**Can astrology be viewed as an expression of chaosmos and is this the same phenomena currently being described by Chaos and Complexity theories?**

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## Abstract

This paper investigates the hypothesis that astrology, over its history, has been and still is a vessel of chaosmos, a chaotic sympathetic cosmology, in western culture. To support this hypothesis, this paper draws on different disciplines and, for ease of understanding, is presented in three sections. The first section discusses the nature of creation that comes from the void of chaos and shows how astrology has its genesis in this paradigm. It then explores the historical background to the rise of order (cosmos) and the resulting definition of 'truth' as order. The second section of the paper focuses on the findings of contemporary chaos and complexity theories and links these findings to psychology and myth, showing how the human sciences have embraced this research to give a new language and methodology to the understanding of life and its systems in the present-day world. This section also presents fractals as a tool for understanding the workings of chaos and complexity. The third section of the paper links the discoveries of chaos and complexity theories with their use in psychology and draws parallels with the practise of twentieth and twenty-first century astrology.

In conclusion this paper explores a view of astrology which would be neither classical science nor needing a religious or spiritual foundation, but rather could allow astrology to be seen as one of the cultural expression or tools of chaosmos existing in the present-day world.

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## CONTENTS

# Introduction

This paper undertakes to link the practice of astrology with the recently acknowledged work in chaos theory and complexity science. It examines the practise of astrologers in the present-day western culture and considers whether they are reflective of both the principles of the creative chaos of antiquity, and those being found in modern chaos theory. With a lack of literature on this question, — aside from William Keepin (1995) whose work is focused on the symbolism of the Mandelbrot set — this paper has drawn on the literature of astrology, mythology, history, philosophy and modern physics and explores the question by synthesising ideas from these diverse fields.

As this paper explores the findings of chaos theory and complexity science and relates these to astrology it uses some of the technical language of chaos and complexity as well as that of astrology. These terms will be defined as they are used but more detailed explanation is given in the supplied glossary. However, a few terms need to be address at this point.

When discussing the notion of creation, as a self-organising order, that emerges spontaneous from a void or chaotic state the term 'chaosmos' as applied by William James and Alfred Whitehead will be used (Kuberski, 1994,37-38).

With regard to the subject of astrology itself there are mixed opinions as to its nature. *Philips' Astronomy Dictionary* (Woodroff et al., 1995,20) considers astrology as a failed science and states that astrology is:

> A pseudo-science professing to assess people's personality traits and to predict events in their lives and future trends in general from aspects of the heavens, in particular the positions of the planets. Astrology is based on ideas which are scientifically unsound and which the great majority of rational people dismiss.

In contrast David Potter (1994,17) spoke of astrology as a form of divination writing that it was the 'Pride of place among the various forms of inductive divination available in the Roman world must go to astrology.' In contrast is a neutral definition which neither implies science or spirit which is that of Patrick Curry (1999,55) who defined astrology as '. . . the practice of relating the heavenly bodies to lives and events on earth, and the tradition that has thus been generated'. This paper does not seek to offer another definition of astrology but rather seeks to explore the possibility of astrology holding a middle position, as reflected in Curry's definitions, between science and spirit.

# Section 1

## Creation Myths and the Emergence of Astrology

Sean Kane (1998,36) talks of myths from pre-history cultures as being stories of patterns, stories which talk of the relationship between plants, animals and earth. In these stories humanity is not central but is simply one of many players in the emerging patterns of life. From this view of nature Kane (1998,251) points out that the different gods or goddesses emerged. The images of the divine from this period were predominantly polymorphic blends of human, plant and animal or half formed, or shape-changed humans. The *Goddess of Lespugue* found in the Pyrenees Mountains in France (Appendix 1 *figure 1*) dated some 23,000 years ago is an example of this blending as the female image has a bird-like head with an egg shaped body. In Mesopotamia around 1800 B.C.E., such images were still prevalent, as can be seen in *The Queen of the Night* (Appendix 1 *figure 2*) with the female image having wings and the feet of an eagle. Such images, of which these are just two examples, suggest that the human view of the world was one where life forms and nature were more blended, interlinked or interwoven together. As Henri Frankfort (1948,9) in discussing the period of the Old Kingdom in Egyptian culture stated, the view of the divine could be a blend of any life forms as well as a mountain or the wind. This was a time before man made God in his own image.

With this blending ran a philosophy of creation from chaos. Chaos was considered a vital component of creation and, according to Merlin Stone (1979,107)  was reflected in the earliest known creation myth which is from the Semitic people of Mesopotamia around 5,000 B.C.E.:

> Queen of Heaven, Goddess of the Universe, the One who walked in terrible chaos and brought life by the law of love and out of chaos brought us harmony and from chaos She has led us by the hand…

Another examples is in the pyramid text of around 2,500 B.C.E. where the Heliopolitan priests wrote of the concept of creation coming out of chaos (Guirand, 1965,27). These texts talk of the chaotic void out of which emerged Atum, the complete one, later identified with the sun god Ra. Atum, a conscious being, appeared on the primeval hill to bring light and disperse the chaotic darkness of Nun.

The Egyptian view was not unique, Michael Bütz (1997,206) comments:

> … chaos was an essential, even pivotal, concept with the ancient Taoist, Egyptians and Native Americans at least a thousand years before Greek civilization imagined it as a philosophical form.

In reviewing different creation mythologies, Bütz (1997,207-09) expands this point by stating that in these myths chaos is an essential state for the creation of new forms and that themes such as a conscious god/goddess who represents chaos, or a god or several gods needing to return to something like chaos to create, are prevalent throughout many of the creation myths. One such cyclic creation myth comes from the native Australians. It contains themes of darkness, void and the emergence of half-life, half patterns that keep returning to the darkness to reform, reshape, and create another pattern (Kane, 1998,65).  In this myth there is no conflict between cosmos and chaos but rather the peaceful acceptance of the creative chaos, known as the Dreaming (see Australian Myths ):

In the beginning the earth was a bare plain. All was dark. There was no life, no death. The sun, the moon, and the stars slept beneath the earth. All the eternal ancestors slept there, too, until at last they woke themselves out of their own eternity and broke through to the surface.  When the eternal ancestors arose, in the Dreamtime, they wandered the earth, sometimes in animal form - as kangaroos, or emus, or lizards - sometimes in human shape, sometimes part animal and human, sometimes as part human and plant.

Two such beings, self-created out of nothing, were the Ungambikula. Wandering the world, they found half-made human beings. They were made of animals and plants, but were shapeless bundles, lying higgledy-piggledy, near where water holes and salt lakes could be created. The people were all doubled over into balls, vague and unfinished, without limbs or features.  With their great stone knives, the Ungambikula carved heads, bodies, legs, and arms out of the bundles. They made the faces, and the hands and feet. At last the human beings were finished .

Another example comes from China where chaos slowly gives rise to creation with no element of conflict (see Chinese Myths):

In the beginning, the heavens and earth were still one and all was chaos. The universe was like a big black egg, carrying Pan Gu inside itself. After 18 thousand years Pan Gu woke from a long sleep. He felt suffocated, so he took up a broadaxe and wielded it with all his might to crack open the egg. The light, clear part of it floated up and formed the heavens, the cold, turbid matter stayed below to form

earth. Pan Gu stood in the middle, his head touching the sky, his feet planted on the earth. The heavens and the earth began to grow at a rate of ten feet per day, and Pan Gu grew along with them. After another 18 thousand years, the sky was higher, the earth thicker, and Pan Gu stood between them like a pillar 9 million li in height so that they would never join again.

The majority of creation myths from across cultures contain this essence of creation or life emerging from the void of chaos. The chaos referred to in all these myths implies an underlying order, a place or state from which life spontaneously emerges (see Briggs and Peat, 1989, Gleick, 1987).  In many cultures these creation myths also contain conflict, a battle between the forces of chaos and cosmos. One such myth is the Babylonian myth of Marduk and the battle with the dragon of chaos, Tiamat (see Heidel, [1942] 1963) which will be discussed later.

**Chaos, sumpatheia and omens**

The nature of these creation myths, reveal a world perceived as an interlinked web of relationships and patterns, signs and events, symbols and corresponding implications.  To understand this world humanity developed a dialogue with these forces, a two-way or multi-layered exchange of one part of the web influencing the other (Eliade, [1957] 1987,32-33, Kane, 1998,14).  The Pythagoreans of the eighth century B.C.E. named this idea of an interlinking cosmology, *harmonia* (Morrison, 1956,153). While later in the third century B.C.E. the Stoics named it *sumpatheia* defined by Suzanne Bobzien (1998,169) as the idea that 'in some sense everything in the universe emits some physical influence on everything else.'

Superstitions and omens naturally arise in such a world view. For they are in essences a small action intentionally done or accidentally occurring which a person or group believes has larger implications later in time. These pairs of events which make up an omen are discussed by Erica Reiner (1999,23) as the protasis (if-cause) and the apodosis (the forecast) and both are indifferent to scale: the size or nature of the protasis, a mad dog, a cat, a cloud passing overhead or a celestial event were not relevant to the size of the expected apodosis.  For example, Reiner (1999,33)  gives a translation of some Babylonian Venus omens from about the seventh century B.C.E.: 'If Venus's position is green: pregnant women will die with their fetuses – Saturn stands with her'. This is a celestial omen linking a visual event in the sky to a human event on earth with no regard to the size of the planet Venus in relationship to the size of a pregnant woman. Furthermore, Reiner points out that the nature of omens and superstition is that if the protasis is repeated, then it was expected that the associated apodosis would also occur in a similar manner.

In modern times omens and superstition still play a role in many people's lives. For example, the recently-retired Australian cricket captain, Steve Waugh who set new world records in batting, never went out to bat without his old red handkerchief in his pocket always showing against his cricket whites.[1] He believed that by carrying the lucky red handkerchief, he would have a better chance of repeating his high scoring performance, although he did not expect to always score the exact same number of runs. Thus for Waugh the protasis was his red handkerchief and the apodosis was gaining a high score.

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[1] Personal knowledge from commentaries on the ABC (Australian Broadcasting Commission) while they broadcasted live coverage of cricket matches.

In both these examples of the appearance of the planet Venus and the carrying of a red handkerchief the association of linked events is across scale as well as, at least in the case of Waugh's superstition, also not looking for exact repetition but similarity. Both of these concepts are a part of chaos mathematics. The first is known as scale-invariance, the phenomena of a repeating shape or event occurring from the very small to the extreme large (Mandelbrot, 1977,196-7, Briggs and Peat, 1989,108). (*see* Glossary for more information). The second is defined as self-similarity, which is the phenomenon that a shape or event will repeat itself not in an identical but rather a similar manner (Mandelbrot, 1977,16-17, Bütz, 1997,17). (*see* Glossary).  Later in this paper these two concepts will be explored in fractals where they come together to form patterns. However, at this point of the discussion it should be noted that the joining of the idea of scale invariance with that of the phenomena of self-similarity implies that a superstition or omen, astrological or not, is also reflected in chaos theory findings and thus may be a vernacular product of people living in what they saw as a chaosmos rather than that of the later Greek designed ordered assured cosmos (Cornford, 1935, 1997) .

**Astrology's emergence in the era of chaosmos**

Astrology genesis was in the practice of such celestial omens and this genesis was formed when the world view was supporting a chaotic, sympathetic chaosmos. James Tester (1987,13) refers to the Babylonians of the second millennium  B.C.E. by commenting that:

> They clearly presupposed that there is some relationship between what happens in the sky and what happens on earth, though they do not suggest that the relationship is one of cause and effect.

Astrology, as a marriage of heaven and earth, developed in a visual format in Mesopotamia around the ninth century B.C.E. where the observable world was read as flowing, interchanging relationship between the life on earth and the sky (Campion, 1982,7, Reiner, 1999,22).  Christopher Walker (1989,10) argues that from the formation of astrology the Mesopotamians sought to understand the emerging patterns of events on earth through the mixture of celestial phenomena, weather patterns and omens. All of which, as has already been suggested, is a reflection of the concepts of modern chaos theory of self-similarity and scale invariance.

Another such example of astrology drawing together seemingly non-related patterns is reflected in one of the earliest known natal horoscopes which is from the fifth century B.C.E (Rochberg, 1998,56):

> Nisannu, night of the 14th, son of Sumu-usur, son of Sumu-iddina, descendant of Deke was born. At that time, the moon was below the Pincer of the Scorpion, Jupiter in Pisces, Venus in Taurus, Saturn in Cancer, Mars in Gemini. Mercury, which had set, was not visible. Nisannu 1, 28 the 14th was 4,40. The last visibility of the lunar crescent was the 27th. (things?) will be propitious for you. Du'uzu, year 12 .. 8…

Here we see the linking of sky patterns to the life of a person which enabled the scribe to say 'things will be propitious for you'.  Indeed based on these links this paper argues that it is *only* within the environment of a chaotic sympathetic chaosmology could astrology have emerged. Astrology requires the interlinking of seemingly disconnected systems. It assumes that one can read order and understand patterns of events on earth by observing the

complex and numerous variables within the heavens. In the first century C.E. Claudius Ptolemy (1969, Book 1.1,2) writing on the mechanism within astrology stated 'That a certain power, derived from the aethereal nature, is diffused over and pervades the whole atmosphere of the earth, is clearly evident to all men.' While some fifteen hundred years later the French astrologer, Jean-Baptiste Morin (1583–1656) (1994,7) stated this central tenet of astrology by simply writing, 'There is nothing that is inherent in a man or will be inherent in him that is not signified by the stars in his natal horoscope.' This central tenet of astrology is a mirroring of the principles now defined in modern chaos theory as scale invariance and self-similarity.

