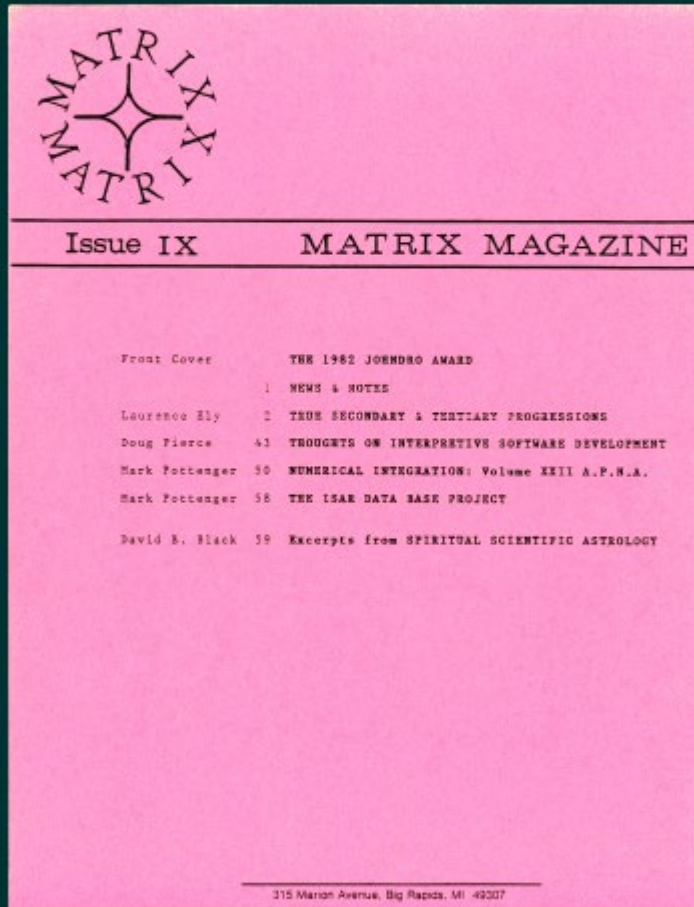


Matrix Magazine Issues 9-11



by Michael Erlewine

Matrix Magazine

Matrix Journal

1978-1992

VOLUME III

Edited By
Michael Erlewine

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These are not all, but they are the most useful essays from 2023 sorted by the seasons.

I don't have time to 'fine edit' them and still get them out there, but these are certainly in good-enough shape to be readable.

And I don't expect many, but hopefully 'any' folks will find these useful.

They are eclectic, yet the overriding theme is dharma and dharma practice. Those of you who reach a certain point in your own trajectory of dharma practice may find some of these useful.

Michael@Erlewine.net

MATRIX MAGAZINE AND MATRIX JOURNAL

Recently I was discussing the history of modern astrology with a couple of folks, and one of the repeated themes was what led to the series of Neo-Astrology Conferences that Matrix Software, my company, put on in 1989 and why have they turned out to be landmark events of a sort in the history of astrology.

There was something in the air at that time of progress, as if astrology was about to solve all its puzzles and roar ahead. This was especially so when it came to the promise of astrological research, as if we were about to blow away the sceptics with some demonstrable research that testified once and for all that astrology works.

Looking back, that seems more like a pipe dream, probably brought on by the advent of the computer in astrology and for a while all things seemed possible.

When I think back for some way to explain to those who were not there how it all went down, I remembered Matrix Magazine (circa 1978) and Matrix Journal (circa 1990). And when I looked at a couple copies of the magazine, sure enough, that's a perfect picture of what happened back then, who was involved, and when.

Matrix Magazine's first issue was in the winter of 1978, and home computers actually appeared in 1977 so things were just getting started. Actually, the magazine kind of started before the first issue, in order to have something to put in that first issue.

And I realized that while I had the old issues around, that there was no way to share them with others, because they are long gone and out of print. So, I scanned all the issues, not a simple undertaking, being some 700 or so pages for the lot. And then they had to be arranged in book form so I could put them in PDF format. It took a few days.

And of course, I don't expect you to read them, at least all the computer code in them, which is old code at this point. Instead, if you just browse through them, you can get an idea as to how it was back then with us.

What you see is some of the brightest technical minds in astrology coming together and sharing in a magazine that was a harbinger of things to come. It was, in its way, a joyful time indeed. And while it perhaps did not solve all the problems in astrology, back then who knew that it wouldn't, because that was a heady time, like a new paradigm for astrology.

Yet, in Matrix Magazine and later in Matrix Journal, we can see that the mix was in; we all were sharing and celebrating a rebirth of astrology in this modern era. What's become of it all is another story.

After all, Matrix Software was the first astrological software company and the name Matrix was picked by me, not to reflect some mathematical term, but because it came from a Greek, and later a French word for womb, and I chose it because Matrix

Software was intended to be where astrology in this time could be reborn, and to some degree it did.

Some of the contributors to the magazine and journal included:

Michael Erlewine [Editor], Stephen Erlewine, James Neely, Theodor Landscheidt, Robert Knight, John VanZandt, Noel Tyle, Buz Overbeck, Lucy Titunik, Charles Hocking, Pat White, Robert Hand, Tim Smith, Malcolm Dean, Ian McKinnon, John McCormick, Charles A. Jayne, Steve Blake, Alexander Borg, Roger Elliot, Tom P. Santiago, Dwight William Johnson, Axel Harvey, Lee Wayne Hold, David B. Black, David W. Wilsom, Mark Pottenger, Alexander Borg, Fairbain & Wesenberg, Austin Levy, Doug Pierce, Larry Ely, Robert Schmidt, John Townley, Thabit B. Qurra, Vladimir Bogdanov, Tom Bridge.

2023 Michael@Erlewine.net



Michael Erlewine, 1978

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315 Marion Avenue, Big Rapids, MI 49307

THE 1982 JOHNDRO AWARD

TO

THOMAS SHANKS

It is with great pleasure that the award in memory of L. Edward Johndro is granted for 1982 to Thomas Shanks. Commencing in 1978, this annual Johndro Award for excellence is being given for those who have distinguished themselves through some major contribution to the technique and theory of Astrology.

Tom Shanks has been an applications programmer at Astro-Computing Services since October of 1976. As Director of Research at that organization, he has been in charge of running a wide variety of full scale research projects including work for John Addey and the Gauquelins. In addition, he has exhaustively tested and re-tested any number of traditional astrological theories on large sets of data. To my knowledge, Shanks is the only astrologer working full time in a purely research capacity on a large computer.

Shanks has served as the prototype and symbol for what it is to be doing serious statistical research in astrology for a whole generation of research oriented astrologers.

- Michael Erlewine

The awarding committee is composed of Zipporah Dobyns of THE MUTABLE DILEMMA, Michael Erlewine of MATRIX MAGAZINE, Robert Hand of NCGR publications, David Cochrane of SIRIUS, Charles Jayne of COSMECOLOGY BULLETIN and Henry Weingarten of NASO publications.

MATRIX MAGAZINE ISSUE IX July 1982

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JOHN ADDEY DIES

We are very sorry to report that astrological pioneer John Addey passed away on March 27, 1982 at 5:17 p.m. at the Royal Homeopathic Hospital in England. He had been seriously ill for about two months.

It is too early to assess John's unique contribution to modern astrological theory and technique. The ramifications of the harmonic approach he pioneered are only now beginning to be understood and applied on any large scale. It is obvious that this approach will continue to be integral to any future astrology.

It is important to point out to those who may not have had an opportunity to know John in person that his work is the result of a rigorous spiritual discipline. John was a great poet in the world of spiritual ideas. The astrological ideas that he has left us are a direct result of his great personal dedication to spiritual ideals and the discipline that can come from such dedication.

John is an example of one who, above all, attempted the great work of integrating his convictions into the details of everyday life. The following is part of a response sent by John Addey to MATRIX upon receiving the 1981 Johndro Award. It says what I have been trying to convey.

"... Although this is an award for technical contributions to astrology- and it is true that some of the spin-offs from the harmonic concept do constitute technical innovation ('innovations', that is, bearing in mind that there is nothing new under the Sun)- yet, my approach to astrology was originally, has always been and remains to this day, from the standpoint of mystical philosophy. This was and is because I believe that in the end, this is the approach which gets closest to the essential truths of the subject and, indeed, includes all others."

MATRIX VIII, page 2, 1981

NEW FULL-TIME MATRIX STAFF MEMBER

MATRIX is happy to announce the addition of Doug Pierce as a full-time staff member here at MATRIX. Aside from being a research astrologer, Pierce is a professional statistician and computer programmer. One of Pierce's initial projects here at MATRIX will be to design and program a statistical module for use with the M-65 RESEARCH SYSTEM. Pierce is one of the foremost researchers in dynamic astrological interpretations systems involving computers. With his help, MATRIX will be offering a variety of new approaches to computer assisted interpretation. Pierce and his wife will re-locate to Big Rapids Michigan in September of this year.

THE SECOND A.C.T. CONFERENCE

The 1982 ACT CONFERENCE will be held as part of the bi-annual AFA CONVENTION at the CHICAGO MARRIOTT hotel from August 28 thru September 1 of 1982. ACT (Astrological Conference on Techniques) is under the direction of Michael Erlewine and Charles Jayne. We will have one room devoted to ACT running during the entire AFA Convention. Registration for the AFA convention automatically includes all ACT workshops and activities. The goal for the 1982 ACT conference will be an attempt to establish standards among astrologers in research areas.

With the exception of two research project reports, all ACT functions this year will be in the form of workshops involving a panel of experts who will interact with each other and with the attending audience on the subject matter. ACT workshops include: Creating a Standard List of Astrological Subjects and their representatives (who is doing what), Research techniques & the Stock Market, Proposed Standards for an Astrological Data Base, Computer Hardware & Software roundtable, Design for an Astrological Research Language, Statistics in Astrological Research, World Personality Data Exchange Project, Dynamic Computer Interpretation Schemes, and many more.

ACT panels include some of the foremost technical and research oriented astrologers in the world today. We have a top notch staff and a carefully laid out program. We hope many of our MATRIX readers will be there to share in the workshops and to meet one another. Don't miss the 2nd ACT!

M-65 RESEARCH SYSTEM LAUNCHED

MATRIX headquarters has been more than a little busy during the last year as we put the finishing touches on our new M-65 system. A computerized system capable of actual research projects has been a dream of my brother Stephen and myself since the late 60's. It would be hard to find an astrologer who has not had similar dreams.

We have worked on M-65 for several years but only recently have we had the manpower to bring it all together and implement it on several machines at the same time. David Cochrane, Stephen Erlewine and your editor have worked on this system (it seems like day and night!) for the past year. It is finally finished and available on the Commodore 32K, Radio Shack Model I and III and the APPLE II computer systems with dual disk drives and a printer. The Commodore and Radio Shack systems have been shipped and the APPLE II system is in the final testing stages.

The initial release of the M-65 consists of two main parts: (1) CHART CREATION & STORAGE and (2) RESEARCH QUERY SYSTEM.

(1) The CHART SERVICE is a self-contained system capable of generating and storing most of the commonly known astrological charts and techniques. This system includes quite elaborate analysis and printout capabilities including single and dual wheels plus many different types of graphic printout (Planetary Pictures, Trees diagrams, etc.). The user may control the arrangement of the final printout, custom program their own set of aspects and orbs, etc.

(2) RESEARCH QUERY SYSTEM The second part of the M-65 system allows the user to access any of the material stored in the astrological files plus create their own set of user defined questions and answers to be accessed. The user may design SEARCH PHRASES to analyze any of the stored data. Data may be sorted thru, counted and formatted for printed output. A multiple pass option allows the user almost unlimited flexibility in designing research projects.

(Continued on page 60)

TRUE SECONDARY AND TERTIARY PROGRESSIONS

By

Laurence Ely
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In this paper I present new theories of secondary and tertiary progressions which are much more accurate and precise¹ in their predictive ability than the customary theories. Besides their superiority in careful rectification and prediction over the customary theories, these new theories, unlike the customary ones, dovetail completely with the theory of transits thus creating a unity of conception in the astronomy or physics of astrology. While a lot of the theory is now tight, a lot of theoretical questions issue from it and so a lot more work still needs to be done as will be seen towards the end of the paper. Before proceeding with the development of this new theory, I want to put secondary and tertiary progressions into perspective with respect to the structure of the body of dynamic or predictive techniques. I must intermix a little history of astrological thought to help put our current knowledge of dynamic techniques into focus.

The presiding astrological wisdom conceives of the structure of the body of predictive techniques as follows. First there is the technique of primary directions based traditionally on the conception of the daily rotation of the heavens about the earth at the rate of one degree in four minutes of sidereal time. The idea here is to equate each degree of rotation (each change of one degree of right ascension of the MC) with one year of life. This theory is credited to the second century A.D. astronomer, Ptolemy, about whom more later.

The word direction arose out of the idea that in primary directions all planets, fixed stars, etc. move at the same rate and in the same direction thus preserving the relative positions as found in the natal chart. By way of contrast, in progressions planets move at different rates from each other and all but the sun and moon go retrograde at times just as in the domain of the technique of transits. It was Placidus, the father of Placidian houses, who introduced the term arcs of direction in his Primum Mobile.² This work represented a thorough discussion of the technique together with the introduction of spherical trigonometry to handle the calculations. It must have had a considerable impact on astrological thought to follow, judging from the fact that at least as late as 1935 primary directions or arcs were also called Placidian arcs.³ That Placidus was influential in the world of astrology is further testified to by the fact that his theory of house division continues to be far and away the most widely accepted theory and it is now more than three hundred years since his death.

Over the past several decades various alternative theories have been proffered as substitutes for the one degree per year of Ptolemy and Placidus. I will explain the reasons for this proffering of alternative theories a little later. For now, it is well to realize that only a handful

of astrologers employ primary directions of one variant or another. By their attachment to the authority of Ptolemy and Placidus, two of the most famous names in astrology, primary directions have taken on an aura of respect and elitism on the one hand yet obliqueness and distance on the other. They have remained the province of certain technical and research astrologers. The spherical trigonometry has kept away most non-mathematically inclined astrologers.

Turning now to the next dynamic technique, we have the widely employed secondary progressions or day-for-a-year progressions. This theory is based on the analogy between two cycles, the cycle of the day and cycle of the year. Accordingly, a sunrise on the daily level corresponds to the vernal equinox on the yearly level, etc. In this technique we go one day forward in the ephemeris for each year of life from the birth moment. As to its origins, we do not have the case of a personalizing as with Ptolemy handing us down the primary directions. Somewhere in the Bible I believe someone says, "Ye shall count ye days as years." Henry Owen indicates the theory as coming from the Arabs, because he refers to it as "the secondary or Arabian system."⁴ Zipporah Dobyns told me the theory goes way back.⁵ In the technique of solar arc directions, commonly understood to be loosely associated with secondary progressions, the difference between the position of the secondary progressed sun and the natal sun is taken as defining the solar arc or arc of the sun. Johannes Kepler, whose dates are 1571-1630, employed solar arc directions, and so I surmise, secondary progressions as well. Here is what Richard Svehla says on the matter:

These directions are not a new feature either, having been extensively used by the great Astronomer-Astrologer, Johannes Kepler, and he probably was following in the footsteps of others before him.⁶

Although the technique of secondary progressions would appear to go as far back as primary directions in its origin, the technique was not in great use vis a vis primary directions it seems until nearer our times. Robert DeLuce had some comments which go to the question of why that was. He refers to secondary progressions as the progressed horoscope and to primary directions as equatorial arcs:

In the last decade of the 19th century there was a growing interest in Astrology and the method of the progressed horoscope was largely brought into popular use because it was easy of application, requiring only the simplest mathematical calculations and furthermore could be used independently of a knowledge of the exact birth time. The method of equatorial arcs requires that the birth time should be known to the very minute, while in the method of the progressed horoscope if a birth time is known to within ten minutes the results are usually satisfactory.⁷

Two who were largely behind the movement towards more widespread employment of the theory of secondary progressions appear to have been Sepharial (1864-1929) and Alan Leo (1860-1917) according to Henry Owen:

"Sepharial" (Walter Gornold) wrote on the primary system, but he is generally held to have introduced the "progressed horoscope" which Alan Leo popularized.⁸

I have thus far discussed three predictive techniques, which are regarded as three independent theories, namely, primary directions, secondary progressions, and solar arc directions. A fourth theory is that currently called minor progressions, but called embolismic lunations a long time ago. Here, our friend Placidus pops up again. The theory was explained by DeLuca as follows:

. . . embolismic lunations treated of by Placidus. By this system each lunation following birth relates to a corresponding year of life. Thus the first time after birth when the Moon holds the same phase or relative position to the Sun that it held at birth denotes the indications for the first anniversary after birth, and the second lunation the second anniversary, and so on.⁹

This means that for every year old you are, you go 29.530589 days forward in the ephemeris from the time in the ephemeris corresponding to your birth time. On page 108 DeLuca gives the following example. I abbreviate embolismic lunation progressed by ELP:

Natal Date	August 24, 1877
Event Date	August 24, 1934
ELP Date	April 3, 1882

Minor progressions are also employed by correlating a year of life with the 27.321582-day period of the moon recontacting its natal place. In either case, these minor progressions are minor, indeed, in terms of use by astrologers.

A fifth technique is that of tertiary progressions. Here the cycle of a month is equated with the cycle of the day. While in secondaries we go a day forward in the ephemeris for a year of life, in tertiaries we go a day forward in the ephemeris for a month of life. As in minor progressions, the month can be either the synodical month of 29.530589 days or the tropical month of 27.321582 days. In as much as these tertiaries bear such a close resemblance to secondaries, it is surprising that there is no mention of them in the astrological literature until recently. Charles Jayne says that Edward Troinski of Germany concocted them,¹⁰ and I surmise the date to have been in the 1960's.

A sixth technique is that of symbolic directions in longitude motivated no doubt, by Ptolemy's one degree per year key in the primary system. Henry Owen informs us of this development:

. . . in the years 1928-1929 by various symbolic measures first introduced by W. Franklan and by Charles Carter, by which a fixed number of degrees of longitude or fractions thereof were added to all natal positions for each year of life.¹¹

These include Carter's $1/4$ degree per year and Franklan's $4 \frac{2}{7}$ degrees a year, his so-called "Point of Life" (one zodiacal sign every seven years). Also he employed $4/7$ of a degree for a year (Sephariel argued for $3/5$ of a degree for a year instead).¹² Also given by Carter was $2 \frac{1}{2}$ degrees per year.¹³ Rudhyar offered his "Point of Self" of $12 \frac{6}{7}$ degrees a year, apparently styling this after Franklan's $4 \frac{2}{7}$ degrees a year by multiplying

his value by three.¹⁴ And last but not least, there is the one degree per year direction, exactly paralleling the traditionally employed primary system.

Carter has been one of the more influential astrologers of the 20th century and so I would guess that his symbolic directions and the symbolic directions of Franklan and Rudhyar have gained a certain coinage, although I personally do not know anybody who uses them. But I would hazard to guess that they are employed more than primary directions are.

A seventh technique includes two directions related to solar arc directions in longitude. Here we have the Naibod arc of 59'08" movement per year, based on the average daily speed of the sun and the Simmonite or birthday arc based on taking the speed of the sun on the birthday as the directional speed throughout the life. This Simmonite arc supposes that somehow one captures the instantaneous speed of the sun at birth. The Naibod arc was employed in Vivian Robson's The Radix System, considered a classic in the field. Sepharial (Walter Gornold) apparently first introduced this Naibod arc.¹⁵ These directional rates have been applied to primaries as well. This area is rather confusing from the literature at my disposal, but I am fairly sure that these arcs in fact first were used in the primary system (arcs along the equator), no doubt because the traditional primary system of Ptolemy was found wanting when stacked up against reality.

The body of predictive technique ends with the good old technique of transits, the most intuitively obvious technique in that it directly considers the continual movements, subsequent to birth, of the actual motions of the planets in real time. In this connection, the birth chart is just a snapshot of the flux of planetary motions through time. Included in the technique of transits as a subset would be the planetary return chart, interpreted as a subsequent birth cast off from the first birth, and living only until the next planetary return takes place.

Ronald Davison has made a quite incisive insight about the interpretation of transits which serves to unify them with progressions. He has stated that transits can be viewed as day-for-a-day progressions.¹⁶ While the day-for-a-year equation creates secondary progressions or the progressed horoscope, his day-for-a-day equation creates what he calls daily progressions or the daily horoscope. He continues:

Some years ago I suggested that the daily horoscope might be regarded as the logical extension of the day for a year system of progressions and proposed as auxiliary measures the day for a month and day for a week series, finishing with the day for a day series, . . . I want to continue with this series in ever decreasing amounts of time . . . it is probably valid to equate a day with an hour, a day with a minute and a day with a second.¹⁷

I have described all of the mechanisms of astrological prediction and now I want to summarize the structure of the body of techniques as it is currently viewed. Here is that structure with the great circle employed for each technique listed along side of the mechanism of the technique, as I suppose it to be commonly conceived:

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TABLE ONE

TECHNIQUE	GREAT CIRCLE	MECHANISM
Primary (Equatorial) Directions	Equator	?
Secondary Progressions	Ecliptic	Analogy between two real astronomical cycles (sympathetic vibration as tuning forks in music).
Tertiary Progressions	Ecliptic	"
Longitudinal Directions Solar Arc, One Degree & Symbolic, Naibod Arc, Simmonite Arc	Ecliptic	?
Transits	Ecliptic	Real astronomical time (sympathetic vibration as tuning forks in music).

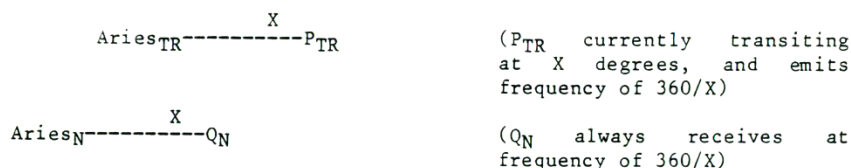
Note: Minor progressions are for the time being subsumed under tertiary progressions since minors involve lunar periods, like tertiaries.

While I enumerated the several directional techniques over a few categories in the above historical development, I include them all together in the same category in the above table since they are all directions in longitude even though their principles or physical conceptions differ. I stated that solar arc directions are considered loosely connected with secondary progressions in that to get the solar arc, one has to first employ the mechanism of secondary progressions (the physical analogy between the day and the year). This begs the question of whether solar arcs should be included under the category of secondary progressions. Yes, but what about the one being progressions and the other being directions? A lack of fit. This question as we shall see, is a ticket for our current structure of techniques to embark on a ship headed for a land of clarity and unity leaving behind the miasmic grounds upon which our structure of techniques now rests. The other ticket for embarking on this voyage comes from asking how come we have directions on the equator and directions on the ecliptic yet transits only on the ecliptic? Looking back at the table, what about the question marks under the Mechanism column? What is the machinery, what is the mechanism by which directions are created? What are directions, anyway?

Where do we start? Well, let us consider transits first. They are simplest. I have in mind a thought that most of you would give a nod of assent to the theory that the mechanism of transits is accurately likened to sympathetic vibration as in the high school tuning fork experiment. One takes two identical tuning forks, strikes one and holds it next to the other without touching them. Then one dampens the one which was struck, stopping

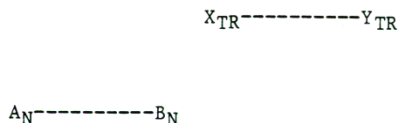
its vibrating. One now notes that the other one is vibrating. One hears the same note at about the same intensity. They are on the same frequency like two people enraptured over sharing the same esthetic sense. Say each produces middle C. Now we take a tuning fork which produces the note D. We strike it, hold it near either of the C forks, and then dampen the D fork. Now we find the C fork does not respond or vibrate, at least not to our senses: just a little energy would have been transferred due to harmonic considerations.

On the level of transits the analogy is directly comparable. If I have a natal planet at two degrees Aries, it is two degrees distant from natal zero Aries, thus its wavelength is two. A planet at one degree Aries would have a wavelength of one. Frequency (the note, or pitch) would be found by dividing the wavelength into 360 degrees. So frequency and wavelength are reciprocally related. Well, if I have a natal planet at two Aries, I possess a tuning fork of frequency $360/2$. Now when a transiting planet reaches two degrees Aries it is emitting a frequency of $360/2$. It is two degrees away from zero Aries transiting. So the frequency the sky is emitting is one that I possess, and so I respond through sympathetic vibration. Let me diagram this with N for natal, TR for transiting, and P and Q for any two planets (P may equal Q as well):



I do not write P_{TR} on top of Q_N. There is no physical hitting or geometrical line-up. I do not possess a zodiacal 360 wheel on the crown of my head or a wheel circumscribing my torso someplace. I have no wheel that always keeps its zero Aries direction in the direction of Aries in the sky. I am free to come and go, and rotation is included among my freedoms.

Generalizing this concept further, there is no reason to require Aries to be one of our natal and transiting members or points. Take X and Y as two transiting bodies; A and B as two natal bodies:



Here if $Y-X = B-A$, then X,Y are emitting at a frequency that A,B can receive.

Now when we go to the level of secondary or tertiary progressions we jump to analogical time.¹⁸ The real time in the ephemeris gets mapped into analogical time which is a very personalizing, internalizing, and

individualizing time. Only two individuals who share the same birth time can be living in the domain of the same analogical time for a given type of progression. So, in progressions, we have planetary positions moving in relation to our fixed natal patterns, just as in transits. Therefore, the same principles of sympathetic vibration apply in progressions as apply in transits. The idea I want to impress upon the reader is that in each of the techniques of transits and progressions, we have two levels, the natal and the dynamic or moving.

Now let us dig into the core of the matter of primary directions. You had better bring along an air purifier to hold over your nose because the whole area is redolent with putrefaction. Our question is the mechanism by which they work. In this technique, the six hours of time following birth are witness to a rotation of the heavens by 90 degrees and as one degree is supposed to signify a year of life, this gives one potentially a 90-year lease on life. After six hours, quadrature is reached, traditionally signifying crisis. Traditionally the fourth house signifies among other things the end of the matter. Even though six hours have elapsed at the 90-degree rotation point or three hours at the 45-degree rotation point (corresponding to age 45 years), curiously, the method does not admit of any consideration of the movements of the planets longitudinally. In three hours, the moon for instance moves 1.65 degrees longitudinally on average. The theory then must suppose some kind of imprinting at the moment of birth on a concentric circle which rotates against the inner circle containing the natal planets. Such imprinting then freezes the pattern of the relative planetary distances in arc. So a copy of the natal chart is somehow created. But where? We have no physical analogue computer as we do in mapping two cycles together in the theory of progressions both secondary and tertiary. Something is fishy here.

I have demonstrated the strong suspicion that the theory of primary directions is lacking. Could it be that those employing primaries were getting approximate results by virtue of the technique's closeness in directional rate to the technique that is now widely acknowledged among careful and thorough astrologers as being highly accurate, namely solar arc directions in longitude?¹⁹ One must realize, in this regard, that there are many variables allowing for errors to at times cancel each other out: the rate of change of RAMC relative to the rate of change of the longitude of the Midheaven, the varying speed of the earth in its orbit and so the varying rate of change of the solar arc with longitude of the progressed sun, and the fact that the MC can be at any angular distance from the sun. Contributing to the plausibility of the theory has been the sloppy technique of working with excessively large orbs of one degree or more. Charles Jayne clearly points out the blunder committed by this older practice of allowing large orbs. By allowing such orbs, the inherent imprecision of the directions by the Naibod arc or the one degree per year arc in longitude would be hidden.²⁰ The orb allowance when this sort of mind was at work on primaries certainly was similar. Take the case of Robert DeLuce's acknowledging that the formation of the arcs in the ensuing hours after birth does allow for the planets to move longitudinally:

A little reflection will show that the time required for the formation of the equatorial arcs significant of a lifetime is too brief to permit any appreciable motion of the heavenly bodies in their orbits, for at

the most six hours would permit the Sun to move in the ecliptic about one-fourth of a degree, while the Moon might move in the orbit approximately three degrees. . . . Therefore the only movement of the heavenly bodies that is important in the system of equatorial arcs is the apparent diurnal motion that carries the whole heavens around the circle of the twenty-four hours.²¹

I do not know what planet he is from, but being content to have a lunar position reach a two-degree error by age fifty say, is curious indeed. Especially since the adjustment to the lunar position would be so easy to make relative to the other lengthy calculations already done. Could this perverse attitude towards accuracy be betraying an underlying realization on DeLuce's part and others who employed this traditional technique, that the technique is bankrupt anyway for any real world results? Could these astrologers be engaging in some bizarre kind of technical, esthetic ritual adopted unconsciously in homage to the great Ptolemy? One really has to stop and wonder.

Now it is time to have a look at this fellow Ptolemy whom so many astrologers revere as though the father of their art. There is a gentleman named Robert Newton who is a creative and dedicated scientist and he has been studying various long-range positional problems in astronomy. He has published a series of books over the last several years. There is one book whose covers I want to open for you now, for it contains a nice little bomb that it is time for me to drop in this paper. In a nutshell, Ptolemy was a fraud. He claims to have made several observations which he did not make and these alleged observations just happen to agree with his theory of planetary motion. Says Newton:

In sum, four classes of Ptolemy's alleged observations have been tested by rigorous procedures. It turns out that all of these observations that Ptolemy actually uses are fraudulent; that is, they have been fudged for the purpose of establishing erroneous theories.²²

Since Newton went much farther back than the second century A.D. of the Ptolemy epoch, to Greek Hellenistic times etc., we can rest assured that the errors are not Newton's. Only for Ptolemy does his data make a huge bulge from what it should give, like a big cosmic finger pointing down from the sky.

This man Ptolemy, then, is nobody to trust. He wanted to tell God how things were rather than have God tell him how things were. I leave it to the reader to dwell on the possibility that he was similarly twisted in his astrological vision and entertained a contempt for observation and reality, here too.

Now I am not yet through in trying to get the wart of primary directions off astrology's nose. We have another authority whom we now must put under the light of reflection. You guessed it, Placidus. It looks as though I am being hard on the letter p these days. Now, Placidus has not impeached his own character, so I cannot impeach it, unlike the case of Ptolemy. All I want to say about Placidus is that he may have been a fine fellow and a capable mathematician, but I, for one, have to question his astrological ability. His house system does not work. It is just that

simple. In my book, to say that a house system works is to say that when dynamic techniques, known to work for the rectified angles of the chart, are applied to the chart's intermediate cusps, the events produced are consistently appropriate, over a long span of investigation, to the values of those intermediate houses, and the orbs on timing are consistently similar to those displayed for the chart's angles. This is a necessary condition to make the statement that the house system works or exists. One has no other astrological method of evaluating a theory of house division than this dynamic test, for there are just too many variables in the interpretation of a chart to argue the case statically or natally in a statistical manner, over many charts.

By the above definition of working, only the following house systems work, and the Placidian system is not among them: Campanus, Alcabitius, Koch, and Meridian. This is based on a dynamic study I have made over the past several years among various charts. It appears that a consensus is building among astrologers to reject the Placidian system in favor of Campanus or Koch, mainly. This is a healthy movement for astrology.

To finish off the business of Placidus, if you question or deny the validity of his house system on empirical grounds (Lord knows we do not need any more Medieval Age a priori theorizing) then you must at least be prepared to doubt his statements regarding the primary direction system, not those pertaining to the purely formal, mathematical aspect, but those pertaining to the efficacy of the system astrologically. What I am convinced we have here is another dazzling display of the technical, esthetic ritual. In astrology we need a dialogue between fact and intuition, not chimeras. It must be realized that Placidus' coming into Ptolemy's orbit re-energized the chimera of the old sage, which has had repercussions down to our day as Victorian astrologers stepped into the miasma of the primary directions. I hope that with the widespread use of microcomputers, astrologers will soon evaluate this oblique area, and I surely expect them to come to the conclusions I have.

I have tested primary directions by these four methods: Ptolemaic one degree per year, Naibod arc, Simmonite arc, and the solar arc in right ascension, which was introduced in the early 20th century by Gornold and termed equatorial arcs by DeLuce. Using known, thoroughly rectified charts I got no results at all in taking meridian distances as well as oblique ascensions.²³ I did not even bother about planet-planet interactions when the angles did not even work! Furthermore, I have tested transits in right ascension using tested charts. Here the right ascensions of transiting planets are taken to the right ascensions of natal planets. Nothing. The equator is not an active field plane as the zodiac is in which to work longitudinally in comparable fashion to the ecliptic. A tangent observation, however, is in order at this juncture. Parallels and contraparallels in declination most decidedly do work, a dimension of astrology given due weight by Charles Jayne, among others.

I have now argued theoretically against primaries. I have shown their treacherous history, and I have empirically tested them as well as transits in right ascension to convince myself of their total inefficacy.

Students of the predictive techniques over the past fifty years roughly, have made great strides in empirically determining which techniques have merit and which ones do not. In terms of directions longitudinally, I know of nobody who wastes time with Naibod, Simmonite, or the one degree per year or other symbolic directions. The solar arc direction is widely embraced and valued more than transits or secondary progressions I would venture to say by growing numbers of astrologers. I am not sure precisely who rediscovered the solar arc technique Kepler had employed, but Charles Jayne states that about 45 years ago both E. Richard Wagner and Alfred Witte began using them.²⁴ In his monograph, Progressions and Directions, no publication date appears, but if we take it to be roughly 1975, then it was around 1930, the discovery date of pluto, when this eventful episode was taking place. So pluto's propensity to "open fresh chapters" (borrowing Charles Carter's phrase)²⁵ in developments is once more born out.

But old soldiers never die and a little before this time came a desperate, last-ditch effort to get primaries to work after more demanding researchers had rejected the Ptolemy one degree key, the Naibod key, and the Simmonite key. Thus, Sepharial (Gornold) introduced the solar arc in right ascension into the primary system²⁶ after having already introduced the Naibod arc.²⁷ The theory of the solar arc in right ascension applied to primaries was embraced by DeLuce and he called them by the name equatorial arcs, probably to distance himself from the dessicated Ptolemy primaries.²⁸

Unfortunately, attempting to substitute for a key of uniform speed, such as are the one degree, Naibod, and Simmonite keys, a key of varying speed, which the solar arc key is, is to engage in an illogical and mechanistically unallowable exercise. For primaries are based on the uniform rotation of the earth, the natal places being somehow reproduced concentrically in order to do their magical revolutions against the inner natal positions. As soon as you go to the reality of a cycle on another level, namely the yearly movement of the sun, you are now doing secondary progressions. Recalling that the solar arc direction in longitude is found by subtracting the natal sun's longitude from that of the secondary progressed sun's longitude, we see that by calculating the solar arc in right ascension we are really doing secondary progressions in right ascension. So we cannot have a structure of technique which does primary directions based on solar arc in right ascension. Instead we have two forms of secondary progressions one calculated as a-day-for-a-year movement in longitude, the other as a-day-for-a-year movement in right ascension.

I hope this last point brings home to some the confused thinking that has so long prevailed in primaries. You see, primaries do not exist. The Emperor has no clothes.

O.K., off with your air purifiers, we are back to some fresh air. We just have a little problem to iron out in our structure of techniques and we are ready to investigate the true secondary and true tertiary progressions.

Let us go back to our structural diagram and retrace our ground to see what has been eliminated. On the basis of Charles Jayne's research group and other researchers, the longitudinal directions have been stripped down to just solar arc directions. Primary directions are gone. This leaves us just: secondary progressions, tertiary progressions, solar arc directions,

and transits. You will recall that the minor progressions have been subsumed under the day for the month tertiaries for the time being. So now rearranging the order of the techniques and rewriting the table without the Great Circle heading, because it has been shown that the equator is inactive in terms of right ascensional values, we have this:

TABLE TWO

TECHNIQUE	MECHANISM
Secondary Progressions	Analogy between two real astronomical cycles (sympathetic vibration as tuning forks in music).
Solar Arc Directions	?
Tertiary Progressions	Analogy between two real astronomical cycles (sympathetic vibration as tuning forks in music).
Transits	Real astronomical time (sympathetic vibration as tuning forks in music).

Now where does the solar arc direction technique fit in? And what is its mechanism? We have grown a little afraid of the word direction given its past track record, but keep the faith because after a bit more mopping up after this restructuring of our body of predictive techniques, we can rename solar arc directions to just solar arcs or even something better, perhaps.

Since the solar arc method of directions is based on taking the secondary progressed sun and subtracting from it the natal sun, it can easily be shown that solar arcs are in reality a harmonic subset of secondary progressions. Let us now see how this is.

If we denote solar arc by S, progressed by P, natal by N, and any zodiacal longitude such as a cusp, fixed star, or any asteroid or planet except the sun by L(I,J), I = 1, 2, 3 . . . and J = S, P, or N, then we can write this diagram illustrating a solar arc at culmination where L(1,N) has come to conjunction with L(2,N) or, longitudinally, $L(1,S) = L(2,N)$:

$$\begin{array}{ccccccc}
 L(1,N) & & L(2,N) & & Sun(N) & & Sun(N) + L(2,N) - L(1,N) \\
 \vdots & & \vdots & & \vdots & & \vdots \\
 \hline
 & & \vdots & & & & \vdots \\
 & & L(1,S) & & & & Sun(P)
 \end{array}$$

The solar arc, SA, is defined as, $SA = Sun(P) - Sun(N) = L(1,S) - L(1,N)$, but this is just $L(2,N) - L(1,N)$, so equating and rearranging, we write $Sun(P) = Sun(N) + L(2,N) - L(1,N)$, which states that the progressed sun has arrived at the sensitive point $[Sun(N) + L(2,N) - L(1,N)]$, which is a statement of the dynamic, astrological reality of what a solar arc direction really is, namely, the arrival of the secondary progressed sun at the

sensitive point involving the natal sun and two other points, A and B: $\text{Sun}(N) + A - B$. This is interpreted, in practice, with the solar arc direction technique as "B solar arcing to A."

Now since $\text{Sun}(P) - \text{Sun}(N) = L(2,N) - L(1,N)$ represents the equating of two differences, it should be understood that a difference is intimately related to a harmonic number, HN by:

$$\text{EQ. 1} \quad \text{HN} = \frac{360}{\text{ABS}[L(2,N) - L(1,N)]}$$

where ABS is the absolute value function. In the terminology of physics, if two differences (wavelengths) are the same they are said to be in sympathetic vibration or in sympathy. Here,

$$\text{EQ. 2} \quad \frac{360}{\text{ABS}[\text{Sun}(P) - \text{Sun}(N)]} = \frac{360}{\text{ABS}[L(2,N) - L(1,N)]}$$

expresses such sympathy. Additionally in physics, a frequency, f, is reciprocally related to a wavelength, w, by:

$$\text{EQ. 3} \quad f = \frac{1}{w}$$

So we should consider calling the difference in arc between any two planets or points, the denominator in EQ. 1 above, by the name wavelength. Thus the pair $L(2,N)$, $L(1,N)$ has a wavelength of $L(2,N) - L(1,N)$. Mercury at one Aries and Uranus at 73 degrees (13 degrees Gemini) have a wavelength of 72. To then talk about the frequency for a given pair, we would write the following in place of EQ. 3:

$$\text{EQ. 4} \quad f = \frac{360}{w}$$

where w is the wavelength or angular separation as described.

So returning to Table Two, we see that we can clear up another appendage and bit of confusion. Solar arc directions are just the same as secondary progressions: in solar arcs we are just limiting our attention to one aspect or part of the whole set of secondary positions or the whole secondary progressed chart itself, complete with house cusps. When one employs solar arcs, one is employing the theory of sensitive points as fleshed out by the brilliant Witte and others of his time. I hope this observation gives pause to the orthodox bulk of astrologers who place little or no weight on midpoints, are ignorant of sensitive points (of which Arabian parts are just a small subset), and who shun the analogue computer known as the 90-degree dial. For the technique of solar arcs, which is universally applauded now, is just one neat tool issuing from the vision of chart structure residing in the theory of midpoints and sensitive points.

It needs to be emphasized now clearly, that there is no mechanism of solar arc directions in terms of an astronomical machinery. The only machinery aside from transits is the machinery of progressions, whereby an analogy between two separate natural, astronomical cycles exists.

Starting from the secondary progressed planets' positions, one can calculate lunar arcs as well as solar arcs, mercurial arcs as well as lunar arcs, venusian arcs as well as mercurial arcs, etc. The principles of midpoints and sensitive points is universal and impartial. It does not work for some planets and not for others. Recall that to say mercury solar arc = venus natal is really to say that sun secondary progressed = sun natal + venus natal - mercury natal. Now just put the sun some place else in the chart and put natal mars where natal sun was. Now if progressed mars minus natal mars is the martial arc (and this can have a negative value, provided mars was retrograde), then we have mercury martial arc = venus natal being expressed in the real process, secondary progressed mars = mars natal + venus natal - mercury natal. Now replace mars by Ascendant. The Ascendant arc would be progressed Ascendant minus natal Ascendant, and the progressed Ascendant, we know, is a function of the Midheaven progressed by solar arc, the geographic (not geocentric!) latitude, and the true obliquity of the ecliptic. Now we have the Ascendant arc directions which Charles Jayne et al swear up and down are vital to predictive work.²⁹

Now if you are beginning to get the picture that the structure of technique is rapidly expanding, hold on a minute, because I am not finished. Please realize now that the same generalizations as to planetary arcs in the secondary progressions apply in the tertiary progressions, as well! Our body of techniques grows all right, but now in the right places and so we can hope to interpret them in more logical, meaningful, specific, and interconnected ways. For example, by going to secondary progressions as opposed to tertiary progressions, we can see right off that it is most likely correct that secondary progressions, based as they are on cycles of the year (solar), will have an application to areas symbolized by the sun in general, while for tertiaries, the symbolism is related to the moon. Furthermore the jupiterian arcs, being progressed jupiter minus natal jupiter in both domains of secondaries and tertiaries, will have a flavor or level of interpretation bearing on the symbolism of jupiter, etc.

Because it is probably true that secondary progressions have a general meaning related to the sun and tertiary progressions have a general meaning related to the moon, we ought to now give serious consideration to calling secondary progressions by the name solar progressions, and tertiary progressions by the name lunar progressions. And as if that were not reason enough, now that we no longer have primary directions to kick around anymore, do our poor secondaries still have to be kept out of the sun by being relegated to second class citizenship?³⁰

I now list Table Three as an object to contemplate in preparation for the theoretical developments to follow regarding true secondary and true tertiary progressions. We can go on to them and we can now appreciate that only progressions and transits exist as dynamic or predictive techniques. There is no such thing as the technique of solar arc directions as an astronomically separate mechanism:

TABLE THREE

TECHNIQUE	MECHANISM
Secondary Progressions	Analogy between two real astronomical cycles (sympathetic vibration as tuning forks in music).
Tertiary Progressions	"
Transits	Real astronomical time (sympathetic vibration as tuning forks in music).

I want to now center our thought on precisely what the physical nature of these cycles are: the day, the month, and the year. We will be uncovering two fundamental flaws in the very way that secondary and tertiary progressions have been viewed or conceived. The premise or concept of equating a day with a year or a month is obviously sound, but the physical interpretation or implementation has not been correct. By adhering literally and rigorously to the concept of equating a day with the revolutionary period of an orbiting body, I have formulated a new theory of progressions which applies to both secondaries and tertiaries.

The new secondary progressions have been exhaustively tested in several accurately rectified charts where transits were employed as well as the progressions and solar arcs. As to the tertiary progressions, my experience and that of others tell us that they work, all right, but I personally have not tested them to date as completely as I have the secondaries. My experience with them has not been explicitly concerned with timing accuracy, until just recently. In the past, I have found them very helpful in supplying more information for predictive work and more confirmation of a rectification since outer planets are made to move rapidly and often are brought to powerful aspects to the angles of a chart. Recent insights and computations are sufficient to tell my intuitive side that they are indeed as accurate and precise as secondaries. But some theoretical problems still remain as to how to progress the MC, for example. I will now begin the discussion of secondaries and will return to tertiaries later.

These new secondary progressions have been tested for five years and consistently give very small errors in timing. For example, solar arcs based on the secondary progressed sun are consistently accurate to 10" of arc (one day) or better,³¹ while the progressed moon times events to the fraction of a day, if not to the nearest few hours. By way of comparison, the errors using the customary techniques of secondary progressions amount at times to 2' of arc for the sun or solar arc (12 days) and 26' of arc for the moon (12 days). It is very gratifying to have observed that transit timing employing ephemerides to 0.1' (6") accuracy corroborates the timing from these new secondary progressions and from the solar arc directions based on them. Truly, there is now a unity of technique between secondary progressions and transits. The combination is extremely valuable, in fact a necessity, for exacting, reliable work in rectification and prediction.

While the validity of this new theory of secondary progressions is based on a wealth of observations, I have chosen not to cite any examples here. I appreciate that astrologers like to test out new ideas on their own charts which they know best and have rectified the most accurately. A quick and most revealing study would simply be the comparison between the customary technique and the new technique of culminating progressed moon aspects to natal planets, but especially to progressed planets, which I have found to be stronger. Having satisfied oneself of the higher accuracy of the new technique in progressed moon timing, one can proceed to investigate any systematic errors in timing employing the new technique. Any error between the theoretical timing of these new progressions and the observed timing (the symbolic event or feeling) will be systematic, i.e., in the same direction and of substantially the same magnitude (the actual magnitude is a function of the speed of the progressed moon and the progressed planet). This error in timing would be due to an error in the birth time or in the rectified time. Having rectified the time, one could then proceed to study the progressions and solar arcs involving the angles. In this way one checks for internal consistency and further refines the rectification.

