

Initial Approaches to Idiomatic Contemporary Writing for a Musical Instrument:

Discovering Methods of Practice-Based Research

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Abstract

Using the flute as a case study, this article discusses the approach to writing for an instrument for the first time in a contemporary style. From the viewpoint of a student composer, it acts as a candid account of the issues a student may face in the early stages of contemporary study and practice, giving insight into the diverse approach to research that composers take. Much of the pedagogic literature on the compositional process is written by expert composers with decades of experience, and often does not consider the 'rookie errors' that many student composers incur in their early attempts at idiomatic writing. The article is not, however, a how-to guide for writing for the flute. It simply uses the flute as an example towards a research model for any instrument, discussing the physics behind playing it, the use of extended techniques, and approach to musical material. My short piece for solo flute, *reflection of light is either specular or diffuse* (Kirk, 2016) (Figure 7 in Appendix 1), exemplifies successful idiomatic writing for the instrument.

Keywords

Composition, practice-based research, flute, idiomatic writing, music

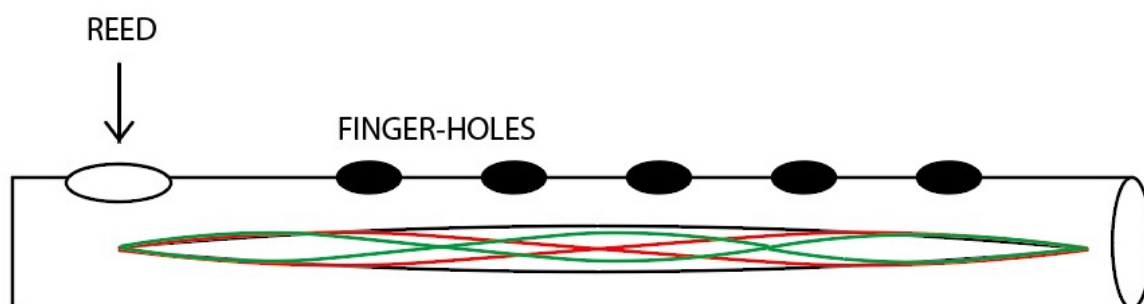
The first step: understanding how the instrument works

When approaching writing for an instrument for the first time, it seems evident that the student composer must at least have some basic understanding of how it works. This will give them integral insight into the instrument's fundamental characteristics, not to mention its limitations. There is a plethora of sources available regarding the physics of musical instruments, many of which take a mathematical approach. However, for a much more 'user-friendly' explanation, a hugely useful source for me was Benade's chapter, 'The Physics of Woodwinds' (1978, pp. 39-43). This text certainly provides a comprehensive overview, with each chapter focusing on a different family of musical instrument. Despite being a little brief when discussing individual instruments in detail, it has proved to be an effective source in understanding the basic physics of each family.

In terms of the flute, the instrument has a cylindrical bore, which is open at one end, and has a 'velocity-controlled air-jet reed' at the other (which is blown through).¹

Figure 1

Author's diagrammatic representation of the physics of the flute



WAVELENGTH OF FUNDAMENTAL

WAVELENGTH OF FIRST HARMONIC (1/2)

WAVELENGTH OF SECOND HARMONIC (1/3)

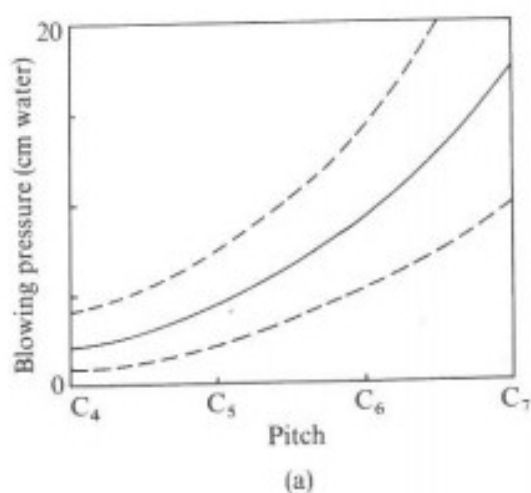
¹ It may seem strange to use the term 'reed' when discussing the flute. However, here I utilise it with the generalised definition that it is a valve that controls the flow of air into a woodwind instrument (Benade, 1978, p. 37).

