Uncertain harmonies (or fall) – Colour scales and cadences

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Uncertain Harmonies (or Fall) examines an area of visual music, associated with colour and the musical scale. The most frequent associations made between art and music relate to the many attempts by artists, composers and scientists to align the musical scale with an equivalency in colour. This is perhaps the most often visited association and probably the most clichéd area of visual music research. Historically, the majority of experiments associated with colour and sound focus on the relationship between hue and pitch. The practice-based research explores the relationship from a structural perspective, focusing on scale patterns rather than colour associations. This paper will consider how the structure of the musical scale, in its major and minor forms might be used as a template for the construction of a series of colour scales and cadences employed in painted and digital compositions.

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Introduction

Since the time of physicist Sir Isaac Newton (1642-1727) it has been understood that light and sound exist within a range of wave frequencies. As a result of this scientific understanding, many pioneers of 'colour music' invented their own colour scales and instruments to realise their ambitions in light and sound [1]. For example, in 1920 the first performance of Vladimir Baranoff-Rossine's (1888-1944) Piano Optophone was held in Moscow [2]. The instrument simultaneously produced sounds, coloured lights, patterns and textures. Numerous other colour organs have been invented since the time of composer Louis-Bertrand Castel's (1688-1757) in 1743 [3].

In 2009 Fred Collopy, Professor and Chair of Information Systems and Professor of Cognitive Science, at Case Western University, USA, made a pertinent point about the problems associated with hearing musical scales and seeing colour. Collopy notes the way in which we receive and make sense of sound and colour are very different [4]. As Collopy remarks in 'Playing (With) Color', aligning sound patterns with colour (whether based on frequency or artistic intuition) may not make for a harmonious colour scale [4]. However, the approach taken here, based on the translation of tone and semi-tone patterns (or whole or half-tone steps applied to colour mixing) will afford an opportunity to align the two disciplines employing a shared system. One of the interesting features of visual music is that it seems to attract attention from both communities of art and science. Figure 1 is a diagram taken from Collopy's paper that illustrates *Three Centuries of Colour Scales* from Isaac Newton in 1704 to Steve Zieverink in 2004.

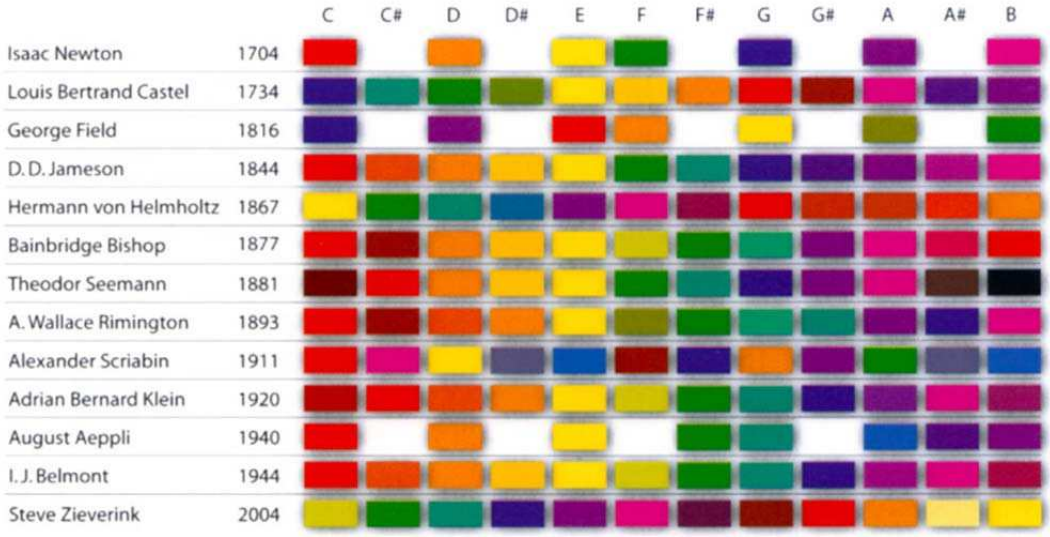

Figure 1: Three centuries of colour scale [4].

