From 'Number and Geometry in Shakespeare's Macbeth,' Floris Press, 2001

Number and Geometry in Shakespeare's Macbeth

By Sylvia Eckersley

Overview

At the time of the Renaissance Neo-Platonic ideas, first put forward in Italy, became widespread in Europe. The works of men such as Pico della Mirandola, Francesco Giorgi and Alberti, had a strong influence on the architects of the time who composed their buildings according to numerical and musical harmonies. The major poets were likewise influenced, though less openly. The list of those in whose works a number-structure has been discerned later includes Dante, Spenser, Milton, Chapman and Donne, as well as many others. It also includes Shakespeare, whose early poem: 'Venus and Adonis' has been analysed by Professor Alastair Fowler.[1]

However, no study of Shakespeare's plays from the number aspect seems to have been published so far, although Professor Fowler clearly recognises Shakespeare as one of the greatest numerologist of all. Whereas much numerology is simply a matter of 'decorum', in Venus and Adonis, Professor Fowler claims, an awareness of the number-structure is essential to a full appreciation of the meaning.

Here a more far-reaching claim will be made: that an awareness of the number-structure of a Shakespeare play is essential to a full appreciation of its plot. Admittedly, this sounds both arrogant and preposterous. How can there be number-structure in plays written at high speed by an actor-poet? They are too copious, too spontaneous and free - and they have no stanzas or regular paragraphs. Are we to suppose that Shakespeare counted lines ?

This is indeed unthinkable - at least in any ordinary use of the word 'count' - though in fact the plays do have a kind of subterranean stanzaic structure. As scientists, however, we should establish the phenomena first, and afterwards try to explain them; and the phenomena are there, in at least nine of Shakespeare's plays,[2] for anyone to observe who cares to.

Everything I claim rests essentially on one happy moment of serendipity, though this followed many years of questioning and research chiefly related to scene symmetry. The story is briefly told. Sometime in the early 1950's I was asked to take a class of school children in English Literature for one term and the book chosen was Shakespeare's 'Macbeth'. While rereading the Banqueting Scene, which we proposed to act, I was struck by two lines near the beginning of the scene (Act III Sc. 4). The lords have just arrived and have been welcomed by Macbeth and more indirectly by Lady Macbeth, who is evidently sitting a little apart, on a throne or grand chair (i.e. not at the table). Macbeth says:

1190 *Macb*. Our selfe will mingle with Society,
1191 And play the humble Host:
1192 Our Hostesse keepes her State, but in best time
1193 We will require her welcome.

Lady Macbeth replies:

1194 *La*. Pronounce it for me Sir, to all our Friends,
1195 For my heart speakes, they are welcome.

At this moment the First Murderer comes in, presumably at a side door, and is not instantly observed by Macbeth. The Lords must now be bowing and smiling towards the Queen; Macbeth says:

1196 *Macb*. See they encounter thee with their harts thanks

Then he turns towards the table, where the Lords have just sat down, and continues:

1197 Both sides are euen: heere Ile sit i'th' mid'st,

As I had been recently studying Shakespeare's scene symmetry, which a number of scholars admit, I was struck by these two lines. They had very much the quality of a centre but, on further investigation, they were found to be nowhere near the centre of this scene; they were nearer the beginning. It struck me then that they could not be far away from the centre of the whole play; it certainly seemed like this in my edition. But if so, was it intentional? There seemed to be no way of finding an answer to this question because every editor has his own ideas about lineation, and even regarding which passages are corrupt and maybe should be cut out altogether. There seemed to be very little I could do to ascertain whether those striking lines were intended by their author to mark the very centre of the play. It did not occur to me to look in the First Folio because of the reputation of that book as a carelessly edited volume and one certainly not to be relied upon. It was not until many years later, when I happened to be working in a public library in Essex, that I observed a handsome volume bound in greenish grey: a facsimile of Shakespeare's First Folio edited by the American scholar Charlton Hinman.[3] Idly I lifted it out and observed that it was numbered, not in terms of scenes, as usual, but in terms of whole plays. Every printed line counted as 'one' and this included all stage directions. It occurred to me to see where, on this system, those two central-sounding lines in Macbeth actually fell. So I counted the lines taken up by stage directions and subtracted them from the grand total. This calculation came to 2392 lines. Then I looked for the position of the two lines:

1196 *Macb*. See they encounter thee with their harts thanks

1197 Both sides are euen: heere Ile sit i'th' mid'st,

These fell at lines 1196 and 1197. In a play totalling 2392 (not counting stage directions) 2392 divided by 2 equals 1196, therefore, by this method of counting they fell at the exact centre of the play! It took a little while to grasp the full significance of this; it was either coincidental or a 'one-off' and some kind of joke in this particular play; or it had implications for the printing of the First Folio which were quite extraordinary.

Before looking more closely at the text of 'Macbeth' I located, with the help of Charlton Hinman's numbering system, the mathematical centre of three more plays: 'Julius Caesar', which directly precedes 'Macbeth' in the Tragedy section of the First Folio, 'A Midsummer Night's Dream' and 'The Merchant of Venice', both of which come in the first or Comedy section. The centre of Julius Caesar (Play-lines 1312 & 1313) falls around the middle of Act III Scene 1, shortly after Caesar has been murdered. The play-centre falls just after the re-entry of Mark Anthony:

Enter Antony

Bru. But heere comes Antony:
Welcome Mark Antony.
Ant. (*gazing at the body of Caesar*)

Ant. O mighty Caesar! Dost thou lye so lowe?
Play Centre 1312 Are all thy Conquests, Glories, Triumphes, Spoiles,
1313 Shrunke to this little Measure? Fare thee well.
I know not Gentlemen what you intend,
Who else must be let blood, who else is ranke:
If I my selfe, there is no houre so fit
As Caesars deaths houre; nor no Instrument
Of halfe that worth, as those your Swords; made rich
With the most Noble blood of all this World.

The Play-centre of 'The Merchant of Venice' comes early in Act III shortly after Bassanio has arrived in Belmont and shortly after a brief conversation with Portia in which she tries to persuade him to stay a little while before coming to the caskets to make his choice. The central passage begins:

Bass. Let me choose,
For as I am, I liue vpon the racke.
Por. Vpon the racke Bassanio, then confesse
What treason there is mingled with your loue.
Bass. None but that vglie treason of mistrust.
Which makes me feare the enioying of my loue:
There may as well be amitie and life,
'Tweene snow and fire, as treason and my loue.
Por. I, but I feare you speake vpon the racke,
Where men enforced doth speake any thing.
Play Centre 1331 *Bass*. Promise me life, and ile confesse the truth.
1332 *Por*. Well then, confesse and liue.
Bass. Confesse and loue
Had beene the verie sum of my confession:
O happie torment, when my torturer
Doth teach me answers for deliuerance:
But let me to my fortune and the caskets.

The lines at the very centre of 'The Merchant of Venice' are lines 1331 and 1332.

The total count of play-lines for 'A Midsummer Night's Dream' is 2138[4] and at the centre of the play, in Act III Sc. 2 (lines 1069 and 1070), we are brought to the moment when Demetrius finally gives up his vain chase of Hermia.

Her. A priuiledge, neuer to see me more;
And from thy hated presence part I: see me no more
Whether he be dead or no. *Exit.*
Dem. There is no following her in this fierce vaine,
Here therefore for a while I will remaine.
So sorrowes heauinesse doth heauier grow:
Play Centre 1069 For debt that bankrout slip doth sorrow owe,
1070 Which now in some slight measure it will pay,
If for his tender here I make some stay. *Lie downe.*

What do we find when we compare the central lines of these various plays and relate them to the central lines of Macbeth? We straight away notice that the word 'measure' appears both in Julius Caesar and in 'A Midsummer Night's Dream' also just after the play-centre of 'Macbeth', Macbeth says:

1198 ... anon wee'l drinke a Measure
1199 The Table round. There's blood vpon thy face.