When the reed is operated by blowing air through the bore (with all finger holes closed down) at a velocity that produces maximum variation in velocity at the reed, the lowest fundamental frequency of vibration occurs: a sound-wave twice the length of the bore (shown in black in Figure 1). It can also vibrate at wavelengths that are integral fractions of the fundamental ($1/2$, $1/3$, $1/4$, etc., shown in colour), producing the harmonic series. To play chromatically, the finger holes come into play. As they are lifted, they reduce the length of the bore, shortening the wavelength of the fundamental and thus raising the pitch. The holes are accurately spaced out in a fashion that allows the full chromatic scale to be played (Benade, 1978, pp. 37–41).

Figure 2 indicates the positive correlation between the increase in blowing pressure and the pitch of the note obtained: as the flautist plays higher, a greater blowing pressure is required to achieve the aforementioned wavelengths that are smaller integral fractions of the fundamental (increase in blowing pressure increases air speed).

Figure 2

Fletcher and Rossing's (1993) diagram demonstrating the positive correlation between blowing pressure and pitch (Fig. 16.28a; p. 462); all measured pressures lie between the broken lines, with the mean represented by the central solid line.



This causes issues for the flautist in terms of the dynamics levels available in each register of the instrument. The increase in blowing pressure moving up the range results in a parallel general increase in dynamic volume, rendering it nigh-on impossible to play a true *ff* in the lowest register of the flute without producing a higher harmonic, or to play a true *pp* in the highest register of the flute without 'losing the note'. Here it is important for the student composer to understand that all dynamic writing is *relative* to the capabilities of the instrument. Thus, they must consider this during the compositional process, prescribing their dynamics markings according to the idiomatic limitations of how the instrument functions.

Approaching extended techniques

Extended techniques are a significant staple of both contemporary composition and performance practice, largely because they explore new sounds worlds and timbres available to instruments. The flute has an especially large number of extended techniques available, so when consulting a book such as Levine and Mitropoulos-Bott's *The Techniques of Flute Playing* (2002)² for the first time, the student composer may be tempted to run amok, using as many different extended techniques as possible in their piece. I was always advised that when approaching an instrument for the first time, it is wise to exercise caution when including extended techniques, exploring a small number with as much understanding as possible. In *reflection of light is either specular or diffuse*, I chose four: flutter-tonguing, 'ch' articulation, residual tones and microtones. Rather than discuss all four at great length, I shall use only flutter-tonguing and microtones as case studies.

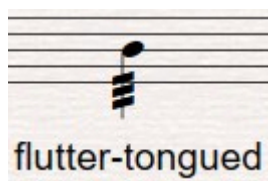
² Levine and Mitropoulos-Bott's (2016) book is one of a series by the publisher Bärenreiter, with each book focusing specifically on a different wind instrument. These books are generally up-to-date accounts of contemporary technique, are comprehensive in their approach and explanation of extended techniques on each instrument, and are friendly to performers and composers alike.

Flutter-tonguing

As a trumpet player, I was familiar with this technique, and the fact that it could be achieved through the rolling of the 'r' using the tongue, or by vibrating the back of the throat. I was also aware that different degrees of 'flutter' could be obtained, from a subtle buzz to a powerful roar, and that it was possible in all ranges of the instrument and at all dynamics (although much easier at louder volumes). According to both Robert Dick's *The Other Flute: A Performance Manual of Contemporary Techniques* (1989, p. 128) and Levine and Mitropoulos-Bott's aforementioned book (2002, p. 12), performing with the flutter-tongue technique on the flute is much the same. However, Dick goes further than his contemporaries to explain that only flutter-tonguing of very low intensity can be applied to unstable multiple-sonorities (such as residual tones), as it further decreases the stability of the sound. As I was also making use of residual tones in *reflection of light is either specular or diffuse*, this was important to bear in mind. With regard to the notation of this technique, both books recommended the notation shown in Figure 3.

