

BISHOPS OF OPPOSITE COLOURS: THE IDEA OF SYMMETRY AND THE SYMMETRY OF IDEAS

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INTRODUCTION

Although the last resort of the scoundrel academic is to fall back on the truism that we all reserve the right to be speculative, there still remain some intellectual projects that cannot rid themselves of the whiff of impertinence, and I have to admit that this is one of them. I believe that the general idea was that an arts specialist should offer some personal reflections on the notion of symmetry, and there is sufficient provenance for a line of argument to be developed, perhaps centred largely on the decorative arts and the aesthetics of pattern recognition, with genuflections in the direction of *art nouveau* tiling, traditional wall paper, the spiritual geometry of islamic art and architecture, together with more recent icons coming out of chaos theory, including the ubiquitous Mandelbrot fractals.

But the more I contemplated this agenda, the less it seemed to capture what I actually wanted to say. In part this was because the approach seemed trapped in the second of the classical double definition of symmetry, which juxtaposes a mathematical version (that an expression is symmetrical if it remains merely reflected in the face of operations that might otherwise reconfigure it) with an aesthetic version that adjudicates symmetry to be a matter of pleasing internal balance and proportion. The first kind of symmetry derives its power from its use in explanation within fields where the data is capable of mathematical manipulation such as Biology or Linguistics, with the added practical advantage that design processes in fields exhibiting symmetry, such as Engineering and

Architecture, can and do make use of repetitive iteration (CAD being the paradigm example). The second, as usually formulated, has until recently been little more than a footnote in aesthetic history, although revived somewhat under the influence of the kind of cognitive psychology that has concerned itself with pattern recognition. To put matters this way is already to have formulated the central question as one of what kind of order is to be found in art, moving on to a consideration of the balance it draws between order and disorder, symmetry and symmetry-breaking. And it is increasingly recognised (as for example by Ian Stewart and Martin Golubitsky 1992) that nature itself, so often the object of contemplation in art, exhibits deeply symmetrical inner structures not least living things through DNA, although the actual processes by which living things come into being seem to prefer right-hand spirals. The expectation, then, is that the aesthetics (symmetries and partial symmetries constructed in the eye of the beholder and perceived pleasurably by the audience) bears some kind of (symmetrical?) relationship with the real order that can be considered as an attribute of the data.



Sydney Parkinson. *Portrait of a New Zealand man*, pen and wash, (c. 1769). British Museum Add. MS, 23920.54a.



The Head of a New Zealander, engraving after Parkinson, in Hawkesworth, *Voyages* (1773), pl. 13.

But this line of argument, although part of what I want to say, also does not seem quite good enough. As reflected in the title, I want to take my speculations beyond the idea of symmetry and its application across the discipline, and in the directions determined by a fuzzy¹ and ill-formed project that seeks to see ideas themselves as stable repetitive structures carrying their own tendency towards soft symmetry. Jan Tent's paper (1993)

makes its own claims to "soft symmetry", so perhaps the kind of symmetry I have in mind should be seen as liquid rather than soft, with the equivalences on view much more fluid but nonetheless ordered according to their own principles of commensurateness.

The structure of this paper begins with some trivial examples and moves up to more complex ones, finally taking a sustained look at negotiated cultural meanings as they inform the dramatic pageants that make up the English medieval mystery cycle, particularly the impact on its complex dramatic form of the doctrine of equivalence known as typological theology.

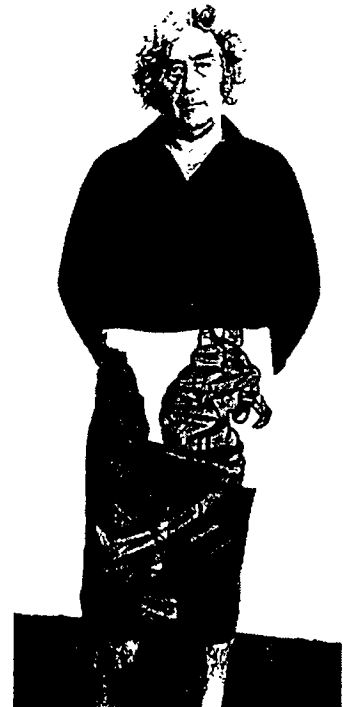
MIRROR MIRROR ON THE WALL

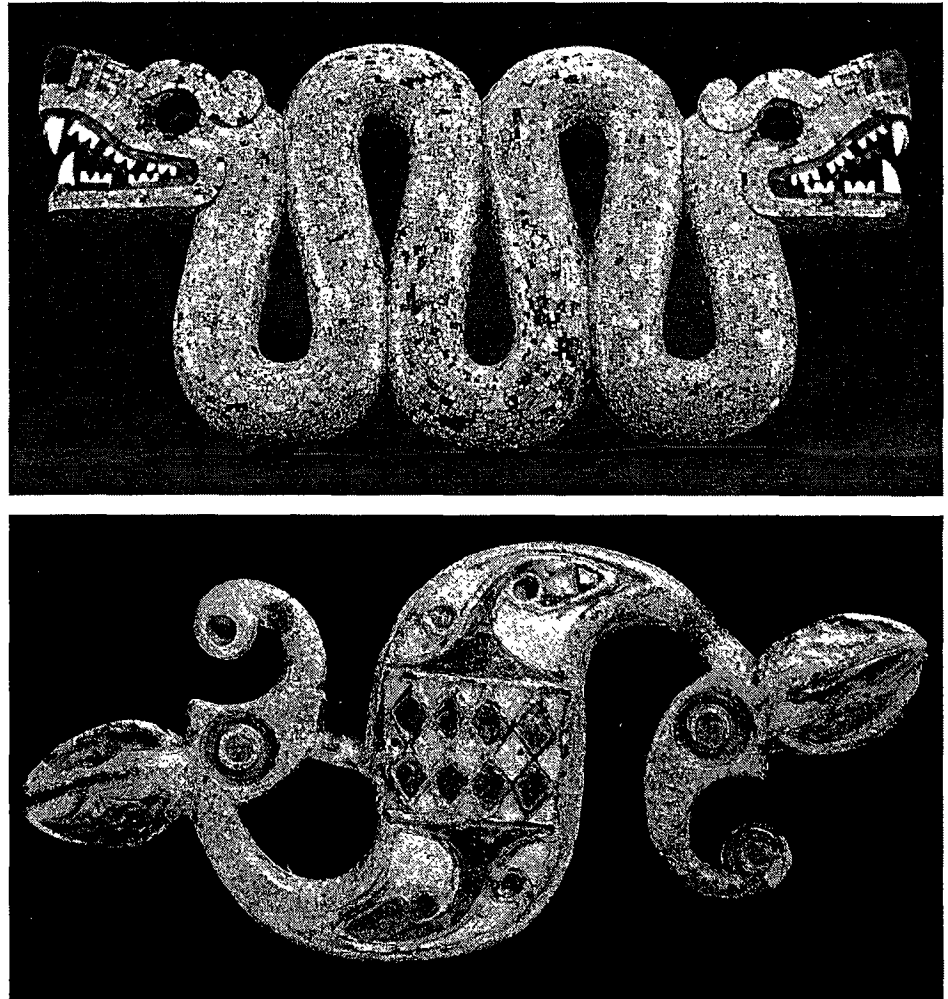
Mirrors give the erroneous impression that they pull their trick of reversal only on a right/left basis but not on a top/bottom one, something to do with the vertical axis of symmetry of the human body. But when I lie down horizontally in front of my mirror, the guy looking back at me leans on the wrong elbow. On a similar theme, when giving this paper at the *Symmetry and Structure among the Disciplines* Conference I wore a *sulu* made up of the Welsh flag, which features a dragon rampant.

Since the dye goes right through the flag, one does not need a mirror to reverse it; it could simply be worn back to front. Does it matter what side the dragon is coming from? It certainly would in the theatre where the symbolism of sinister/dextra adds a dimension (like colour in symmetrical tiling) that reduces perceived symmetry by introducing a novel category of non-equivalence. There is only one "right way" for the Welsh flag.

In passing, it is more usual for dragons in the decorative arts to be symmetrically two-headed. Figures 2 and 3 offer two pleasing examples, the first displaying bilateral symmetry, but the second only rotational symmetry.

Figure 1: Flag-as-sulu





Figures 2 and 3: Symmetrical dragon ornaments

CROWNS, HEARTS, HANDS

The claddyr ring is a ring of traditional design associated with County Galway on the west coast of Ireland. No matter that I first acquired this particular one to confuse deliberately the semiotic signals during my sojourn as Professor of Education at the University of Ulster (claddyr rings are supposed to be worn only by Catholics); our

present interest is in its design. Rings as objects in their most basic shapes exhibit not only a symmetry but a symbolism of shape, suggesting a wholeness and completeness in their sparse roundedness (topological doughnuts, all) but also carrying in the way they are worn on fingers a symbolism owing much to what we might delicately label physiological analogies ("Clarissa's ring" in Shakespeare's *The Merchant of Venice* is clearly handled with such reverberations in mind). But the claddyr ring breaks its symmetry by carrying further emblems on one segment of its circle, in some sense not unlike the bicycle wheel, which allows its rotational symmetry to be broken by a valve. What the claddyrness of the claddyr ring depicts can be variously interpreted, linking together as it does a pair of hands cradling a heart, topped by a crown. Some say it represents the Sacred Heart of Jesus, others that it celebrates the commanding authority of the heart's affections, but there are two other features that command attention. Firstly, that it is reversible and can be worn in two ways; with either the crown or the unprotected heart exposed to the top of the finger; and in Ireland this bifurcation in orientation is deployed culturally to indicate commitment (marriage, engagement or "going steady") or emotional availability. Secondly, and arising out of this possibility, that it is much more aesthetically interesting than a plain ring, precisely because of its symmetry-breaking, whilst retaining bilateral symmetry around a single axis (hearts, hands and crowns echoing the symmetry in their own way).



