-element interaction is a basic tenet of many fields of early Chinese thought, such as geomancy, Feng shui, astrology, and traditional Chinese medicine. These ancient philosophies reflect our human longing to understand how the world we find ourselves in comes into being. Understanding and expressing deep, innate connections in the physical world, and expressing those connections in such a way as to illuminate and enlighten, is a goal of many artistic endeavors, and also a goal of science. It may be it a conscious intent, or an unconscious yearning, but it manifests in popular culture in the search for the elusive audio-visual interface.

In the 20th and 21st centuries technology has provided the opportunity to connect image and sound in unprecedented ways. A new type of hybrid artist who works across media and technologies has been emerging. Walter Ruttmann, a German experimental film director who is best known for the 1927 film "*Berlin: Die Sinfonie der Großstadt* (Berlin: Symphony of a Great City) foresaw this in 1919 when he remarked that technological progress would lead to the acceleration of the transfer of information between sound and image, leading to a *"constant state of being swamped with material",* and thereby to an altered state of perception. Ruttmann was right: that's what has happened, and how many people, particularly in the first world, live, Nearly a century later we are bombarded with information that assaults us via technological media, and millions are addicted to this media. Most lose themselves in fantasy via television, film, and gaming, and others are actively seeking to obtain altered states at massive, community events like Burning Man and Electric Daisy Carnival. This "altered state of perception" can be desirable, I think, because it can create a condition resembling synesthesia in the perceiver.

Synesthesia is defined as a condition in which one sense, say, of sight, is involuntarily perceived as if by one or more additional senses, like hearing and smell. The word synesthesia comes from two Greek words, syn (together) and aesthesis (perception) – joined perception. Richard Cytowic, author of several popular books on synesthesia, defines it as the following*:*

" Synesthesia is an involuntary joining in which the real information of one sense is accompanied by a perception in another sense. In addition to being involuntary, this additional perception is regarded by the synesthete as real, often outside the body, instead of imagined in the mind's eye. It also has some other interesting features that clearly separate it from artistic fancy or purple prose. Its reality and vividness are what make synesthesia so interesting in its violation of conventional perception."

A form of synesthesia joins objects such as person's name with a a smell, flavor, or color. The most common form gives a particular color to a particular letter or number. But there is no universal form of synesthetic perception – the associations given are generally unique to each individual. It was theorized that synesthesia is caused by "cross-wiring" in the brain. Measured brain activity in people who have it show that parts of the brain associated with hearing "light up" when given a visual stimulation, and that parts associated with vision "light up" with auditory stimulus. People who don't experience synesthesia don't show these correlations.

Synesthesia was not formally studied by western medicine until 1812, when a medical doctor reported on the letter-and-color synesthistic perceptions recorded by himself and his sister. It was, until recently, regarded as an abnormality, a problem, much as left-handedness was regarded until fairly recently. But there is a long correlation of synesthesia to artistic, religious and mystical experience, and some scientists are identifying it as an evolutionary advantage.

"Synesthesia is about eight times more common among artists, writers, poets and creative people.... If you assume that there is greater cross-wiring and concepts are located in different parts of the brain, then it's going to create a greater propensity toward metaphorical thinking and creativity in people with synesthesia."

- Dr. V.S. Ramachandran of the University of California at San Diego, author of *Phantoms of the Brain*

According to author Michael Gelb in his 2000 book, *How to Think Like Leonardo Da Vinci,* *"Synesthesia, the merging of the senses, is a characteristic of great artistic and scientific geniuses."* Gelb believes that one can heighten all of one's powers of sensation by practicing synesthetic thinking. "*A simple way to begin is to practice describing one sense in terms of the others."* He suggests exercises such as drawing or sculpting music, making sounds of color, and engaging in synesthetic problem-solving by giving challenges and their solutions colors, shapes, smells, sounds, and textures. But mystical studies, religious and meditation practice have long been linked to synesthetic experiences, and that link is re-emerging in popular culture. In the 2005 study "Can Synesthesia be Cultivated?" researcher Roger Walsh studied three groups of longtime Buddhist meditators, and a control group of medical students. The incidence of reported synaesthesia among all meditators surveyed was significantly higher than among non-meditators, and there was also a relationship between reported synaesthesia and the years of meditation practice, and the number of hours spent on meditation retreats. William Bushell, MIT anthropolgist and Columbia University Buddhist researcher, takes the results of this study a step further: *"In fact, synesthesia may not only be associated with the highest spiritual states, it may be necessary for them."*

"It is striking how often the connection between synesthetic and mystical perception comes up in the literature — as reported by a great range of people from medieval mystics such as Hildegard of Bingen, to nineteenth-century poets, such as Rimbaud and Baudelaire, to 20th century writers, such as Aldous Huxley, to contemporary neuroscientists such as Eben Alexander. The range of types of experiencers and the depth and breadth of their reports invites first awe and then further exploration."

- Patricia Lynne Duffy, author of the synesthesia memoir *Blue Cats and Chartreuse Kittens*
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There is also evidence that surviving a near-death experience can lead to synesthesia. In his book *Consciousness Beyond Life: The Science of the Near-Death Experience*, Dr. Pim van Lommel of the Netherlands places synesthesia alongside other changes which seem to occur in the newly "returned" from NDEs — photosensitivity and aversion to touch are two other side effects he notes. He writes:

"*Synesthesia is a condition in the brain of conjoined senses. It is a neurological condition in which stimulation of one sensory or cognitive pathway leads to automatic, involuntary experiences in a second sensory or cognitive pathway. And quite a lot of people (how many exactly is not well known) experience synesthesia as a result of their NDE because their brain has changed structurally and/or functionally. However, during NDE normal senses do not function anymore because the brain does not function anymore: patients* *have a extrasensory perception of hearing, perceiving, smelling, etc., and all these at the very same moment because time and space do not exist in this higher dimension, everything happens/occurs simultaneously*. "