Figure 3

Author's example of the recommended notation of the flutter-tongue technique



However, after discussion with my tutor, who advised that the above is also a common way of notating the tremolo or 'timbral trill', I decided to show the technique as in Figure 4, to avoid confusion.³

³ The majority of instrument-specific books discuss the notation of various extended techniques; however, there are some comprehensive books available that show multiple ways of notating the same extended technique, such as Kurt Stone's *Music Notation in the Twentieth Century: A Practical Guidebook* (1980). Discussion with performers and fellow composers should also help to clear up notational issues.

Figure 4

Author's example of the notation used for the flutter-tongue technique in *reflection of light is either specular or diffuse*



Microtones

A great advantage the flute has over most other woodwind instruments is its ability to facilitate the playing of microtones of all kinds, with intervals of even smaller than a sixteenth-tone being possible to play with practised ease (Dick, 1989, p. 52). All sources I consulted on the matter, however, concurred that to achieve microtones with the most accuracy, an open-holed flute is preferable. Levine and Mitropoulos-Bott (2002, p. 64) include a microtonal scale for the open-holed flute in their guide, showing fingerings for the closed-hole flute where possible. Dick takes this a step further, and shows complete fingering charts for both the open- and closed-holed flutes, indicating where the performer can use the lips to change the tuning of the pitch to produce microtones on both models of the instrument. He also helpfully explains that although some microtones in the lower register require the B-footjoint key to be depressed, they can be achieved with only a C-footjoint if the lips are used to flatten the note (1989, p. 52). This is only relevant to one note in *reflection of light is either specular or diffuse* – the low E-three-quarters-flat – where I state in my performance notes what the player is to do in the absence of a B-footjoint. The piece also includes a full fingering chart for the quartertones used in the piece, drawn from Dick's open-hole flute fingering chart (see Figure 6).

It should have become evident through this section that when querying any practical aspect of an instrument, a composer should at least consult more than one source,

otherwise they may run into problems such as those illustrated in the following personal case study.

Regarding the use of microtones for the bass clarinet, Henri Bok states the following: 'in Table 5 we indicate a series of fingerings that permit the production of microtones ... It should be remembered that it is possible to obtain microtones by modifying the pressure of the lips' (2011, p. 33). Upon reading this, the unsuspecting student composer may go on to write a piece for bass clarinet that makes use of a plethora of microtones, assuming that so long as these fingerings are adhered to, anything is possible. They would soon find out that they are completely wrong. Harry Sparnaay's candid explanation of microtones on the bass clarinet sheds far more detail on the matter: 'For the bass clarinet there are major difficulties to be overcome when producing quartertones. The instrument is not really designed for it' (2012, p. 123). He goes on to explain that the lower register is especially difficult for the production of microtones, and that faster playing incorporating microtones is nigh-on impossible to achieve accurately (pp. 124–125). Thus, the ill-informed piece written by the student composer, however sophisticated it may be, is largely rendered defunct. Bok and Sparnaay, however, concur that the fingerings shown on their respective charts largely vary according to the performer, reed and instrument on which the microtones are being played (Bok, 2011, p. 33; Sparnaay, 2012, p. 128). It is paramount here for the student composer to understand that the best source of advice for any practical query regarding any instrument is *a player of that instrument* – preferably the one who will be performing their composition! Much of the literature written specifically about an instrument is from the perspective of a single player, usually a virtuoso, and does not ring true for all of their contemporaries. My ports of call for *reflection of light is either specular or diffuse* were one of my fellow undergraduate students of particular talent, and my sister, who is also a proficient flautist.

Approach to material

The detailed analysis attached to the work largely explains this section. However, here I will cover how this related to my studies and influences at the time of writing the piece, and other works that influenced its compositional process.