We should call these new progressions true progressions while naming the customary progressions mean progressions for the purpose of differentiation in future evaluation and discussion. One might equally well choose the word apparent in place of the word true, but true is more concise and connotes more the idea of exactness in terms of predictive accuracy, which I want to convey. Having created the distinction between the mechanisms of true or apparent progressions and the mechanism of mean progressions, I must hasten to state that only one of these is correct in the sense of existing as an astrologically efficacious mechanism. That mechanism is the mechanism of true progressions. The mean progressions (the customary secondary or day-for-a-year progressions) represent a flawed perception and therefore an incorrect calculational approach to the whole idea of what progressions are all about. Please rest assured that by mean progressions I do not indicate the Naibod arc of 59'08" movement per year regardless of the birth date. The word mean in mean secondary progressions refers to the employing of the calendar, which involves mean motion, to determine the fraction of a year beyond a birthday as will be discussed in a moment.

The reason underlying the choice of the terms true and mean will be explained at length in a moment. For the time being it should be noted that the sense of the words true and mean are taken from astronomy. I feel it is proper and desirable for astrology to adopt a terminology in its physical and mathematical concepts, whenever possible, which parallels existing terminologies in astronomy and physics. The last thing we want to do is to add to the top-heaviness of the terminological Tower of Babel.

Mean in astronomical parlance usually means either (1) the smoothed base line tendency of motion which does not include the various correction terms, perturbations, or oscillations above and below this base line or (2) the average value taken as uniform: as the mean speed of the earth is 59'08" arc per day while the true speed ranges from 57' arc per day to 61' arc per day. In both senses of the word mean, the idea back of mean is that of a first-step approximation towards some calculational end or a value of only intermediate worth or accuracy before correction terms are applied.

The second sense listed above also includes the idea of a group attribute or the idea of summation or integration of individual elements.

Having stated the equivalence between the words apparent and true in our context here of apparent progressions or true progressions, I want to point out that the word apparent should be thought of as connoting perceived or detected by the senses. Thus an apparent position of a planet³² or the apparent Midheaven degree³³ is the position noted by the senses of the astronomer using his eyes via instruments or by the senses of the astrologer when doing astrology. Just so, the apparent (true) progressions give those positions, and they differ from the mean progressions' positions, where appropriate events occur (are detected by various senses) symbolized by the planets, cusps, or any astrologically efficacious point involved when alignments are exact measured by those positions.

To sum up the distinction in meaning between true or apparent versus mean we see that the true or apparent position is the actual, perceived, detected, effective position while the mean position is an intermediate value or a value based on a group property (an average). As the mean position expresses the property of a group (neptune) it has no real individual existence (uranus). As an illustration, the earth is only travelling at its mean speed of 59'08" per day at two instantaneous points or times in its elliptical orbit.

To apply this idea to the astrological practice of progressions, if mean progressions are employed instead of true progressions, one will sometimes get events happening too late, sometimes too early. While on average one will get events happening on time, one will only rarely get an individual event exactly on time. But with true progressions, one will always get an individual event exactly on time.

One last point is in order before the detailing of the theory of true progressions. From now on I will use the term mean time, mean day etc. to indicate either universal time (UT) or ephemeris time (ET) since the distinction between the two is unimportant for our purposes for the time being. Both UT and ET, it should be realized, were conceived of as being uniform measures of the time at the time of their adoption. UT was based on the rotation of the earth on its axis relative to Aries, while ET was based on the revolution of the moon or earth relative to Aries. UT is the same as GMT or civil time for our purposes here.

The customary practice of computing secondary progressions corresponding to a given date is based on calculating the number of days which have elapsed since the previous birthday and dividing by 365³⁴ to get the fraction of a year. This fraction is then added to the integer number of years of age and the result equated with days forward in the ephemeris.

We have been doing two things wrong in our customary practice of calculating progressions for a given date:

- 1) We have been measuring the elapsed portion of the year since the previous birthday with reference to the calendar, when we should have been measuring the elapsed portion of the year since the

previous solar return with reference to the geocentric ecliptical longitude of the sun.³⁵

- 2) We have been using the equation: one mean day = one year when we should have been using the equation: one apparent day = one year.

The fault with 1) lies in the implicit assumption that the sun's apparent speed of revolution about the earth is uniform, which it is not. It ranges from 57'13" per day at aphelion to 61'10" per day at perihelion. Consider Diagram 1, which shows the perihelion-aphelion axis of the sun about the earth, which is 12 degrees Capricorn-Cancer. Note the labels indicating the time of passage from one leg of the axes to another. The perihelion-aphelion axis is an axis of symmetry so that the number of days required for the sun at aphelion to arrive at perihelion is equal to the number of days for the sun at perihelion to arrive at aphelion. This number of days is one half the period of revolution ($365.24/2$ days = 182.62 days). But if we consider the 12 degrees Aries-Libra axis, or any but the 12 Cancer-Capricorn axis, the above relationship does not hold. To go from 12 degrees Libra to 12 degrees Aries requires 178 days while the other way around requires 187.24 days.

If we have a Libran entity of 12 degrees natal sun and we want to find the position of the progressed sun when the entity is half a year old, we must ask ourselves "Do we mean half a calendar year old or half a zodiacal year old?" When the entity is exactly half a zodiacal year old (transiting sun at 12 Aries, opposed the natal sun), the entity is only $178/365.24$ or 0.4874 calendar years old.

Let us now do the calculations side by side for both techniques. After counting the number of birthdays (solar returns) the entity has had, the problem remaining is to determine the fraction of the year which has elapsed since the preceeding birthday (solar return). Then according to the theory of progressions, one equates the age in years with days forward in the ephemeris to arrive at the progressed date. If we call FCAL the fraction of the year measured in the calendar and FZOD the fraction of the year measured in the zodiac, we can write these verbal definitions:

- Def. 1. FCAL: We have an actual (event) date for which we want to calculate the corresponding progressed date. Find how many days the actual (event) date is from the previous birthday. Divide this number of days by 365.24 days to get FCAL.
- Def. 2. FZOD: We have an actual (event) date for which we want to calculate the corresponding progressed date. Take the transiting sun (0-360 mode) for the actual (event) date and subtract the natal sun (0-360 mode). Add 360 if negative. Divide by 360 to get FZOD.

For purposes of implementation later I now rewrite Def. 2 as an equation. I define the function CIR(X):

$$\begin{aligned} \text{EQ. 5} \quad \text{CIR}(X) &= X \text{ IF } X \text{ IS } 0 \text{ OR GREATER} \\ &X + 360 \text{ IF } X \text{ IS LESS THAN } 0 \end{aligned}$$

Now denoting transiting by TR, natal by N, FZOD is given by:

$$\text{EQ. 6} \quad \text{FZOD} = \text{CIR}(\text{SUN}(\text{TR}) - \text{SUN}(\text{N}))/360$$

where SUN(TR) and SUN(N) are already modulus 360.

Here is an actual example calculation side by side, taking a 12 degree Libran entity (OCTOBER 5 of year YYYY progressed to APRIL 1 of the following year, YYYY + 1):

$$\begin{aligned} \text{FCAL} &= [(\text{APRIL } 1, \text{YYYY} + 1) - (\text{OCTOBER } 5, \text{YYYY})]/365.24 \\ \text{FCAL} &= 178/365.24 \\ \text{FCAL} &= 0.48735 \\ \\ \text{FZOD} &= (12 - 192 + 360)/360 \\ \text{FZOD} &= 0.50000 \end{aligned}$$

The new method of measuring in the zodiac instead of in the calendar is more satisfying theoretically. The apparent reality of motion of the sun about the earth is the mirror image of the kinematical, astronomical reality of the elliptical revolution of the earth about the sun at varying speeds. As opposed to this natural astronomical reality, the calendar, which assumes uniformity in speed, is a mere fiction.³⁶ It is a man-made convention for convenience. The mean solar day or civil time with its calendar is based on making each day the same duration when in fact the apparent length of the day varies sinusoidally over the year because the speed of the earth revolving around the sun varies sinusoidally³⁷ while the rotation of the earth about its poles is relatively uniform.

This last point brings us to the second fault cited above, namely that we have been using the equation of one mean day = one year instead of one apparent day = one year. Our modern ephemerides give positions for the sun for zero hours or twelve hours of mean time. But we should have at our disposal for doing progressions and calculating solar arcs, an ephemeris giving positions for zero hours or twelve hours apparent time.

The length of the apparent day is not constant. In other words, each successive apparent day has a duration measured in uniform or mean time either greater or less than the preceding apparent day's duration. Since we want to equate a year of life with an apparent day, conceptually what we are doing is making this equation, and then determining how many mean days correspond to this many apparent days. Then we are employing our ephemerides or our computers based on mean time.

When it is noon apparent time at Greenwich, by definition, the sun is exactly in conjunction with the Midheaven i.e. the sun is due south. But only rarely when it is noon mean time at Greenwich is the sun in conjunction with the Midheaven. At noon mean time at Greenwich the sun can be some four degrees either side of the Midheaven.

The equation which gives the difference between apparent time and mean time is called the Equation of Time. The graph of the negative of the Equation of Time, NEQT, versus the geocentric ecliptic longitude of the sun is presented in Diagram 2 and the tabular version of this function is

presented in Diagram 3A,B. Reference will be made to them later, but for the moment, inspection of Diagram 2 shows the sinusoidal pattern whose cause was described four paragraphs earlier. NEQT can loosely be thought of as the sun's longitude minus the Midheaven's longitude. Therefore when NEQT is positive, the sun in a horoscope is in the tenth house for an entity born at noon civil time exactly on the defining longitude of his particular time zone, say 75 degrees west for zone -5, 60 degrees west for zone -4, etc. When NEQT is negative, the sun is in the ninth house when an entity is born at noon civil time exactly on the defining longitude for the time zone. While the vertical scale is measured in days, I would point out that the 12 degree Scorpio point, the curve's minimum, corresponds to some minus 16 minutes of time or minus 4 degrees of SUN-MC arc while the 21 degree Aquarius point, the curve's maximum, corresponds to some plus 16 minutes of time or plus 4 degrees of SUN-MC arc.³⁸

If we inspect our expression, a day-for-a-year, and interpret it literally and in the apparent, astronomical sense, we see that either of two ideas is intended:

- (1) to set up a physical analogy between the naturally occurring phenomenon of a daily sunrise and the naturally occurring phenomenon of the yearly spring equinox or
- (2) to set up a physical analogy between the naturally occurring phenomenon of daily high noon and the naturally occurring phenomenon of the yearly summer solstice.

Both ideas point to a relationship between one natural, phenomenological, apparent, or physical astronomical cycle and another: between the day and the year. But in the case of equating the civil day with a year. We have made no direct relationship or analogy in a natural, phenomenological, apparent or physical sense.

The days referred to in ideas (1) and (2) above consist of the synodical cycles between one of the angles of a chart, the Ascendant and the Midheaven, and the sun. The problem now before us is to choose between idea (1) and idea (2), since (1) or the Ascendant day is not of the same duration as (2) or the Midheaven day. This point was made to me by Rob Hand around 1975 and was something I had missed: I had not considered that an apparent day could be referred to the Ascendant.

I will now refer to these two days formally as the Ascendant-phased apparent day, abbreviated APAD, and the Midheaven-phased apparent day, abbreviated MPAD. The APAD is the interval in time between one sun-Ascendant phase and the next. The MPAD is the interval in time between one sun-Midheaven phase and the next. Diagrams 4 and 5 show how these days are defined and their interrelationships.

In the example of Diagram 5, one notes the difference in solar arc computed by both methods is 4 seconds of arc. Obviously, according to the rate of change of the Ascendant relative to the Midheaven, the APAD will be longer or shorter than the MPAD. Anyway, this 4 arc second difference we can take as a nominal difference in solar arc issuing from the two different

definitions of the day. This is a serious difference because each day will add roughly the same amount of difference and so the difference in solar arc will accumulate each day (year of progression) giving a sizeable difference in the timing of events throughout a life.

Now, let us get back to our problem. Which do we use for our definition of the apparent day? Well, that is where this article rather ends. The MPAD is the basis for all my thorough testing to date over an eight year period and is the apparent day used in the new theory of true secondary and tertiary progressions. I have not yet tested the APAD, but I have a sneaking suspicion that the APAD will not pass the test of events when I do test it.³⁹

Now let us take up the formula for the Equation of Time. It is given on page 103 of the Explanatory Supplement:

$$\text{EQ. 7} \quad \text{EQTIME(HRS)} = \text{MOD } 24 \text{ HRS [12 HOURS + APPARENT SIDEREAL TIME (HRS)] - APPARENT RIGHT ASCENSION OF THE SUN (HRS)}$$

For our purposes later we will want the equation of time expressed in units of days, so we set:

$$\text{EQ. 8} \quad \text{EQTIME} = \text{EQTIME(HRS)}/24$$

Apparent sidereal time is sidereal time to which the nutation in obliquity has been added. The apparent right ascension of the sun is calculated by adding aberration and nutation in longitude to the ecliptic longitude of the sun for the mean equinox of date. Then using the true obliquity of the ecliptic one calculates right ascension from longitude using the right spherical triangle having obliquity of the ecliptic as its smallest angle:

$$\text{RA} = \text{ARCTAN} [\text{TAN}(\text{LONG}) * \text{COS}(\text{OBLIQ})]$$

Here is the procedure, conceptually, for getting the true progressed date based on counting an apparent day and not a mean day for each year of life.

1. CALCULATE: AGE = INTEGER NUMBER OF YEARS OLD + FZOD
2. EQUATE AGE WITH APPARENT DAYS FORWARD IN THE EPHEMERIS.
3. CONVERT THIS NUMBER OF APPARENT DAYS TO MEAN DAYS. (ONE NEEDS A VALUE EXPRESSED IN MEAN TIME IN ORDER TO GO INTO THE PLANETARY ROUTINE OR THE EPHEMERIS).

The third step of the procedure involves obtaining an interval of mean days from an interval of apparent days. To do this we first write the relation,

$$\text{MT} = \text{AT} - \text{EQTIME}$$

where,

MT = MEAN TIME EXPRESSED IN DAYS FROM SOME EPOCH
 AT = APPARENT TIME EXPRESSED IN DAYS FROM SOME EPOCH
 EQTIME = EQUATION OF TIME EXPRESSED IN DAYS

Now let P stand for progressed, N for natal. We write,

$$MT(P) - MT(N) = [AT(P) - EQTIME(P)] - [AT(N) - EQTIME(N)]$$

Rearranging,

$$MT(P) - MT(N) = AT(P) - AT(N) - EQTIME(P) + EQTIME(N)$$

Putting NEQTIME as the negative of EQTIME,

$$NEQTIME = -EQTIME$$

we have,

$$MT(P) - MT(N) = AT(P) - AT(N) + NEQTIME(P) - NEQTIME(N)$$

Now since $AT(P) - AT(N)$ is nothing other than AGE,

$$MT(P) - MT(N) = AGE + NEQTIME(P) - NEQTIME(N)$$

or,

$$MT(P) = MT(N) + AGE + NEQTIME(P) - NEQTIME(N)$$

Now call MT by the name Julian Day, JD,

$$\text{EQ. 9} \quad JD(P) = JD(N) + AGE + NEQTIME(P) - NEQTIME(N)$$

or call MT by the name calendar day, CD,

$$\text{EQ. 10} \quad CD(P) = CD(N) + AGE + NEQTIME(P) - NEQTIME(N).$$

EQ. 9 above is for computer coding, EQ. 10 is for work with the printed ephemeris.

EQ. 9 giving the progressed Julian Day number, $JD(P)$, is exactly solved by iteration since $NEQTIME(P)$ is a function of $JD(P)$. But it turns out that only one iteration is necessary to get accuracy to 0.01 seconds of solar arc or 0.13 seconds of arc on the moon. Here is the algorithm in a verbal sense:

SECONDARY PROGRESSION ALGORITHM FOR COMPUTER

A. ADD THIS TO THE NATAL CHART ROUTINE:

1. CALCULATE $JD(N)$ AND STORE.
2. GET $NEQTIME(N)$ AND STORE.

A. SET $T = (JD(N) - 2415020)/36525$

B. WITH THIS T, GO INTO EQTIME EQUATION. CHANGE SIGN.

C. RESULT IS NEQTIME(N)

B. TRUE SECONDARY PROGRESSION ROUTINE:

1. CALCULATE TRANSITING SUN (APPARENT, TRUE EQUINOX OF DATE) FOR EVENT DATE/TIME USING A LOGICAL FLAG SO AS NOT TO CALL SOLAR PERTURBATIONS, SINCE THE SUN'S LONGITUDE WITHOUT PERTURBATIONS IS ACCURATE TO 18" ARC WHICH IS ACCURATE ENOUGH FOR OUR PURPOSES HERE.

2. CALCULATE AGE = INTEGER NUMBER OF YEARS OLD + FZOD

THIS STEP CAN BE A BIT TRICKY IN GETTING THE INTEGER NUMBER CORRECTLY. IT IS POSSIBLE TO GET THE INTEGER OFF BY EXACTLY PLUS ONE OR MINUS ONE IF WE ARE NOT CAREFUL HERE. THE PROBLEM COMES ABOUT IN THE EVENT OF A VERY OLD OR VERY NEW CYCLE, I.E. WHEN THE TRANSITING SUN HAS NOT QUITE CONTACTED THE NATAL SUN, OR HAS JUST CONTACTED IT. THIS IS BECAUSE THE INTEGER PART COMES ABOUT BY CALCULATING IN THE MEAN EQUINOX WHILE THE FRACTIONAL PART COMES ABOUT BY CALCULATING IN THE TRUE EQUINOX, WITH NUTATION ADDED. ALSO TO LEAVE A MARGIN OF SAFETY FOR ACCUMULATED ERRORS IN THE PERIOD OF REVOLUTION, THE FOLLOWING ROUTINE NEEDS TO BE IMPLEMENTED, AND THIS IS ESPECIALLY SO FOR USING THE FOLLOWING ROUTINE FOR TERTIARY PROGRESSIONS WHICH WE WILL COME TO LATER.

HERE IS A GLOSSARY OF TERMS AND VARIABLES USED:

EV = EVENT
 TR = TRANSITING
 N = NATAL
 AGE = NUMBER OF RETURNS OF THE BODY TO ITS NATAL PLACE PLUS THE FRACTIONAL PART
 AGEINT = NUMBER OF RETURNS OF THE BODY TO ITS NATAL PLACE
 GT = GREATER THAN
 LT = LESS THAN
 EQ = EQUALS
 FZOD = FRACTION OF A CYCLE MEASURED IN THE ZODIAC
 FMEAN = FRACTION OF A CYCLE MEASURED AS IF ECCENTRICITY = 0
 SUN(TR) = TRANSITING SUN IN DECIMAL 0-360 FORM
 SUN(N) = NATAL SUN IN DECIMAL 0-360 FORM

THE ROUTINE:

DEFINE FUNCTION CIR(X) = X IF X GT 0
 = X + 360 IF X LT 0

IN TERMS OF ERLEWINE'S BASIC ROUTINE, THIS WOULD BE EQUIVALENT TO EMPLOYING THE MODULUS FUNCTION FNU(X) BY SETTING MO = 360 AND THEN USING FNU(X+360)

AGE = (JD(EV) - JD(N))/365.24219878 MEAN AGE
 AGEINT = INT(AGE)
 FMEAN = AGE - AGEINT


```

FZOD = CIR(SUN(TR) - SUN(N))/360.0
IF (FMEAN.GT.0.75.AND.FZOD.LT.0.25) AGEINT = AGEINT + 1.0
IF (FMEAN.LT.0.25.AND.FZOD.GT.0.75) AGEINT = AGEINT - 1.0
AGE = AGEINT + FZOD

```

3. GET NEQTIME(P).

A. SET: JD(P)RAW = JD(N) + AGE

B. NEQTIME(P) IS FOUND BY SETTING:

```

T = (JD(P)RAW - 2415020)/36525 AND GOING INTO EQTIME
EQUATION WITH THIS VALUE OF T AND THEN CHANGING SIGN.

```

4. JD(P) IS FOUND BY:

```

JD(P) = JD(P)RAW + NEQTIME(P) - NEQTIME(N)

```

5. FINALLY,

```

T = (JD(P) - 2415020)/36525

```

GIVES THE VALUE OF T IN JULIAN CENTURIES AS ARGUMENT TO GO INTO THE PLANETARY ROUTINE TO GIVE BACK THE TRUE PROGRESSED POSITIONS. RESET LOGICAL FLAG SO YOU DO ALL PERTURBATIONS ON THE SUN. WE WANT THE PROGRESSED SUN TO BE GOOD TO 1" ARC.

Now to count off our days is easy enough if we use Julian Days of continuous numbering, which we do in a computer program, but in the event that some readers do not own a computer, or in the event that your computer is down and you desperately need to pull your dusty ephemerides off the shelves to calculate some true progressions, I now give a method of counting that obviates errors and is quicker than counting lines in the ephemeris.

CREATE MAP #1, MAPPING MONTH AND DAY INTO A NUMBER FROM ONE TO 365.
CREATE MAP #2 IN THE EVENT THE YEAR IS A LEAP YEAR:

<u>MAP</u>	#1	#2	<u>MAP</u>	#1	#2
JAN	0	0	JUL	181	182
FEB	31	31	AUG	212	213
MAR	59	60	SEP	243	244
APR	90	91	OCT	273	274
MAY	120	121	NOV	304	305
JUN	151	152	DEC	334	335

YOU ADD THE VALUE FOR THE MONTH TO THE DAY OF THE MONTH OF YOUR EPHEMERIS (GREENWICH) BIRTHDATE TO ARRIVE AT THE NATAL CALENDAR DAY, CD(N). FOR EXAMPLE, AN ENTITY BORN FEBRUARY 3 AT 12 HOURS ET WOULD ADD 3.5 TO 31 TO GET A CD(N) OF 34.5. AN ENTITY BORN SEPTEMBER 23 AT 18 HOURS ET WOULD ADD 23.75 TO 243 TO GET A CD(N) OF 266.75.

NOW ALL ONE NEED DO TO GET A PROGRESSED CALENDAR DAY, CD(P), IS ADD THE AGE TO THE CD(N). THEN THE CALENDAR DATE CORRESPONDING TO THIS CD(P) IS

GOTTEN BY SUBTRACTING THE HIGHEST MONTH VALUE FROM THE CD(P) WITHOUT GETTING A NEGATIVE NUMBER. TAKING 34.5 AS THE CD(N) AN ENTITY OF AGE 37.05 WOULD HAVE A CD(P) OF 71.55. SUBTRACTING 59 IF A NON-LEAP YEAR (60 IF A LEAP YEAR) GIVES MARCH 12.55 (11.55) AS THE PROGRESSED DATE IN WHICH TO INTERPOLATE IN THE EPHEMERIS.

CONTINUING NOW IN ANALOGUE FASHION TO THE VERBAL ALGORITHM FOR COMPUTERS, HERE ARE THE STEPS EMPLOYING A HARD COPY EPHEMERIS OF THE SUN TOGETHER WITH A TABLE OF NEQTIME VERSUS GEOCENTRIC ECLIPTIC LONGITUDE OF THE SUN (DIAGRAM 3A,B):

SECONDARY PROGRESSION ALGORITHM BY HAND

A. RECORD THESE AS NATAL CHART VITAL STATISTICS:

1. RECORD CD(N).
2. EXTRACT NEQTIME(N) FROM DIAGRAM 3A,B AND RECORD.

B. TRUE PROGRESSION ROUTINE:

1. DETERMINE TRANSITING SUN FOR THE EVENT IN QUESTION.
2. CALCULATE AGE = INTEGER NUMBER OF YEARS OLD + FZOD (SEE Def. 2)
3. ADD AGE TO CD(N) TO GET CD(P)RAW. CONVERT CD(P)RAW TO THE CORRESPONDING CALENDAR DATE. INTERPOLATE IN THE EPHEMERIS TO GET THE RAW PROGRESSED SUN POSITION. ENTER DIAGRAM 3A,B TO OBTAIN NEQTIME(P) USING THIS RAW PROGRESSED SUN POSITION.
4. GET CD(P) BY:

$$CD(P) = CD(P)RAW + NEQTIME(P) - NEQTIME(N)$$
5. BE SURE TO EMPLOY A SECOND DIFFERENCE ROUTINE OR BETTER IN INTERPOLATIONS OF THE MOON BECAUSE NOW IT IS WORTH YOUR WHILE. DO THE SAME IF USING AN EPHEMERIS WITH TENTH OF A MINUTE OF ARC TABULATED ACCURACY WHEN INTERPOLATING THE INNER PLANETS.

My employing the customary practices of tertiary progressions (both synodic and tropical⁴⁰) one gets an error of 0.057 days in the progressed date, as a worst case, giving these errors in progressed positions:

Moon	44 minutes of arc
Sun	3.4 minutes of arc
Mercury	6.8 minutes of arc
Venus	4.1 minutes of arc
Mars	2.4 minutes of arc, etc.

The nominal error would be half of these. Note that due to the greater eccentricity of the moon's orbit over that of the earth's, the FZOD factor is larger for tertiaries than for secondaries. Also note that while the actual errors in longitude are much greater than for secondaries (recall that the worst to expect on the secondary sun by the old technique is

two minutes of arc), the error in corresponding real time would be less than for secondaries. The 12-day worst-case error for the secondary sun compares with some 1.5-day error for the tertiary moon.

Now we can go over the verbal algorithm for the tropical tertiaries. Let us refer back to the algorithm for secondaries, which was outlined as A.(1.,2.) and B.(1.-5.). We need not make many changes:

TERTIARY PROGRESSION ALGORITHM FOR COMPUTER

- A. SAME AS FOR SECONDARY
- B. 1. CALCULATE TRANSITING MOON (APPARENT, TRUE EQUINOX OF DATE).
- 2. CALCULATE AGE = INTEGER NUMBER OF YEARS OLD + FZOD

$$\text{AGE} = (\text{JD}(\text{EV}) - \text{JD}(\text{N}))/27.321582$$

$$\text{FZOD} = \text{POS}360 (\text{MOON}(\text{TR}) - \text{MOON}(\text{N}))/360.0$$
- 3. SAME
- 4. SAME
- 5. SAME

TERTIARY PROGRESSION ALGORITHM BY HAND

- A. SAME AS FOR SECONDARY
- B. 1. GET TRANSITING MOON FOR EVENT DATE
- 2. CALCULATE AGE = INTEGER NUMBER OF YEARS OLD + FZOD

$$\text{FZOD} = (\text{MOON}(\text{TR}) - \text{MOON}(\text{N}))/360$$

IF FZOD IS NEGATIVE, ADD 1
- 3. SAME
- 4. SAME
- 5. SAME

Now when we want to do the equally valuable synodical tertiaries, we must have a transiting sun as well as a transiting moon. The period for the synodical month is 29.530589 days and we substitute that for 27.321582 days in (B.2.) of the algorithm for computer. Next we need to generalize our expression for FZOD. The numerator now will contain four variables: MOON(TR), MOON(N), SUN(TR), and SUN(N): The expression is:

$$\text{EQ. 11} \quad \text{FZOD} = \text{CIR}((\text{MOON}(\text{TR}) - \text{SUN}(\text{TR})) - (\text{MOON}(\text{N}) - \text{SUN}(\text{N}))) / 360.$$

This expression can be used for tropical tertiaries as well. Before using it one sets SUN(TR) and SUN(N) to zero. Then by indexing the routine both

types can be done. At step B.2. AGE must also be rewritten:

$$\text{AGE} = (\text{JD}(\text{EV}) - \text{JD}(\text{N}))/\text{P}(\text{I})$$

where,

$$\text{P}(1) = 27.321582 \text{ and } \text{P}(2) = 29.530589, \text{ in a dimension statement.}$$

I have found the discipline required to write astrological coding a great exercise in clarifying my thinking about astrological matters. The generality needed in coding, and the strange psychological detachment one needs to slip into the world of computers, cannot but help to bring insights into our body of knowledge. As an example, a month ago as I was doing the coding for tertiaries both tropical and synodical, I was struck by the symmetry of EQ. 11 above. Then it dawned on me that SUN(TR) and SUN(N) could be replaced by URANUS(TR) and URANUS(N), etc. We all know that our solar system is filled with these synodical cycles from all possible pairings of planets, especially if we have read a little Rudhyar.

A little later it dawned on me that SUN(TR) and SUN(N) could be replaced by ARIES. This then gave the tropical tertiary. All is synodical! If we go to the Hamburg School's understanding of ARIES, the world, general events in the open, we start to flesh out our structure of progressions, whether secondary or tertiary: the secondary progressions are actually SUN,ARIES progressions and the tropical tertiary progressions are actually MOON,ARIES progressions.

If this is correct then we ought to find tropical tertiaries pointing to events of a general, impersonal nature involving other people, while synodical tertiaries (MOON,SUN) should point more to a level of dialogue between our inner and outer selves, acting on our emotions, rather than a more heightened emotional responsiveness in the tropical tertiary.

It seems where this leads us is towards more specialization as to application. Everything in the MOON,URANUS progression ought to be interpreted with uranus in mind. Therefore, uranus aspects in the mutual progressed chart and uranus aspects between the progressed chart and the natal chart ought to be given especially high consideration. If other uranian factors, such as transits, had pointed to a good or difficult time, we may want to look to the MOON,URANUS and SUN,URANUS progressions to find amplification or amelioration to enhance our judgment.

In the couple of weeks of brief empirical testing, I can say that I do think these synodical progressions, both solar and lunar, are working. Yet I am very subjective about them at the moment, naturally, so I need to distance myself from them for a while. I would greatly welcome any feedback from other investigators about them.

Another question has probably occurred to many of you by now, and that is, do these synodical progressions always have to include either the sun or the moon? How about the mars,jupiter synodical cycle being equated with an apparent day (M,SUN)? And my putting M,SUN in parentheses was obviously to beg the question of whether one can employ a day based on a planet other than the sun. Would tertiaries work if based on M,MOON = MOON,X rather than

on M,SUN = MOON,X? Or should the question have been asked, would not this be preferable to M,SUN = MOON,X? In solar progressions we have M,SUN = SUN,X where SUN appears in both cycles being equated. Does this make the progression stronger than without this doubled influence?

Clearly there are a lot of questions to be answered. I hope to have interested some of you in taking on some of this research and publishing your findings.

Let me now sum up the ground we have covered. I have argued the weaknesses of the primary system's theory, the sloppy, large orbs employed thus allowing its practitioners to cover their tracks, so to speak, and I posited the possibility of some bizarre, narcotic effect which the authority of Ptolemy and Placidus may have had on the logical faculties of various astrologers. I may be completely wrong here. Perhaps I am just not attuned to the level on which primaries work, if we can entertain a theory of level for a moment. But I think you will agree that the weight of the evidence rests with the case that they do not work. In as much as primary direction devotees have ended up employing the solar arc in right ascension key, and abandoning the three mean-arc keys of Ptolemy, Naibod, and Simmonite, these devotees can not any longer call their technique by the name primary directions, rather they must admit that what they are doing is working with secondary progressions in right ascension. What I want to know from those who would still adhere to these secondaries in right ascension is, how are those other progressed positions working in terms of both mutual progressed and progressed to natal? Also, how do they find transits in right ascension working? I really would like to see somebody publish some evidence for transits in right ascension working. Really.

I have one last thought on primaries and then I will drop the issue. Here is a quote from Charles Jayne, one of the most technically experienced astrologers around and one with a finely honed astrological vision, in my estimation. In summing up his experience with solar arcs, Ascendant arcs, and Vertex arcs, in both longitude and declination, he says, speaking for his research group:

In our opinion, based on a great deal of testing and practical experience the 6 modes of Direction described in this series ... together comprise Astrology's most valuable timing Technique.⁴¹

How come primary directions are not stronger and more valuable than these longitudinal directions, since, after all, the planets in primary directions are brought bodily onto the horizon and meridian planes, while in longitudinal directions, the planets are seldom bodily on these planes? Every astrologer I can think of would agree that a planet-planet occultation (bodily line-up) is stronger than a mere conjunction in longitude, since an occultation represents both a conjunction in longitude and a parallel of declination at the same time.

I have repeatedly emphasized the need to consider the apparent astronomical positions in doing astrology. For our purposes, these positions are where points or planets actually are effectively. In contrast mean positions are mere formal constructs not applicable to a given, individual situation, which is what we want for a prediction.

In this light, the theory of embolismic lunations of Placidus (minor progressions in today's currency) is highly dubious, a point I neglected to cover previously, after temporarily subsuming the technique under tertiary progressions as I was doing the weeding in our garden of dynamic techniques. In putting to use what we have learned about being distrustful of mean motions, consider how in minor progressions one goes forward in the ephemeris a lunar period for a year of life. Now, if the sun's (earth's) and moon's orbits had an eccentricity of zero, and they did for our mean-motion champions Ptolemy and Placidus, fixated as they were on rotating spheres, then everything would be all right with minor progressions. But I now leave it to the reader as an exercise to consider why this equation in the theory of minor progressions cannot be done when we have to consider the transiting positions of both the sun and the moon, which we need to do to get each orbit's FZOD value.

In reflecting on the new theory of progression I have outlined in this paper, we will recall that we used the fraction of a cycle of an orbit by considering the orbiting body's transiting position. Since eccentricities are non-zero, orbiting bodies are continually speeding up and slowing down. Because of this, the rate of progression is not uniform, but in fact, mirrors this alternating speed. There has always existed the subtle trap of assuming uniform motion due to the obviousness of it on its face when we have looked at the expression, a-day-for-a-year, say. This is because the interpretation of uniform motion is accurate at values of years which are just integers i.e., at the birthday each year. However, in general, this is the only moment when this interpretation is accurate.

The other aspect to the new theory is the employing of a Midheaven-phased apparent day and not a civil day for each year or month of life. Those of you who employ the progressed Midheaven by adding the solar arc to the natal Midheaven must realize that if you are convinced of this being correct, you are substantiating this aspect of the true progression theory. Just look back to Diagram 5 to convince yourself of this statement.

I now give two examples of the results one should get for the true secondary progressed sun so you can check whether your routines have been correctly done should you care to program these yourself. Michael Erlewine has implemented the true progressions on his new M-65 comprehensive software package should you be set up to go that route. Also he may offer a routine written for earlier software.

EXAMPLE CALCULATIONS

Natal date:	July 31, 1913; 0 hr. UT
Natal sun:	7 Leo 09'59"
EQTNAT:	0.0043 days
A. Event date(1):	July 31, 1983; 0 hr. UT
TR sun:	7 Leo 14'27"
AGE:	70.00021
Prog sun(mean):	15 Libra 05'37" (customary way)
EQTPROG:	-0.0086 days
Prog sun(true):	15 Libra 04'51" (new way)

B. Event date(2): July 30, 1983; 22 hr. 01 min. 59 sec. UT
 TR sun: 7 Leo 09'45"
 AGE: 69.99999
 Prog sun(mean): 15 Libra 05'37" (customary way)
 EQTPROG: -0.0086 days
 Prog sun(true): 15 Libra 04'51" (new way)

We will recall that in addition to the secondary and the two tertiary progressions there exist many more progressions, each based on the synodical cycle from a geocentric viewpoint between any two orbiting points (planets, nodes, stars, etc.). Aries, too, should be interpreted as an orbiting point, infinitely far out with a speed of zero. In doing so, we perceive the whole set of progressions as a unity and we can use EQ. 11 for any case by putting the faster member of a pair for MOON and the slower member for SUN. When ARIES is the slowest member we have MOON,ARIES and SUN,ARIES as the names we should now use instead of tropical tertiary and secondary, respectively. This XY nomenclature indicates what the meaning of a given progression is. If X and Y are two different orbiting points, X being the faster, we should call the progressions based on their synodical cycle "X,Y progressions."

We saw that in an X,Y progression any progressed point, whether planet or cusp, generates an arc defined as the difference between the point's progressed and natal positions. Further, because of the principle of sensitive points, all natal points may be directed by this arc. We can say that each member of the set of X,Y progressions has its own family of directions.

In doing the X,Y progression we need to be clear on how we progress the MC for the MPAD or the ASC for the APAD. Here this paper ends. Hopefully, it might turn out to be the case that the sun is the driver of the MC, so that the MC is progressed by the solar arc for any X,Y progression! We also raised the possibility of employing the synodical cycle of the MC to planets other than the sun in generating our day. Here we most assuredly want to work with longitudes and not oblique ascensions and meridian distances from the old Ptolemy school, for reasons demonstrated throughout this paper.

Well our journey is complete. The structure of techniques now seems much more clarified to me and I hope it does to you. A lot of stuff has been eliminated but more has flooded in to take up the slack. At least we have the right things in the right places now, I think. Now we all need to start some empirical work and compare notes to see if we all like the new land to which we have arrived.

FOOTNOTES

1. The words precision and accuracy are frequently used interchangeably, but they should not be. Accuracy refers to how close one is to a true value, while precision refers to how consistent one is in the sense of the tightness or looseness of scatter. If I am target shooting with a bow and arrow and place all my arrows in the bottom, left corner, covering a space of one hand, then I am quite precise in my technique compared to my companion who places his arrows over the space of three hands. Depending on the size of the target, he may be more accurate on average. But if I am told of my systematic error (always in the same direction) then I need only aim for the top, right corner and I would then place my arrows in a hand space centered at the bull's eye. Perhaps there was a wind blowing near the target which I did not know about or that day, God had intervened and locally changed the strength and direction of gravity near the target.
2. Robert DeLuce, Complete Method of Prediction (New York, A.S.I. Publishers, Inc., 1978, Reprint of 1935 ed., with new Foreword by Henry C. Owen, Jr.), p. 11.
3. DeLuce, Op. Cit., p. 7.
4. Henry C. Owen, Jr., Foreword in DeLuce, Op. Cit., p. v.
5. Zipporah Dobyns, private communication, workshop, 1973, Boston, Ma.
6. Richard Svehla, "Introduction to the Uranian System of Astrology," The Aquarian Agent, v. 4, no. 7 (May/June 1975), p. 13.
7. DeLuce, Op. Cit., p. 11.
8. Owen, Foreword in DeLuce, Op. Cit., p. v.
9. DeLuce, Op. Cit., p. 12.
10. Charles A. Jayne, Progressions and Directions, Trident Series, 2nd ed., Astrological Bureau, Monroe, N.Y., p. 3.
11. Owen, Foreword in DeLuce, Op. Cit., p. v.
12. Charles E. O. Carter, The Principles of Astrology (Wheaton, Ill., Theosophical Publishing House, 1963, 5th Rev. ed.), p. 176.
13. Dane Rudhyar, The Astrology of Personality (Garden City, N.Y., Doubleday, 1970, Reprint of 1936 ed.), p. 437.
14. Rudhyar, Op. Cit., p. 437; Rudhyar, The Astrological Houses, The Spectrum of Individual Experience (Garden City, N.Y., Doubleday, 1972), pp. 147-150.

15. Carter, Op. Cit., p. 176.
16. Ronald Davison, "The Daily Horoscope," NASO Journal, v. 2(1975), p. 2.
17. Davison, Op. Cit., p. 2.
18. The term symbolic time has been employed, but that is an inaccurate term. The word symbol has a transcendent connotation as in the statement "the number five symbolizes creativity."
19. Solar arcs almost always come due within an orb of one to two minutes of arc or six to twelve days of calendar time, the way they are currently calculated.
20. Jayne, Op. Cit., p. 6.
21. DeLuce, Op. Cit., p. 16.
22. Robert R. Newton, Ancient Planetary Observations and the Validity of Ephemeris Time (Baltimore, Maryland, Johns Hopkins Univ. Press, 1976), p. 154.
23. Neil Michelsen's Astro Computing Services graciously supplied the calculations for me at discounted, research rates. His routines have been in existence since 1972 and we can rest assured of their being relatively bug-free.
24. Jayne, Op. Cit., p. 6.
25. Charles E. O. Carter, An Introduction to Political Astrology (London, L. N. Fowler and Co. Ltd., 2nd ed., 1969), p. 38.
26. Jayne, Op. Cit., p. 23.
27. Carter, The Principles of Astrology, Op. Cit., p. 176.
28. DeLuce, Op. Cit., p. 7.
29. Jayne, Op. Cit., p. 8.
30. Michael Erlewine was cool to this proposed change in nomenclature, arguing that it might prove confusing. That is quite possible in the short run. But we astrologers, who are serious, must realize that we are in this game over the long haul. It is potentially much more confusing, in this light, to continue with our inappropriate nomenclature. So, send him your votes. He strikes me as being quite democratic.
31. It needs to be realized that with the kind of accuracy I am talking about in these new progressions one needs to consider the problem of whether one should use geometric or apparent positions for the planets' geocentric longitudes. The difference between the two can be as much as 1.5 minute of arc for mercury diminishing to 20 seconds of arc for the outer planets as well as the sun. I have found that the apparent

position is the real or actual position from the standpoint of astrological efficacy, a proposition which can easily be tested by employing these new secondary progressions, solar arcs based on them, and transits.

32. The demonstration has not been made in the astrological literature, at least to my knowledge, of the relative merits of apparent positions versus geometric positions, at least not in an empirical study. The recent publication circa 1975 of a geometric ephemeris by the Hieratic Publishing Company serves as a break from the traditional employment of apparent positions. The discrepancy between apparent and geometric positions can be some 1.5' arc for mercury diminishing to 20" arc for the outer planets as well as the sun. The tabulated accuracy of astrological ephemerides until recently has been only 1' to 2' arc since this was considered by custom to be all the accuracy needed. Some may have considered calculating positions more accurately but the extra effort involved in compiling the ephemeris and the extra effort involved for the user to interpolate in such ephemeris correctly probably had conspired to dampen enthusiasm for such a project. The above mentioned Hieratic ephemeris and Neil Michelsen's recent American Ephemeris for the 20th Century are accurate to 0.1 minutes of arc. Since Michelsen's is an apparent ephemeris while Hieratic's is a geometric ephemeris, one can fruitfully compare timing using both theories. For example, timing of outer planet secondary progressions would usually be weeks or months apart between the two theories.

While apparent positions are positions where planets are seen to be by an observer on earth, geometric positions are abstract positions derived directly from the kinematics of the solar system.

The geometric position is a kind of mean position in that the positions are intermediate in calculation of the apparent positions. The difference in position is called aberration and comes about due to the finiteness of the speed of light. The formula for aberration, AB, is:

$$AB = -0.347 * N * R$$

where, AB is in seconds of arc, N is the geocentric geometric speed in minutes of arc per day, R is the geocentric geometric distance in astronomical units.

The aberration is added to the geometric position to get the apparent position. Thus, if motion is direct geocentrically, the apparent position is less than the geometric position and vice versa.

I will be adducing empirical evidence in the future to show that it is via apparent positions that astrological influence manifests.

Credit should go to the Hieratic Publishing Company for having broken the arbitrary, customary, and outdated-in-terms-of-astronomical-theory use of 1 minute of arc accuracy in astrology when it created its 0.1 arc minute accuracy geometric ephemeris. And now with computers at our disposal we are crazy to keep with the 1' accuracy level when astronomical theory currently admits of 0.1' accuracy at worst (neptune and pluto).

Now all astrology will benefit from finding out the truth. I feel that working to the highest accuracy possible will show unforeseen benefits and progress for the science of astrology, just as Kepler's breaking the 8' arc barrier in 1603-1605 brought in the discovery of elliptical orbits.

33. It is the apparent sidereal time and not the mean sidereal time which we want to use to calculate the Midheaven. This is yet another instance of the mean versus apparent issue popping up. To reiterate, one should think of apparent as meaning perceived or detected by the senses. Logically a chart can be rectified to some 1" arc on the Midheaven provided planets' longitudes are available to this same accuracy. To do rectification this accurately requires just astrological knowledge, lots of observations, and correctly calculated charts.

Since the nutation in right ascension can be on the order of 15 seconds of arc, and since the ratio of arc to time is 15, using the theory of mean sidereal time as opposed to apparent sidereal time would leave the astrologer with at times an error of one second of universal time in deriving the UT from the Midheaven degree. I grant that this is negligible for everyone now, but could prove an important difference down the road when planetary positions catch up in accuracy.

34. Some apparently have used the value 365.24 days as the length of the tropical year to be more exact, but this merely changes the progressed sun on the order of one second of arc. This should be compared to the nominal one minute, maximum two minutes error which ensues from using either the value 365 or 365.24. The distinction cannot logically be allowed anyway, in that the technique of mean progressions simply subtracts the birthdate as an integer number from the event calendar date as an integer number. Already an average error of half a day is thereby introduced out of an average number of days from birthdate of 182. Therefore $0.5/182 = 1/365$, which is a fourfold error over $0.24/365$. This serves to point out the underlying flawed perception and lack of definitional rigor in the whole technique, which has no consideration of a zero point or actual point of solar return i.e. date/time of the actual birthday each year.
35. Steve Strimer of Aldebaran Press in Haydenville, Massachusetts originally intuited the idea of measuring the fraction of a year with respect to the zodiac instead of in the calendar. During a discussion with him in November 1976 he had intuited that in tropical tertiary progressions one ought to calculate the fraction of a month by subtracting the longitude of the natal moon from the longitude of the transiting moon and dividing by 360. As he said that I thought to myself that he was on to something. I tried out the idea by applying it to the case of secondary progressions and the results immediately spoke for themselves. His insight was a delightful example of a bolt out of the blue, expunging an oversight or flaw in astrological practice that had existed for years.
36. The calendar or civil day being created by taking the earth's mean speed is just a mathematical construct or artifact and so has no natural, apparent, physical reality or existence.