This correlates with the experience of neurophysician Eban Alexander, who wrote about his vivid NDE in *Proof of Heaven: A Neurosurgeon's Journey Into the Afterlife.* In an interview, he says, "*I think synesthesia is closer to the true knowing that is part of our true existence at the core — the eternal part of our existence. And for whatever reason, my hunch is that synesthesia, the whole phenomenon — the more that we can learn about it and the more we can learn about any brain action that is associated with the phenomenon of synesthesia, it will help us to understand more about that fundamental reality of our soul and spirit that exists eternally, and that is truly experience and is truly the source of memory. Somehow that stuff kind of comes back through the mechanisms that sometimes appear to be synesthetic because the nature of that underlying reality is purely synesthetic in kind of an infinite sense."*

This statement is extra interesting - "*stuff kind of comes back through the mechanisms that appear to be synesthetic*" - because there is another form of synesthesia, called mirror-touch synesthesia, in which people have extreme empathy, to the point of appearing extremely psychic. Mirror-touch synesthesia was first identified by scientists observing the behavior of macque monkeys in Spain. It has now been expanded to "explain" why healers see auras and why some people have what seems to be extrasensory perception.

"Researchers in Spain have found that at least some of the individuals claiming to see the so-called aura of people actually have the neuropsychological phenomenon known as "synesthesia" (specifically, "emotional synesthesia"). This might be a scientific explanation of their alleged ability.

Many local people attribute "paranormal powers" to (healer) El Santón, because of his supposed ability to see the aura of people "but, in fact, it is a clear case of synesthesia," the researchers explained. According to the researchers, El Santón has face-color synesthesia (the brain region responsible for face recognition is associated with the color-processing region); mirror-touch synesthesia (when the synesthete observes a person who is being touched or is experiencing pain, s/he experiences the same); high empathy (the ability to feel what other person is feeling), and schizotypy (certain personality traits in healthy people involving slight paranoia and delusions). "These capacities make synesthetes have the ability to make people feel understood, and provide them with special emotion and pain reading skills," the researchers explain.

In the light of the results obtained, the researchers remarked on the significant "placebo effect" that healers have on people, "though some healers really have the ability to see people's 'auras' and feel the pain in others due to synesthesia." Some healers "have abilities and attitudes that make them believe in their ability to heal other people, but it is actually a case of self-deception, as synesthesia is not an extrasensory power, but a subjective and 'adorned' *perception of reality," the researchers state*."

http://www.wildmind.org/blogs/news/synesthesia-may-explain-how-some-healers-can-see-auras#more-17866

I feel that this sort of reasoning is akin to researchers explaining the results of a successful séance by saying, *but perhaps the people at the séance were communicating with each other telepathically! This doesn't prove we survive death*! I read the abstract for this paper. The researchers seem to sort of grumpily admit that something unexplained is going on, but insist it is all it taking place in the healer's brain without any possibility of a valid energetic connection to the patient.

http://www.sciencedirect.com/science/article/pii/S1053810011002868

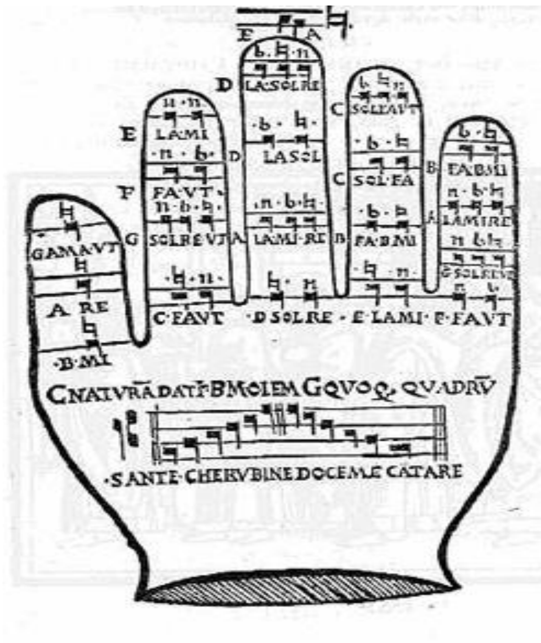
Here's a story from the Guardian, a narrative from a person who has been diagnosed with mirror-touch synesthesia:

"It's the same with emotions. If someone is happy, it's like hearing an orchestra and I feel extreme excitement and joy. This is the reality of living with "mirror-touch" synesthesia....I struggled to cope with normal life. I was constantly crying – not because something had happened to me, but because I had seen someone else crying or felt someone else's pain. Watching someone eating, I would taste and feel their food in my mouth, and I struggled with weight loss because I always felt full. I could walk into a room and tell you who has depression, who is angry and who has just had good news. My reactions vary: sometimes I see colours and feel vibrations, other times I sense a change in temperature or hear a particular sound. The feelings that I draw from other people stay with me for days and invade my dreams, making it difficult to sleep."
- Fiona Torrence, The Guardian, March 18, 2011

So, is this a neurological or a spiritual condition?

A condition where the senses are inter-related in an interactive way, that is good for you: (as long as you don't have boundary issues) makes you more creative, intuitive, empathetic, and is being "discovered" and researched by western medicine at a rapidly increasing rate.

How does that connect with popular culture? Because we form new neural connections when sight and sound are linked for us in a new way, and we are hungry for these connections.



Guido D'Arrezo was a Benedictine monk and Medieval music theorist who taught singers to sight-read synesthetically by "placing" the notes in different locations on their hands. He is credited with inventing modern staff notation. My brother-in-law, who is a total non-musician, sung at a community event where the singers were taught parts using this method, and he was amazed at how quickly and easily he could learn his parts by "putting" them in his fingers.

