

Colour and music.

The relationship between colour and music as part of the complex consisting of music and the visual arts has not yet been systematically investigated. Since Liszt wrote *Lo spozalizio* from *Années de Pèlerinage* (1839), based on a painting by Raphael, composers have often taken pictures as inspiration for their works (Fink, 1988, lists 711 such compositions). Conversely, painters have derived inspiration from musical compositions or the abstract idea of music. The subject of colour and music encompasses the relationships between colour and form, light and music, colour and tonal intervals, colour and sound, and indeed painting and music. Cosmological ideas pervade the history of these relationships, from antiquity to the 20th century.

1. Colours as related to music.
2. Music as related to colours.
3. Colour and music as an artistic synthesis.
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1. Colours as related to music.

A theory of music founded on mathematical principles, and distinguishing between consonance and dissonance, has frequently been taken as the model for theories of colour and the basis for establishing the harmony or disharmony of colour combinations. The ancient Greeks were the first to construct a scale of colours divided into seven parts, on the analogy of the seven musical notes and the seven known planets. In this scale, all colours derived from a mixture of black and white. Consonances of tonal intervals were transferred to colours (Aristotle, *De sensu et sensibilibus*, 439b–442a). Aristotle's theory of colour was considered valid into the 17th century, and different colours were associated with various tonal intervals in the 16th and 17th centuries, although usually in connection with further analogies in such heterogeneous fields as levels of being, the planets, the elements, the phases of human life and degrees of knowledge. The aim of such analogies was to define a harmony of colours. Hieronymus Cardanus (*De subtilitate*, 1550, bk 13) associated seven colours, seven flavours and seven planets with each other. Gioseffo Zarlino related the consonances of prime and octave to white and black, and

the intermediate consonances to the intermediate colours of green, red and blue (*Le institutioni harmoniche*, 1558, pt iii, chap.8). Athanasius Kircher drew up complex tables of analogies, among other things associating musical notes, colours, intensities of light and degrees of brightness with each other (*Ars magna lucis et umbrae*, 1646, p.67). Four years later he devised a system associating colours with intervals (*Musurgia universalis*, 1650, i, 568). Marin Cureau de la Chambre transferred proportions derived from the musical theory of intervals to pairs of colours, and devised a 'Système des couleurs et des harmonies' (*Nouvelles observations et coniectures sur la nature de l'iris*, 1650, p.215). All these attempts at analogy, and many others of the period, were based on Aristotle's theory of colour. Although the concrete associations of these systems cannot now be reconstructed in detail, and other works by their authors contain contradictions, it is clear that they represented a rational conception in which all phenomena were constructed on the same principles and reflected the harmony of the world.

André Félibien, in 1666, was the first to establish yellow, red and blue as the basis of a new colour system. At the same time Newton was making his first prismatic experiments, and in 1672 he associated tonal intervals with the colour bands of the spectrum, 'for the Analogy of Nature is to be observed' (*An Hypothesis Explaining the Properties of Light*, 1675). There are lingering remnants of cosmological thinking in Newton too when he traces connections between colours, notes and planets. A relationship between colour and musical intervals now seemed to have a physical foundation, and the idea had Newton's authority to support it. Reaction to his *Opticks* (1704), in which he returned to the analogy, can be observed in England, France, Germany and Russia. Under the influence of Newton, ideas of the relationship between colour and music developed in all these countries (see Jewanski, 1999).

The most intense discussion of the subject occurred in France. After 1772 Rameau's writings constituted the point of departure in music theory: he regarded the individual chord as the core of the harmonic system, and derived musical phenomena from the harmonic series. Louis-Bertrand Castel, a French mathematician and philosopher, built on these new ideas. He knew the colour theories of his day, the writings of antiquity and those of the 16th- and 17th-century theorists. Reviewing the French translation of Newton's *Opticks* in 1723, he commented, with reference to Kircher's table of colours and intervals, that 'to all appearance the range of our senses is exactly the same, and nature gives us as many sounds as colours' (p.1450). After 1725 Castel developed his own system of colours and notes, starting with C = blue. He adopted the colour theories of dyers and painters, rejecting those based on Newtonian physics. He simplified the relationship

between colours and tonal intervals to a relationship between colours and notes, liberated it from its cosmological context, and at the same time attempted to transfer it to art as *Farbenmusik* ('colour music'). He built a *clavecin oculaire*, or 'optical harpsichord', which he demonstrated for a small audience on 21 December 1754. Every key on the instrument, when pressed, opened up a shaft through which coloured light passed. Castel's invention complemented earlier attempts to give the theory of colour a musical direction by adding the idea of an artistic synthesis. At the same time, the concept of a pure colour display was born.