37. This should be intuitively evident, but is given approximately by:

$$\text{SPEED} = K1*(K2 + K3*\cos(E))$$

where the K's are constants and E is the eccentric anomaly, which is zero at perihelion. This can be shown by the differential calculus on Kepler's equations and a few substitutions.

38. Diagram 2 was plotted from the tabulated values of Equation of Time from Ernest Grant's 1776 ephemeris. Due to the slow movement of the earth's perihelion, these values are not strictly correct for working in our current epoch. But the errors in the solar arcs calculated amount to what are negligible errors for most astrological work, something around 0.5 seconds of arc. The errors in the theory of the sun of Newcomb are currently this level or higher, a point I will discuss in a future Matrix article.

39. I have an astrological understanding that the sun and Midheaven axis are closely related in meaning. For one thing the sun is hottest at noon. I have an understanding also that the sun rules Cancer as well as Leo.

For those interested in examining the idea of employing the APAD, here is the equation for the rate of change of the Ascendant relative to the Midheaven as a function of the Midheaven's longitude and right ascension:

$$\begin{aligned}\frac{dU}{dV} &= \frac{\cos(e) + \tan(l)\sin(e)\sin(\text{RAMC})}{\cos^2(\text{RAMC}) + [\sin(\text{RAMC})\cos(e) + \tan(l)\sin(e)]^2} \\ \frac{dX}{dY} &= \frac{\cos(e)}{[1 + (\tan^2(\text{RAMC}))]\cos^2(M)} \\ \frac{dA}{dM} &= \frac{dU}{dV} \cdot \frac{dX}{dY}\end{aligned}$$

where, e = obliquity of ecliptic, l = geographical latitude, RAMC = right ascension of the Midheaven, M = longitude of the Midheaven, and A = longitude of the Ascendant.

Since dA/dM is how much A changes for a given change of M, one can multiply it by a known incremental amount of M, delta M, to get the corresponding incremental amount of A, delta A. Alternatively one can take the reciprocal and get dM/dA. When dM/dA is multiplied by delta A, a corresponding delta M will be gotten.

So to do the APAD theory one has first to do the MPAD theory as outlined in this paper and then calculate a progressed Ascendant based on the solar arc progressed Midheaven. Then, using the terminology P for progressed and N for natal we would see what the slippage was of the progressed Ascendant phased to the progressed sun relative to the natal Ascendant phased to the natal sun:

$$\text{Slippage} = A(P) - \text{SUN}(P) - [A(N) - \text{SUN}(N)]$$

then,

$$-\text{Slippage} \cdot dM/dA = \text{delta } M$$

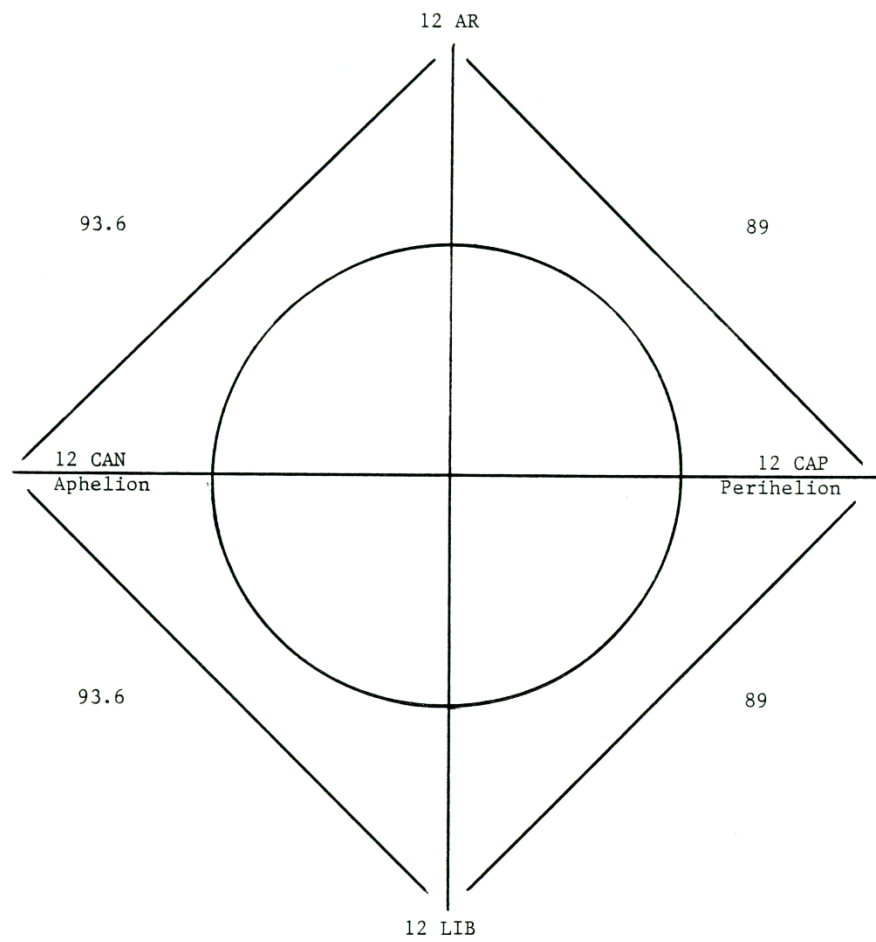
gives a delta M. But since delta M = delta SUN, since the sun and M progress at the same rate, we now know that delta SUN needs to be added to SUN(P) to get the SUN(P) for the APAD.

Diagram 5 can fruitfully be employed as an actual example when Day 1 is interpreted as Year 1 and Day 2 as Year 2.

40. The tropical tertiary has erroneously gone under the name sidereal tertiary even though employed by tropical astrologers. That is like letting the fox into the chicken coop! The tropical tertiary equates the period of the tropical month with a day. The sidereal tertiary equates the sidereal month with a day. The tropical month is the periodic time for the transiting moon to recontact the natal moon against the backdrop of the tropical zodiac. The sidereal month is the periodic time for the transiting moon to recontact the natal moon against the backdrop of the sidereal zodiac.
41. Jayne, Op. Cit., p. 21.

DIAGRAM 1

Sun's Apparent Orbit About The Earth



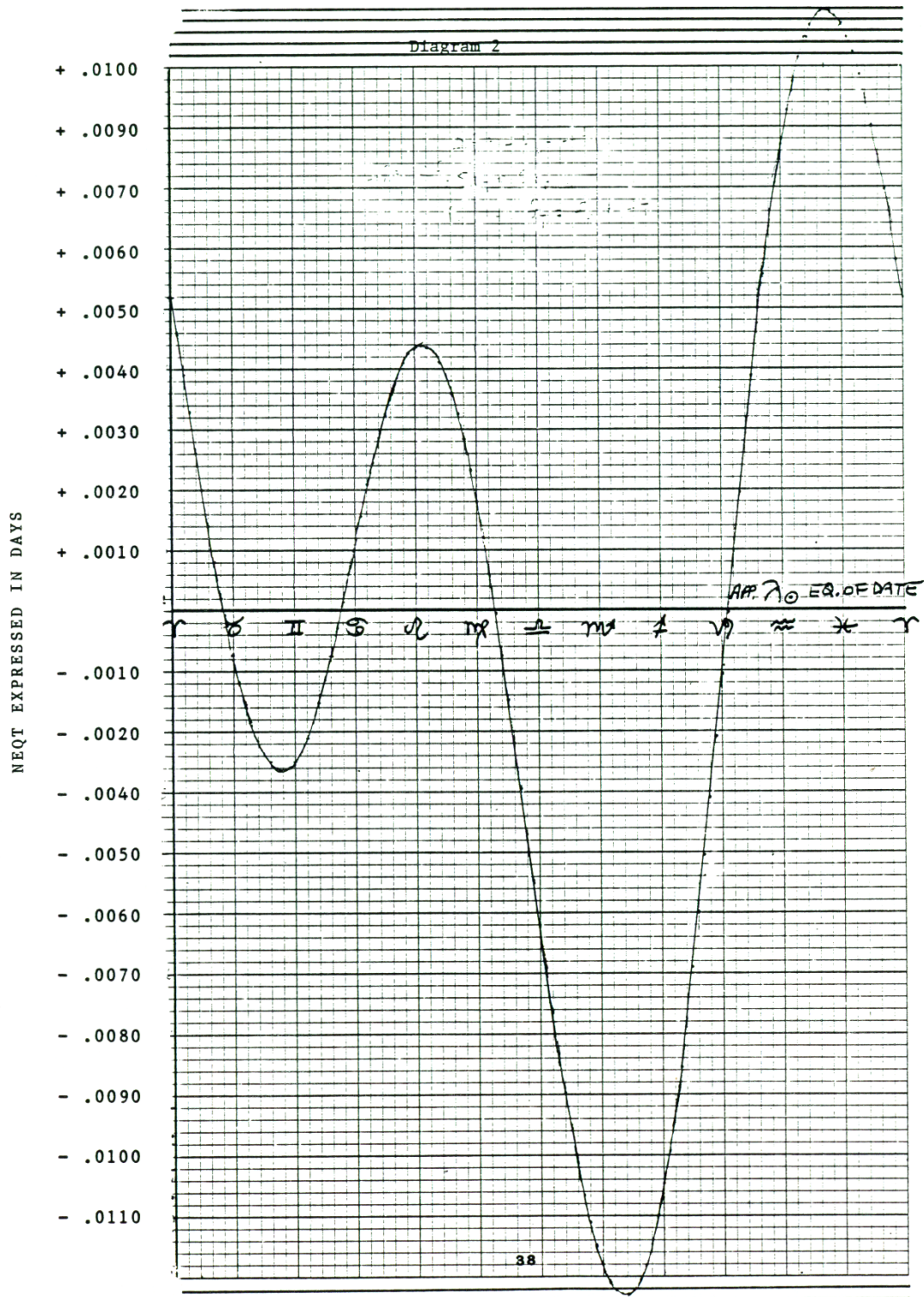


DIAGRAM 3A

Degrees	ARIES	TAURUS	GEMINI	CANCER	LEO	VIRGO
0	+0.00518	-0.00074	-0.00249	+0.00108	+0.00435	+0.00180
1	+0.00498	-0.00089	-0.00244	+0.00124	+0.00437	+0.00161
2	+0.00477	-0.00104	-0.00239	+0.00140	+0.00438	+0.00141
3	+0.00457	-0.00119	-0.00233	+0.00156	+0.00439	+0.00121
4	+0.00436	-0.00132	-0.00226	+0.00171	+0.00439	+0.00101
5	+0.00414	-0.00145	-0.00219	+0.00186	+0.00438	+0.00080
6	+0.00391	-0.00156	-0.00211	+0.00201	+0.00436	+0.00059
7	+0.00370	-0.00167	-0.00203	+0.00216	+0.00434	+0.00038
8	+0.00348	-0.00178	-0.00194	+0.00230	+0.00431	+0.00016
9	+0.00327	-0.00189	-0.00184	+0.00244	+0.00427	-0.00006
10	+0.00305	-0.00199	-0.00174	+0.00258	+0.00422	-0.00029
11	+0.00284	-0.00208	-0.00163	+0.00272	+0.00417	-0.00052
12	+0.00262	-0.00217	-0.00152	+0.00285	+0.00411	-0.00075
13	+0.00241	-0.00225	-0.00140	+0.00298	+0.00404	-0.00099
14	+0.00220	-0.00232	-0.00128	+0.00311	+0.00396	-0.00123
15	+0.00200	-0.00238	-0.00115	+0.00324	+0.00388	-0.00148
16	+0.00180	-0.00243	-0.00102	+0.00336	+0.00379	-0.00172
17	+0.00160	-0.00248	-0.00089	+0.00347	+0.00369	-0.00196
18	+0.00140	-0.00252	-0.00075	+0.00358	+0.00359	-0.00220
19	+0.00120	-0.00256	-0.00061	+0.00368	+0.00348	-0.00245
20	+0.00101	-0.00259	-0.00046	+0.00376	+0.00336	-0.00270
21	+0.00081	-0.00261	-0.00031	+0.00384	+0.00323	-0.00296
22	+0.00062	-0.00263	-0.00016	+0.00392	+0.00310	-0.00321
23	+0.00043	-0.00264	-0.00001	+0.00401	+0.00296	-0.00346
24	+0.00025	-0.00264	+0.00014	+0.00409	+0.00282	-0.00370
25	+0.00008	-0.00263	+0.00029	+0.00415	+0.00267	-0.00395
26	-0.00009	-0.00262	+0.00045	+0.00420	+0.00250	-0.00421
27	-0.00025	-0.00259	+0.00060	+0.00424	+0.00233	-0.00447
28	-0.00041	-0.00256	+0.00076	+0.00428	+0.00216	-0.00472
29	-0.00058	-0.00253	+0.00092	+0.00432	+0.00198	-0.00497

DIAGRAM 3B

<u>Degrees</u>	<u>LIBRA</u>	<u>SCORPIO</u>	<u>SAGITT.</u>	<u>CAPRICORN</u>	<u>AQUARIUS</u>	<u>PISCES</u>
0	-.00522	-.01080	-.00955	-.00105	+.00770	+.00973
1	-.00546	-.01089	-.00936	-.00071	+.00790	+.00966
2	-.00570	-.01098	-.00916	-.00037	+.00808	+.00959
3	-.00593	-.01106	-.00894	-.00004	+.00826	+.00950
4	-.00617	-.01112	-.00873	+.00030	+.00843	+.00941
5	-.00641	-.01118	-.00851	+.00063	+.00860	+.00931
6	-.00665	-.01122	-.00829	+.00097	+.00876	+.00921
7	-.00688	-.01126	-.00805	+.00130	+.00890	+.00910
8	-.00711	-.01128	-.00781	+.00164	+.00903	+.00899
9	-.00734	-.01130	-.00755	+.00197	+.00915	+.00888
10	-.00756	-.01131	-.00729	+.00229	+.00927	+.00875
11	-.00777	-.01131	-.00702	+.00261	+.00938	+.00861
12	-.00798	-.01131	-.00675	+.00293	+.00949	+.00846
13	-.00818	-.01129	-.00647	+.00325	+.00958	+.00831
14	-.00838	-.01126	-.00619	+.00356	+.00966	+.00816
15	-.00858	-.01122	-.00590	+.00388	+.00973	+.00801
16	-.00877	-.01117	-.00561	+.00418	+.00979	+.00785
17	-.00895	-.01112	-.00531	+.00447	+.00984	+.00769
18	-.00913	-.01106	-.00500	+.00476	+.00988	+.00753
19	-.00931	-.01098	-.00469	+.00504	+.00992	+.00735
20	-.00948	-.01090	-.00437	+.00532	+.00995	+.00717
21	-.00965	-.01080	-.00404	+.00559	+.00997	+.00698
22	-.00981	-.01070	-.00372	+.00585	+.00998	+.00679
23	-.00996	-.01059	-.00339	+.00611	+.00997	+.00660
24	-.01010	-.01047	-.00307	+.00636	+.00996	+.00640
25	-.01023	-.01034	-.00274	+.00660	+.00994	+.00620
26	-.01036	-.01019	-.00241	+.00683	+.00991	+.00600
27	-.01048	-.01004	-.00208	+.00706	+.00988	+.00579
28	-.01059	-.00988	-.00174	+.00728	+.00984	+.00559
29	-.01070	-.00972	-.00140	+.00749	+.00979	+.00538

DIAGRAM 4

Pictures of M and A Phases To Sun

Ascendant Phase:



Midheaven Phase:

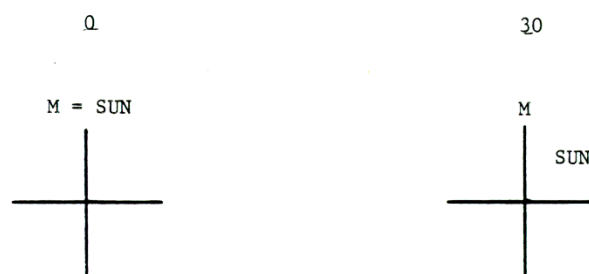
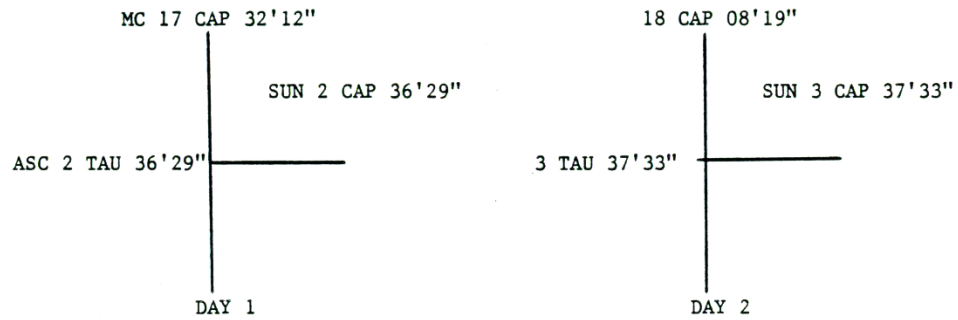


DIAGRAM 5

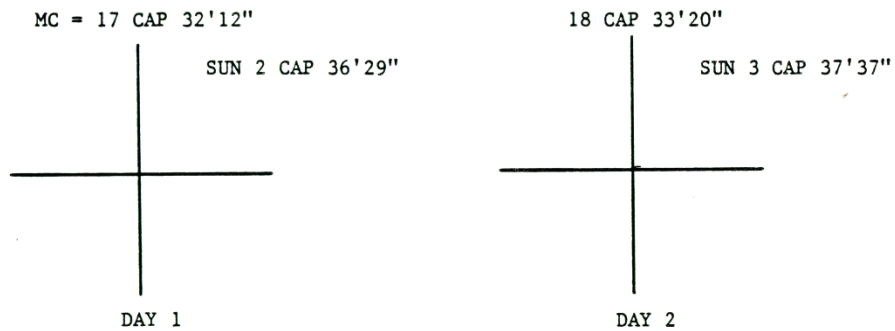
LATITUDE = $42^{\circ}00'$ N.
 OBLIQ. ECLIP. = $23^{\circ}45'00''$

APAD: PHASE = 120



SA = $1^{\circ}01'04''$

MPAD: PHASE = $14^{\circ}55'43''$



SA = $1^{\circ}01'08''$

Some Thoughts on Interpretive Software Development

Doug Pierce

Before sharing some of my own thoughts on this topic, it would be informative to share some comments from respondents to the Symbolic Perceptions Survey. This survey was proposed and described in Issue VIII (1981) of Matrix Magazine. One item on the survey questionnaire asked astrologers about their "perceptions of computers as interpretive tools". Many astrologers responded to this question; I will include a short sample of responses that are fairly representative of the larger group.

"So far I haven't been impressed with computers as interpretive tools, but I think their speed, versatility, and ability to analyze data have made them the greatest advance in Astrology in this century." -- Male, age 38

"I feel that computers are good, but a facet of their impact upsets me...The conclusion could be drawn that Astrology is merely a correlation of digital data combined in a few algorithms, and that people can be figured out easily so long as the amount of factors is sufficient...if it proceeds to its conclusion, [the computer] will represent Astrology as just another technology." -- Male, age 37

"I'm looking for something that can work with my ideas as they happen and as they evolve right then and there; all I'd have to do is punch in the background with which to play on. Do you have this available?" -- Female, age 25

"I cannot see, as yet, how the computers can synthesize all the individual factors. Mechanical analysis, yes -- personalized interpretive synthesizing, no. I have an open mind -- Convince me!" -- Female, age 66

"The complexity of the horoscope itself limits the perceptive content of the computer as an interpretive tool." -- Female, age 71

"The computer as an interpretive device seems like it could be very useful in applying a truly objective and verifiable approach to astrology...From this standpoint an interpretive program could produce a useful guide for initially getting into a chart...it can never serve the ultimate needs or penetrate the full depth of understanding that astrology can provide. I think that education as to the capacities and limitations of computer astrology is crucial if its great potential is to be realized and its dangers averted." -- Male, age 35

"I feel computers are certainly a welcome asset to astrology. However, as far as interpreting a chart the necessary human exchange is lacking." -- Female, age 34

"Computer analysis and the challenge of clarifying our thinking that this demands must surely be one of the most positive and potentially fruitful developments in astrology."
-- Male, age 42

"I feel computers and the work others are doing on programs will be the instruments to turn astrology into a more reputable and accepted activity." -- Female, age 36

"With respect to interpreting a chart for a client, I am sure the computer will prove to be extremely useful. The computer is not impressionable...It will therefore not 'read into' a chart what is not there." -- Male, age 32

"There is a possibility of fairly good computer interpretation, but this will take a great deal of work and time. The lack of integration is the biggest problem now and good intuition adds the extra touch that computers don't have." -- Female, age 45

Obviously, astrologers have a broad range of attitudes toward interpretive computing! One thing that stands out, after reviewing all responses, is that many of us see computer interpretation as something quite isolated from the interpretive process of the astrologer. This is not surprising, given that this really is the general state of affairs in most examples of interpretive systems. We have yet to achieve even a clear vision of a system that would serve as a true and intimate extension of our own interpretive capacities. Developing our concepts of possible future systems demands a substantial leap of imagination. And yet in fulfilling these potentials, we can only start from where we are, with existing systems.

A comprehensive review of the state of the art in interpretive systems is not the purpose of this article. What I propose here is to examine a hypothetical system, the Simple Report Writer; I will call it the SRW. Actual working systems obviously incorporate features not detailed in this illustration, but the essential components are present in the SRW. These processing components are summarized as follows:

1. Retrieve chart data from a disk file as requested by the user.
2. Generate pattern data from chart data.
3. Retrieve text descriptions from knowledge base, using pattern data as search keys.
4. Produce formatted text output.

This brief sequence can easily be expanded to include more detail. For example, step 2 above could be expanded into:

- 2a. Perform aspect scan of planet positions, with user-defined aspects and orbs.
- 2b. Generate an array of pattern data (aspects found, sign and house positions, etc.) for use by the text retrieval routine.
- 2c. Transfer control to the text retrieval routine.

This processing sequence gives us a starting point for describing future developments in terms of refinements to these basic processing components. Ideally, this work goes hand in hand with a process of clarifying and extending our concepts of this whole field of inquiry.

Steps 1 and 4 above can be discussed together as the tasks of an interface component that performs all input and output processing. In the SRW, we have an initial user input requesting a particular chart file, and a straightforward process of printing a formatted report. The programming here is far from trivial, but the flow of control is quite simple. The SRW has minimal interactive capacity; there is essentially one input and one output sequence. In designing future systems, it may be useful to adopt a broader definition of the interface component. This component would not only control input and output routines, it would be a central control or executive program for the whole system. It would mediate all communications between user and system, interpreting information passing in both directions.

While speaking of the interface component, it is important to note one primary constraint on systems of interest here, that of language capacity. I am speaking of systems that can be implemented on 32K-48K micros with floppy disks. The focus here is on smarter, not larger. The development of smarter systems could enormously reduce the redundancy of text storage, as generation of text from simpler language components (say, clauses rather than paragraphs) becomes workable. Language capacity becomes a qualitative rather than a quantitative matter. The issues here cannot be confined to a single component of the system, but they mainly involve the processing components outlined in steps 2 and 3 of the sequence. One aspect of language capacity that is not present in the SRW is the interpretation of user communications to the system. As noted above, this would be a function of the interface component.

Note the use of the term "knowledge base" in step 3 above. This is a general term that in the SRW refers to a random-access disk file of text entries. Each entry corresponds

to, and is accessed by, one of the many possible elements in an array of pattern data (such as a particular planetary aspect). The SRW retrieves these entries in a fairly mindless way, one by one. It has no comprehension of the content of these descriptions. Calling this a knowledge base is really stretching (or rather, shrinking) this term quite a bit. Regardless of how massive its text capacity is, the SRW remains primitive due to its lack of capacity for meaningful synthesis of descriptions.

There are artificial intelligence systems in existence with true knowledge bases. They can handle the full complexity of the English language, in interpreting and generating statements. They have powerful semantic and syntactic analysis routines, and vocabulary entries that define all the possible usages of a given term. They can carry on a coherent conversation with the user, but only on very limited topics. They embody quite sophisticated schemes for representation of knowledge. However, these systems are relatively massive, most requiring support by a mainframe computer. Even if this were not a problem, the nature of the thinking processes of these systems still would remain a problem. These are utterly logical and denotative thinkers, as opposed to the analogical and connotative mode of thought that seems to be essential to astrological interpretation. In Issue V of Matrix Magazine, Lee Holt describes this contrast quite succinctly: "In denotation there is a one-to-one-and-only-one relation between the symbol and its meaning. In connotation there is a one-to-many relation between the symbol and its many meanings...all horoscope interpretation is based on connotative thinking."

It seems that the intelligence of the sophisticated systems described above is not the kind of intelligence that is needed in an interpretive system. Interpretation deals with a different kind of knowledge and a different associative process that can be referred to as connotative in nature. What would a connotative knowledge base look like? Physically, it would still occupy a random-access disk file, but this file would be structured in a unique way. The location of a given element of knowledge--let's just call it a 'descriptor'--(or its pointers) within this file would have a direct correspondence to its connotative meaning within the system's total knowledge. It would share certain associative properties with its neighbors. This kind of relation would not be limited to the physically sequential organization of the file. Descriptors could be connotatively close within any subset of a large number of distinct dimensions of meaning. Thus knowledge would be represented within this system not only in declarative form (by stored descriptive phrases), but also by the inherent structure of the system's total

set of descriptors. This knowledge of connotative relations is at least as essential as the declarative form, since it captures the underlying nuances of meaning that cannot be adequately expressed in declarative form. In this sense, and only in this sense, the system could be said to have knowledge of its descriptors. A small system of this type would be quite limited in its use of grammar, since this type of language analysis requires some of the most massive and lengthy processing components in current artificial intelligence systems. Thus we could have a system that "knows" more than it could ever communicate in a report format. This system could have a sense of connotative relations that would substantially extend the astrologer's capacities in this area, and yet it would rely on the user in composing full descriptions. An essential aspect of this connotative knowledge would be the capacity to relate new information to its current knowledge base in a meaningful way. By this, I mean that the system would be able to draw meaningful parallels and contrasts between existing knowledge and new information, and to decide where new entries should reside within its knowledge base.

The knowledge base would be a literal representation of a connotative space with a large number of dimensions. The term "connotative space" is perhaps an imposing one, but essentially it is quite simple. My AISAR article in Matrix VIII presented a rather primitive connotative space model, using polarities of the four elements as dimensions. To give another simple example, we could define a space in terms of a set of three personality dimensions, such as Introversion/Extroversion, Dominance/Submission, and Creativeness/Conventionality. Thus we may develop a knowledge base using the vocabulary and concepts of the astrologer, the psychologist, or whomever we wish.

Besides the knowledge base itself, the essential processing component of a dynamic interpretive system is a refinement of step 2, where pattern data is generated from chart data. These data represent the system's knowledge of a chart. In the SRW, this is a static representation, a simple list of search keys. Developing more powerful representations of chart dynamics seems essential to advances in interpretive software. What might one expect of a "dynamic" representation of a chart? First, it should provide a way of focusing on a particular chart element or relation, while at the same time taking into account all other relations that affect it. In focusing on a chosen element, the user would literally be affecting the total chart. Rather than simply observing the chart, one would be interacting with it, with the system as mediator. A dynamic representation should provide information about relative prominence of chart elements, with which

the system could generate descriptions that follow a meaningful sequence or priority of reference. Beyond this, the system should be able to use this representation to describe the overall prominence of major configurations and their elements.

These concepts can be extended to a type of analysis that would yield an energy-flow model of chart dynamics. This has been for a number of years a growing orientation, within prominent schools of thought. This is an orientation toward perceiving the energy flow or dynamics of a chart as a whole, and seeing planetary relations as continuous cycles rather than isolated aspects. Within this mode of perception, isolated observations are unified and synthesized in a luminous image of the whole. Yet this orientation remains largely a philosophy rather than a mature methodology. It seems rather paradoxical, but altogether possible, that dynamic computer representations will contribute substantially to this methodology. The paradox, of course, lies in the "mechanicalness" of the computer, in contrast to the creativity of intuitive perceptions. Yet this misses the point, for what is of interest here is the capacity for representing complex symbolic relations. The essence of the computer's potential here lies in the power of certain computable techniques to formulate chart information on a pre-verbal level, an energy-flow level. This is the simplest way I have found to point to this capacity in any non-technical terms.

Even if one could fully perceive a chart as a dynamic flow of energy, communicating these perceptions meaningfully requires a solid grounding in a chosen descriptive territory. In this sense, we each have our own territory, our own grounding in a body of descriptive knowledge that reflects our awareness of human experience. I think this is something like what Michael Erlewine has spoken of in his editorial in Matrix VIII. I share his keen interest in delineating the common ground that astrologers share. And in speaking of territory, we come back to the concept of the knowledge base once again.

Building a knowledge base such as I have described is a demanding art. It is an art of delineating a chosen territory of description, and of cultivating and mapping that territory as a coherent domain of knowledge. It is coherent in terms of its portrayal of real-life relations, rather than relying purely on the structure of the astrological language. Ideally, this mapping is from the experiential to the abstract language of symbolism, rather than vice-versa. At least, this is my own opinion, but the concept itself is quite flexible.

Within one's chosen domain, the artist can be as detailed as he or she wishes in describing its features. These descriptors are like connotative landmarks that will orient the user to possible paths of association that may be explored within a chart. As future systems evolve, they will allow the astrologer more and more freedom of imagination, bringing the chart to life through the dynamics that are played out within any descriptive territory one may choose or conceive of. The astrologer will be able to enter into this territory, participating in these dynamics and learning the chart in a more and more experiential sense. The natural energy flow of the chart will be expressed in the unfolding of any one of its possible paths of interpretive development. This may be a rather poetic way of thinking about possible futures for interpretive systems, but it is not within the realm of pure fantasy.

The preceding descriptions clearly go beyond the capacities astrologers have learned to expect of computers. Judging from the responses sampled earlier, we collectively see computers mainly as powerful tools for generating chart data, aspect grids and graphics, and for doing large-scale research. On the other hand, we remain unimpressed with most attempts to make the leap to complete computer-generated interpretations. There seems to be a great deal of room for development that lies between these extremes of the computer's potential role in astrology. The ideas presented here aim directly at this middle ground. Here, there is much to learn about what tasks are most appropriate to the computer and to the astrologer, and about the point where they meet.

NUMERICAL INTEGRATION: One Step at a Time

A.P.N.A. Vol. XXII

by Mark Pottenger

Numerical integration, at least as concerns astronomical programmers, is a technique for ephemeris generation. When done by hand, numerical integration consists in setting up difference and summation tables and extrapolating them by assuming the differences at some order are constant. The assumed constant difference is filled in for the time step ahead and the rest of the difference table filled in to the left. Corrector formulas can now be applied to the extrapolated values if desired, otherwise repeat the procedure for the next time step. The methods used in Volumes XII and XXII of the Astronomical Papers have essentially the same logic, except that a formula getting the next position directly from previous accelerations and positions is used instead of the difference table. The formula used in Volume XXII is of a slightly higher order than that in Volume XII, which is the same thing as taking the difference table to a higher order before assuming the differences will be constant.

The other main difference between the Volume XII and XXII implementations is the starting procedure. Volume XII gives complete starting table of positions and differences, and summations (the leftward differences of a difference table) for XXII asteroids around the starting epoch. Volume XII gives a single position and velocity at the epoch and formulas to create a starting table from these values. The Volume XXII form, though slower to start, permits more flexibility since less information is needed to start. I developed the Volume XII program after having implemented the Volume XII program presented by James Neely in Matrix V because the startup procedure looked like what I needed for work I am doing with asteroids. The asteroid work is still in the testing stage, but the Volume XXII program is presented here for anyone interested.

One additional reason people might want to implement the Volume XXII program is that the orbit of Pluto was considerably better defined than in Volume XII. The Volume XII positions were already off by 10" a decade ago according to Oesterwinter and Cohen (1972). (The orbit used in Volume XII was determined in 1932, that used in Volume XXII in 1967.) The mass used for Pluto in both volumes was determined long ago and differs by a factor of 366 from estimates made since the discovery of Pluto's moon Charon, but I didn't change it for fear it would throw the integration off. (The starting values were determined using the old mass, so they must in a sense be tailored to that mass. If you change the mass you should determine new starting values.)

A brief description of the accompanying program follows. In this description I am using "forward" and "backward" to mean "in the direction

the integration is going" and "opposite the direction of the integration". The program is set up to determine whether the time step should be positive or negative from the ending Julian Day Number input.

All arrays are defined and dimensioned immediately after the questions that start the program going. Provision is included for breaking up the integration by storing a re-start table to disk. If re-starting, the table is read back and several sections of the program get skipped. The coefficients from Volume XXII are all defined next. The Julian Day Number of the epoch and the starting positions and velocities at the epoch are read from DATA statements at the end of the program. The data statements are at the end so that they can be changed easily. They are the only part of the program that needs to be changed to use starting values for another epoch. (Volume XXII gives starting values at 40,000 year intervals for anyone into really ancient charts.) Accelerations for asteroids and planets are given in a subroutines and a separate array of accelerations is filled with these values. (The starting table goes 12 time steps forward with both positions and accelerations and the accelerations also go 12 time steps backward from the epoch.)

The starting table is generated iteratively as follows. The position one time step before the epoch is gotten as a function of the 12 accelerations after epoch and the starting position and velocity. Positions forward from the epoch are determined as functions of previous accelerations and positions. This formula includes the acceleration of the time step whose position is currently being determined, so that has to be there from a previous iteration. (That was the reason for filling the acceleration array at the beginning.) This is called a corrector formula because it takes a previously determined value and refines it. After getting positions with the above formula, get new values for the accelerations from these positions. After getting the accelerations, perform a convergence test to see if the starting table is finished. (Note: the convergence test I did is not that described in Volume XXII--it is a bit more simple-minded.) If the table has not converged, extrapolate the accelerations to the -12th time step and start over from getting the -1st position. After completing the starting table, write the resulting positions to disk and start the main integration.

The main integration gets positions as a function of two preceding positions and 12 preceding accelerations. In this form, the formula is called a predictor. After getting the positions, get the accelerations from those positions. If you want super precision and don't care about speed, you can add in the corrector formula at this point (the one used in the starting iteration). Since

the authors of Volume XXII don't mention having used it when they got positions for a million years, I doubt that it is really necessary (if your computer's math is accurate enough). After the main integration finishes, the re-start table will be saved if requested.

I have also included a few small programs to complete the package. INVERTER reverses the order of the entries on a disk after running a backward integration. COPYPREC selectively reads positions for a single planet at a requested time interval (which must be a multiple of 40 days) and sets up an individual ephemeris file. It rotates and preprocesses the coordinates from 1950 equatorial to ecliptic of date. PERTPREC is a modification of that program for fellow fanatics. It applies the perturbations of the outer planets by the inner planets given in Volume XIII Part 5 of the Papers before preprocessing the positions. COMPIXZ can be used to compare the results of different integrations. PRINTXIZ prints the coordinates in a form suitable for comparison to Volume XII.

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10 REM VOLUME22--IMPLEMENTATION OF VOLUME 22 FORMULAS FOR NUMERICAL INTEGRATION
20 REM BY MARK POTTINGER
30 REM 838 5TH AVE LOS ANGELES, CA 90005
40 REM REV 15 JUNE 1980
50 REM MOST OF NOTATION IS AS CLOSE TO VOLUME 22 AS MANAGABLE
60 REM STEP SIZE IS "W" IN NOTATION OF VOL 12 INSTEAD OF VOL 22 "h"
70 REM STEP SIZE IS 40 DAYS
80 REM N IS USED AS STEP INDEX, I IS COEFFICIENT INDEX
90 REM N IS PASED AT 12 INSTEAD OF 0 FOR SUBSCRIPT PURPOSES
100 INPUT #1, "TYPE 0 IF STARTING FRESH, 1 IF READING AN OLD TABLE ",T9
110 INPUT #1, "TYPE THE NUMBER OF THE DRIVE TO BE WRITTEN TO ", D9
120 R0=692 \ REM # OF RECORDS PER 5 INCH DISK
130 IF D9=4 THEN R0=1992 \ REM RECORDS PER 8 INCH DISK
140 INPUT #1, "GIVE ENDING JULIAN DAY # ",J1
150 REM M(I)=MASSES OF THE PLANETS IN TERMS OF THE SUN'S MASS AS 1
160 REM M(I)=MASS OF SUN PLUS MASS OF PLANET FOR EACH PLANET
170 REM A(I)=ALPHA COEFFICIENTS FROM VOLUME 22, A(I)=ALPHA PRIME
180 REM B(I)=-B" (SMALL B) COEFFICIENTS FROM VOLUME 22, G(I)=GAMMA
190 DIM N(5), M(5), A(12), B(12), G(12)
200 REM X(PLANET), TIME STEP, COORDINATE, PLANETARY COORDINATE (X=0,Y=1,Z=2)
210 REM X(PLANET), COORDINATE, VELOCITY, ACCELERATION (ATTRACTIONS)
220 REM X(PLANET), TIME STEP, COORDINATE, VELOCITY, ACCELERATION (ATTRACTIONS)
230 REM X(PLANET), COORDINATE, VELOCITY, ACCELERATION (ATTRACTIONS)
240 DIM X(24), Y(24), Z(24), V(24), A(24), B(24), G(24)
250 REM R(PLANET)=RADIAL DISTANCES OF PLANETS FROM SUN
260 REM R(I)=SEPARATIONS BETWEEN PLANETS, NAME RE-USED FOR DIRECT PERTURBATIONS
270 REM D(PLANET, PLANET)=DISTANCE BETWEEN PLANETS (SQUARED, THEN CUBED)
280 REM U(PLANET, COORDINATE)=SUN-PLANET ATTRACTION/MASS
290 DIM R(5), R0(5,2), D(5,5), U(5,2)
300 IF T9=0 THEN 470
310 REM READ RE-START TABLE--13 SETS OF ACCELERATIONS & 2 SETS OF POSITIONS
320 INPUT #1, "GIVE THE FILE NAME USED FOR THE OLD TABLE ", I$
330 OPEN #2, I$
340 READ #2, I$
350 FOR P=1 TO 5
360 FOR X=0 TO 2
370 FOR N=0 TO 12
380 READ #2, X2(P,N,X)
390 NEXT N
400 READ #2, X(P,11,X), X(P,12,X)
410 NEXT X
420 NEXT P
430 CLOSE #2
440 N4=0 \ REM COUNT OF RECORDS WRITTEN TO DISK
450 J0=J0-12*W \ REM OFFSET STARTING JD TO ALLOW FOR OFFSET IN MAIN LOOP
460 REM P1,DEGREE TO RADIAN, RAD TO DEG, RAD TO SECONDS, SEC TO RAD, CIRCLE
470 P1=3.1415926535898/P2=P1/180/P3=180/P1/P5=P3*3600/P6=1/P5/C=360
480 REM MODULUS 360
490 LFF FNM0(U)=(U/C-INT(U/C))*C
500 REM RECIPROCAL OF MASSES OF PLANETS
510 DATA 1047.355,3501.6,22869,19314,360000
520 M(0)=1.00000597682\REM SUN + INNER PLANETS MASS
530 FOR I=1 TO 5
540 READ FNM(I)=1/FNM(I)=M(0)*M(I)
550 NEXT I
560 REM PAPERS VOLUME 22 ALPHA--COEFFICIENTS FOR STARTUP INTEGRATION
570 DATA 2615348736000\REM LOWEST COMMON DENOMINATOR
580 DATA 150653570023,266265961044,-1401863453062,3926822700380
590 DATA -6604398106155,8380822992264,-8088023425180,5907495735864
600 DATA -3215663657055,1265630766980,-340671801462,56165516844,-428116477

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610 READ F0
620 FOR I=0 TO 12
630 READ FNA(I)=F/F0
640 NEXT I
650 REM VOLUME 22 ALPHA PRIME--COEF FOR MAIN INTEGRATION
660 DATA 2615348736000\REM LCD
670 DATA 4621155471343,-13232844914856,47013743728958
680 DATA 114321706672600,282227167611865,-266609549584656
690 DATA 26442902195332,-19710608276656,10898293333425
700 DATA 4342752828640,11807143978636,-1962777574776,150653570023
710 READ F0
720 FOR I=0 TO 12
730 READ FNA(I)=F/F0
740 NEXT I
750 REM VOLUME 22 GAMMA--COEF FOR ACCELERATIONS TO GET X(-1) IN START SWEEP
760 DATA 5230897472000\REM LCD
770 DATA 8133527365351,-3028240168720,10170697040054
780 DATA 528527365351,-3028240168720,10170697040054
790 DATA 528527365351,-3028240168720,10170697040054
800 DATA 528527365351,-3028240168720,10170697040054
810 READ F0
820 FOR I=0 TO 12
830 READ FNA(I)=F/F0
840 NEXT I
850 REM VOL 22 B--COEF FOR BACKWARD EXTRAPOLATION IN START SWEEP
860 REM =-1*(131/(1+111*(13-111))) FOR I=0 TO 12
870 DATA 13,-78,286,-715,1287,-1716,1716,-1287,715,-286,78,-13,1
880 FOR I=0 TO 12\READ B(I)\NEXT I
890 K=-017202989593\REM GAUSSIAN GRAVITATIONAL CONSTANT
900 IF T9=1 THEN 930
910 REM ALL DATA STATEMENTS FROM NOW ON AT END OF PROGRAM
920 READ J0\REM STARTING JULIAN DAY #
930 F1=86.5*1024 \ F2=8 \ REM DISK SPACE, BYTES PER NUMBER
940 IF D9=4 THEN F1=249*1024 \ REM 8 INCH DISK
950 F3=INT(ABS(J1-J0)/40+1) \ REM TOTAL # OF RECORDS IN RUN
960 IF T9=1 THEN F3=F3-13 \ REM CORRECT FOR JD OFFSET IN RE-START
970 F4=F3*16*F2/F1 \ REM RECORDS*(JD & 15 COORDS/RECORD)*BYTES/DISK
980 PRINT #1, "THIS WILL TAKE",F4," DISKETTES(S)"
990 IF T9=1 THEN 1100
1000 REM READ OUTER PLANET STARTING POSITIONS & VELOCITIES
1010 FOR P=1 TO 5
1020 FOR X=0 TO 2
1030 READ X(P,12,X)
1040 NEXT X
1050 FOR X=0 TO 2
1060 READ X1(P,X)
1070 NEXT X
1080 NEXT P
1090 REM PREPARE FILE
1100 GOSUB 2800
1110 REM SET STEP SIZE IN DAYS (40 OR -40)
1120 W=40*SGN(J1-J0)
1130 REM W, K SQUARED
1140 W2=W*W \ K2=K*K
1150 REM SET UP FOR STARTING SWEEP
1160 N=12
1170 IF T9=1 THEN 2220 \ REM RE-START GOES DIRECTLY TO MAIN INTEGRATION
1180 PRINT "GETTING ACCELERATIONS AT EPOCH"
1190 GOSUB 2920
1200 PRINT "DONE--FILLING ARRAY"