In my composition classes and seminars, we were studying methods of writing that involved modal scales, various forms of serialism, and composer-invented scales, and were encouraged to make use of these methods of writing in our portfolio assignments. As the analysis of *reflection of light is either specular or diffuse* suggests, I invented a scale of my own that incorporated microtones, and applied serial techniques to it to generate the pitch material of the piece. These same serial techniques were also applied to the organisation of meter and impulse-subdivision for each bar, a tip-of-the-hat towards integral serialism.⁴

With regard to approaching any instrument, pieces of essential analysis include not only contemporary works, but also traditional pieces, allowing the student composer to gain a grasp of how the instrument sounds in all registers, speeds and timbres. For the flute, we were encouraged to listen to the tonal, linear writing of J.S. Bach's Flute Sonatas (1963), leading on to the chromatic writing of the late romantics in Debussy's *Syrinx* (1927) and Poulenc's *Sonata for Flute and Piano* (1958). It was through these works that I came to concur with Adler's description of the characteristics of the flute in *The Study of Orchestration* (2002): a weak but luscious low register; a pure mid-register with little carrying power; a clear and brilliant upper register; and a potentially shrill extreme upper register (pp. 181–184). This inspired me to pair each of my chosen extended techniques with a different register: the

⁴ By 'integral serialism', I refer to a method of serialism pioneered by the likes of Stockhausen and Boulez that applied 'rows' not only to pitch, but to all aspects of the music including pitch, rhythm, dynamics, register and instrumentation. For a guide to traditional serial technique, Richard Smith Brindle's *Serial Composition* (1966) proves to be highly comprehensive and chronological, including a set of cumulative composition exercises that relate to each chapter.

flutter-tongue with the upper register in order to emphasise its aggressive nature; the 'ch' articulation with the mid-register to provide a strong form of articulation, perhaps leading to a greater carrying power; and the residual tone with the lower register, as both have weak, subtle qualities. In terms of modern works, we studied the writing of Boulez in *Sonatine* (1946), which includes large, angular leaps between the different ranges of the flute, moving on to Berio's ground-breaking exploration of extended techniques for the flute in his *Sequenza I* (1958), and Ferneyhough's extremely complex percussive writing in *Cassandra's Dream Song* (1970).⁵

Conclusion

The 'moral' here seems to be that practice via *consultation* is of the utmost importance in the development of any composer in both a practical and an aesthetic sense. Approaching literature for advice is useful; however, the consultation of performers and fellow composers is of vital importance, often proving more informative than any form of text. This is not as a means to copy the ideas of others, but to improve and influence individual compositional practice towards a strong personal aesthetic. It also seems clear that the student composer should not 'dive in' by studying the most modern piece possible for an instrument in their preliminary research, but should build up through a chronological range of traditional repertoire towards effective contemporary study.

⁵ It is worth noting here that Ferneyhough learnt to play the flute during the writing of *Cassandra's Dream Song*, and is able to play each of the six sections of the piece separately (Ferneyhough, 1995, pp. 207–271), an immersive sentiment above and beyond the practice of most composers!

Appendix 1

Reflection of light is either specular or diffuse

Joel Kirk (2017)

Solo C-Flute

c. 2mins

Performance Notes

When light reflects off the surface of an object, two types of reflection can be achieved: *specular*, where the image is retained in a mirror-like manner; and *diffuse*, where the image is either lost or distorted. The nature of the reflection is determined by the nature of the reflective interface.

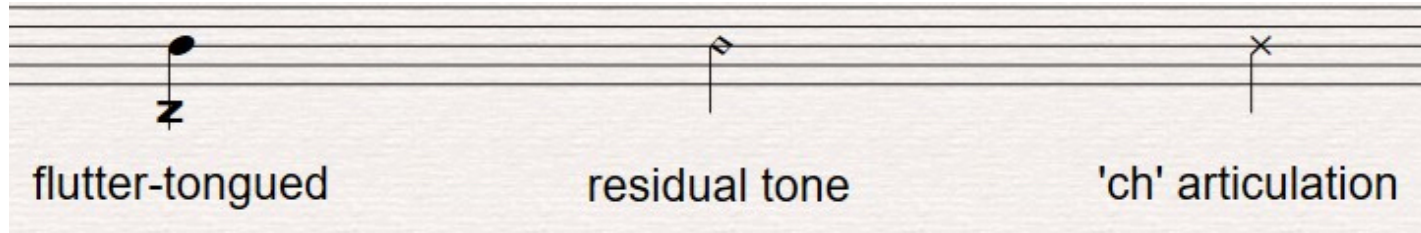
This piece for solo C-Flute is saturated in structural palindromes, reflections and symmetries in both partial and complete forms, exact and distorted. Thus, the musical material develops through the piece via symmetry and palindromes in both specular and diffuse forms in order to emulate the reflection of 'light' (the resultant musical material) from various 'reflective interfaces' (the original musical material).