Figure 4: The "Claddyr" ring

THE RORSCHACH BLOT

First year university students studying the quasi-science of Psychology can scarcely avoid coming across the most famous of the projective psychodiagnostic tests, the so-called Rorschach Inkblot (Figure 5).

As Bootzin, R., Acocella, J., and Alloy, L. (1993) point out, the validity of the test is based on the assumption that unconscious motivations can be drawn out by asking subjects to "interpret" ambiguous stimuli into which they will be disposed to read meaning, first through free association but increasingly via a kind of psychological

interrogation. The Inkblot cards vary considerably in detail, but they have one feature in common, displaying bilateral symmetry, almost as though they had been produced by folding a piece of paper to mirror-image an inkblot. It is this bilateral symmetry, of course, that anthropomorphises the image and trades on the (according to Jonathan Miller probably wired-in²) capacity of the human brain from infancy to recognise faces and their myriad of expressions and subliminal messages. For similar reasons attributed meanings may also be taken in the direction of flowers or insects as one's mood or psyche might determine. This theme (believing is seeing) resulted in the strangely enduring iconography of Dürer's misobserved rhinoceros. His "plated armour" image was copied assiduously for nearly a century, including the anatomically mistaken dorsal horn³.

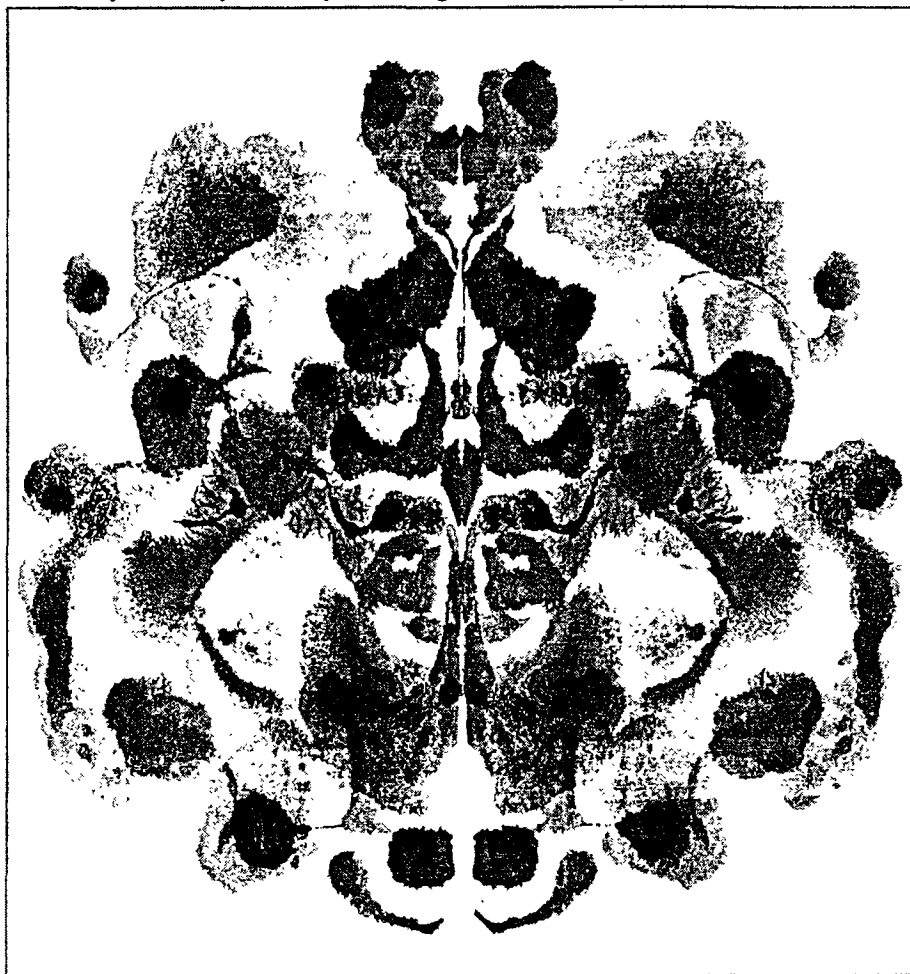


Figure 5: Rorschach inkblot

PIED BEAUTY

Perhaps beauty has little to do with symmetry after all. The Jesuit poet Gerard Manley Hopkins is usually perceived as torn between his ascetic calling to the "God beyond change" who (paradoxically) "fathers" everything forth, and his overwhelming aesthetic engagement with the "dangerous" earthly beauty of an ever-shifting and changing creation itself. His poem *Pied Beauty*⁴ glorifies God for His "dappled things", valuing the transient, the ephemeral and the fleeting ("landscape, plotted and pierced, fold, fallow and plough / And all trades, their gear and tackle and trim / All things counter, original, spare, strange / Whatever is fickle, freckled (who knows how)...."). There is perhaps an echo here of the sort of thing James Gleick talks about in *Chaos* (1987) when he describes how the reconstituted geometers, persuaded to look afresh at things like clouds, eroded landscapes and turbulence, have been digging up new words to describe whole families of shapes, words like "jagged", "tangled", "fractured", "twisted" and "splintered". If Gerard Manley Hopkins were alive today he might even have become a topologist.



Figure 6: Monet's *Grain Stacks at Giverny*

The spirit of *Pied Beauty* can be discerned in *fin-de-siecle* French Impressionist painting, particularly the work of Monet in his legendary concern for the ambience of light, subtle colouring and atmosphere that might be snatched from fleeting moments of time. Yet Monet became pre-occupied with "series paintings" (of the facade and Tour d'Albane of Rouen Cathedral, the grain stacks at Giverny etc.). For the grain stack

paintings, he often stood in exactly the same position rendering the stacks under different lighting conditions and different seasons of the year ("I have been grinding away, bent on a series of different effects, but this time of the year the sun goes down so quickly I can't keep up with it") Collectively they show an unnerving balance between periodicity and what Hopkins would have called their unique idiosyncratic "inscape"⁵.

MORAL SYMMETRY

Ideas of appropriateness and balance often outcrop in areas of life where to assert a mathematical model of commensurateness would appear contrived. But take the *lex taliosis*, the famous Hebrew doctrine of appropriateness in punishment; the eye for the eye and the tooth for the tooth is symmetrical in its patterning, with retaliation aping offence, although the notion of fittingness has at times in our cultural history been subjected to grim excess, as when the adulterers among the damned in San Gimignano Cathedral's *Last Judgement* have sadomasochistic retributions enacted on their offending parts.

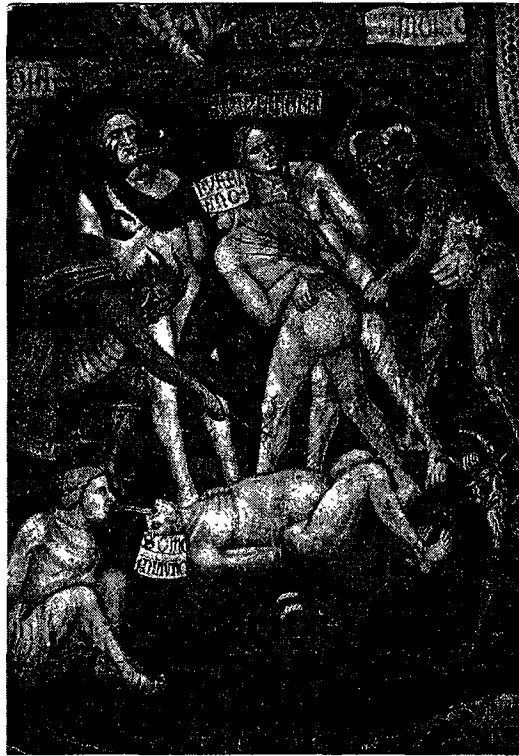


Figure 7: *Last Judgement* in San Gimignano cathedral

The Greeks, of course, saw matters differently, imagining a moral universe with some asymmetrical unfairness, precisely because the gods were held to be capricious. The symmetry was broken when the victim's number came up, as when a roulette wheel loses its rotational symmetry at the point a ball drops into a slot.

FROM MIMESIS TO "THIS WOODEN O"

Any discussion of symmetry in the arts has to find a way of handling the classical doctrine of *mimesis*. According to Plato, all art is mimetic, either striving for true likeness (the "eikon") or representing from a viewpoint (the "phantasma"). But as Monroe Beardsley (1966) points out, this doctrine in its strongest version implies deep symmetries central to what it is to understand anything, thus linking the idea of symmetry with the symmetry of ideas. ("Not only are objects imitated by pictures of things, but the essence of things is imitated by names, reality by thought, eternity by time.") These are ideas we will take to English medieval religious drama, but meanwhile will jump ahead of ourselves and consider Shakespeare's Globe and Swan theatres.