But there can be great tension between the notion of chaos and the desire for logical linear order.

**The Birth of Order through a Battle with Chaos**

Norman Cohn (2001,3) in talking of ancient faiths, points out that there was a natural polarity between chaosmos and cosmos. It was and still is the polarity of the day and the night, that which is clear and that which is unclear. The cosmos as ordered and understandable was exemplified in Plato's *Timaeus*, where Plato wrote (Timaeus 28a), 'Now everything that comes to be must of necessity come to be by the agency of some causes', thereby requiring a causal logical, clarity, a linear simplicity. This view of preferred order was in juxtaposition with the nature of chaos, as discussed earlier, which had non-causal links between patterns which have no regard for scale of size, time or nature. Mircea Eliade ([1957] 1987,22) argues that this polarity led to conflict for such chaotic features were an anathema to the ordered cosmos.

Ralph Abraham (1994,125) discusses one such conflict of the overthrowing of chaosmos by cosmos by citing a Sumerian creation myth from around 2500 B.C.E.  In the myth *Enlil's* (earth) son Niurta defeats the dragon or serpent of chaos, Basmu. Later in the *Enuma Elish*, the epic hymn of the Babylonian creation myth, the earliest known written example of which is from the twelfth century B.C.E  (cited in Abraham, 1994,128) chaos is defined as the dragon Tiamat:

> When above unnamed was the heaven,
>
> The earth below by a name was uncalled,
>
> The primeval deep was their begetter,
>
> The chaos of Tiamat was the mother of them all.

Tiamat engages in a struggle with Marduk, the later replacement of the Sumerian deity of earth son, and eventually Marduk acquired new weapons and overthrew her (chaos) and split her into two. One part he left in the earth and the other he placed above the earth to make the covering of the heavens (Abraham, 1994,129). This battle of Marduk against the chaotic serpent Tiamat was also reflected in Genesis, Revelation 12:7-9 with the battle between the archangels of Michael and Lucifer –Satan (The Dartmouth Bible, 1950):

> And there was war in heaven: Michael and his angels fought against the dragon; and the dragon fought his angels. And prevailed not; neither was their place found any more in heaven. And the great dragon was cast out, that old serpent, called the Devil and Satan, which deceiveth the whole world: he was cast out into the earth, and his angels were cast out with him.

Such a conflict was also contained in the fourth century story of St. George and his victory for Christianity over the pagan religions symbolised by his killing of a dragon (Stuart, 1933). In all of these myths and stories the dragon, with its chaotic symbolism, was seen to reflect all that was negative and destructive and must be condemned, overthrown, damned, killed, beheaded and eliminated for all time. These battles were not ones in which resolution or compromises are considered. They demand total victory and the total eradication of all of the dragon elements. Indeed Abraham (1994,189-98) argues that Marduk represented the ordered cosmos and Tiamat the chaotic creative void, chaosmos,  and that the west, historically and culturally, has been in a continuum of this ancient battle which seeks the permanent removal of the dragon of chaos.

In discussing his own field of psychology and the use of chaotic concepts in his profession, Bütz (1997,214) supports Abraham's idea of the domination of the ordered cosmos and the damnation and continual attacks on the ideas or nature of chaos:

> Those who do not go along with the current orderly paradigm lose funding, cannot get published, or lose their positions. If, on the other hand, they are practitioners [of psychological chaos] they may lose their license to practice if they do not follow along with the linear medicalization of the psyche. .. It has been a powerful political influence, pushing along the idea of order, linearity, and other similar ideas that equate to good at all costs.

Bütz further suggests (1997,214) that this battle was the force behind the Christian missionary movements which he suggests was the desire to rid the world of chaos by the conversion of the primitive or evil savages, '.. it

appears Christians condemn chaos as a thing associated with the devil  and therefore, to discuss disorderly ideas would surely be of the devil.' This battle is also expressed in popular culture through Ridley Scott's film *Alien* (1979) a modern box-office success and now of cult standing. In the film the evil female monster was in conflict with a female of the realm of cosmos played by Sigourney Weaver. These two were locked in mortal combat. H.R. Giger's famous female monster wanted to breed with the human race and therefore, from cosmos' point of view, potentially destroy all of humanity. This fertile, salvia-dripping, scaly, female monster (Appendix 1 *figure 3*) can be likened to a version of Tiamat. Weaver's task in Scott's film was not to negotiate with the monster but to totally eliminate her from the face of the universe.

**Chaosmos to Cosmos**

The shift from the creative void of chaosmos to the divinity of ordered cosmos was slow. The creative force hidden in the darkness or turbulence of chaos was a theme central to the philosophy of Heraclitus (540–480 BC) when he proposed a law which he called *logos* where forces moved towards each other. Klaus Mainzer (1994,17) quotes Heraclitus saying, 'What is opposite strives towards union, out of the diverse there arises the most beautiful harmony, and the struggle makes everything come about in this way'. But the flux or *logos* of Heraclitus had philosophical problems for the Greek desire for knowledge.  If everything was in a state of flux, then everything was constantly changing and if everything was changing, then nothing could be known. As Heraclitus (2003,fg 41) stated, 'The river where you set your foot just now is gone — those waters given way to this, now this.' The creative chaos, argued Heraclitus, did not allow for the concept of knowledge, yet such a philosophical terminus was unacceptable

to the needs of a philosophy seeking the stable, and thus knowable, order of cosmos.

Mainzer (1994,18) points out that Parmenides of Elea (c. 500 B.C.E.) presented a counter argument to Heraclitus he argued that the world was solid and uniform without motion and time. This Eleatic philosophy of unchanging being yielded a singular end state of the highest symmetry. Plato also answered Heraclitus by suggesting that the ever-changing flux could exist in the land of the living, the sub-lunar world, but that the divine or godly world was perfect, orderly, totally stable and consistent. In the *Republic* Plato (530b) was critical of learning by observation of the world,

> Then if, by really taking part in astronomy, we're to make the naturally intelligent part of the soul useful instead of useless, let's study astronomy by means of problems, as we do geometry, and leave the things in the sky alone.

Based on this and other passages of Plato's work Luce (1992,99) argues that Plato considered that there was nothing that belongs to the body, or the visible, the sensual or phenomenological which could be used as a source of truth. Knowledge could be found only be in a stable unchanging place. To allow for the existence of knowledge Plato (*see Timaeus* 28a) created two worlds. One was the place of 'being' the perfect, stable and orderly world which could be known if one applied reason, this world belonged to the divine. The other was that of 'becoming' the sub-lunar where all things were subject to change. With knowledge existing only in the orderly divine world, the measure of the verity of a 'truth' was linked to its measure of elegant, simplicity or beauty. According to Bernard Williams (2001,88)

Plato emphasised this split across most of his works with god  as knowledge and earth and body as the unknowable.

Plato's thinking also extended to motion. Mainzer (1994,29) points out that for Plato there were only two forms of motion. One was the straight line and the other was the curve. The curve was considered the more perfect of motions because it could go on without end and thus Plato assigned it to the unchanging celestial spheres and the stars. For Plato the planets orbited the earth in perfect circles attached to perfect spheres (*Timaeus* 34a). The second motion was the straight line and that was considered by Plato to be less perfect, assigned to the four elements and placed in the sub-lunar changing world. Plato also noted the irregular retrograde motion of the planets and believed this apparent aberration in the heavens could be explained by some simple perfect truth (*Timaeus* 40c-d).

Abraham (1994) argues that the potency of Plato's thinking, mixed with the materialism of Stoic philosophy of the third century B.C.E. and put through the neo-Platonic lenses of Plotinus (204–270) and later Saint Augustine (354–430) resulted in a cosmic view linked with the Christian God and any view of chaosmos or non-order, which was, and still is, linked with the negative or even the demonic. Mainzer (1994,24) makes a similar argument stating that Plato's attitude to the retrograde movement of the planets and his desire to explain them within his perfect circular model had large implications for the development of ideas and research up to the present day.  Mainzer (1994,24-25) adds that it was Apollonius of Perga (ca 210 B.C.E.) who eventually answered Plato's question by suggesting that the planetary orbits contained epicycles: smaller perfect circles located at points on bigger perfect circles . This model of the heavens persisted until the work of Johannes Kepler (1571–1630) who will be discussed later in this paper.

In response to the perfect world of Plato, Aristotle (384–322 B.C.E.) introduced the ideas of Form and Matter to explain the principles and function of the ever-changing shape of life. Luce (1992,116) comments that the form was that which made the individual being what it was while the matter was the substance that had been shaped by the form.  Aristotle (*Physics* II.3) also suggested that matter had a potential for being formed and not until matter has been formed does reality come into being.[2]  Unlike Plato, Aristotle believed the physical realm was not imperfect and concluded that the physical realm, despite always being in flux, moves towards specific ends, demonstrating a certain teleology (*telos* = 'end' or 'purpose'). The essence of a thing, he argued, did not lie outside the physical realm but was contained within it (see for example *Phys*. 194 b 13; *Metaph*. 1032 a 25, 1033 b 32, 1049 b 25, 1070 a 8, 1092 a 16).  Unlike Plato therefore who saw nothing but imperfection in the sub-lunar world, mere imitations of a perfect form in the divine world, Aristotle considered that each organism strove towards perfection in a teleological manner towards its inherit perfect form.

For Aristotle, movement and change was the key, not in the manner of Heraclitus where fire *(logos)* was the driving force but rather the desire of matter to take the form to which it was destined.  Richard Tarnas (1996,57) sums this up by saying:

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[2] These ideas are represent throughout Aristotle's work notably *[Physics* II.3; and (extensively) and  in *Metaph*. A.3 ff. See also *Part. An*. 639b12ff, *APo*. II.11; *Metaph*. D.2; *Gen. et Corr.* 335a28-336a12.].

Aristotle brought a more pronounced recognition of nature's processes of growth and development, with each organism striving to move from imperfection to perfection: from a state of potentiality to a state of actuality, or realisation of its form. While Plato emphasised the imperfection of all things compared with the Forms they imitated, Aristotle taught that an organism moves from an imperfect or immature condition in a teleological development toward achievement of a full reality in which its inherent form is actualised: the seed is transformed into a plant, the embryo becomes the child, the child becomes the adult, and so on.

Both Heraclitus and Aristotle accepted the concept of movement as one of the great forces at work in nature. Heraclitus considered nature was driven by *logos* while Aristotle saw nature driven by each separate entity containing its own teleological force pulled towards its inner idea of perfection.

Anthony Mansueto (1998) argues that thinking has now turn against chaos as well as Aristotle's ideas on teleology. Instead Aristotle's work was blended with Plato's ideas of a perfect world to yield a research approach to the natural world, an approach that considered that the natural world could be understood through the lens of Aristotelian philosophy of observation but with the understanding that all answers or reasons concerning the physical sub-lunar world were superior or closer to the 'truth' if they were simple and elegant. As Prigogine and Stengers (1984,7) argue the greater the elegance of the answer, the closer the answer was to the divine; the closer the answer was to the divine, the closer it was to *the truth.*

According to Mainzer (1994,27,29) even Nicolaus Copernicus (1473–1543) strove to find a solution which fitted into the framework laid down by Plato. Working within the guidelines of Plato's original question of an elegant solution to the observed retrograde moment of the planets, he placed the sun in the centre and allowed the earth to orbit on one of the perfect circles. He therefore explained the retrograde motion of the planets in a simpler fashion, Mainzer writes:

> Copernicus considered that greater simplicity in the sense of "natural" circular motion to be a sign of proximity to reality. …

> Simplicity was not only understood as the demand for an economical methodology, but, still for Copernicus, as a feature of truth. Thus, the astronomical doctrine from Plato to Copernicus proclaimed: reduce the apparent complexity of the celestial system to the simple scheme of some true motions. …

Truth was thought to be held in the simple and the elegant.

However, although completely comfortable within neo-Platonism Copernicus new model of the solar system began a one hundred year period of change where many different models of the solar system were proposed. The resultant upheaval provided the intellectual space for the work of Johannes Kepler and Galileo Galilei (1564–1642).

