keyed instruments

Ramsay

The inner stave contains the chromatic scale of twelve notes as played on **keyed instruments**. The flat and sharp phase of the intermediate notes are both given to indicate their relation to each other; the sharpened note being always the higher one, although seemingly on the stave the lower one. The two notes are the apotome minor apart overlapping each other by so much; ?D is the apotome lower than C#; ?E the apotome lower than D#; F# the apotome higher than ?G; G# the apotome higher than ?A; and A# the apotome higher than ?B. The figures for the chromatic scale are only given for the notes and their sharps; but in the mathematical series of notes the numbers are all given. [Scientific Basis and Build of Music, page 120]

Hughes

General remarks on the method of harmonies developing on all kinds of instruments, including the human voice
—Much paradox, but yet the scheme will admit of clear demonstration
—A musical note compared to a machine, the motive power not of our creation
—The imperfection of **keyed instruments**, from some notes acting two parts, attuned to the ideal of harmony within us
—Macfarren quoted on the echoing power of a cathedral attuning the Amen
—Why music as an art precedes painting
—Philosophers and mathematicians have only studied music to a certain point
—Every key-note a nucleus, including the past, the present, and the future; no finality in any ultimate
—The late Sir John Herschel's views on the musical gamut alluded to
—The imperfection of **keyed instruments** adapts them to our present powers
—The laws will be seen to develope the twelve major and the twelve minor keys in unbroken sequence and in harmonious ratio; to gain them in geometric order [as] **keyed instrument** should be circular, the seven octaves interlacing in tones a lower and a higher series, . 15 [Harmonies of Tones and Colours, Table of Contents1 - Harmonies]

Helmholtz's experiments on developing colours shown to agree with the scheme
—The sounds of the Falls of Niagara are in triplets or trinities
—The Arabian system divides tones into thirds
—Two trinities springing from unity apparently the germ of never-ending developments in tones and colours
—Inequality of the equinoctial points; is the want of equilibrium the motive power of the entire universe?
—The double tones of **keyed instruments**, the meetings by fifths, the major and minor keys, so agree with the development of colours, that a correct eye would detect errors in a piece of coloured music
—Numbers not entered upon, but develope by the same laws
—Bass notes omitted in order to simplify the scheme, 18 [Harmonies of Tones and Colours, Table of Contents2 - Harmonies]

I had for a long time studied the development of the harmonics of colour, and believed that I had gained them correctly; but I saw no way of proving this. The thought occurred—Why not test the laws in musical harmonies? I wrote down the development of the seven major keys of the white notes in **keyed instruments**. I was perplexed by the movement as of "to and fro," but the development of numbers explained this point, and I found that the method of development in colours, tones, and numbers agreed. I remembered the keys with sharps, but had forgotten that B? belonged to the key of F, and here I thought that the laws failed. But I found by reference that all were correct, the eighth being the first of a higher series, the laws having enabled me to distinguish between flats and sharps, [Harmonies of Tones and Colours, General Remarks on Harmonies of Tones and Colours, page 12]

THE METHOD OF DEVELOPMENT, OR CREATION, OF HARMONIES ON ALL KINDS OF **KEYED**, WIND, AND STRINGED INSTRUMENTS, INCLUDING THE MOST PERFECT OF ALL, THE HUMAN VOICE.
[Harmonies of Tones and Colours, The Method of Development or Creation of Harmonies1, page 15]

study of the natural sciences, as we progress, we find that "hills peep o'er hills, and alps o'er alps arise." As regards **keyed instruments**, it appears that the effect of those notes which act two parts, such as C# and D?, is rectified in some way so as to be perfectly attuned to the ideal of harmony within us. Again, the "Amen" sung by the choir in a cathedral may not be in accurate tune, but if nearly the correct intonation is sounded, after traveling along the aisles, the chords always return to the ear in perfect harmony, because the natural laws of music, assisted by the echoing power of the building, have attuned them to the perfect harmonical triad. If the "Amen" be too much out of tune, these laws decline to interfere, and there is no such helpful resonance.* [Harmonies of Tones and Colours, The Method of Development or Creation of Harmonies2, page 16]