The previously accepted application of harmonic principles to colour combinations, although no longer regarded as a legacy of classical thinking, was now extended to the relationship between music and painting, and discussed in that light for the first time. Castel noted that painters often adopted the vocabulary of music, speaking of colour tones, colour harmonies and even colour dissonances, while musicians described mingled chords as imitating chiaroscuro. He conceived of painting as simply a collection of colours and music as a collection of notes, and extended the comparison to a *musique des couleurs*, the translation of musical pieces into pictures. In 1739, on the basis of Castel's ideas, Telemann listed a number of 'truths' that can be reduced to the following principles: the compass of notes runs from low through medium to high, and the range of colours from dark through medium to light; the movement of both notes and colours is either rising or falling and ranges from fast to slow; the distance between both notes and colours is from one to its neighbour; presentation in both cases may be simultaneous or successive. These 'truths', Telemann concluded, suggest that 'a fugue in sounds will make up a fugue in colours'. This is the first recorded mention of a colour fugue.

Castel's many articles gave rise to animated discussion. Weighty arguments for and against the analogy of colours and notes, painting and music, were expressed by such intellectual giants as Diderot, Mairan, Rousseau and Voltaire. It was pointed out that colour harmonies depend on fashion while the definition of musical consonance always remains the same; that a dissonance in colour leaves a less disturbing impression than a musical dissonance; that colours mingle to create a unit incapable of analysis, as when yellow and blue make green, whereas two notes combined do not create the note between them; that the perception of notes is always related to a tonic and is therefore relative, while the perception of a colour is absolute; that the emotions aroused by music and painting are not attributable to relationships between colours and notes; and that sequences of colour cannot be retained in the memory like musical melodies.

Although 18th-century French writers denied a direct relationship between colour and notes, they compared drawing and melody, colour and pitch, and colour and instrumental timbre, without, however, reaching coherent conclusions. The idea of treating colours like music was taken up by Johann Gottlob Krüger, who made the first recorded sketch of a *Farbenclavecymbel* or 'colour harpsichord' (1743, pl.7) which would produce 'music to delight the eye' as a counterpart to 'music for the ear'. Nothing came of his plans, but the idea led Moses Mendelssohn to propose the notion of expressing melodies in 'various kinds of undulating and flame-like lines' (*Über die Empfindungen*, 1755). Carl Ludwig Junker compared the drawing, colouring and expression of a painting with the melody, harmony and expression of a musical composition (*Betrachtungen über Mahlerey, Ton- und Bildhauerkunst*, 1778). The idea of a colour keyboard instrument operating analytically, and other attempts to treat colours like music, fell into oblivion once the discussion of notes and colours shifted to its psychological and physiological aspects. By the last third of the 18th century individual colours and notes were no longer being compared; instead, music and painting were related to each other as a whole, music having a superior status because of its more immediate influence on the soul. 'No art affects the soul so directly as music Painting, sculpture and architecture are dead things by comparison with a sweet voice' (W. Heine, 1780; 1977 edn, 74).