Soon after the completion of the earlier Visual Music project Tectonics (2007) came an awareness of the British composers, Gavin Bryars (1948) and Michael Parsons (1938), Chris Hobbs (1950) and John White (1936), and their associations with fine artist Jeffrey Steele (1931). Inspired by Steele and the work of the British Systems Group (1969-1979) Bryars and Parsons began to make musical compositions based on a visual language that finds its origins in geometry and mathematics. Parsons work suggests a logical progression based on the shared theoretical principles common to both systems artists and composers:

> ..because of the difference of medium, there can be no exact equivalence between individual musical and visual works on the material and perceptual level. Sounds are experienced differently from visual forms, and specific analogies are generally misleading. It is on the basis of common theoretical principles and their underlying attitudes that the association between musicians and systems artists has developed [5].

In line with Parsons' recommendations, the interest in the relationship between colour and the musical scale here lies not with the scientific discoveries of Newton, but with the vertical structures of cadences and in the ascending and descending patterns of tones and semi-tones present in the musical scale. The intention here is not to make a light instrument or to map a colour scale in relation to wave frequencies or to employ psychological associations with key signatures. Like *Tectonics* and

Collision, Uncertain Harmonies (or *Fall*), is an analysis of the architectural qualities of the musical score. Here, the tone, semi-tone and chord structures will be translated into colour sequences. The colour scales and cadences will then be used to construct a series of mid to small-scale paintings in oil. Details of this translation will be outlined in a later section on studio practice.

Prior to this commentary, a publication was produced (*Uncertain Harmonies*) in the form of an exhibition catalogue to document this aspect of the research in 2007. The paintings and publication were presented at three UK exhibition venues and as an online [6]. The exhibition toured to the Colour Museum, Bradford, West Yorkshire, (now the Colour Experience, an education resource for children), the University of Leeds International Textiles Archive and Art First, Cork Street, London. The first two venues screened the contents of the exhibition catalogue as a digital presentation in portable document format (PDF). The Art First showing of *Uncertain Harmonies* was in conjunction with the work of Gillian Lever and was entitled *Subliminal Language*. Art First was the only venue to hang the paintings as a gallery exhibition, which provided an opportunity for an audience to view the paintings made in response to shared musical language. Two very different approaches to painting were offered at the exhibition: via process and system in *Uncertain Harmonies*, versus an intuitive painterly response in Lever's *Subliminal Language*.

This relationship between order and instinct are highlighted further in Whittle's commentary on *Uncertain Harmonies* from 2007, '..ethereality and definition, give Laycock's paintings their characteristic feeling of rhythm married to fluidity, their Musicality' [7]. Whittle uses the term musicality to define the collective qualities of the series, the paintings were in part composed using a musical system, a system that is constantly at odds with intuitive art and design practice. The tension that Whittle speaks of can be seen in other contemporary abstract painters such as Alex Harding, consider *Ruinart, II* from 2001 (Figure 2). Although Harding employs grid structures, the grids are not used to place or locate motifs, but instead the grid becomes the motif. Harding pours enamel or gloss paint on to fresh oil paint to make loose linear networks. As the process develops, the grids slide and disintegrate across the oil paint ground. Then, as the physical qualities of the two materials react, the grid structure becomes physically fused establishing a unified paint surface. Harding's handling of colour, paint and process is bold and confident, a quality reflected in the *Uncertain Harmonies* series.

Figure 2: Alex Harding's Ruinart, II (2001), oil on gloss paint on MDF.