The title is drawn from the introduction of John Lekner's *Theory of Reflection, of Electromagnetic and Particle Waves* (2016), although the piece takes his theories no further than this basic scientific concept (this would require a greater knowledge of wave physics than I possess).

Notations

Figure 5

Examples showing the notation of extended techniques in *reflection of light is either specular or diffuse*



Fingerings

Figure 6

Fingering chart for quartertones used in *reflection of light is either specular or diffuse*

The image displays a musical staff with a treble clef and a series of ten quartertone notes. The notes are: B-flat, C-sharp, D-flat, E-sharp, F-flat, G-sharp, A-flat, B-sharp, C-flat, and D-sharp. Below the staff, a fingering chart shows the fingerings for each note. Each fingering is represented by a vertical column of circles (fingers 1-5) and a footjoint symbol (a semi-circle with a vertical line). The circles are filled (black) for fingers used and empty (white) for fingers not used. The footjoint symbol is filled for notes requiring a B-footjoint and empty for notes requiring a C-footjoint.

Note	Finger 1	Finger 2	Finger 3	Finger 4	Finger 5	Footjoint
B-flat	●	●	●	○	○	●
C-sharp	●	●	○	○	○	○
D-flat	●	●	○	○	○	●
E-sharp	●	●	○	○	○	○
F-flat	●	●	○	○	○	●
G-sharp	●	●	○	○	○	○
A-flat	●	●	○	○	○	●
B-sharp	●	●	○	○	○	○
C-flat	●	●	○	○	○	●
D-sharp	●	●	○	○	○	○

Fingerings retrieved from Robert Dick's *The Other Flute: A Performance Manual of Contemporary Techniques* (1989). For further information, see Dick (1975), or Levine and Mitropoulos-Bott (2002). *Notes requiring a B-footjoint can be played on a C-footjoint flute; however, they will be sharp and must be 'lipped down' accordingly.

Figure 7

reflection of light is either specular or diffuse

C-Flute (requires B-Foot) reflection of light is either specular or diffuse Joel Kirk

$\text{♩} = 78$
explosive
lyrical
agitated
aggressive
sweetly
nimble

poco f mf sfz f mf mp

breathe where necessary throughout
 see performance notes for suggested microtone fingerings
 flutter-tongue

8 poco rall. poco accel. $\text{♩} = 65$

rougher mf *with some aggression* *gracefully* *residual tone; allow upper partials to occur indeterminately* *regaining consciousness*
transition to residual tone *hollow* *transition to ordinary tone*
slowly dying away... pp

$\text{♩} = 71.5$
 ($\text{♩} = 143$)

14 *lyrical* *sweetly* *flurried* *gracefully* *bold*
 mf *subito p* mf

20 *flurried* *agitated* poco rall. *lyrical* *aggressive*
 f subito ff *maintain intensity to finish...* fff

Appendix 2

reflection of light is either specular or diffuse: Analysis

It may seem rather excessive to provide a full detailed analysis of a piece with the performance notes; however, I was advised that in relation to the context of the music, it would greatly enhance the performer's understanding of the piece, thus enabling a more convincing performance.

- **Rhythmic structure (Figure 8):**

- Bars 1–12 make use of a randomly ordered series of the numbers 1–12 to determine the time signatures for each bar ($n/8$).
- This same series (in its seventh permutation) is then used to determine the number of notes in each bar (not including grace-notes), creating a palindromic effect between the time signatures and the number of notes in each respective bar.
- Bars 13–24 are derived from bars 1–12 in retrograde (i.e. bar 13 relates to bar 12, 14 to bar 11, etc.). This is done by swapping the digits in the tuplets (e.g. bar 11 contains 9 quavers in the time of 11, so its related bar (bar 14) contains 11 quavers in the time of 9).