In the early 19th century E.T.A. Hoffmann and Schumann further broke down the barriers between the arts. Schumann's Eusebius claimed (c1833) that 'the educated musician will be able to derive as much usefulness from the study of a Madonna by Raphael as will a painter from a Mozart symphony', to which Florestan added, 'The aesthetics of the two arts are the same; only the material is different' (Schumann, *Gesammelte Schriften über Musik und Musiker*, ed. M. Kreisig, i, 5/1914, p.26). In his *Kapellmeister Kreisler*, Hoffmann created the archetype of an artist who transcended the frontiers between disciplines: 'I find colours, notes and scents all coming together, not so much in a dream as in that state of delirium that precedes sleep, particularly when I have been listening to a great deal of music'. In 1844 D.D. Jameson propounded the concept of 'colour-music', the translation of music into a play of colours. Later in the century H.R. Haweis called for a form of 'colour-art' as a pendant to 'sound-art', and William Schooling conceived a silent electric colour-organ. A.W. Rimington's 'art of mobile colour' continued the ideas of the painter J.M.W. Turner, who had explored colour's independent ability to represent subjects in such paintings as *Light and Colour (Goethe's Theory of Colour)* of 1843. Rimington hoped to replace Turner's naturally static colour shading by constant colour changes, that is by introducing movement into colour. He produced several schemata: a theory of colour and music, a translation of

produced several schemata: a theory of colour and music, a translation of music into his play of colour, and a pure art of colour without music. Orientation by the musical model as previously accepted could now be abandoned.

The first two decades of the 20th century saw many attempts to establish the free play of form and colour as an independent art relating to music in various ways. Some artists continued to explore the translation of music into colour in accordance with Castel's ideas (see Klein, 1926; Scholes, 1938). Others developed the concept of the 'absolute film' based on the formal patterns, rhythmic and dynamics of music. Ludwig Hirschfeld-Mack's *Dreiteilige Farbensonatina*, Hans Richter's *Film ist Rhythmus* and Viking Eggeling's *Symphonie Diagonale* were among the works in this genre presented in Berlin on 3 and 10 May 1925. Paul Klee translated elements of music into pictorial equivalents. In his 'polyphonic paintings', such as *Polyphon gefasstes Weiss* (1930), differently structured areas are superimposed, with colour assuming particular significance. Of Robert Delaunay's *Les fenêtres sur la ville, première partie, premiers contrastes simultanés* (1912), Klee wrote in 1917: 'Delaunay tried to transfer artistic emphasis to the temporal aspect, on the model of the fugue, by opting for such a length that the whole picture cannot be seen at once' (*Paul Klee: Tagebücher 1898–1918*, ed. F. Klee, Cologne, 1957, p.383). The idea of 'kinetic painting' (Diebold, 1921) was promoted in both Germany and the USA, where W.H. Wright spoke of the new art that would use the resources of a colour organ instead of canvas and paint: 'The color-organ, in fact, is the logical development of all the modern researches in the art of color' (*The Future of Painting*, 1923, p.49). From 1922 Thomas Wilfred performed silent 'Lumia' compositions on his 'Clavilux', giving them opus numbers and sometimes musical titles. Many colour organs were built with a view to creating kinetic art through plays of changing colour (Goldschmidt, 1928).

Luigi Veronesi's *Chromatische Visualisierung: J.S. Bach Kontrapunkt No.2 aus 'Kunst der Fuge'* (1971) was based on a physical parallel between colour and music. In Jakob Weder's cycle of pictures *Orchestersuite 3 in D-Dur von J.S. Bach* (1980–81), each of the five movements of the suite is associated with a colour that supposedly reflects its character and subject. The separate colours are modulated with shading derived from the structure of the music.

2. Music as related to colours.

In the 20th century the temporal differences between colours and notes, or music and painting, were no longer seen as irreconcilable. Painters such as Ad Reinhardt and Mark

Rothko integrated a temporal element into their works, using colour procedures that made the act of looking at a picture a process in itself. In music time seems to stand still in such works as Ligeti's *Volumina* for organ (1961–2, revised 1966) and *Atmosphères* for orchestra (1961), where the elimination of rhythm makes tonal colour paramount, and form is constructed by a gradual succession of states of sound. Ligeti described the process of harmonic transformation in his orchestral work *Lontano* (1967) as a kind of polyphony of light: an imaginary perspective is created by means of reflections and refractions, slowly revealing itself to the hearer 'as if he were coming out of bright sunlight into a dark room, and only gradually perceiving colours and shapes' (O. Nordwall, *György Ligeti*, 1971, p.114). As early as Schoenberg's *Farben*, from Five Orchestral Pieces (1909), the two themes are reduced to their smallest possible extent both in number of notes and in range; the melodic function is obliterated, and only tonal colour remains. The composition may be seen as an attempt to transfer to music the wide variety of shades of a single colour found in painting, extending the opportunities open to music by the attempt to compose in colour.