That is just after he has seen Banquo's murderer at the door. Mark Anthony, gazing at Caesar's murdered body, says:

1311 *Ant.* O mighty *Caesar*! Dost thou lye so lowe?
Play Centre { 1312 Are all thy Conquests, Glories, Triumphes, Spoiles,
1313 Shrunke to this little Measure? Fare thee well.

This word 'measure' does not occur close to the centre of 'The Merchant of Venice', but there is another word indicating quantity, the word 'sum':

1133 *Bass.* Confesse and loue
1134 Had beene the verie sum of my confession:

Again, we have the indication of an exact amount!

We observe that in two of the centres we have looked at there is a prostrate body: the dead body of Caesar, covered with a bloody cloak, and the nearly asleep one of Demetrius who has collapsed on the ground in despair. In the other two plays there is the thought of a prostrate body; in 'Macbeth' the murderer appears at the door of the banqueting hall just before the two central lines and immediately we are aware of what he has just done, that is murdered Banquo and left him lying 'With twenty trenched gashes on his head', (scene-line 30, Act III Sc.4). In The Merchant of Venice the talk between Bassanio and Portia has just been of the 'rack', that instrument of torture where the victim lies down and is pulled apart to the point of agony.

We could say that at every play-centre encountered so far there is either a physically present prostrate body or the thought of such a body. At three play-centres, 'The Merchant of Venice', 'A Midsummer Night's Dream' and 'Julius Caesar' there is suffering: Bassanio's agonising uncertainty, Demetrius' weary despair, Mark Anthony's controlled sorrow and rage. Only at the centre of Macbeth is there no such obvious suffering but instead a false joviality. Yet behind this mask and surfacing from his earlier words, 'O full of scorpions is my mind dear wife', we recognise his true inner state.

Although the sample was a small one, after considering these other play-centres I was left with a strong impression that although none was as explicit as the centre of 'Macbeth', they had certain properties in common, recognisable by anyone looking out for them. I felt reassured that the 'Macbeth' centre was not a coincidence or a 'one-off'.

The next step was to look at the pages that preface the thirty-six printed plays in the First Folio. These early pages include poems by Ben Jonson and others; the rather strange Droeshout engraving of the poet's face and upper body; the dedication to the Pembroke brothers; the Address to the Great Variety of Readers; the catalogue of the plays included in the book divided neatly into Comedies, Histories and Tragedies and finally the list of principal actors in Shakespeare's plays. Was there any hint to be found here that this book was something more than it appeared to be?

Indeed there was and when I found it in the Address to the Great Variety of Readers it spoke so loudly and clearly that it felt more like a statement than a hint. This address which is clearly meant to be read by whoever stands in a book shop, browsing and hesitating, first exhorts the reader to buy the book and then goes on to regret that the author himself was not able to edit it. Finally it pleads that the actual editors - John Heminge and Henry Condell - have spent much time in that task (in fact seven years altogether) and then makes the remarkable claim:

> ...as where (before) you were abus'd with diverse
> stolne, and surreptitious copies, maimed, and deformed by the frauds
> and stealthes of iniurious impostors, that expos'd them: even those,
> and now offer'd to your view cur'd, and perfect in their limbes; and all
> the rest, absolute in their numbers, as he conceived the'.

This short passage, I discovered later, is taken by scholars to mean that the metre in the printed plays is now correct, but I think that a seven year old might understand it better! Numbers here mean numbers in its commonest sense and the opening words of this address might warn us that a certain childish simplicity is required. 'From the most able to him that can but spell there you are numbered'. It might well have been written, 'From the most able to him that can but <u>count</u> there you are numbered'. These words are in fact an invitation to the reader to examine the numerical setting out of the text.