Both the early Christian Church fathers and the medieval Christian Platonists revered and followed the teachings of Plato, as exemplified in the work of the master mathematician Bothius, who lived between 480-524 A.D. Bothius intended to pass on the great Greco-Roman culture to future generations by writing manuals on music and astronomy, geometry, and arithmetic, and his wish came true. His works were widely studied during the Middle Ages. His *"De institutione musica*" was one of the first musical works to be printed in Venice between the years of 1491 and 1492. In this, Bothius elaborated on the threefold classification of music:

- *Musica mundana* — music of the spheres/world
- *Musica humana* — harmony of human body and spiritual harmony
- *Musica instrumentalis* — instrumental music

And of the "sound" of sacred architecture, as did many of his contemporaries.

"Music is so naturally united with us that we cannot be free from it even if we so desired." – Bothius

But this music referred to was "pure" music, music that was defined by mathematical principals and ratios found in nature. For the theologians of the

Middle Ages, St. Augustine's *De Musica* was also very influential. In this work he emphasizes the importance of number, without which the cosmos would return to chaos. Number was given an almost mystical or magical essence, and appreciation of music and visual art was based on mathematical principles. Artistic instincts or impulses, feelings and aesthetic sensibility were not trustworthy in this scheme; only rational, geometric systems could express beauty.

In the same way Gothic architecture, which reached a pinnacle in the construction of Chartres, is defined by pure mathematics and it's correlating musical structures, the divisions and ratios that create notes and harmony. It is very interesting to speculate how these philosophers and architects actually perceived music and structure. Did they have a synesthetic experience, or was it entirely intellectual? The buildings were created as templates for spiritual practice. Did understanding and internalizing the symbols, and praying and meditating in the structures, cause synesthesia? Was it a common experience?

"Whoever you are, if you seek to fathom the good in this work
Then marvel not at the gold or the cost, but find the aim of the artist.
This noble art has a hidden light that can lift the mind in an inward way
And opens the door to truth in each of us.
Such art can show how the spirit within can be found in this world:
The dull mind rises to truth through material things,
And seeing this light escapes its former submersion."

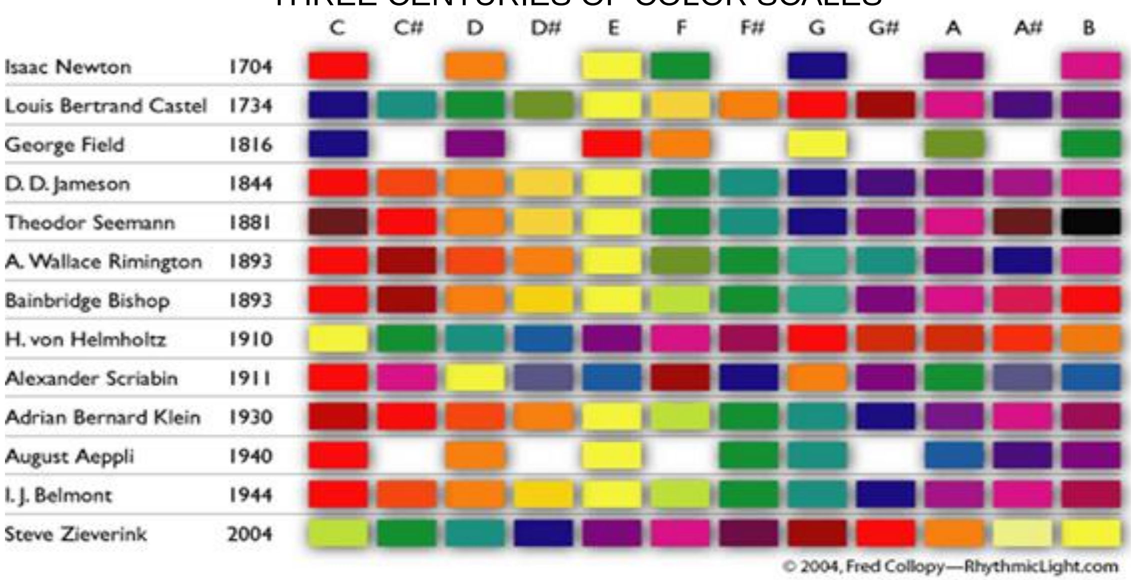
- Suger, Abbot of St. Denis, patron of Gothic architecture, from the Abbey Church, 1140

So there's a thread, a thread of longing for a deep, pure expression of what the laws of the universe might be, from Pythagoras into the Middle Ages. What happened next? Along came the Enlightenment. From 1650 on, the scientific method began to hold sway in the western world. The gradual spread and dominance of the ideas of Spinoza, Descartes, and Newton changed the perception of humanity's place in the order of things. Where previously God was in charge, and God's perfect order was to be discovered and respected, humans were now considered "Masters". The world was freed from it's magic and truth became a system of thought, rather than an empirical, natural quality to be discovered. This is of course a tremendous over-simplification but it is, in a nutshell, what happened. The sublime became mundane. However, there's still a longing for this pure expression, an idea of a pure synthesis of sound and music as a truth revealed.

Hildegard von Bingen receiving a vision

As we have learned in class, there’s a long tradition and history of scientists, artists, and musicians trying to codify a relationship between color and the notes on the scale, using more scientific methods than spiritual ones. The first known experiment to test correspondences between sound and color was conducted by the Milanese artist Giuseppe Arcimboldo at the end of the sixteenth century. He consulted with a musician at the court of Rudolph II in Prague to create a new experiment that sought to show the colors that accompany music. He decided to place different colored strips of painted paper on the harpsichord.