In composition based on colours, and in music referring to pictures, the precise nature of the stimulus provided by the colours or the painting may not be evident. If the composer has given no other indication, analysis of the score will not even tell us whether there was any extra-musical stimulus at all. Without knowledge of this programme, it is impossible to link colours and music. Moreover, the character of individual colours is variable; the term 'red', for instance, does not define the colour exactly. Only a small number of colours can be chosen, usually limited to those of the 12-part colour circle, and their expressive character has no more variety than such common descriptions of musical movements as *adagio*, *moderato* or *allegro*. In Bliss's *A Colour Symphony* (1921–2), each of the four movements bears the name of a colour: 'Purple', 'Red', 'Blue' and 'Green'. The heraldic significance of the colours (green for instance, being associated with emeralds, hope, youth, joy, spring and victory) is reflected in the character of the music. Palle Mikkelborg used the names of colours to describe the movements of *Aura* (Sony 463351–2, 1989), while the singer Lauren Newton and bassist Joëlle Léandre have translated painting techniques (for instance Frank Stella's monochrome palette in *Stella Black*) into contemporary jazz (*18 Colors*, Leo LR 245, 1997).

Besides the general association of colour and music, colour has been equated with individual musical parameters. Messiaen employed his subjective association of colours with chords, forms and themes in such works as *Sept Haïkai* (1962). In the fifth movement of this work he wrote into the score the colours to be associated with the chords,

and in his preface to *Couleurs de la Cité Céleste* (1963) he explained: 'The form of this work depends entirely on colour'. The melodic and rhythmic themes, the complex of sounds and timbres, evolve like colour. In Michael Denhoff's cycle *Die blaue Vier – Musik zu Bildern von Jawlensky, Klee, Kandinsky und Feininger* (1977) there are 'correspondences of gestus and sound to colours and forms', for instance 'when the prismatic interlocking and shading of colours in Feininger's *Gelmeroda IX* corresponds to the changing tonal play of closely similar chords whose temporal construction derives from the proportions of the picture' (Denhoff, 1993, p.17).

3. Colour and music as an artistic synthesis.

As early as 1889, in his opera *Mlada*, Rimsky-Korsakov synchronized stage lighting with use of colour words in the libretto and a pattern of keys in the music. Independently, Skryabin sought to synthesize all sensations. In his *Prométhée* for orchestra, chorus and tastiera per luce (colour organ) of 1908–10, colours and sounds were associated in a pattern that is difficult to reconstruct. In *Die glückliche Hand* (1913) Schoenberg wanted the emotions arising from the action to be expressed by means other than music alone: 'it should be evident that movements, colours and light are to be treated in the same way as notes are usually handled: they must make music. Figures and structures are to be formed, as it were, from various light values and shades of colour, resembling the structures, figures and motifs of the music' (*Stil und Gedanke: Aufsätze zur Musik*, ed. I. Vojtech, Frankfurt, 1976, p.238). Kandinsky also tried to achieve an artistic synthesis by using methods from each art in his stage work *Der gelbe Klang* (1912). Writing in *Der blaue Reiter*, he gave detailed instructions for the colours, but only vague indications of the music, for instance: 'Some indistinct chords in the orchestra. Curtain up. Dark blue twilight on stage, whitish at first, later becoming an intense dark blue. After a while a small light appears at the centre, becoming brighter as the colour deepens. Orchestral music after a while. Pause. A chorus is heard offstage' (1912, p.212). Only sketches of Thomas Hartmann's score for this piece have been preserved; it was reconstructed by Gunther Schuller in 1982. A more recent work is by Schnittke (1973–4, rev. 1983), who intended his dance composition to be seen as part of a multimedia theatre of movement.