NB. Some bars threw up issues as either they did not contain a tuplet (e.g. bar 1), or the number of notes in the bar did not relate to the tuplet (e.g. bar 4). To overcome this, I came up with 'theoretical tuplets', which allowed me to work out the rhythms of their related bars.

- This rhythmic structure orders the 24 bars of the piece into six sets of four (ordered into columns in Figure 8), which are in some way derived from one another. To allow the pitch structure to follow this same derivation pattern, I added grace-notes to certain bars so that every bar in each set contained the same number of notes (e.g. all bars in Set 1 contain 12 notes, Set 2 = 11 notes, etc.). The grace-notes in each individual bar are arranged symmetrically.

- **Pitch structure (Figures 9 and 10):**
 - 9a(i) highlights the 12-note scale used to organise the pitch structure. Notes 7–12 are intervallically symmetrical to (and superimposable over) notes 1–6.
 - 9a(ii) shows how the scale is used in the piece. In bars 1–12, only notes 1–6 of the scale are used. In bars 13–24, notes 7–12 take over. In each case, the six notes are numbered and arranged into a series using the same series as the rhythmic organisation (in its original permutation both times).
 - 9a(iii) indicates how these series are treated. The example I will use is bar 1:

In bar 1, there are 12 notes. Therefore, according to 2a(iii), we start at the note labelled ‘1’ in the series (D). We then move through the series forwards from this point (going back to the start when necessary) until we have the 12 notes of the bar. This process is repeated for each of the first 12 bars of the piece.
 - Figure 9b maps the registrational change over the course of the piece (directly symmetrical between bars 1–12 and 13–24). I devised this by choosing my starting and ending pitches, then mapping the bar numbers 1–12 out

equidistant from each other and drawing lines between the starting and ending pitches. I then pinpointed the pitches where the bar-lines and pitch-lines met.

- Figure 10 shows how bars 13–24 are derived from bars 1–12 (again, in retrograde fashion). The example I will use is bar 1 in relation to bar 24:

The last note of bar 1 (note '4' in the series; F#) is taken and used as the first note in bar 24, however as its equivalent note in the series for bars 13–24 (C#). We then move backwards through the series until we have the number of notes required for bar 24 (six). So, technically, bar 24 can be regarded as a rhythmically augmented, transposed retrograde of the last six notes of bar 1 (with added grace-notes). This process is repeated between all corresponding bars of the piece (shown in Figure 2c).

- The grace-notes are added via a filtration system from the 'primary bars' in each set.⁶ The example I will use is bar 1 related to bar 24:

Including grace-notes, bar 24 contains 12 notes. The pitch of each grace-note is determined by the note in bar 1 in its equivalent position in the bar. For example, the first note of bar 24 is a grace-note. Therefore, it takes the pitch of the first note of bar 1 (D). The third note of bar 24 is also a grace-note, so takes the pitch of the third note of bar 1 (E□).

This filtration process of pitches from the 'primary bars' is used throughout the piece to determine the pitch of each grace-note.

⁶ The 'primary bars' are highlighted in yellow in Figure 10, and are the bars in each set which contain the greatest number of notes. In the cases where two bars contain this number of notes, the earliest occurring bar takes precedence (e.g. in set 1, bar 1 takes precedence over bar 13 as they both contain 12 notes).

- **Extra notes**

- The tempi are chosen so that bars 1–12 and 13–24 each last exactly one minute (if played exactly metronomically).
- In terms of register, dynamics and performance directions, the piece is not arranged systematically (so as not to make it too autonomous). I made the choices for these according to my own realisation of the piece (within the parameters of my structural materials).
- Occasionally, the pitch-ranges specified by Figure 2b are not adhered to, so as to achieve a more effective musical result.