THREE CENTURIES OF COLOR SCALES



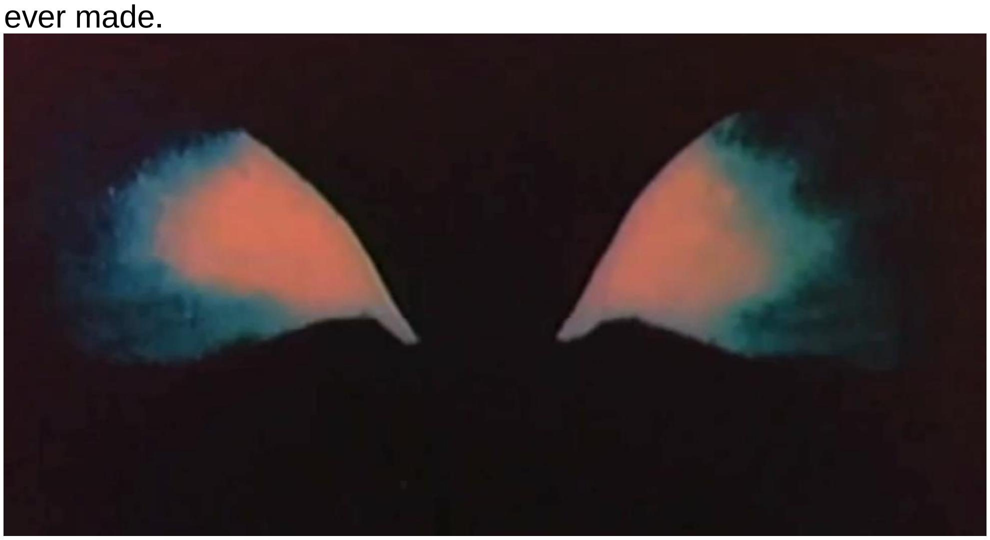
Louis Betrand Castel, a French Jesuit monk, built an Ocular Harpsichord

in the 1740's. It had 60 small windows of different coloured glass illuminated in correspondence to sound, and was based on Newton's color scale. When a key was struck a length of cord attached to a pulley lifted a specific curtain, so that one of the many stained glass panes received light from a set of candles. The coloured light would be projected into the darkened recital room. The composer Telemann was so enthralled by Castel's achievement that he composed pieces specifically for the Ocular Harpsichord. More than a 100 years later, non-musician and non-inventor Bainbridge Bishop published his wonderfully titled *'A Souvenir of the Colour Organ, with some suggestions in regard to the soul of the rainbow and the harmony of light'*. You can find it online:
http://rhythmiclight.com/books/HarmonyOfLight.pdf

It is a pamphlet outlining Bishop's theories of colour-sound relationships based on the study of rainbows and prisms. Bishop spent over 5 years refining his machines. The final product incorporated a projection screen on which the colours were diffused and reflected in accordance to the music being played.. It must have been considerably risky using candles as a light source in these machines and this is backed up by the fact that all of Bishop's machines were eventually destroyed by fire. But for all the things he wasn't, Bishop WAS a painter. He started out as a painter, and got so frustrated by that he couldn't paint the colors in his head, he decided to try music and color together.

Color-organ builders continued to dream and build machines to the end of the 1880's, hoping to find a magical breakthrough to synthesize their concept of visual music. But the next avenue of expression for visual music wasn't a musical instrument - it was projected light.

Early film makers experimented with abstract films to represent moving music, and there was a great flowering of this in German expressionism, but without music as first. I opened this paper with a quote from Walter Ruttmann – he was a painter who became a tremendously influential film-maker. His Lichtspiel Opus 1 (1921) is considered the first abstract film, with a composed score, ever made.



https://www.youtube.com/watch?v=od0MxuD4xxQ

You can see Opus 1, 2, 3 and 4 at this link. Lichtspiel is commonly translated at “movie” but Ruttmann meant it as “play of light”.

These films were entirely painted. Opus 1 has 10,000 images, each of which was a painting. Then the film was hand-colored frame by frame. The music was composed by Ruttmann’s friend Max Butting. The premiere of the film was marked with technical difficulties and audience incomprehension, but his friend, the actress Valeska Gert, was quoted in the press:

“Ruttmannn has endowed film with pure, mobile painting; Ruttmannn completely detaches himself from the representational and lets balls, circles and wedges dance to a rhythm which emerges from within. Forms glide effortlessly across the screen, conglomerate, end in disaster and discharge. He gives destiny to pure forms, parallel lines become a storm, or an erotic nude. This play of forms represents an artwork, because it can truly unsettle and because it is pure and clear in its construction and has nothing to do with the handmade Expressionist trickery currently appearing in cinemas and theatres, which dupes the public with its gestures toward modernity.”

The forms appearing in these films are simple, geometric forms, and there are verticals, horizontals, bisecting spheres, cubes, and triangles. There is also a lot of bilateral symmetry. I would dare to say that these are expressions of sacred geometry and that Ms. Gert, in her observations, resonates with the images. I love her continual references to purity and truth.

Nazism shut down “decadent” German film, sadly, but the next torchbearer of the flame of pure, abstract music and visuals comes from a somewhat surprising quarter.

FANTASIA, 1940

"beautiful ... but it is also bewildering. It is stupendous. It is colossal. It is an overwhelmingly ambitious orgy of color, sound, and imagination. "