At the heart of the architecture of the Globe Theatre lay both a conceit and an ambiguity. The conceit punned on the physical shape of the theatre's structure, a "wooden O" that held in suspension two extreme versions, standing both for the world and nothing, the pun itself echoing the hyperbole by which a stage could name itself after a planet or alternatively understate itself as zero, nothing, zilch, the figure naught. And of course in some symbolic sense both were true and the tension between them was productive, a kind of negative symmetry of opposites. Paradox is not dissimilar, although it is important to remind ourselves that its structure depends on some *doxa* being considered *para*.

The ambiguity relates to the Elizabethan theatre's capacity to accommodate shifts in *mise-en-scene* between outside and inside locations. Historically, this flexibility has been explained by people like S. L. Bethell (1948) as having something to do with stage conventions, in particular that scene-setting speeches are allowed to colonise neutral space; but equal attention might well be paid to the physical ambiguities of theatre architecture. The facade of the tiring house lends itself to being treated as the outside of a building such as Macbeth's castle with its attributed "friezes and jutties".

When seen in relation to the cube-shaped extension that came out from the tiring house above the stage itself (pillars supporting a square roof), sufficient visual ambiguity existed to support the alternative interpretation that the facade represented an inside wall. The fact that the ceiling of the extension was called "the heavens" and painted with stars rendered it also capable of inside/outside dichotomous interpretation, and the plays make consistent use of the implicit optical illusion.

A formal distillation of the same set of ideas can be found in those two-dimensional cube-suggesting symmetrical tiling patterns that retain an optical reversibility as images interpreted in three dimensions, depending on which face or edge is held to be nearest to the eye⁷. The addition of tone or colour can be made substantially to reduce the ambiguity since our brains are more used to interpreting objects lighted from above.

SYLLOGISTIC LOGIC AND METAPHOR

In the mathematical expression $x = y$, it is unproblematical to assert equality at either side of the equals sign since its ordinary meaning is not to compare but equate. One consequence, perhaps the cause, of the symmetrical form of the expression is that it can be written as $y = x$ without affecting its values. Yet ordinary language statements that appear superficially to have an identical configuration carry a particular problem associated with the verb "to be" in that there is often a difference that the traditional formal logic identifies as pertaining to the implied distribution of the terms. Thus "apples are fruit" can be seen as a shorthand version of the longer sentence, "all apples are some fruit", a feature sufficient to make the sentence asymmetric although perhaps retaining a soft bilateral symmetry setting it aside from sentences using transitive verbs, as in "Sitiveni castigated the sleaze-bag".

Syllogistic logic is a pattern of inference (as opposed to truth) by which it is possible to assert some conclusion deduced from two premises. Let us stick with the most famous example:

All men are mortal
Socrates is a man
Therefore Socrates is mortal

Leaving aside that inference is in some sense itself a symmetrical system, consisting entirely of transformations preserving "truth value" equivalence, it is interesting to note that the two premises that lead to the conclusion are technically interchangeable, whilst at the same time possessing a natural order, the major preceding the minor. One of the

rules of syllogistic inference is that there can be no increase in the distribution of a term between the premises and the conclusion⁸.

When we move on to the world of the arts, the caveats we noticed in relation to propositional logic are present in spades, since simile and metaphor are not only seeking to assert equivalence and commensurateness in the teeth of differences but are often far-fetched, extremely in the deployment of the metaphysical conceit ("Far-fetched, but worth the carriage," observed Dr Johnson dryly). A typical example might be John Donne's *The Flea* which seeks to seduce a mistress with the thought that since the insect has bitten both of them it has pre-sanctified their union in the mixing of blood, as well as being emblematic of the three-in-one Holy Trinity. Nice one, John.

Nevertheless, metaphorical language is capable of carrying sustained parallels of great emotional and intellectual appeal and it would be parsimonious to exclude this area from any discussion of soft symmetry. When parallels of this kind are sustained in narrative the resulting framework is often what we call allegory⁹, which is a cultural trick whereby a story is allowed to carry a non-literal message in relation to which it stands as a sign. As ever, the reciprocity between a sign and what it signifies is at one level a symmetrical one, despite the polymorphous perversity of signifiers.

More than perhaps we realise, our interpretations of experience are ultimately dependent on making comparisons, asserting sameness, and using preferred and proven configurations as the basis on which to assimilate anything new. It is small wonder that there is a natural history of metaphors that take them from their first beginnings as arresting novel comparisons (e.g., why not argue a dramaturgy of everyday life?) to their perception as well-worn literal truth (e.g., role theory as put forward in standard structuralist/functionalist sociology textbooks).

Stanley Fish (1980) offers a brilliant exposition of a sermon by Lancelot Andrewes, dating from 16th April 1620. Fish sees the sermon as an example of what Roland Barthes calls "replete literature". Andrewes' sermon deals with the episode when Mary Magdalen encounters the Risen Christ outside the empty tomb and "supposes Him to be the gardener". But Mary is cleared of error, since her mistake concealed a deeper truth (Jesus is the second Adam, can weed the tares of sin from the human heart etc.). Fish realises he is dealing with "structural homiletics", a world of mutual affirmation in which the available meanings are seen as a vast mesh of fitnesses, agreements and correspondences "within a storehouse of equivalent and interchangeable meanings". The narrative of the sermon, as of the Gospel itself, posits a world in which it is not possible to make a mistake as every surface feature carries its load-bearing share of the deeper truths that it reflects in its internal symmetries.

Later in this paper I will be taking a look at extended metaphors, symbolic associations and allegories as they proliferate in English medieval religious drama. But by way of foreshadowing, it may be useful to note three ways in which the dramatic genres leading up to Shakespeare and the English Renaissance echoed the basic configurations of bilateral, rotational and periodical symmetry. These parallels can be seen respectively in the conventions of the sub-plot (mirror-imaging the main plot)¹⁰, the reflected antitheses and double allusions of irony¹¹ (itself always dependent on comparisons around a twist) and thematic repetition at the level of plot¹². It was not for nothing that A. P. Rossiter (1950) described the Wakefield Master, responsible famously for the "mock nativity" in the Towneley *Secunda Pastorum*, as having "a peculiar twist to his vision".

THE GAME OF CHESS

It has long been realised that certain repetitive tiling patterns lose some of their geometric symmetries by the addition of colour, a consequence that underlies much of the complex artistic punning of M. C. Escher¹³. A deceptively simple example is the ordinary chess board, which allows alternate squares to be coloured black or white. Since either a black or a white square will appear at the bottom right hand corner, and the rules of chess require it to be a white, the chess board in relation to either of the players evidences rotational symmetry only at 180 degrees, with 90 and 270 precluded by the colouring. Interestingly, the inclusion of colour means that the chess board has bilateral symmetry only around two axis, the black and white long diagonals.

When we add the pieces in the opening position ("the array") there is again a tantalising near symmetry, interestingly broken in three ways, by the colouring of the pieces (raising again M. C. Escher's question of the extent to which colour matters), by the disruption of the pattern on either side of the line between the *d* and *e* files by the non-equivalence of the King and Queen, and in actual play by the alternation of moves so that any tendency towards symmetry in opening theory is a matter of Black echoing to the extent that is possible White's previous move.

Chess players are, of course, deeply aware of the impact of these imperfect symmetries and many have settled preferences either for balanced or unbalanced positions. Several defences are sufficiently reflective of the opponent's opening moves to be labelled "symmetrical", for example the symmetrical defence in the English opening and the Austrian defence in the Queen's Gambit Declined¹⁴. It is in the endgame, however, that a formal symmetry, perhaps organised around the axis of the long diagonal, enters into solutions, with the practical concomitant that one section of analysis will hold for its symmetrical alternative. An interesting pure example was recently offered by John

Nunn (1994)¹⁵. The following diagrammed position involves a neat reciprocal zugzwang through which White can force a win by Bishop to g2.

The only way for Black to avoid loss of the rook is by moving it either to c8 or a6, but because of the symmetry of the position either analysis will hold for the other. If c8 then the rook on f3 moves to f7 with discovered check. The Black king is forced to b8, allowing the White rook to b7 forcing the king back to a8. The point becomes apparent when White gently moves his king to h2 creating another reciprocal zugzwang. Black to move must lose his rook to some discovered check. Although it is rare for chess to achieve this level of symmetrical geometric precision, the aesthetic qualities of the game are substantially linked to its subtle balancing of true, partial or broken symmetries and it is these qualities that make the game so appealing. Like many games, it also has the oppositional symmetry of zero sum since in any chess game there is one point to be distributed between the players. A draw gives both half a point.