Figure 8

Rhythmic structure of reflection of light is either specular or diffuse

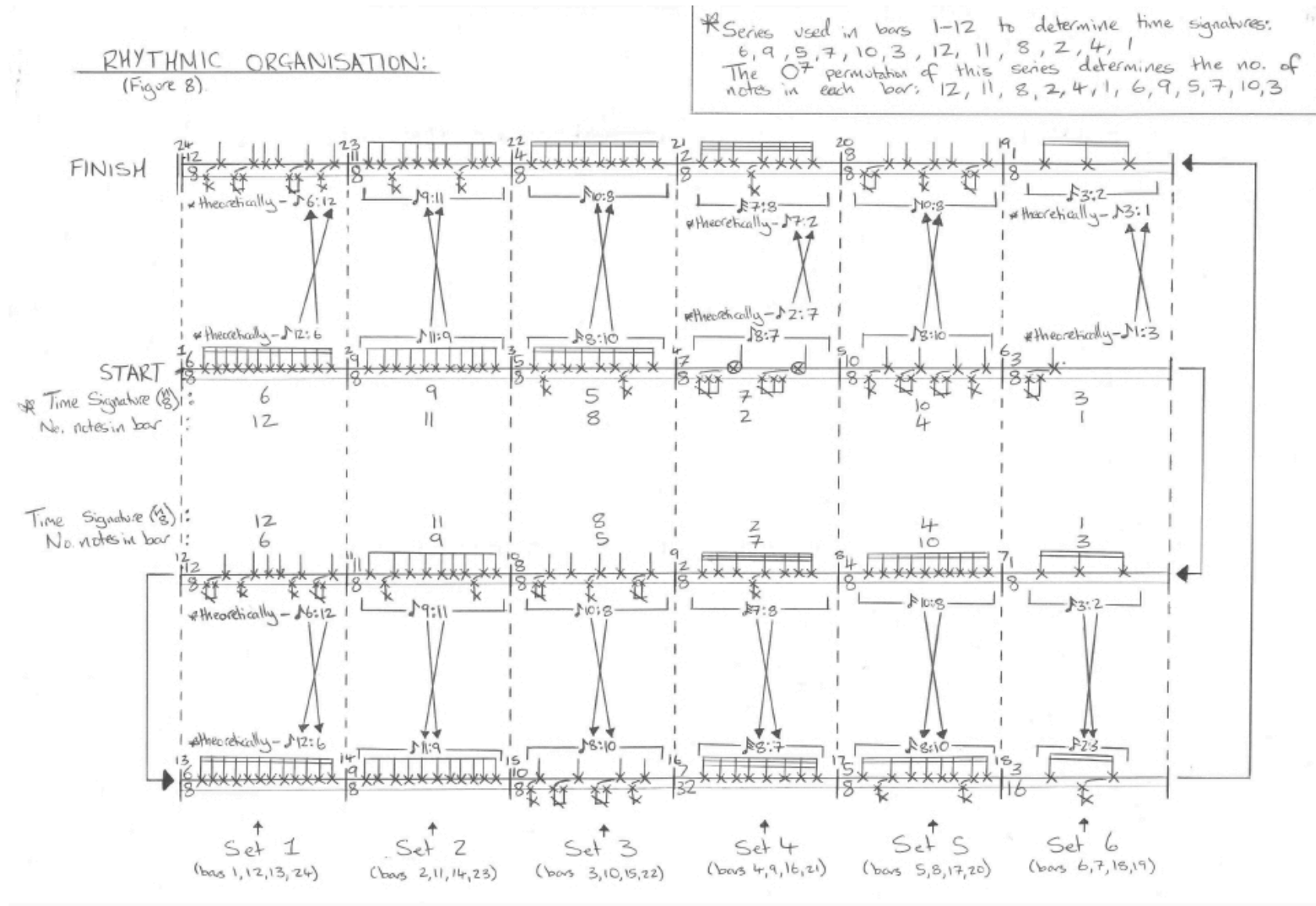


Figure 9

Constituents of pitch organisation in *reflection of light* is either specular or diffuse

Figure 9a: Pitch Organisation.

i) **Bars 1-12:** **Bars 13-24:**

ii) **Bars 1-12:** **Bars 13-24:**

iii)

No. notes in bar.	Starting position in series.
12	1
11	2
10	3
9	4
8	5
7	6
6	7
5	8
4	9
3	10
2	11
1	12