It is of course true that to count 'one' for each printed line of speech, regardless of how many words or syllables this contains, makes no obvious sense in relation to our understanding of prosody. It does not teach us where a whole pentameter should be regarded as complete, nor how long we should pause between two half-pentameters printed on separate lines; above all it does not teach us how we should regard prose, where the length of a printed line seems to be more or less arbitrary and unconnected with rhythm. One can only suppose that this primitive method of giving each line the numerical value of 'one' provides us with the 'answers' we need, like the answers in the back of an arithmetic text book, though not as yet the logical steps by which these answers are reached! For prose passages I had simply to accept a rule of thumb: 'each line of printed prose must be treated exactly like a line of printed verse'. Later I will discuss the problem of prose at more length and show how the counting of prose-lines in the First Folio can, after all, make perfect sense.

Earlier studies of scene-symmetry in 'Macbeth' - together with a certain faith in the original text and the literal precision of metaphor - had already led me to suspect the presence of a new plot working like a strong undercurrent within the play. The question to be pursued now was this: would an accurate mapping of the structure of this play, from the point of view of its number structure, substantiate this alternative plot?

'Macbeth', a relatively short play, presents many problems to scholars. Some regard it as so compact and well-built that it could scarcely have been altered. Others believe that Scene 2, Act I is almost certainly interpolated or mutilated, and that the Hecate scenes are likewise not original. Traces of a fuller treatment of the Cawdor story are suspected, and the extraordinary length of Scene 3, Act IV, is felt to be out of scale with the rest.

Carelessness, cutting, re-writing are easily suspected; yet the exact position of the central lines suggest that the Folio text may after all be undamaged. We allow ourselves, after all, to regard the oddities as intentional, and just because they are peculiar, to take them seriously as hints or clues. In fact the structure

of the play does confirm the new plot (or rather the original and implied plot, buried with deliberation and good reason); but on the way it leads us into an entirely new country, of which we will speak first.

My first attempt at gaining a sense of the structure of the play proceeded as follows. The play was mapped on graph-paper, with the scale, 1 Folio line : 1/10 inch. The map showed, in continuous linear form, the simple features of the text: act divisions, scene divisions, exits, entrances, passages of prose and (later) songs. A similar map, not quite so accurate, might have been made from a copy of the Folio text, with the double columns divided into single ones and these laid end to end. The effect of the map was to display to the eye proportions which are usually experienced in time by the ear. But since our visual sense today is so strong, it showed many things in a striking way which had not previously been recognised (i.e. by this writer).

The centre of the play was also marked, and later the centres of all Scenes and Acts (though I was not yet sure about the structure of Acts).[5] This led to a natural use of the geometrical compass. With its point at scene or act centre, mirrored passages might be conveniently linked by arcs of a circle, thus:

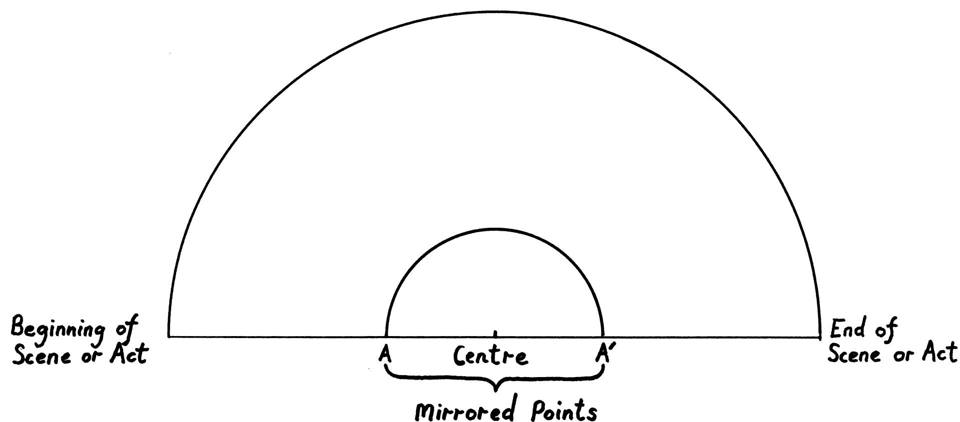

Fig. I

In this way, time was expressed by a straight line and relationships by curved lines. The idea, however, of reversing this seemed at once more in tune with tradition and with experience. The heavenly bodies, from which our sense of time is derived, move in curves: so I let the time stream of the play be curved, and the relationship between mirrored passages be straight.