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1210 REM FILL ARRAY WITH ACCELERATION AT EPOCH
1220 FOR P=1 TO 5
1230 FOR N=0 TO 24
1240 IF N=12 THEN 1280
1250 FOR X=0 TO 2
1260 X2(P,N,X)=X2(P,12,X)
1270 NEXT X
1280 NEXT N
1290 NEXT P
1300 C0=0 \ REM COUNT OF ITERATIONS
1310 REM STARTING ITERATION--INTEGRATE X, CALCULATE X", EXTRAPOLATE X" BACK
1320 C0=C0+1
1330 IF C0<3 THEN 1410
1340 REM STORE VALUES FOR COMPARISON
1350 FOR P=1 TO 5
1360 FOR X=0 TO 2
1370 T(P,X)=X(P,24,X)
1380 NEXT X
1390 NEXT P
1400 REM GET X(-1)
1410 FOR P=1 TO 5
1420 PRINT "X(-1)=",
1430 FOR X=0 TO 2
1440 T=0
1450 FOR I=0 TO 12
1460 T=T+G(I)*X2(P,I+12,X)
1470 NEXT I
1480 X(P,11,X)=X(P,12,X)-W*X1(P,X)+W2*T
1490 PRINT X(P,11,X),
1500 NEXT X
1510 PRINT
1520 NEXT P
1530 PRINT "STARTING AN INTEGRATION"
1540 REM INTEGRATE X
1550 FOR P=1 TO 5
1560 PRINT "PLANET",P
1570 FOR N=13 TO 24
1580 PRINT "STEP",N-12," XYZ=",
1590 FOR X=0 TO 2
1600 T=0
1610 FOR I=0 TO 12
1620 T=T+A(I)*X2(P,N-I,X)
1630 NEXT I
1640 X(P,N,X)=2*X(P,N-1,X)-X(P,N-2,X)+W2*T
1650 PRINT X(P,N,X),
1660 NEXT X
1670 PRINT
1680 NEXT N
1690 NEXT P
1700 I="FINISHED INTEGRATION ",C0
1710 REM GET ACCELERATIONS FROM INTEGRATED POSITIONS
1720 FOR N=13 TO 24
1730 GOSUB 2920
1740 NEXT N
1750 PRINT "GOT 12 SETS OF ACCELERATIONS"
1760 IF C0<4 THEN 1890
1770 REM TEST FOR CONVERGENCE IN LAST TIME STEP OF STARTING SWEEP
1780 REM THIS IS NOT THE TEST DESCRIBED IN VOL 22
1790 F=0
1800 FOR P=1 TO 5
1810 FOR X=0 TO 2
1820 PRINT "OLD,NEW=",T(P,X),X(P,24,X)
1830 IF X(P,24,X)<T(P,X) THEN F=1
1840 NEXT X
1850 NEXT P
1860 IF F=0 THEN 2030
1870 IF C0>20 THEN 2030 \ REM THIS IS MY OWN ARBITRARY CUT-OFF
1880 REM EXTRAPOLATE ACCELERATIONS TO -12TH STEP
1890 FOR P=1 TO 5
1900 FOR N=1 TO 12
1910 FOR X=0 TO 2
1920 T=0
1930 FOR I=0 TO 12
1940 T=T+B1(I)*X2(P,12-N+1+I,X)
1950 NEXT I
1960 X2(P,12-N,X)=T
1970 NEXT X
1980 NEXT N
1990 NEXT P
2000 PRINT "EXTRAPOLATED 12 SETS OF ACCELERATIONS BACK"
2010 GOTO 1320 \ REM GO BACK FOR ANOTHER ITERATION
2020 REM WRITE RESULTS OF STARTING ITERATION
2030 J=0
2040 FILL 3328,2 \ REM SWITCH OUTPUT TO PRINTER
2050 I"ITERATION COUNT IS ",C0
2060 FOR N=12 TO 24
2070 IJ
2080 WRITE#1,J
2090 FOR P=1 TO 5
2100 FOR X=0 TO 2
2110 IX(P,N,X),
2120 WRITE#1,X(P,N,X)
2130 NEXT X
2140 NEXT P
2150 J=J+1
2160 NEXT N
2170 NEXT IJ
2180 FILL 3328,0 \ REM SWITCH BACK TO SCREEN
2190 N4=1 \ REM COUNT OF RECORDS WRITTEN TO FILE
2200 GOSUB 2650
2210 REM START MAIN LOOP
2220 FOR J=J0+13*W TO J1 STEP W
2230 IJ
2240 WRITE #1, J
2250 N2=N+1
2260 N3=N-1
2270 FOR P=1 TO 5
2280 FOR X=0 TO 2
2290 T=0
2300 FOR I=0 TO 12
2310 T=T+A1(I)*X2(P,N-I,X)
2320 NEXT I
2330 X(P,N2,X)=2*X(P,N,X)-X(P,N3,X)+W2*T
2340 IX(P,N2,X),
2350 WRITE #1, X(P,N2,X),NOENDMARK
2360 NEXT X
2370 I
2380 NEXT P
2390 N=N+1
2400 GOSUB 2920 \ REM ACCELERATIONS

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2410 N4=N4+1
2420 IF N4/R0=INT(N4/R0) THEN GOSUB 2770
2430 IF N=24 THEN GOSUB 2650
2440 NEXT J
2450 IF N4/R0<INT(N4/R0) THEN CLOSE #1
2460 INPUT #1, "DO YOU WANT TO SAVE A RE-START TABLE? ", IS
2470 IF IS<>"YES" THEN 2630
2480 F=8 \ REM SIZE OF FILE IN 256 BYTE SECTORS
2490 PRINT #1, "PUT IN A DISK WITH ", F, " SECTORS FREE & GIVE A FILE NAME ",
2500 INPUT #1, IS
2510 CREATE IS,F
2520 OPEN #2, IS
2530 WRITE #2, J1,W
2540 FOR P=1 TO 5
2550 FOR X=0 TO 2
2560 FOR N2=N-12 TO N
2570 WRITE #2, X2(P,N2,X)
2580 NEXT N2
2590 WRITE #2, X(P,N-1,X), X(P,N,X)
2600 NEXT X
2610 NEXT P
2620 CLOSE #2
2630 END
2640 REM MOVE VALUES DOWN IN ARRAYS
2650 FOR P=1 TO 5
2660 FOR X=0 TO 2
2670 FOR N=0 TO 12
2680 X2(P,N,X)=X2(P,N+12,X)
2690 NEXT N
2700 X(P,1,X)=X(P,2,X)
2710 X(P,2,X)=X(P,3,X)
2720 NEXT X
2730 NEXT P
2740 N=12 \ REM STEP COUNTER
2750 REM CLOSE IS CALLED ONLY AFTER FILLING A DISK
2760 REM CLOSE #1
2770 IF J=11 THEN RETURN
2780 REM CREATE FILE TO STORE RESULTS ON--256 BYTE SECTORS
2800 PRINT #1, "PUT A BLANK DISKETTE IN DRIVE ", D9, \ INPUT #1, IS
2810 IS=STR$(D9)
2820 IS="XYZ1950."+IS(2,2)
2830 CREATE IS,R0/2
2840 OPEN #1, IS
2850 RETURN
2860 REM GET ACCELERATION FROM POSITIONS
2870 REM R() IS SQUARE OF SOLAR DISTANCE, THEN CUBE
2880 REM R0() IS SEPARATION BETWEEN PLANETS IN EACH COORDINATE
2890 REM R0() IS LATER RE-USED AS VOLUME 12 T(I,J)/MASS
2900 REM D() IS SQUARE OF DISTANCE BETWEEN PLANETS, THEN CUBE
2910 REM U() IS VOLUME 12 U/MASS
2920 FOR P=1 TO 5
2930 R(P)=X(P,N,0)^2+X(P,N,1)^2+X(P,N,2)^2
2940 R(P)=R(P)*SQRT(R(P))
2950 FOR X=0 TO 2
2960 U(P,X)=-K2*X(P,N,X)/R(P)
2970 NEXT X
2980 FOR P=0 TO 5
2990 FOR X=0 TO 2
3000 R0(P,P0,X)=X(P0,N,X)-X(P,N,X)

```

```

3010 NEXT X
3020 D(P,P0)=R0(P,P0,0)^2+R0(P,P0,1)^2+R0(P,P0,2)^2
3030 D(P,P0)=D(P,P0)*SQRT(D(P,P0))
3040 D(P,P0)=D(P,P0)
3050 FOR X=0 TO 2
3060 R0(P,P0,X)=R0(P,P0,X)/D(P,P0)
3070 R0(P,P0,X)=-R0(P,P0,X)
3080 NEXT X
3090 NEXT P
3100 NEXT P
3110 FOR P=1 TO 5
3120 FOR X=0 TO 2
3130 T=0
3140 FOR P0=1 TO 5
3150 IF P0=P THEN 3170
3160 T=T+N(E0)*(R0(P,P0,X)+U(P0,X))
3170 NEXT P0
3180 X2(P,N,X)=M1(P)*U(P,X)+T
3190 NEXT X
3200 NEXT P
3210 RETURN
3220 REM EPOCH DEPENDENT DATA
3230 DATA 2430000.5 \ REM STARTING JD
3240 REM JUPITER-PLUTO XYZ,X'Y'Z' FROM VOLUME 22 PART 1 PAGE 14
3250 DATA 3.429474151893,3.353869597109,1.354949017147
3260 DATA -.005571605704487,.005056967832843,.002305785438997
3270 DATA 6.64145425491,5.971569578783,2.182314997275
3280 DATA -.004155707763713,.003656827228077,.001691432132941
3290 DATA 11.26384372073,14.69525767935,6.279605250673
3300 DATA -.003253256691587,.001897060219635,.0008772653227807
3310 DATA -.30.15522687593,1.656999664043,1.437857527205
3320 DATA -.0002404762541773,-.002876595326073,-.001172195431741
3330 DATA -.21.125116520930,28.448070099397,15.309278950295
3340 DATA -.0017687432476998,-.002164274774144,-.00014870371365842

```

```

10 REM COPYREC--COPY OUTER PLANET FILES & PRECESS TO ECLIPTIC OF DATE
20 REM FILE IS CREATED FOR EACH PLANET SEPARATELY IN FORMAT FOR CHART PROGRAM
30 REM REV 15 JUNE 80
40 REM BY MARK PORTINGER, 838 5TH AVE, LOS ANGELES, CA 90005
50 REM I USUALLY USE 80,160,320,640,640 DAY INCREMENTS FOR JUP-PLU
60 DIM P(3,3),X(3),PS(40)
70 PS="JUPITER SATURN URANUS NEPTUNE PLUTO "
80 P1=3.14159265358979 \ R=P1/180 \ S=R/3600
90 INPUT #1, "PUT THE DESTINATION DISK IN DRIVE 1"
100 INPUT #1, "GIVE THE DRIVE NUMBER OF THE SOURCE DISK ", D9$(1,1)
110 R0=692 \ REM NUMBER OF RECORDS ON 5 INCH DISK
120 IF D9$(1,1)="4" THEN R0=1992 \ REM 8 INCH DISK
130 INPUT #1, "GIVE THE NUMBER OF THE PLANET (1-5 FOR JUP-PLU) ", K
140 INPUT #1, "GIVE THE FIRST JD, LAST JD, & JD INCREMENT ", J1,J2,J3
150 F=INT((J2-J1)/J3)+1 \ REM # OF DATES
160 F=(N+1)*24/256 \ IF F<>INT(F) THEN F=INT(F+1) \ REM FILE SIZE
170 PRINT N, " DATES--FILE WILL BE",F," SECTORS"
180 CREATE PS(K*8-7,K*8),F
190 OPEN #K, PS(K*8-7,K*8)
200 WRITE #K, N,J1,J3 \ REM 1ST RECORD IN FILE--# OF DATES, 1ST JD, JD INCREMENT
210 OPEN #6, "XYZ1950",*D9$(1,1)
220 READ #6 #0, J0
230 FOR J4=J1 TO J2 STEP J3
240 P=(J4-J0)/40*128
250 IF P<0 OR P/128>R0 THEN GOSUB 360
260 READ #6 #P, J5
270 PRINT J5,
280 P2=P+24*(K-1)+8
290 READ #6 #P2, X(1),X(2),X(3)
300 GOSUB 430
310 NEXT J4
320 CLOSE #K
330 CLOSE #6
340 END SWITCH SOURCE DISKS
350 REM SWITCH SOURCE DISKS
360 CLOSE #6
370 PRINT #1, "PUT NEXT DISK IN DRIVE ",D9$(1,1), \ INPUT #1, I$
380 OPEN #6, "XYZ1950",*D9$(1,1)
390 READ #6 #0, J0
400 P=(J4-J0)/40*128
410 RETURN
420 REM PRECESS AND ROTATE TO ECLIPTIC OF DATE (ADOPTED FROM NEELY VOL XII)
430 F=(J5-2415020)/36525*TS=(J5-2413282.423)/36524.218879
440 F=((1.00181)*F-.0059)*M=46.845)*M+84426.26)*S*(COS(E)\S0-SIN(E)
450 P(1,1)=M*TS*(-13*TS-29696)/168+1
460 P(2,1)=((221*TS-676)*TS-2234941)*TS/168*P(1,2)-P(2,1)
470 P(3,1)=((96*TS+207)*TS-971690)*TS/168*P(1,3)-P(3,1)
480 P(2,2)=M*TS*(-15*TS-24975)/168+1
490 P(2,3)=-10858*TS*TS/168*P(3,2)+P(2,3)
500 P(3,3)=-4721*TS*TS/168+1
510 FOR I=1 TO 3
520 S8(I)=0
530 FOR J=1 TO 3
540 S8(I)=S8(I)+P(J,I)*X(J)
550 NEXT J
560 NEXT I
570 H1=S8(1)
586 H2=S8(2)*C+S8(3)*S0
590 H3=-S8(2)*S0+S8(3)*C
600 WRITE#K,H1,H2,H3,NOENDMARK
610 PRINT H1,H2,H3
620 RETURN

```

```

10 REM INVERTER--COPY EPHEMERIS INTO REVERSE ORDER--ALL DONE ON ONE DISK
20 REM RUN AFTER DOING A BACKWARDS INTEGRATION
30 REM REV 17 JUNE 80
40 REM BY MARK PORTINGER, 838 5TH AVE, LOS ANGELES, CA 90005
50 DIM X(15),X0(15)
60 INPUT #1, "GIVE THE DRIVE NUMBER ", D9$(1,1)
70 R0=692 \ REM # OF RECORDS ON 5 INCH DISK
80 IF D9$(1,1)="4" THEN R0=1992 \ REM 8 INCH DISK
90 OPEN #1,"XYZ1950",*D9$
100 FOR R=1 TO R0/2 \ REM RECORD NUMBER
110 P=(R-1)*128
120 I="R,P"
130 READ #1 #P, J
140 FOR I=1 TO 15
150 READ #1, X(I)
160 NEXT I
170 P0=(R0-R)*128
180 IF0
190 READ #1 #P0, J0
200 FOR I=1 TO 15
210 READ #1, X0(I)
220 NEXT I
230 WRITE #1 #P0, J
240 FOR I=1 TO 15
250 WRITE #1, X(I),NOENDMARK
260 NEXT I
270 WRITE #1 #P, J0
280 FOR I=1 TO 15
290 WRITE #1, X0(I),NOENDMARK
300 NEXT I
310 NEXT R
320 CLOSE #1
330 END

```