In Bartók's opera *Bluebeard's Castle* (1911, first performed 1918), the composer integrated the coloured light of the seven rooms with the prevailing keys. At about the same time, Granville Bantock advocated the use of coloured light in the concert hall for performances of his *Atlanta in Calydon* (1911), but no lit performance is known to have been given. Mary Elizabeth Hallock-Greenewalt gave piano recitals in Philadelphia ac-

accompanied by a 'light color instrument' which filled the concert hall with colours complementing the music. In the years 1925–7 Alexander László gave concerts of works in the new genre of **FARBLICHTMUSIK** (colour-light music), in which music and colour were to be linked as arts. In Vishnegradsky's multimedia experiment *Mosaïque lumineuse de la coupole du temple* (1942–), he aimed to project colours on the ceiling of a temple while music was played; like Skryabin, he dreamt of the awakening of a cosmic consciousness. There have been many attempts to re-create *Prométhée*, *Die glückliche Hand* and *Der gelbe Klang*, but the visual expectations that audiences have developed from modern videoclips, light shows at pop concerts and laser-beam spectacles have made such reconstructions problematic.

Colour, or coloured light, has also been employed in many works composed since 1945. Shchedrin added a *luce* part to *Poetoria* (1968) to illustrate the form of the music and the symbolism of the text by different colours. Xenakis linked light, colour, music and architecture in *Polytope* (1967), *Persépolis* (1971), *Polytope de Cluny* (1972) and *Le diatope* (1978). In Gubaydulina's *Alleluja* for chorus, boy solo and orchestra, with colour, organ ad libitum (1990), colour is a basic rhythmic element in the formal development of the music. (Rihm added a part, 'Das Licht', to his opera *Die Eroberung von Mexico* of 1992, with dynamic indications, but as suggestions rather than actual instructions.) Stockhausen's seven-part operatic cycle *Licht* (1977–) seeks to achieve a unity of music, light, words, movement and stage design, referring to esoteric traditions and aiming to create a 'cosmic world theatre' (M. Kurtz, *Stockhausen*, 1988, p.275). In 1993 the painter Hans Werner Berretz (Ha Webe) began working with Gubaydulina, Denhoff, Galina Ustvol'skaya, Violeta Dinescu, Winfried Maria Danner and Bernd Hänschke on a series of works in which the score becomes part of the picture. Primary colours illustrate the musical parameters (red for pitch and duration, blue for rhythm, yellow for melody, green for harmony) and mingled colours accompany such non-musical elements as the text.

4. Synaesthesia.

Although any association of colour and music may be described as synaesthesia, it most frequently takes the form of 'colour-hearing', the involuntary perception of colours by someone hearing sounds or listening to music. Until the late 18th century colours and notes or intervals were associated by a process of analogy accepted as scientific method (see §1 above). Not until the turn of the 19th century did writers use verbal metaphors linking colour and music to express the new spirit of the times, with music promoted to the top of the artistic hierarchy.

The fundamental difficulty in assessing the artistic significance of synaesthesia is that in the case of many musicians and artists it is impossible to be sure whether they are experiencing synaesthesia, have a heightened sensitivity to interdisciplinary associations and/or are seeking new ways of expressing themselves by deliberately blurring the frontiers between the arts (for instance in sound-sculptures). The works of Skryabin, László, Messiaen and Denhoff involve synaesthetic phenomena in the process of composition, but it is not clear whether they are true synaesthesias in the sense of Cytowic's catalogue of criteria (*see* [SYNAESTHESIA](#)) and they are not necessarily perceived as synaesthetic by the hearer. Because synaesthesia varies from one person to another, problems arise when, as in Skryabin's *Prométhée* and László's *Farblichtmusik*, uniform perception of the music and the colour image is fundamental to the understanding of a multimedia performance.

Four congresses devoted to colour and music, directed by Georg Anschütz, were held in Germany between 1927 and 1936. In 1962 the Prometheus Studio was founded at the Technical University of Kazan in the former Soviet Union to study the artistic significance of synaesthesias. Research on synaesthesia has also been carried out at the Medizinische Hochschule, Hanover. The International Synaesthesia Association has its headquarters in the UK.

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