**The Domination of Cosmic Thinking**

The supernova of 1604 observed by Kepler and presented in his work titled *De Stella Nova* (published in Prague 1606) was more than just an interesting observation in astronomy. It was the recognition of change in the perfect

unchangeable divine realm. Earlier in his *Mysterium cosmographicum* (published in Tübingen, 1596), Kepler had pursued Plato's thinking with regard to perfect shapes where simplicity was understood as a harbinger of truth. With this Plato's perfection in mind he created a model of the solar system which based planetary distance on Plato's regular solids. However, his later work, *Astronomia Nova* published in 1609 after his discovery of the supernova in 1604, was a dissolution of Platonic concepts of simplicity (Gentner et al., 1997,12-14). In this work Kepler (1609) produced his first two laws of planetary motion, the first law stating that the planets moved in ellipses with the sun at one foci of the ellipse, and the second law stating that the arc described by the orbiting planet describes equal area in equal time. Hence the planets needed to speed up and slow down depending on their position on the ellipse of their orbit.

Kepler had removed the perfect circles from the heavens. The perfect, unchanging and therefore knowable, divine realm was no longer. Combined with the observation of the supernova of 1604, the sky was seen as a place of change. This shift of attitude to the heavens was summarised by Kepler when he was nearing the completion of his book, *Astronomia Nova,* in a letter that he wrote in 1609 to Herwart von Hohenzollern, the Catholic Chancellor of Bavaria, where he stated his desire to return order to the heavens but under new rules (Koestler, 1959,345):

> My aim is to show that the heavenly machine is not a kind of divine, live being, but a kind of clockwork, insofar as nearly all the manifold motions are caused by a most simple, magnetic, and material force, just as all motions of the clock are caused by a simple weight. And I also show how these physical causes are to be given numerical and geometrical expression.

At the same time that Kepler was seeking to return order to the heavens the idea that one could never measure of predict anything in the sub-lunar world was being challenged.

Galileo, a contemporary of Kepler, was also interested in motion, but it was motion in the sub-lunar world that he wanted to explore. In his *Dialogue on the Two Chief World Systems,* Galileo (1953, 2001,14) used a dialogue between Simplicio and Sagredo to show his attitude to Plato's consideration that truth only existed in the super-lunar realms:

> Simplicio: But I still say, with Aristotle, that in physical (*naturali*) matters one need not always require a mathematical demonstration. Sagredo: Granted, where none is to be had; but when there is one at hand, why do you not wish to use it?

At this time the organic, sub-lunar world could only be understood by thinking and philosophising. Yet Galileo proceeded to measure, weigh and calculate laws which began to explain and predict the workings of the sub-lunar world (Olschki, 1943,351). Indeed his approach to the sub-lunar world was so radical that the French philosopher René Descartes (1596–1650) rejected Galileo's physics totally because he, Galileo, had failed to investigate the cause of motion or heaviness but had instead simply measured it (Drake, 1996,11). Both Kepler and Galileo corresponded with each other but both pursued their own endeavours: one the motion of the heavens; the other the motion in the sub-lunar world. Nevertheless the combined impact of both their work was to swap the polarity of cosmos and chaosmos. Order fell from the sky under the publications of Kepler but found a home in the sub-lunar world via the work of Galileo. Eventually cosmic thinking reclaimed it rulership over the sky but for a short time it

appeared as if Tiamat had returned to the sky. This turbulence was reflected in the poem of John Donne written in 1611, *The First Anniversary* when he wrote:

And new Philosophy calls all in doubt,

The Element of fire is quite put out;

The sun is lost, and th'earth, and no man's wit

Can well direct him, where to look for it.

And freely men confess, that this world's spent,

When in the Planets, and the Firmament

They seek so many new; they see that this

Is crumbled out again to his Atomis.

'Tis all in pieces, all coherence gone;

All just supply, and all relation:

Princes, subject, father, son, are things forgot…

However, Kepler eventually succeeded in his new view of the heavens. He discovered his third law of planetary motion which he published in *Harmonices mundi libri* V (Linz, 1619) in which he showed that he had found the 'elegant' relationship between the orbital period of a planet and it distance from the sun, returned the surety of simplicity and order to the sky.

A generation later, Isaac Newton (1643–1727) also helped this domination of cosmic order with his mathematical development of differential equations (see Glossary) which were the foundation of calculus, the equations required to deal with shifting variables. Indeed after Newton, the idea of chaos as the creative force no longer had dominion over earth or sky and was placed amongst the primitive worlds of superstition and ignorance. As Capra asserts (1996,119):

> … Newton's differential equations became the mathematical foundation of the mechanistic paradigm. The Newtonian world machine was seen as being completely causal and deterministic.

The science of the day considered that all things could be known, all things were in order, and that this order was stable. The scientific quest was thus to remove chaos and having nothing but order. Marquis Pierre Simon de Laplace (1749–1827), the French mathematician and astronomer, summarised the position of science when he stated (1812,4):

> We may regard the present state of the universe as the effect of its past and the cause of its future. An intellect which at any given moment knew all of the forces that animate nature and the mutual positions of the beings that compose it, if this intellect were vast enough to submit the data to analysis, could condense into a single formula the movement of the greatest bodies of the universe and that of the lightest atom; for such an intellect nothing could be uncertain and the future just like the past would be present before its eyes.

There was, of course, disagreement with this mechanical, knowable, ordered world notable in the work of the philosopher Immanual Kant (1724–1804) (1971,340) who attempted to suggest that an organism:

> Cannot only be a machine, because a machine has only moving force; but an organism has an organising force… which cannot be explained by mechanical motion alone.

Here Kant is suggesting that Aristotle's *telos* should not be abandoned and from the work of Kant, Wolfgang von Goethe (1749–1832) and Friedrich von Schlegel (1772–1829), a romantic philosophy arose in Germany which supported chaos principles. This philosophy was voiced by von Schlegel (1847,4) when he advocated that although knowledge and the advance of knowledge by reductionism was a productive endeavour, the greater noble cause was the inner mental life *(geistige Leben),*which was not able to be reduced in this way. However, the work of Charles Darwin (1809–1882) silenced the debate. Darwin's publication of his theory of evolution was held as proof of the validity of the reductionist, mechanised world view. Darwin's theory attempted to show that complex organisms could evolve purely by the pressure of survival of the fittest, thereby removing any teleological or natural self-organising elements from the equation (Larson, 2004,79-111). Kauffman (1995,6) argues that from this time forth life was based on chance and became mechanical. Marduk had finally defeated Tiamat with the new weapon of Darwinism.

Yet in spite of the domination of order cosmos and the damnation of chaosmos, the idea of a creative chaos has stayed with humanity. The notion of creation coming from the chaotic void and an inter-related sympathetic chaosmos, is central to superstitions, folk lore, 'old wives tales' or what some may call the 'hocus pocus' of the common folk, and also, as this paper explores, it is central to astrology.

**Chaosmos as a world view**

For clarity, therefore, at this junction it may be wise to summaries some of the components for a world view which supports chaosmos and show some of the links with contemporary chaos theory:

The central feature is a need for feedback. All things are interlinked by relationships which embrace a continuous feedback system. This can be considered as the same concept as the Pythagorean notion of *harmonia* and the Stoic idea of *sumpatheia*. It is expressed in chaos mathematics as iteration, the process in mathematics of feeding the results of a particular style of equation back into itself (Briggs and Peat, 1989,57), (*see* Glossary for further explanations).

A system in such a feedback relationship is also very sensitive to the the initial conditions at its genesis. The conditions at the commencement of an event can have influence on the outcome of a later event. This is expressed in chaos theory as Sensitive Dependence on Initial Conditions or SDIC (Eenwyk, 1997,49-50) ( *see* Glossary for further explanations).

As a system emerges it displays self-organisation and does not require an 'architect' or any form of external organising force.  In chaosmos there is a natural tendency for order to occur spontaneously. This is also the argued with chaos theory with any particular emerging system which is subject to feedback (Waldrop, 1992,102, Briggs and Peat, 1989,137-42). This new order moves forward through time in a self-similarity manner, that is there is a tendency for the new order to produce similar shapes or events. In the human sciences it is the feature of a family or a person to experience the re-occurrence of past patterns (Bütz, 1997,17-18) (*see* Glossary for further explanations).

In this regard omens and superstition can be considered to be events which are sensitive to their initial conditions, the moment of an event. In this way they are events linked by scale-invariance, a small event can indicate a much larger event. They are also events which emerge in a self-similar

manner, that is the reoccurrence of an the first part of an omen leads to the reoccurrence of the apodosis in a self-similar manner to its previous manifestation.

**Overview of the some of the key concepts in this section**

This section has considered the nature of creation myths and shown that many of these represent a chaosmos, a belief that life and a shifting order emerged from a creative void. It then considered the origins of astrology as a product of the Mesopotamian view of chaosmos, rather than the Greek cosmos. The section then explored the tension between the Greek cosmos and earlier chaosmos and discussed the hostile reaction of cosmos in seeking to overthrow chaos. Additionally, it looked at some philosophical implications of the domination of cosmos in terms of the defining the idea of 'truth' and summarised the nature of a chaosmos world.

# Section 2

# The Return of Chaos

In 1899, a few years before Einstein was becoming the deified figure of science with his Theory of Relativity, a French mathematician, Jules Henri Poincaré (1854–1912), solved the Three Bodies problem first poised by Newton (Newton, 1966,Prop.66 Bk1). Newton had been seeking the solution to predicting the future position of three planets, each of which was applying gravity to each other. In fact Newton had found the limits of linear dynamics and classical science — defined by Capra, as causal and linear (1996,xxviii).  Poincaré solved Newton's problem by mathematically proving that there was no solution, that the positions could not be predicted, only estimated (see Poincaré, 1914) . However, as Bütz (1997,6) comments Poincaré's solution went largely unnoticed as physics, at that time, was enthralled with the work of Einstein. Nevertheless, Poincaré is now considered the grandfather of chaos theory as his solution of 'no solution' was the beginning of the undoing of Newton's clockwork universe. Poincaré had shown that science could not *know* everything. The paradigm of the ordered cosmos had encountered its limitations. Laplace's argument was finally, albeit slowly, being banished. As Bütz comments in the same passage, the undoing of the mechanical world of order was not caused by some obscure cerebral-rarefied problem. Instead it was undone through the seemingly simple situation of understanding the orbital path of three planets all influencing each other by gravity. The huge weakness in the linear model was thus exposed. According to Mainzer (1994,71) this was a turning point from ordered cosmos back to looking at non-ordered chaos:

The equilibrium of the Parmenidean world broke down and changed to the evolutionary and complex world of Heraclitus, caused by a basic principle of quantum physics under the hypothesis of a "smooth" time without singularity.

**A brief overview of chaos theory and complexity**

The term chaos was first used in science by James Yorke in 1975. He used it in its classical science expression referring to the findings of Edward Lorenz (Gleick, 1987,65-69). Lorenz had found that in weather prediction small changes in variables lead to vastly different results, a finding that defied prediction in classical science. Yorke's use of the term chaos described the unpredictable and apparent randomness in behaviour of complex interlinked systems and contained all the negative cultural values that chaos and non-order had come to mean to the western world. Yet, as stated by R.A Thiétart and B. Forgues (1995,19) this scientific version of chaos has now proven to be the creative source for all living systems as it is the source of self-organising new patterns which can then be 'ordered'. In this way the new chaos of mathematics is in fact reflective of the mythic, primal and creative chaos of ancient mythology, chaosmos. For these reasons Robert Poole (1989,25-28) in 1989 defined chaos as 'Chaos is order disguised as disorder, a sheep in world's clothing.'

Briefly, as stated by Prigogine and Stengers (1984,75) chaos theory is the study of the impact of feedback into a dynamic system. A dynamic system is a collection of responsive 'units' which can be an equation in mathematics or an organism in biology or an organisation in social systems, human or otherwise. There are two types of dynamic systems. The first is called a linear dynamic system and is a dynamic system in which all the

units function in a sequential or linear manner so that A impacts on B, B on C, and so on. Such a system is fully understood by classical science. Classical science, however, reaches its limits when dealing with a dynamic system that is linked by feedback. A system, for example where A impacts on B, and C but B and C also impact on A as well as on each other. This means that A's next impact on B and C is altered due to the impact it received from B and C. This is Newton's Three Body problem discussed earlier where if three bodies are all influencing each other their different movements cannot be predicted. This is called a non-linear dynamic system and was considered chaotic, random and unable to be studied by the reductionist methodology of classical science.

Capra (1996,40) approached this problem of what could and could not be understood by presented the notion he defined as 'approximate knowledge' rather than exact knowledge:

> This new approach to science [complexity and chaos] immediately raises an important question. If everything is connected to everything else, how can we ever hope to understand anything? Since all natural phenomena are ultimately interconnected, in order to explain any one of them we need to understand all the others, which is obviously impossible.

Here Capra, or the science that he represents, stands in the same position as Plato when dealing with the implications of Heraclitus' philosophy discussed in section 1. The dilemma presented by Heraclitus, was if all things are in a state of change, if all things are linked, then we can never know anything (Heraclitus, 2003,fg 41). However, Capra puts forward an

answer. In the same passage of his work Capra offers the solution, the idea of 'approximate knowledge':

> The old paradigm is based on the Cartesian belief in the certainty of scientific knowledge. In the new paradigm it is recognized that all scientific concepts and theories are limited and approximate. Science can never provide any complete and definitive understanding.