the artificial system must not be mixed up. The wonders of Nature's laws in the developments of harmonies, consist in the beautiful adaption of **keyed** and all other musical instruments to a range commensurate with human powers. The chromatic scale of twelve notes (the thirteenth being the octave) is not the scale of Nature. To construct a musical instrument upon real divisions of musical tones, each of them being in correct ratio with the others, it would be necessary to have a larger number of tones to the octave. In the development of harmonies on the natural system, we trace the perfect adaptation of means to ends, meeting the intricacies of every musical instrument, including that most perfect of all— the human voice. [Harmonies of Tones and Colours, The Method of Development or Creation of Harmonies3, page 17]

In the diagrams the circles are not drawn as interlacing into each other, from the difficulty of representing them accurately as rising spirally in geometric progression. If we endeavour to realise the development of harmonies, both in geometric order, and at the same time advancing and retiring, as in musical clef, we must imagine a musician having the physical power of striking all the notes on a circular **keyed instrument** of seven octaves, linked to a lower series of seven octaves, and a corresponding series of seven higher. But in fact the depth of the lower series, and the height of the higher, are alike unfathomable to our present powers. C, the first note of the seven octaves, sounds the four lowest tones, F, G, A, B of the lower series; and B, the last and highest note of the seven octaves, sounds in its harmony C? and D# of the higher series of sevens. [Harmonies of Tones and Colours, The Method of Development or Creation of Harmonies3, page 17]

This quotation on vibrations will be seen to agree with the laws which I have gained. The fact that six of the notes of **keyed instruments** are obliged to act two parts, must prevent the intermediate notes bearing a definite ratio of vibrations with the intermediate colours of the spectrum. I name the note A as violet, and B ultra-violet, as it seemed to me clearer not to mention the seventh as a colour. [Harmonies of Tones and Colours, On Colours as Developed by the same Laws as Musical Harmonies2, page 19]

The tones between the seven white notes of **keyed instruments**, and the tints and shades between the seven colours, cause the multequivalency of colours and of tones; consequently every colour, as every musical harmony, has the capability of ascending or descending, to and fro in circles, or advancing and retiring in musical clef. It is a curious coincidence that Wünsch, nearly one hundred years ago, believed in his discovery of the primary colours to be red, green, and violet; and in this scheme, red, answering to the note C, must necessarily be the first visible colour, followed by green and violet, but these not as primary colours, all colours in turn becoming primaries and secondaries in the development of the various harmonies. To gain facts by experiment, the colours must be exactly according to natural proportions—certain proportions producing white, and others black. In this scheme, green and red are shown to be a complementary pair, and therefore (as Clerk Maxwell has proved) red and green in right proportions would produce yellow. The same fact has been proved in Lord Rayleigh's experiments with the spectroscope. Yellow and ultra-violet, [Harmonies of Tones and Colours, On Colours as Developed by the same Laws as Musical Harmonies3, page 20]

The inequality of the equinoctial points is a well-known fact. It will be seen how apparent this is in the developments of harmonies. From the moment that trinities depart from unity, the balance is unequal, and the repeated endeavours after closer union cause a perpetual restlessness. May not this want of equilibrium be the life or motive power of the entire universe, with its continuous struggle after concord, even to oneness? "Closer and closer union is the soul of perfect harmony." In tracing harmonies of tones and colours, the double tones of **keyed instruments** will be seen to correspond with the intermediate tints and shades of colours. The twelve notes, scales, and chords in the major and minor series, the meetings by fifths, *&c.*, all agree so exactly in their

mode of development, that if a piece of music is written correctly in colours with the intermediate tints and shades, the experienced musician can, as a rule, detect errors more quickly and surely with the eye than the ear, and the correct eye, even of a non-musical person, may detect technical errors. Although the arithmetical relation has been most useful in gaining the laws, it is not here entered upon; but numbers equally meet all the intricacies both of tones and colours. The bass notes have been omitted, in order to simplify the scheme. [Harmonies of Tones and Colours, The Arabian System of Music, page 21]