```

10 REM PRINTXYZ--PRINT OUT XYZ FOR OUTER PLANETS FROM FILE
20 REM PRINTS ALL FOR ONE PLANET BEFORE STARTING NEXT PLANET
30 REM REV 17 JUNE 80
40 REM BY MARK POTTINGER, 838 5TH AVE, LOS ANGELES, CA 90005
50 DIM PS(35)
60 PS="JUPITER SATURN URANUS NEPTUNE PLUTO "
70 INPUT #1, "WHAT DRIVE IS THE FILE IN ", D9$(1,1)
80 INPUT #1, "GIVE FIRST JD, # OF ENTRIES TO PRINT ", J1, N
90 OPEN #1, "XYZ1950," + D9$(1,1)
100 A=0
110 READ #1 #A, J
120 A=(J1-J)/40)*128 \ REM ADDRESS OF 1ST JD
130 A0=A
140 FOR K=0 TO 4
150 IF$(K+1)*7<6, (K+1)*7)
160 FOR I=1 TO N
170 READ #1 #A, J
180 A=A0+J
190 A=A0+K*7+I
200 READ #1 X(K), Y(K), Z(K)
210 I=81559, X(K), Y(K), Z(K)
220 A=A+128
230 NEXT I
240 A=A0
250 I
260 NEXT K
270 CLOSE #1
280 FILL 3328, 0
290 END

```

THE ISAR DATA BASE PROJECT

July 12, 1982

by Mark Pottenger
838 5th Avenue
Los Angeles, CA 90005

A group of astrologers in Los Angeles has been meeting whenever possible for the last year to start developing a data base system for astrology. The group is primarily drawn from ISAR: Lois Rodden, Ron Tiggie, Brooke Smith, Linden Leisge of Church of Light, myself and several other people occasionally contributing. The complete system we hope to end up with will include a data collection questionnaire, chart and coded data storage, query and statistical analysis of stored data and research guidelines. So far, the working group in Los Angeles has been defining categories and codes for storing information about a person. When the code definition is finished, we will incorporate it as an extension record for the M-65 Research System from Matrix Software. The M-65 package already supplies the chart calculation and storage and data base query features and will be supporting statistical analyses later on. [see note below. Editor].

The definition of the data structure is mostly finished, and we now want feedback from a larger group of astrologers and researchers. Our structure has sever major divisions: physical, birth & childhood, education & mind, sexual & social, adult relationships & home, work and career, and religion & values. The working group does not include anyone with extensive knowledge of medicine, so that part of the data definition is still vague. Anyone who would like a copy of our description of the structure as so far defined may write directly to me. Please join us in this effort- the more people who contribute now, the better the final working version will be.

Mark Pottenger

Editor's NOTE: As regards the statistical routines for the M-65 System, statistician/programmer Doug Pierce is relocating to join the MATRIX programming staff on a full time basis. One of Doug's priority projects will be to design a comprehensive statistical package to complement the M-65.

Excerpts from SPIRITUAL SCIENTIFIC ASTROLOGY

by David B. Black

Editor's note: The excerpts below are from an unpublished manuscript entitled SPIRITUAL SCIENTIFIC ASTROLOGY by David Black. Aside from being a top notch programmer, Black has a real talent for astrological theory and an ear for poetry. Prose with good images in it is hard to find in modern astrological writing. MATRIX intends to devote more space to writing like the following.

"If the astrological Planets are spiritual beings in the sense we have been discussing, it is reasonable to approach them in a different way. Looked at in a simple way, the process is this: one must find and recognize the elements of what exists in the world (including oneself) at a certain level, and consciously create images of them in the form of feeling-filled concepts. The fact that we are caught in the illusion of the two-fold world can actually be a help here: what we find in the external world of Jupiter must be a transformation of what we find as Jupiter in the internal world. In undertaking this process, we are attempting to do no less than attain a perfect understanding of ourselves. If we already had such an understanding, we would not need to undergo this process. For this is not reformulating our self-understanding in new terms (that is the symbolic approach- the symbols being an overlay of what is really there), but actually coming to it for the first time. Until one has attained perfection, one has only imperfect means for attaining perfection. ("For whosoever hath, to him shall be given, and he shall have more abundance: but whosoever hath not, from him shall be taken away even that he hath." Matthew 13:12) This is a thought worth pondering, for it is unlike those we ordinarily encounter. If what you are trying to understand is your self, and it is your self that is trying to understand, you can never achieve your goal, or even make real progress, unaided. This thought should lead us through feelings of helplessness to reverence and gratitude to those powers that generously reward our stumbling efforts with what the efforts in themselves could never attain, but are striving for."

"... For each person, the Sun is the source of personhood, the right to say 'I', rather than being the source of things which he or she possesses as characteristics. It is quite possible for the effect of a person's Sun Sign to escape him or her entirely, so strong is the lack of any felt possibility for things being different. It is well known that people overlook the familiar, and there is nothing more familiar to a person in the whole world than the experience of being in his or her Sun."

"... The flower is a revolution from the leaf, and so is the fruit from the flower, and yet there is no leaping, but gradual metamorphosis. The plant works minute by minute to bring about these things, which are no surprises to it. But one morning- flowers everywhere, where before there were none. In working on one's Venus, one must consider oneself to be the plant which works hard, and knows that it is changing what it already has, bit by bit. In such a way, one may grow flowers in oneself where before there were only thorns, and surprise others by the miraculous revolution one has wrought in oneself."

"... Before entering into a description of members of the Zodiac as they appear in etheric astrology, I would like to indicate the nature of their relation to the Planets, which we have already spent some time with. The Planets are like actors, who create the drama by their speeches and actions, but who are inconceivable without the supporting framework and context of the stage, its lighting, and the background music. An actor could give a speech repeatedly, and the effect on the audience would be different each time if the contextual elements were appropriately varied. A courageous speech could be made foolhardy, a romantic one could be made silly, manipulative, coy, ironic, or deluded. The planets have a set repertoire of speeches; their passage through the Zodiac throws different lights on them, drastically altering the effective quality of what they say."

"... One could easily imagine that the nodes [Lunar Nodes] stand at the endpoints of a continuum, and that one is always at some point in the continuum. In life, however, one always finds oneself to be in situations. In a situation, each pole struggles to take the situation under its care, to turn the situation into a manifestation of that pole. The struggle does not usually take place in a straightforward way. Better than 'struggle', the process can be described in terms of transformation and metamorphosis, in which mutually antagonistic transforming agents are working. Thus, the process is one which can never end. Progress of falling back is measured in terms of the level at which the struggle takes place. If a situation is transformed chiefly according to the north node, it is different, and thus a new situation. As such, it is subject like any other new situation to the transforming efforts of the Moon's nodes. In short, the Moon's nodes are the active poles of a dialectical process which does not contain within itself the possibility of ending."

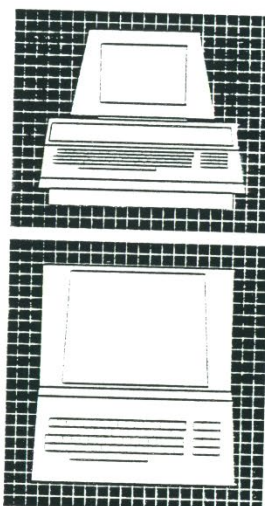
The 'situations' that were referred to should not be thought of as one ordinarily thinks of the weather. i.e. as something fundamentally external, and having nothing in particular to do with the individual. The language reflects the reality in the highly ambiguous phrase 'to find oneself in a situation'. One meaning is the discovery that one is, yet again, caught up in a situation. Another meaning is the discovery that, in a situation, a part of one's own self is to be found. If the self were never a part of the situation, then things would be relatively simple. But of course it is up to the self to change the self, and the state of the situation is an intimate mirror of this process. The situation can only be significantly altered through corresponding self alteration."

This fact should not make one focus all one's efforts on inner change, however. Such a focus would reflect the belief that the objective world is found inside, which is no more or less true than the belief that the objective world is found outside. Knowledge of the illusion of the two worlds, inner and outer, should be used to guide the process of change. One's activity should be in each of the worlds, and should be guided by the mirror that each world finds in the other."

An old terminology for the Moon's nodes can guide us to an intimation of the spiritual reality of the nodes which can be encountered upon our crossing the inner boundary of the spiritual world. The south node was traditionally known as the 'Dragon's tail', and the north node as the 'Dragon's head'. When I first encountered these older terms, I found them offensive. I had associations of long black robes with mystical markings, and of the old sort of mysterious astrologers who would make dire predictions in enigmatic language. I think that my reaction was proper insofar as one should not indulge strange language in order to evoke indefinite feelings of depth and mystery that have no corresponding understanding. However, as soon as clear, fresh understanding and sympathy are brought to the old terms, their murkiness disappears, and they reveal to a certain extent the wisdom in pictorial form of their origin. The wisdom can only be known in its true form by means of actual spiritual-scientific perception, but it is possible to gain an intellectual understanding of it from description.



The dragon represents the person's etheric body. The rest of the chart is the body of the dragon. Wherever the dragon goes, it drags its tail along behind it. The tail is that part of the dragon which is most in the past; most of the dragon has already been where the tail is now. But the only part of the dragon's path which is familiar to every part of the dragon is where the tail is. The tail leaves a trail behind it, since it is a big heavy tail. One of our words for such a tail is 'rut', the figurative meaning of which portrays a part of the meaning of the Dragon's Tail, as in the phrase 'the same old rut'. The tail drags on the ground, slowing down the dragon's progress, and making a very noticeable impression on the material earth. The head, on the other hand, is raised above the earth, and leads the rest of the dragon to where it is not now. Unlike the tail, it is not committed to a path. The tail marks the end of the dragon's past, while the head finds the beginning of the dragon's future. The head is the part that thinks. The tail does not need to think to do its job... Dragons are fearsome beasts. They have often been part of ancient pictures of the nature of the human being. In such pictures, they have both been a part of man, but needed to be conquered in order to win a valuable treasure. That the dragon is in us is pictured in the Tail of the Dragon; the path to the overcoming of the dragon is pictured in the Head of the Dragon. Of course, being the dragon, we can never escape it; we can only change our relation to it."



(Continued from page 1)

There is not space in this issue to go into detail on the M-65. A more detailed article is being published in the the new AFA Research Journal. Details are, of course, available from MATRIX on this system.

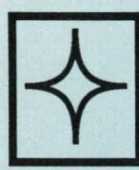
At this point, M-65 exists in identical form on the Commodore, APPLE and Radio Shack machines. In addition, a version is being readied for the new IBM Personal Computer. A CPM version is under consideration but is not yet in the working stages.

Complete line-by-line documentation for M-65 is being made available and the system has been released in un-locked form. In addition, two M-65 user oriented newsletters are available: User Notes and Working Papers. The first newsletter provides inter-communication between M-65 users and MATRIX while the second is oriented towards the astrological/programmer seeking to modify the system.

A statistics package is in the works and a number of outside programmer/astrologers are working on valuable additions to the system. For example, Michael Munkasey is making his Keyword Phrase generator available. More details in a future issue.



MATRIX JOURNAL ISSUE ONE – 1990 SUMMER/FALL



Matrix Journal

Volume One Issue One

1990 Summer/Fall

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Introduction

It has been 13 years since the first *Matrix Magazine* was put together. At that time we felt the need for a forum that could devote itself to radical theory and, of course, computer-related articles. For several years, a small band of us were very active, and the magazine was a meeting place for astrologers with a research and technical orientation. In time, the same group of us began to meet at the ACT (Astrological Conference on Techniques) panel discussions at AFA conventions. After a while that wore itself out, and there has been a hiatus.

There are many fine research astrological magazines and journals in the world now. Why another? As with all new publications, we feel the need for a special kind of journal. This new publication is a response to a small group of us who want more than the astrology-as-usual articles and straight-ahead statistics. Those things are fine, but we happen to love new theories and radical ways of looking at the world of astrology. We also love calculations and methods for solving particular problems. The answer: *Matrix Journal*.

James Neely and I have corresponded for years about publishing a wide range of calculation-related material, sort of doing a more thorough job of presenting the basic calculations of astrology. Some of that will appear in these pages.

And we are getting older. This particular group is in its forties and fifties. There is no time like the present. Our sincere apologies for publishing so much of our own material in this first issue, but it is what we find at hand. You can change all that by joining in with your articles and calculations.

We will be a periodical in the true sense of the word, publishing each issue as articles accumulate, and making it available for purchase. Each reader will be notified when a new issue is ready. Take a look at this issue and get an idea of where we are headed. If this looks good to you, please sign on. Join us. Let's have some fun with a small technical journal devoted to the type of material you see here.

— Michael Erlewine
— Robert Schmidt

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Intensive Magnitude and the Space-Time Continuum

by Robert Schmidt

We shall not here discuss the inexactitude which lurks in the measurement of time, but only consider it approximately the same place, which can only be removed by an abstraction.

Albert Einstein

The purpose of this paper is to present — and entertain — a new understanding of intensive magnitude. Intensive magnitude is a scholastic innovation derived from the characteristic adduced by Aristotle to distinguish qualitative beings (qualia) from quantitative beings (quanta): namely, that qualitative beings are capable of possessing a certain quality to a greater or lesser degree, while the greater and the lesser have to do with magnitude. A body can be more or less red while remaining red; it is just more intensely red. However, a person is either six feet tall or he isn't. In modern times, the concept of intensive magnitude has almost entirely lost its autonomy and authenticity. Exact scientific thought persists in defining it against the horizon of extensive magnitude. It has done this for so long that the scientific concept may have finally lost touch with the phenomena we would naturally think of as "intense" or "intensive."

There is something almost pernicious about this tendency. Just consider one of the most recent instances: Grassmann, one of the founders of the vector calculus, carefully distinguishes intensive magnitude from extensive magnitude,

A new distinction between intensive magnitude and extensive magnitude is proposed, in which the two concepts are equally original and equally accessible to our noetic faculty. An attempt is made to instantiate these concepts in the space-time of our experience with a unitary view of space-time and matter. The new concept of intensive magnitude is explicated in the context of special relativity, using devices drawn from chaos theory. The mind/matter dualism is reinterpreted in terms of the marriage of intensification and extensification.

assigning the former to ordinary algebra⁽¹⁾ and the latter to the combinatorial art is about to introduce. This combinatorial art of extension develops into the vector calculus, which gets generalized into the tensor calculus. Whereupon the distinction between tensors and tensor-densities is invoked — totally within the tensor calculus itself — to give physical significance to the distinction between intensive magnitudes and extensive magnitudes.

For the most part, philosophy has abetted this tendency by effectively ruling out the possibility of such a thing as intensive magnitude. What is knowable about nature must either be an extended magnitude itself or allow of being modeled with extended magnitudes. What cannot be so symbolized belongs to the irrational, material, given element of experience that does not allow of being grasped notionally, or in a mathematically exact way, and thus does not really deserve to be called a magnitude at all.

Fortunately, some awareness of intensive magnitude slumbers on in our common consciousness and our common sense. Over the centuries, a concern for this realm of experience has surfaced at odd times and always left its mark. When we hesitate over the words 'further' and 'farther,' or the phrases 'to a large degree' and 'to a large extent,' we are sensing a distinction between intensive and extensive magnitude. When we are struck with a certain inscrutable subtlety in the curious phrase 'remission of sin,' we are catching an echo of the scholastic debate about whether grace could be more or less, remission being the opposite of intensification. If we ever struggle to understand the special kind of indeterminacy belonging to the letter-signs employed in algebra, it is because mathematicians in the 17th century never fully succeeded in assimilating Viète's algebra of intensive magnitudes to Descartes' algebra of extended magnitudes. And many more traces of intensive magnitude could be adduced in our language and common experience.

It is my hope that the new conceptualization of intensive magnitude presented in this paper, though highly abstract, will accord with this largely subliminal awareness. What is more, I believe that it will give an exact statement to what the New Age has been reaching for with its vague notion of

"holistic," while it is the lack of such a concept that has been at the root of the dissatisfaction that it feels for modern science. I also contend that an authentic conceptualization of intensive magnitude — something that it may never have had in the modern world — may go a long way toward overcoming some of the impasses in modern thought: the unsatisfactory dualism between matter and space-time, and between matter and mind. And curiously enough, it would seem to show the ultimate emptiness of all things. Finally, if I were to align myself in the Western philosophical tradition, I would be tempted to be very bold and say that Being is intensification.

It is not the purpose of this paper to build a theory around this new concept, or even to lay the foundation for one, but merely to entertain it. After presenting the pure mathematical concept of an intensified space in general, we will try to instantiate it in the space and time of our experience to come up with a unitary view of space-time and matter. We will then reconsider Riemann's argument that the metrical properties of space cannot be fully determined a priori and must consequently be due to the presence of matter, trying to show that the problem of the unification of the gravitation field and the electromagnetic field is the same as the problem of a necessary relation between intensification and extension. We will next take the occasion to re-root the concept of intensive magnitude in the philosophical tradition by returning to Kant's analysis of the anticipations of perception. At this point, we will deepen our understanding of intensification by setting up a model with special relativity, using devices drawn from modern chaos theory. The question of temporal intensification will then be broached, and astrology suggested as a means of studying it. All along we will reach until our reaching begins to exceed our grasp, which is perhaps the true way of finding the horizon of a concept.

The Pure Mathematical Concept of Intensive Magnitude — Intensive magnitudes — or rather, intensified spaces in which intensive magnitudes can be distinguished — may be constructed in either of two ways: either 1) by performing a simple operation on a given, multiply extended, continuous manifold, or 2) at the same time as the

multiply extended continuous manifold is itself being constructed, by modifying in a very simple way the well-known procedure for creating a new space as a "product" of two others.

The first way of intensifying a continuous manifold is to run through the given extended manifold with a special act of synthesis that continues each element of the manifold by some other element adjacent to it, or by itself. That is, it is a way of mapping each element onto one of its neighbors and keeping track of all the paths generated in this way.

Imagine a line divided into segments in an arbitrary manner. Ordinary continuity, where the parts are merely butted up against one another, is a special case that results when each segment of the line is continued by itself mapped onto itself. More generally, however, each segment will be continued by one of the segments adjacent to it. Segments continued in this way will overlap, somewhat in the manner of the strands of a rope, intensifying the one-dimensional space. We assume that it is also possible for two different segments to be continued by the same segment, making them "hypercontinuous" at that part.

The reciprocal operation takes contiguous parts and separates them from one another, making them subcontinuous, or takes the first-order hypercontinuous line and reduces it to ordinary continuity.

This first mapping may be followed by a second which perhaps iterates the same map, perhaps continues the segments yet further according to a new map, perhaps even reverses the first map and returns each segment to its origin. And so forth.

The same line of reasoning can be elaborated to explain the intensification of multiply extended continuous manifolds.

We can accomplish the same thing in the course of constructing the multiply extended continuous manifold itself. In the usual way of constructing a triply extended manifold from two doubly extended manifolds, for example, every point on one of the doubly extended manifolds is conceived to pass over into one of the points of the other manifold in a fully determinate manner. That means that to every point on the one manifold there corresponds a definite point on the

other, and vice versa, and also that the lines joining the points of each manifold fill the intervening space without gaps and without crossing one another. Every point on the one manifold is thus a proper function of a point on the other.

We can construct multiply intensified continua at the same time, merely by relaxing this determinacy condition to allow improper or multivalued mapping functions. For now, we will restrict this mapping function to the class of those functions that map a part onto a part of the same scale. Then, for example, two points may map onto the same point (intensification) or the same point may map onto two different points (remission), making the above lines cross or leave gaps. Continua resulting from proper mapping functions may then be understood as continua with minimal or perhaps zero intensification.

If we wanted to, we could probably turn the improper functions into proper ones by means of the Riemann surfaces, but this would be to treat the intensified spaces as extensive magnitudes, wherein the parts remain forever exterior to one another, however they are stretched or involutioned. Such a procedure would defeat the whole spirit of our enterprise.

In both our constructions, intensification is a kind of coalescence, remission a principle of making discrete, or discretion. These notions seem to be intuitively consistent with the notion of increasing or decreasing intensive magnitude.

In an elastic extended manifold, intensification would result in overlaps or "seams," remission in "tears." Either would necessarily cause a buckling or change of curvature of the manifold. The curvature of a manifold is related to its metric. This suggests that in manifolds that have some principle of cohesion like elasticity, there may be a necessary and intelligible connection between intensification and the metric of extension.

The notion of coalescence and its opposite, discretion, suggest a "filling" or "emptying" of the space in question — not with something extraneous to the manifold, however, but merely with "more" of the manifold itself. This in turn calls to mind the concept of fractal dimension from fractal geometry, inasmuch as a self-similar jagged line may be thought to partially

fill a surface, resulting in a fractal dimension between one and two. It is true that the present concept of fractal dimension has been elaborated in the context of figures and shape (that is, extensive thinking), but there seems to be no reason why it cannot be disengaged from that context and employed in the intensive realm.

For example, we could take one of the Koch constructions and collapse its various segments onto the baseline, causing them to overlap, and then view them as coalesced.

We could also reconceptualize the Cantor set within the sphere of intensive thinking. Instead of removing the middle portion of a segment, for example, and continuing to remove the middle portion of the successively smaller segments that remain, until we produce a kind of dust, we could take contiguous segments and remove them to a distance from one another.

This gives us a kind of natural measure of intensification. Accordingly, we provisionally make use of similarity dimension and measure intensification with the expression $\log N / \log(1/r)$, where N is the number of parts and r is the ratio of part to whole.

It should be apparent that we do not have to iterate the reconstructions to infinity in order to give meaning to the coalescence or discretion of a space, as we must for their extensive counterparts. However, higher iterations do give a kind of depth to the coalescence and should also be a component in our measure of intensification. Whether the intensification is directly proportional to both the dimension number and the number of iterations making up the depth is a matter that we will consider shortly.

Physical Space and Time of our Experience — What would it mean for the space and time of our experience to be intensified?

We maintain that space is a three-dimensional manifold intensified by energy. The parts of space do not simply endure in time in some pre-given state of contiguity. They too must be continually remapped back onto themselves or each other as continuations. And in order for a region or "extant" of space to have any coherence, they must be remapped together, or at once. This is the function of energy. We cannot take it for granted that

ordinary continuity prevails in the spatial continuum any more than we can take it for granted that a Euclidean metric obtains in a certain region of space. We do not even have any a priori reason for thinking that the intensification of space is homogeneous. In fact (as we will argue), tangible matter is itself the result of a special local intensification of space.

We further maintain that the successive spatial mappings that make up the time of our experience form a manifold that is also intensified by energy. In order for a "stretch" of time to have any coherence, the successive remappings must be recursively related by the same function. In order for there to be any duration in the space of our experience, as well as succession, this recursive function must help bring about a repetition of the same spatial intensification state. But we have no reason for assuming a priori that this repetition is direct; it may be the outcome of a multiply periodic repetition cycle, what we call temporal intensification, since it is the superposition of two or more cycles at the same time. Again, this entire cycle may be a stretch of nonhomogeneity in a higher order repetition cycle, in which case we might call it a temporal "body."

Energy is intensification, and it is its nature to intensify a region of space to infinity, to make more and more parts of the space coalesce at finer and finer scales. But other regions of space have their respective principles of intensification too, and the same region may be participating in many different intensification schemes, each wanting to go its own way and tending to curb the intensification scheme the local energy would follow. So there is a self-renewing internal principle of intensification and a countervailing nonlinear restraining principle. Modern nonlinear dynamics has taught us to model such a scenario with a one-dimensional recursive map. Then, various possibilities arise depending on the balance of these principles. Sometimes the local energy will be overwhelmed and the intensification will necessarily assume its lowest possible state; usually it will produce a cyclical succession of intensification states.

But the situation is not quite so simple. The emerging succession of intensification states also constitutes a manifold. Energy works no less to

intensify this manifold to infinity as well. To intensify temporal moments is to turn a simple cycle into a multiply periodic one. But just as each region of space may have to participate in, and conform to, several different spatial intensification schemes at different scales, so each emerging intensification state may have to belong to several different schemes of temporal intensification, several different cycles, corresponding to the larger picture that the given region is part of. Thus energy's tendency to multiply the articulations of temporal intensification to infinity is counteracted by the competing claims of other schemes to make them intensify according to some other scheme. In a manner analogous to the above, the result is a certain limited, multiply periodic scheme of successive intensification states.

Thus, spatial intensification and temporal intensification reciprocally influence one another. We might call this cyclical succession of states a clock. A useful technical definition of a clock was given by Weyl: "If an absolutely isolated physical system (i.e., one not subject to external influences) reverts once again to exactly the same state as that in which it was at some earlier instant, then the same succession of states will be repeated in time and the whole series of events will constitute a cycle. In general such a system is called a clock. Each period of the cycle lasts equally long."

Weyl adduced this as an objective criterion for equal lengths of time. It is a truism that without change there would be no time. But what we are looking at in our intensification scenario is the most basic and fundamental energy process there is in a certain region of space. No change takes place between successive intensification states. There is no time flowing on continuously in which the intensification happens. Instead, it is the recursive repetition itself that generates time. Furthermore, when we have a recursively periodic cycle of intensification states, these must all be thought of as coalesced into a single moment. We must remember that we are not dealing with extensive repetition in which each new stage is exterior and distinct from its predecessor. Instead, we are proposing an intensive repetition in which each "successive" step encloses and carries along the former steps, at least until the first intensification state in the

cycle, the one most deeply enclosed, begins to relax, as it must do as long as the temporal intensification component of the local energy is curbed in its attempt to intensify to infinity, which would be tantamount to rendering all the intensification states simultaneous with one another, in which case there would be only an endless moment.

Thus the succession of intensification states does make up a clock, but it is a clock that makes time instead of merely telling it.

It might be objected that at some smaller scale in this region there might be different cyclical processes taking place, shorter ones that could measure the longer ones in question. But we have already made the assumption that the internal energy has intensified to the greatest depth possible. The only way to create a faster clock would be to introduce more energy.

We could have dealt with spatial and temporal intensification together in one argument if we had considered intensification in a four-dimensional space-time continuum, but that might have obscured the different roles of spatial and temporal intensification. There would be no coherence to space at all if there were no time, and there would be no time if no space, because there could be no recursion of intensification states, no succession and duration together, no simultaneity or moment. Thus time is not just another coordinate in a four-dimensional system.

Instead of trying to construct a limited intensification out of a dynamical balance between self-excitation and damping, as we did above, we might have tried to describe it in terms of a Poincaré recurrence, although it would have to be an elaborated version of one to allow for the improper functions that are used in the mapping. However, the idea behind a Poincaré recurrence seems more in keeping with extensive thinking, remapping all the points in a manifold. The dynamical procedure that we did use also has the advantage that it gives a meaning to the "elasticity" or coherence of the continuum, which will be important when we discuss the influence of intensification on the space-time metric.

To recapitulate: We have tried to point the way to a unitary view of matter and the space-time continuum. In a sense, we have constructed matter out of nothing, as a special intensification of the

space-time continuum. This is in keeping with the vision of field theorists like Einstein, whose goal has been to understand matter as a kind of "knot-tiness" in the space-time continuum. However, their approach seems to be totally dictated by extensive thinking, which makes it hard for them to understand why the "knot" held together in the first place. This difficulty is solved as a matter of course in the approach outlined here.

The a priori Determination of the Metrical Properties of Space — Riemann seems to have been the first to really worry about the metageometrical problem of constructing multiply extended manifolds instead of merely taking geometrical spaces as given. In this way he discovered that the metrical properties of a three-dimensional manifold were not fully determined by general concepts of quantity. From this, he concluded that the metrical properties of the space of our experience would have to be due to the empirical content of that experience, that is, its material content rather than its formal characteristics. So matter would have to provide the binding forces to hold the parts of space together. Different densities of matter locally would result in some parts of space being bound together more "tightly" than others, thus producing different spatial metrics, different curvatures, and thus different geometries.

Brilliant and revolutionary as this argument is, there is one major unexamined assumption behind it, deriving from its overall Kantian orientation. Even though Kant calls quality as well as quantity a mathematical category (as opposed to the dynamical categories relation and modality), Riemann takes it for granted that quantity is the only category that could be an a priori determinative of the geometry of space, the only category that would have any bearing on whether space was Euclidean or not, so that if some geometrical characteristic is not due to the formative influence of quantity, it must be assigned to the empirical realm.

However, if matter/energy is the intensification of space-time in the manner outlined above, so that space can still be understood as an "elastic" continuum, then the intensification of space-time is a seam, which necessarily causes a buckling or curvature of the space, thus affecting its geomet-

rical characteristics. In other words, the intensification of space-time is necessarily connected to its intensification. Thus we can already see, in an intuitive way, a path leading towards the unification of the electromagnetic field (intensification) and the gravitational field (intensification). The question is, to what extent are the intensification properties and the metrical properties of this unified field deducible from purely formal characteristics of their mathematical description, and what is left over to be given in experience?

It seems that we have to deepen Riemann's investigation. We must first see whether the intensification characteristics of our space — the general nature of the mapping — are fully determined by general concepts of quality. This argument is parallel to Riemann's. Then we must see whether the conditions due to quality, taken together with those due to quantity, more fully narrow the possibilities for our three-dimensional space than the conditions due to quantity alone.

One feature of our approach deserves to be singled out for special comment. Riemann quite properly thinks of the parts of the manifold as preceding the whole and needing to be bound together, since he is thinking in terms of extension. But in the case of intensive magnitude, the parts of the continuum do not precede the whole in experience. It is true that we have allowed them to do so in our construction of an intensified space, but even there we stipulated that these parts were participants in larger intensification schemes; they were not understood to enclose smaller ones. Intensive magnitude is a truly "holistic" concept.

Replanting Intensive Magnitude in the Philosophical Tradition — The question is whether the above construction of intensive magnitude is more than just an image in terms of extensive magnitudes (that is, merely a model), but instead represents its authentic character ontologically speaking. We can use a straight line to represent not only a length but also a number; if we divide the line into equal parts, it is a multitude of equal parts and looks like a multitude of parts. But if we use a line to stand for one of the general numbers of algebra, and justify this use by saying that the number of parts of the line is indeterminate until

a measure is assigned, then the line is a mere symbol of a general number; it represents it by the convention we have introduced but it does not look like a general number. How does the construction of intensive magnitude represent it? Is intensive magnitude as here presented something that can be seen for what it is notionally? That is, can we stand back and look at it in the mind's eye, or can we only receive it as a given, inseparable from perception itself?

The procedure of representing intensive magnitudes with straight lines goes at least back to the 1400s, if not further. These lines could even be mixed with lines representing extensive magnitudes in the same figure. They represented intensive magnitudes no differently than the other lines represented extensive magnitudes. The intensive magnitude was understood to be just as directly inalienable and seen in the mind's eye as the extensive magnitude. And at that time there was still a tacit understanding that intensive magnitudes were just as "real" as extended magnitudes, and totally distinct from them.

But after Descartes identified the real of nature with extension, and others such as Galileo distinguished secondary qualities from primary ones (understanding qualities to be due to the modification of our sense organs — themselves material and extended — and their intensities the degree to which they were modified), intensive magnitudes lost their place. This is when the representation of the late Renaissance began to turn into the modeling of modern times. In so far as the formless element of our experience could be understood, it could only be understood symbolically. As a result, we now understand the intensity of light, for example, as the amplitude or vertical displacement of a certain wave.

Unlike his immediate predecessors, Kant did try to retain a formal synthetic principle of quality, and did make this principle responsible for intensive magnitude. Nevertheless it has seemed to some that it was Kant's own characterization of intensive magnitude that led to its extinction as a directly intuitable mathematical concept not requiring the mediation of extensive magnitude, in that he made it an anticipation of perception and not of intuition, a principle of the immediately given in general rather than of the synthesis of the

immediately given. You could not do mathematics with it because you could not get away from the merely empirical, except with a general concept that can not be constructed in manifold ways in the intuition in the same way that a straight line can be drawn in different sizes.

It is not entirely clear that this is Kant's own view. In any case, here we will try to interpret him in the opposite way, primarily because of the remarkable example of Vîète, who sought to create an algebra of intensive magnitude in the late 1500s.

To be brief, Vîète thought that the Greek mathematicians had had an algebra of intensive magnitudes. He called the objects of this algebra "species," which is the Latin term for the subject in which qualities inhere. These species were "functions" of the things being sought in a problem, which were the greater and the lesser. A typical "function" might be the sum of the greater and the lesser; however, Vîète understood this sum to result in the greater and lesser together, coalesced into a unity. (It is pertinent to remark that Vîète seems to have considered his species to be a restoration of Plato's eidetic "numbers," which are constructed by the operation of the One on the Indeterminate Dyad — the greater and the lesser, at the same time.) These were not numbers, but qualitative analogues to numbers, and Vîète constructed a logistic, that is, a calculus of the rules of calculation for these curious objects, which he represented by letters.

If we were to return to a Kantian context, then we might say that Vîète's concept of species is the true schema of quality with respect to time, just as number is the schema of quantity with respect to time. The concept of species is time content or the filling of time.

Much could be said about the effect of these ideas on the deep structure of algebra, but what matters to us here is whether there is a true spatial counterpart for the logistical concept. Is there an object in spatial intuition that properly corresponds to Vîète's species in the same way that length corresponds to number? Presumably, it would have to be something that reflected the property of coalescence.

So the question becomes, can we look at the two lines in an original way and see them coalesce

into one instead of remaining an aggregate? This is analogous to seeing a line as a number. According to Kant, the only a priori quality that all magnitudes have is their continuity. Then, can we see the quality of the magnitude in general, namely its continuity, increase or decrease in a direct and nonsymbolic way? Above, we have tried to show how this is possible with the new concepts "hypercontinuity" and "subcontinuity."

Therefore, Kant should not be understood as showing the impossibility of intensive magnitude as a viable mathematical concept. Instead, it is in his work that the concept can be picked up again in an authentic way and replanted in the tradition.

Intensive Magnitude and Relativity — As we have explained above, the rest energy of a body may be understood as spatial intensification. In a preliminary and informal way, we resolved this intensification into two elements: the dimension number and the number of intensification states contained in the moment. In order to begin to see whether this distinction has any physical significance and consistency within the context of present day physics, we will try to interpret the relativistic effects of uniform motion in terms of intensification.

Above, we also made the assumption that it is the nature of energy to intensify its space recursively to infinity if left to its own devices, although this tendency is continually counteracted by the differing degrees of intensification in the neighboring regions of space and the resistance they provide. The result is a limited amount of intensification taking place through a multiply periodic recursion of intensification states. The intensification is thought to generate time. We came to this result by employing a one-dimensional, nonlinear recursive map. We used a one-dimensional map because it seemed that repetition has only a single directed sense. Furthermore, we argued that one complete cycle of the recursion takes place within a single moment, and in fact defines the moment. At this point, it would be helpful to consider the well-known bifurcation properties of such a map.

Consider the logistics map $x_{n+1} = v(1-x_n)$. We know that its bifurcation properties are universal for maps that generate point sets that lie on curves having a quadratic maximum, so that we can use

it as a model. Let I_n be the initial intensification state as measured by the dimension number, and I_{n+1} the subsequent state. (We do not want to use t standing for time as a subscript, because the different values of n correspond to different states within a moment, at least as viewed from a system at rest relative to the moving body.) Let v be the parameter controlling the steepness of the parabolic hump.

From the study of this map it is known that for v less than 1, successive iterations of the map go to zero; greater than 4, it goes to negative infinity. As the parameter increases within this range, the map goes through a variety of behaviors: first, stable points with increasing value until just under 3, whereupon the last such point bifurcates and there are two stable points for a while, which both grow as the parameter increases; then the two become four, and so forth, with successive bifurcations until a value is reached where the number of points has become infinite.

Now, remember that the intensification state and the number of repetitions in the recursion are due to the energy that makes the body in the first place. The energy of the body may be increased kinetically by setting it in motion or directly by absorption. The two specifically relativistic effects in these cases are an increase in momentum in the first case, and an analogous increase in mass or inertia in the second.

We will try to see if these increases are related to a change in intensification reflected in the recursive map above, by assuming that the controllable parameter is equal to the uniform velocity in the first case and the absorbed energy in the second case.

First let v equal the uniform velocity of a body relative to us. Clearly we must understand its motion to be a kind of energy "flux" in which at least some of the parts are being repeated or continued within each moment by different parts than they would be if the body were at rest. When v is less than the minimum value, then successive iterations of I_n will go to zero. We read this to mean that there will be no relativistic addition to the energy below this value, and no change in the intensification state or recursion scheme.

When v exceeds that minimum value, then there would be an increase in the intensification

state that would add to the traditional nonrelativistic value of the kinetic energy. Furthermore, since the intensification is equal to $\log(v/\log(1/r))$, and it does not seem reasonable that the number of parts is increasing by the change in intensification, we can assume that $\log(r)$ is decreasing, and consequently that the ratio r of part to whole is increasing. This could be interpreted to mean that the overlapping is becoming greater and the overall length of the body is contracting.

When v reaches the next critical value, the intensification state bifurcates and assumes two values, which would indicate an oscillation between two intensification states within the moment itself. Since these two values are still within the same moment to the observer at rest with the moving system, it must appear to us that his time interval has dilated in some way. Meanwhile, the length of the body continues to contract. And as v continues to approach the third critical value, the body contracts even more, although the dilation of the time interval remains the same.

This line of reasoning can be continued until v approaches the speed of light, at which time the ratio of part to whole must approach unity, and consequently, the overall length must shrink to zero, although the number of iterations within the moment must grow to infinity, and thus the moment must appear to us to dilate to infinity.

It would be fairly easy to calculate the rate at which bifurcations would have to occur in order to be in rough accord with special relativity, using the law by which time dilates as a function of v as a consequence of the Lorentz transformation on the one hand, and the fact that the values of v corresponding to a bifurcation have to converge to the speed of light. This ratio could then be used to help discover the recursive rule itself, since the rate of convergence is now known to be universal for large classes of function.

For example, we could quickly rule out the simplest quadratic map, $I_{n+1} = v(1-I_n)$, because at speeds less than $1/3.57$ of the speed of light there would be no permanent relativistic effect in terms of shortening, and between $1/3.57$ and $3/3.57$ there would be contraction but no dilation. Between $3/3.57$ and $3.36/3.57$ there would be time dilation as well. These changes do not accord with the manner in which time dilates;

namely, by an amount roughly equal to v^2/c^2 . But more importantly, the convergence rate here is the Feigenbaum constant, which cannot agree with the ratio of the calculated time dilations. And by ruling out this map, we also rule out any map having a quadratic maximum. But there are other convergence constants calculated for maps having other types of maximums.

One strange result of this model is the discontinuous nature of the time dilation. However, we must remember that beyond a certain point the bifurcations start occurring so quickly that the result would be a nearly continuous growth in the time dilation.

The other very strange result is the lack of any relativistic effect beneath a certain velocity, but this could very well be compatible with experience, since the relativistic effect is hardly detectable until the velocity becomes considerable. We might also speculate that the variable luminosity of certain stars may be related to an oscillation between two different intensification states caused by a considerable velocity of recession from us.

Next, let the parameter v be the absorbed energy. Presumably, when the body absorbs more energy of a certain kind from the outside, its intensification of the space increases and the rest mass of the body increases. It seems natural to ask anew Einstein's original question of how the inertia of the body depends on its energy content.

Here it is very tempting to consider the upper limit of the parameter to be the amount of energy the body could absorb before its ratio of mass to radius turned it into a "black hole." Since time also stops at this point, we might suppose that the recursion had assumed an infinite number of stages again, as it did for motion at the speed of light.

At the other end of the scale, there would seem to be a least amount of energy that the body could absorb that would actually account for an increase in intensification. It is all too tempting to try to relate this to Planck's quantum of action for that kind of energy.

In between, there are the successive bifurcation points that result in newly constituted moments involving more and more recursively

related intensification states coalesced together. It could be apparent that we would try to invoke quantum theory to fix the parameters in this model, but this is much too complex to go into at this point in our speculations.

Einstein's "kinematical" derivation of the Lorentz contraction was a vast improvement over previous dynamical derivations that made ad hoc assumptions about forces, although it did not rule out the possibility of such forces. But even though it was logically impeccable, it left some dissatisfaction as to whether there was a special cause involved.

Furthermore, Einstein's derivation is not totally kinematical. The principle of relativity is kinematical, but the principle of the constancy of the speed of light involves very subtle assumptions. Here we only point out that light is an event in the electromagnetic field, and we have tried to constitute this field from a principle of intensification. Again, it is interesting to note that the intensity of light was the example of intensive magnitude par excellence throughout its history.

Nevertheless, the argument we have just presented does not yet try to find a deeper ground for the facts established by relativity in the concept of intensive magnitude. On the contrary, it attempts to gain a deeper insight into intensification by assuming these facts (and perhaps the facts of quantum theory as well).

However, there were two unexpected consequences of the argument, which, if they could be experimentally confirmed, would point to an insufficiency in the two principles of relativity as they presently stand. These were the inference that there was a minimum velocity at which relativistic effects began, and the inference that time dilation changed discontinuously. Of course, it is also possible that intensification requires a recursive map of more than one dimension to be correctly modeled, that we have incorrectly resolved the total intensification into components, etc. None of these would invalidate our basic approach, however.

We wish to acknowledge in passing that Kant in his youth produced a very curious, speculative argument claiming that there was a minimum and maximum velocity wherein a body could main-

tain its vis viva. Similarly, there was a minimum and maximum mass between which the vis viva was proportional to the mass.

Intensive Magnitude and the Mind/Matter Dualism — At this point, I would like to reach directly for the horizon — making no pretense of systematic reasoning, but arguing directly by analogy with the physical ideas of intensification and extensification presented so far — and speak about mind.

Just as tangible matter consists of a special local intensification of space resulting in a non-homogeneity of the spatial continuum, so mind consists of a special local temporal intensification which is tantamount to a nonhomogeneity in the moment, a temporal "body," a self. Extensive spatial singularity results from intensive spatial nonuniformity, *existence* from *introversio*. Extensive temporal singularity results from intensive temporal nonuniformity, *intentionality* from recursion. This self is more and no less real than material body.

Being ultimately a temporal intensification of spatial intensification states, mind is localized around its matter although not necessarily exactly coincident with its boundaries. The boundaries of the material body are actually the "intersection" of the spatial coalescence that would be due to the temporal intensification scheme alone and the coalescence that would be due to the spatial intensification scheme alone. Since a change in temporal intensification necessarily results in a change in the spatial intensification, and vice versa, we see that mind and matter interact and are simply different manifestations of the intensification principle of energy.

A nonhomogeneous temporal intensification represents a higher order recursion of spatial intensification states. Recursion is a kind of feedback loop. Here we identify recursion with self-consciousness. The lowest level recursion defines the moment and thus is not self-consciousness even though there is feedback. This is the kind of consciousness possessed by inanimate matter. Higher level recursions are ways of intensifying the manifold of moments and thus may be understood as ways of structuring the time of an inner awareness. This is the deeper meaning of

Kant's synthetic unity of apperception. It is clear that there are many higher degrees of consciousness and self-awareness, depending on the nature of the higher order recursion.

Outside of the nonuniform local intensifications of the temporal moment that we call self-consciousness, there is no thought in the sense of self-awareness, although there is mind in the larger sense, since there is temporal intensification of the single moment, even in the regions of space outside of material body.

Just as the intensification of space-time that we call matter produces a curvature of that space, so the local intensification that produces the self produces a "buckle" in its own "extended" temporal field of a synthetic unity of concepts. This "buckling," and the awareness of self that we have through its means, is a mood, a state of mind. So just as every electromagnetic field is accompanied by a gravitational one, and vice versa, so every thought is accompanied by a mood, and vice versa.

The buckling caused by the local temporal intensification, or consciousness, is communicated to the temporal intensification taking place in the regions surrounding this consciousness, causing a buckling there as well. Thus the surrounding space can bear the impress of a mood and carry it, although the surrounding space cannot have the mood in the same way as a self-consciousness. Reciprocally, this buckling can affect the buckling of other local self-conscious intensifications, causing them to experience the mood in their own way.