Capra' idea contains two important points. The first is that since 'approximate knowledge' accepts the connectedness of all things, the inter-relationships and feedback of one system on another, it does allow space for the principles of chaos and complexity to be acknowledge as valid concepts. Furthermore, it challenged the value judgement — 'perfect', 'imperfect' — that science had place on knowledge. No longer was there a need for Descartes' split of the world of two separate places, that of perfect and that of imperfect ([1644]1984,Pt. IV, art.187).  No longer was there a need for conflict between the principles of cosmos and chaosmos.

This potential removal of the tension between order and chaos was vital. For science was finding that the chaotic non-linear dynamic systems are the very systems of life. Whether 'life' is defined as a simple, single cell or a complex animal or even a society of organisms functioning in their environment, life functions in relationships (Thiétart and Forgues, 1995,19). Life and the organisations of life, as Kauffman states (1995,15) interact with their environment, form relationships, apply and receive feedback and emerge and move through time in organised ways. Classical science's success in understanding linear dynamics had meant, as has been discussed, that linear orderly dynamics have been seen as superior to non-linear and had been applied to problems involving living systems. Mitchell Waldrop

(1992,17) points out that the consequence of this is that stability or 'balance' has been the goal in economies. Similar John van Eenwyk (1997,43) extents this desire for order and stability beyond economies to the preferred state for organisations, political systems, populations, communities and even in individual lives. But this very stability could also spell death.

**Two types of chaos – entropic and deterministic**

By the late twentieth century economists discovered that stable systems tended towards stagnation or death or what is now called entropic chaos (See Waldrop, 1992). An example of a simple form of entropic chaos is a pendulum clock swinging its pendulum back and forth over a fixed point until it eventually winds down. Its energy becomes the same as that of its environment and movement no longer occurs. However, as Paul Davies (1989,501) notes if systems are pushed into an unstable situation through feedback then new patterns, new order, new options are encountered. This was called deterministic chaos and it is now being applied across many diverse disciplines from economics and companies to family therapy and even to the health and life style of individuals (Blackerby, 1993,135-7, Thiétart and Forgues, 1995,19, Eenwyk, 1997,45, Bütz, 1997,18).

However, history shows that it is unwise to push a stable, orderly but becoming static economic or social system into complete chaos as the human suffering involved in the process of the new emerging economic or social patterns is usually considerable. When this occurs in political systems it is called a revolution which, although eventually yielding new patterns, does so with loss of life and general human suffering. In the 1990s (see Waldrop, 1992) economists studied just how much an economy needed to be 'disturbed' in order for it to start to yield new patterns.

**Complexity – a phase just before chaos**

The on-going results from this research have revealed that there is a thin zone between a static system and a system in chaos. It is in this thin zone located just on the edge of chaos, just before a system goes chaotic, that order naturally occurred and where complexity increased with no apparent cause (Kauffman, 1991, 1995,15, also see Corcoran, 1992, Waldrop, 1992). This discovery of a natural increase of order, seen as patterns or complexity, in this zone between static and chaotic challenged the Second Law of Thermodynamics (*see* 'Thermodynamics' in Glossary). This law states that all systems move towards disorder. In classical science this is the statement that entropy (*see* Glossary) increases. Put more simply, this law states that all systems wind down to no patterns and no individual shapes or forms (Capra, 1996,48). Thus systems which were not sensitive to feedback would become simpler and 'wind down', however it was found that systems that contained feedback did not 'wind down' but instead became more complex over time. This phenomenon was called *Complexity*.

The biosphere can be considered a place of 'complexity'. It is a thin film wrapped around the earth about twenty miles thick. In proportion to the earth, the biosphere is no thicker than a coat of paint on a globe the size of a soccer ball. It is also the only known place where life exists in the universe. Thus all of life exists in this thin space between the solidness of the earth and the vacuum of the sky. The biosphere is therefore, as defined within complexity, the zone between the states of static/unchanging and chaotic/all changing. And in this zone we, according to complexity, live our lives in an order of repeating patterns (Kauffman, 1995,15, Capra, 1996,209-11).

Thus the application of complexity and its implications for all life has spread beyond economics. Indeed life is like an economy as it engages in

feedback, it creates a web of naturally-occurring interlinking patterns within its environment and thus forms social and/or community systems such as hives, anthills, nest, colonies, flocks, herds, tribes, cities and nations (Kauffman, 1995,186, Abraham, 1994,209). Similarly the way an individual living organism moves through its life —  being influenced and influencing by its environment — means that it, too, will be involved in these naturally-occurring patterns and experience them as upheavals and disturbances, times of ease and then times of stress. Consequently, the thinking and principles of complexity and chaos theory have been absorbed into the human sciences, psychology and family therapy (Bütz, 1997,18, Eigenauer, 1993,469)  as well as to business systems. Mary Ann McClure (2004) points out that:

> Self-organizing government agencies function best in conditions of bounded instability, instead of a state of equilibrium, as advocated by the more traditional system theorists. It follows that managers must accept uncertainty and risk and learn to see crises as opportunities that allow for innovation and a new responsiveness. They must learn not only to be comfortable with instability, but also to create disorder when the organization becomes too stable.

It has been established that chaos can creates new order and in turn order is not stable and can move towards chaos. At the edge of chaos greater complexity (new order) and patterns emerge. These new patterns continue to emerge until eventually they move into chaos to once again re-emerge transformed into new order and patterns (deterministic chaos), or end never to appear again (entropic chaos).

There are arguments against the findings of chaos and complexity, and one such voice is that of Richard Dawkins (1989) who in his work *The Selfish Gene* supported a classical scientific view. In this work he suggests that the primary reason for genes to exist is to benefit themselves, rather than other organisms or the environment in a supportive, evolving, order-forming network (Complexity). His arguments support the neo-Darwinian model of evolution and challenge the findings on evolution by complexity theory. The merits of his arguments are not the province of this paper which is focused on exploring the findings of chaos, both ancient and modern, rather than debating its actual existence. Nevertheless if Dawkin's argument were to be accepted as valid, then the question that this paper asks would no longer relevant.

**Fractals and life**

The role that chaos and complexity can play in understanding the emerging dynamics of life and living systems individually or collectively can be considered in its visual form of fractals.

Benoit Mandelbrot (1977)  coined the term 'fractals' from the Latin *fractua* – to be irregular (*see* "Fractals" in Glossary). He was working with the hand-calculated and hand-drawn graphs of the early twentieth century French mathematician Gaston Julia (1893–1978). The patterns/graphs produced by Julia and published in 1918 were a visual representation of how order is created at the edge of chaos. Julia found these patterns when he iterated equations which contained imaginary numbers. These are numbers which retain their quality of either negative or positive values independent of calculations in which they are used (Allen, 1922,302) (*see* Glossary for a further explanation).

Julia, and later Mandelbrot found that by observing the imagery of fractals the shapes grew in a scale invariance and self-similar manner (Bütz, 1997,17).  To clarify this point, a fractal will continue to produce the same patterns and images regardless of the scale or magnification, see *figure* 1. (*Also* s*ee* Appendix 2 *figures 1 to 7* for more information). A fractal, however, is produced by an equation fed back on itself, and thus is a simple visual representation of a system which is in feedback and hence can move towards the edge of chaos. When the results of the equation move off into infinity (entropic chaos) this is represented by the red area or the black area in the diagram in *figure 1*. The 'edge of chaos' is where the actual visual pattern occurs. Continual iterations of the equation will produce results which give a new expression of the pattern (deterministic chaos).
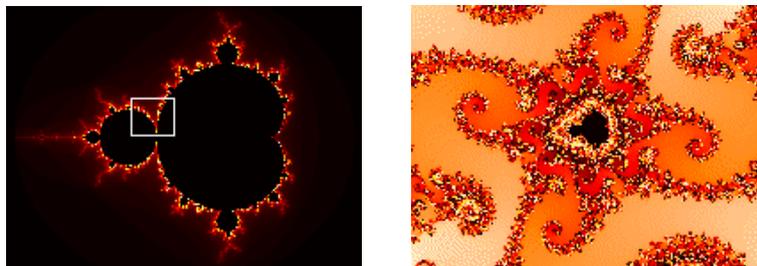


*Figure 1 –*  A fractal known as the Mandelbrot set, the image of the left is the whole set while the image on the right is a magnification of the set which shows that after extreme magnification the shape of the original set is reappearing in the pattern.

The work in fractals rapidly jumped from mathematics to an understanding of nature. Two points were quickly realised. The first was that the shapes of nature could be reproduced by iterating these types of equations, these are now called fractal forgeries (*see* Appendix 2*, Figure 8*) where a leaf, tree, mountain range and so forth are expression of the emerging fractal; the second point was that living and non-living forms in nature also grow

through self-similarity and scale invariance (Eenwyk, 1997,54). The similarity of the images of a river system, the bronchi of a lung and the shape of a cauliflower stem are examples of fractal shapes in nature which form both living and non-living shapes regardless of scale. The different shapes could be produces by using different equations. Tiny changes in the variables used at the beginning of the iterations of the equation gave vastly different results in the end pattern. As discussed earlier this sensitivity to small changes in the initial variables became known as Sensitive Dependence on Initial Conditions or SDIC (Eigenauer, 1993,458).

The step that Mandelbrot made with Julia's work was to produce a formula which took into account all possible imaginary numbers that when iterated did not move into infinity. Thus Mandelbrot found how to produce all possible fractals, all possible shapes of nature, in one set. This product or image is now known as the Mandelbrot set (see *figure 1*) and is a collection of all possible patterns.  It is in fact mother nature's master template or pattern set in which patterns and shapes in the world, as we know it, reside (Keepin, 1995). For this reason Mandelbrot's 'image' is not called an image but rather it is defined as a 'set', as it is a collection of all shapes.

Fractals are in fact a visual map of how a living unit can emerge through time, be it a company with many employees or the life of a single individual.  For this reason the implications of self-similarity and scale invariance has have been drawn into psychology.  Michael Bütz (1997:18) discusses the use of chaos and complexity in the practice of psychology by stating:

> Self-similarity adds understanding to this type of change process,
> which moves from stable to bifurcation [a point of change] to chaos

or complexity and into a new, more complex and adaptive order. These changes become a universal process as systems become unstable. This process can be applied to an individual, a family, a community, and so on — in a self-similar manner.

He is not alone with these ideas. The effect of complexity and chaos on the field of psychology has also been described by the Jungian psychologist, van Eenwyk  (1997,43) in the follow manner:

> There is a recognition that reductionism cannot be used to understand the human psyche, that there is no longer an assumption that order is healthier than chaos. There is a paradigm shift occurring in the psychological landscape in terms of chaos.

This paradigm shift referred to by van Eenwyk is a new way of understanding how life moves through time. Fractals indicate that life 'lives' by reparation (iteration) of daily life or personal behaviour patterns which produce events of similar nature (self-similar) across the many areas of a person's, company's or nation's life (scale invariance). In psychology this has led to the now-recognised phenomenon of families reproducing the same style of events over different generations (Straus and Gelles, 1990,245, Forward and Buck, 1990). Until Mandelbrot's work in fractals, these self-similar events were disregarded as little, idiosyncratic non-explainable, shoulder-shrugging patterns: the third son killed in war for three generations, the members of a family all born or dying on the same day of the week, daughters mirroring mothers in giving birth to the same number of children, or divorcing at the same age as their mother, or in the

number of marriages they made, the gender of their children, and so on.[3] As Margaret Ward (1995,630-1) comments a normal family will function in patterns because it is a living unit which is subject to feedback. What is now being considered (Abraham, 1994,215, Bütz, 1997,4) is that our group and individual lives emerge in the same manner as fractals and indeed these family or personal reproductions of patterns or events, far from being seen as odd, meaningless and at times considered superstitions, are actually to be expected and should be considered the norm.

Van Eenwyk (1997) extends this thinking into the life of a single human being. He argues that the repeating images of a fractal can be recognised as being equivalent to the personal habits of the individual. These may be stuck states in the person's life where they run the same patterns: similar relationships with similar problems; or always find they are naturally lucky or unlucky.  Van Eenwyk makes an argument for the scale invariance of a fractal being the individual's tendency to apply their philosophy of life to their political ideas, preferred sports, hobbies or personal neuroses or even to the small patterns of how one brushes one's teeth. Scale invariance can also be expressed in how an individual exists as part of a family, community or nation and as an event appears in these communities, so the individual responds (see Shulman, 1997,13-14). Thus an event on one scale is linked to an event on a smaller scale.

**Bifurcations - The way that change comes into a living system**
A fractal also has many different branches, twists and turns which can explode into new patterns and shapes or spin off out of the pattern and

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[3] This is colloquial knowledge gained by working with families and individuals as a professional astrologer.

disappear into infinity —the black or red space outside the image as shown in *figure 1*. Such a twist or turn is called a bifurcation (*see* Glossary), a junction where the equation can jump in either direction (Ward, 1995,631).