THE five circles represent a musical clef on which the twelve notes of a **keyed instrument** are written. Six of the notes are shown to be double, *i.e.*, sounding two tones, eighteen in all, including E#, which is only employed in the harmony of F#, all others being only higher or lower repetitions. [Harmonies of Tones and Colours, Diagram I - The Eighteen Tones of Keyed Instruments, page 22a]

The diagram begins with C, the third space of the treble clef, as being more convenient to write than C, the lowest note in the bass clef. The life of musical sounds rising from a hidden fountain of life is shown by the chasms of **keyed instruments** between B and C, and E and F; their great use will be strikingly manifest as the developments proceed. The fundamental key-note C and its root F rise from the chasms. B, the twelfth key-note, and E, its root, sound the octave higher of the fountain B. The generation of harmonies is by one law a simple mode of difference. Each major major key-note and its tones embrace the eighteen tones of **keyed instruments** which all lie in order for use. The power and extent of each are complete in itself, rising and developing, not from any inherent property in matter, but from the life communicated to matter. In the whole process of harmony there are limits, and yet it is illimitable. Its laws compel each key-note to follow certain rules within certain bounds; each separate key-note, being the fountain of its own system, has its own point of rest, and series after series rise and enlarge, or fall and diminish infinitely. [Harmonies of Tones and Colours, Diagram I - The Eighteen Tones of Keyed Instruments, page 22a]

The 18 tones of **keyed instruments** are represented round this circle, and again below in musical clef. As all, with the exception of G? and A#, become in turn either Major or Minor Key-notes, or both, no distinction is made between tones and semitones throughout the scheme. In this diagram the 12 Major Key-notes are written thus

[Harmonies of Tones and Colours, Diagram I - Eighteen Tones of Keyed Instruments, page 22c]

the 7 white notes of a **keyed instrument** are here coloured; the intermediate tones, shown by a flat or a sharp marked to a note, are left uncoloured, being intermediate tints. [Harmonies of Tones and Colours, Diagram I - Eighteen Tones of Keyed Instruments, page 22c]

We here trace the twelve harmonies developing in succession. Notice how exactly they all agree in their mode of development; also the use of the chasms between E and F, B and C. Remark also the beautiful results from the working of the double tones, especially C#-D?, and E#-F?, causing the seven tones of each harmony, when ascending, to rise one tone, and, descending, to reverse this movement. F#-G? is the only double tone which acts as F# when a key-tone, and G? when the root of D?. The root of each harmony is the sixth and highest tone in each succeeding harmony, rising one octave; when it is a double tone, it sounds according to the necessity of the harmony. The intermediate tones are here coloured, showing gradual modulation. The isolated fourths (sounding sevenths) were the previously developed key-tones; these also alter when they are double tones, according to the necessity of the harmony. Beginning with B, the isolated fourth in the harmony of C, the tones sound the twelve notes of a **keyed instrument**, E# being F?, and the double tones, some flats, some sharps. [Harmonies of Tones and Colours, Combinations of dissonance, rests, page 24]

We find that on a **keyed instrument** each primary sounds the same tones as the secondaries of each third harmony below, but in a different order, and the double tones are altered sharp or flat as the harmony requires. For example, the secondaries of B are sharps; when primaries of D?, they are flats. In order to trace this quickly, the sharps and flats are written to each note. [Harmonies of Tones and Colours, Combinations of dissonance, rests, page 24]