Thus, as a large body like the planet Mars intensifies its space in its own characteristic way, it reaches out to touch us with a gravitational field. But as it intensifies its temporal moments in its own characteristic way, thinking its angry thoughts and becoming what it is, it also reaches out to touch us with its temporal field, its mood. And we have no choice but to feel what it feels in our own characteristic way.

In order to study this effect, we have no choice but to become astrologers.

Note: The ideas presented in this paper were sharpened considerably in numerous conversations with John Townley and Ellen Black. At the first Matrix Neo-Astrology Conference, I learned that Michael Efron had been pursuing analogous inquiries, though with a more psychological orientation, and contact with him has helped me embed these ideas in a larger context.

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Toward a Physical Basis for Astrology

by John Townley

An exposition of Paul Kammerer's ideas of "persistence causality" (in his Law of Seriality) as a complement to modern chaos theory, showing that this supplementary causal concept may furnish a basis for the natal horoscope and the mode-locking of mundane cycles to planetary ones.

There is a tremendous love-hate relationship between astrologers and the scientific community, at least seen from the astrologers' point of view. Astrologers go out of their way to appear "scientific" and often go to such extremes in seeking recognition by the scientific establishment as to leave behind much of the substance of their art. Then, when finally rejected by the scientists (as is usually the case), the response is that this is something that is somehow beyond the abilities of science to grasp — scientists read this as "fantasy world." (One astrologer at the first Matrix Neo-Astrology Conference, when approached with the possibility of making formal links between theoretical science and theoretical astrology, even dismissed the whole possibility, saying he'd "rather stick with something more concrete, like the collective unconscious." Fantasy, indeed...)

The problem with linking astrology and modern science has been their mutually incompatible paradigms, or world-views. Science has not admitted to a structure of physical reality that would allow distant planets to have any appreciable effect upon life on earth, while

astrology has assumed a reality in which much of the principal structure of earthly behavior is linked to the planets in a manner unknown but demonstrable in its visible effects. When challenged to be more specific about this unknown link, astrologers most often retreat into vague concepts like a proposed "collective unconscious" or "acausal synchronicity," both concepts attributed to Jung, who tried to walk the fence between science and spirituality with only limited success.

Hard science, of course, rejects this outright — it insists on having a formal theory that can be demonstrably described and tested in physical reality. That is the way the modern scientific method operates (more or less). Furthermore, it rejects any astrological "results," statistical or otherwise, without this series of theory-to-reality deductions. Astrology, intuitively knowing itself to be onto something and getting surprisingly good results, rejects science for being too stuffy about the whole thing and playing too limited a game. Two hostile paradigms of reality, but both existing and functioning rather well in the actual world (real reality, one might call it).

These mutual criticisms can be quite valid, however, if there is a larger picture that includes both points of view — a larger inclusive paradigm that allows both approaches to work, without invalidating either. This expansive trend has persevered throughout the history of thought, and another inclusive paradigm leap seems to be in the making.

Where will it come from? In this paper, we will be searching for the pivotal concepts in two places: First, in the visionary work *Das Gesetz der Serie* (*The Law of Seriality*) published in 1919 by biologist Paul Kammerer, which has remained virtually unstudied; second, in the burgeoning field of fractal geometry and chaos theory. These two approaches would seem to complement one another. That is, Kammerer searches for a true order of causality behind regularities apparently due to random causes, while chaos/fractal theory seeks to give apparently irregular phenomena a deterministic causal basis. Kammerer's work is conceptually consistent at the deepest level while remaining completely unmathematical; chaos theory em-

plays an elaborate descriptive mathematics, although its conceptual foundations often seem incoherent.

Both have profound implications when applied to astrology and modern science and may indeed, if they can be successfully brought together, unite these two studies under the umbrella of a much larger unified theory which will, as far as we are capable of conceiving at this point in history and temporal reality, literally explain everything. Here, in a nutshell, are the pertinent concepts as they bear on astrology.

Since modern theoretical astrology, such as it has been, so often leans quite heavily on Jungian concepts in general and "acausal synchronicity" in particular, we thought to trace this latter concept to its originator, Paul Kammerer. Jung credits Kammerer with this concept and understands him to be proposing a new principle of nature, co-existent with causality and finality, which would explain the apparently random groupings of similar events that we call coincidences, such as runs of luck or the concurrence of planetary patterns and human behavior. In actuality, Kammerer clearly and repeatedly stresses that he is proposing no "acausal" principle. His intention is rather to uncover a hitherto unsuspected side to the workings of causality itself and, by this means, to extend the range of accepted natural law.

When one event follows another event and resembles it without any commonly acting cause, traditional causality teaches us to attribute their individual *occurrence* to special causes in each case, their *concurrence* to chance. Kammerer's beautiful and simple idea is that often we should instead be looking to the persistence of an antecedent state, the tendency of any given system (a "complex of bodies acted upon by a constellation of forces," as he puts it) to persevere in the "state and direction in which it was occurring" when the forces ceased to act upon it, as long as other forces do not intervene in the meantime.

This is plainly an extension of the classical law of inertia to a larger scale of nature. We might call it the mesoscale because it is between the microscale of isolated individual bodies and their constituent particles, and the macroscale of planetary bodies in nearly complete isolation from one another. At the mesoscale, bodies are in physical

contact with one another either directly or through a medium, but they may be characterized as "loose" and more free to move about. It is also the scale at which we human beings are participants instead of mere observers looking in from the outside. Although Kammerer is a little vague as to what "state" and "direction" could mean at this level, he clearly means them to be more than just metaphors for accepted physical concepts, as they are when we talk of a "state of affairs" or "events being set in motion" or "maintaining a status quo." Perhaps they could never be as well defined as the corresponding physical concepts themselves. But just as we now understand temperature, viscosity, etc., as "coarse-grained" concepts for the motions and properties of molecules, so there must be appropriate coarse-grained concepts that would tie together the motions and properties of individual bodies at the level of the body complex to which they belong.

Of course, since we are speaking of an entirely different scale of phenomena than that for which the original inertia law was conceived, we have no a priori reason for thinking that a properly scaled law would take exactly the same form. We need only think of the inertia law at the level of the isolated body as the limiting case for the inertia law pertaining to a body complex. Kammerer makes the hypothesis that the persistence of a body complex need not be uniform and rectilinear as it is for an isolated body; on the contrary, the antecedent state would usually be persisting in a nonlinear manner. It would fade in and out in intensity, like a fluctuating temperature, usually not even periodically, part of the time being beneath the threshold of our consciousness. Then, when it resurfaced to comprise an event similar to the first one, its identical reappearance would only seem to be due to new and unrelated causes, would only *appear* to be a coincidence.

Such a repetition is tantamount to a Poincaré recurrence, which can happen when all the points in a set are mapped onto other points of the set in accordance with certain rules that Poincaré discovered. If we focus our attention on some group of points in the set that happens to form a pattern, and then iterate the mapping many times, the pattern will first vanish all together. After more iterations, it will partially reappear, and eventu-

ally it will reappear in perfect form. Of course, at the microscale where the molecules appear to be moving nearly randomly, the possibility of such a recurrence is almost nil. But there is no a priori reason to rule it out at the mesoscale, and Kammerer has heuristic reasons for advocating it. [Astrologers N.B.: Anyone who uses the harmonic chart variation developed by mathematician/astrologer J. S. Williams called an "arc transform" chart is using this very kind of thinking, probably without realizing it.]

But what happens when the system under question encounters resistance, either internally or in the form of external intervention? The persistence law of body complexes abstracted from such a possibility. To cope with it, Kammerer also attempts to generalize Einstein's conclusion that the inertia of a body depends on its energy content. Energy absorbed by a body will tend to keep that body in its state of motion all the more steadfastly. Similarly (so Kammerer argues), the energy communicated to the body complex by the constellation of forces will add to the natural persistence of the body complex.

Kammerer calls this the persistence capacity of forces, because it is as if the force constellation continued to act on the body complex internally even after it had broken off. But instead of bringing about a further change in the state of the body complex, it now works to maintain the state the body complex was in when it ceased to act externally. In this way it may try to overcome any tendency of the initial state to dissipate. Kammerer does acknowledge that there is a principle of dissipation at the mesoscale too, but it is not a randomizing principle as friction is at the microscale. Instead, it is a tendency for the initial state to embed itself as a similar element in larger and larger repetition schemes of higher order and degree. Nevertheless the initial state would eventually get lost without Kammerer's principle of the persistence capacity of force constellations to counteract the "dissipation."

This persistence of force constellations also gives the persistence of the body complex a certain robustness in the face of comparatively small transitory shocks, a certain restorative capacity. Here again, we may often misconstrue certain repetitions of events as coincidences due

to independent causes, whereas they were really just natural returns to an original state due to the internal robustness of the system.

The continual overcoming of dissipation in the mesoscale by the persistence capacity of force constellations, resulting in a return to an earlier state, has a nearly perfect counterpart in the general nonlinear dynamical model studied by modern chaos theory. A certain dynamical system suffers energy loss due to internal dissipation (for example); it has a compensating input of energy from some such source as external heating. Depending on the values of these two parameters, the system can exhibit various stable behaviors. For example, we might keep taking the temperature at some point in the system, and this temperature might sometimes be constant, sometimes periodic, sometimes multiply periodic, and sometimes nonperiodic in a way that at first seems merely erratic but upon closer examination is highly structured (Kammerer would no doubt call it serial).

Furthermore, if this nonlinear system suffers a transitory shock of some kind, it will be attracted back to the trajectory it was on prior to the shock. Thus it, too, possesses a kind of robustness.

The dynamics of the mesoscale and the dynamics of the microscale are thus analogous. But they are also complementary because of the differing standpoints we have as observers. In the dynamics of the mesoscale, we are inside the system observing the individual elements and trying to extrapolate the behavior of the whole system. In the dynamics of the microscale, we stand outside the system and try to infer its microbehavior from its global behavior.

Kammerer also envisioned an analogous extension of the law of action and reaction — which he thinks of as a law of "imitation" — to the level of the body complex. Any two proximate single bodies tend to become increasingly like one another, or imitate one another, through an equalization of the various energies they possess; they tend to become equally hot, for instance. But at the level of the body and force complex, this law applies even more broadly. For example, in so far as shape has to do with the agglomeration of parts, it is meaningful to speak of an energy of form and the tendency of two body complexes to become

increasingly similar to one another in their form. Furthermore, it has long been known that two oscillating systems will often tend to interact and imitate one another in their periodic or "serial" character, growing closer together in their temporal organization over time, with the less regularly periodic tending to assimilate to the more strongly periodic. This latter is just the phenomenon called *mode-locking* or *phase-locking*. This was noted as early as the 17th century by the Dutch thinker Christian Huygens when he found that a collection of pendulum clocks in a room, if left alone for a time, always ends up in perfect lock-step, no matter how out-of-sync they were to begin with. This same phenomenon is found in an orbiting body whose period of revolution is a small multiple of its period of rotation (the moon always presents the same face to the earth), and in the behavior of various waves (quartz crystals and radio waves), certain ocean and tidal wave configurations, and even coordinated firefly flashing. Though a variety of transfer mechanisms may be invoked in each specific instance (sound waves through the wall for the clocks, gravitational tidal pressure for the moons) the principle seems to hold — stronger more regularly periodic systems tend to entrain the smaller less regular ones and bring them into line.

But Kammerer goes one step further and speculates that, at the level of the body and force complex, the periodicity that the lesser system takes on from its surroundings may eventually be held fast; it may retain its new periodic character as something endemic or indwelling, even if its link with the larger system is broken, something that is manifestly not true of the examples of simple systems cited above.

By putting together his generalized inertial principle and his extended imitation law, Kammerer can begin to make sense of a host of anomalous phenomena, from beginner's luck and runs of luck in gambling, to contact metamorphosis in geology, to the simultaneous surfacing of major ideas in the history of thought. Without too much imagination, we could profitably apply this thinking to some of the more recently discovered puzzles, such as the possibility that evolution goes in spurts. Kammerer himself only alludes to astrology and

the possibility of making it scientific on his grounds, but here is a way that his principles might be applicable.

Let us start with the solar system as the next largest system of bodies we as a planet need to immediately concern ourselves with. It is true that although the direct static gravitational influence of the planets on us *individually* at any one moment is minuscule, as scientific debunkers of astrology are so quick to point out, their effects on our entire *planet* as a whole is enough to perturb its orbit through space.

But it is not its direct immediate influence that is important. Since the planets do not maintain a uniform distance from the earth, their gravitational pull constantly changes, creating a somewhat complicated cycle. Within the sphere of what complicated phenomena, these autonomous, regularly repeating cycles of gravitational influence are one of the most important facts of life for our planet as a whole. Nothing on our planetary scale is nearly so regular or persistent. Thus, whatever is capable of having a repetitive character in the global systems on earth (land and water tides, weather, geological cycles, etc.) should eventually mode-lock to these planetary cycles in their periodic character. These, over the eons, continue to mode-lock downward to smaller subsystems, not as a single homogeneous unit, but singly by planet, depending upon the nearest associated frequencies or resonances (just as different crystals lock onto different radio wavelengths). Over millions of years, multiple series of integrated systems are set up and continually reinforced.

In the old way of looking at physics, pattern and information would neither be transferred intact nor persist long in the subsystems, but would be dissipated due to friction. However, if pattern and information are not lost at the mesoscale, as suggested by Kammerer, but either spontaneously recur due to their own persistence or else diverge into other related forms, then the whole system and all of its parts would be evolving in step, motivated and encoded by the fluctuating gravitational influence of the planetary system long ago, and continually rebuffed by it still. The original gravitational rhythm of each planet upon the earth would be stepped down into a multiplicity of lesser systems originally associated with its fre-

quency (somewhat like an overtone series, but more pervasive), all of which interact and diverge but continually resurface in forms closer to the original and in sync with it and each other. One might say that when Mars returns to a given place in its orbit, for instance, earth-based systems receive the effect from that event as a reinforcement of a pulse developed over eons, more that just as a particular transit happening right now — the time of the transit simply indicates when a particular set of Mars-related systems is in sync and reinforcing the same set for later step-down effects. Naturally, under such a plan, the effects of an individual transit would not always be instantaneous and exact, but varying and approximate according to the developments of the step-down systems — an inexact sort of reliability which is so often observed in astrology and which so befuddles astrologers and comforts debunkers. It may, in fact, be a key to how the whole system actually works.

This approach would certainly allow for a profound cumulative influence of other planetary bodies upon even the finest of systems on earth, living and otherwise. But what about a natal horoscope — how does it explain that? What happens at birth that provides something for these other systems to interact with all your life? The answer may well lie in Kammerer's persistence capacity. At the time of birth (first breath, in fact), the child becomes an independent system, a constellation of elements and forces that tends to maintain the fabric of its initial conditions, that fabric being the entire set of conditions present at its initiation. Moreover, since life systems are recursive systems (feedback systems that tend to maintain themselves), the subsequent development of that system is greatly more resistant to change than that of nonrecursive systems. In fact, this would apply to any other system that is recursive or at least tends to maintain itself, such as a ship, a country, or a corporation, for which, horoscopes are also commonly used. Naturally, transits are simply times when certain parts of the rest of the picture overlap that initially established condition and so may affect it. Furthermore, it can easily be seen in this sort of view that the otherwise mysteriously invoked astrological techniques of the various forms of progressions are simply a

form of viewing transits and their future implications through a single fractal transform (of a day equaling a year, for instance).

Nicely, these hypotheses lend themselves to experimental exploration. If the carrier of the astrological influences is gravitation via modeling, then we should be comparing the cycle (delimited by the times of a planet's nearest approach to the earth) with various earthly cycles. Also, it would seem to follow that many times it is not the observed position of the planet that is the pertinent indicator for birth patterns or events, but its mean position instead.

This unified approach provides a new vision of both astrology and physics which contradicts the tenets of neither. Since it is directly mathematizable, we should be able to bring it down from theory to application without leaps of faith, gratuitous elimination of inconvenient anomalies, or reliance upon conflicting views of statistics. Further investigation of these subjects will follow before long. Robert Schmidt (who has translated Kammerer's work into English) and I are collaborating on a semi-popular book about Kammerer's ideas. We are also planning a series of more technical papers developing them. But in the meantime, anyone interested in pursuing this further should turn to Paul Kammerer's seminal work, where we began...

Lunar Gaps: Taking Advantage of the Moon Cycle

by Michael Erlewine

The lunar cycle has been observed for ages. The moon, named from a Sanskrit term for measure, is the primary means by which the majority of the people in the world (even in this 20th century!) measure time and their own lives. This article takes a look at what astrologers (and ordinary people) have come to understand about the lunation cycle — the phases of the moon. In particular, we will contrast methods of using the lunar cycle in the East and West.

Eastern and Western astrologies use the lunar cycle in the same and different ways. In the West, the lunar cycle is seen as a key to the personality and the birth chart. Although books like Rudhyar's *The Lunation Cycle*, Yeats' *A Vision*, and many others describe the cycle as a dynamic process that unfolds each month, their focus is more with individual snapshots (the various lunatypes) taken from the overall process. The emphasis in the West has been individual birth charts that represent the various lunar phase types.

In contrast, the East seldom mentions the individual birth chart. Their primary interest is in the dynamics of the lunation cycle itself, which they divide and analyze in great detail in order to make use of the opportunities it offers for day-to-day decision-making. In other words, in the East the lunar cycle is used as a means to determine the kind of activity appropriate for each successive lunar day. This amounts to a form of electional astrology.

In the West, electional astrology is thought of as a means to pick an appropriate time in the future for a particular ceremony or happening. Eastern astrology does the same thing, but it also

uses electional astrology as a guide to day-to-day personal living and practice. In India and Tibet, it is the lunation cycle rather than the yearly sun or solar cycle that is the primary indicator used for planning activities and for personal guidance. In other words, in the East they live by and follow the cycle of the moon.

A very clear illustration of this idea is the fact that, in most Eastern countries, birthdays are observed according to the particular day of the moon cycle (lunar phase angle) during which a person was born, rather than according to the solar return as here in the West. Moreover, due to the fact that lunar months do not fit nicely within the solar year, a birthday in the East for any given individual can be up to a month away (during some years) from the solar return — our Western birthday. This simple fact makes it clear how important the moon and the lunar cycle are in these countries. A study of the existing literature on the meaning and use of the moon in astrology (East and West) shows much similarity but also considerable difference.

There is general agreement (East and West) about the nature of the lunation cycle, in that it somehow proceeds from some sort of seed time at the new moon to a fruition at the full and so on. This is the archetype of a cycle and can be compared to any other cycle, such as the circle of the astrological houses or the zodiac itself. If this is done, then the new moon is made equivalent to Capricorn (and the 10th house), while the full moon is similar in cycle phase to Cancer (4th house).

The moon receives more attention in Eastern astrology. And it is not just a matter of increased emphasis; there are major qualitative differences in approach. The emphasis is seldom on the type of individual that typifies a given lunar phase. Instead, it is on analyzing the entire lunar cycle in order to take advantage of its ongoing opportunities — using the moon cycle for living. This Eastern approach is very practical.

What interests Eastern astrologers are the opportunities available to them in the monthly lunar cycle. They use the lunar cycle as a way to gauge and measure their life. They have learned how to take advantage of opportunities they have discovered within the lunation cycle. This is an

important concept to grasp. These lunar opportunities are sometimes referred to as gaps or openings — windows. They conceive of these gaps as articulation points, much like an elbow is where the arm is articulated. They are natural joints or gaps in time/space upon which time and space turn and through which it is sometimes possible to gain access to information about the larger, dynamic life process that already encapsulates us.

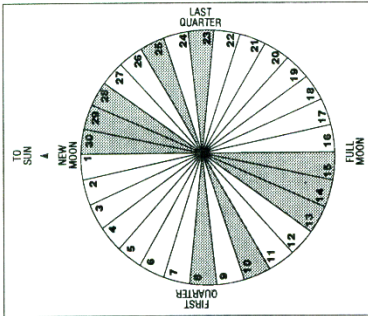
From a reading of the Eastern literature on this subject, one gets the sense that life is perceived as (on the average) being filled with the noise of our problems (obscurations), making clear insights often difficult. These obscurations can be many and their accumulation amounts to the sum total of our ignorance — that which we ignore.

Therefore, in Eastern astrology, these articulation points or windows in time/space are very much to be valued. In fact, Eastern astrologers analyze the lunar cycle in minute detail in order to isolate these moments (gaps in time/space) where insight into our larger situation can be gained. Much of so-called Eastern religion amounts to a scheduling of precise times for personal practice or activity built around the natural series of gaps that can be found in the continuous lunar cycle. In its own way, it is a very scientific approach. In the East, they have been astute observers for many centuries.

In India and Tibet, the 29.5-day lunar synodic cycle is divided into 30 parts, called tithis. A tithi, or lunar day, is the time it takes for the aspect between the sun and moon (elongation, angular separation) to reach a multiple of 12 degrees. Thus each tithi is 12 degrees of solar angular separation.

It might interest readers to know that each tithi is further divided into two parts, called karanas, and that this additional subdivision finds wide use in India, Tibet, and other Eastern countries. However, for the purposes of this article, the division of the lunar cycle into 30 parts or lunar days will suffice.

The way tithis are measured is as follows. The moment of the new moon (0° angular solar separation) marks the end of the 30th lunar day and the start of the first. The first lunar day, or tithi, ends at 12° of solar separation, and the 2nd lunar



Tithis: 30 Lunar Days

day begins. And so it goes, on and around. The only part of this that might be confusing is that the 30th lunar day (248° to 360°) is considered the new moon day, and the 15th lunar day (168° to 180°) is considered the full moon day; however, these days are often celebrated the following day.

Just as in the West, much is made of the new and full moon days. In fact, in many countries they don't have Saturday and Sunday off. Instead, new and full moon days are considered holy days (holidays), and normal routines are suspended at these times.

It seems that although East and West agree on the importance of new and full moons, there is less congruence when it comes to the quarter moons. Here in the West, the lunar quarters are next in importance after the new and full moon times. However, in the East there are other days that are considered of greater importance, such as the 10th and 25th lunar days.

In both traditions, there is agreement that the 2 or 3 days preceding the moment of the new moon are difficult ones, which require special observation. In the West these days have been called the dark of the moon, or devil's days, days when the darker forces have power. Both traditions affirm that we sort of survive these final days each

month. Check it out for yourself. The three days before new moon can be a hard time. The East is in total agreement on this point, and the days prior to new moon are set aside for invoking the fierce dharmic protectors, those energies that ward off harm and protect us during the worst of times.

In particular, the 29th day (the day before new moon) is called Dharma Protector Day. It is a time given over to purification and preparation for the moment of new moon. Ritual fasting, confession of errors, and the like are common practices. In a similar vein, the days just prior to the full moon (the 13th and 14th) are also days of purification, days in which the various guardian and protector deities are again invoked, but in a somewhat more restrained way. For example, the 14th day is often given over to fire puja — a ritual purification. In summary, during days prior to full and new moon, there is some attempt at purification, both physical and mental, in preparation for those auspicious events.

It is clear from the literature that the times of the new and full moon are considered of great importance. These days are set aside for special rituals and worship. As pointed out, full and new moon (full more than new) are times of collective worship and public confession. In many traditions, the monks and priests assemble for a day of special observance. In the East, the full moon celebration and the entire waxing lunar fortnight are oriented to the masculine element in consciousness, what are called the father-line deities. The new moon and the waning fortnight are given over to the mother-line deities and the feminine element. The full moon completes the masculine, or active, waxing phase of the cycle, and the new moon completes the feminine, waning phase of the month. To my knowledge, this kind of analysis does not exist in the West.

Aside from the new and full moon, the two most auspicious lunar days in the East are the 10th and the 25th. The 10th day (108° to 120°), called Daka Day, is considered auspicious for invoking the father-line deities — the masculine. The 25th day (288° to 300°), called Dakini Day, is given over to the feminine principle and the mother-line deities, in general. These two days, the 10th and the 25th, are formal feast days, days of observation when extra offerings are made and increased attention

given to what is happening. There is some sense of celebration at these points in the month. In many respects, these two days even rival the new and full moon days in importance. The fact is that these four days (new, full, 10th, 25th) are the primary auspicious days as practiced in many Eastern rituals.

There are many other days of lesser importance, which might also interest Western astrologers. Health and healing are important in Eastern ritual, and the 8th and 23rd days of the lunar month are auspicious for this purpose. It is these days that straddle the first and last lunar quarters. The 8th day (84° to 96°) is often called Medicine Buddha Day. Again this occurs in the male, or father-line, half of the month. The 23rd day (264° to 276°), occurring in the feminine half of the month, is dedicated to Tara practice. Tara is the female deity connected to health, long life, and healing in general.

Earlier, we mentioned the days given over to purification, most prominently the 15th and the 29th. In addition, on a lesser scale, the 9th and the 19th days are also noted as days when the protector deities should be invoked and kept in mind. These, too, are days of purification. And there are more, still finer subdivisions that are made. In this brief article, these major observance days are enough to give us the idea of how Eastern astrologers approach the lunar cycle. It should be kept in mind that, in the East, astrology is practiced by the general public. So it is not just astrologers who are using the lunar days; everyone observes these days.

Next, we might ask ourselves how this Eastern approach to the lunation cycle might be of value in the West? As mentioned earlier, a major fact is that the lunar cycle is perceived as having a variety of gaps, joints, or points of articulation that can be used. They can be seen as links in the armor of our particular obscurations. Many Western mystery traditions also observe the times of the full (and sometimes the new) moon. Full moon meditations are common. The quarter moons are given less attention, and few Western rituals exist (to my knowledge) for these events.

It is an intuitive fact that moments of clarity and insight (gaps) do come in the course of living. We all benefit from this kind of insight. What Eastern

both male and female energies (channels) are in simultaneous alignment — the ultimate opportunity. The lunar cycle and its effects and opportunities have been analyzed in great detail in the Eastern teaching.

In summary, the major difference between Eastern and Western astrology as related to the lunation cycle is that in the East any lunar theory is put to the test. It exists as a guide to practice. In other words, they practice what they preach. Here in the West, it would appear that we are somewhat more theoretical. We read about and discuss ideas on the lunar cycle, but very few astrologers *have met* make use of the lunar-phase cycle as a guide to day-to-day practice. As a society, we don't even observe the full or new moon, much less the quarters or any of the other possible lunar days. It is true that most astrologers are aware of the zodiac sign the moon is in, but here we are not examining that part of the tradition; we are looking at the cycle of the lunar phases. Or, here in the West we may know that it is new or full moon, but we do nothing out of the ordinary in response to that information. And, of course, the general public seldom even takes note of lunar events.

The Eastern approach to the lunar cycle is quite ancient and very detailed. East or West, I assume that both astrological traditions have been engaged in recording something rather than nothing all of these centuries. In other words, I assume that the existing lunar tradition, East and West, is a reflection of reality rather than something we have made up. After all, that is what astrology is all about and why we practice it.

Here we have concentrated on the synodic cycle of the sun, moon, and earth — the lunation cycle. We have ignored the use by astrologers of the moon in the signs and houses, something practiced both here and in the East.

On a personal note, my study of the lunation cycle has led me from Western to Eastern texts in an attempt to obtain more practical information for day-to-day living. When I ran out of new texts to study, I sought out some of the living Eastern meditators who observe the lunar cycle on a regular basis. For example, we have had a wide variety of Eastern astrologers living and working at our center in recent years. In addition, one individual skilled in Sanskrit and Tibetan astrology spent

almost two years here, translating various Buddhist texts on the subject.

From my experience with these sources, the primary piece of information that stays with me is that reading about or listening to someone with experience in this area is, by definition, *preliminary*. Both text and teachers (however fine they may be) can but point beyond themselves to the lunar cycle itself. Through any differences that exist, all sources seem united in this one maxim: go and see for yourself. Check it out. The purpose of the teachings is the experience itself that waits to be known. They are telling us: Observe these days. Call it meditation or observation (whatever), but observe with care and attention if these insight gaps are, in fact, there.

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Science and the Lunation Cycle

by Michael Erlewine

Modern scientific research into lunar activity as it affects the earth is presented in brief form. The similarity is pointed out between the observance of the 10th and 25th lunar days in Eastern astrology and recent theories of a lunar modulation of solar corpuscular radiation around these same times.

Scientific research into the lunation cycle over the last 15-20 years is fascinating from an astrologer's perspective. It was not very many years ago that science gave little or no credence to the possibility of a lunar effect on life here on earth. Today it is no longer a question of "is there an effect?" but rather one of "let me count the ways." In fact, the research at this point is so extensive that in this brief article we can only mention some of the high points in the existing literature.

It should go without saying, but I will repeat it here, that science still has little or nothing to say about psychological or personal events connected with lunar activity. Instead, it has discussed how the moon relates to such things as rainfall, weather, and atmosphere. More important to astrologers, and a step closer to the psychological, is the growing evidence for a hard connection between lunar activity and geomagnetic activity. It is this connection that we will detail here.

Geomagnetic activity coming from beyond the earth's aura or atmosphere has been linked to all kinds of mundane activities ranging from

radio reception to the aurora borealis type displays and so on. The picture that emerges from modern research is one where each body (the earth, the sun, and perhaps even each of us) is surrounded by some sort of magnetic field. We radiate, and this radiation surrounds us and even keeps some things out.

The earth's aura (or magnetosphere as it is called) keeps at bay enormous amounts of radiation coming from the sun and from the galaxy in which our solar system is a part. Very energetic particles can penetrate our magnetosphere and find their way through the atmosphere to the surface of the earth itself. For the most part, these particles funnel in from the north and south polar caps via field lines of high geomagnetic declination. During times of increased solar activity such as solar flares, or during the peak of the sunspot cycle (like this year), very much more solar radiation reaches the earth than at other times. The weaker cosmic radiation must wait for the years of sunspot minimum to reach their maximum penetration. Please examine the diagrams of the magnetosphere shown below as we examine some of the scientific evidence that relates to the lunation cycle — lunar power.

Auroras — Although we have long studied oceanic tides, we know now that there are atmospheric tides, as well, that move in response to the position of the moon. For example, auroras are caused by the excitation of atmospheric molecules by energetic charged particles penetrating the atmosphere along geomagnetic field lines. Although the mechanism of this phenomenon is still being examined, it is generally understood that auroras are associated with the arrival of solar corpuscular radiation in the magnetosphere, 1 to 3 days after a solar flare. These particles (depending on their intrinsic energy and the current density of the atmosphere) penetrate the atmosphere.

It has now been shown that these auroral peaks and valleys are modulated by the position of the moon. This lunar auroral tidal effect in the upper atmosphere can be correlated with flood and ebb tides on earth, thus linking its rise and fall to the position of the moon in its monthly cycle.

Rainfall — It has been well documented that rainfall is correlated with the moon's position in

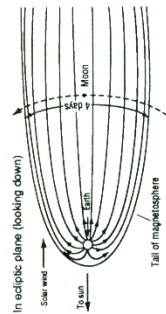
its monthly cycle. According to many studies, rainfall maximizes midway through the 1st and 3rd quarters of the lunar synodic month; in other words, about a half week after new and full moon rainfall reaches a peak. Correspondingly, a low point in rainfall occurs during the 2nd and 4th quarters, with the lowest point of all occurring some three days before new or full moon.

In addition, it was found that increased rainfall at these two peak times in the month was greater at solar minimum than at solar maximum. The lunar cycle accounts for 63% of the variance during years of solar minimum, but only 14% during the year surrounding solar maximum. It has been suggested that cosmic radiation may be a factor, since this form of radiation penetrates more deeply into the solar system during years of low solar activity. During the years of high solar activity, a more powerful solar wind helps to keep out cosmic radiation.

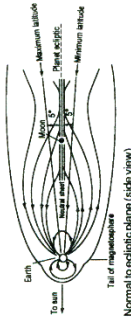
Thunderstorms and Cosmic Radiation — It has been shown that the maximum in thunderstorms coincides with the maximum in galactic cosmic radiation, and vice versa, that minimum thunderstorm activity coincides with the minimum in galactic cosmic ray radiation. There have been many studies on the relationship of cosmic radiation to lunar activity. Cosmic radiation consists of energetic particles entering our solar system from beyond its aura, or magnetosphere. As mentioned, there is an inverse relationship between cosmic radiation and solar activity. In other words, the increased solar wind at sunspot maximum keeps cosmic radiation out of the solar system and away from the earth. During the years of sunspot minimum, cosmic radiation is strong enough to penetrate the solar aura and reach the earth's atmosphere.

Thunderstorms and the Moon — It has been shown that the maximum in thunderstorms coincides with maximum geomagnetic activity. In addition, it has been shown that thunderstorm activity is modulated by lunar position. The greatest number of thunderstorms occur after either new or full moon. Thunderstorm frequency reaches a maximum two days after full moon and remains high for most of the third quarter.

The Moon and Geomagnetic Activity — The Kp-geomagnetic index varies with the lunar phases.



When the moon is less than $3\frac{1}{2}$ degrees from the plane of the ecliptic, geomagnetic activity reaches a minimum during the 2nd lunar quarter and a maximum during 3rd lunar quarter. Lunar modulation while near the ecliptic suggests that the moon is influencing the solar corpuscular flux which, guided by the solar magnetic field, approaches the earth generally from close to the plane of the ecliptic. Some of these particles become trapped in the magnetosphere.

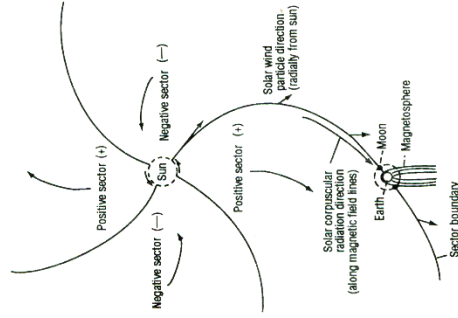


There is a thin, neutral-sheet region close to the ecliptic plane in the tail of the earth's magnetosphere that the moon might be modulating when it is traveling near the plane of the ecliptic. The high density of field lines near the ecliptic would make this region particularly sensitive to a magnetic perturbation, which could modulate the flux of particles reaching our atmosphere. In short, there is evidence that the moon has a magnetohydrodynamic wake with an enhanced magnetic field, which, when in the magnetospheric tail, causes magnetic disturbances on the earth.

Polar Cap Absorption (PCA) — PCA happens when solar protons from solar flares enter the earth's upper atmosphere in high geomagnetic latitudes, often causing radio blackouts and increased auroral activity. These periods of severe ionospheric disturbance are often marked by Forbush decreases, when the counting rate of background galactic cosmic radiation has a sudden anomalous decrease which might take hours

to days to recover to normal levels.

In effect, it is as if there were a magnetic screening of galactic cosmic radiation by the enhanced solar plasma. It has been noted, but unexplained, that PCA events and Forbush decreases seem to be ordered with the lunar synodic period (29.5 days). When this research was begun, it was expected that a 27.3-day period would be found, indicating a link with solar rotation. It was a surprise to scientists when, instead, results fingered the lunar synodic period (29.5 days). Therefore, it is possible that the moon somehow controls solar corpuscular radiation streaming toward the earth. The mechanism is still undetermined at this time.

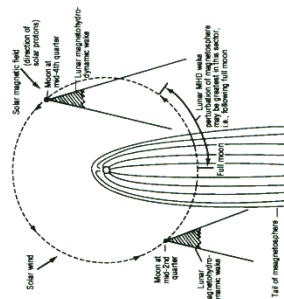


Solar Sectors — Solar sectors and the geometry of the solar magnetic field represent important areas for research. The solar wind is a plasma of charged particles endlessly being ejected from the surface of the sun. These particles tend to concentrate in the plane of the ecliptic. All of the planets are within the aura or atmosphere of the sun, the solar wind. Each charged particle moves away from the

sun in a straight line; however, since the sun itself is rotating, these particle streams get bent into a spiral of the type made famous by Archimedes. In addition, this plasma contains a frozen-in magnetic field, constituting the sun's magnetic field, that conforms to this spiral. This is the interplanetary magnetic field.

Because of this spiral effect, at the distance of the earth, the magnetic field is oriented about 45 degrees west of the earth-sun line, on the morning side of the earth. Both the slow (4 days) and fast (10 minutes to several hours), charged solar particles approach the earth guided by the solar magnetic field. They come in from the western side of the sun (morning side of earth) at about a 45-degree angle to the earth, although this angle fluctuates from moment to moment based on the changes in the solar plasma. The fact is that each of us are exposed to this general direction around 9 AM each morning. We are most shielded from this direction around 9 PM each night.

The great rotating disk of the solar magnetic field itself is divided into four primary sectors, each with an alternating polarity. The magnetic field direction is either positive (away from the sun) or negative (toward the sun). These sectors are tied into definite regions on the surface of the sun, which are of corresponding magnetic signs. It has been suggested that this may be thought of as a rigid disk in the plane of the ecliptic with four



Lunar Magnetohydrodynamic Wake

quadrants connected to the sun and rotating with it in its 27-day rotation cycle — the co-rotating sector structure.

It has been found that geomagnetic and cosmic ray activity, as well as the velocity and number density of the solar wind flux, vary as a function of position within the solar sectors; thus there is a weekly fluctuation in the Kp-geomagnetic index. Studies show a maximum in thunderstorm activity when the earth passes from a positive sector into a negative sector. These four great sectors like a great pinwheel rotate past the earth exposing our planet to alternating positive and negative solar phases.

A study of the lunar position in relation to the Kp-geomagnetic index, PCA, and Forbush decreases shows that PCA and Forbush decreases reach a minimum during the middle of the 4th lunar quarter when the moon is near the 45° axis and thus between the earth and the spot where the charged particles arrive from the sun. A maximum for these values is reached when the moon is in the 2nd quarter, unable to block the particle advance. It has been shown that the moon has an electrical charge of at least 100 V/m, which means that the moon has a positive electrical charge that can deflect solar protons.

There is also a minimum in the Kp-geomagnetic index during 2nd quarters when PCA and Forbush decreases are at a maximum. It has been suggested that at 2nd quarter the moon may least disturb the geomagnetic field, which is, at that time, most active.

There is a sharp rise in the Kp index just prior to full moon and continuing into third quarter. It has been suggested that this might be due to the magnetohydrodynamic wake of the moon interacting with the tail of the magnetosphere or modulating the flow of solar particles to the tail.

It is interesting to note that around the 2nd quarter, the 10th/11th days are the maximum for PCA activity. This is when the father-line deities are observed in Eastern astrology. The 25th/26th days are when the moon somehow block or inhibits the solar magnetic field. This is when the mother-line deities are celebrated in that tradition. Thus the time of greatest activity (male) has some scientific backup, and the same for least activity and greatest calm (female).

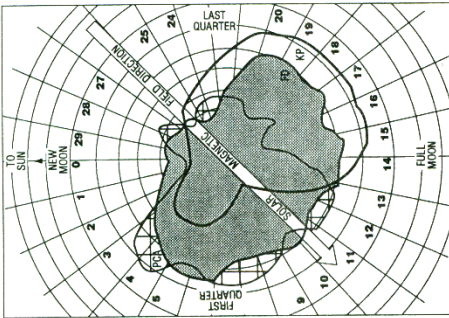
Tidal and Electrical Influence — The western portion of the sun is strongly magnetically linked to the earth, while the eastern portion of the sun is not. This is due to the fact that solar corpuscular radiation approaches the earth from the west, guided by the solar magnetic field. As pointed out, these particles come in from the western side of the sun at about a 45° angle to the morning side of earth. Statistical studies show that solar flares occurring on the eastern portion of the sun are much less frequently associated with geomagnetic storms than those occurring near the central or western portion.

Flares occur during periods of solar activity, which typically last a few days. These regions of activity (near sunspots) travel from east to west across the face of the sun, with a sunspot taking about seven days to travel from the central meridian to the western limb. Thus active solar regions (generating particles capable of reaching the earth) move into and through the western section of the sun, which is magnetically linked to the earth. During this period, recurrent particle streams from an active sunspot region can reach the earth. Some periods when solar protons have bombarded the upper atmosphere have lasted over ten days.

This has been a very brief description of some of the geophysical research that has been performed in the last 20 years and that might be of interest to astrologers. It seems that all bodies have a field or aura around them. The earth and the sun radiate, and that radiation is swept along behind whatever trajectory the object travels. It is fascinating to see scientific evidence emerging that seems to conform with the astrological tradition.

As pointed out in the previous article on the lunation cycle, the 10th and 25th lunar days have been found (for ages) to be significant periods within the month, where some kind of change or transition takes place. It is interesting to note that these points are more or less in line with the 45° vector along which solar corpuscular radiation reaches the earth.

The moon in its monthly cycle appears to (somehow) modulate this stream of radiation when it reaches the area surrounding a solunar phase angle of some 315°. At this point the moon (perhaps due to its magnetic field) effectively blocks and cuts off some of the radiation stemming from



PCA: Polar cap absorption

FD: Forbush decrease

KP: Kp-geomagnetic index

the sun. At the opposite point in its orbit (around 135°), the moon reaches a point of least blockage, where the most solar radiation can penetrate and reach the earth.

It is this point in the lunar 2nd quarter, during which the greatest amount of radiation is available to the earth, that the Eastern astrologers have set aside as a time for the masculine (active) element. The fourth quarter, where the moon effectively blocks the solar radiation, is the point when the feminine energies are most observed.

It is interesting that, on the surface at any rate, ancient tradition and modern science appear to have some general agreement.

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Meanderings

by James Neely

Among many others, I am delighted to see *Matrix Magazine* appear in this new format as the *Matrix Journal*. I hoped I would have more to contribute to this premier issue, but unfortunately Michael didn't know about some of my temporary commitments, and so I lack the lead time I need to make a meaningful contribution. But what I can do is to make a few comments on things I plan to do in the not too distant future.

For example, I just opened my copy of *The American Ephemeris for the 20th Century* and found that Neptune went retrograde on 27 March 1981. But a closer look reveals that the longitude of Neptune remains constant to within 0.1 minutes of arc (meaning that it hasn't moved over 0.05 arc-minutes, or 3 arc-seconds) for *four days*. Now imagine how accurately one must be able to compute positions in order to determine the station time to within a minute, or even an hour. This is the major reason why different sources can generate very accurate positions for astrological work, but can disagree radically on the time of occurrence of a planetary phenomenon. We'll try to explore this in some depth in a future issue.

Another interest is the generation of highly accurate ephemerides on the home computer. This state-of-the-art ephemeris, called the DE-200 integration, was computed by the Jet Propulsion Laboratory (JPL). The ephemeris is available on magnetic tape and consequently requires a large computer to access the information. Since about 1977 the U.S. Naval Observatory has been publishing a yearly *Almanac for Computers* using the DE-200 integration, but it is somewhat awkward to use. More recently (since 1986), they have made the yearly information available to the home computer through their distribution of the *Floppy Almanac*, but unfortunately the format of the output is of no use to the astrologer. During the past year or so, the Naval Observatory has developed what they call the *Interactive Computer Ephemeris* (ICE), which is awesome

in that 250 years of highly accurate positions are compressed onto four 360 kilobyte floppy disks — but again, the format of the output is of no use to the astrologer. My long-term project, then, is to try to find some way to make a similar condensation of the DE-200 integration available to the astrological community. The easiest way to do the job would be to access the ICE disks, but the Naval Observatory considers their program to be proprietary, so no information is available on how to read their data files. (If anyone has any information to the contrary, I would appreciate it if you contact me through Matrix.) I have some ideas on alternative approaches, but it will take time to work them out.

I'll also try to work up some technical articles along the lines of those which appeared in *Matrix Magazine*. There are some new algorithms as well as some old algorithms which need reworking, and of course, I'm always open to suggestions as to what the reader would like to see. So make your desires known and we'll try to respond in future issues.

On a Consistency Argument for Astrological Principles

by Robert Schmidt

Part One Relative Velocity as a Primary Factor in Astrological House Differentiation

The diurnal motion of the earth is adduced as the main factor bringing about astrological house differentiation. It is argued that the statistical distribution characteristic of the "Gauquelin effect" implies that the effect of a planet is sensitive to changes in the relative velocity existing between the planet and the point upon the surface of the earth where it is supposed to act, these changes being caused by this diurnal motion. Although it cannot uniquely specify how it depends on the relative velocity, it does provide a necessary condition. This condition is explored by making several arbitrary and ad hoc assumptions. The overall argument is purely formal and is not dependent on any assumptions regarding the causal mechanism transmitting the effect; however, it is shown to be consistent with known phenomena such as wave incidence and resonance.

This is the first in a series of papers that will seek to examine the validity of the causal or "scientific" view of astrology by subjecting the fundamental astrological principles to a consistency argument. In order to carry out such an argument, all the fundamental astrological principles must be understood as making implicit but definite statements about the same thing — that is, the behavior of the astrological "influences" — which can then be compared with one another for consistency, sufficiency, and independence.

The method of discovering these implicit statements will be analytical rather than synthetic. There have been previous attempts to derive astrological principles directly from the known forces and their laws; these attempts may be characterized as largely synthetic and constructive. However, it has been recognized for a long time in the other sciences that the success of such an approach depends a great deal on luck. Here we will embark on the opposite path, the analytical one. Assuming an astrological principle to be true, how must the causes — the planetary influences — behave in order to be in accordance with it. For example, how must they

depend on distance or relative velocity or some other kinematical quantity?

Since, however, this isolated hypothetical argument may not determine the behavior of the causes completely but only specify a necessary condition that the causes must satisfy, it may be necessary to perform a similar analysis with a second astrological principle, and perhaps even further ones, before we have conditions sufficiently to determine the behavior of the causes unambiguously.

The causes so determined may or may not turn out to behave like known forces in nature. But in either case, we should proceed to perform analogous analyses on the remaining astrological principles and to compare the conditions they specify with the determinate condition already inferred. If there is consistency here, it would go a long way toward proving an underlying unity. Inconsistency would indicate that there are serious problems with the deterministic or causal view of traditional astrology (assuming that we have modeled the astrological principles correctly).