There are different types of bifurcations which can produce different parts of the pattern. One particular bifurcation of note is called a hopf bifurcation named after its discoverer, the Polish mathematician Heinz Hopf (1894–1971) and it is a bifurcation which can potentially change the whole pattern (See Strogatz, 1994). A hopf bifurcation occur at what is now called a saddle point (*see* Glossary). At a saddle point two pathways are offered to the evolving pattern, one of which will lead to an end, the other path leading to new patterns, new images, new order. Both possibilities are an expression of chaos. When the equation 'chooses' the pathway to infinity, it leaps to a place in which it disappears (into the red or black area of *figure 1*) and, as previously stated, the equation is said to move into entropic chaos. However, when the equation takes the path to new patterns, this is an example of deterministic chaos, the pathway of new possibilities.

These findings can also be applied to psychology (see Bütz, 1997, Mainzer, 1994, Eenwyk, 1997). A person will encounter choices or events throughout their life but if they seek too much order or stability, they will avoid or ignore the hopf bifurcations (options for change) in their life. This action of shunning hopf bifurcations (options for change) tends to result in life heading into entropic chaos (stagnation). The person's life becomes one where no new opportunities present themselves, no new ideas and no new patterns are allowed to enter their world and their life becomes non-changing all the way to eventual death. In contrast to this, if a person seeks or accepts hopf bifurcations and actively engages in their period of disorder while the new patterns are emerging, then the person's life will produce new

opportunities, new ventures and new patterns. At times the new patterns encountered by the individual will be older patterns on a smaller or larger scale, while other patterns will take the individual to a new part of their life, a new part of their 'personal fractal'. This would be a whole new area of life but one that was always inherently there within the initial set of forming conditions (SDIC). As shown in Appendix 2, there are different areas of the fractal, different parts and different shapes within the same fractal which the length of one human's life may never have the time to fully explore. This is the potential contained within the equation, and thus the potential contained within a life. This concept of the parameters to an equation is known as a phase portrait and will be discussed later in this paper.

## Fractals — Rituals, Superstition and Omens

The practice of rituals has also been linked to chaos and complexity theory and, by implication to fractals. Van Eenwyck (1997,113) suggests that the practise of a ritual can be reduced to the simple idea of the iteration of an equation. He suggests that by considering that time is circular not linear, then we can use ritual at seasonal times to remake the world and allow human kind to rejuvenate itself, just as chaos rejuvenates order. The repeating nature of ritual is the self-similar nature of life. Additionally an individual can use the concept of self-similarity in a more mundane manner. If a particular bifurcation yields pleasing results, then the person will consciously set up the pattern and run it again and again. Colin Campbell (1996,154) argues that this repetition gives rise to habits, rituals, superstitions at the individual or collective level of society.  He suggests that people will consciously reproduce a pattern which has previously proved fruitful and although classical science would dismiss this type of action as superstitious and merely coincidence, chaos and complexity actually suggest that this may be a valid methodology.

The actual emerging patterns produced by a given fractal are generated by what chaos theorists call a strange attractor (Polley, 1997,446)  (*see* 'Attractors' in Glossary). There are three main types of attractors. The simplest is a point attractor. A funnel with all the fluids running to the centre is a point attractor. A periodic attractor is one where bodies have a periodic oscillation like the planets orbiting around the sun, where the sun is the periodic attractor. The third attractor is called a strange attractor. Capra (1996,132)  points out that strange attractors exist in a chaotic system and can be understood by observing the external patterns of an iterated equation or life (person, ant, company, economy, and so on). The emerging events of the equation or life will appear to occur randomly in a manner which looks to the person embedded in classical science as being unpredictable. However, when this journey of emergence is plotted graphically, the movement, far from being random, actually orbits around a set of multidimensional foci. The moving foci points are what are called strange attractors. Lorenz's famous butterfly and weather example came about when he plotted the apparent random results of his iterated equations and produced an image in the shape of a butterfly. Each 'eye' on a wing was the focus point of a strange attractor (Stewart, 2001,177). For an image of Lorenz' strange attractor see Appendix 2, *figure 9*.

These strange attractors are a great deal more than just interesting patterns. Complexity  theorists imply that the interlinking of life with all its environmental influences actually creates strange attractors and these in turn will produce fractal patterns, patterns of behaviour (Eenwyk, 1997,48). According to studies within chaos and complexity, life and all the products of life functions by orbiting around strange attractors. Sections of psychology have embraced the concepts of strange attractors as the invisible

hand in an emerging events of life, directing it in what appears to be random to the observer but what is actually a precise set of patterns (see Middleton, 1991). Van Eenwyk links the concept of Jungian archetypes with the influence of strange attractors in an individual's or community's life. He also suggests that narrative, myths, fairy stories and folklore can be seen as verbal fractals showing different choices (bifurcations), some leading to loss and destruction (entropic chaos), others leading to fruitfulness (deterministic chaos). The end result of such a story is often a new pattern, a new strange attractor found and taken back to the tribe (Eenwyk, 1997,120). Bütz (1997,21) also addresses this point and identifies the influence of strange attractors in a person's life as issues that can pull them into different life attitudes, he writes:

> It seems in psychology or clinical psychology more exactly, that an attractor can be roughly equivalent to a healthy or an unhealthy agenda that pulls an individual in one way or another.

In the same way that Bütz refers to strange attractors influencing an individual, they can also influence a family and be experienced as a family curse or a family gift. A historical examples of this is the seventieth century German musical family, the Bachs. Over two hundred years the family produced over fifty notable musicians and composers (Goetz 539). One can argue that the Bach family showed a powerful musical strange attractor. In contrast a family that was continually beset with illness or general misfortune over several generations would, in this model, be said to have within their midst a more difficult strange attractor.

Nevertheless the fact that a myth or fairy story can be discussed as the hero following a hopf bifurcation into deterministic chaos resulting in a strange

attractor which is returned to the village as a gift does not change the fact that the myth or fairy story will still contain a valuable moral lesson. This lesson can still be learned by the listener and the verbal fractal (story) used to help move or prepare the listener for when they personally encounter that particular hopf bifurcation (a life event that requires a particular choice) in order that they take the pathway that leads to the enrichment of their community's life (deterministic chaos). As van Eenwyk (1997,120) argues nothing about life is changed by this new language of chaos and complexity; rather science is now finding a language for the ways of life.

## Brief overview of arguments of Section 1 and Section 2

This section has presented the some of the findings of chaos theory and complexity science focused on their application into the human sciences. Fractal where introduced as they represent a simple visual image of the workings of chaos and complexity. The following table (*Table 1*) combines the discussion in these first two sections.

| Chaosmos | Modern Chaos and Complexity | Phenomenological expression |
|---|---|---|
| All things are linked and influence each other. (Sumpatheia) | A system linked by feedback produces chaos. This is defined as a non-linear dynamic and is applicable to all living systems. | All life is in a continuous process of influencing its surroundings, while its surroundings influence it. |
| A large event can be linked to a small event and vice versa (Omens and superstition). | Patterns are scale invariant. The very small or individual can be reproduced on the very large or galactic level. | The qualitative experience of the linking between two seemingly disconnected events. These can be labelled as 'coincidences'. |
| Stories (myths) repeat themselves; events emerge as they have before, given a set of original conditions or omens. (Story has meaning for the community.) | Patterns emerge in a self-similar manner. The patterns move forward through time in a manner which is loyal to the intended pattern. | Myths, stories and archetypes will repeat in a person's life or the life of a family, company or country. This is termed the experience of serendipity. |
| A pattern can be encouraged through ritual or other such practises. The actions at the beginning of an event can influence the outcome. (Use of ritual and cultural customs). | Iteration of an equation produces 'order'. This order is sensitive dependence on initial conditions (SDIC). The butterfly effect. Tiny changes at the beginning of a pattern lead to huge differences later. | Small attitude changes in an individual or a small, seemingly insignificant change to one's daily routine can have huge consequences on the way life emerges. This is usually understood in retrospect: 'If I had not taken that different route to work that morning…….and so on'. |
| There is a pattern which shapes all life – destiny or fate. (A belief of ancient and classical communities). | The nature of the emerging pattern is inherently contained, although not visible to the observer of events, within the original equation and variables. | The experience of a guiding hand – the divine. The long string of coincidences which unfold in the correct manner. Teleology yielding an experience of the divine. |

*Table 1*

# Section 3
# Astrology, and complexity

**Astrology and cosmology**

Fuelled by Plato's and Aristotle's thinking the Greeks took what they saw as
the ill-defined, unmanageable Mesopotamian mixture of sky omens and
observations and proceeded to develop what is now called horoscopic
astrology (Campion, 1982,14,16). For the Greek world astrology was
potentially the 'physics' of the day, the corpus of work that could possible
explained the workings of the world and if it was going to contain
knowledge and truths, then the whole system needed to be made more
simple, elegant and logical. By the end of the last century B.C.E. there was
an outpouring of Greek astrological work which Campion (1982,25) cites as
the foundation for all future branches of astrology. This shift from the
Mesopotamian visually-based astrology to the Hellenistic horoscopic
astrology was one of the earliest pressures placed on astrology as it was
moved away from its philosophy of origin, chaosmos as the creative force.

Claudius Ptolemy (ca 150 C.E.) probably one of the most influential
astrologer/astronomer in the history of the subject contributed to this Greek
adoption of astrology (Tester, 1987,3). Tester (1987,12) claims that by
fourth century B.C.E. Greek horoscopic astrology had emerged and in the
best Platonic tradition, Ptolemy strove to correct, improve, and take closer
to perfection the logic in astrology. His apparent desire was to reconcile
astrology with the new push towards order. Ptolemy's aim was to build a
logical foundation for astrology based on Aristotelian principles in the same
way as he had laid the foundations of astronomy in what was later to be

known as his *Almagest* (The Great Work). Thus in his astrological work, the *Tetrabiblos* he applied logical elegance to different areas of astrology (Taub, 1993). Ptolemy acknowledge that there was 'a certain power, derived from the aethereal nature, is diffused over and pervades the whole atmosphere of the earth…'(1969,Bk 1.1, 2) but he saw this as order. Consequently he  sort to place astrology into the world of cosmos by defining the meaning of planets through Aristotelian principles (1969,Bk I.IV) and re-arranging some of the attributes of the zodiac signs to make the system more logical. For example Ptolemy argued (1969,Bk I.XXIII) :

> There are two methods of disposing the terms of the planets, in reference to the domination of the Triplicities; one is Egyptian, the other Chaldaic.
> But the Egyptian method preserves no regular distribution, neither in point of successive order nor in point of quantity.

Terms are a way that a zodiac sign allocated quality and power to a planet, however, Ptolemy disregarded the older 'Egyptian' non-rational doctrine in favour of his more 'logical' system. In this way Ptolemy created what can be thought of as a cosmological astrology based on a horoscope which sought to represent a Platonist perfect or ideal form. This was in contrast to a more chaosmos style of astrology which engaged with the vagaries of the actual sky above and the 'messy' relationships between signs and planets.

A thousand years later another scientific reforming astrologer, the theologian Ramon Lull (1232 – 1316), like Ptolemy, also tried to develop a 'scientific' astrology. He reduced all of the astrological components of a horoscope down to their simplest form, assigned them an alpha-numerical value and then rebuilt them into a form of algebra or logic in order to exact a

more consistent or deeper understanding of the astrological patterns (Lull, 1994,v). This reductionist approach, which considered that astrology as a linear system belonging to the world of cosmos, was not considered useful by future astrologers and was abandoned.

Another reformer was Johannes Kepler, discussed earlier, who reformed the art of aspecting in astrology (see *Aspects* in Glossary). Prior to Kepler, the importance of the geometrical distances between planets was not only contained in the physical distance but was also dependant on the planet's 'personality' and 'place of residence' (Masha'allah, 1998,2). Certain 'places of residence' did not have easy communication with other places and certain planets had characteristics that did not matched or responded to other planets. Kepler removed all of these relationships and reduced the planets to mechanical bodies which either formed or did not form elegant or logical geometric configurations with each other (Gettings, 1985,173). Kepler's reforms had a substantial impact on the practice of astrology moving it, as Ptolemy had done earlier, still further away from the vagaries of planetary variable sign-based relationships in favour of the more simplistic geometric relationships. The recent revival of interest by some astrologers in classical and medieval astrology in the late twentieth century notably with the publications of Project Hindsight and ARHAT is now challenging Kepler's reform of astrology (see Zoller, 1980,3).