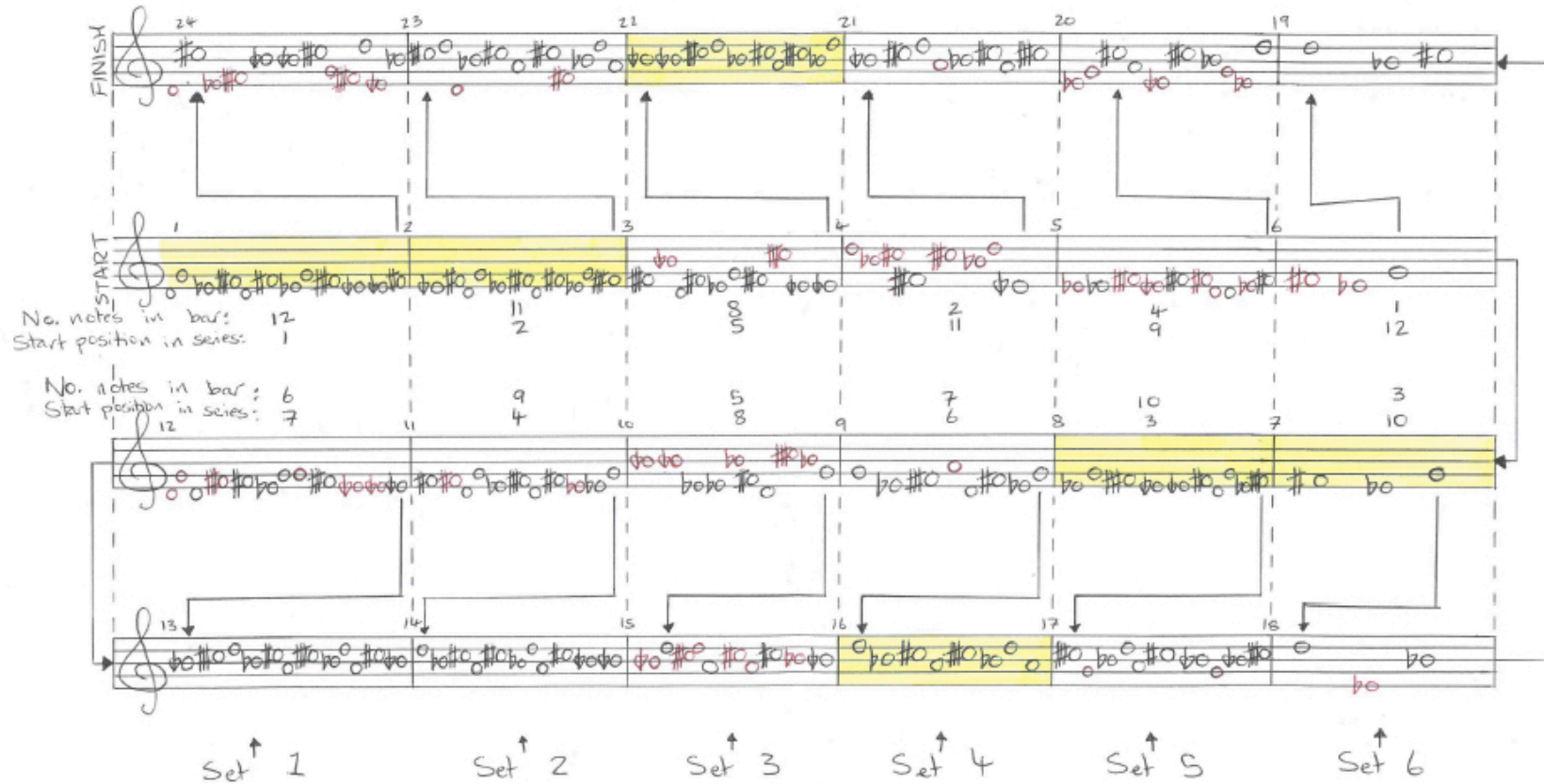
Figure 9b: Pitch Organisation.

Figure 10

Pitch structure of reflection of light is either specular or diffuse

Figure 10: PITCH ORGANISATION

= primary bar of each set (grace notes are filtered from these).
o = grace note. o = ordinary note.



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