The title of the subsequent exhibition based on this paper, *Uncertain Harmonies*, is borrowed from *Ramifications for String Orchestra-Nocturnal Landscapes* (1968-69) by Hungarian composer Gyorgy Ligeti (1923-2006). In a BBC Radio 3 pre-concert broadcast from the summer of 2006, Ligeti spoke about the way the string sections were tuned separately, creating a unique harmonic tension. This variation in tuning established what Ligeti describes as an uncertain harmony. This idea of uncertainty and the way it seemed to reflect this unfulfilled quest for a new visual music, was the driving force behind the concept for this series.

Fall is a word associated with the close of a musical phrase, determined by a sequence of chord progressions known as a cadence. *Fall* refers to the sensation of a falling tone that is the movement from one chord to another. Sadie and Latham define a cadence as a resting point in a melody, '…some momentary, some more strongly defined; these are called *cadences* (after the Latin word meaning "fall"), and there is virtually always a decisive one at the end' [8].

Background

In music, consonance refers to agreement or harmony within a musical composition. For example, a combination of notes that centres music when played simultaneously. Evans introduces the term 'visual consonance' as further example of shared language, in his paper the 'Foundations of Visual Music' [9]. How do we know when something is musically or visually in agreement or harmoniously composed? Consider the following quote by Rudolph Arnheim (1904-2007) who describes compositions as being either '…visually right or wrong!' '…one of the basic visual experiences is that of right and wrong' [10].

Art-and-design education provides an understanding of the formal elements of composition, point, line, plane and volume. This awareness, of the elements of composition and design are what Arnheim describes as '…visual rightness…' [10]. Evans explains visual rightness in terms of the simultaneous interaction of the component parts of composition within a given visual space, '…as objects in a defined space, expressed, as size, shape, colour and texture establishing dynamic relationships as these elements interact' [9]. John Bowers, Professorial Research Fellow at Goldsmiths, University of London, provides the following explanation for visual art in a publication from 1999 entitled *Introduction to Two-Dimensional Design: Understanding Form and Function*:

> '…the arrangement of elements and characteristics within defined area… a grouping of related components that make sense together… balanced by an overall appearance of continuity' [11]

Both Evans and Bowers agree that visual art should include elements or the arrangement of formal objects within a given two-or three-dimensional space. Bowers takes the idea further by saying that the components of a visual composition should '…make sense or work together' [12]. Evans mentions nothing about the success or failure of objects in a harmonious arrangement. Whereas Borrows suggest that for visual art to be successful the notion of visual consonance or harmony is an important factor in the arrangement of these formal elements and motifs.

Could Arnheim's '…visual rightness…' find an equivalent in visual consonance and the visually wrong in dissonance [10]? Evans introduces the concepts: visual tension, visual release, visually wrong to visually right and dissonance to consonance. The aforementioned terms (all with a duel meaning in art and music practice) provide yet further examples of shared language. These words are

in opposition to one another, but at the same time provide an interchangeable vocabulary for both visual and musical composition. The juxtaposition or alignment of words can provide the artist with some meaningful analogies in which to develop composition. Consider for example that, if artists were to agree on a precise shared language for visual music (or a shared theory) then what effect might this have upon the freedom of visual practice? Many of Evan's art-music associations are in fact established visual ideas, for example the notion of visual tension (best considered as changes in visual contrast in the use of light and shade in painting and drawing), have been in place since the Renaissance in the form of Chiaroscuro. Returning to the subject of visual tension, then perhaps here it is possible to make direct association between both types of composition through the use of visual and audible contrast. Moments of interest and energy or moments of tension provide both audible and visual contrast. These points of interest or contrast establish significant moments in composition. Evans likens these moments to musical cadence points and comments that 'With cadences, we can articulate units of time and so develop larger temporal units such as motifs, periods and phrases' [9]. Interestingly and for the first time in the paper 'Foundations of Visual Music', Evans makes a direct reference to the theory of music with the introduction of the musical cadence. In particular he introduces the perfect cadence and hints at a possible equivalent for the visual arts

The 'practice as research' project *Uncertain Harmonies* takes the theory of musical scales and cadences and represents them as colour scales and cadences (or points of visual punctuation) in a series of works on paper. *Uncertain Harmonies* is not a visual response to the aural result of musical notation. Instead, the project focuses on the visual aspect (or architecture) of scales and cadences. With the exception of musical scale and cadence theory, this body of work is in some ways less structured than the *Tectonics* series. The decision-making and formal aspects of composition rely more upon intuition than the application of rigid painting systems.