However before this revival there was an attempt to return to Lull's reductionism. The German astrologer Reinhold Ebertin (1901–1988) developed what he defined as cosmobiology which utilises planetary midpoints, the half-way point between planets measured along the ecliptic and their resulting geometrical 'trees'. In producing these midpoint trees Ebertin removed the meanings of zodiac signs, aspects and houses (*see*

Glossary) from astrology and stripped astrology down to its bare planetary geometrical relationships. This was Ebertin's attempt to create scientific astrology and set it apart from what he saw as being it's more ancient, imperfect and vulgar origins. As he (Ebertin, [1940] 1997,11) said:

> Cosmobiology is a scientific discipline concerned with the possible correlations between cosmos and organic life and the effects of cosmic rhythms and stellar motions on man, with all his potentials and dispositions, his character, and the possible turns of fate…. In this endeavour, cosmobiology utilizes modern-day methods of scientific research, such as statistics, analysis, and computer programming. … The word cosmobiology was coined by the Austrian physician Dr. Freerhow and was later used by the Swiss statistician K.E. Krafft to designate that branch of astrology working on scientific foundations and keyed to the natural sciences. Cosmobiology has, through the work of the author of this book, become increasingly well-known within the last forty years from those aspects marking it off from ancient astrology.

It is, in effect, an extension of Ptolemy's, Lull's and Kepler's drive to reduce astrology down to simpler, more orderly units to which one could begin to apply reductionist thinking. His work, although influencing some astrologers has not had a lasting impact on the practise of astrology.

A further attempt to apply reductionism to astrology was made in the 1950s by the French couple Michel and François Gauquelin. They were not attempting to reform astrology, but rather they sought to prove astrology within the scientific model. Their most famous research result, *L'Influence des Astres* (the Mars Effect) was published in 1955. In this research the

Gauquelins showed that the tendency of the diurnal position of Mars to be in particular zones of the natal horoscopes of French sports champions was statistically significant. Garry Phillipson (2000,144) points out that what followed was over forty years of turmoil between astrological skeptics and the Gauquelins. The Mars Effect is considered by some to still to be a valid and statistical result, yet regardless of whether this can be seen as proof of astrology or not, it is not the type of proof that most astrologers desired, as it does nothing to justify their daily practise of astrology.

What this two thousand year struggle to reform astrology into the world view of an ordered cosmos suggests is that astrology may not be compatible with the philosophy of cosmos. Cosmos philosophy contains the beauty and stability of order and the ability to use the tools of linear dynamics — reductionism and statistics — to label knowledge true or false. Astrology has resisted conforming to the tests of 'truth' as defined by cosmos and thus one could argue that astrology may be more responsive in the philosophy which produced it, that of chaosmos.

**The position of western astrology in twentieth century culture**

Within the discipline of astrology the impact of living in a world built, viewed and understood through the philosophy of cosmos is that astrologers are ambivalent about their role, ambivalent about their identity and ambivalent about their purpose. This is reflected in the different attitudes that astrologers have concerning their subject.

Phillipson compiled a cross-section of astrological thought and opinions and provided a window into the views of its practitioners and critics, in the late twentieth century. Amongst the different groups of astrologers he

interviewed, there were those who believed that astrology was a science and thought that (Phillipson, 2000,182):

> … the discovery of the mechanism by which it works can only be a matter of time, and likewise it is inevitable that science will eventually recognise that astrology works and welcome it back to the faculty of respectable studies.

This group within the astrological community continue to pursue research using the scientific method and believed that astrology belonged in cosmos. Other groups linked astrology to a form of magic and practise their craft closer to divination. In the words of Phillipson (2000,185):

> The picture (of astrology as an art touched by divine anarchy) is not an easy thing to make any kind of sense of, but it is essential to an understanding of how many astrologers think about their subject.

Other astrologers interviewed by Phillipson (2000,187)  saw astrology as a language:

> Astrology gives us the number of accounts of a human being. For me astrology is very much a language; it can describe things that other languages can't do, it brings things together that for other people are completely separate.

Another approach to astrology is found in the work of Patrick Curry who offered the neutral definition cited earlier in this paper. Curry, moving away from his neutrality considers the practise of astrology to be a form of enchantment, or an instrument of enchantment, a way in which humanity

encounters mystery, awe and wonder (Willis and Curry, 2004,89). His focus is that it is necessary for astrology to be marginalised by establishment views in order for it to maintain this position. Indeed Curry, in the same passage, notes that any success gained by astrology in becoming creditably in the view of the establishment 'would be at the price of its soul.' In the language of this paper Curry is suggesting that it is not possible for astrology to belong to cosmos, as its 'soul' is in chaosmos.

Astrology may be all of these things - scientific, magic, a language or a vehicle of enchantment - or it may be none of them. However, with its confusion of identity, diverse communities and many different forms and definitions, it is demonstrating its inability to find a place to stand within the ordered cosmic philosophy. However, by see astrology as a produce of chaosmos then like the expelled Tiamat cast into the underworld by Marduk, or the banished Lucifer overthrown by the angel Michael, astrology would logically find no acceptance in a world dominated by cosmic thinking. Hence the only way that astrology will be viewed in contemporary culture would be that of the damned, that of the outcast, or even that which is associated with the devil.

Nevertheless, in spite of its maligned credibility astrology in the twentieth and twenty-first centuries is popular. Curry (2004,88) suggest that the robustness of astrology is not despite the endeavours of science to stamp it out but because of science's endeavour to stamp it out. He suggests that the strength of popular astrology today is a latent desire in the general public for re-enchantment. Yet the answer may be simpler and less romantic.  For if astrology is a cultural expression of the philosophy of chaosmos and noting Abraham's (1994,124) argument, that the components of chaos philosophy have been returning to the west from the late nineteenth century onwards,

then one can argue astrology, logically, should be strengthening in the popularity.

The robustness of astrology may be more correctly interpreted as the robustness of chaomos philosophy.

**Mapping Astrology to Chaos and Complexity**

The English astrologer Michael Harding, in an interview with Phillipson (2000,187) said, 'I think astrology is infinitely complex, I think life is infinitely complex. If astrology claims to mirror life, then it will have life's complexity.' Here Harding is using the word 'complexity' in its non-mathematical sense but he may have been, although without intention, offering a real insight into the nature of astrology.  But can astrology be mapped into chaos and its extension of complexity?

Astrology, as discussed in Section 1, and works on a principal of scale invariance, with the patterns of the heavens being related to the patterns of a person's life  (Rudhyar, 1967,1, Leo, [1905] 1929,17).  Many astrologers also believe that the horoscope can then be used to define the quality of the pattern so formed, rather than the exact quantity — a self-similarity style of thinking (Greene, 1996,147, Gunzburg, 2004,82).

Along with the themes of self-similarity the disciplines of astrology and complexity both accept that the future is inherently contained within the system. Astrology links the emergence of a person's life to the moment of their birth and the patterns of the sky for that moment while complexity links it to the nature of the initial conditions. In this way both disciplines can be focused on the ideas of whether one can predict the exact nature or just

the theme of an event. As Capra (1996,137) states referring to chaos, 'It is impossible to predict the values of variables of a chaotic system at a particular time, but we can predict the qualitative features of the system's behaviour.' This theme is also reflected in the astrological work of Liz Greene (1996,147) and Alan Leo (1860-1917) ([1905] 1929,270) and is summed up in the words of Dane Rudhyar (1895-1985) (1967,104) when he is referring to the astrological approach to predictive work:

> Events cannot be foretold accurately, but the conditions needed by an individual if he is to grow to his full stature as an individual can be pre-diagnosed. The astrologer can discover from the progressions the main turning points in the life of a person.

Middleton, Fireman and Di Bello (1991,19) referring to complexity also talk of understanding the nature or quality of behaviour while allowing that the actual exact event is unpredictable:

> Exact behaviour would be unpredictable from moment to moment but it would remain within loose boundaries – those of the strange attractor; all potential behaviour would not have an equal probability of occurrence. In contrast, if behaviour were random, then every possible behaviour would have an equal probability of occurrence at any given time.

This suggests that within complexity one can predict the 'loose boundaries' of an emerging pattern in the same way as astrologers also claim to be able to look at a horoscope and define the 'loose boundaries' or symbolic quality of a particular planetary patterns rather than narrow-band exactitudes (Rudhyar, 1967,5).

Additionally, using the language of complexity, an astrologer could talk of the quality of a hopf bifurcation (option to change the pattern of their life) which the client can experience in a productive, pattern rich manner, deterministic chaos, or they can experience it in a more difficult expression which can reduces the client's potentials giving rise to what complexity could label as entropic chaos. Indeed in the light of complexity theory, the role of the consulting astrologer could be defined as a profession which, firstly, helps people to locate or recognise their hopf bifurcations (psychology may also call these neuroses) and then, secondly, help the individual biases their hopf bifurcations towards deterministic chaos. This could also be defined as the role of the psychologist.

But what separates astrology from to the human sciences is a map, the horoscope, a cosmological instrument, which endeavours to plot the image of the solar system for a moment in time and an exact place. This map is the in fact the astrologer's 'ordered' version of the 'initial conditions' for a birth of an individual or any other event. Astrologers consider that the patterns of sky and earth at the beginning of the individual's life can provide information about the emerging patterns of that individual's life.  Dane Rudhyar (1967,5) talked of the horoscope as representing a complex structure linked with life that was not subject to reductionism and thus could not be broken into parts.

**Sensitive Dependence to Initial Conditions and the Horoscopes**
As has already been discussed, in chaos theory there is the concept known as Sensitive Dependence to Initial Conditions (SDIC) also nicked-named 'the butterfly effect': if an outcome is going to become chaotic, then the exact nature of its chaotic behaviour is sensitive to the initial conditions at

its origin and that small variations at the start can lead to totally different and unpredictable outcomes over time (For an example see Batterman, 1993,48). With the findings of chaos and complexity having significance for the way life emerges which some areas of psychology seems to be accepting, then life could be subject to the same sensitivity as a fractal.

There are, however, some counter arguments against complexity being used in psychology. The US computer scientist Gary McGath (1990) has argued that one cannot link the thinking of complexity with the human sciences:

> Human behaviour, in contrast, is unpredictable not because its flow displays 'sensitive dependence on initial conditions,' but because it is not dependent on initial conditions at all. The future may change due to events that no amount of precise calculation can predict.

Yet if complexity applies to all living systems the questions remains as to why would a human life be the one exception and be exempt from SDIC?  A more logical argument would be to accept the influence of SDIC in human life by considering it being the genetic make-up, or by considering that there are so many other influences after birth that the conditions of birth are insignificant.  Nevertheless, regardless of these arguments, the concept of SDIC does potentially provide a base for exploring the use of a horoscope as the image, of the initial conditions of a life or event. The link between the concept of SDIC and the astrologer's horoscope is also supported by van Eenwyk (1997,115) who reaches a similar conclusion and refers to astrology as part of the original conditions (SDIC) and therefore, in his opinion, having a voice in the nature and emerging manner of a life.

## Phase Portraits and Horoscopes

Chaos and Complexity theory also have maps. These maps are known as phase portraits (*see* Glossary) and Capra (1996,134) defines phase portraits as a map of the emerging potential of a particular pattern which can be used to gain understanding of the quality of a non-linear dynamic system:

> The qualitative analysis of a dynamic system, then, consists of identifying the system's attractors and basins of attraction, and classifying them in terms of their topological characteristics, the result is a dynamical picture of the entire system, called the 'phase portrait'.

Capra, talking purely of mathematics, is stating that an emerging pattern can be mapped in terms of its attractors — psychology would call these attractors, the personality, make up, family issues, parts of the self that pull events and people into the life. These attractors have basins, an area of influence. For a funnel the basin is the width of its mouth, for an individual it is the influence of work, family, interest and so on in their own life and in the life of others. The topological characteristics referred to by Capra are a measure of how flexible and adaptable the system is to its attractors. In psychology this is how flexible the individual is to what their attractors, via their basins, bring into their life. Such a map, Capra tells us, is called a phase portrait and can be used for the qualitative analysis of the 'system'. One can argue that the horoscope of astrology is an ancient attempt of the notion of a phase portrait. It contains planetary patterns which act as attractors and, as suggested by the work of Greene, Leo and Rudhyar, astrologers attempt to read the quality of the 'system' from their maps.

The following are examples of the way in which the astrological features of a horoscope could be linked to the mathematical features of a phase portrait.

**Planetary Patterns and Strange Attractors**

As previously discussed all systems subject to chaos create or contain strange attractors. Every horoscope contains what astrologers call planetary patterns. These are the geometrical and visual patterns formed between the planets and the surface of the earth at the time of a person's birth. Depending on the type of astrology being practised, these are thought to be particular markers or tendencies within the person's life or within the person's psyche which will dictate/symbolise/indicate their behaviour patterns. Astrologers will also assign orbs to a planetary pattern which can be classed as one way to measure the basin of an attractor.  Indeed before the reform work of Johannes Kepler (1571-1630) on astrological aspecting, the orbs used by astrologers were orbs applied to each individual planet. Planets acted like spheres on a net, some heavier than others but all creating indents and therefore inter-relating basins of attraction in the horoscope (Bonatti, 1994,4).

In this way the planetary positions in the horoscope can be reflective, even if crudely, of the strange attractors that chaos and complexity indicate occupy living systems.