ON a **keyed instrument** only twelve are major key-notes, but as the double tones C#-D? and F#-G? are roots, there are fourteen different chords. The fourteen that are roots are written in musical clef. As an example of the major chords in the different keys, we may examine those in the key of C. A major fifth includes five out of the seven of its key; with the third or central note it is the threefold chord, or fourfold when the octave note is added. Including the silent key-notes, a threefold chord embraces eight, or, counting the double tones, not including E#, eleven. The first and second chords of the seven of the harmony are perfect major chords in the key of C; the central note of the third chord, being #C-?D, is a discord. The first pair of fifths in the scale, with its central note, is a chord of the key; if we include the octave, the last pair of fifths, with its central note, is the same chord an octave higher than the lowest chord of the seven. Of the chords written in musical clef of the twelve keys, the octave chord is only written to C, the seven of each having two chords and the scale one, thirty-six in all, or forty-eight if the octave chords are added. Notice how the chords of each seven and the chord of its scale are altered. [Harmonies of Tones and Colours, Diagram V - The Chords of the Twelve Major Keys, page 27a]

the bass clef, carrying each key-note a fifth higher or descending a fifth lower. A constant difficulty arises in explaining the development of tones and colours, from the fact that the ascending notes on a **keyed instrument** are descending lines in musical clef, and the ascending lines in musical clef in the retrogression of fifths must be gained by beginning below and following them upwards. They are therefore not repeated, either in the table or in musical clef, as descending. [Harmonies of Tones and Colours, Diagram VII - The Modulating Gamut of the Twelve Keys2, page 30]

Ascending, begin with C in the innermost circle, F being its root. The Key-note C becomes the root of G, G becomes the root of D, and so on. In descending, begin with the octave Key-note C in the outermost circle. F, the root of C, becomes the fifth lower Key-note. F is the next Key-note, and becomes the root of B?, &c. The 12 Keys in their order are written in musical clef below. Lastly, the Keys of C and G, ascending on a **keyed instrument**, are written in music as descending; therefore, to shew correctly notes and colours meeting, it is necessary to reverse them, and write C below G. All are seen to be complementary pairs in tones and colours. [Harmonies of Tones and Colours, Diagram VII Continued2, page 31e]

Round the circle the eighteen tones of **keyed instruments** are shown; the twelve developing perfect minor keys are written thus

, the seven white-keyed notes are coloured, the intermediate tones left uncoloured. [Harmonies of Tones and Colours, Diagram VIII - On the Development of the Twelve Minor Harmonies, page 32]

Referring to Diagram I., the 18 tones of **keyed instruments** are here again represented, both round the circle and in musical clef. In this diagram the 12 Minor Key-notes are written thus

; the 7 white notes of a **keyed instrument** are here coloured; the five intermediate tones, as before, are left uncoloured. [Harmonies of Tones and Colours, Referring to Diagram I, page 33c]

AS an example of the twenty-four, compare A major, developing, in Diagram II., with A minor, Diagram IX., taking the notes in the order which they sound in trinities. The three notes of the primaries sounded by A minor are, first, the same root as the major; the two next are the fourth and seventh higher notes (in the major, the fifth and sixth); the secondaries only vary by the sixth and seventh notes being a tone lower than in their relative major. Observe the order in which the pairs unite; the fourth in depth, sounded seventh, isolated. A and its root do not rise from the chasms. The fundamental key-note C was seen not to be interfered with, neither is the fundamental minor key-note A; G# on the one side, and B? on the other, being the key-notes. The seven of each minor harmony embrace only seventeen tones. C major and A minor are the only two keys which sound the seven white notes of **keyed instruments**. The minor scale and chords of A are not included in this remark. [Harmonies of Tones and Colours, Diagram IX - The Minor Keynote A and Its Six Notes, page 34a]