At once the question arose: in what manner of curve should the time-stream flow? The question was simultaneously logical, geometrical and aesthetic. The curve must be continuous; a three-fold symmetry must appear, qualitatively different for play, act and scene. The numbers of the play gave me enough information to construct such a figure with exactness.

I was looking in fact for a geometrical form, something like a circle, but not just a circle; something like a spiral, but with its end coinciding with the beginning. The essential hint was found in Act I of 'Macbeth'. This act contains seven scenes whose sum is 540, or 6 x 90 lines. In linear form the act looks like this:

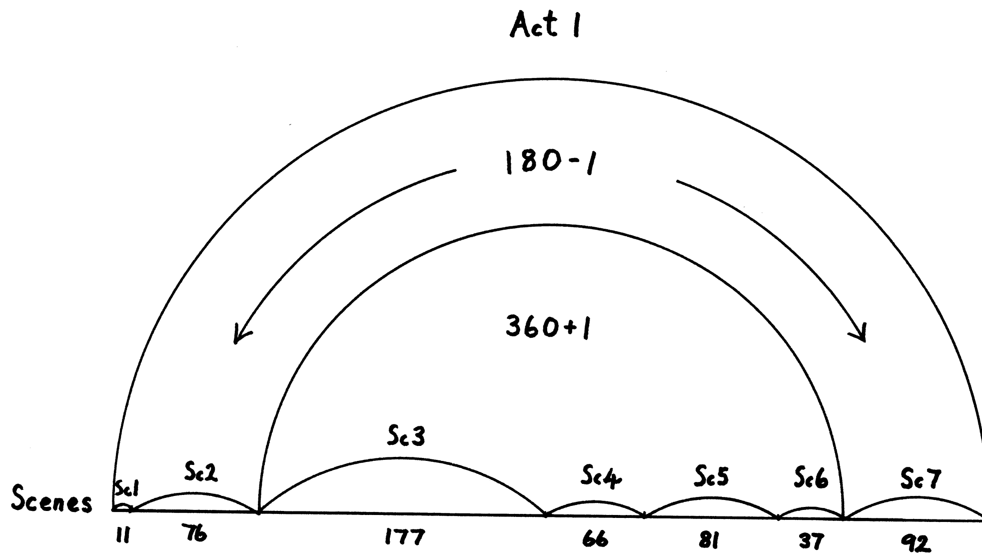

Fig. 2

It may be observed that Scenes 1 and 2 are roughly balanced by Scene 7; and that Scene 3 (the long scene on the Heath) is roughly balanced by Scenes 4, 5 and 6. The centre falls near the beginning of Scene 4.

It may also be observed that the sum of the four 'inner' scenes is (360 + 1) lines, and the sum of the three 'outer' scenes (180 - 1) lines.[6] These numbers at once suggested the degrees of a circle. The curve implied here must be:

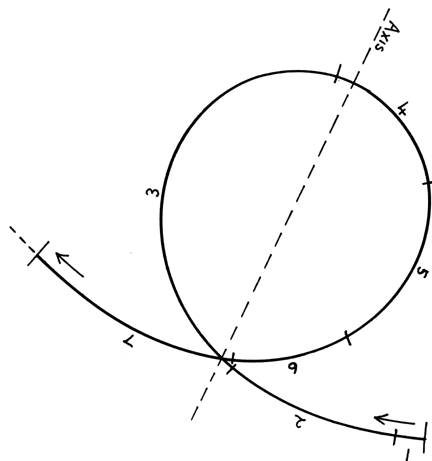

Fig. 3

Aesthetically, all acts must have the same basic form. The 'wings' may differ in length from act to act, but the central circle must surely be the same. I had to imagine five such loops, dancing in a ring and then taking hands. Like this:

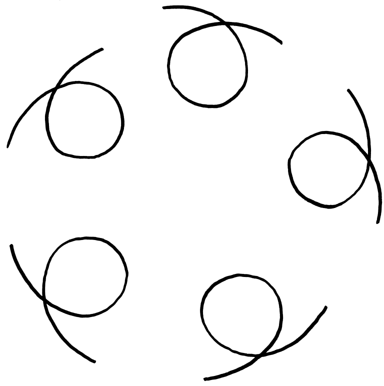

Fig. 4

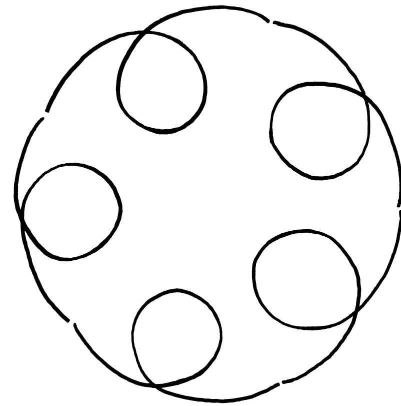

Fig. 5

The numbers of the play gave me enough information to construct such a figure with exactness. We only have to subtract 360 lines in turn from each act total, add up the bits left over to make a great embracing circle and, finally, make a small but crucial amendment, to come to a total for the great circle of 600 lines. By this simple calculation we arrive at a total for the great circle of 600 lines and a ratio for the whole figure of 600:360, or 5:3. Calibration is not very difficult. Anyone with elementary geometric skills and a good protractor could achieve it. The angles of act axes are determined by the lengths of the wings in the individual acts. The figure, accurately drawn on a small scale, but without detail, looks like this:

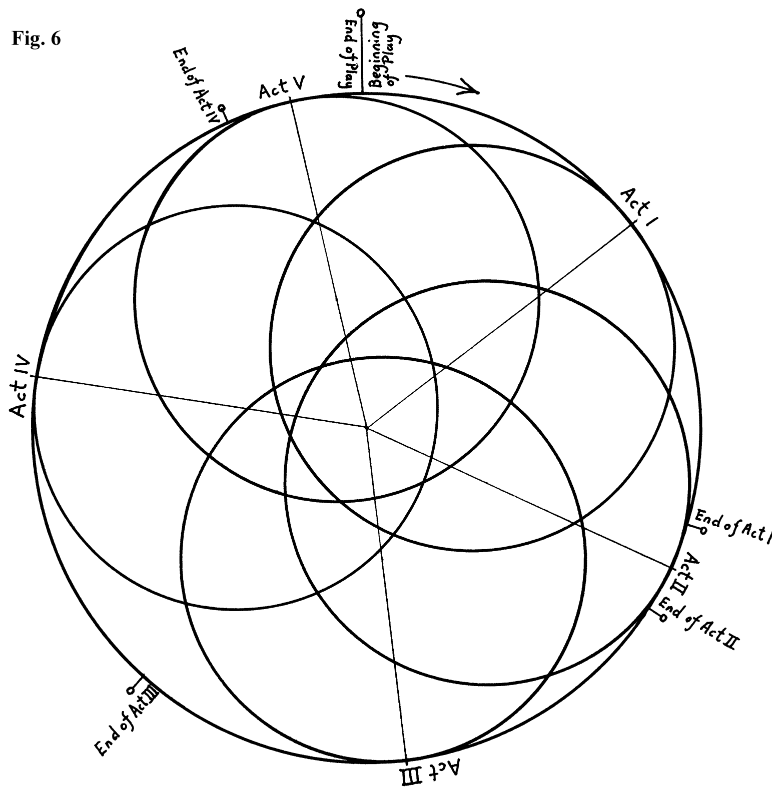

Fig. 6

Once drawn (at first with breathless speed) it looks as solid as an astrolabe, yet we ask: is it a figment of the mind, a spider's web, an illusion? Or was this figure wrought long ago, with antique instruments, on paper, or parchment, stone or metal? Certainly the numbers were given, not invented; certainly these lightning-flash ideas seem 'given' too. *Perhaps this form is rather the spiritual shape of an earthly act of creation, an archetype that caused the play to 'grow that way', like a mathematically perfect pine-cone? Let it anyway be explored, and its properties discovered.*