Since we are arguing in terms of causes, inconsistency would mean that different astrological principles are making contradictory implicit statements about the causes involved. It would, however, say nothing about the synchronistic alternatives to a causal explanation of astrology.

Here we pattern our argument along the lines of the classic mathematical studies of the last century that established the consistency of the axioms of non-Euclidean geometry by finding a Euclidean model for its axioms, and which further argued that the axioms of Euclidean geometry were themselves consistent, since they could be modeled by the algebra of the real numbers.

The difference is that the skeptics of non-Euclidean geometry were convinced that a contradiction would arise among the axioms, while the skeptics of astrology would not so much expect the astrological principles to be inconsistent with one another as to be totally incomparable and unrelated to one another. So even a demonstration of the inconsistency of astrological principles would be striking, because it would indicate that different principles might be consistent and that some kind of astrology might still be possible.

We will provisionally take as our astrological

principles: 1) that the effect of a planet depends on its "house" position, 2) that the effect of a planet is modified when forming "aspects" with other planets, 3) that the regions of the zodiac are meaningfully divided into a finite number of "signs," and 4) that the individual planets have different effects.

We have tried to keep the statements of these four principles as general as possible for now. It is possible that some of these principles are not independent of one another; it is also possible that these four do not comprise a complete system. These questions of independence and sufficiency will have to be taken up as we progress.

We start with the principle of "houses," namely, that the effect of a planet depends on its house position. We start here because there is independent statistical confirmation of this principle in the Gauquelin effect, yielding quantitative information that may eventually help to fix the pertinent parameters exactly.

The Gauquelin distribution can be interpreted as confirming the claim that the strength of the planetary action is some more or less continuous function of its angularity, being strongest around the horizon and midheaven, but always present to some lesser degree in between. Here the distribution is a direct reflection of the planet's effective strength in that house: the stronger it is, the more profoundly it will influence births taking place at that time, and therefore the more likely that these individuals will plainly exhibit characteristics associated with the planet. But it has always been particularly hard for physics to imagine how house position, which since Copernicus has been understood as simply due to the daily rotation of the earth, could be responsible for such variability at all, let alone produce extrema in these particular two sectors.

However, any such distribution is also consistent with the assumption that the action of the planet is sensitive to the change in relative velocity between the planet and its point of application upon the surface of the earth, this change being produced by the diurnal rotation of the earth — in other words, the planet would simply be acting for a greater amount of time in certain sectors, thus influencing more births. Sometimes there would

be "false positives," namely individuals born when the planet was rising but exhibiting none of the characteristics of the planet, simply because the planet was not acting then. There would also be "false negatives," or individuals born when the planet was in some other sector but influenced just as strongly by it as someone born when the planet was rising. Under this assumption, the Gauquelin distribution reflects how often the conditions of relative velocity will allow a planet to be active in a certain sector. It is a statement of the probability of planetary action. It is this second assumption that will be pursued in this paper. It is, of course, still possible that the effective planetary strength varies in some way, but it is not necessary to assume that it varies according to house position.

We are considering the direct action that the planet has at the moment of birth. We do not, of course, rule out the possibility that the planet has indirect effects on the individual.

There are two facts that argue for the plausibility of the second assumption: 1) the fact that the statistical distribution is virtually identical for each of the planets that exhibit the Gauquelin effect suggests that it has a common cause in the diurnal motion of the earth, rather than in peculiarities of these planets themselves, and 2) the fact that the distribution peaks around the horizon and the midheaven seems to correspond to a property of the rotational motion of the earth — that the horizon and midheaven are extrema for relative velocity. The component of the relative velocity between a planet and a point on the surface of the earth that is due to the earth's diurnal rotation is greatest at the horizon although the change in velocity is least, while at the midheaven the relative velocity is least although the change in velocity is greatest.

Furthermore, during the course of a single day, the largest single contribution to the change in relative velocity of the planet Mars (for example) and a point on the surface of the earth is due to the diurnal rotation of the earth itself. A point on the equator moves with a velocity of about 1000 mi/hr. If the axis of the earth were not tilted relative to the plane of the orbit of the planet Mars, this would mean that when the planet was just rising, the rotation of the earth would contribute 1000 mi/hr to the relative velocity of approach

of the planet toward this point (or subtract 1000 mi/hr from the relative velocity of recession). When the planet was at the midheaven, the point on the equator would be moving perpendicular to the line joining the earth and Mars, and would not contribute to the relative velocity. Thus, during this six-hour period, the change in relative velocity due to the rotation of the earth would be about 167 mi/hr on the average. By contrast, the change in relative velocity due to the approach or recession of the earth and the planet Mars is typically 200-300 mi/day or 20 mi/hr.

Finally, the first three astrological principles mentioned above all make statements about different kinds of angularity. On the face of it, it seems that relative velocity is the only common denominator that these principles have.

So, given this assumption, how must a planet's action depend on the relative velocity so as to produce the effect?

Let us take some portion or zone of the apparent path of a planet around the earth during the course of a day. Due to the uniform rotation of the earth about its axis, the amount of time it takes the planet to traverse this zone is almost exactly the same as the amount of time it takes to traverse an equal zone.

The total amount of time T that a planet is active in a given zone during a certain epoch may be resolved into the product of the total number of times n during which it is active in that zone and the average amount of time $[t]$ during which it then acts. Thus

$$T = n[t].$$

Then, this product divided by the duration d of the epoch in question (measured in days) represents the percentage of time $[p]$ during which the planet acts within the zone in question. So

$$[p] = \frac{n[t]}{d}.$$

But the total number of times the planet acts equals the average number of times $[n]$ it acts per day times the total number of days d . So

$$[p] = [n][t].$$

Thus, if the distribution of births during the course of a day were uniform, a larger value of $[p]$

for some zone would correspond to a higher number of births influenced by that planet.

Now, we are assuming that for equal zones, the zones corresponding to equal periods of time, the percentage of time during which a planet acts in them is not necessarily equal; it varies with the position of this zone, but only because the rotation of the earth gives a point on the surface of the earth a different velocity toward or away from the planet.

So we are assuming that for a given zone, $|\mathbf{p}|$ is some function $\mathbf{P}$ of the relative velocity between the planet in question and the point on the surface of the earth where it is acting. The total relative velocity $\mathbf{r}$ at any instant consists of two components: the relative velocity $\mathbf{v}$ due to the approach or recession of the planet and the earth toward one another, and the relative velocity $\mathbf{u}$ due to the rotation of the earth. So presumably $|\mathbf{h}|$ and $|\mathbf{t}|$ are also functions of $\mathbf{u}$ and $\mathbf{v}$; call them $\mathbf{N}(\mathbf{u}, \mathbf{v})$ and $\mathbf{T}(\mathbf{u}, \mathbf{v})$ respectively. Thus

$$P(u+v) = N(u+v)T(u+v),$$

and so

$$P'(u+v) = N'(u+v)T(u+v) + N(u+v)T'(u+v).$$

The Gauquelin distribution itself, having maxima around the horizon and the midheaven, tells us that this derivative is zero when u equals a small value k and when du/dt equals k ; that is, when u equals k or when u equals kt . So we have

$$N'(k+v)T(k+v) + N(k+v)T'(k+v) = 0$$

$$N'(k_l+v)T(k_l+v) + N(k_l+v)T''(k_l+v) = 0$$

Since $\mathbf{v}$ is constantly changing, and $\mathbf{t}$ is an arbitrary parameter here, it appears that the functions are defined for all possible values of the total relative velocity $\mathbf{F}$, and thus

$$N'(r)T(r) + N(r)T'(r) = 0$$

is the necessary condition.

In order to get a better feel for the formula

[p] = [p] [t]

and to check some of our reasoning, we will make some simplifying assumptions.

First of all, suppose that the planet is able to be effective at a birth only when the total relative velocity between the planet and the point on the surface of the earth where the birth occurs falls

within one of a number of separate bands of relative velocity. Since the relative velocity component $\mathbf{v}$ (due to the approach or recession of the planet and the earth itself) changes from day to day, the value of the component $\mathbf{u}$ (due to the earth's rotation) that will bring the total relative velocity into an active band must also vary. Thus the zone or "house" in which the planet begins to be effective will be constantly changing.

Let us suppose — in our ignorance as to the true active bands — that the distribution of these active bands is such that, on any given day, the value of the component u at which the planet will begin to be effective has an equal chance of lying anywhere between 0 mi/hr and the maximum attainable velocity m at that latitude (something less than 1000 mi/hr). Then it is apparent that this particular value of u will have a greater probability of occurring when the planet is within a zone bordering on the midheaven than when it is within an equal zone bordering on the horizon, for the simple reason that u is changing more quickly at the midheaven and hardly at all at the horizon, and thus the zone near the midheaven takes in a wider range of values of u . In fact, the probability that the value of u will fall within a given zone is directly proportional to this range of values.

Accordingly, if we consider some zone within the horizon and the midheaven and suppose that u has the value of V_1 at the beginning of this zone and V_2 at the end, then the probability is almost exactly

$$\frac{\Delta V}{m}$$

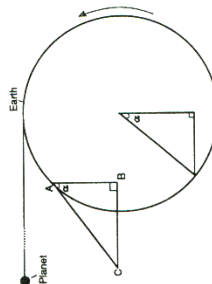
where $\mathbf{m}$ is the additive inverse of the total change in velocity from horizon to midheaven.

I say almost exactly, because it is possible that the planet will begin to act shortly before it enters this zone and continue to act at least until it enters it. Thus, if it begins to act at $u = u_1$ and ceases at $u = u_2$, then the probability becomes

$$\frac{\Delta V + \Delta u}{m}$$

This value is, of course, also the value of $[n]$, the average number of times per day that the planet is effective within a certain zone.

But for the very same reason that it is more unlikely that the planet will be effective in a zone nearer the midheaven, it will also be effective for shorter amount of time within such a zone. That is, because the value of u is changing so rapidly it will pass through the band of active velocities more quickly. Thus, under our present assumptions, we should expect that the amount of time that the planet is effective — that is, the time it takes for u to go from $u = u_1$ (at which velocity it begins to act) to $u = u_2$ (at which velocity it ceases to act) — will be shorter nearer the midheaven and longer nearer the horizon. And we should also expect that the factor $\|t\|$, the average amount of time that the planet acts while it is within a certain zone, will be smaller in a zone nearer the midheaven and greater in a zone nearer the horizon.



AC = rotational velocity of earth = $k = 1$
BC = velocity component toward planet = u
 $u = k \sin \alpha$

To determine [1], we first calculate the amount of time t it takes for the relative velocity to slow down from $\mathbf{u} = \mathbf{u}_1$ to $\mathbf{u} - \Delta \mathbf{u} = \mathbf{u}_2$ (assuming that the change in the component v is negligible during any one action of the planet). If we ignore for the moment the axis tilt of the earth, and effectively assume that the planet in question is in the equatorial plane, then, using the notation in figure 1,

$$u = k \sin \alpha$$

and so

$$\text{acceleration} = \frac{du}{d\alpha} = k \cos \alpha$$

which is

Neatly enough, if we multiply this expression by the value we determined for $[n]$ and evaluate the integrals, we have

$$[p] = \frac{\Delta u}{m} [\sin^{-1}(V_1) - \sin^{-1}(V_2)]$$

Thus

$$t(u) = \int_{u_1}^{u_2} \frac{du}{k \cos \alpha} = - \int_{u_1}^{u_2} \frac{du}{\sqrt{k^2 - u^2}}$$

Thus, letting $k = 1$ and $u_2 = u_1 - \Delta u$,

$$r(u) = \sin^{-1}(u) - \sin^{-1}(u - \Delta u)$$

In order to use this formula to calculate $[t]$ in a given zone for which $u = V_1$ at the beginning and $u = V_2$ at the end, we also take into account the possibility that the planet begins to act slightly before the velocity reaches V_1 and also the possibility that it continues to act slightly beyond the point where the velocity reaches V_2 . Thus there are three possibilities: $u_1 > V_1$ but $u_1 < V_2$; $V_2 = u_1 > V_2$; and $V_1 > u_1 > V_2$. Accordingly, in order to obtain the exact value of $[t]$, we set up three separate integrals, apply the mean value theorem to each, and then average them with a weighted mean. So

$$[t_{\text{init}}(u)] = \frac{1}{\Delta u} \int_{u=V_i}^{u=V_i+\Delta u} t_{\text{init}}(u) du$$

$$[t_{\text{mid}}(u)] = \frac{1}{\Delta V \cdot \Delta u} \int_{u=V+\Delta u}^{u=V_i} t_{\text{mid}}(u) du$$

$$[t_{\text{end}}(u)] = \frac{1}{\Delta u} \int_{V_1}^{V_2 + \Delta u} t_{\text{end}}(u) du$$

For weighting the integrals, we break the whole zone (which now also includes the end portions) into parts equaling Δu . Then the integrals are to be taken in the proportion of $\Delta u: \Delta V - \Delta u: \Delta u$. So $[t]$ is equal to

$$\frac{\Delta u[t_{\text{init}}(u)] + \Delta v - \Delta u[t_{\text{mid}}(u)] + \Delta u[t_{\text{end}}(u)]}{\Delta v + \Delta u}$$

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Modeling Astrological Systems with the Damped, Harmonically Forced Oscillator

by Robert Schmidt

of relative velocity were met, for the effectiveness or strength of the planetary influence may itself be a function of the relative velocity. But any of these modifications would be ad hoc at this point.

We could also have held onto our assumption about the bands of effectiveness as above (or any other alternative assumption pertaining to it) and modified one of the assumptions that guided our calculation of $\{n\}$, such as the assumption that the bands were more or less uniformly distributed, so that the daily change in the velocity component v would effectively randomize the value of u at which the planet began to act. But this would be equally ad hoc at this point.

It would be wiser to try to determine another condition from another astrological principle, a condition that also involves the way in which the action of a planet is sensitive to relative velocity, and hope that these two conditions together will uniquely determine the assumptions to be made.

We here give a concrete example of a phenomenon that is sensitive to relative velocity, not necessarily because we think that it is the mechanism of astrological influence, but only to show that the formal argument we gave is not too far distant from the known phenomena of physics.

Suppose we have a resonating device at some point on the surface of the earth, tuned to waves of a certain frequency and their harmonics. Let some sort of wave or wave group issue from the planet with a given frequency and velocity and impinge on the resonator. Because of the Doppler effect, as the relative velocity between the planet and the resonator changes, so does the frequency of the waves as they arrive here on earth. So it is possible that the resonator will all of a sudden begin to resonate at a certain point in the rotation of the earth, and then quit just as suddenly. Another day, when the earth and the planet are approaching or receding from one another at a different relative velocity, the device will begin to resonate and cease to resonate at different moments in the rotation of the earth.

It is clear that such waves or wave groups would have to be moving with a velocity or group velocity considerably less than the speed of light in order for the relative velocity component due to diurnal rotation to have any significant effect.

This just tells us something that we could have anticipated: that the average amount of time that the planet is active in a given zone is directly proportional to the size of the zone itself. This means equal zones will have the planet effective in them for equal amounts of time, even if one is near the horizon and the other near the midheaven. Thus, if the planet were in the plane of the equator and acted according to the assumptions we have made, there would be no statistical house bias whatsoever; that is, no Gauquelin effect.

Now let us take into account the fact that the planet is not in the equatorial plane but nearer the plane of the ecliptic, and thus it is only a vector component of u that is directed toward the planet. Let β be the angle between the equatorial plane and the plane of the orbit of the planet in question, and let w be the component of u directed towards the planet. Then

$$w = u \cos \beta = k \sin \alpha \cos \beta$$

But we do not any longer wish to express the rotational motion of the earth in terms of the angle α which belongs to the equatorial plane, but in terms of the angle γ , which is its counterpart in the plane of the planetary orbit. After some simple trigonometry, we see that

$$w = \frac{k \sin \gamma}{\sqrt{1 - \sin^2 \gamma}}$$

where g is a constant equal to $(\tan^2 \beta)$.

Using an argument analogous to the preceding, we could proceed to calculate $\{p\}$. Clearly, the average amount of time a planet is effective in a given zone will no longer be directly proportional to the size of the zone. Equal zones, corresponding to equal amounts of rotational time, can have the planet effective in them for unequal amounts of time in a way that depends on the position of the zone.

Thus we have produced a nonuniform statistical distribution, although not the Gauquelin distribution itself. We could, of course, go back and modify one of the assumptions that guided our calculation of $\{t\}$, such as the assumption that the planet was only active within certain separate bands or the tacit assumption that the planet would invariably be effective at a birth if the conditions

Can chaos theory, the new nonlinear dynamics, be applied to the problem of establishing correlations between mundane cycles and planetary ones?

This new approach to nonlinear systems has a particular value because it has been discovering so many fundamental properties that are universal to numerous special systems having their own defining equations. In many cases, these universal properties cut across the boundaries laid down by classical physics and seem to be broader than mere generic properties. Like the original Aristotelean categories, they seem to unify by analogy. There are certain systems that embody several of these properties at once, in ways that have a suggestiveness far beyond mere dynamical systems. We would like to call them the new archetypes of nature.

Every nonconservative, nonlinear system that may potentially display chaotic behavior must combine at least three elements. First, it must have a ground state to which it naturally reverts, which may be a stable state, periodic, or irregularly cyclical. Second, it must have a restraining principle, which may be internal or external, a kind of damping, dissipation, or friction, etc.

The problem of inferring an unknown driving cycle (a planetary cycle) from a cycle with a given behavior (some mundane cycle) is addressed, using methods adapted from chaos theory. The pertinent practical and theoretical problems are discussed.

Third, it must have a source of energy renewal, which may be internal or external, a constant or periodic forcing, self-excitation, feedback, etc. Each of the nonlinear archetypes combines these elements in a unique way.

We suggest modeling astrological systems—a mundane cycle resulting from a planetary one—with the damped, harmonically forced oscillator. In this model, the ground state is understood to undergo a natural, periodic oscillation, the restraining principle in the system is internal damping, and the driving force corresponds to the planetary cycle. The problem of correlating planetary and mundane cycles then reduces to the problem of inferring a driving cycle from a given data set and comparing it with a proposed planetary cycle.

The main value of chaos theory lies in its ability to distinguish whether the apparently irregular behavior of a system has a deterministic basis or not.

The problem of performing a nonlinear analysis on given data sets and given time series is quite different from the one of studying a fully modeled system with known parameters. It involves certain general difficulties common to the nonlinear analysis of any given time series, certain difficulties common to systems with many degrees of freedom, and certain specific difficulties having to do with the particular choice of a nonlinear dynamical model for an astrological system.

First, as to the general difficulties, one of the most important tools for diagnosing the presence of deterministic chaos is not available to the analyst in the case of given time series. That is, it is usually impossible for us to methodically vary some system parameter and observe period doubling, intermittency, or some other increase in the complexity of an initially regular behavior, although if the system has a very long recorded history, it may be possible to study the variation in some parameter through natural causes.

Second, in higher dimensional systems, the value of studying the Fourier spectrum for the presence of chaotic dynamics is very limited.

Third, the use of the damped, harmonically forced oscillator as model introduces two more difficulties:

- 1) The standard way of studying this model is to sample data in accordance with the driving frequency. This is tantamount to making a Poincaré section for some particular phase of the three-dimensional phase portrait reconstructed from the given data set by curve-fitting. If the sampling is not done in accordance with the driving cycle, then we are effectively selecting points from different phase planes and projecting them all onto the same plane. If there was fractal structure when the phase plane was constructed in accordance with the driving cycle, then sampling that was not done in accordance with it will almost certainly obscure the fractal structure. However, it is the driving cycle itself that is in question. Thus we have no way of knowing a priori how to sample the time series.

- 2) We also have no guarantee that the original data was gathered in accordance with the driving cycle. The basic unit of the given time series is only accidentally a submultiple of the driving cycle. This might exacerbate the problem of curve-fitting, particularly around the critical points.

The two techniques that have been used almost exclusively to detect the presence of chaos in given data sets are 1) the calculation of Lyapunov exponents and 2) the construction of higher dimensional embedding spaces called pseudo-phase spaces. In principle, a Poincaré section made on an embedding space of sufficiently high dimension will display a fractal structure and reveal the existence of deterministic chaos, if it is present. The drawback is that it will say nothing whatsoever about the period of the forcing. Furthermore, the noise becomes an increasingly important factor in the higher-dimensional embedding spaces. Finally, the usefulness of this technique is still subject to the limitations of data gathering mentioned above.

A similar remark can be made about the determination of Lyapunov exponents, which are indicative of sensitivity to initial conditions. It, too, may establish the existence of chaotic behavior, but not the period of the forcing.

The only solution to this dilemma seems to be the development of certain systematic sampling techniques, under the assumption that only the correct sampling scheme will exhibit a fractal dimension. All this would, of course, be greatly facilitated by suitable computer software. Various sampling options are already suggested by the chaos literature so far. Not only should we be able to sample at uniform time intervals, but also whenever the amplitude of the variable in question reaches a maximum or a minimum, and even when the instantaneous change of this variable reaches a maximum or a minimum. Furthermore, it should be possible to sample in accordance with the singularities of any given irregular cycle. Finally, for phase spaces exceeding three dimensions, a multiple sampling procedure will have to be developed corresponding to double or multiple Poincaré maps.

The problem of sampling does not involve any theoretical issues; however, the reconstruction of the phase space portrait prior to the sampling procedure is fraught with theoretical problems at the present time. We must devise interpolation techniques appropriate to the chaotic attractors we are trying to reconstruct. (Since chaotic attractors have no closed analytical form, it seems rash to assume that any of the traditional interpolation techniques can be applied without bias.) The same remarks apply to the problem of curve-fitting: why use cubic splines, for instance, for an attractor in three-dimensional phase space? Finally, we will have to deal with the problem of noise in these systems. Appropriate filters will have to be developed to prepare the data, as it would be rash to assume that the noise element in these systems is Gaussian.

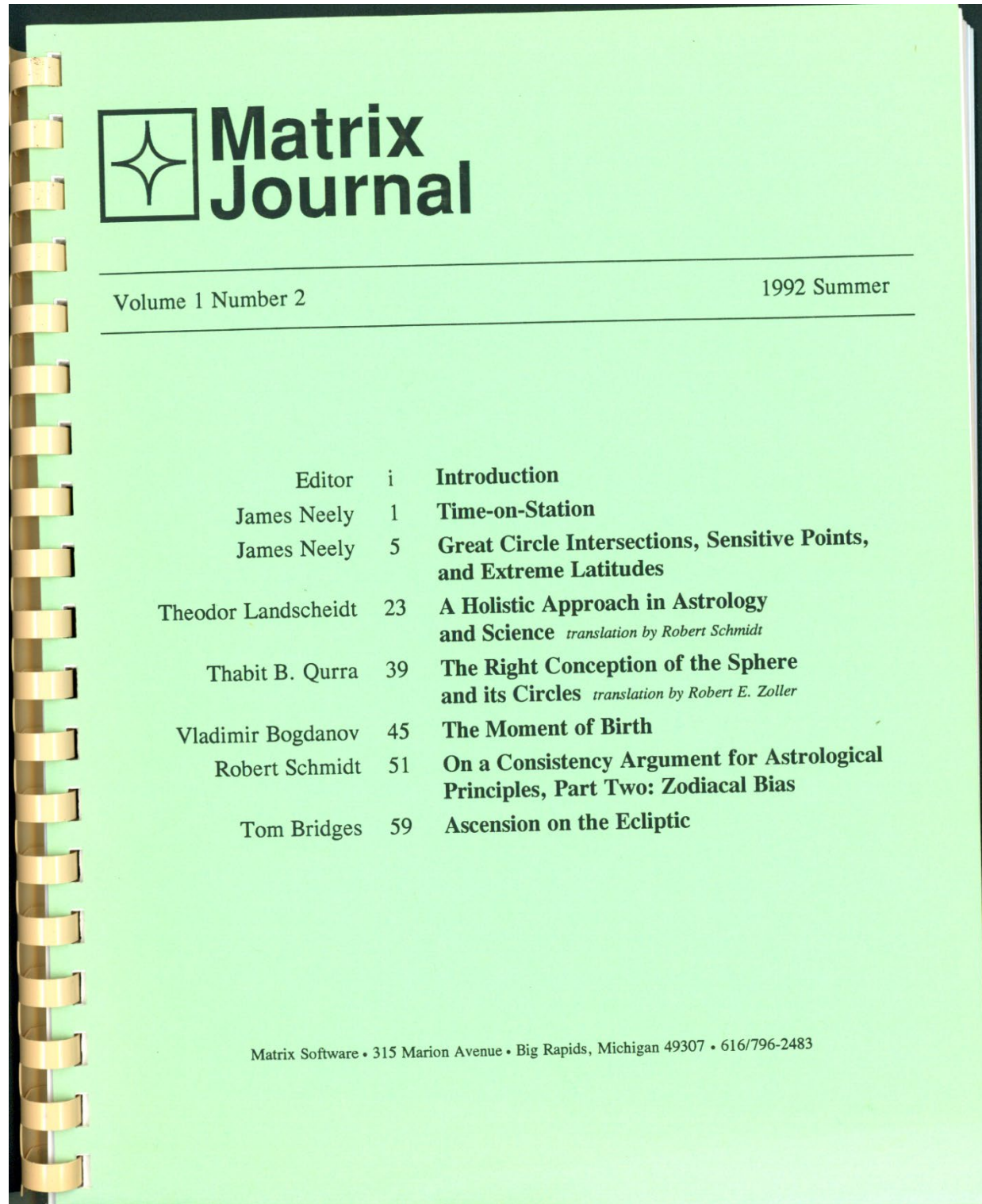
A final remark: The techniques discussed above could possibly be employed to verify that fairly regular periodic behavior in a system modeled by

the damped, harmonically forced oscillator was in fact caused by a driving cycle having that period. This is very often taken for granted in cycles research, but should not be, since harmonic forcing in such a system can also result in cyclical behavior having an entirely unrelated period. If the data set actually exhibits limited or narrow-band chaos, which is chaotic motion that remains close to some periodic motion in phase space, then a sampling in accordance with the putative period should also show a fractal structure in the phase space.

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Introduction

by Michael Erlewine

The first *Matrix Journal* appeared in 1978. This is the second issue published in the 90s. We hope you like it.

I would like to say just a few words about a problem astrology faces today.

Having studied astrology for almost thirty years now, I have (as many of you have also) worked with and through many techniques. When all is said and done, the chief result of my work has been a better understanding of myself—who I am and what I am useful for.

However, over the years of astrological work, one concept has gradually occurred to me—a kind of overview or overriding thought. I feel it is worth sharing.

The Copernican revolution changed forever the way Western humankind viewed the solar system. Prior to the concept of a Sun-centered system, there were many competing ideas that appeared to explain the phenomenon of retrogradation—the apparent forward and backward weaving of the planets in the sky. The many elaborate schemes and models devised to explain this motion were all abandoned once the Sun-centered solution became clear. With this notion, the Western world took a major step forward in the conceptualization of our solar system, which brings me to my point.

Although the Copernican idea brought about a major conceptual adjustment in physics, there was no psychological or esoteric adjustment of similar magnitude. The meaning of the Copernican view never registered to us on a personal basis. Psychologically, we still appear to live in a pre-Copernican universe.

We can conceive of the Sun as the system-center in our physics, but we (or most of us) have yet to experience the accompanying psychological initiation and empowerment (what it all means).

It is this particular concept and its accompanying initiation that has most fascinated me, and to which I have devoted much of the last 20 years or so of my life to exploring: that our center and heart essence is also solar, and that we can become conscious of the Sun-center. It has always been there, the most inner part of us. Somehow we have remained caught up in an outmoded view of the various personal motives, notions, etc.—emotionally pre-Copernican.

We can allow ourselves to become aware of the radiant Sun-center within us, endlessly shining through all our personal days and nights. It is a great discovery, this fact that we are living representatives of that great solar energy—whether we know it or not. It is worth knowing that.

Solar Sun-awareness just is. It is the self-secret source of our life—an energy that, simply put, we all just are. Grasping or keeping this open secret in mind is what is so difficult. Such a secret: that there is none.

The world religions are attempts to complete the Copernican revolution on a psychological or personal level, attempts to help us see through our personal focus to that great inner life we live. This is not an abandonment of personal focus, but a fulfillment of that person as the living end of the solar energy, not us looking inward toward the Sun, but the Sun shining out through us, just as it shines in the firmament. We are the Sun. Whatever it is we are, is that one—solar.

I know this is heady stuff, and perhaps this is why this subject has been relegated to the domain of esoteric astrology. Let me summarize:

Geocentric astrology is the correct coordinate system for studying this inner or heart essence. And although geocentric methods of astrology can be applied to the helio, this is really beside the point. There is so much more to helio. It is, after all, another coordinate dimension, and a study and view of our very essence. It is capable of empowering us and completing the Copernican revolution at a very personal or psychological level.

Time-on-Station

by James Neely

In 1978, in the *Ephemeris of Chiron*,¹ Eric Tarkington remarked that, "The calculation of stations is tremendously insensitive to time in amounts on the order of a few minutes or hours. In 1/100 of a day immediately after station, Chiron typically moves about 8/100,000,000 of a degree. This means that we must know Chiron's position to the nearest 8×10^{-8} degree in order to specify the actual time of station to within 0.01 of a day, and 0.01 day equals about 15 minutes!" This is a major reason why different programs can generate very accurate positions for astrological work, but can disagree radically on the time of occurrence of a planetary phenomenon.

Since I have access to the state of the art ephemeris (the DE-200 integration computed by the Jet Propulsion Laboratory), I thought that it would be interesting to compute a table showing how long it takes each planet to move a discernible amount from its station.

¹James Neely and Eric Tarkington, Phenomena Publications, distributed by Samuel Weiser, Inc., P. O. Box 612, York Beach, ME 03910.

An examination of the difficulty of an accurate determination of the time at which a planet's motion becomes stationary. This has relevance to the timing of the coming conjunctions of Uranus and Neptune.

First I generated a table of the time of occurrence and position of the retrograde and direct stations for each planet. Then I recorded the time duration in which the planet's position was indistinguishable from its station position, when rounded to the nearest 0°01, 0°1, or 1°. These time durations for 1985 (1984 for Mars) are given in Table 1.

An examination of Table 1 on the next page reveals that the duration of periods of indistinguishability are not as systematic as might be expected. In fact, it appears as though the table is in error for the 0°01 and 0°1 times at Saturn's direct station, and that there is a similar error for the 0°1 and 1° times at Uranus' direct station. This discrepancy turns out to be real, but yet is an artifact of the rounding mechanism which depends upon the planet's position. Table 2 provides details of times and positions at Saturn's station, where only the seconds and fractions of seconds of the direct position are shown in the table—for instance, an apparent ecliptic longitude of 231°28'03".25 is displayed as 3°25.

Even though a column showing Saturn's position rounded to the nearest 0°001 has been added to Table 2, complete detail is still lacking. If, for example, at 19°09^m the position were 3°25.01, it would round to 3°25.0, 3°25, and 3°2, whereas if the position at 19°09^m were 3°24.99, it would round to 3°25.0, 3°25, and 3°2. From the table it can be seen that Saturn spends more time at 3°25 than it does at 3°2.

Although the duration times given in Table 1 are correct, they are subject to the rounding artifact mentioned above. To get a truer picture of the time on station, I decided to do a second series of computations to arrive at what might be called a "worst case" scenario. Again a table of positions at the time of station was examined. Then I recorded the time duration in which the planet's position varied by 0°01, 0°10, and 1°00 from the stationary position. For example, if the stationary direct position was 26°39'1, then I recorded the time duration in which the body was within 26°40'1 (+0°01), 26°49'1 (+0°10), and 27°39'1 (+1°00), of the

stationary position. The results are given in Table 3.

Table 2—Details of Saturn's Direct Station (Rounded Position)

Time	0°001	0°01	0°1	1°
18°27 ^m	3°255	3°26	3°3	3°
18°28 ^m	3°255	3°25	3°3	3°
19°02 ^m	3°250	3°25	3°3	3°
19°03 ^m	3°250	3°25	3°2	3°
20°06 ^m	3°250	3°25	3°2	3°
20°07 ^m	3°250	3°25	3°3	3°
20°41 ^m	3°255	3°25	3°3	3°
20°42 ^m	3°255	3°26	3°3	3°

It should be emphasized that these tables were computed only for the station times at the date given and do not in any way represent an average time on for any particular planet. Table 3 reveals that for outer planets, it is extremely difficult to generate an accurate station time and even the most accurate ephemerides are not really to be trusted. Certainly station times can be computed accurately with respect to a given ephemeris, but how accurate is the ephemeris? The most accurate ephemeris currently available is DE-200, but according to the *Astronomical Almanac*,² "A satisfactory ephemeris for Uranus for the 1980's could be computed only by excluding observations made before 1900." This should serve as a reminder that accurate ephemerides are computed for the express use of astronomers for astronomical purposes and that astrologers must use the results as best they can. Since the DE-200 ephemeris covers the years 1800-2050 but ignores all observations of Uranus prior to 1900, one might ask how accurate is a Uranus station time for 1853? Our answer would be to calculate the station time and then look at Table 3 and decide that the station time might be correct to within ±19 hours.

²Page L1 of any *Astronomical Almanac* since 1984.

Table 1—Planetary Time Duration at Stations (Rounded Positions)

Planet	Date	Retrograde Station		Direct Station	
		-0°01	-0°1	+0°01	+0°1
♄	3-24-85	0 ^h 20 ^m	0 ^h 46 ^m	2 ^h 02 ^m	4-17-85
♅	3-13-85	0 ^h 32 ^m	1 ^h 39 ^m	4 ^h 30 ^m	4-25-85
♆	4-05-84	0 ^h 47 ^m	1 ^h 49 ^m	4 ^h 22 ^m	6-19-84
♁	6-04-85	1 ^h 37 ^m	2 ^h 13 ^m	13 ^h 38 ^m	10-03-85
♂	3-07-85	2 ^h 17 ^m	6 ^h 50 ^m	21 ^h 28 ^m	7-25-85
♂	3-22-85	2 ^h 53 ^m	3 ^h 57 ^m	10 ^h 30 ^m	8-23-85
♂	4-05-85	2 ^h 24 ^m	8 ^h 03 ^m	36 ^h 52 ^m	9-12-85
♂	2-05-85	4 ^h 07 ^m	8 ^h 19 ^m	31 ^h 39 ^m	7-12-85

Table 3—Planetary Time Duration at Stations (Absolute Positions)

Planet	Date	Retrograde Station		Direct Station	
		-0°01	-0°10	+0°01	+0°10
♄	3-24-85	0 ^h 20 ^m	1 ^h 00 ^m	3 ^h 06 ^m	4-17-85
♅	3-13-85	0 ^h 35 ^m	1 ^h 47 ^m	5 ^h 37 ^m	4-25-85
♆	4-05-84	0 ^h 59 ^m	3 ^h 10 ^m	10 ^h 14 ^m	6-19-84
♁	6-04-85	2 ^h 00 ^m	6 ^h 04 ^m	19 ^h 59 ^m	10-03-85
♂	3-07-85	2 ^h 40 ^m	8 ^h 32 ^m	27 ^h 19 ^m	7-25-85
♂	3-22-85	3 ^h 40 ^m	11 ^h 51 ^m	38 ^h 00 ^m	8-23-85
♂	4-05-85	4 ^h 51 ^m	15 ^h 10 ^m	48 ^h 26 ^m	9-12-85
♂	2-05-85	4 ^h 30 ^m	13 ^h 55 ^m	45 ^h 24 ^m	7-12-85

Great Circle Intersections, Sensitive Points, and Extreme Latitudes

A New Look at Some Old Results

by James Neely

*An odyssey into the mathematical
description of sensitive points
in astrology and their behavior
at extreme latitudes.*

This paper presents an alternative mathematical method for conceptualizing and calculating the location of some of the sensitive points (primarily the midheaven, ascendant, and vertex) used by astrologers in erecting horoscopes. A unique characterization (which depends upon the coordinate system being used) of each of the basic great circles is presented. This method uses rigorous matrix and vector techniques rather than classical spherical trigonometry. The sensitive points are computed directly as the intersection of the two relevant great circles (in the proper coordinate system) with no additional constructions required.

When the bizarre begins to happen using ordinary formulae in extreme latitudes, one wonders if the equations need to be re-analyzed or if something weird is happening with the geometry of the situation. With the formulation discussed here, there is no doubt about the mathematics being correct—for we deal only with the intersection of great circles; the only time when two great circles do *not* intersect in two, and only two, points is when the two circles are coincident—in that case they have all their points in common. In addition, the apparently anomalous locations of sensitive points in extreme latitudes (polar latitudes for the midheaven

and ascendant, and tropic latitudes for the vertex) can be determined easily [Refs. 1 & 2]. Since the computation of sensitive points in non-extreme latitudes is well known, numerical examples for extreme latitudes only are presented.

I. Great Circles and Sensitive Points

A great circle is characterized by a vector perpendicular to the plane of the great circle. Such a vector, called here the *polar axis* or the *polar axis vector* and denoted by the symbol $\mathbf{g}$, can be, in turn, determined by a point $\mathbf{x}$ on the great circle¹ and a vector $\mathbf{c}$ tangent to the great circle at that point. Although there are infinitely many points on the great circle, the *polar axis vector*, is unique, except for magnitude and sign, which is determined by the direction in which the great circle is traversed. The polar axis vector is given by the cross product of $\mathbf{x}$ and $\mathbf{c}$, namely, $\mathbf{g} = \mathbf{x} \times \mathbf{c}$.

Sensitive points arise from the intersection of two of the five basic great circles: prime meridian, prime vertical, horizon circle, equator, and ecliptic (Ref. 4). Occasionally the polar axis circle is added to this list. The polar axis circle is needed to define the equatorial ascendant.²

For completeness, it may be well to define each of these great circles (Fig. 1).

- **Prime meridian.** The prime meridian is the great circle passing through the observer's zenith and the north and south points, which are the points on the horizon to the north and south of the observer.
- **Prime vertical.** The prime vertical is the great circle passing through the observer's zenith and the east and west points, which are the points on the horizon to the east and west of the observer.
- **Horizon circle.** The horizon circle is the great circle perpendicular to the observer's

¹A point on a sphere can be considered to be the terminus of a vector from the origin. The components of the vector are the rectangular coordinates of the point.

²In some works no distinction is made between the equatorial ascendant and the east point. The reader should note that in this article the cardinal points, and specifically the east point, are always on the horizon whereas the equatorial ascendant is always on the ecliptic. Thus "equatorial ascendant" and "east point" refer to two different points.

- zenith and passing through north, east, south, and west points.
- **Equator.** The equator is the great circle passing through the east and west points and perpendicular to the celestial north pole.
- **Ecliptic.** The ecliptic is the great circle formed by the intersection of the earth's surface and the plane of the earth's orbit about the sun.
- **Polar axis circle.** The polar axis circle is the great circle passing through the celestial north pole and the east and west points.

Intersections of pairs of these great circles give rise to the points listed in Table 1.

Intersecting Great Circles	Points of Intersection
Ecliptic & equator	Vernal & autumnal equinox
Ecliptic & horizon	Ascendant & descendant
Ecliptic & prime meridian	Midheaven & immum coeli
Ecliptic & prime vertical	Vertex & anti-vertex
Equator & polar axis circle	Equatorial asc. & desc.
Equator & horizon	East & west points
Equator & prime meridian	RAMC & RAIC
Equator & prime vertical	East & west points
Equator & polar axis circle	East & west points
Horizon & prime meridian	North & south points
Horizon & prime vertical	East & west points
Horizon & polar axis circle	East & west points
Prime mer. & prime vertical	Zenith & nadir
Prime mer. & polar axis cir.	North & south cel. poles
Prime vert. & polar axis cir.	East & west points

Two great circles intersect in exactly two points. These two points are determined by the vector cross product, $\mathbf{x} = \pm(\mathbf{g}_1 \times \mathbf{g}_2)$. Since $\mathbf{x}$ is perpendicular to both polar axis vectors $\mathbf{g}_1$ and $\mathbf{g}_2$, it must lie in the plane of each of the great circles—hence it lies in the line of the intersection of both great circles. One point is the sensitive point and the other is antipode or opposite point; for example, the ascendant and descendant are antipodes of one another, as are the midheaven and IC, and the vertex and anti-vertex. From these points of intersection, the classical equations for all of the sensitive points can be deduced.

The formulae for the sensitive points developed in the remainder of this section strictly apply in the non-extreme latitudes. There is no agreement in

the astrological community as to the precise definition to be used when discussing sensitive points in the extreme latitudes, but in all cases, the definition used will select either one sensitive point or its antipode.

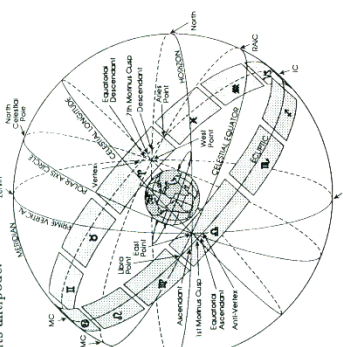


Figure 1. The fundamental great circles and sensitive points.

Four distinct coordinate systems are used in this paper. The geographic system is introduced first because some of the great circles are most easily defined in that system. The equatorial system is discussed next—it is closely related to the geographic system and is encountered frequently in astrological work. The ecliptic system is then discussed, for almost all of the relevant mathematics required for astrological work is required in that system. Finally, in Section II, the altitude/azimuth system is introduced to determine where the sensitive points, as calculated by the standard ecliptic formulae, are located with respect to either the horizon or the east/west positions.

In the following sections, superscripts denote the coordinate system being referenced, while subscripts denote the great circle or point being represented. Superscripts are usually omitted except in cases where confusion may arise.

A. Geographic Coordinates.

Probably the most familiar and elementary coordinate system is the geographic, which uses geographic latitude

ϕ and geographic longitude ℓ for locating positions on the surface of the earth (no distinction is made in this article between geographic and geocentric coordinates). In addition, almost all of the relevant great circles needed are most easily constructed in this system. Using a right-handed coordinate system, north latitudes and east longitudes are positive—the origin of this system is the intersection of the equator, Equ, and the Greenwich meridian, Gm. If an observer is at a point (ϕ, ℓ) on the earth's surface, then the zenith direction $\mathbf{z}$ is given by

$$\mathbf{z}^{\text{Geo}} = \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} \cos \phi \cos \ell \\ \cos \phi \sin \ell \\ \sin \phi \end{bmatrix}. \quad (1)$$

The direction of local north and local east are then given by (see Appendix):

$$\mathbf{n}^{\text{Geo}} = \begin{bmatrix} -\sin \phi \cos \ell \\ -\sin \phi \sin \ell \\ \cos \phi \end{bmatrix}$$

and

$$\mathbf{e}^{\text{Geo}} = \begin{bmatrix} -\sin \ell \\ \cos \ell \\ 0 \end{bmatrix}.$$

Various polar axes are then easily found. Details of computing the cross product are given in the appendix.

Horizon: $\mathbf{g}_{\text{Hor}} = \mathbf{e} \times \mathbf{n} = \mathbf{z}$.

Prime meridian: $\mathbf{g}_{\text{PM}} = \mathbf{z} \times \mathbf{n} = -\mathbf{e}$, and

Prime vertical: $\mathbf{g}_{\text{PV}} = \mathbf{z} \times \mathbf{e} = \mathbf{n}$.

As a trivial example (the results are trivial, the mathematics are not trivial) of how the method works, we will find the geographical coordinates of the east point, $\mathbf{x}_{\text{EP}}$, by computing the intersection of the horizon with the prime vertical. We have

$$\begin{bmatrix} \cos \phi_{\text{EP}} \cos \ell_{\text{EP}} \\ \cos \phi_{\text{EP}} \sin \ell_{\text{EP}} \\ \sin \phi_{\text{EP}} \end{bmatrix} \equiv \mathbf{x}_{\text{EP}} = \mathbf{g}_{\text{PV}} \times \mathbf{g}_{\text{Hor}} = \begin{bmatrix} -\sin^2 \phi \sin \ell - \cos^2 \phi \sin \ell \\ \cos^2 \phi \cos \ell + \sin^2 \phi \cos \ell \\ \cos \phi \sin \ell \sin \phi \cos \ell - \cos \phi \cos \ell \sin \phi \sin \ell \end{bmatrix},$$

or

$$\begin{bmatrix} \cos \phi_{EP} \cos \ell_{EP} \\ \cos \phi_{EP} \sin \ell_{EP} \\ \sin \phi_{EP} \end{bmatrix} = \begin{bmatrix} -\sin \ell \\ \cos \ell \\ 0 \end{bmatrix} = \begin{bmatrix} \cos(\ell + 90^\circ) \\ \sin(\ell + 90^\circ) \\ 0 \end{bmatrix}.$$

The matrices on the left and right are equal only if $\ell_{EP} = \ell + 90^\circ$ and $\phi_{EP} = 0^\circ$. In other words, the east point is on the equator and is 90° east of the zenith. If we had taken the cross product in the reverse order, i.e., $\mathbf{g}_{HOR} \times \mathbf{g}_{EP}$ instead of $\mathbf{g}_{EP} \times \mathbf{g}_{HOR}$, we would have found that

$$\begin{bmatrix} \cos \phi_{EP} \cos \ell_{EP} \\ \cos \phi_{EP} \sin \ell_{EP} \\ \sin \phi_{EP} \end{bmatrix} = \begin{bmatrix} \sin \ell \\ -\cos \ell \\ 0 \end{bmatrix} = \begin{bmatrix} \cos(\ell - 90^\circ) \\ \sin(\ell - 90^\circ) \\ 0 \end{bmatrix},$$

or $\ell_{EP} = \ell - 90^\circ$ and $\phi_{EP} = 0^\circ$, which is the west point rather than the east point (note that this result is the negative of the previous result). This means we have inadvertently computed the antipode of the east point and have consequently mislabeled the point, the correct labeling should be $\ell_{WP} = \ell - 90^\circ$ and $\phi_{WP} = 0^\circ$.

B. Equatorial Coordinates. It is usually more convenient to use the equatorial system with coordinates of right ascension, α , and declination, δ , rather than geographic coordinates. The equatorial system is closely related to the geographic system and is a step closer to the ecliptic system used by astrologers. Also, the concept of declination is frequently used by astrologers. To obtain equatorial coordinates, the geographical origin is shifted to the vernal equinox (first point of Aries) by a rotation about the north polar axis (z-axis) through an angle of α_{GM} , where $\alpha_{GM} = 15 \times \text{GMT}$ is the right ascension of the Greenwich meridian and GMT is the Greenwich mean sidereal time. [Note: A slight increase in accuracy may be obtained by using the Greenwich apparent sidereal time, GST, rather than the GMT.] For any vector $\mathbf{x}^{geo}$ in geographical coordinates, the coordinate conversion to the equatorial system is given by $\mathbf{x}^{eqv} = \mathbf{R}_3(-\alpha_{GM})\mathbf{x}^{geo}$, where $\mathbf{R}_3$ is the matrix that performs the rotation about the z-axis [Ref. 3 and Appendix].

Converting the zenith from the geographical system

to the equatorial system, we have:

$$\begin{aligned} \begin{bmatrix} \cos \delta \cos \alpha \\ \cos \delta \sin \alpha \\ \sin \delta \end{bmatrix} &= \mathbf{z}^{eqv} = \mathbf{R}_3(-\alpha_{GM})\mathbf{z}^{geo} \\ &= \begin{bmatrix} \cos \alpha_{GM} & -\sin \alpha_{GM} & 0 \\ \sin \alpha_{GM} & \cos \alpha_{GM} & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \cos \phi \cos \ell \\ \cos \phi \sin \ell \\ \sin \phi \end{bmatrix} \\ &= \begin{bmatrix} \cos \phi \cos \ell \cos \alpha_{GM} - \cos \phi \sin \ell \sin \alpha_{GM} \\ \cos \phi \cos \ell \sin \alpha_{GM} + \cos \phi \sin \ell \cos \alpha_{GM} \\ \sin \phi \end{bmatrix} \\ &= \begin{bmatrix} \cos \phi \cos(\ell + \alpha_{GM}) \\ \cos \phi \sin(\ell + \alpha_{GM}) \\ \sin \phi \end{bmatrix} = \begin{bmatrix} \cos \phi \cos \alpha_{MC} \\ \cos \phi \sin \alpha_{MC} \\ \sin \phi \end{bmatrix}, \end{aligned}$$

where $\alpha_{MC} = \ell + \alpha_{GM}$ is the right ascension of the midheaven, RAMC. Thus, the equatorial coordinates of the zenith are right ascension $\alpha = \alpha_{MC}$ and declination $\delta = \phi$.

In a similar manner,

$$\mathbf{n}^{eqv} = \begin{bmatrix} -\sin \delta \cos \alpha_{MC} \\ -\sin \delta \sin \alpha_{MC} \\ \cos \delta \end{bmatrix}$$

and

$$\mathbf{e}^{eqv} = \begin{bmatrix} -\sin \alpha_{MC} \\ \cos \alpha_{MC} \\ 0 \end{bmatrix}.$$

Once again,

$$\text{Horizon: } \mathbf{g}_{HOR} = \mathbf{e} \times \mathbf{n} = \mathbf{z},$$

$$\text{Prime meridian: } \mathbf{g}_{PM} = \mathbf{z} \times \mathbf{n} = -\mathbf{e}, \text{ and,}$$

$$\text{Prime vertical: } \mathbf{g}_{PV} = \mathbf{z} \times \mathbf{e} = \mathbf{n}.$$

At this point it is useful to introduce the polar axes for the equator and ecliptic. The direction of the equatorial polar axis is that of the north pole, and in the equatorial coordinate system this is represented by $\mathbf{g}_{eqv} = \mathbf{k}$, where $\mathbf{k}$ is the unit vector in the direction of the positive z-axis (north pole), that is,

$$\mathbf{g}_{eqv} = \mathbf{k} = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}.$$

The ecliptic polar axis is obtained by rotating the equatorial polar axis through an angle ϵ , the

C. Ecliptic Coordinates. In astrology the ecliptic (or zodiacal) coordinates of longitude λ and latitude β are used almost exclusively. Ecliptic coordinates can be obtained by a rotation of equatorial coordinates to the ecliptic, by development from polar axes, or by using spherical trigonometry. Using coordinate rotation, any vector $\mathbf{x}^{eqv}$ in the equatorial system can be transformed to the ecliptic system using the rotation $\mathbf{x}^{ecl} = \mathbf{R}_1(\epsilon)\mathbf{x}^{eqv}$ [Ref. 3 and Appendix].

Without repeating the detail in the previous section, we find:

$$\begin{aligned} \mathbf{z}^{ecl} &= \begin{bmatrix} \cos \phi \cos \alpha_{MC} \\ \cos \phi \sin \alpha_{MC} \cos \epsilon + \sin \phi \sin \epsilon \\ -\cos \phi \sin \alpha_{MC} \sin \epsilon + \sin \phi \cos \epsilon \end{bmatrix}, \\ \mathbf{n}^{ecl} &= \begin{bmatrix} -\sin \phi \cos \alpha_{MC} \\ -\sin \phi \sin \alpha_{MC} \cos \epsilon + \cos \phi \sin \epsilon \\ \sin \phi \sin \alpha_{MC} \sin \epsilon + \cos \phi \cos \epsilon \end{bmatrix}, \end{aligned}$$

and

$$\mathbf{e}^{ecl} = \begin{bmatrix} -\sin \alpha_{MC} \\ \cos \alpha_{MC} \cos \epsilon \\ -\cos \alpha_{MC} \sin \epsilon \end{bmatrix}.$$

As before,

$$\text{Horizon: } \mathbf{g}_{HOR}^{ecl} = \mathbf{e} \times \mathbf{n} = \mathbf{z}^{ecl},$$

$$\text{Prime meridian: } \mathbf{g}_{PM}^{ecl} = \mathbf{z} \times \mathbf{n} = -\mathbf{e}^{ecl}, \text{ and,}$$

$$\text{Prime vertical: } \mathbf{g}_{PV}^{ecl} = \mathbf{z} \times \mathbf{e} = \mathbf{n}^{ecl}.$$

In addition,

$$\mathbf{g}_{eqv}^{ecl} = \begin{bmatrix} 0 \\ \sin \epsilon \\ \cos \epsilon \end{bmatrix}, \text{ and}$$

$$\mathbf{g}_{ecl}^{ecl} = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}.$$

The midheaven can be found from

$$\mathbf{x}_{MC}^{ecl} = \mathbf{g}_{ecl}^{ecl} \times \mathbf{g}_{PM}^{ecl} = \begin{bmatrix} \cos \alpha_{MC} \cos \epsilon \\ \sin \alpha_{MC} \\ 0 \end{bmatrix},$$

or

$$\lambda_{MC} = \text{atan2}(\sin \alpha_{MC}, \cos \alpha_{MC} \cos \epsilon); \quad (2)$$

the ascendant from

$$\mathbf{x}_{ASC}^{\text{ECL}} = \mathbf{g}_{\text{ECL}} \times \mathbf{g}_{\text{NOR}} \\ = \begin{bmatrix} -\cos \phi \sin \alpha_{MC} \cos \epsilon - \sin \phi \sin \epsilon \\ \cos \phi \cos \alpha_{MC} \\ 0 \end{bmatrix},$$

or

$$\lambda_{ASC} = \text{atan2}(\cos \phi \cos \alpha_{MC}, -\cos \phi \sin \alpha_{MC} \cos \epsilon - \sin \phi \sin \epsilon); \quad (3)$$

the vertex from

$$\mathbf{x}_{VX}^{\text{ECL}} = \mathbf{g}_{\text{ECL}} \times \mathbf{g}_{PV} \\ = \begin{bmatrix} \sin \phi \sin \alpha_{MC} \cos \epsilon - \cos \phi \sin \epsilon \\ -\sin \phi \cos \alpha_{MC} \\ 0 \end{bmatrix},$$

or

$$\lambda_{VX} = \text{atan2}(-\sin \phi \cos \alpha_{MC}, \sin \phi \sin \alpha_{MC} \cos \epsilon - \cos \phi \sin \epsilon); \quad (4)$$

and the east point from

$$\mathbf{x}_{EP}^{\text{ECL}} = \mathbf{g}_{\text{ECL}} \times \mathbf{g}_{\text{EOR}} = \begin{bmatrix} -\cos \phi \sin \alpha_{MC} \\ \cos \phi \cos \alpha_{MC} \cos \epsilon \\ -\cos \phi \cos \alpha_{MC} \sin \epsilon \end{bmatrix}.$$

Observe that the east point has nonzero latitude since it is not on the ecliptic (except in very special circumstances). To compute the longitude of the east point, we have

$$\lambda_{EP} = \text{atan2}(\cos \phi \cos \alpha_{MC} \cos \epsilon / |\mathbf{x}_{EP}|, -\cos \phi \sin \alpha_{MC} / |\mathbf{x}_{EP}|) \\ = \text{atan2}(\cos \alpha_{MC} \cos \epsilon, -\sin \alpha_{MC}). \quad (5)$$

The final formula is obtained by noting that the common term, $|\mathbf{x}_{EP}| = \cos \phi$, cancels out. When needed, the latitude of the east point can be computed from

$$\beta_{EP} = \sin^{-1}(-\cos \phi \cos \alpha_{MC} \sin \epsilon / |\mathbf{x}_{EP}|) \\ = \sin^{-1}(-\cos \alpha_{MC} \sin \epsilon).$$

Finally, the equatorial ascendant is defined as the intersection of the ecliptic with a great circle passing through the celestial north pole and the east

and west points. For lack of better nomenclature, let this “polar axis circle” be denoted by $\mathbf{g}_{ASC}$. Then,

$$\mathbf{g}_{PAC} = \mathbf{g}_{\text{EQU}} \times \mathbf{g}_{PM} = \begin{bmatrix} \cos \alpha_{MC} \\ \sin \alpha_{MC} \cos \epsilon \\ -\sin \alpha_{MC} \sin \epsilon \end{bmatrix}.$$

The equatorial ascendant is then determined by

$$\mathbf{x}_{EA}^{\text{ECL}} = \mathbf{g}_{\text{ECL}} \times \mathbf{g}_{PAC} = \begin{bmatrix} -\sin \alpha_{MC} \cos \epsilon \\ \cos \alpha_{MC} \\ 0 \end{bmatrix},$$

from which the longitude is

$$\lambda_{EA} = \text{atan2}(\cos \alpha_{MC}, -\sin \alpha_{MC} \cos \epsilon). \quad (6)$$

The standard formulas for computing the ecliptic position (longitude and latitude) of various sensitive points have been presented in this section. If they appear to be somewhat different than usual, it is only because they are expressed in component form rather than being rearranged into some more compact form. The formulas for the midheaven and ascendant are valid for all non-polar latitudes and the formula for the vertex is valid for all non-tropical latitudes. The behavior of these formulas in other latitudes, the so-called extreme latitudes, is discussed in Section II.

II. Sensitive Points at Extreme Latitudes

Although not used too frequently by astrologers, it will be convenient to convert ecliptic coordinates of sensitive points to the azimuth/altitude system. Using this system, it is easy to analyze the behavior of the sensitive points, when calculated using the standard formulas of the previous section, with respect to being above or below the horizon and whether they are toward the east or west. The origin of this system is the observer's position; the altitude a is the angle from the horizon to the point measured perpendicularly to the horizon (the angle is positive if the point is above the horizon, and negative otherwise) and the azimuth A is the angle measured clockwise (toward the east) from north to the perpendicular projection of the point onto the

plane of the horizon. The general transformation is given by

$$\mathbf{x}^{\text{AZ}} = \mathbf{R}_3(180^\circ) \mathbf{R}_2(90^\circ - \phi) \begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \\ \times \mathbf{R}_3(\theta = \alpha_{MC}) \mathbf{R}_1(-\epsilon) \mathbf{x}^{\text{ECL}}, \quad (7)$$

where θ denotes the sidereal time and $\mathbf{R}_3(\theta)$ is evaluated at sidereal time $\theta = \alpha_{MC}$.

When the coordinates of the midheaven, ascendant, and vertex are transformed to the azimuth/altitude system, a curious relationship between these three sensitive points becomes evident. These sensitive points are given by

$$\mathbf{x}_{MC}^{\text{AZ}} = \begin{bmatrix} A \\ 0 \\ B \end{bmatrix}, \quad \mathbf{x}_{AC}^{\text{AZ}} = \begin{bmatrix} C \\ 0 \\ B \end{bmatrix}, \quad \text{and} \quad (8)$$

$$\mathbf{x}_{VX}^{\text{AZ}} = \begin{bmatrix} 0 \\ A \\ -C \end{bmatrix},$$

where

$$A = \cos \phi \sin \alpha_{MC} \sin \epsilon - \sin \phi \cos \epsilon, \\ B = \sin \phi \sin \alpha_{MC} \sin \epsilon + \cos \phi \cos \epsilon, \quad \text{and} \quad (9) \\ C = \cos \alpha_{MC} \sin \epsilon.$$

Results are given below.

A. Midheaven. Using the results cited above (Equ. 8), the azimuth of the midheaven is

