

Apparatus to Play the Color Music

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The connections between music and colors dated back to ancient Greek, when Aristotle stated in his *De Sensu* that ‘We may regard all colors as analogous to the sounds that enter into music.’ He also believed that there must be a correlation between the sound HZ and the color spectrum, just like the musical scales and the rainbow colors. Our ancestors explored hundreds of ways to combine colors with instruments. The earliest experiment was in 1590, the painter Giuseppe Arcimboldo experimented with a system based on apparent light and dark contrast instead of colors. Sir Isaac Newton was the first person to observe an association between the width of the seven prismatic rays and the string lengths for the seven musical scales in 1704. He believed that the fundamental order of the spectrum, for example, from red to violet (rainbow colors), is equivalent to the order of pitches from C to B. Below is Newton’s color scheme:



A French mathematician Louis-Bertrand Castel was considered the first person to come up with the idea of the Ocular Harpsichord (*Clavecin pour les yeux*).



He was inspired by the writings of Athanasius Kircher, who invented the magic lantern, that became the slide projector. Castel claimed his instrument as ‘a precise and natural

correspondence between color and pitch so that a deaf listener could enjoy music that was originally written for the ear.¹ There was a square frame that was put on the top of a regular harpsichord. This equipment consisted of sixty small windows of different colors. Each window matches a string to a specific key. Each time when a key was struck, a curtain would be lifted to show a flash of colors. He attempted to use prisms for his instrument. However, the colors obtained by the refraction of light were not sufficient luminous. Later on, there was an improvement. Five hundred candles were placed with reflecting mirrors to provide enough light for a larger group of audience. Besides heat, it was also noisy with the usage of the curtains. There was no practical way to produce the instrument in the eighteenth century because of the technical difficulties. There are no full-sized ocular harpsichords existing. Below is Castel's color scheme:

C C# D D# E F F# G G# A A# B



After Castel's experiments on the early color organ, other similar devices were invented. For example, an argand oil lamp was invented to produce colorful music by projecting strong light through colored glasses by Erasmus Darwin in 1789. In 1816, Sir David Brewster also imagined his invention kaleidoscope as a type of color organ. In 1844, D.D. Jameson published a pamphlet *Colour Music*. He invented a system that he took information from a piano music score and translated it into a color score. Unlike other people, he did not only adapt pitches in different colors but also other musical elements like rhythm, durations (length of the color), octave

¹ Hankins, Thomas L. "The Ocular Harpsichord of Louis-Bertrand Castel; Or, The Instrument That Wasn't." *Osiris* 9 (1994): 141-56. Accessed December 1, 2020. <http://www.jstor.org/stable/302003>.

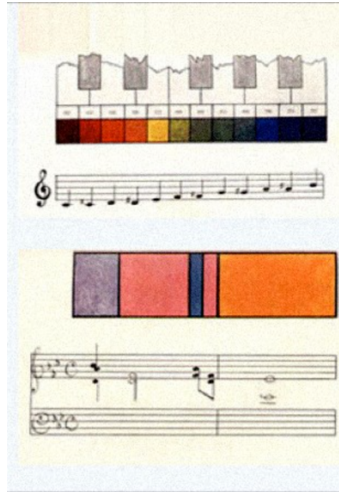
(height), accent (depth of color), rests (blank spaces), staccato notes (short blank spaces), etc.

Below is Jameson's color scheme:

C C# D D# E F F# G G# A A# B



Another tremendous instrument was invented and constructed by Frederick Kastner between 1869 and 1873. It's called Pyrophone, or so the called flame organ. The flame is placed in a pipe. By changing the air supply in the pipe, the flames will achieve the different proportions between air and the fuel to trigger different pitches. Bainbridge Bishop patented his first color organ in 1877. After the second Industry Revolution, the innovation of electricity was more common. It provided more possibilities for using electronic lights other than nature luminosity or gas. In 1893, Alexander Wallace Rimington created the most famous color organ. He named his instrument as *Colour-Organ*. After that, it became s general term for all instruments which can project colors. It was similar to the instrument that was used in the premiere of Alexander Scriabin's symphony *Prometheus: The Poem of Fire* in 1915. The *Colour-Organ* was ten feet high. It did not make a sound. The trackers from the keyboard were connected to the diaphragms and filters for the fourteen arc lamps. There were multiple stops to control the colors, luminosity, and color purity of the lamps. The second picture below shows how the musical notations are translated into color language.



Below is Rimington's color scheme:

C C# D D# E F F# G G# A A# B



After the twentieth century, developing technical innovation provided more possibilities for a large number of color organs. Hallock-Greenewalt's apparatus *Sarabet* has the various luminosity choices according to nuances in musical expression. Alexander Laszlo introduced a special system of notation in his book *Die Farblichtmusik*. *Chromola* constructed by Preston S. Millar was intended particularly for performances of *Prometheus*. Thomas Wilfred cooperated with the Philadelphia orchestra on Rimsky-Korsakov's *Scheherazade* with his apparatus *Clavilux*. Oskar Fischinger patented his *Lumigraph*, which would need two people to operate that.

No matter it is operated by five hundred candles or LED lights controlled by computers nowadays, people never stopped their strong desire of exploring the connections between music and the world.

² https://en.wikipedia.org/wiki/Alexander_Wallace_Rimington#/media/File:Rimington's_Colour-Organ_2.jpg