Those prime concepts of geometry that were first built into the plays are of course present: arcs or chords of circles elegantly link all symmetrical points. But the figure also has many other intriguing and meaningful geometrical properties. Are other intersections we ask, other relationships, also reflected in the action and word-stream of the play? (I must confess that if they were not, this book would never have been written) In fact, the more journeys of exploration one makes, the more remote seems the possibility that chance is here the master-hand - so striking, eloquent and enchanting are the word (or sound) echoes and connections to be found, and there are, for instance, lines of intersection linking recurrent images, or leading straight from evil thought to evil deed. There are scenes (arcs) with a common centre, separate in time but overshadowing one another, where the same mood and pattern appears again, transformed. There are great concentric circles which cut each act in two mirror-points and link all acts together, along whose pathways we find avenues of the clearest musical echoes. At one moment the figure takes on the aspect of a map of destiny, at the next an aeolian harp, at the next a table of poetic logarithms. We can play with it, but perhaps we continue too long at our peril. In the end only the right questions asked in the right mood get the right answers.

The Figure arose from the principle of symmetry, but a second principle of form, reflected in on-flowing number waves, can also be discovered there. Along the circling time-stream we can inscribe the great prime-number rhythms which flow all together - now above, now below - from the beginning of the play to the end.

Some rhythms are referred to by number-jokes. The weeks, or time-rhythm waves, in 'Weary sev'nights, nine times nine,' (line 23, I, 3.) can, for instance, all be counted. Other rhythms may be pointed to by numbers alone, as surely as if they had been named. Thus my original total of the play is 2392 lines; but this does not include the songs, whose traditional length we venture to say is 5 and 4 lines respectively. If we add them, we not only perfect the figure but reach a grand total of 2401 lines (see Chapter II). This number - the kind of number a Renaissance mathematician and magus would know as a friend - proves to be 49 x 49, or 7 x 7 x 7 x 7. It not only points to a 7-rhythm but to a 49 rhythm and a 343 rhythm.[7] These rhythms are all traceable. At line 343 for instance (I, 5.) Lady Macbeth, looking up from the letter, speaks her own words for the first time in the play:

343 Glamys thou art, and Cawdor, and shalt be
344 What thou art promis'd: ...

Each rhythm seems to speak its own message; and long rhythms like the 343 one, sign themselves at the nodes or pauses with recurring words and themes. Here we find the thought of inescapable destiny repeated, and also the words 'hand' and 'pray'. Along the path of this rhythm we meet Lady Macbeth for the last time in the play too, as she washes her hands in the midst of sleep (play line 2058 [6 x 343, or 6x7x7x7], Sc. 1, Act 5). Shorter rhythms, which flow across the long ones, can more easily be traced by the ear alone; and their ebb and flow can also be mapped in terms of such elements as short and long vowels, end-stopped and overflowing lines, strong and weak endings, and so on.

In general, however, the study of rhythms, which grows into the study of timing, is more difficult than the study of symmetry; just as the study of one's own breathing (which changes when it is brought to

consciousness) is more difficult than the study of one's face in the mirror. Yet we may live in rhythms, without always fully grasping them, and become conscious, to a greater or less degree, of the endless interplay between surging wave and symmetrical form, between life and image. Only when we 'possess' the play as a singer possesses a song - never really through detached manipulations of geometry and text - do we allow it to speak with a new voice - or rather with many new voices.

This is the law of symmetry: that one passage 'speaks' to another across a still-point centre. The effect of this law is that two dimensions give way to three: a landscape of in-between events appears. They may of course be disputed, but if the figure is accepted, if symmetry is accepted, there can be no quarrel about which passage speaks to which.

In this sense we come to something like proof - for proof belongs to the sphere of mathematics - and behold: we <u>have</u> mathematics - though in a sphere where there is much else besides.