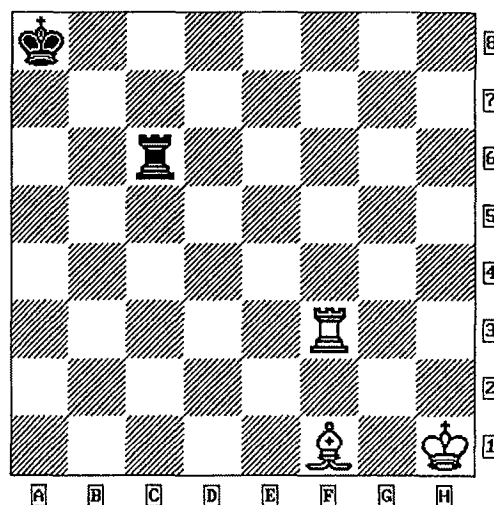


Figure 9: Reciprocal zugzwang with symmetry

IMPLICIT BIOGRAPHY

The possibility of projective structuring is not confined to the Rorschach blot, as it is increasingly seen as legitimate in literary criticism to plot an unconscious soft symmetry between texts and lives. One fine example of this biographical criticism can be found in Ellen Moers (1985) which develops the argument that Mary Shelley's *Frankenstein* is in effect a mythological reworking of her tragic experiences of pregnancy and parturition¹⁶. Mary Shelley's mother, Mary Wollstonecraft, died giving birth to her and she herself

lost several babies. Frankenstein's creature (Frankenstein was the inventor and not, as commonly supposed, the monster) was put together with bits of dead bodies gathered from graves and charnel houses in a way clearly drawing on these experiences. My ex-colleague Carolyn Steedman has been able to explicate the links with reference to entries in Mary's diary¹⁷. Clearly this kind of parallelism must remain imprecise at any level of detail, but the principles of thematic commensurateness are utterly clear¹⁸. As ever in the Arts, we are dealing with reverberation and resonance rather than formal geometric equivalence but there is a commonality of patterning nevertheless.

STRUCTURAL ANTHROPOLOGY

Already admitted into our consideration is the notion of the underlying patterns, and it is one of the tenets of structuralism that when exhumed in particular contexts they can display a fearful symmetry. Barbara Hardy has observed that narrative is a primary act of mind, one of the absolutely basic ways of bringing order to the intractable complexities of experience. One might expect narrative to reflect this unavoidable and opaque human diversity. But one would be wrong! Hardy (1975) examines the narratives of fiction not as unique aesthetic monads but as heightened versions of common discourse, organised around stable thematic patterns (although clearly exhibiting surface cultural variation). In the novel, the epic and the picaresque narrative carry the largest burden in sustaining the template of the genre. And certainly in relation to that range of narratives that we call myths, their historical subjection to the interpretive approaches of a "structural anthropology" has led to the strong assertion that it is possible to exhume a deep persistent underlying patterning. This approach has been epitomised in the book by Claude-Levi Strauss (1963) that names the game, *Structural Anthropology*. Readers preferring the more tough-minded definitions of symmetry will warm to Levi-Strauss's analogy with mathematical expressions retaining symmetry under transformations ("variants of one myth or several myths which appear different from each other can be reduced to many stages of the same group of transformations as can their corresponding rituals of different people"). An interesting litmus question is whether this insight does or does not appear to be counter-intuitive.

The robustness of the patterning leads Levi-Strauss to assert that the evidence shows "relations of symmetry" between the rituals and myths of neighbouring people. This example perhaps opens up a further dichotomy; elegance in explanation so often strikes one as pleasing precisely because of its sparseness. As we should see later, eloquence in the decorative arts paradoxically often depends more on complex elaboration and variation, in short on symmetry-breaking as much as on symmetry.

CLASSICAL AND ROMANTIC AESTHETICS

One set of ideas from which we might seek some of the answers is classical aesthetics, pursuing some of the issues that Dénes Nagy raised in his introductory lecture "Why Symmetry?" which are reflected in this volume. As Monroe Beardsley (1966) analysed, Plato's answer to the question what kinds of things are both complex and beautiful saw them as exhibiting ideal properties. Thus a temple was imbued with literal mathematical qualities that guaranteed its aura of stillness and self-completeness. What was being asserted was the underlying truth that *metron* ("measure") and *symmetron* ("proportion") between them constitute beauty. Deformity is at heart lack of proportion.

But as ever these notions need to be modified with at least half a nod in the direction of the mathematical models of perception wired-in to the human brain. The Parthenon's famous optical illusion, with its pillars bulging slightly so as merely to look vertical must occasion at least a mild diversion from the platonic argument. A modern version of this digression would be the insistence that any decent aesthetics theory would have proper regard for the mechanics of perception, most sharply framed in neurophysiological terms. Talking as we are of symmetry, it is interesting to record the rectangular geometry associated with the arrangement of rods and cones in the human visual system, and to enquire in what precise ways it might determine perception of shape.

But we need not, of course, allow ourselves to get trapped in a classical aesthetics. In my own country, there was a time when neoclassic canons of taste, at least as far as gardens and landscapes are concerned, shifted abruptly under the influence of that collective cult of individualism and feeling that tends to be collected together under the rubrics of romanticism. As Anthony Ashley the third Earl of Shaftesbury put it, the "horrid graces of the wilderness" were now to be preferred to "the mockery of princely gardens", gardens which sought to tame the rude promiscuity of nature by imposing geometric order on it¹⁹. The new taste embraced the sublime as well as the picturesque and led to paintings like those by Salvator Rosa and Claude of Lorraine, showing humanity overwhelmed by brooding alpine cliffs, and having titles like *Landscape with Banditti*. At the time taste was seen as detaching itself from mathematics and basing itself on mood. There is evidence that this was a lens through which explorations of the South Pacific were viewed and interpreted, as, for example, in Figure 10.

One of the really interesting things about chaos theory, as we shall see later, is that the gnarled oaks are now once again seen, alongside cloud formations and ferny undergrowth, as possessing their own soft symmetry.

If we are to take on a single lesson into the rest of this paper, it is that in matters of taste and aesthetics there is no such thing as a naive viewer. Any assertion as to why symmetrical patterning may be perceived as pleasurable must cope not only with alternative delimitations of what is symmetrical but must also allow itself to be subsumed under cultural history²⁰.

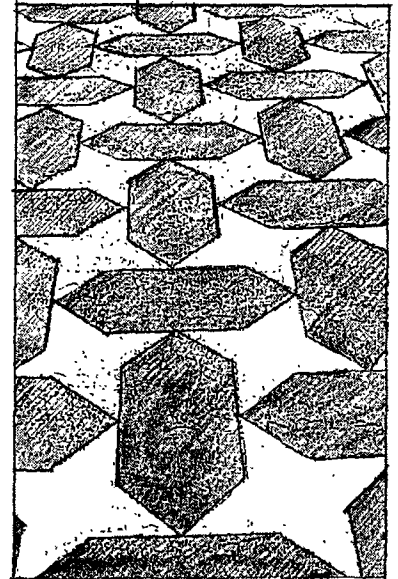
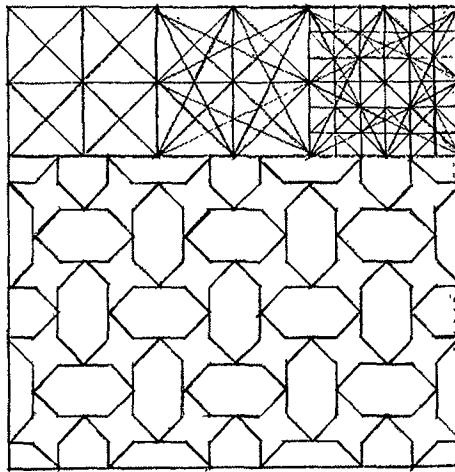
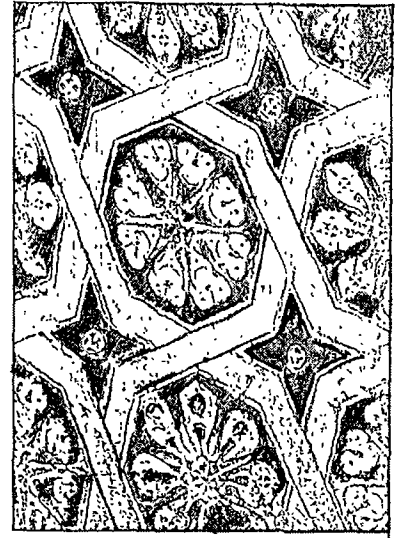
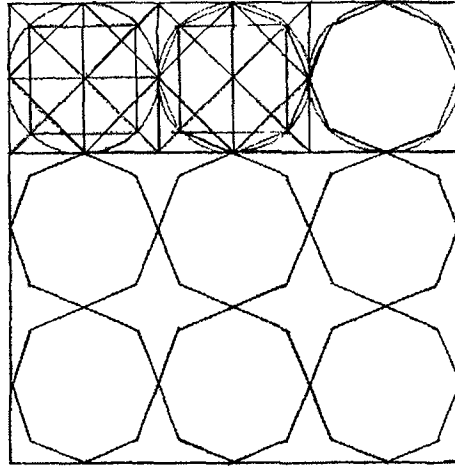


Figure 10: Augustus Earle, *Waterfall in Australia*

ISLAMIC ART

My former colleague Richard Yeomans (1993) recently analysed the abstract geometric art of Islam as an abstract expression of its spiritual values, since as Titus Burckhardt has observed, there is a strong rejection of devotional images in Islam. Particularly on the Sufi side, Islam holds that the deepest truths cannot be put into words but must be "manifest" in a uniquely abstract visual language, which subsumes under a spiritual geometry everything from calligraphy to its uncluttered mosques²¹.