Scales and cadences

In the précis of Ernest Gombrich's (1909-2001) Epilogue to *The Sense of Order,* under the sub-heading 'The Claims of Music', a significant observation in his understanding of the nature of music can be found, which refers to the '…correspondence or difference between visual or tonal composition' [13]. To understand music beyond the recognition of sound one must understand the rules of music and as Gombrich points out, 'Music can only be discussed in musical terms' [13]. Gombrich makes the analogy with the game of chess and notes that in order to begin the game, the player would need to be acquainted with '…the rules and traditions of the game' [13]. Gombrich writes about our ability to elucidate information from the musical score into sound describing the symbolism of musical notation as '…tonal patterning…' [13]. In simple terms the language of the score, the horizontal patterns of melody and the vertical structures of harmony have to be interpreted by the reader, translated into sound (by the performer) before being received by the listener, (or in the case of this project, interpreted into visual music).

Given an interest in the architecture of the score and not the sound itself, then the association between art and music are best located in what Parson's describes as '…common theoretical principles…' [25]. Therefore, the horizontal and vertical patterns held within the different forms of scales and cadences are also of interest in making a different kind of association between the score and painted surface from those encountered in *Tectonics*. Prior to beginning work on *Tectonics* and *Uncertain Harmonies* there was no plan for a collaboration with either the British composer and broadcaster Michael Berkeley or concertmaster of the Royal Opera House Covent Garden, Peter

Manning. However, it became apparent that a further journey in painting would need to be made before realising the work in light and sound.

Scale structure

Major and minor scales are made up of eight notes (or tones). The eight notes of the scale form what is known as an octave. Musical scales are normally represented on a stave in ascending and descending patterns. The octave can be divided further into twelve equal parts known as semitones. The arrangement of tones and semi-tones in major or minor scale are characterized by their own particular tonal note patterns. The tone and semi-tone sequence of a major scale always follows the same pattern regardless of the scales key signature. For example, in a major scale the tone pattern follows the sequence: tone, tone, semi-tone, tone, tone, tone, semi-tone or in Taylor's shorthand '..(T T S T T T S for short)..' [14]. Minor scales come in two forms either harmonic or melodic. The tone and semi-tone arrangements are different from each other and from those of the major scale. The harmonic minor scale has the following arrangement of tones and semi-tones: semi-tone, tone, tone, semi-tone, tone+semi-tone (augmented tone), semitone (T S T T S T+S, S). The melodic minor scale follows a different arrangement the ascending and descending scale. Ascending melodic minor scale: tone, semi-tone, tone, tone, tone, tone, semi-tone, (T S T T T T S) and descending melodic minor scale: tone, tone, semi tone, tone, tone, semi-tone, tone (T T S T T S T) [15].

What is suggested here is not an audible equivalent in colour, but rather a basic system for colour mixing based on the structure of the written scale. These proposed experiments are not a translation of any particular musical composition, they are however a visual experiment in comparative structure. Can the tone and semi-tone sequences be understood in visual terms? If so, then the arrangements of tones and semi-tones of a major or minor scale may be employed as a template in a seven-point colour scale. Therefore any primary, secondary, tertiary or neutral colour could be used as the first colour of the scale. The scale could be lightened or darkened using the same whole or half tone step sequence of a major or minor scale.