**Hopf Bifurcations - the range of expression within a planetary combination**.

Astrologers working with a horoscope will discuss with a client the productive uses of a feature in the horoscope versus its non-productive or self-negating uses. They will look at an upcoming potential and suggests ways that the client can 'make the most' of the opportunity and even talk of

negative options that the client may wish to seek to avoid (Meyer, 1974,21, Gunzburg, 2004,136).  This is similar to what complexity would define as the potential of a hopf bifurcation (opportunity for change) to develop into its deterministic (creative outcome) or entropic (stagnations outcome) chaotic expressions. Complexity also indicates that at a hopf bifurcation one may be able to prediction of the quality however, the actual pathway taken – entropic or deterministic chaos – cannot be predicted. This is simply expressed by the mathematicians Maturana and Varela (1987,95) in their discussion on predicting such outcomes at bifurcation points:

> When a living system reaches a bifurcation point, its history of structural coupling will determine the new pathways that become available, but which pathway the system will take remains unpredictable.

**Saddle Points and Homeostasis – The Sensitivity horoscopic points**

Astrologers will find possible future events by using mathematical ways of moving the horoscope through time and find what particular planetary pattern are being influence at what time. Astrologers consider that each point in the horoscope is vulnerable, in its own way, to bringing change into a person's life.  In a phase portrait chaos labels such points as saddle points, the place where the pattern can change its shape. Additionally the sensitivity of the system is known within chaos and complexity thinking as its level of equilibrium. Living systems display what is known as homeostasis, the ability to maintain an equilibrium and be able to resistant small disturbances (Kauffman, 1995,79) (see Glossary). This potential for stability and the potential for change within a homeostatic system can be measured in chaos by the size of the strange attractors and the nature of the saddle points. In non-chaos language, this can be expressed as the size of the area of

influence that the system draws on (basin), what is the nature of this influence and how sensitive is the system to the input of this influence. In human life this resistance to change is not just at the biological level of maintaining one's body as a distinct unit. A person also has boundaries which are material, emotional, spiritual and intellectual. Astrology reflects these concepts and considers that some parts of a horoscope are more sensitive to others and some sorts of predictive events are more powerful than others. Just as chaoticians are creating a bifurcation encyclopaedia (Abraham, 1994,61) astrologers also provides a corpus focused on this subject which any recognised published works on predictive astrology will reflect (*see* Hand, 1976, Ebertin, 1976, Hastings, 1984).

**Self-similarity and scale invariance – Astrological use of cycles**
Astrologers use many cycles, all of which are based on one scale, that of a planetary period and then link this by scale invariance to the life of the person (a country, an organisation, and so on). Along with other disciplines, astrology classes all cycles as expressing the same rhythm: a beginning, a period of growth, a time of fullness and then a period of waning leading to a winter or an end point which in turn leads to a rebirth. Whether the cycle is the diurnal rhythm of a day and night over twenty four hours or the monthly rhythm of the lunar phases, or the cycles of outer planets — returns or aspect — or the synodic cycles (see Glossary) of two planets which may take hundreds of years, all cycles in astrology unfold in the same manner (Rudhyar, 1967,3). Thus within the mechanism of self-similarity and scale invariance, an event or pattern which occurs at one point of the cycle will be expected to re-emerge in essence at the same point in the cycle again.

Thus the horoscope can be seen as a vernacular attempt to create a phase portraits of a complex system in order to judge, what Capra argued, was 'the

qualitative analysis of a dynamic system'. This paper makes no claim to astrology's efficacy in this endeavour however it does argue that astrology in attempting to create an image of a living system creates the horoscope which contains the same *components* as a phase portrait, that is planets are used like attractors, orbs are used like attractor basins, horoscope points are seen as saddle points, and there is a general judgment of 'strength' of a combination in regard to the living system maintaining its homeostasis.

The following table (*Table 2*) shows some of the possible links between the mathematics of chaos and complexity and the practice of astrology. This table does not attempt to be exhaustive but to simply summarise the most obvious parallels.

| Chaos and Complexity – mathematical findings | Common practices and beliefs of astrologers |
|---|---|
| **Sensitive Dependence on Initial Conditions** (SDIC). The initial conditions dictate the emerging patterns. | The **moment of birth** will influence the emerging pattern of a person's life. The horoscope. |
| **Phase Portraits** – an image of the attractors, basins and flexibility of a pattern which can be used to predict the times and qualities of changes to the pattern. | The creation of a **horoscope** which can be used to observe the emerging patterns and timing of these patterns in a person's life. |
| **Strange Attractors** – the moving foci which seems to invisibly influence the external events or pattern. | **Planetary combinations** which define the nature or quality of what the person will attract towards themselves and the story of their life. |
| **Hopf Bifurcation** – a change in the pattern which can lead to new patterns or entropic chaos – death. | A time in a person's life indicated by a **predictive event** where the individual can be encouraged to take the path which yields the most creative options. |
| **Saddle Points** – the point where hopf bifurcations occur. | **Sensitive points** in the horoscope which, when receiving some form of predictive event, will result in events of a certain quality occurring in the person's life. |
| **Self-similarly and scale invariance.** Repeating themes in patterns occurring in unrelated patterns – e.g. river systems and the bronchi of lungs. | Astrologers use of cycles which link **planetary cycles** with smaller cycles within an individual (or country or organisation) life. |

*Table 2* – comparison between the features of chaos and complexity and the

practice of astrology

All of the above correspondence could be challenged in different ways. One could challenge the very findings of chaos and complexity theories or one could challenge that the vernacular maps of astrology have a relationship to the maps of chaos. Additionally one could challenge the link between chaos' Sensitive Dependence to Initial Conditions and that of the views of astrologers. For although one can show that humans think, live and create in the manner of complexity which is subject to SDIC, it is only astrology that says that the pattern into which humans are born constitutes part of those initial conditions. There can never be a statistical proof of this point, for as Capra (1996,113) states about the new science of non-linear dynamics, it made up of, 'Qualitative instead of quantitative, Relationships instead of objects and Patterns instead of substance'.

## Conclusion

The aim of this paper was to investigate the potential of astrology to be neither science nor spirit and thereby free it from requiring either scientific proof or a divine presence for its philosophical core. The paper sought to do this by exploring astrology's possible parallels with chaos theory and its allied discipline of complexity science. The purpose of this has been to locate astrology in chaosmos, a sympathetic web of inter-related influences which do not require a divine presence, nor do they respond to reductionism.

The paper is divided into three sections. The first section is focused on establishing the nature of creation myths which are reflective of a philosophy of chaosmos. This world view considers that creation emerges spontaneously from the void and that all of the world, living and non-living, is linked in a self-organising sympathetic web. The interwoven nature of chaosmos allows for the generation of omens, superstitions and divination

as logical tools of enquiry. The paper discusses astrology's genesis in this period and proposes that the very concepts of astrology are a product of chaosmos philosophy. The paper then shows how chaosmos is challenged by and eventually lost to cosmos, the world of logical linear order. The consequence of this lost battle is that the measure of the verity of knowledge has come to be known by its association with the elegant Platonist cosmos or logical order. Additionally, chaosmos symbolised by the dragon Tiamat, is not only supressed, it is actively attacked in a long-running two thousand year battle aimed at eradicating chaos from existence.

The second section of this paper discusses the return of chaos thinking to the scientific community in the twentieth century. It outlines the major concepts of chaos theory via the work of Prigogine and Stengers (1984,75) and then introduces the concept of complexity which, at this stage, is seen as an expression of chaos theory within the earth sciences. The third arm of chaos is then introduced, is that of fractals. This is the work of Benoit Mandelbrot (1977) and offers a visual display of the major findings of chaos and complexity. Using Mandelbrot's work in fractals, the paper draws links between the practice of rituals, omens and superstitions and the notions found in fractal geometry — and chaos theory — of scale invariance and self-similarity. The paper also introduces the chaotic concepts of entropic chaos, a system moving towards stagnation, and deterministic chaos, a system moving into greater complexity.

The third section of this paper is focused on astrology and shows that subject's long and unsuccessful struggle to be accepted by a world dominated by an ordered cosmological philosophy. The paper argues that this very history of a long and failed struggle is in itself an indicator that astrology is not suited, as a subject, to an ordered cosmos. Additionally the

paper points out that the claimed popularity in astrology of the latter part of the twentieth century was paralleled with the re-emergence of chaos theory in science. In this way astrology's robustness suggests that rather than being due to a spiritual or poetic need within humanity, as suggested by Curry (2004,88), or as Stephen Dawkins (1995) argues, due to a basic ignorance in the population, it is instead taking the role of providing a meaning for living a life within a chaosmos. This is a world which is able to accommodate the vagaries of human life, one containing superstitions, repeating patterns, coincidences, and serendipities.

The paper then looks at the components of chaos' theory map, the phase portrait. This map is used for examining the quality of an emerging event. The paper shows how the horoscope contains the same genre of objects as chaos theory, with present-day astrologers using planets, orbs, and knowledge sensitive horoscopic points in a similar qualitative manner to chaos' notion of strange attractors, basins, and saddle points.

This paper has investigated the question of whether astrology can be seen as a vehicle of chaosmos philosophy in western culture. Based on this initial enquiry, this paper concludes that the question has merit.

# Appendices

## Appendix 1

## Female images of the divine from chaos thinking

## 23,000 B.C. E. – The Goddess of Lespugue



Her bird-like head, fan-like tail feathers and repetition of the egg shape suggest a bird goddess. This was found standing on a hearthstone in a shallow cave in the Pyrenees of southern France.The mammoth ivory original is 5 3/4 inches tall, and is now in the Musee L'Homme, France. It is from the Gravettian-Upper Perigordian of about 23,000 B.C.E.

*Figure 1*

## 1800-1750 B.C.E. - The Queen of the Night

Old Babylonian, from southern Iraq



This large plaque is made of baked straw-tempered clay, modelled in high relief. The figure of the curvaceous naked woman was originally painted red. She wears the horned headdress characteristic of a Mesopotamian deity and holds a rod and ring of justice, symbols of her divinity. Her long multi-coloured wings hang downwards, indicating that she is a goddess of the Underworld. Her legs end in the talons of a bird of prey, similar to those of the two owls that flank her. The background was originally painted black, again suggesting that she was associated with the night. She stands on the backs of two lions, and a scale pattern indicates mountains

*Figure 2*

## 1979 – Alien, the film

The mouth of a modern Tiamat – the Alien from Ridley Scott's film *Alien* (1979).

An egg-laying, fertile, female monster seeking to procreate.



*Figure 3*

# Appendix 2

## Fractals, Self-similarity and Scale invariance.

Examples of self-similarity and scale invariance contained within a fractal. The first image (*Figure 1*) is the Mandelbrot set and successive images are magnifications on the area defined by the square. As one magnifies the fractal another Mandelbrot set becomes apparent by *Figure 4*. Further magnification in *Figure 7* reveals once again the image of a Mandelbrot set, each new Mandelbrot set is slightly different from the first.
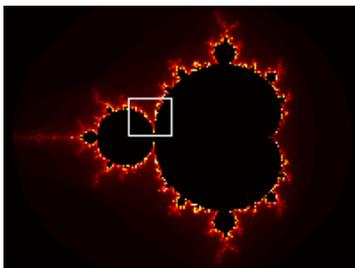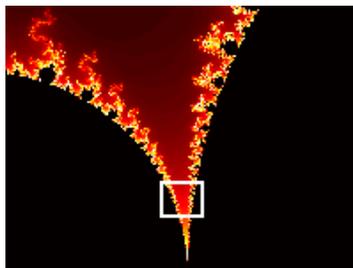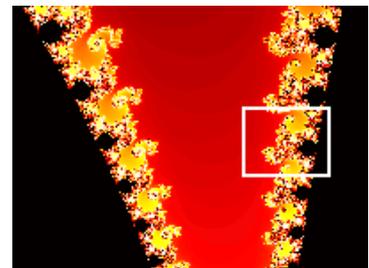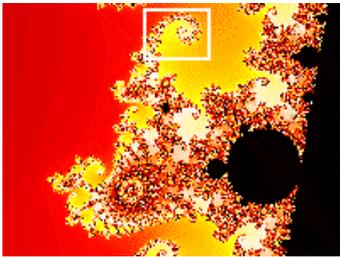


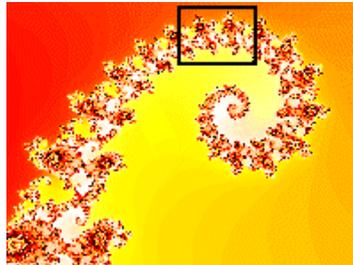Figure 1            Figure 2            Figure 3
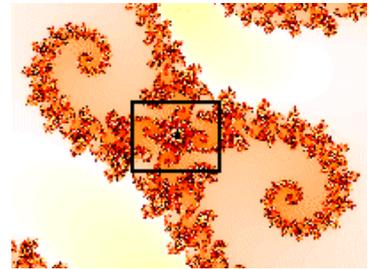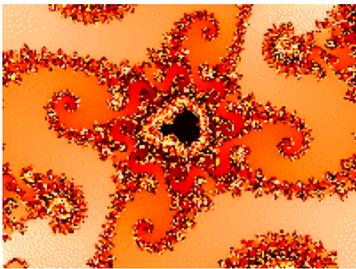
Figure 4


Figure 5


Figure 6


Figure 7

## Fractal Forgeries

Fractals reproducing realistic shapes such as mountains, clouds, or plants, can be generated by the iteration of one or more particular style of equations. An example of an iterated function system is the black spleenwort fern *figure 8*.