THE same laws are followed here as in the development of the major scales. In that of A, F, the sixth note, has risen to F#, in order to meet B, which has previously sounded. In descending, the seventh note, B, falls to B?, in order to meet F, which has also previously sounded. The notes, ascending or descending, always follow the harmony of their key-note, except when rising higher or falling lower to meet in fifths. We may here trace the twelve, the ascending scale sounding the fifth harmony higher than its key-note, and, in descending, sounding the fifth lower harmony. The four pairs of each scale are written at the end of the lines. If we strike the twelve scales as they follow in succession, the thirteenth note being the octave of the first, and leader of a higher twelve; having gained them six times, at the seventh they gradually rise (though beyond the power of a **keyed instrument**) into the higher series of seven octaves, and again, in descending, they fall lower, and are linked into the lower series of seven octaves. Nine notes of any ascending minor scale may be struck without the necessity of modulating beyond the fifth harmony. For example, in the scale of A, its tenth note, C#, rises to meet the sixth note, which has previously sounded. In descending, E?, the eleventh note, meets B?, the seventh note, which has previously sounded. The scale of A may be traced veering round by reference to Diagram IX., beginning with A, and carrying the four lowest notes an octave higher, F rising to F# in ascending, B falling to B? in descending. [Harmonies of Tones and Colours, Diagram XI - The Twelve Minor Keynotes with the Six Note of Each, page 36a]

ALTHOUGH only twelve notes of a **keyed instrument** develope perfect minor harmonics, there are fifteen different chords, the double tones D#-E?, E#-F?, A#-B? all sounding as roots. The fifteen roots are written in musical clef. A major and a minor fifth embrace the same number of key-notes, but the division into threefold chords is different. In counting the twelve, a major fifth has four below the third note of its harmony, and three above it; a minor fifth has three below the third note of its harmony, and four above it. A major seventh includes twelve key-notes, a minor seventh only eleven. As an example of the minor chords in the different keys, we may first examine those in the key of A, written in musical clef. The seven of its harmony have two threefold chords, and two of its ascending scale. If we include the octave note, the highest chord of the descending scale is a repetition (sounding an octave higher) of the lowest chord of the seven in its harmony, and the second chord of the descending scale is a repetition of the first chord of its ascending scale. These two repetition chords are only written to the key of A: the chords of the other eleven keys will all be found exactly to agree with those of A in their mode of development. We may again remark on the beautiful effect which would result if the colours of the minor chords could be seen, with the tones, as they develope. [Harmonies of Tones and Colours, Diagram XII - The Chords of the Twelve Minor Keys, page 37a]

If the foregoing harmonies of sound and of colour have been rightly developed from the Scriptures, I trust they will be considered as steps gained towards the belief that Evolution is the law of the Almighty for the continuance of activity throughout the universe, and towards an increasing study of Creation and Revelation as mutually explaining each other. According to my belief, the Scriptures must be based on the principle which is explained of **keyed instruments** at the conclusion of Chapter II. In the development of musical harmonies the beginning and the ending are unfathomable. It is the same in the Scriptures. No musical note or colour can be separated from those below and above it. Neither can any portion of the Bible be separated: every part embraces the past, [Harmonies of Tones and Colours, Reflections on the Scheme4, page 46]

I had also hoped to write a very brief outline of a few of the innumerable Scriptural types which have guided me in the development of Tones and Colours; but my sight suddenly failed for reading and writing; and I only allude to the seven spirits of God (Rev. iii. I) as regards tones and colours, and to the twelve fruits of the Tree of Life (Rev. xxii. 2) as regards the twelve notes of **keyed instruments**. [Harmonies of Tones and Colours, Supplementary Remarks and Diagrams, page 53]

EXAMINE the notes in the first circular diagrams. Beginning with C, they rise revolving from the right hand to the left; the notes in the musical clef below rise from the left hand to the right, as in **keyed instruments**. If, however, the volume be turned upside down, the circles will correspond with the music below. [Harmonies of Tones and Colours, On Keyed Instruments as considered Circular, page 56]

See Also

chromatic
musical instrument
organ
organ pipe
piano
sounding instruments
Stringed instruments
tempered instrument
wind instruments