Cadence structure

The intention here is not only to use scale structures in visual composition, but to introduce the four different types of cadence sequences in preparation for a series of works in two-dimensions using oil paint on paper. In the introduction, a brief definition of the function of a cadence in musical composition was provided. However, as any definition given may not be readily accessible to the non-music specialists a more prosaic explanation, provided by the Associated Board of the Royal Schools of Music in 1958, is as follows:

> Music, like language, has its punctuation, its full stops, its semicolons and its commas. These stops are indicated by chords specially selected and arranged to give a logical end to a musical phrase or sentence. These phrase-endings are called cadences [16].

There are four types of cadence regularly employed in musical composition: perfect, imperfect, plagal and the interrupted. Each cadence creates its own particular musical effect. The ability to

translate the numeric structure of a cadence into the visual was evident, but it was not clear what they would look like either as part of an abstract geometric composition or as structures in isolation.

Cadences are made up of the two chords. A chord is composed of three notes stacked vertically in thirds for example, C-E-G, D-F-A or E-G-B. Each chord is identified by a Roman numeral from I to VIII that locates the position of the chord on the scale. A cadence is composed of a pair of chords and a pair of Roman numerals can be used to identify the type of cadential sequence being used. Music educationalists Veronica Jamset, Susan Wynne Roberts and Huw Ellis-Williams provide the following cadence descriptions:

> 'A perfect cadence consists of the progression V-I and has a conclusive effect rather like a full stop…An imperfect cadence ends on chord V and has an inconclusive effect, rather like a comma. There are various choice for the first chord first chord, including I, ii, iib, and IV..A plagal cadence consists of the progression IV-I and has a conclusive effect, although less so than the perfect cadence..An interrupted cadence consists of chord V followed by any chord *except* I (V-vi is a possible choice). It sounds rather as if a perfect cadence has been interrupted by a momentary change in the harmonic direction and is sometimes used before the final perfect cadence…[17].

For *Uncertain Harmonies* the decision was made not to use a choice of chords. When there was an option available, as in the imperfect cadence, I-V was used. Again, with the interrupted cadence a common sequence of V-vi is used.

Jon Thompson: cadence and discord

Before beginning a description of the practice employed for the *Uncertain Harmonies* project, a mention should be made of a recent exhibition by British artist Jon Thompson (1936) entitled *Cadence and Discord*: *Further Paintings from the Toronto Cycle*. The Anthony Reynolds Gallery, London, October 2011, presented the exhibition. Although this exhibition took place four years after *Uncertain Harmonies*, Thompson's work has reinvigorated an interest in colour interactions, which take place when colour scales and cadential sequences are seen in isolation, unlike the paintings which form part of *Uncertain Harmonies*, which, were as part of a multilayer composition. Thompson's paintings employ two vertical stacks of rectangles arranged side-by-side to establish shifts in scale change through his use of basic geometry and colour proportion. It can be proposed that the vertical stacks of vivid coloured rectangles represent the three notes of a chord known in music theory as a triad. From a purely formal perspective the whole composition relies on the careful placement of what appears to be Thompson's own arrangement of colour scales within a rectangular structure. Thompsons formal approach is different from the one about to be described, one based on system, process and chance, through the addition and subtraction of colour scales and cadences in order to achieve a series of complex layered colour interactions. The Reynolds Gallery press release provides a further insight into Thompson's work in relation to his use of colour inspired by works from Giotto di Bondone (1266/7-1337) to Patrick Caulfield (1936-2005) along with his musical analogies made with harmony:

> ..While engaged with the musical analogies, each one of these paintings also draws upon the palette and colour structures of a different artist, ranging from

> Giotto to Gaugin, Caulfield to Cezanne. A further important driving force behind these works is Merleau-Ponty's concept of the vertical being occupying the horizontal landscape... [18].

Particularly inspiring was Thompson's use of colour in *The Tor0nto Cycle 19, Cadence and Discord* (HM) Traer Los Sentidos (Figure 3). The colour palette seems to be in keeping with the work of British painter and printmaker Patrick Caulfield (1936 - 2005).