*Figure 8*

This image is infinitely complex - it is a self-similar fractal on all scales. What is breathtaking in its simplicity is that only twenty eight numbers were required to generate this infinitely complex image.
( from "Fractal Forgeries"
http://classes.yale.edu/fractals/IntroToFrac/SelfSimEx/SelfSimEx.html
Accessed 5th October, 2004)

## Lorrenz's Butterfly Strange Attractor

The "butterfly" strange attractor also called the Lorenz attractor because it was the attractor producing the 'chaotic' behaviour in his weather experiments. The pattern of the attractor produces two 'eyes' hence its associate with a butterfly.

Results of this iterated equation will randomly either move into infinity or produce a result which falls somewhere in an orbital positions around either eye. It is only when a large number of iterations are plotted does the nature of the strange attractor become observable.
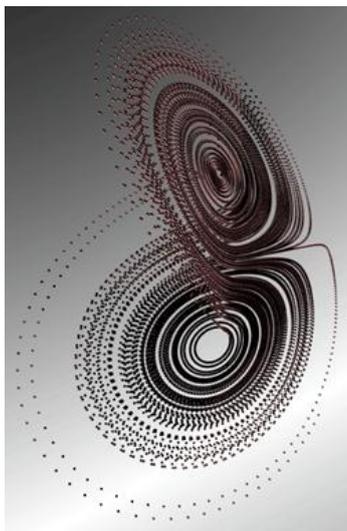


This image appeared in the *Nature Journal*, 31 August 2000: 949 as part of an article titled 'The Lorenz Attractor Exists', written by Ian Stewart.

*Figure 9*

# Glossary of Technical Terms

**Aspects** (Astrology) - The geometric relationship between planets, points or luminaries. The types of geometric relationships and the orbs used in these relationships vary considerably over the unfolding history of astrology. In the second century C.E. Ptolemy used just five aspects. Later, Johannes Kepler (1571-1630) introduced new thinking into the field of aspecting and not only increased the number of aspects but disregarded the sign boundaries (Gettings, 1985:173).

**Attractors  -**There are three types of attractors:

a)  A point attractor - This is a system that moves towards a stable equilibrium such as a clock pendulum.

b)  A Periodic attractor – This is a system with a periodic oscillation. The planets orbiting around the sun move around the attractor but do not encounter it.

c)  A Strange Attractor – This is a chaotic system. The behaviour of a particle or object appears to move chaotically. However when, it is analysed, the object is found to be moving around a "moving" foci and the movement or the different positions of the foci create a pattern. (Capra, 1997: 132).

See "Phase Portraits" for an overview of the system of attractors, basins, saddle points and SDIC.

**Basin** – The area of influence of an attractor. With a funnel, which is a point attractor with its centre hole, the basin of the attractor is the funnel's bowl. See 'Phase Portraits' for an overview of the system of attractors, basins, saddle points and SDIC.

**Bifurcations and Hopf Bifurcations** – Points in a dynamic scheme where changes occur to the behaviour of the scheme(Abraham,1994 :66). A Hopf bifurcation occurs when a bifurcation fails to stabilise itself, leading to a cascade of bifurcations (Eenwyk, van, 1997:61). In psychology a bifurcation is a small event which the person absorbs into their life causing little change. A hopf bifurcation is a large event which causes the whole life to change.

**Chaos**: **Deterministic chaos and Entropic chaos**. — Chaos, as used in chaos theory, refers to deterministic chaos which is a form of chaos within which patterns periodically appear (Eenwyk, van,1997: 45). In contrast, entropic chaos is when all order is lost and no patterns occur. A burning camp fire reducing all to ash is a form of entropic chaos. However, if the burning fire randomly left other shapes and forms after it had died out, then that would be an example of deterministic chaos.

**Complexity** – A phase membrane which exists between the states of static (no change) and chaos (all change). In this phase membrane spontaneous order emerges which increases the complexity in the system (see Corcoran, 1992; Kauffman 1991, 1995; Waldrop 1992). Complexity is considered a feature of chaotic systems. Complexity science is the study of the behaviour of these complex, self-organising systems in living and non-living forms (Shulman, 1997,16-17).

**Differential Equations -** Equations which express certain formulas of constant relationships and in which changes in the value or magnitude assigned to certain variable factors determine the value or magnitude of the other variable factors. These equations are helpful in solving many problems of higher mathematics and the natural sciences because the knowledge of certain known factors permits one to compute the value or magnitude of the unknown variable factors. (see Anon 2004:12 - Differential Equations https://www.mises.org/easier/D.asp  5th October, 2004)

**Entropy** – a term introduced by Rudolf Clausius, a German physicist and mathematician, to measure the dissipation of energy into heat and friction (Capra, 1997: 180). The greater the entropy of a system, the greater the distribution of energy within that system.

**Fractals** – In 1977 Benoit Mandelbrot (1977,2) coined the term 'fractal' to define one of mathematics 'empirical study of nature'. A fractal is a graph created by plotting the results of equations that are subject to iteration and as a result of this are pushed into chaos. The results of an iterated equation will either move off into infinity or produce order (a closed shape). The results of the order-producing equations are plotted to produce a visual representation which, as already stated, Mandelbrot defined as a fractal. In this way the visually observed patterns of the fractals are the patterns which are spontaneously formed at the edge of chaos. The concept of fractals has moved beyond mathematics an example of their apparent universal nature was put forward by John Briggs and F. David Peat (1989,195-6) who showed that some poetry could and did use this notion of iteration.

**Houses** (Astrology) - The method of dividing the horoscope into a total of twelve sections called houses.  Each house refers to a different part of a

person's (or company, nation or so forth) life and each house will be governed by a series of astrological considerations.

**Imaginary numbers** - These are numbers which exist outside our philosophy of numbers. For example, the square root 25 is 5 or -5 because in our number philosophy we say that 5x5 = 25 as well as -5x-5 = 25. However, if we ask what is the square root of a negative number like -25, we cannot answer that question. To resolve this limitation on our number system the idea of an imaginary number was created.  So the square root of -25 become 5i or -5i. Though these number do not exist in the realm of real numbers, these imaginary numbers play a vital role in physical and engineering calculations, as well as in the generation of Julia and Mandelbrot set fractals.

Imaginary numbers can be combined with real numbers to form what is called complex numbers. The range of complex numbers which do not move into infinity can be plotted on a Cartesian plane (graph) to produce a fractal. The complete set of all of these complex numbers that produce a closed pattern is used to create the Mandelbrot set.

**Iteration** – *Iter* is Latin for a journey.
The process of feeding the results of an equation back into itself and then re-solving the equation. When an equation is 'iterated', it gives rise to chaos (Briggs and Peat, 1989,57).

**Homeostasis** – A unit which is resistant to small perturbations. Attractors provide a homeostatic situation. In a large system the attractor drains a large basin and so changing any one component within this large basin has little impact within the network. However a unit with a small trajectory and a

small basin can be altered permanently by a small change. For example, if you add one white mouse to a population of 10,000 brown mice, the impact on the gene pool is minimal. The mouse population is in homeostasis. However, if you add 5,000 white mice to the same population this will have a large impact on the gene pool and in that situation the population would not be in homeostasis. Any system which does not have homeostasis, is considered to be chaotic.

**Phase Portrait** – The map which plots or identifies the system's attractors and basins of attraction and classifies them in terms of their topological characteristics. The result is a dynamic picture of the entire system, called the 'phase portrait' (Capra, 1997: 134).

 A simple example of a phase portrait could be the layout of a golf course with its 18 holes as the attractors to which all the little while balls seem to be drawn. The greens and fairways would be the basins —  the area that seems to draw in the little white balls towards the attractors. The teeing off area could be considered the saddle points — the place where change will occur. The sand traps and roughs could be the areas of entropic chaos where the little white balls never reappear. The entire golf course plan is the phase portrait of the course. This of course ignores weather conditions and the skill of the golfer which could be equated to the SDIC factor of the chaotic the system.

**Planetary Patterns** (Astrology) – A geometrical arrangement of planets in a horoscope which astrologers believe blend, in some fashion, the symbolic meanings of the planets.

**Planetary midpoints** (Astrology) — The geometric midpoint between two planets. First discussed by Ptolemy in the second century C.E. but used extensively by Reinhold Ebertin as the foundation of his reform of astrology which he called cosmobiology. Midpoints can also give rise to midpoint trees which are simply the collection of planetary midpoints occurring at the same degree of the zodiac or aspecting it.

**Predictive Systems** (Astrology) — Any method of moving the horoscope through time. The most common used in modern astrology is probably that of transits: the current position of a planet in its orbit is traced on the horoscope and when it reaches a sensitive zodiac degree in the person's horoscope, the astrologer gauges that some form of event will occur. The quality of the event will depend on the nature of the horoscopic point, the nature of the transiting planet and the geometry by which the transit occurs.

**Saddle Point** — The point in the system where a hopf bifurcation can occur.  See 'Phase Portraits' for an overview of the system of attractors, basins, saddle points and SDIC.

**Scale-invariance** – The feature of a fractal to produce the same shapes regardless of scale. This is also the feature of nature to produce the same shapes from the micro to the macro. In the human sciences it is the feature of a family's history to be similar to that of a country, the events concerning the family pet reflecting the events happening to the family's finances and so forth. Self-similarity and scale invariance are, in chaos concepts, the mechanism contained within omens, superstition and divination of all kinds.

**Self-similarity** — The feature of a fractal to continue to produce similar shapes. In the human sciences it is the feature of a family or a person to

experience the re-occurrence of past patterns (Bütz, 1997,17-18). Self-similarity linked to scale invariance can be considered within chaos thinking, as the logic contained within omens, superstition and divination of all kinds.

**Sensitive Dependence on Initial Conditions (SDIC) -**This is abbreviated to SDIC.  Small changes at the beginning can lead to greatly different results – as in the butterfly example which was one of the first discoveries about chaos (For an example see Batterman, 1993,48). See 'Phase Portraits' for an overview of the system of attractors, basins, saddle points and SDIC.

**Structural coupling** – The past history of the equation in the way that it has moved through different bifurcations. In human science this can be equated to the history of the subject.

**Synodic cycles** (Astrology) - Synodic cycles in astrology are the time periods required for two orbiting planets to create their same geometric relationship to each other. The most commonly known synodic cycle is that of the sun and the moon which produces a new moon every 29.5 days. Other synodic cycles are much longer, with that between Neptune and Pluto being 492 years (Brady, 1992,304).

**Thermodynamics, 2nd Law -** The 2nd law of thermodynamics (the entropy law or law of entropy) was formulated in the middle of the last century by Clausius and Thomson following earlier observations that, like the fall or flow of a stream that turns a mill wheel, it is the 'fall' or flow of heat from higher to lower temperatures that motivates a steam engine. The key insight was that the world is inherently active, and that whenever an energy distribution is out of equilibrium a potential or thermodynamic 'force' (the

gradient of a potential) exists that the world acts spontaneously to dissipate or minimize. All real-world change or dynamics is seen to follow, or be motivated, by this law. (see http://www.entropylaw.com/entropy2ndlaw.html   Accessed 9th Dec, 2004)

**Topology** - Topology is the mathematical study of the properties that are preserved through deformations, twisting, and stretching of objects. It studies the "wholeness" properties of an object rather than its parts. One of the central ideas in topology is that spatial objects like circles and spheres can be treated as objects in their own right, and knowledge of objects is independent of how they are "represented" or "embedded" in space. For example, the statement "if you remove a point from a circle, you get a line segment" applies just as well to the circle as to an ellipse and even to tangled or knotted circles, since the statement involves only topological properties. (http://mathworld.wolfram.com/Topology.html Accessed 9 Sept 2004)

**Terms and Term Rulers** (Astrology) - Terms are seemingly irregular divisions of the degrees of each zodiac sign into groups. Each grouping within a sign is linked to a different planet known as the Term Ruler. Each zodiac sign contains five terms with each one being ruled by one of the five planets. The luminaries do not rule any terms.  There are two main types of terms: the earlier set was labelled by Ptolemy as *Egyptian* and the later set, which were devised by Ptolemy in his attempt to make them more logical, are known as the Ptolemaic terms (Ptolemy,1969:47).

**Transits** (Astrology) – see Predictive systems.

**Triplicities** (Astrology) – Each sign of the zodiac is assigned one of four possible elements (air, fire, earth and water) so that there are three signs for each element. Each group of three signs are then assigned three planets which are called the triplicity rulers.  For example, for the fire signs the triplicity rulers were: the Sun, Jupiter and Saturn.  However, in an effort to reform what he believed was an illogical assigning of rulers Claudius Ptolemy in his *Tetrabiblos* (1969:44) allocated only two triplicity rulers per sign instead of the older concept of three.

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