Mae Tinee, film critic, Chicago Tribune, November 1940

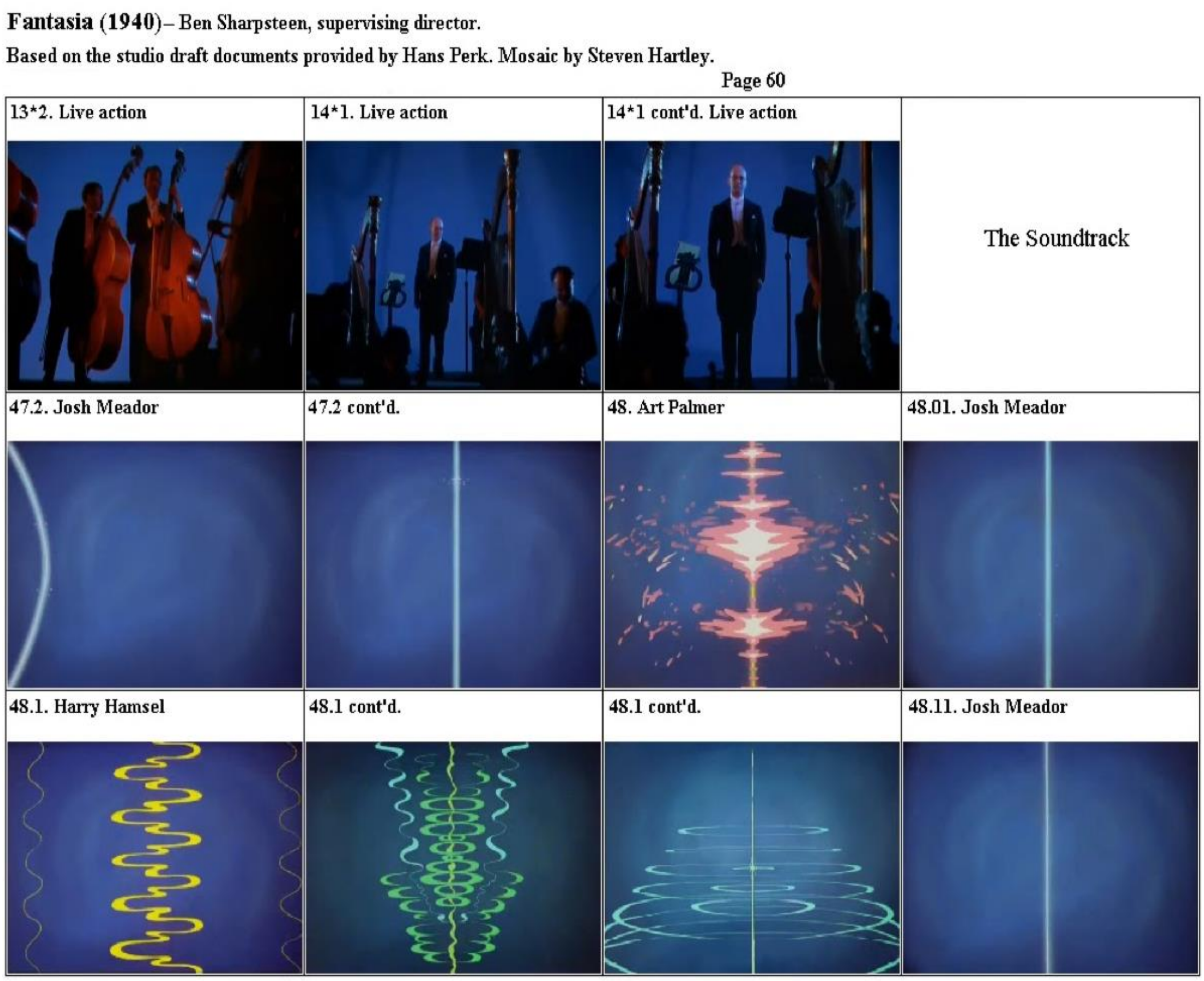
It seems hard to believe, now that we take sophisticated computer graphics for granted, but Fantasia (November, 1940) was a ground-breaking film in many ways. It wasn't an "art" film – it's audience was the established Disney audience, but it was only Disney's third full-length animation feature. The attempt to marry classical music and animation, with many abstract visuals, wasn't very well received by the general public and took decades to turn a profit. Each theatre had to be fitted with a Fantasound surround system that cost $85,000.00, the equivalent of $1,421,618.93 in 2013 dollars. Walt Disney wanted Fantasia to be "*an adventure in color, sound, and motion"*, and was prepared to spend whatever it took to make the experience be remarkable.

The Disney brothers contacted David Sarnoff of RCA regarding the manufacture of a new system that would "*create the illusion that the actual symphony orchestra is playing in the theater."* Though it was not exactly known how to achieve their goal, engineers at Disney and RCA investigated many ideas and tests made with various equipment setups. The collaboration led to the development of Fantasound, a pioneering stereophonic surround sound system. The advancements in recording and sound reproduction technology made by Fantasia are so detailed and dense, I need to leave it out of this paper as it is long enough already. Suffice to say it was a complete game-changer and caused the Disneys to not recoup on the film until the series of re-cuts and re-releases in the 1990's.

Among those at the film's premiere was film critic Bosley Crowther of *The New York Times*, who noted that *"motion-picture history was made last night.... Fantasia dumps conventional formulas overboard and reveals the scope of films for imaginative excursion.... Fantasia ... is simply terrific."* Peyton Boswell, an editor at *Art Digest*, called it *"an aesthetic experience never to be forgotten". Time* magazine described the premiere as *"stranger and more wonderful than any of Hollywood's"* and the experience of Fantasound *"as if the hearer were in the midst of the music. As the music sweeps to a climax, it froths over the proscenium arch, boils into the rear of the theatre, all but prances up and down the aisles."*

Variety also hailed *Fantasia*, calling *it "a successful experiment to lift the relationship from the plane of popular, mass entertainment to the higher strata of appeal to lovers of classical music."*

But it seems to me that the critics missed the intent of the film, which is clearly stated - to create synesthetic correlations in its audience. It opens with the orchestra taking their places against a blue backlit backdrop. As each musician plays, their instrument is keylit – for example, when the tuba plays, the bell of the tuba glows red. Then music critic and composer Deems Taylor explains to the audience that *"this is a new form of entertainment…what you will see on the screen is a picture of the kind of images that might flash through your mind when you hear this music being played.*" Then as Leopold Stokowski begins to conduct, the blue backdrop becomes lit with pure colors that follow the music, and each section of the orchestra is given its own color, and the musicians and their shadows seem to interact, and multiply, as we cross-fade from section to section in a seemingly live interaction. But it wasn't live – it was 1940, and it was carefully storyboarded and edited to bring the audience to a state of seeming to be INSIDE the creation of the music, with their brains as fully engaged as Uncle Walt could get them to be, and creating some new neural pathways. The film is kitschy, heavy-handed, and someone pompous and self-important – I know Disney wanted to be validated as a creator of "real" art – but I also feel an urgency in what he is trying to communicate. It's almost like he's yelling, "music and visuals are the same! Get it?" or something like that.