The resulting decorative art and architecture is unrelievedly abstract, based on a method of mensuration and composition that predates the numerical decimal system in the 8th century, probably at first making use of ropes with equidistant knots. As El-said and Parman (1976) note, its ordering principle is that of *mizan* (balance or order) and depends aesthetically on the systematic arrangement of repeat units in the overall design.



Figures 11: The geometry of Islamic tiles

Figures 11 show the design principles lying behind the two examples. The sheer complexity of the architectural inventiveness never ceases to amaze. The squaring of the circle, allowing a circular dome to cap a square plan, was achieved by Byzantine architects in a way that spawned the complex honeycombed crystalline forms known as squinches and the stalactite forms known as pendentives.

ERNST CASSIRER AND SUSAN LANGER: FROM "PHILOSOPHICAL ANTHROPOLOGY" TO "SYMBOLIC TRANSFORMATION"

The claim made in the introduction for the broad thrust of this paper was that it is attempting to move outwards from a discussion of the idea of symmetry towards some parallel notion of the repetitive patterning through which cultures seek to organise experience, what I called by the hopefully evocative but doubtlessly slippery term "the symmetry of ideas". It is necessary to lay down some basis on which this project might be attempted, and I shall do so by a large scale borrowing of a set of insights first proposed by Ernst Cassirer in his *Philosophie der Symbolischen Formen*. Cassirer has been influential in showing us how we might see the arts alongside other preferred explanations as aspects of human culture and his work has been built upon in particular by Susan Langer and more recently by the cognitive psychologist Howard Gardner in *Art, Mind and Brain* (1982).

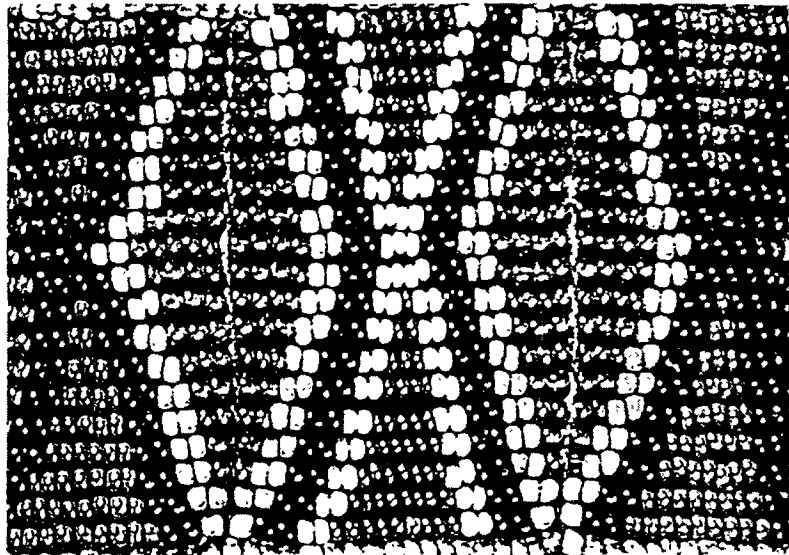


Figure 12: Patterning with beads

The insight at the heart of Cassirer's work is his argument that human forms of intuition (space, time etc.) and categories of understanding (substance, causality etc.) are typically *imposed* on raw data to give it form rather than in any strict sense derive from it. Once again this is an intellectual backwater, or perhaps frontwater, sensitively summarised by Monroe Beardsley (*op. cit.*) who depicts Cassirer surveying evidence from psychology, anthropology, and linguistics before coming to the far-reaching conclusion that the great symbol systems or symbolic forms of world cultures (their mythologies, their art forms, their scientific theories and explanations and their religions) are not modelled on reality but actually seek to model it. If so, the purpose of all the creativity of spirit that we see in these human endeavours is less a nomothetic quest for underlying regularity than an idiographic imposition of interpretive schema of our own invention. The "symmetry of ideas" that I hope to indicate is the product of the coming together in cultures of the twin forces of human inventiveness, often rooted in metaphor, and our preference for elaborating the patterns we already assert rather than switching to new ones. We just thread the beads in different but depressingly predictable ways.

Susan Langer (1942) in *Philosophy in a New Key* hints at the role played by symmetries (essential meanings unaltered by symbolic transformations) in the world of the arts. If tonal structures exhibit a close similarity to forms of feelings, music can be conceptualised as a tonal analogue of the emotional life, presenting as it were a kind of reflection of it with its essential configurations intact.

Towards the end of this paper I shall be taking a sustained look at English medieval religious drama to test these insights in a reasonably well described setting.

HAGIOLOGY AND ICONOGRAPHY

There is a difficulty in arriving at an appropriate visual representation of a saint, with perhaps a tendency to identify by some association with a symbolic object, like St Catherine and her wheel. Representations need to be symbolically commensurate, not with lives as lived, but with the often apocryphal and yet to be demythologised version of them currently being peddled to succour the faithful. In the case of a "composite saint" like Mary Magdalen, there is a kind of bilateral asymmetry around the twin poles of her life-as-processed, taking in her traditional identification as the woman "taken in adultery" in *St Matthew's Gospel* and her subsequent apocryphal life as a wilderness saint. She is also graphically identified by her assertive but touching act of homage to Jesus before his death, smothering his feet with expensive ointment from an alabaster box and drying them with her (often luxurious and auburn) hair. Her association with

Christ's feet extends insistently into the iconography of the crucifixion, and one quite delightful anonymous miniature from the Siena Pinacoteca depicts her quite unmistakably as the patron saint of foot fetishists, crawling under the table to embrace Jesus' feet at an otherwise sombre gathering in the house of Simon the Pharisee.

On the opposite polarity, Donatello's quite striking wooden *Magdalena*, centrepiece of the 1987 *Donatello et son Sui* exhibition at Fort Belvedere, Florence, revealed an anorexic Mary Magdalen with calf-length hair like some wilderness animal. She appears tense and angular, ravaged with grief, her suffering seemingly void of any comfort or faith, confronting us with what to all intents and purposes is a gaunt stare²².

AMBROGIO LORENZETTI'S ANNUNCIATION AND ITS ARCHITECTURAL SETTING

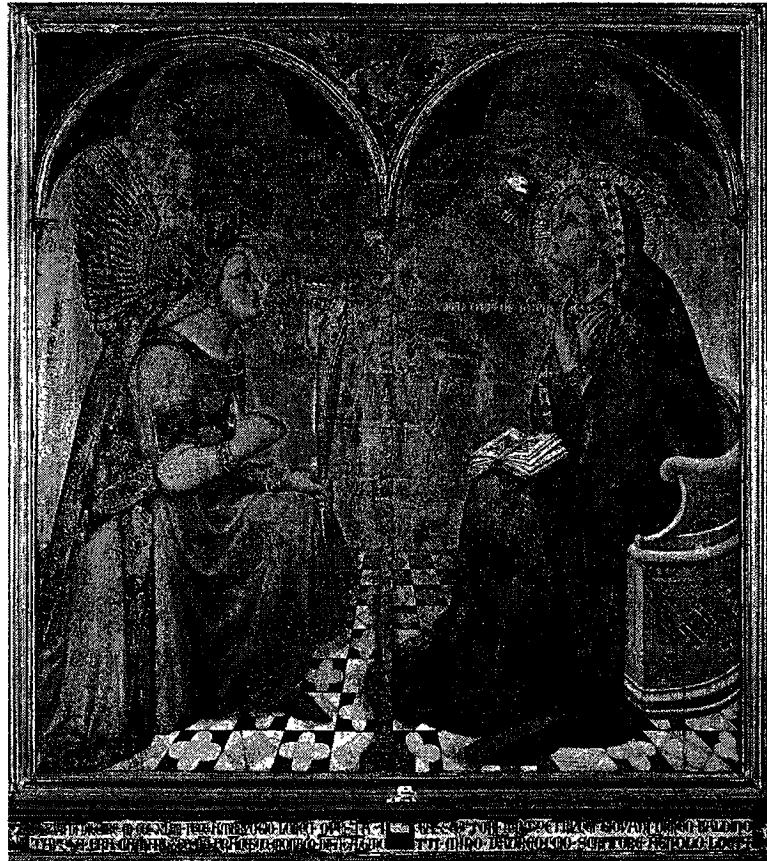


Figure 13: The *Annunciation* by Ambrogio Lorenzetti

Ambrogio Lorenzetti's reputation rests most securely on the cycle of frescoes of the *Allegories and Effects of Good and Bad Government* painted towards the end of the first half of the 14th century in the Sala dei Novae of the Palazzo Pubblico in Siena, but my own favourite piece is his *Annunciation* in the Pinacoteca. The event, celebrating the moment when the Virgin Mary is told she is with child by the visiting Angel, is variously depicted in art, but at best with a subtlety of reciprocation, most usually expressed as a delicate balance between deference and modesty. Here, however, there is an unusual serenity in the acceptance and an evident easy complicity between the strikingly similar figures in spite of their segregated conventional gestures. But the unusual mutuality of the encounter is achieved architecturally by placing both figures under identical trefoil arches symbolising the eternal Holy Trinity (even as the Son is about to be born). The symmetry of the arches is continued in the expansive ornamental pavement, which has a strong repetitive tiling pattern. Its perspective lines vanish towards a single point, although arrested by the abstract gold background that gives the picture its jewel-like gloss. Interestingly, this application of the rules of Renaissance perspective would not have been experienced as symmetry-breaking; it was simply understood that this is how symmetrical patterns appear when not viewed from above. What the formal tiles contribute to the painting, along with the church-like architecture, is an overwhelming sense of rightness and order, enhanced by the slight all-too-human hint in Mary's expression that perhaps she knows already and is quietly confident²³.