As already noted, the discovery of the 'Macbeth' Play-Figure leads to an awareness of new elements of the plot and a full discussion of the new plot will occupy us Chapters VII and IX. Briefly, it hinges on the true character of King Duncan, whom, it is argued, Macbeth already hates when the play opens. It also provides that 'defence of the Macbeths' that history was willing to furnish (and many actors too) but which the play itself has so far steadily refused to yield.

Crucial parts of the argument are linguistic. As Hilda Hulme points out,[8] a certain faith in original texts is the attribute of linguists rather than editors. The danger has always been that, thinking we know what a play is about, we interpret or change the words in terms of our pre-conception. Once the conception itself is changed many words in this play take on other, often simpler, meanings and their own original printed form (as 'Barlet' instead of 'Martlet', Act I, Scene 6, play-line 416) makes sense.

If we ask <u>why</u> the plot we have discovered was buried we may come to at least two good answers. First, in the context in which the play was first written and performed it was politically expedient to bury it. (Banquo was only a mythical ancestor of James I of England: King Duncan was a real one.) Second, the very process of discovering the hidden plot is also the process of discovering the mystery of the figure. It was planned as a door: one of many such doors to be found throughout the plays.

The 'Figure' discovered behind 'Macbeth' proves to be one variation of a basic geometrical theme. Other similar 'Figures', but with different ratios of great to small circles, have now been constructed by the author,[9] and always from numbers that fall into place as easily as well-trained dancers. So far, the game does not fail. However this magical kind of writing was done, it seems it was partly done by sheer practice, as walking is, where we do not think of the separate steps, or as writing a symphony is, where the composer does not need to count bar-lines. Yet somewhere in the background there might well have been a great occultist and mathematician.[10] There may have been an esoteric circle, like the Sydney circle, to which the poet belonged.

The implications of the figure are of course not just academic. If ever it comes to be widely accepted, it must at least slow the tide of 'Shakespearesque' productions, in which Shakespeare's text is dismembered, re-arranged, reduced, expanded and generally mutilated. It <u>ought</u> to lead to an entirely new concept of production, where the study of the play, which includes study of its structures, and the acting of the play, are fused into one. Then, and only then, in the white-heat of action, will the profoundest laws of prosody be understood. To this Shakespeare points through the words of Macbeth:

> Strange things I haue in head, that will to hand,
>
> Which must be acted, ere they may be scand. (III, 4)

What Macbeth first has ‘in head’ is to consult the witches again at the pit of Acheron. He will enter a world of magic spells - as Shakespeare himself does when he writes a play, though the cauldron stirred is a cosmic one, and the meeting place a region unimaginably higher than the pit.

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[1] In the essay, ‘Time-Beguiling Sport’. Alastair Fowler, Shakespeare 1564 – 1964. A Collection of Modern Essays by Various Hands. Brown University Press 1964. Alastair Fowler also analyses the number structure of Shakespeare’s Sonnets in ‘Triumphal Forms’. Cambridge University Press.

[2] ‘Macbeth’, ‘The Merchant of Venice’, ‘A Midsummer Night’s Dream’, ‘King Lear’, ‘Romeo and Juliet’, The Tempest’, ‘Hamlet’, ‘A Winter’s Tale’, and ‘Cymbeline’.

[3] The Norton Facsimile of ‘The First Folio of Shakespeare’, prepared by Dr. Charlton Hinman. 1968

[4] See Appendix 1.

[5] I was aware that Acts are regarded by some as merely decorative devices inserted in the First Folio to give it an aspect of Classical lineage.

[6] We may note in passing that in Shakespeare’s numerology, nothing is rigid; rather it is organic, with the laws of compensation - of balance – always at work.

[7] 343 = 7x7x7.

[8] ‘Exploration in Shakespeare’s Language’ by Hilda N. Hulme, Longman, 1962.

[9] ‘Macbeth’, ‘The Merchant of Venice’, ‘A Midsummer Night’s Dream’, ‘King Lear’, ‘Romeo and Juliet’, ‘The Tempest’, ‘Hamlet’, ‘A Winter’s Tale’, and ‘Cymbeline’.

[10] Perhaps John Dee, who died as Shakespeare ceased to write.