These beautiful storyboards are from the "Intermission" sequence in Fantasia – after a real intermission, as the audience is coming back in, we hear the musicians warming up: then Deems Taylor introduces THE SOUNDTRACK, a shy retiring vertical line, that tries to hide in the wings until Taylor cajoles it to come out and create these beautiful patterns. These certainly look like they were inspired by an oscilloscope, and by sacred geometry.

Fantasia (1940) – Ben Sharpsteen, supervising director.
Based on the studio draft documents provided by Hans Perk. Mosaic by Steven Hartley.
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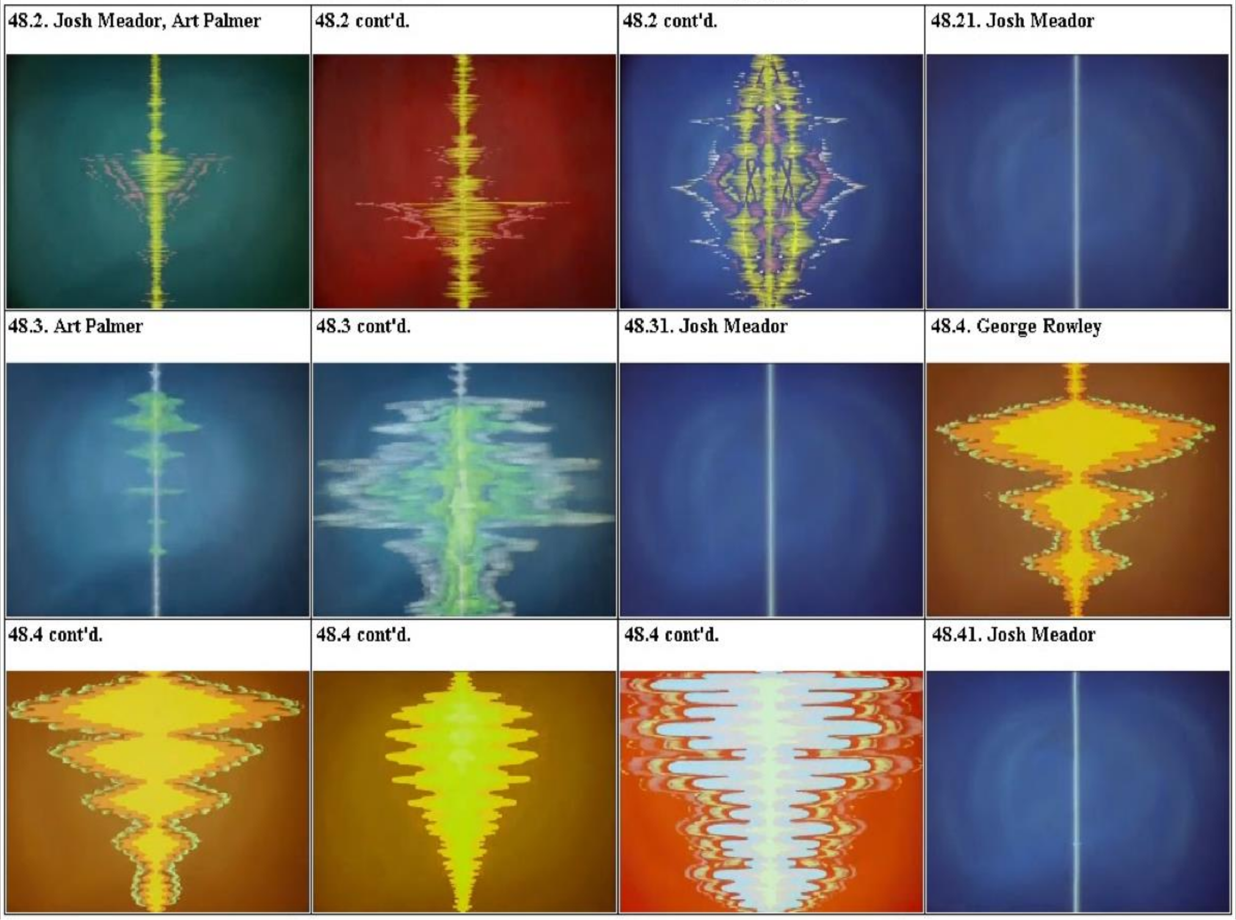


A key Disney animator was given the task of rendering the sound of each instrument for this sequence. Imagine being in the audience in 1940, hearing the sound of the instrument, and seeing it represented in pure visual abstraction and motion – AND THINKING ABOUT IT AS PURE VISUAL ABSTRACTION - a new set of correlations for many people. By this time you are used to the idea, enjoying it, and having fun along with the animators.

Fast forward to the 1970's…The computer, of course, has become an amazing instrument for forging music and image connections. The brilliant American animator and composer John Whitney Sr., considered to be the father of computer graphics, states:

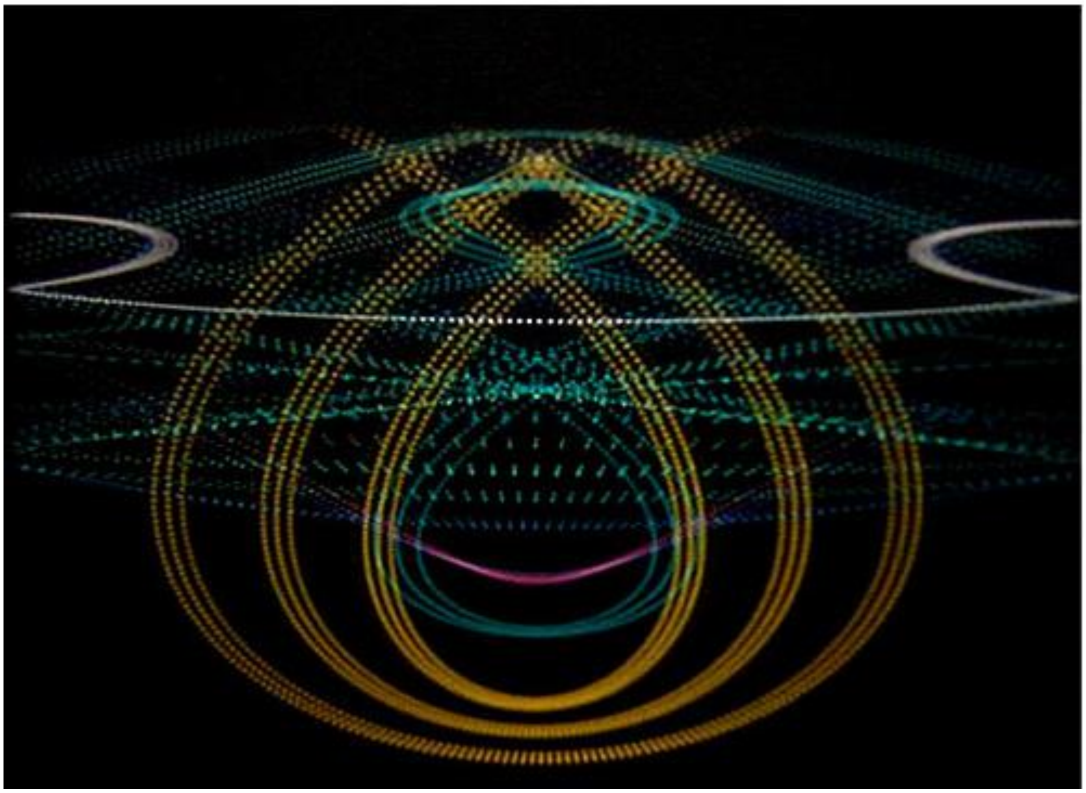
" *The computer [is] the only instrumentality for creating music inter-related with active color and graphic design, and though the language of complementarity is still under-examined and experimental, it foretells enormous consequences and offers great promise*."

John Whitney and his brother James were heavily influenced by Pythagoras and sacred geometry. Their dream was create a “more instantaneous harmonic union of abstract art and music”, some kind of computer interface hardware that you could put music in and get visuals out of, and vice-versa. That is STILL the holy grail of many a programmer, but the Whitneys were great artists, not just technicians, and their work remains beautiful and fresh. The young John Whitney worked in the Lockheed Aircraft Factory during WW2, and he realized that the targeting elements in such weapons as anti-aircraft guns calculated trajectories and produced finely-controlled linear numerical equivalents, which could be used for plotting graphics in peacetime artistic endeavors. After the war he bought some of these analog computer mechanisms as "war-surplus", and constructed camera tracking devices with them, which pioneered the concept of motion control in film. He became tremendously successful as an animator, working on such films as “*Vertigo*” and making many small commercial films. But his primary interest was in creating a dialog between "the voices of light and tone." He is the primary creator of early computer graphics programs, using simple mathematical operations, to mimic changes in music. He felt that music was an integral part of the visual experience; the combination had a long history in man's primitive development and was part of the essence of life. "*Painting and song share the earliest relationship in cave societies."* Both the Whitneys were pioneers of computer interactivity and worked at figuring out how to get musical control voltages into visual computer programs in a meaningful way, the modern equivalent of the tone-color scale.

"The future of Society: the way we communicate, learn and entertain ourselves lies in making pictures that move, images created by cameras and computers and displayed on a computer screen." – John Whitney, 1959

Whitney stated that with the development of computer technology, “computers can now create and store images and music in infinite combinations and sequences to experience Complementarity and bring about a richer communication”. Whitney believed he could look to future artists to develop the communication of “strong emotions caused by the interaction of music and visuals” further. He was very interested in harmony and harmonic progression, and made a series of films about it: in the 1974 film ”Arabesque”, which was one of the first films created using images generated entirely by computer graphics, Whitney experimented with the curves and harmonies of Islamic architecture and Arabic music.

This film was made by programming vector graphics, which displayed on a CRT screen - a television. The television image was shot with a film camera, and the film was printed on an optical printer to get the color in, and edited. There was no direct voltage control from the music itself, but some of the movement in the vector graphics was timed to be synchronous with the score. The film editing creates the seemingly synchronous movement in the piece as a whole.



still from Arabesque – John Whitney, 1974. music by Manoochelher Sadeghi

http://www.youtube.com/watch?v=w7h0ppnUQhE

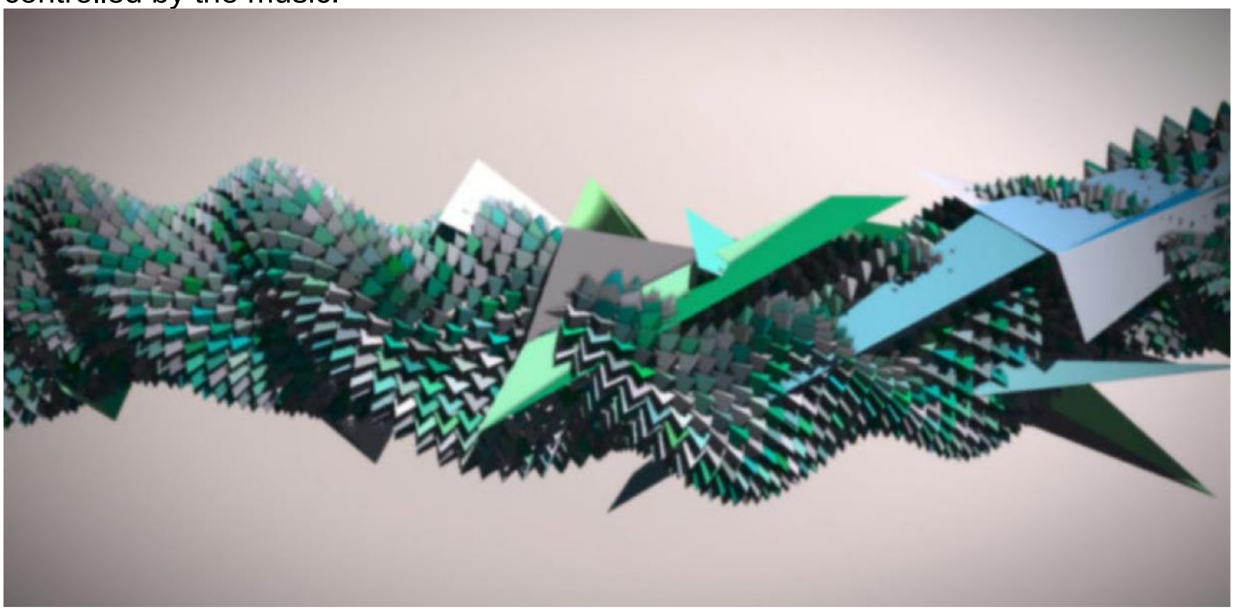
In the later 1980s, Whitney concentrated on developing a computerized instrument on which one could compose visual and musical output simultaneously in real time. Although the compositions were linked to the particular computer set-up, and defied many attempts to copy them onto film and video, Whitney continued to compose new visual-music pieces until his death in 1995.