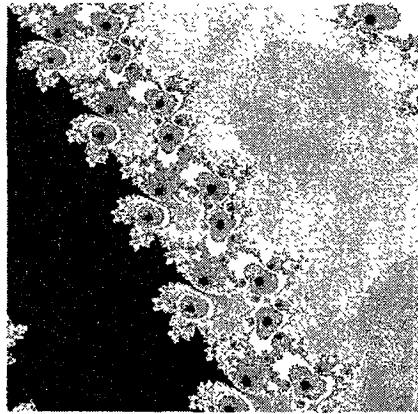
THE AESTHETICS OF CHAOS

From quintessential order it is appropriate that we next turn to chaos. It is perhaps best to start with an example.

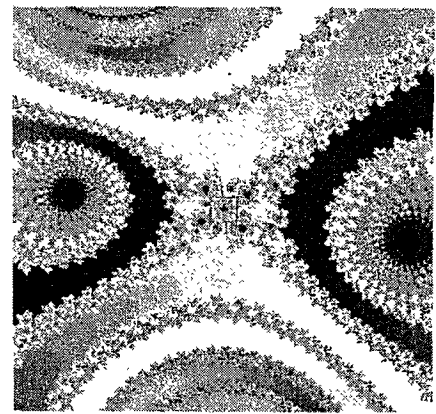
James Gleik (1987) offers a nice account in *Chaos* of the first application of Cantor sets to the distribution to transmission noises. In all systems, "message" is infinitely preferable to "noise", but the standard way of thinking about noise, although recognising its tendency to come in clusters, was that the effects were pretty much random with the worst examples mythologically attributed to somebody somewhere being careless with a screwdriver. But Benoit Mandelbrot brought intellectual order to the noises by seeing them as a Cantor set over time (a Cantor set is a representation produced by removing the middle third of a block, then the middle third of each section etc., thus producing a pattern like the famous rough but robust fractal model of the English coastline, identical on every scale)²⁴. In passing, self-similarity across scales can be proposed as a novel form of "Russian doll" soft symmetry with an aesthetic *frisson* of its own which from time to time has informed certain kinds of architecture, although the opposite effect is more common in which a large scale symmetry is subtly

undermined at the level of detail (e.g., twelve consecutive identical architectural niches occupied by twelve distinctively individualised apostles).

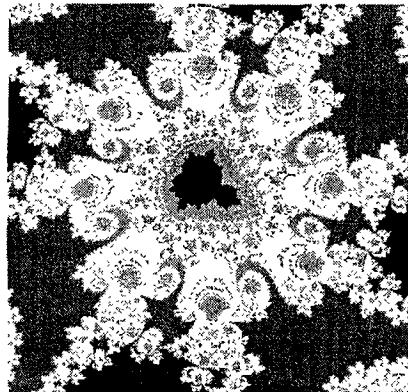
Fractals occupy a world poised surprisingly easily between the realms of the arts and the sciences. Peitgen and Richter's *The Beauty of Fractals* is clearly premised on Mandelbrot's claim that fractals can at one level be read as novel anti-minimalist art, albeit the (accidental?) by-product of dynamic systems, merely offering pictorial visualisation of the encoded mathematical information. But through an act of radical political appropriation they have been taken over by the cyberpunk sub-culture and turned into cyberpunk mandalas by New Age hallucinogenic acidheads ("Just like the inside of my head, man"). The video makers Strange Attractions recently produced a four-minute video, *Where No Penguins Fly* based on a colour-cycled Mandelbrot set. Unsurprisingly, it is now available as a screen saver.



COLOR PLATE 1



COLOR PLATE 2



COLOR PLATE 3

Figure 14: The Mandelbrot set at various scales

One of the shifts in taste associated with fractal aesthetics, is its implicit endorsement of an architecture rich in every scale. Gleick (1987) infers from Mandelbrot's schema an antithesis to the architecture of the *Bauhaus* as the epitome of Euclidean sensibility, "spare, sparse, orderly, linear, reductionist, geometric". By contrast the Mandelbrot set (Figure 14) is the most complex of all objects with its "thorns, spirals, filaments, hanging molecules on God's personal vine". Amazingly, this deep recursive swirling geometry of almost infinite complexity comes, like Creation itself, out of what seems in context so little; the full set can be transmitted using only a few dozen characters of code.

COMPUTER-GENERATED IMAGES: FROM THE UTAH TEAPOT TO VIRTUAL REALITY

One of the axioms of computer-generated artwork within the quasi photo-realistic mode is that it is based on attempts to replicate mathematically optical phenomena arising from predictable relationships between lights, surfaces and reflections. The results have a fashionable plastic, shiny, almost surrealist look, as one would expect from observing algorithms seeking to arrange coloured pixels. As Jane Prophet (1994) suggests, the early pictorial efforts (like the Volkswagen Beetle or the ubiquitous Utah teapot) did not merely establish developmental norms but acquired cult status. Since a Utah teapot is for all practical purposes a data-base, it can be manipulated to appear with a variety of reflective surfaces, from any angle, and under any light conditions, rather like a Monet series painting. The computerised data-base was the more simple to construct because of the partial symmetries characterising the original object.

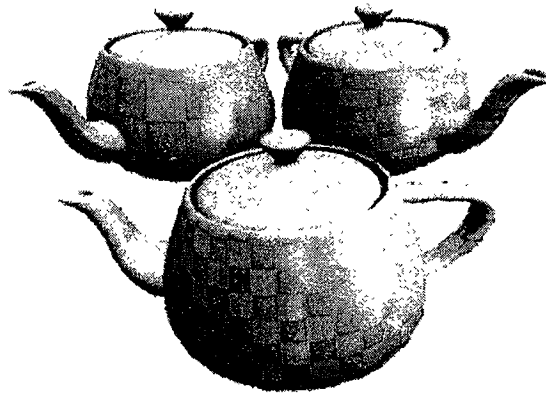


Figure 15: Image of the Utah teapot

It is in VR (virtual reality systems) that emerging computer graphics applications are seeking an experiential symmetry between genuine and simulated happenings, although "virtual reality" is currently a bit misleading, not much more than a manufacturer's hype. But beyond flight simulators for pilot training and the opportunity for CAD architects to walk around inside simulated buildings as if they were real, lie complex problems to do with intellectual property rights (sampling is not coterminous with plagiarism), morality (cybersex will not remain confined to *Lawnmower Man*, and the technology is neutral before the question of whether your partner might be a distant lover or a piece of software that has passed the Turing test²⁵ and ontology (a concern for truth requires that we can tell the difference)²⁶. Clearly, these issues place mimesis at its problematic outer edge.



Figure 16: *Lulu* by Pekka Tolonen, 1992. A computer-generated sex object. The sexual fanatics of hundreds of men (transcribed from pornographic literature and interviews) have been programmed into the system of this program

TYPOLOGICAL THEOLOGY AND FIGURAL REALITY IN THE MEDIEVAL MYSTERY PLAY

We now take these ideas to the sustained example of English medieval religious drama. In spite of its relative unfamiliarity, it exemplifies richly the capacity of developed art forms deploying meta-narratives (in this case rooted in Christian theology) to evolve towards a metaphorical structure of elaborated resonances and equivalences, exactly in the spirit of Stanley Fish's earlier comment on the replete literature of the sermon. A more accessible example might have been to explore the thematic echoes and doctrines

of "correspondence" lying behind what E.M.W. Tillyard described as an "Elizabethan world picture"²⁷ ("Untune that string, and see what discord follows"), but the medieval mystery play has the advantage of offering stronger links between the drama and the iconography. What is at stake, in Cassirer's terms, is the human imaginative capacity to *invent* order and structure. Commensurateness is in the eye of the beholder.



Figure 17: Animated Coco Cola bears

There are four extant texts of English mystery plays, dating from the 15th century, although a continuous tradition began earlier. Cycles have survived from Chester, York, Towneley (Wakefield) and from an unidentified N-town, probably an itinerant cycle travelling at of Bury St Edmunds. Like Gothic cathedrals, the mystery cycles evidence layers of accretions, alterations, excisions and revisions. Mystery plays were street plays, cyclic verse dramas each containing up to forty-six individual plays, and performed under the sponsorship of the medieval craft guilds which were at that time still under the hegemony of the medieval church. In performance they were distinctly "stagey", employing props, machines, traps, tricks, dummy bodies, live animals and exploding furnaces. Craft pride allowed an amusing allocation of the Chester *Deluge* to the "drawers of water from the River Dee" and (more audaciously) gave the *Crucifixion* at York to the nail-makers and ironmongers, turning the sacred nails into commendable craft objects ("large and long"). Although the Feast of Corpus Christi, with which the plays were associated, lies outside the liturgical calendar as such, each in its own way reflects the liturgical year with many individual pageants arranged around the events of Christmas and Easter.