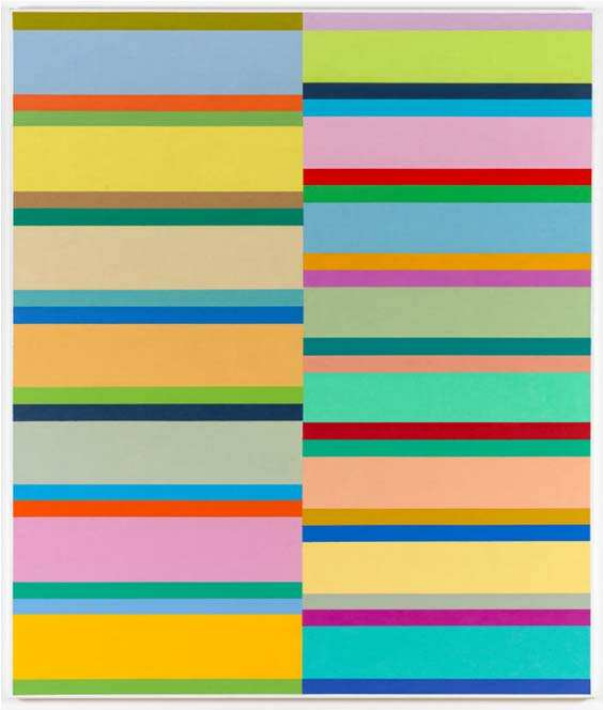

Figure 3: Jon Thompson's The Toronto Cycle no. 19, Cadence and Discord (HM), Traer Los Sentidos (2011), oil on canvas.

Studio practice: twenty-one painted compositions in oil

Originally, seventeen paintings in oil were produced, all of which are illustrated in the *Uncertain Harmonies* catalogue. A further four compositions were completed, also in oil, shortly after the publication of the catalogue and these were made available as postcard images for all three exhibition venues. In terms of composition, each painting contains several colour scales and all of the paintings in the series are tonal in character. Throughout the picture surface, layer upon layer of colour scales and cadences were placed and taken away to create unexpected compositions. Although a system to translate the scale and cadence patterns to the visual was employed, the arrangement of the information on the picture plane was intuitive[1]. Unlike music, where scales and cadential sequences are seen and heard within a linear time frame, the colour patterns here are seen simultaneously and within a two-dimensional framework.

1 I also intend to produce a series of digital prints that illustrate the colour interactions based on the structures of major, minor and the four cadential sequences. This particular aspect of the research did not take place due to time constraints imposed by exhibition and publication deadlines in 2007. However, it is my intention to complete this aspect of my research in visual music beyond the scope of this PhD.

In traditional Western harmony, cadences are used in sequence to create specific harmonic effects at the beginning, middle and end of compositions. At the start of the series, the cadences were positioned in a similar fashion on each of the picture planes. This approach limited the possibilities for composition. Within the context of the *Uncertain Harmonies* series, the definition of a tonal range is based on seven colours derived from any primary, secondary, tertiary or neutral colour becoming either progressively lighter or darker in tonality. For example, in *Uncertain Harmonies, series number 6* (Figure 4), the surface of this painting was worked heavily with geometric tonal ranges of reds, yellows and corresponding earth colours.

Figure 4: Kevin Laycock, Uncertain Harmonies, series number 6 (2006), oil on gesso on paper.

Many attempts were made to establish a multi-layered cadential surface, but for whatever reason it was a struggle to resolve the composition and define the surface structure. Using a vigorous sanding technique the paint surface was taken back to a distressed condition. As a result of the physical action of the sanding process the structure of the paper began to breakdown around its perimeter. The surface had now acquired a quality reminiscent of a decaying Roman wall painting and in the absence of any significant forms, was ready to accept a formal structure. The painting was quickly resolved with the introduction of seven vertical bands of different widths. The bands of cadmium orange were composed, descending in tonal value, which was achieved by the addition of equal quantities of ultramarine blue. The bands were placed in a random order using cadence sequences of Perfect V-I, Plagal IV-I, Imperfect X-V and Interrupted V-VI. The majority of paintings in the *Uncertain Harmonies* series are composed using more than one colour scale operating simultaneously throughout the paint layers.