The visual music practice of today is diverse and wide-ranging, assisted by computer and digital technology tools.
Thousands of programmers and artists all over the world are still searching for the “language of complimentarity”. But the technology is much much better at using control voltages generated by music and movement, thanks in large part to Hollywood, which has financed the development of amazing computer graphics programs like Houdini. A graphics student can buy a license for Houdini for $99 a year, and they will be using the same computing platform as Dreamworks.

The amazing genius Davide Quayola, born in 1982, lives and works in London. He is an artist, programmer, director, and builder of new neural pathways. From his website: “ Quayola is a visual artist based in London. He investigates dialogues and the unpredictable collisions, tensions and equilibriums between the real and artificial, the figurative and abstract, the old and new. His work explores photography, geometry, time-based digital sculptures and immersive audiovisual installations and performances."

His work embodies the current cutting edge of interactivity: the generation of images is controlled by music and motion.

Here's Davide Quayola's "Partitura" – the generation of the images are controlled by the music.



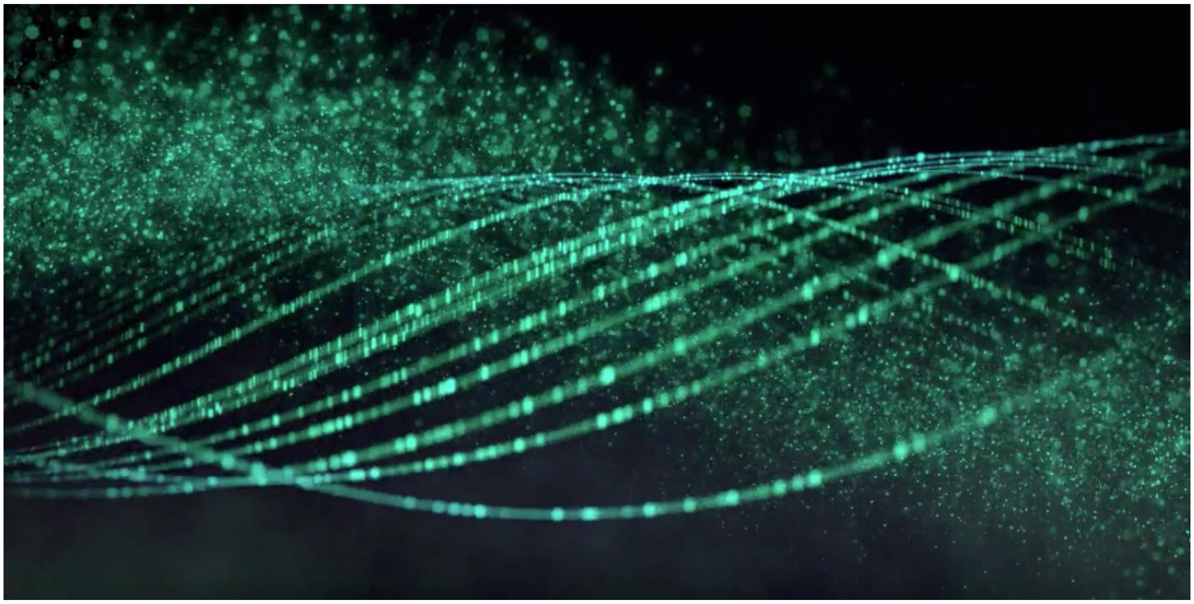
http://www.quayola.com/partitura1/

Here is some of the work of Davide Quayola and Pedro Mari, who are breaking new ground in providing a synesthetic experience of music, in real-time performance, using the actual music as controllers for the images.
http://www.youtube.com/watch?v=h5d4cjUeuKU

Davide Quayola collaborated with British artist Memo Akten to create "Forms", an interactive piece where the movement of athletes on film controlled the development of graphic images on the screen.

http://www.youtube.com/watch?v=Xe-C_rv3_p0

He has also created "Strata (1 – 4)" which are totally cool and interesting deconstructions and validations of western art forms. This series honors the values of classical art and medieval architecture. Check them out.



still from Oscillate, Richard Sierra
http://vimeo.com/65475425

Thousands of people, artists and technicians all over the world, are working on the audio-video interface every day. Why? To provide us with an experience that we all long for, in the core of our being. The identification and study of synesthesia is another step toward understanding the mystery of material existence. Deep within ourselves, we believe, as do the mystics, in an absolute truth of music and light as the fundamental expression of the universe, of creation itself. The continual search for the audio-visual grail is an expression of that truth. Artists and programmers, working together, are helping to create new neural pathways that can give us a greater intuitive understanding of this universe, as we continue to explore our human experience, and evolve in the ever-changing now.