Each cycle of plays tells the story of man from Creation to the Last Judgement, a schema that has been described as "making *War and Peace* thin and *Paradise Lost* parochial". From the point of view of the present argument, it is important to stress that each cycle was written under the arch of scholasticism, in the spirit of St Augustine's *Theatrum Mundi* which quite literally treats history as if it were a play written by God. The critic V. A. Kolve (1986) brought to the plays Northrop Frye's abiding agenda, the quest for the so-called "generic features" that might make the genre stable. Kolve noted that the cycles appear to have been written to a patristic framework, heavily dependent on the teaching of the church fathers²⁸. Indeed, Rosemary Woolf (1986) has argued that the patristic tradition of the church was decisive in choosing episodes, and that it is possible to assert an irreducible core including *Adam and Eve*, *Noah*, *Abraham and Isaac*, *The Shepherd Plays*, *Herod*, *The Birth of Jesus*, *The Temptation in the Wilderness*, *Christ before Pilate*, *The Crucifixion*, *The Harrowing of Hell*, and *The Last Judgement*.

The Crucifixion is sometimes treated with a kind of grim irony, sometimes with an audacious wit. The Towneley Jesus is "done on the rood, tugged, lugged, all-too-torn with traiters", but the cross is also a horse with a wooden saddle, and Jesus depicted daringly as a "jouster" in a tournament. The torturers deliberately mis-drill the holes in the cross piece, requiring Jesus to be stretched with ropes. Emblematically His widespread arms embrace all humanity, but the torturers fail to decode accurately the iconographic symbolism ("Short-armed is He").

Underpinning the use of *Old Testament* material is an elaborate set of ideas known as "typological theology", which asserts a (soft) symmetrical doctrine of equivalence linking *types* with their *antitypes* and developing thematic reverberation at every level (rather like Mary Magdalen being cleared of error in supposing Jesus to be the gardener).

The effect is partly achieved through a "figurative" non-periodic view of time. Although rooted in medieval life, the plays have in common a juxtaposition of narrative time (the sequence of the plot), contemporary time (medieval England) and figurative time (the non-time of the Divine Plan). It is in this last framework that the *fabula* can best be understood, although exemplified at the other levels. Erich Auerbach's defining work *Mimesis* (1957), important to the argument I am trying to develop here, has this to say about figurative time:

An occurrence on earth not only signifies itself, but others that it predicts or confirms. The link is oneness in the Divine Plan.

Both the theology and the texts are elaborated to resonate with a particular kind of thematic repetition. As well as the deployment of type and antitype, as in the *Abraham and Isaac play*²⁹, another underpinning theological concept is the "periodic" doctrine of *recapitulatio*, a schema which demands that Christ re-iterates Adam, restoring by repetition. *Recapitulatio* avoids the worst crudities of a "barter" theory of the redemption by emphasising the continuity of God's providence. Something of its flavour is caught in the iconography of the period, so often a bridge between the theology and the drama. The *Holkham Bible Picture Book* uses emblematically the "pelican in piety", the bird pecking its breast to succour its young with little fountains of blood. The strict allusion is to *Psalm* 101 ("I am a pelican in the wilderness") but the fabula references Jesus, justifying the usual non-literal "placement" of the bird's nest on the holy rood tree, itself often sprouting foliage. (The dead tree of the second Adam brings life, while the live tree of the first Adam brought only death). But in the "Fruit Forbidden" of the *Holkham Bible Picture Book* the pelican tops Eden's tree. Only to the uninitiated would this be an inappropriate placing, since the trees have a mystical unity. (Indeed some of the legends of the holy rood assert physical continuity, the rood growing from the pip of Adam's apple). Such complex reverberations appear at time almost capable of exponential growth. The *Arundel Psalter* has a "Tree of Life with Nicodemus" that playfully turns him into spiritual fruit, referring back to the "you must be born again" episode. Similarly a phallic "Rod of Jesse", perhaps the ultimate icon of a disinterested autoeroticism, displays its arboreal genealogy of Jesus and manages to get in on the symbolic act.

A number of important issues arise from the use in medieval drama of the doctrine of *recapitulatio* and the invitation of typological and allegorical interpretation, all of which were already part of the "mind set" of the contemporary believer. In the first place we can dispose of the old accusation of "naive anachronism", which must rank as one of the least discerning misjudgements of all time. More interesting is the extent to which the structure lends itself to the most Sophoclean of ironies in which the audience knows the end from the beginning. Neat examples abound, as when Herod in *The Slaughter of the Innocents* boasts "He will die on a spear" even as the audience references Longinus as its bearer. A more tricky issue in speculative poetic hands is what might be termed the limits of typological decorum. A willingness to stretch the metaphor to embrace Rahab the hospitable harlot as a type of Christ (her red hair like Christ's blood in Marlowe's *Dr. Faustus* "streaming in the firmament") must be somewhere near the outer edge, but what about the "mock nativity" of the stolen sheep in Mak's wife's cradle in the *Wakefield Secunda Pastorum*?

Among the symmetries and correspondences on view is a rather daring version of moral symmetry in the N-town cycle, which systematically develops the distinction between "pious" and "malignant" fraudulence. The conflict between Jesus and Satan dominates the cycle, but the characterisation is conceived of in a rather daring way, reflecting an earlier classical aesthetic. Cornford (1914) distinguishes a traditional opposition between the *ieron* (from which we get the word irony) and the *alazon* (who is brashly overstated, a braggart in a Herod-the-Great kind of way). In the N-town Cycle Jesus is the *ieron*, but his understatement is given a twist by the imposition on the plays of a speculative theological framework, the so-called "deception of Satan" theory of redemption. Satan has acquired mankind by malignant fraud and must be out-duped in return. Patristic sources for this theme are suggestive, for example Gregory of Nyssa's metaphor of the fish hook in *The Great Catechetical Oration*. Satan is tricked by the humanity of Christ, but it is the divine Logos playing the line:

the deity was hidden under the veil of our nature, that, as is done by a greedy fish, the hook of the deity might be gulped down along with the bait of the flesh.

The equivalent in chess is the sealed move, known only to the player who has made it. In the plays, the theme is worked through consistently in *The Betrothal of Mary*, *The Trial of Joseph and Mary* ("By my father's soul here is great gyle!"), *The Temptation in the Wilderness* (after which Satan declares, "His answers were marvellous. I knew not his intention/whether God or man be he I can tell in no degree"), *The Descent of the Anima Christi into Hell* and somewhat equivocally in an incomplete *Last Judgement* play. But the fanciful theology surrounding pious and malignant fraudulence is most fully developed in an exquisite *Christ and the Doctors* play in which the boy Christ ("twelve years old" through his mother but "everlasting" through his Father) turns the temple episode into a theological set-piece. He explains the *Logos* as a *Logos pediagos*, a divine teacher restoring knowledge in kind. A nice exchange occurs with one of the doctors:

Doctor: What need was it for her to be wed
 To a man of so great age
 Lest that they might both go to bed
 And keep the law of marriage?
Jesus: To blynd the devil of his knowledge
 And my birth from him to hide
 That holy wedlock was a great stoppage
 The devil in doubt to do abide.



Figure 18: The Last Judgement from the Holkham Bible Picture Book

Although, as Beardley (*op. cit.*) points out, there was not a strong interest in the Middle Ages in constructing a distinctive theory of aesthetics, the arts (particularly drama and iconography) were seen, beyond initial uncertainties, as sensuous aids to worship. In both the theology and the staging of the N-town Cycle, the incarnation is itself treated as a device producing an illusion, and the two forms of commentary intersect.

One promising strand linking classical aesthetics to the medieval era resides in continuities that can be traced in an implicit theory of interpretation. The work of Homer, as poet and seer, was increasingly held to be open to deep, but rather fanciful, allegorical interpretations and increasingly perceived as carrying profound truths hidden in symbol and allegory. Consider the peculiar problem posed to Christianity in having a double set of texts. At its roughest, the dilemma of the hi-jacked Hebrew Scriptures (turning them into the Christian *Old Testament*) was solved by giving to them the treatment given to Homer, evolving styles of interpretation that transcend their literal or received meanings. Understood in retrospect, in a Christian perspective, the secret truths of the *Old Testament* reveal themselves through typological and allegorical forms of exegesis. As in solving a good crossword clue, the truth once revealed as fitting a symmetrical pattern of complex mutually supportive reverberations, could not have been otherwise. Jonah's experience in the whale's belly in the mode "prefigures" the Harrowing of Hell, an association offering the iconic leviathan hell-mouth to the medieval stage. Such figurative interpretations were legitimised by St. Augustine in terms of their capacity of facilitate spiritual growth. The ultimate inspiration for this theory of interpretation was John Cassian's four levels of meaning to be found in the scriptures – historical, typological, tropological and analogical³⁰.