The final twenty-one paintings can be broadly classified into four distinct groups:

i. Those compositions that include a tonal colour scale of seven vertical or horizontal bands. Some of the vertical colour bands being arranged as colour cadences sequences, for example, *Uncertain Harmonies, series number 3* (Figure 5).

ii. Those compositions that include several simultaneous fragments of colour scales and cadences, for example, *Uncertain Harmonies, series number 14* (Figure 6).

iii. Those compositions that show only one components of the seven point colour scale in the foreground, for example, *Uncertain Harmonies, series number 17* (Figure 7) .

iv. Those compositions that include a colour chord (or triad) that is the first, third and fifth points of the colour scale in a vertical position either in or out of sequence, for example, *Uncertain Harmonies, series number 21* (Figure 8).

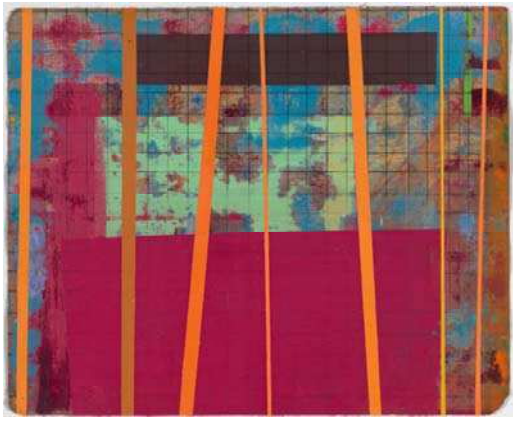

Figure 5 (left): Kevin Laycock, series number 3 (2006), oil on gesso on paper.
Figure 6 (right): Kevin Laycock, series number 14 (2006), oil on gesso on paper.

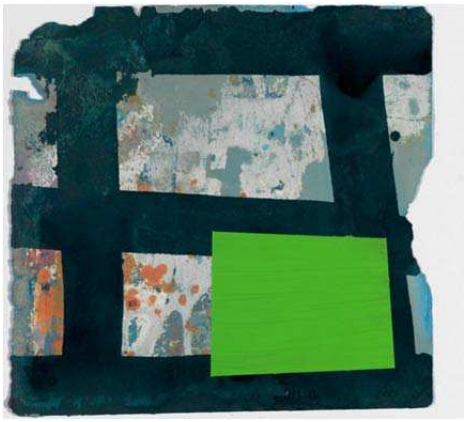

Figure 7 (left): Kevin Laycock, series number 17 (2006), oil on gesso on paper.
Figure 8 (right): Kevin Laycock, series number 21 (2007), oil on gesso on paper.

Summary

The visual effects of the twenty-one painted compositions produce some unpredictable and unexpected colour interactions. For example, the tonal qualities of the scales and effect on subsequent colour cadences are characterised by two factors: Firstly, the quality of the pigment, and secondly the degree of contrast in each of the seven tones of the colour scale. Rather like following a recipe in a cookery book, this colour mixing system enables the painter to prepare colours using the same whole or half tone steps found in major and minor scales. A scientific approach was considered, weighing fixed quantities of titanium white or a complementary colour to lighten or darken a particular colour scale. In science such a measured technique is known as serial dilution; instead a palette knife was used to gauge the proportions of ascending and descending lightness or darkness. Deciding to follow the whole and half tone step sequence proportions (or recipe) inevitably introduced another factor, that of personal critical judgment. On this occasion, the intention was to retain what Hay describes as

'..the old idealist chestnut of the "ineffability" of art...' [19]. The ineffable suggests that which is too great or beautiful to describe. The understanding of the ineffable offered here relates more to the handwriting of the artist/designer and had a more scientific approach been taken, then the colour effect would have been standardised.

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