A medieval mystery cycle is thematically complex in its reverberations, involving in another context what Douglas Hofstadter (1979) called a "nesting in recursive structures and processes", and involving not a few "tangled hierarchies and strange loops"³¹. Is God a geometer?" ask Ian Stewart and Martin Golubitsky (*op. cit.*, sub-title). In the medieval drama, just to pick the *Noah* plays as offering one of a thousand reverberating images, he is also the metaphorical as well as the literal boat builder, preoccupied with measurements to be sure, but also one whose arc is also an arca – shrine, ship, salvation, church and altar, all at one and the same time. There are no regular solids in poetic geometry.

REMARKS

1. There is increasing recognition recently of the beauty and usefulness of blurred ideas. See, for example, Bart Kosco's *Fuzzy Thinking* (1993).
2. Suggested by Jonathan Miller in a series of (as yet unpublished) lectures on *Looking in Art* at the National Gallery, London, April 1994 which linked art history and appreciation to models of perception.
3. Dürer's misobserved rhinoceros. Equally "anatomically mistaken" was Edward Budd's attempt to extend the Rorschach techniques to the metabolically challenged. See Budd, E. "Rorschach assessment of the 'non living'", *Journal of Polymorphous Perversity*, Vol.9, No.1, Spring 1992, pp. 12-16.
4. There is a sustained attempt in the poems of Gerard Manley Hopkins to resolve what are ultimately tensions between faith and experience. See for example Herbert Read, "Creativity and spiritual tension" (1933) in Bottrall, M. (editor) (1975).
5. See Donald McChesney, "The meaning of inscape" (1968) in Bottrall, M. (1975) *op.cit.*.
6. See William Shakespeare, *Macbeth*, New Penguin Edition, pp. 67-68.
7. Similar ambiguities are taken advantage of in Francis Bacon's "Screaming Pope" series, optical ambivalences similar to those that underpin M. C. Escher's disturbing uphill waterflows.
8. My USP editor John Hosack dislikes this formulation since, according to Prior in the *Encyclopaedia of Philosophy* (1967), the concept "distribution" in relation to terms is often ill-defined and too slippery to be useful. But one cannot slough off one's youth that easily.
9. Allegory is probably a fundamental mode of thought in spite of its having thrived in its more elaborate versions in particular cultural contexts. A paradigm example might be the parables of the Kingdom from the *Gospel according to St Matthew*. See Northrop Fry (1957) *Anatomy of Criticism*, Princeton, N.J.
10. As in Shakespeare's *King Lear* where the Gloucester plot revivifies in terms of physical blindness the thematic paradoxes of Lear's spiritual blindness ("I stumbled when I saw").
11. Most empathically in so-called Sophoclean irony, which adorns accident in the clothing of design.
12. Famously in Samuel Beckett's "periodic" *Waiting for Godot*, which is why it has been called a meditation on the Catholic liturgy.
13. Ideas developed by Andreas Dress at the International Symmetry Conference and reflected in this volume. Professor Dress was plenary speaker at the *M. C. Escher: Art and Science Congress* in Rome, 1985.
14. See Gary Kasparov and Raymond Keene, *Batsford Chess Openings* (1982). It is worth noting also that David Hooper and Kenneth Whyld in *The Oxford Companion to Chess* (1984) treat symmetry in part as a theme in composition, giving the example of a symmetrical model mate by Kaminer which won first prize in the 1920 Shakhmaty tourney.
15. See John Nunn, *Secrets of Pawnless Endgames* (1995). The foregoing analysis follows David Norwood's account in his *Daily Telegraph* review, "The Nunn's story (on zugzwangs - when every move is a bad move)".
16. See also "Female gothic" in Levine, G; and Knoepfmarcher, V. (eds.) *The Endurance of Frankenstein: Essays on Mary Shelley's Novel* (1979). There is a "psychological" as well as a "political" gothic.
17. A relationship demonstrated with examples in a lecture by Carolyn Steedman in the Department of Arts Education, University of Warwick, March 1991.
18. This kind of interpretation is seen as legitimate (almost as a challenge to the autonomy of the text) under "reader response theory", which asserts symmetry between the acts of writing and reading (decoding exactly paralleling encoding). See Jane Tompkins (ed) (1980) *Reader Response Criticism*, and James Kinneary (1983) "The relationship of the whole to the part in interpretation theory and the composing process", *Visible Language* XVII, 2.
19. See for example, Christopher Hussey's *The Picturesque: Studies in a point of view* (1927). There was an attempt to link the landscapes of North Wales and the Lake District emotively and subjectively to sub-alpine aesthetics, a kind of partially tamed version of Burke's sublime.
20. As most matters of format. My University of the South Pacific colleague Liz Todd was instrumental in organising the 1993 *Weaving* exhibition at the Suva Museum and had developed an interest, from an ethnomathematical perspective, on how traditional crafts carry implicit mathematical knowledge. Fijian weaving exhibits complex patterns of partial and broken symmetries.
21. See also Hankin (1925), "The drawing of geometrical patterns in saracenic art" in *Memoirs of the Archaeological Survey of India*, Calcutta. The basic grammar and vocabulary of the patterning is explored in Albarn, K; Smith, J; Steele, S; and Walker, D. (1974).
22. I am aware of remembering an analysis along these lines in a very perceptive quality newspaper review of the exhibition, but unfortunately I do not have the reference. Certainly the account coloured my own viewing of the exhibition.
23. For further exegesis, see Enzo Carli's *Sienese Painting* (1983) p.44.
24. James Gleick (1987) collects a number of specific areas into a general account of Chaos as an interdisciplinary area exhibiting what the cultural anthropologist Clifford Geertz (1983) has called "blurred genres". See also Benoit Mandelbrot's *The Fractal Geometry of Nature* (1982), Peitgen and Richter's *The*

Beauty of Fractals (1986) and Hans Lauwerier's *Fractals* (1991), all dealing with the visual beauty of computer-generated images.

25. In the popular imagination, the Turing test is the ultimate criterion for admitting the arrival of "machines that think", in that their performance on sophisticated tasks cannot be distinguished from those of human beings. The test is named after Alan Turing of Second World War "Bletchley Hall" fame, a locale where chess players and mathematicians were brought together as code-busting cryptographers. See George Atkinson, *Chess and Machine Intuition* (1994). When cybersex passes the Turing test, the pawn's "lust for promotion" will have been fully satisfied.

26. These issues are nicely handled by Jane Prophet (1994) in *Taste Teaching and The Utah Teapot: the Use of Electronic Media in Art and Design Education*. With regard to the apparent authenticity of the image, it is mainly the un-bear-like social psychology of the Coco Cola bears (who are evidently both awed and puzzled by the Northern Lights which they settle down to view as if in a theatre before taking their interval drinks) that persuades us that they are of the digital species *ursor sapiens*, rather than true bears.

27. Although not particularly Elizabethan, comprising in many instance the commonplace speculations of Renaissance humanism and cosmology. See E. M. W. Tillyard, (1943) *The Elizabethan World Picture*.

28. This quest for "generic" features might suggest strong thematic links with traditional Taz'iyeh plays, dealing with the events surrounding the tragedy at Kerbela. See Peter Chelkowski (ed.) (1979) *Taz'iyeh: Ritual and Drama in Iran*, New York, UP.

29. Rosemary Woolf's account of typological interpretation in the *Abraham and Isaac* episode is balanced by that of Martin Stevens (1987) across the cycles as a whole, but with particular reference to N-town as the most overly theological of the cycles.

30. See John Cassian's *Collationes* (XIV, 8, Migne, Vol. 49).

31. See Douglas Hofstadter, *Gödel, Escher, Bach: an Eternal Golden Braid* (1979). This profoundly serious and playful book is perhaps better reflected in its subtitle, "A Metaphorical Fuge on Mind and Machines in the Spirit of Lewis Carol".

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ILLUSTRATIONS

- Frontispiece: Sidney Parkinson *Portrait of a New Zealand Man* pen and wash (1769) British Museum Add. Ms, 23920.S4a; and *The Head of a New Zealander*, engraving after Parkinson, in Hawkesworth, *Voyages* (1773) pl.13. Hawkesworth's engraving is derivative, and for self-evident technical reasons ends up virtually as a mirror image (although with slight but interesting differences) of Parkinson's portrait. Noted and commented upon in Bernard Smith (1985).
- Figure 1: Welsh flag worn by author as sulu. Photo Media Centre, University of the South Pacific.
- Figure 2: Mixtec-Aztec turquoise mosaic pectoral ornament in the form of a double headed serpent from the Museum of Mankind, London (1988) Trustees of the British Museum. Printed by P. J. Graphics Ltd, London.
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- Figure 5: Rorschach inkblot. The authentic inkblots, (to utilise a novel-sounding concept) are subject to copyright and are not available due to the possibility of response-interference. The illustration is of a card of similar design used to discuss projective psychodiagnostic tests in Bootzin, R., Acocella, J., and Alloy, L. (1993), Sixth Edition, p.142.
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- Figure 10: Augustus Earle, *Waterfall in Australia*, canvas 28 x 33 in (c. 1826) Nan Kivell Collection 9, National Library of Australia, Canberra. The painting depicts the painter "placing" one of his aboriginal guides who is posed picturesquely before a waterfall. Also in Bernard Smith (1985) *op.cit.*, Plate 157, p.255.
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