$$A_{MC} = \text{atan2}(0, A)$$

and its altitude is

$$\alpha_{MC} = \sin^{-1} \left(\frac{B}{\sqrt{A^2 + B^2}} \right),$$

where $A^2 + B^2 = 1 - \cos^2 \alpha_{MC} \sin^2 \epsilon$.

Since the y-component of $\mathbf{x}_{MC}$ is zero, the midheaven is either north or south of the zenith; it is south whenever A , the x-component of $\mathbf{x}_{MC}$, is negative, and north whenever A is positive.

Of greater interest is when the calculated value of the midheaven is above the horizon, $\alpha_{MC} > 0$, or

$$\min \mathcal{B} = \min(\sin \phi \sin \alpha_{MC} \sin \epsilon + \cos \phi \cos \epsilon) > 0.$$

Notice that $\sin \epsilon$, $\cos \phi$, and $\cos \epsilon$ are all positive quantities and that $\sin \phi$ may be either positive or negative. The analysis breaks down into two cases depending upon the sign of ϕ . First, when $\phi > 0$, the right-hand side of Equation 10 can be minimized by choosing α_{MC} in such a way that $\sin \alpha_{MC} = -1$, so that $\sin \alpha_{MC} \sin \epsilon = -\sin \epsilon$, as small as possible, namely, so that $\sin \alpha_{MC} = -1$, or

$$-\sin \phi \sin \epsilon + \cos \phi \cos \epsilon > 0,$$

which is equivalent to

$$\sin \phi \sin \epsilon < \cos \phi \cos \epsilon \quad \text{or} \\ \tan \phi < \cot \epsilon = \tan(90^\circ - \epsilon)$$

or $0 < \phi < 90^\circ - \epsilon$. Similarly, when $\phi < 0$, $\sin \phi$ is negative, and the right-hand side of Equation 10 can be minimized by choosing α_{MC} in such a way that $\sin \alpha_{MC}$ is as large as possible, namely, so that $\sin \alpha_{MC} = +1$, which implies that $-90^\circ + \epsilon < \phi < 0$. Thus, these two cases are satisfied simultaneously whenever $-90^\circ + \epsilon < \phi < 90^\circ - \epsilon$, in other words, when ϕ is a tropic or temperate latitude.

To determine when it is possible to have the altitude $a = 0$, we must require that

$$\mathcal{B} = \sin \phi \sin \alpha_{MC} \sin \epsilon + \cos \phi \cos \epsilon = 0$$

or

$$\sin \alpha_{MC} = -\frac{1}{\tan \phi \tan \epsilon}. \quad (11)$$

For this equation to have a solution, the right-hand side of Equation 11 must lie in the interval $[-1, 1]$. This means that we must have either $\tan \phi \tan \epsilon \geq 1$ or $\tan \phi \tan \epsilon \leq -1$. The first inequality holds whenever $\phi \geq 90^\circ - \epsilon$, and the second inequality holds whenever $\phi \leq -90^\circ + \epsilon$. In other words, the only situation in which the midheaven can be on the horizon is when ϕ is a polar latitude. When ϕ is a polar latitude, we find that α_{MC} can have one of two values:

$$\alpha_{MC} = \begin{cases} \sin^{-1} \left(-\frac{1}{\tan \phi \tan \epsilon} \right) \bmod 360^\circ \\ 180^\circ - \sin^{-1} \left(-\frac{1}{\tan \phi \tan \epsilon} \right) \bmod 360^\circ \end{cases} \quad (12)$$

If $\phi = 90^\circ - \epsilon$, the midheaven is on the horizon when $\alpha_{MC} = 270^\circ$, or at a sidereal time of 18 hours. As the latitude increases, the midheaven (when calculated by the usual formula) is below the horizon for an interval centered around 18 hours sidereal time, determined by the two values of α_{MC} : as the latitude increases to 90° , the interval increases and extends from 12 hours to 24 hours in sidereal time. In a similar manner, if $\phi = -90^\circ + \epsilon$, the midheaven is on the horizon when $\alpha_{MC} = 90^\circ$, or at a sidereal time of 6 hours. As the latitude decreases, the midheaven is below the horizon for an interval centered around 6 hours sidereal time, and as the latitude decreases to -90° , the interval increases and extends from 0 hours to 12 hours in sidereal time.

Example: The Midheaven above the Arctic Circle. Analyze the general behavior of the midheaven at latitude 75° north and take the obliquity $\epsilon = 23^\circ 26' 33'' = 23.4425^\circ$, then find the specific behavior at a sidereal time of $\theta = 16$ hours, or $\alpha_{MC} = 240^\circ$.

At a latitude of 75° north, the midheaven can be on the horizon when (see Equ. 12)

$$\begin{aligned}\alpha_{MC} &= \sin^{-1} \left(-\frac{1}{\tan \phi \tan \epsilon} \right) \bmod 360^\circ \\ &= \sin^{-1} \left(-\frac{1}{1.61829} \right) \bmod 360^\circ \\ &= \sin^{-1}(-0.61794) \bmod 360^\circ \\ &= -38^\circ 16' 56'' \bmod 360^\circ \\ &= 321^\circ 8' 344'' = 321^\circ 50' 04'',\end{aligned}$$

and when

$$\begin{aligned}\alpha_{MC} &= 180^\circ - (-38^\circ 16' 56'') \bmod 360^\circ \\ &= 218^\circ 16' 56'' = 218^\circ 09' 56''.\end{aligned}$$

Therefore, at latitude 75° north, the midheaven, when calculated using the standard formula, is below the horizon whenever α_{MC} is between $218^\circ 09' 56''$

³This value of the obliquity will be used in all of the examples, not because it is current but because the decimal version cited is exact. Further, for computational purposes, all trigonometric values were performed on a computer using ten significant figures; intermediate results are displayed to five significant figures.

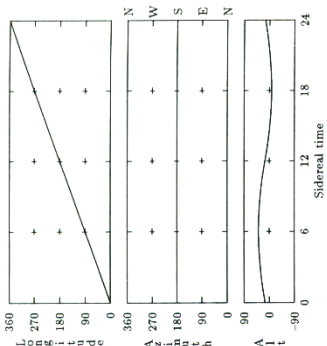


Figure 2a. Midheaven at 75° north.

and $321^\circ 50' 04''$, or whenever the sidereal time is between $14^\circ 32' 40''$ and $21^\circ 27' 20''$ (Fig. 2a).

Specifically, when $\alpha_{MC} = 240^\circ$, the longitude of the midheaven (Equ. 2) is

$$\begin{aligned}\lambda_{MC} &= \text{atan2}(\sin \alpha_{MC}, \cos \alpha_{MC} \cos \epsilon) \\ &= \text{atan2}(-0.86603, -0.5 \times 0.97146) \\ &= \text{atan2}(-0.86603, -0.48573) \\ &= 242^\circ 09' 00'' = 242^\circ 05' 24''.\end{aligned}$$

The azimuth of the midheaven is

$$\begin{aligned}A_{MC} &= \text{atan2}(0, A) \\ &= \text{atan2}(0, \cos \phi \sin \alpha_{MC} \sin \epsilon - \sin \phi \cos \epsilon) \\ &= \text{atan2}(0, -0.089171 - 0.88620) \\ &= \text{atan2}(0, -0.97537) = 180^\circ,\end{aligned}$$

which is south, and the altitude is

$$\begin{aligned}\alpha_{MC} &= \sin^{-1} \left(\frac{\sin \phi \sin \alpha_{MC} \sin \epsilon + \cos \phi \cos \epsilon}{\sqrt{1 - \cos^2 \alpha_{MC} \sin^2 \epsilon}} \right) \\ &= \sin^{-1} \left(\frac{-0.33279 + 0.23746}{\sqrt{1 - 0.039567}} \right) \\ &= \sin^{-1} \left(\frac{-0.095334}{0.98002} \right) \\ &= \sin^{-1}(-0.097278) = -5^\circ 58' 24'' = -5^\circ 34' 57'',\end{aligned}$$

which is below the horizon, as was known from the previous analysis. Actually, it is sufficient to notice that the sign of the numerator of the argument of the arcsine function is negative to determine that the midheaven, calculated by this standard formula, is below the horizon. For the midheaven to be above the horizon, the astrolager must use the antipode (which would normally be the IC) of $62^\circ 05' 24''$. This antipode is to the north.

Example: The Midheaven below the Arctic Circle. Analyze the general behavior of the midheaven at latitude 70° south, then find the specific behavior at a sidereal time of $\theta = 7$ hours, or $\alpha_{MC} = 105^\circ$.

Similarly to the previous example, at a latitude of 70° south, the midheaven can be on the horizon when (Equ. 12),

$$\begin{aligned}\alpha_{MC} &= \sin^{-1} \left(-\frac{1}{\tan \phi \tan \epsilon} \right) \bmod 360^\circ \\ &= \sin^{-1} \left(-\frac{1}{-1.19136} \right) \bmod 360^\circ \\ &= \sin^{-1}(0.83938) \bmod 360^\circ \\ &= 57^\circ 07' 44'' \bmod 360^\circ \\ &= 57^\circ 07' 44'' = 57^\circ 04' 28'',\end{aligned}$$

and when

$$\begin{aligned}\alpha_{MC} &= 180^\circ - (57^\circ 07' 44'') \bmod 360^\circ \\ &= 122^\circ 52' 56'' = 122^\circ 55' 32''.\end{aligned}$$

Therefore, at latitude 70° south, the midheaven, when calculated using the standard formula, is below the horizon whenever α_{MC} is between $57^\circ 04' 28''$ and $122^\circ 55' 32''$, or whenever the sidereal time is between $3^\circ 48' 18''$ and $8^\circ 11' 42''$ (this barely shows in Fig. 2b).

Specifically, when $\alpha_{MC} = 105^\circ$, the longitude of the midheaven is

$$\begin{aligned}\lambda_{MC} &= \text{atan2}(\sin \alpha_{MC}, \cos \alpha_{MC} \cos \epsilon) \\ &= \text{atan2}(0.96593, -0.23746) \\ &= 103^\circ 8' 13'' = 103^\circ 48' 41'',\end{aligned}$$

the azimuth of the midheaven is

$$\begin{aligned}A_{MC} &= \text{atan2}(0, \cos \phi \sin \alpha_{MC} \sin \epsilon - \sin \phi \cos \epsilon) \\ &= \text{atan2}(0, 0.98356) = 0^\circ,\end{aligned}$$

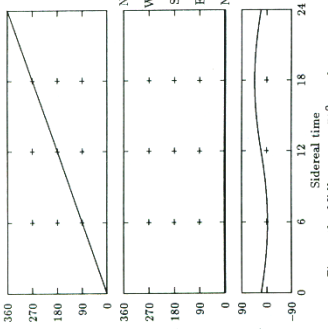


Figure 2b. Midheaven at 70° south.

which is north (darkened for emphasis in Fig. 2b), and the altitude is

$$\begin{aligned}\alpha_{MC} &= \sin^{-1} \left(\frac{\sin \phi \sin \alpha_{MC} \sin \epsilon + \cos \phi \cos \epsilon}{\sqrt{1 - \cos^2 \alpha_{MC} \sin^2 \epsilon}} \right) \\ &= \sin^{-1} \left(\frac{-0.047309}{0.99468} \right) \\ &= \sin^{-1}(-0.047561) \\ &= -2^\circ 27' 261'' = -2^\circ 43' 34'',\end{aligned}$$

which is below the horizon, as had been determined previously.

B. Ascendant. Using the standard equation for the ascendant, we wish to know under what circumstances the ascendant is toward the east—or, more likely, we are concerned about the possibility that the ascendant could be in the west. The azimuth of the ascendant can be computed from the x- and y-components of $\mathbf{x}_{ASC}^{AZ}$ (Equ. 8):

$$A_{ASC} = \text{atan2}(\mathcal{B}, \mathcal{C}).$$

For the ascendant to be in the east, it is sufficient that the numerator, the y-component of $\mathbf{x}_{ASC}^{AZ}$, be positive. That is, we require

$$\mathcal{B} = \sin \phi \sin \alpha_{MC} \sin \epsilon + \cos \phi \cos \epsilon > 0. \quad (13)$$

Note, however, that in the azimuth/altitude system, the y-component of the ascendant is the same

as the z-component of the midheaven, and an analysis of this component has been done in the previous section. To make the equivalence, one needs to substitute the words "to the west" in the ascendant argument for the words "below the horizon" in the midheaven argument.

In particular, close to the arctic circle, the ascendant behaves in the following manner: As the latitude increases and nears the arctic circle, the ascendant passes through a complete 360° as the sidereal time goes through a full 24 hours. During this interval, the azimuth of the ascendant moves from the northeast through east to almost due south as the sidereal time varies from 0 hours to close to 18 hours. As the sidereal time passes through 18 hours, the azimuth moves rapidly from almost due south to almost due north. Finally, as the sidereal time varies from just after 18 hours to 24 hours, the azimuth moves from almost north to northeast (Fig. 3a).

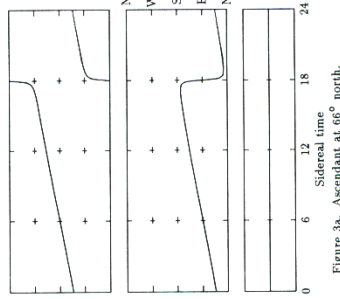


Figure 3a. Ascendant at 66° north.

When the latitude is just above the arctic circle at 67°, the ascendant moves from about 139° to 259° as the sidereal time varies from 0 hours to 17^h12^m51^s (Eq. 12) and the azimuth moves from northeast to south. From sidereal time 17^h12^m51^s to 18^h47^m09^s, the ascendant motion is rapidly retrograde from 259° to 101° while the azimuth changes rapidly from south to west to north. Finally, as the sidereal time varies from 18^h47^m09^s to 24^h, the ascendant motion is direct from 101° to

133° and the azimuth changes slowly from north to northeast. One point to be noted is that, when using the standard equation for the ascendant at $\phi = 67^\circ$, the ascendant never has a value between 0° to 101° and 259° to 360° (Fig. 3b).

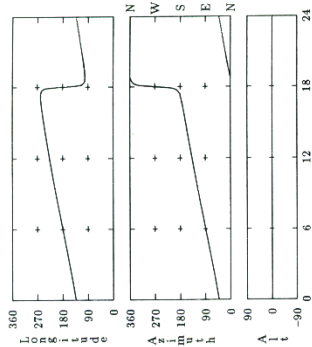


Figure 3b. Ascendant at 67° north.

At an extreme latitude of, say 89° N, the ascendant is never more than a degree or two from 180° (0°), while the azimuth varies linearly from north at sidereal time 0^h to east at sidereal time 6^h to south at sidereal time 12^h to west at sidereal time 18^h and back to north at sidereal time 24^h (Fig. 3c).

When the latitude is on the arctic circle, $\phi = 90^\circ = \epsilon$, Equation 3 becomes

$$\lambda_{ASC} = \arctan\left(\frac{\sin \epsilon \cos \alpha_{MC}}{-\sin \epsilon \cos(1 + \sin \alpha_{MC})}\right).$$

Then, setting $\alpha_{MC} = 270^\circ$, this equation degenerates to

$$\lambda_{ASC} = \arctan(0/0),$$

which means that the arctangent, and hence the ascendant, is indeterminate; that is, it can take on any value. Stated another way, the equation is satisfied for all values of λ_{ASC} . Physically, this means that the ecliptic has become coincident with the horizon, and so all points of the ecliptic are on the ascendant simultaneously. One way of interpreting this result is given in Reference 2.

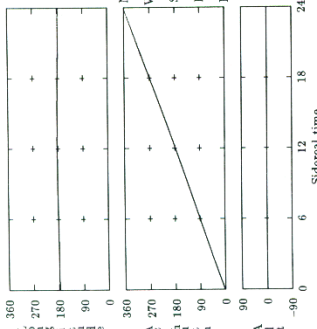


Figure 3c. Ascendant at 89° north.

Alternate Development. The behavior of the ascendant in extreme latitudes seems to be of the greatest concern to astrologers; hence, an alternative way of examining the problem may be of interest. As shown earlier (Eq. 3), the ecliptic coordinates of the ascendant are given by

$$\mathbf{x}_{ASC}^{ECL} = \begin{bmatrix} -\cos \phi \sin \alpha_{MC} \cos \epsilon - \sin \phi \sin \epsilon \\ \cos \phi \cos \alpha_{MC} \\ 0 \end{bmatrix},$$

from which the longitude of the ascendant is found to be

$$\lambda_{ASC} = \tan^{-1} \frac{\cos \phi \cos \alpha_{MC}}{-\cos \phi \sin \alpha_{MC} \cos \epsilon - \sin \phi \sin \epsilon}.$$

The arctangent form of the longitude is used here since, at the moment, we are not interested in properly determining the quadrant of the ascendant, but rather in its motion as a function of α_{MC} . The motion is obtained by taking the partial derivative of λ_{ASC} with respect to α_{MC} :

$$\frac{\partial \lambda_{ASC}}{\partial \alpha_{MC}} = \frac{\cos \phi \cos \epsilon + \sin \phi \sin \alpha_{MC} \sin \epsilon}{(\cos \phi \sin \alpha_{MC} \cos \epsilon + \sin \phi \sin \epsilon)^2}.$$

To find when the ascendant is stationary with respect to increasing α_{MC} , equate this derivative to zero. Since the denominator is always positive, it cancels out as does the factor $\cos \phi$ in the numerator. What we are left with is that the ascendant is stationary whenever

$$\cos \phi \cos \epsilon + \sin \phi \sin \alpha_{MC} \sin \epsilon = 0,$$

or

$$\sin \alpha_{MC} = -\frac{1}{\tan \phi \tan \epsilon}.$$

Once more we arrive at the same equation analyzed in the discussion of the midheaven (Eq. 11).

In the polar latitudes we find that the ascendant behaves normally (as we expect it to behave) when its azimuth is easterly; however, the ascendant is retrograde whenever its azimuth is westerly.

Additional Insight. When discussing the behavior of the midheaven in polar regions, it seems intuitively reasonable that we should have the midheaven on or above the horizon. So, too, with the ascendant it seems intuitive that the ascendant should be toward the east since "things rise in the east." House [Ref. 2] proposed the following definition for the ascendant to cover all cases:

"For a given latitude and a given time, the ascendant is that unique point on the ecliptic which is also on the rational horizon and which will be above the horizon an infinitesimal moment of time later."

The key here is that the point will be above the horizon an infinitesimal moment later—in our terminology, the time-rate-of-change of the altitude of the ascendant must be positive. Since clock time and sidereal time are both monotonically increasing functions, it will suffice to determine the rate of change of the altitude of the ascendant with respect to sidereal time. The easiest way to proceed is to take the partial derivative of Equation 7 with respect to sidereal time θ and evaluate the result at $\theta = \alpha_{MC}$. We find

$$\frac{\partial \mathbf{x}_{ASC}^{ECL}}{\partial \theta} \bigg|_{\theta=\alpha_{MC}} = \mathbf{R}_3(-180^\circ) \mathbf{R}_2(90^\circ - \phi) \times \begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \frac{\partial \mathbf{R}_3(\theta = \alpha_{MC})}{\partial \theta} \mathbf{R}_1(-\epsilon) \mathbf{x}_{ASC}^{ECL},$$

where

$$\frac{\partial \mathbf{R}_3(\theta)}{\partial \theta} = \begin{bmatrix} -\sin \theta & \cos \theta & 0 \\ -\cos \theta & -\sin \theta & 0 \\ 0 & 0 & 0 \end{bmatrix}.$$

Without going through the details of the simplification, the result is

$$\frac{\partial \mathbf{x}_{ASC}^{ECL}}{\partial \theta} \bigg|_{\theta=\alpha_{MC}} \equiv \begin{bmatrix} \dot{y} \\ \dot{z} \end{bmatrix} = \begin{bmatrix} -B \sin \phi \\ C \sin \phi \\ B \cos \phi \end{bmatrix}.$$

Since the altitude of the ascendant can be computed from

$$\alpha_{ASC} = \tan^{-1} \frac{z}{\sqrt{x^2 + y^2}},$$

where x , y and z denote the components of $\mathbf{x}_{ASC}$, we find that

$$\frac{\partial \alpha_{ASC}}{\partial \theta} \bigg|_{\theta=\alpha_{MC}} = \frac{z \sqrt{x^2 + y^2}}{x^2 + y^2 + z^2} = \frac{B \cos \phi}{\sqrt{B^2 + C^2}}.$$

For the altitude of the ascendant to be increasing, we require that

$$\frac{\partial \alpha_{ASC}}{\partial \theta} \bigg|_{\theta=\alpha_{MC}} = \frac{B \cos \phi}{\sqrt{B^2 + C^2}} > 0.$$

Because both $\cos \phi$ and $\sqrt{B^2 + C^2}$ are never negative, requiring the altitude of the ascendant to be increasing is equivalent to requiring

$$B = \sin \phi \sin \alpha_{MC} \sin \epsilon + \cos \phi \cos \epsilon > 0.$$

This requirement (Equ. 13) has already been examined in detail (see Equ. 12). It confirms our intuition in that the altitude of the ascendant is increasing *only* when the azimuth of the ascendant is to the east. If one wishes to use this criteria, then, in polar latitudes, one must tolerate an ascendant that can be both discontinuous and retrograde in time.

Example: The Ascendant above the Arctic Circle. Analyze the general behavior of the ascendant at latitude 75° north, then find the specific behavior at sidereal time $\theta = 16$ hours, or $\alpha_{MC} = 240^\circ$.

As discussed previously, for a specified latitude, the formulae for both the ascendant and midheaven are unconventional during the same interval of sidereal time. In Example A, we found that the midheaven required special attention at latitude 75° north whenever α_{MC} is between $218^\circ 09' 56''$ and $321^\circ 50' 04''$, or whenever the sidereal time is between $14^h 32^m 40^s$ and $21^h 27^m 20^s$. The ascendant requires special consideration in this same interval (Fig. 4a).

In particular, when $\alpha_{MC} = 240^\circ$, the longitude of the ascendant (Equ. 3) is

$$\begin{aligned} \lambda_{ASC} &= \text{atan2}(\cos \phi \cos \alpha_{MC}, \\ &\quad -\cos \phi \sin \alpha_{MC} \cos \epsilon - \sin \phi \sin \epsilon) \\ &= \text{atan2}(-0.12941, -0.17863) \\ &= 215^\circ 59' 21'' = 215^\circ 55' 18''. \end{aligned}$$

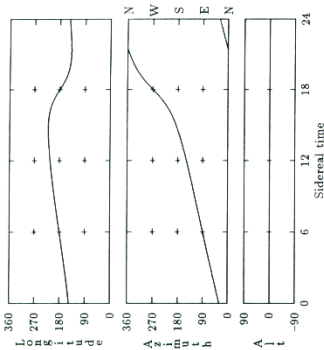


Figure 4a. Ascendant at 75° north.

The azimuth of the ascendant is

$$\begin{aligned} A_{ASC} &= \text{atan2}(B, C) \\ &= \text{atan2}(-0.095334, -0.19891) \\ &= 205^\circ 60' 71'' = 205^\circ 36' 26'', \end{aligned}$$

which is to the west. Thus it is up to the astrologer to decide whether to place the ascendant in the chart to the west or to use the antipode of $25^\circ 36' 26''$, which is in the east.

Example: The Ascendant below the Arctic Circle. Analyze the general behavior of the ascendant at latitude 70° south, then find the specific behavior at sidereal time $\theta = 7$ hours, or $\alpha_{MC} = 105^\circ$.

As in the previous example, the formula for the ascendant, at 70° south latitude, requires special attention when $57^\circ 04' 28'' \leq \alpha_{MC} \leq 122^\circ 55' 32''$ (Fig. 4b).

When $\alpha_{MC} = 105^\circ$, the longitude of the ascendant (Equ. 3) is

$$\begin{aligned} \lambda_{ASC} &= \text{atan2}(\cos \phi \cos \alpha_{MC}, \\ &\quad -\cos \phi \sin \alpha_{MC} \cos \epsilon - \sin \phi \sin \epsilon) \\ &= \text{atan2}(-0.088521, 0.070739) \\ &= 308^\circ 62' 90'' = 308^\circ 37' 44'', \end{aligned}$$

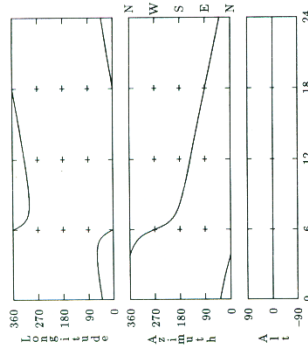


Figure 4b. Ascendant at 70° south.

and the azimuth of the ascendant is

$$\begin{aligned} A_{ASC} &= \text{atan2}(B, C) \\ &= \text{atan2}(-0.047309, -0.10297) \\ &= 204^\circ 67' 69'' = 204^\circ 40' 37'', \end{aligned}$$

which is to the west.

C. Vertex. From Equation 8, the azimuth of the vertex is

$$A_{VX} = \text{atan2}(A, 0),$$

and its altitude is

$$\alpha_{VX} = \sin^{-1} \left(\frac{-C}{\sqrt{A^2 + C^2}} \right).$$

The vertex is in the west (east) whenever the y -component of $\mathbf{x}_{VX}$, A , is negative (positive). So for the vertex to be west, we ask, “when is

$$A = \cos \phi \sin \alpha_{MC} \sin \epsilon - \sin \phi \cos \epsilon \leq 0?$$

or, rearranging, “when is

$$\tan \phi \geq \sin \alpha_{MC} \tan \epsilon?$$

If we want to know under what conditions the vertex is *always* west, we ask, “when is

$$\tan \phi \geq \max(\sin \alpha_{MC} \tan \epsilon)$$

$$\geq \tan \epsilon \max(\sin \alpha_{MC})$$

$$\geq \tan \epsilon?$$

The answer is, whenever $\phi \geq \epsilon$. Similarly, we find that the vertex is east whenever $\phi \leq -\epsilon$. One aspect of this solution is the well-known fact that, in the tropics, the computed vertex is sometimes west and sometimes east. Just when this is so depends upon the value of α_{MC} as well as some additional analysis.

Considering the region in which $\phi \in (-\epsilon, \epsilon)$, we find that the vertex is to the west whenever $\sin \alpha_{MC} \leq \tan \phi \tan \epsilon$. When equality holds, the resulting equation has two roots, namely,

$$\alpha_{MC} = \begin{cases} \sin^{-1} \left(\frac{\tan \phi}{\tan \epsilon} \right) \bmod 360^\circ \\ 180^\circ - \sin^{-1} \left(\frac{\tan \phi}{\tan \epsilon} \right) \bmod 360^\circ. \end{cases} \quad (14)$$

When ϕ is slightly smaller than ϵ , the vertex, in a small interval centered on sidereal time 6 hours, is discontinuously displaced to the east. As ϕ decreases, this interval becomes larger and larger. Finally, as ϕ approaches $-\epsilon$, the only interval in which the vertex remains to the west is centered around sidereal time 18 hours.

Thus as the latitude varies from 90° to -90° , the vertex, using the formula given above, remains in the west until the latitude reaches ϵ . As the latitude continues to decrease, the vertex is in the east for larger and larger intervals of sidereal time until, when $\phi = -\epsilon$, the vertex is always in the east and remains so as the latitude approaches the south pole.

Example: The Vertex in the Northern Tropic Zone. Analyze the general behavior of the vertex at latitude 15° north, then find the specific behavior at sidereal time $\theta = 4$ hours, or $\alpha_{MC} = 60^\circ$.

From Equ. 14, we compute the factors

$$\begin{aligned} \sin^{-1} \left(\frac{\tan \phi}{\tan \epsilon} \right) &= \sin^{-1} \left(\frac{0.26795}{0.43362} \right) = \sin^{-1} 0.61794 \\ &= 38^\circ 16' 56'' = 38^\circ 09' 56'' \end{aligned}$$

and

$$180^\circ - \sin^{-1} \left(\frac{\tan \phi}{\tan \epsilon} \right) = 141^\circ 50' 04''.$$

Because the desired latitude is to the north, the interval $(2^h 32^m 40^s, 9^h 27^m 20^s)$ is centered about

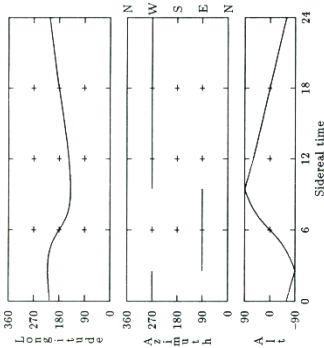


Figure 5a. Vertex at 15° north.

6 hours sidereal time, in which the vertex formula yields easterly positions (Fig. 5a).

In particular, when $\alpha_{MC} = 60^\circ$, the longitude of the vertex is (Equ. 3)

$$\begin{aligned}\lambda_{vx} &= \text{atan2}(-\sin \phi \cos \alpha_{MC}, \\ &\quad \sin \phi \sin \alpha_{MC} \cos \epsilon - \cos \phi \sin \epsilon) \\ &= \text{atan2}(-0.12941, -0.17863) \\ &= 215^\circ 55' 18'',\end{aligned}$$

the azimuth of the vertex is

$$\begin{aligned}A_{MC} &= \text{atan2}(A, 0) \\ &= \text{atan2}(\cos \phi \sin \alpha_{MC} \sin \epsilon - \sin \phi \cos \epsilon, 0) \\ &= \text{atan2}(0.095334, 0) = 90^\circ,\end{aligned}$$

which is east, and the altitude is

$$\begin{aligned}a_{vx} &= \sin^{-1} \left(\frac{-C}{\sqrt{A^2 + C^2}} \right) \\ &= \sin^{-1} \left(\frac{-0.19891}{\sqrt{(0.095334)^2 + (-0.19891)^2}} \right) \\ &= \sin^{-1} \left(\frac{-0.19891}{0.22058} \right) \\ &= \sin^{-1}(-0.90178) = -64^\circ 23' 34'',\end{aligned}$$

which is below the horizon.

Example: The Vertex in the Southern Tropic Zone. Analyze the general behavior of the vertex at latitude 20° south, then find the specific behavior at sidereal time $\theta = 7$ hours, or $\alpha_{MC} = 105^\circ$.

From Equation 14, we compute the factors

$$\begin{aligned}\sin^{-1} \left(\frac{\tan \phi}{\tan \epsilon} \right) &= \sin^{-1} \left(\frac{-0.36397}{0.43362} \right) \\ &= \sin^{-1}(-0.83938) = -57^\circ 07' 44'' \\ &= -57^\circ 04' 28'' = 302^\circ 55' 32''\end{aligned}$$

and

$$180^\circ - \sin^{-1} \left(\frac{\tan \phi}{\tan \epsilon} \right) = 237^\circ 04' 28''.$$

Because the desired latitude is to the south, the interval $(15^\circ 48' 18'', 20^\circ 11' 42'')$ is centered about 18 hours sidereal time, in which the vertex formula yields westerly positions; for all other times, the vertex formula yields easterly positions (Fig. 5b).

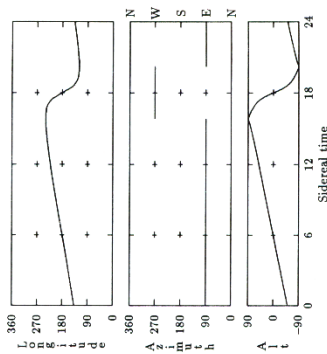


Figure 5b. Vertex at 20° south.

In particular, when $\alpha_{MC} = 60^\circ$, the standard formula for the longitude of the vertex (Equ. 3) will yield an easterly position, as follows:

$$\begin{aligned}\lambda_{vx} &= \text{atan2}(-\sin \phi \cos \alpha_{MC}, \\ &\quad \sin \phi \sin \alpha_{MC} \cos \epsilon - \cos \phi \sin \epsilon) \\ &= \text{atan2}(-0.088521, -0.67693) \\ &= 187^\circ 45' 02'' = 187^\circ 27' 01''.\end{aligned}$$

B. The North and East Vectors. Let μ and ν denote the (generic) spherical coordinates—longitude (or right ascension) and latitude (or declination), respectively—of a point $\mathbf{z}$ on a unit sphere. That is,

$$\mathbf{z} = \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} \cos \nu \cos \mu \\ \cos \nu \sin \mu \\ \sin \nu \end{bmatrix}.$$

We can think of $\mathbf{z}$ as the unit vector normal to the surface at the point. Two other unit vectors which can be defined in the tangent plane to the earth's surface at the point $\mathbf{z}$ are local north $\mathbf{n}$ and local east $\mathbf{e}$,

$$\begin{aligned}\mathbf{n} &= \frac{\partial \mathbf{z} / \partial \nu}{|\partial \mathbf{z} / \partial \nu|} = \begin{bmatrix} -\sin \nu \cos \mu \\ -\sin \nu \sin \mu \\ \cos \nu \end{bmatrix} \quad \text{and} \\ \mathbf{e} &= \frac{\partial \mathbf{z} / \partial \mu}{|\partial \mathbf{z} / \partial \mu|} = \begin{bmatrix} -\sin \mu \\ \cos \mu \\ 0 \end{bmatrix}.\end{aligned}$$

The three vectors $\mathbf{z}$, $\mathbf{e}$, and $\mathbf{n}$ form an orthonormal coordinate system, that is,

$$\mathbf{n} = \mathbf{z} \times \mathbf{e}, \quad \mathbf{z} = \mathbf{e} \times \mathbf{n}, \quad \mathbf{e} = \mathbf{n} \times \mathbf{z}$$

and

$$|\mathbf{z}| = |\mathbf{e}| = |\mathbf{n}| = 1.$$

The magnitude of a vector $\mathbf{x}$ is denoted by $|\mathbf{x}|$ and is equal to $\sqrt{x^2 + y^2 + z^2}$. In the case of unit vectors, the magnitude is one.

C. Spherical Coordinates from Rectangular Coordinates. In the previous section, the rectangular x -, y -, and z -coordinates of a point were computed from the generic spherical coordinates μ and ν . Conversely, if the rectangular coordinates are known, the spherical coordinates can be computed from

$$\begin{aligned}\mu &= \text{atan2}(y/|z|, x/|z|) \\ &= \text{atan2}(y, x), \quad \text{and} \\ \nu &= \sin^{-1} \frac{z}{|\mathbf{z}|},\end{aligned}$$

where $|\mathbf{z}| = \sqrt{z^2 + y^2 + x^2}$.

The azimuth of the vertex is

$$\begin{aligned}A_{MC} &= \text{atan2}(A, 0) \\ &= \text{atan2}(\cos \phi \sin \alpha_{MC} \sin \epsilon - \sin \phi \cos \epsilon, 0) \\ &= \text{atan2}(0.67489, 0) = 90^\circ,\end{aligned}$$

which is east. The altitude is

$$\begin{aligned}a_{vx} &= \sin^{-1} \left(\frac{-C}{\sqrt{A^2 + C^2}} \right) \\ &= \sin^{-1} \left(\frac{-(-0.10297)}{\sqrt{(0.67489)^2 + (-0.10297)^2}} \right) \\ &= \sin^{-1} \left(\frac{0.10297}{0.68270} \right) \\ &= \sin^{-1}(0.15082) = 8^\circ 40' 28'',\end{aligned}$$

which is above the horizon.

III. Appendix

A. The Cross Product. The cross product, or vector product, of two vectors,

$$\mathbf{x}_1 = \begin{bmatrix} x_1 \\ y_1 \\ z_1 \end{bmatrix} \quad \text{and} \quad \mathbf{x}_2 = \begin{bmatrix} x_2 \\ y_2 \\ z_2 \end{bmatrix},$$

can be defined by

$$\mathbf{w} = \mathbf{x}_1 \times \mathbf{x}_2 = \begin{bmatrix} y_1 z_2 - y_2 z_1 \\ z_1 x_2 - z_2 x_1 \\ x_1 y_2 - x_2 y_1 \end{bmatrix}.$$

It is important to note that the cross product of two vectors is not commutative, that is, $\mathbf{x}_1 \times \mathbf{x}_2 \neq \mathbf{x}_2 \times \mathbf{x}_1$, but rather $\mathbf{x}_1 \times \mathbf{x}_2 = -\mathbf{x}_2 \times \mathbf{x}_1$. It is equally important that the cross product produces a vector which is perpendicular to the two vectors being "crossed," that is, $\mathbf{w}$ is perpendicular to both $\mathbf{x}_1$ and $\mathbf{x}_2$.

D. Great Circles. In Section I it was stated that a great circle is characterized by a vector $\mathbf{g}$, the polar axis vector, perpendicular to the plane of the great circle. If one wishes to characterize the plane in which two, non-parallel, vectors lie, it is sufficient to compute the cross product of the two vectors. The resulting polar axis vector is perpendicular to each of the two vectors and hence is perpendicular to the plane in which they lie. One vector might be a point $\mathbf{x}$ on a great circle and the second vector might be a vector tangent to $\mathbf{x}$, such as mentioned in Section I. However, the two vectors might represent two points (positions) on a sphere—the polar axis vector then characterizes the great circle joining the two points.

Example. Assuming the earth to be a sphere, characterize the great circle passing through Minneapolis (44°N59', 93°W16') and Dallas (32°N47', 96°W19'). First, convert the latitudes and longitudes to decimal degrees, using a right-handed coordinate system (see section I.A.) in which north latitudes and east longitudes are positive.⁴ For Minneapolis, $\phi = 44.9833$ and $\ell = 93.3167$; hence

$$\mathbf{z}_{\text{MIN}}^{\text{GEO}} = \begin{bmatrix} -0.040305 \\ -0.70616 \\ 0.70690 \end{bmatrix}$$

Similarly, for Dallas,

$$\mathbf{z}_{\text{DAL}}^{\text{GEO}} = \begin{bmatrix} -0.099788 \\ -0.83478 \\ 0.54146 \end{bmatrix}$$

The polar axis vector is then found to be

$$\mathbf{g}_1 = \pm (\mathbf{z}_{\text{MIN}}^{\text{GEO}} \times \mathbf{z}_{\text{DAL}}^{\text{GEO}}) = \pm \begin{bmatrix} 0.20775 \\ -0.048717 \\ -0.036821 \end{bmatrix}$$

Although it is not important in this problem, one might be interested in the location of the end of

⁴ Actually it doesn't matter whether one uses a right-handed system or a left-handed system in which north latitudes and west longitudes are positive, as long as the use of one or the other is consistent throughout a problem. However, if trigonometric functions are involved, then the developer of the formula has used one system or the other—in such cases, one must be consistent with the formula. The interested reader may wish to do this exercise using a left-handed system just to see the differences. The final results should be the same.

the polar axis vector and its antipode. From $\mathbf{g}_1$, we find

$$\begin{aligned} \ell &= \text{atan2}(-0.048717, 0.20775) \\ &= -13.519730 = 13.519730 \end{aligned}$$

and

$$\begin{aligned} \phi &= \sin^{-1}(-0.036821/|\mathbf{g}_1|) \\ &= \sin^{-1}(-0.036821/0.21654) \\ &= \sin^{-1}(-0.17044) = -9.79033 = 9.79033. \end{aligned}$$

This position is about 150 miles from Ascension Island (75°S, 14°W22). The antipode is located at $\ell = -13.519730 + 180^\circ = 166.480270 = 166.480270$ and $\phi = 9.79033$, or about 60 miles from Kwajalein Atoll (9°N05, 167°E20).

Example. Find where the great circle joining Minneapolis and Dallas intersects the great circle joining San Francisco (37°N47', 122°W25) and Denver (39°N44, 104°W59). Using the method of the previous example, we find for Denver,

$$\mathbf{z}_{\text{DEN}}^{\text{GEO}} = \begin{bmatrix} -0.42368 \\ -0.66718 \\ 0.61268 \end{bmatrix},$$

and for San Francisco,

$$\mathbf{z}_{\text{SF}}^{\text{GEO}} = \begin{bmatrix} -0.19882 \\ -0.74288 \\ 0.63922 \end{bmatrix},$$

from which the polar axis vector is

$$\mathbf{g}_2 = \pm (\mathbf{z}_{\text{DEN}}^{\text{GEO}} \times \mathbf{z}_{\text{SF}}^{\text{GEO}}) = \pm \begin{bmatrix} -0.028677 \\ -0.14901 \\ -0.18209 \end{bmatrix}$$

The intersection of the two great circles determined above is the diameter common to both great circles—it is perpendicular to both $\mathbf{g}_1$ and $\mathbf{g}_2$ and hence is found by

$$\mathbf{v} = \pm (\mathbf{g}_1 \times \mathbf{g}_2) = \pm \begin{bmatrix} 0.0033843 \\ 0.038885 \\ -0.032352 \end{bmatrix},$$

from which

$$\begin{aligned} \ell &= \text{atan2}(0.038885, 0.0033843) \\ &= 85.502578 = 85.502578, \end{aligned}$$

IV. References

1. Robert Hand, *Essays on Astrology*, Para Research, Inc., 1983, pages 131-135.
2. Roger House, "The Behavior of the Ascendant About the Arctic Circle," *NASO Journal*, Vol. 1, 1976, pages 49-64.
3. Ivan Mueller, *Spherical and Practical Astronomy as Applied to Geodesy*, Frederick Ungar Publishing Co., 1969, pages 39-51.
4. Michael Munkasey, "The Houses: The Measurement View," *Astrology Now*, Vol. 1, No. 8, Llewellyn Publ., Nov. 1975.
5. James Neely, "On Vectors, Matrices, and Coordinate Transformations," *Matrix Magazine*, Issue 4, Spring 1979, pages 6-44.

$$\begin{aligned} \phi &= \sin^{-1}(-0.032352/|\mathbf{v}|) \\ &= \sin^{-1}(-0.032352/0.050697) \\ &= \sin^{-1}(-0.63814) \\ &= -38.765358 = 38.765358. \end{aligned}$$

This position is somewhere in the Indian Ocean. The antipode is $\phi = 38.765358$ and $\ell = 85.502578 - 180^\circ = -94.497412 = 94.497412$. This location is in Missouri and very close to the Kansas border. It is 9.5 miles from Faucett (39°N36, 94°W48), 5.3 miles from De Kalb (39°N35, 94°W55), and 5.3 miles from Rushville (39°N35, 95°W01).

E. Rotation Matrices. The three fundamental rotation matrices are defined by

$$\mathbf{R}_1(\xi) = \begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos \xi & \sin \xi \\ 0 & -\sin \xi & \cos \xi \end{bmatrix},$$

$$\mathbf{R}_2(\xi) = \begin{bmatrix} \cos \xi & 0 & -\sin \xi \\ 0 & 1 & 0 \\ \sin \xi & 0 & \cos \xi \end{bmatrix},$$

and

$$\mathbf{R}_3(\xi) = \begin{bmatrix} \cos \xi & \sin \xi & 0 \\ -\sin \xi & \cos \xi & 0 \\ 0 & 0 & 1 \end{bmatrix}.$$

The symbol $\mathbf{R}_1$ means that the rotation is about the first coordinate axis, or x-axis; $\mathbf{R}_2$ means that the rotation is about the second coordinate axis, or y-axis; and $\mathbf{R}_3$ means that the rotation is about the third coordinate axis, or z-axis. The argument of the rotation ξ designates the angle through which the rotation is performed. Detailed descriptions and examples of coordinate rotations are given in References 3 and 5.

A Holistic Approach in Astrology and Science

by Theodor Landscheidt

translated by Robert Schmidt

Dr. Landscheidt, director of the Schroeter Institute of Research in Cycles of Solar Activity in Canada, is an internationally recognized expert in solar-terrestrial relations. He received the renowned award of the Edward R. Dewey Institute of Cycle Research in California "in recognition of outstanding accomplishments in the field of solar cycle research." In his book

Sun-Earth-Man, he showed how planets regulate solar eruptions, geomagnetic storms, climatic change, conditions of life, and economic cycles. His forecasts based on corresponding solar system constellations have proved successful. Dr. Landscheidt is equally at home in traditional astrology; in the early 60s, he brought the galactic center and geocentric planetary nodes to astrologers' awareness. Recently, he extended research of the "Gauquelin effect" to the Sun, Mercury, and the outer planets.

According to a fundamental astrological thesis, the world presents itself as a holistic structure in which everything, the largest as well as the smallest, is connected to everything else, and everything interacts with everything else, irrespective of whether it belongs to the microcosm or the macrocosm. Analogous formulations are found in the *Corpus Hermeticum*,¹ which is attributed to Hermes Trimegistos. This is the later Greek name of Thoth, the Egyptian god of learning, who is supposed to have invented writing. The writings collected together in the *Corpus Hermeticum* were probably composed from the middle of the first century up to the third century. The first texts were primarily of an astrological nature.² Later, medical and alchemical texts were added to them. One of these texts, the *Tabula Smaragdina*,³ begins in Latin translation with the following words:

1. A. D. Nock, A. J. Festiguer: *Corpus Hermeticum*. Paris, 1945-1954, 4 vol.
2. R. Merkelbach: "Hermes' Writings," *Encyclopedia Britannica*, Micropedia, Chicago, London, Toronto, Geneva, Tokyo, 1977, Helen Hemingway Burton, vol. IV, p. 1049.
3. H. C. O. Guenther: *Tabula Smaragdina — Ein Beitrag zur Geschichte der Alchimie*, 1931.

¹ "As above, so below..." Literally, "What is lower is as that which is higher. And what is higher is as that which is lower, so that the miracles of creation be perpetuated."

7. Loe, cit., p. 194.
8. E. Cassirer: *Die Begriffsform im mythischen Denken. Vorräte der Bibl. Forum*, Leipzig 1922, p. 34. *Philosophie der symbolischen Formen – Das mythische Denken*. Darmstadt 1973, Wissenschaftliche Buchgesellschaft, pp. 111-112.
9. H. Keesling: *Das Buch von Ursprung*. Baden-Baden, 1947. Hans Böhler, p. 155.
10. B. J. Bok, L. E. Jerome, P. Kurtz: "Objections to Astrology – A Statement by 186 Leading Scientists." *The Humanist*, September/October, 1975.

It had to be with the way we split things up in a subjective and an objective manner, that is, the way we consider the "parts" that surface in our thinking to be primary and independent building blocks of the whole reality inclusive of ourselves. The world outlook of such a mechanism, which considers the whole of existence to be compartmentalized from "elementary" particles, is a strong support for this fragmentary mode of contemplation. It is this fragmentary mode of contemplation that bolsters up and develops such a world outlook. As a consequence of this general attitude, man begins to see and experience himself and his world as though everything consisted of separate and independently existing elementary particles. If man allows himself to be guided by this point of view, he endeavors in his dealings to split himself and the world up in his own image. He desires to respond to the needs of his fragmentary world image and does not notice that it is he himself who, by acting true to this thought scheme, has effected that splintering, which henceforth seems to have an autonomous existence independent of his will and wishes. This fragmentation is consequently a spiritual attitude that brings with it quite

From the point of view of quantum theory, the separation between observer and observed may no longer be upheld in the manner that is postulated in the atomistic view, which conceives matter to be atomic masses separate from one another. Observer and observed must rather coalesce with one another; they are reciprocally interpenetrating aspects of a single whole reality that is indivisible and indismissible. The theory of relativity leads us to a way of observing the world that is contrary to the atomistic view. There can be no signal faster than light, here follows the collapse of the concept of a rigid body. However, this concept holds a key position in classical atomic theory, because this theory must deal with small, indivisible objects as the ultimate constituent parts of the universe if every part of such an object is to be rigidly connected to all the other parts. In a relativistic theory, it is necessary to completely neglect the concept of 'building blocks'. It is preferable to see the world as a universal flow of energy and processes... Thus the theory of relativity and the quantum theory agree on the necessity of viewing the world as an undivided whole, in which all parts of the universe, including the observer and his instruments, merge and unite into a single totality... We can perhaps designate this as an 'undivided Wholeness' in flowing motion, in contrast to the 'divided Wholeness' that is made up from one another, but rather much different aspects of a single, whole, and unbroken totality. In this way we can see all phenomenon forms of matter.

11. D. Bohm: "A Suggested Interpretation of the Quantum Theory in Terms of 'Hidden Variables'," *Phys. Rev.* 85 (1952), p. 166. "Die implizite Ordnung," in: R. Kakuska, ed.: *Andere Wirklichkeiten*. München 1984. Diederichs-Trinkant, pp. 86-87.

10. T. Landscheidt: *Wir sind Kinder des Lichts – Kosmisches Bewusstsein als Quelle der Lebenserfahrung*. Freiburg, 1987, Herder, S. 17-23.

existence as not separate from one another, and thereby put an end to fragmentation.¹²

At this point, it should be noted that if these conclusions of a physicist standing at the forefront of research are grasped in their entire import, they already include the result that so-called matter, as an inseparable constituent part of the "single motion" of the "undivided wholeness," can influence the so-called mind, which likewise belongs to the dynamical cosmic totality. There is no longer an insuperable discrepancy between this position and the influence of a dynamical cosmic constellation of matter on the "psychic motion" of a living creature, as astrology postulates it. There is no longer such a yawning chasm as there was between the world image of a scientist sworn to the mechanistic materialism of the 19th century and an astrological conception in the spirit of Kepler.

Even readers who have no knowledge of physics will have no difficulty in coming to the conclusion that the fundamental astrological thesis of the universe as an integrated whole is at least compatible with the presentations of David Bohm. Through his persistent efforts to give quantum theory an objective interpretation with the help of the so-called hidden variables, this physicist has gained international recognition. In order to avoid any misunderstanding, let it be stressed that I am not here attempting to prove the reality of astrological interdependencies, but rather to point out that the adduced principle is by no means incompatible with progressive physical thought.

The qualitative affinity of fundamentally different modes of being such as mind and matter, which is an essential property of the conceptual world of the physicist Bohm, corresponds in many respects to the concept of a *causa formalis*, the formal cause as developed by Aristotle. Aristotle, who regarded the universe as a single organism that in development contains

12. D. Bohm: "Fragmentierung und Ganzheit," in: H. P. Dürr, ed.: *Physik und Transzendenz*. Bern, München, Wien, 1986, Scherz, pp. 275-275.

parts acting on the whole as much as a whole acting on the parts, made no distinction between the *causa formalis* that acted upon human consciousness and the one that took effect in the macrocosm. David Bohm sees here connections with his physical presentations and stresses how important it is to forge ahead in this direction.¹³

There is no longer such a yawning chasm as there was between the world image of a scientist sworn to the mechanistic materialism of the 19th century and an astrological conception in the spirit of Kepler.

Accordingly, astrology's emphasis on qualitative elements does not seem as backward as some critics think. It will be established more fully in another connection that astrology, with its qualitative elements of a chiefly geometrical nature, goes directly along with the trend of the latest scientific development. Especially complex problems can be approached only with qualitative solutions, and this has led to a rebirth of geometry. David Bohm does not stand alone in physics. J. Bubi¹⁴ has likewise developed a theory that proceeds from hidden variables. Bubi writes: "The deep intention that is at the bottom of theories concerning hidden variables is the realization of a philosophy of science that includes a concept of 'wholeness' as a new 'ontological thesis'." Kurt Hübner, who has subjected these efforts to an ongoing critique, considers the results of Bohm and Bubi to be consistent.¹⁵

S-Matrix-Theory (developed by Geoffrey Chew¹⁶ and his colleagues), which serves as the basis for the description of the strong interaction between elementary particles, likewise comes to

13. *Loc. cit.* pp. 276-277.
14. J. Bubi: "Hidden Variables and the Copenhagen Interpretation - A Reconciliation," *Brit. J. Phil. Sci.* 19 (1968), p. 186.
15. K. Hübner: *Die Kritik der wissenschaftlichen Vernunft*. Freiburg, München, 1976, K. Neumann.
16. G. F. Chew: "Bootstrap - A Scientific Hazy?" *Science* 161 (1968), pp. 762-765. G. F. Chew, M. Gell-Mann, A. H. Rosenfeld: "Strongly Interacting Particles," *Scient. American* 210 (1964), pp. 74-83.

the conclusion that the universe is not composed out of fractional fundamental units like a machine, but instead constitutes a dynamical process that can only be properly grasped as wholeness. According to the formulation of the physicist Fritz Capra, the bootstrap philosophy that stands behind these initial steps "not only relinquishes the thought of fundamental building blocks of matter, but in general accepts no fundamental unities of any kind.... The universe is regarded as a dynamical web of events bound up with one another. None of the properties of any part of the web is fundamental; all result from the properties of the other parts; and the overall logical coherence of their interrelations determines the structure of the whole web."¹⁷

Critics may object that Bohm, Bubi, and Chew cannot be numbered among those very great physicists who have been honored for their services with a Nobel prize. Apart from the fact that posterity will be the final judge on these matters - Einstein, for example, was not awarded the Nobel prize for his theory of relativity - the Nobel prize laureate Heisenberg, co-founder of the quantum theory has expressed himself in the same vein as Bohm, Bubi, and Chew: "Thus the world appears as a complicated web of processes in which very different kinds of bonds alternate with one another to intersect and operate together and, in this way and in this manner, finally determine the structure of the whole web."¹⁸ The agreement of this definition with the fundamental astrological thesis of a holistic universe is unmistakable. Max Planck, the discoverer of the quantum of action, also stresses that only a holistic mode of consideration will do justice to reality: "In the new mechanics, purely local relations suffice just as little for the formulation of the laws of motion as, say, the microscopic investigation of all the individual parts of a painting serves for the understanding of its meaning. We can only, then, attain to a serviceable representation of natural laws if we consider the physical

structure as a whole."¹⁹ Such assessments are not the product of free philosophical speculation; they rest upon physical experiences of the world of "elementary particles," as incorporated into quantum theory in the first decades of the 20th century.

The knowledge gained in the contact with the microcosm also has a bearing on the macrocosm. According to a formulation of the physicist H. Stapp, quantum mechanics does not represent the universe "as a structure that is built up out of analyzable entities existing independently from one another, but rather as a web of relationships between elements whose meaning proceeds entirely out of their relationship to the whole."²⁰ This could stand just as written in an introduction to a textbook of astrology. Carl F. von Weizsäcker has said the same thing in other words: "Properly speaking, the description of any object in the world as an isolated 'one' is always illegitimate. The object would not be an object in the world if it were not bound up with it through interactions. Then, strictly speaking, it could no longer be an object. If there could be something that could be a quantum-theoretical object in the strict sense, it would have to be the whole world."²¹

The philosophical inclinations of the cited physicists are well known. One could get the impression from this that their expressions are attributable more to a bias for speculative philosophy than to results grounded in physical inquiry. However, here we are dealing with a consistent series of inferences from quantum mechanics, as it was formulated at the 5th Solvay Congress in Brussels in 1927. This generally accepted interpretation is called the "Copenhagen interpretation" and refers to the dominating influence of the physicist Niels Bohr and his school of thought. From his youth, Niels Bohr interested himself in philosophical

19. A. Müller: *Das naturphilosophische Werk Teilhard de Chardin*. München, 1964, K. Neumann.
20. H. P. Stapp: "S-Matrix Interpretation of Quantum Theory," *Phys. Rev.* (1971), No. D3.
21. C. F. von Weizsäcker: "Parmenides und die Quantentheorie," in: H. P. Dürr, ed.: *Physik und Transzendenz*. Bern, München, Wien, 1986, Scherz, p. 244.

and epistemological questions. His study of Kierkegaard seems to have influenced his physical conceptions. The principle of complementarity, which is an essential constituent of the Copenhagen interpretation, cannot disclaim its kinship with basic ideas of Kierkegaard. Thus critics could maintain that speculative elements have intruded into quantum mechanics through this link with philosophy and are reflected in the holistic conception of physicists who lean more toward philosophy than is healthy for a natural scientist.

It is not a cogent argument against this objection that the predictions of quantum mechanics have been continually confirmed. It is true that the illustrations of this reliable theory range from the behavior of subatomic particles to transistor, laser, and stellar energies, and in its relativistic version it stands in accord with Einstein's special theory of relativity; even Newtonian theory can be derived from it with exactitude. Nevertheless, all this could not have entirely excluded the possibility that the conclusions drawn from the Copenhagen interpretation regarding the holistic structure of the universe would subsequently turn out to be unfounded.

However, since the experimental proof of the criterion of Bell's theorem in 1972, it is certain, according to the overwhelming opinion of competent physicists, that quantum mechanics is not compatible with a world that can be resolved into separable elements of reality.²² According to the words of the physicist Henry Stapp, this proves "that the world is either fundamentally lawless or fundamentally indivisible."²³ The microscopic and macroscopic bodies and systems that are apparently separated from one another must form an immediate coherent whole at a deeper level that is still closed off to inquiry. In a probing essay, Martin Gardner,²⁴ who has distinguished himself with especially fine contributions to the history of science, has

22. G. Zukav: *Die unsendenen Wu Li Meister*, Hamburg, 1981.
23. *Op. cit.* Stapp, p. 343.
24. M. Gardner: "The EPR Paradox and Rupert Sheldrake," *Skeptical Inquirer* 11 (1986/1987), no. 2, p. 131.

characterized this natural realm still awaiting discovery as the "subquantum field."²⁵ The physicist David Finkelstein,²⁶ who has made important contributions to quantum logic, proceeds in his "quantum topology" from the assumption that the search for fundamental processes takes place outside the categories that appear to people as space and time; he considers space, time, mass, and energy to be secondary properties whose roots reach down into a stratum that the physicist Rudolf Tomaschek²⁶ has named "primal ground." In 1975, Henry Stapp²⁷ had already written, "Bell's theorem is the most momentous discovery of scientific history"; however, the significance of the experimental confirmation of this theorem has up till now been recognized only by a few contemporaries. There are even many physicists who have never heard of Bell's inequality. Accordingly, an outline of the development and argumentation shall be set out, so that the reader can form his or her own picture.

Albert Einstein did not receive the Nobel prize for his theory of relativity, but instead for his ground-breaking contribution to the development of quantum theory. After the discovery of the quantum of action by Max Planck, Einstein took the decisive second step when he showed the quantum nature of light, thereby shattering the prevailing conception of the wave nature of light. This led to the recognition of the duality of waves and particles as an essential presupposition for the development of quantum mechanics. In spite of his role as midwife to quantum mechanics, Einstein struggled all his life against its far-reaching consequences, never accepting the principle of complementarity lying at its base. While quantum mechanics, counter to the causal principle that ruled without restriction at that time, proceeded from the supposition that microevents such as radioactive decay took place without recognizable causes

25. D. Finkelstein: "Beneath Time — Explorations in Quantum Topology," quoted in: G. Zukav: *Die unsendenen Wu Li Meister*, Hamburg, 1981, p. 343.
26. R. Tomaschek: *Kosmische Kraftfelder und astrale Einflüsse*, Aalen, 1959, Eberlin p. 64.
27. H. P. Stapp: "Bell's Theorem and World Process," *Nuovo Cimento* (1975), no. 29 (B).

and were only subject to probabilistic laws, Einstein judged that upsetting the causal principle was a temporary difficulty of a theory still insufficiently developed, and said in reply to Bohr, "God does not play dice." More particularly, Einstein was opposed to the existence of the non-local connections inherent in quantum mechanics. His research contributions were directed at eliminating from physics obscure actions-at-a-distance and setting in their place local theories that obeyed the principle of local causes and made possible an exact description of physical processes in space and time as the result of proximate actions. Quantum mechanics, however, was characterized by those very non-local connections that Einstein was struggling against. This went against Einstein's conviction "that physics ought to represent a reality in space and time, without ghostlike actions-at-a-distance."

In the course of his interchanges with the proponents of the Copenhagen interpretation of quantum mechanics, Albert Einstein conceived of a thought experiment, which he published in 1935 with Boris Podolsky and Nathan Rosen under the title, "Can the Quantum-Mechanical Description of Objective Reality Be Regarded as Complete?"²⁸ (This is the EPR experiment.) In the original version, it revolved around the position and momentum of elementary particles. The arguments were very abstract and could really only be followed by specialists well-versed in quantum mechanics. In 1951, David Bohm²⁹ devised a form of the thought experiment that can be explained more easily. In this, the spin of an elementary particle plays an essential role.

The concept of spin is tied to the angular momentum of a body rotating around its axis. Every subatomic particle has a fixed angular momentum ascribed to it. However, this may not be understood in its macroscopic sense. As Max Born expressed it, spin originates in the

28. A. Einstein, B. Podolsky, N. Rosen: "Can Quantum-Mechanical Description of Physical Reality Be Considered Complete?" *Phys. Rev.* 47 (1935), p. 777.
29. D. Bohm: *Quantum Theory*, New York, 1951, Prentice Hall.

conception of a rotation "without there being any existent thing that rotates." At any rate, subatomic particles behave as if they had an angular momentum that assumes a fixed value characteristic of it.

In theory, the particles could be removed from one another across light-years without anything changing with respect to the holistic structure of their direction potentials.

As with everything in quantum theory, spin is quantized. To the spin of a photon (a particle of light), the physicist assigns the quantity 1. Lepton and baryons, like electrons, positrons, protons, and neutrons, have a spin of 1/2. As in quantum theory subatomic particles have a tendency to exist in a determinate place, they also display a tendency to orient their "rotation" along a determinate axis. However, this tendency is first realized at the moment an observer takes a measurement. Particles that form a system "rotate" around axes that are oriented parallel or antiparallel. These directions are designated as "+" and "-" or "up" and "down."

The point of departure of the thought experiment is a pair of particles that, through interaction, have come into contact in such a way as to form a system with the collective spin of zero. However the particles are aligned, their spin is always equally great and the "axes of rotation" point in opposite directions. The equally great positive and negative spin values reciprocally cancel one another out. If the two particles are constrained to separate from one another and fly off in opposite directions, they continue to form a system with zero spin and a tendency for the "axes of rotation" to orient themselves in an antiparallel manner. According to quantum mechanics, this also holds for macroscopic distances. In theory, the particles could be removed from one another across light-years without anything changing with re-

spect to the holistic structure of their direction potentials. According to quantum mechanics, if one of the particles is measured after it has already become far distant from the other, the wave function that represents the possibilities of the system collapses and realizes one of these potentialities. As there are only two possibilities of equal probability for the axis orientation, one of them will be realized. In the same moment, the other particle realizes the opposite axis orientation. If the measurement is repeated after a little while, the second particle again orients its axis in an antiparallel manner, even if the first particle has changed its first orientation after the measurement. This takes place without any time lapse. Since no form of energy and no information can be propagated with a velocity faster than that of light, it is impossible that a signal is involved. Hence Einstein asked how the second particle knew in each case which axis orientation was correct, allowing the total spin to remain zero; he ventured that there must be a hitherto unknown causal bond between the two particles. From this he concluded that quantum mechanics was incomplete; in addition, from the violation of the principle of local causes he inferred that the theory had to contain a grave error. In conclusion he remarked, "One can only avoid this inference by assuming that the measurement ... [telepathically] changes the real state, or by in general denying an independent real state for things that are spatially separate from one another." Niels Bohr's answer³⁰ was not long in coming; less than four months after the publication of the EPR thought experiment, Bohr's answer was in the hands of the editor of the same journal that had published Einstein's work, *Physical Review*. Bohr pointed out that the paradox proposed by Einstein and his young colleagues "only revealed that the customary views of natural philosophy were unsuited for the apt description of the physical phenomena with which quantum mechanics was concerned." Furthermore, he pleaded for a "final

rejection of the classical idea of causality" and a "radical revision of our attitude toward the problem of physical reality." In the final analysis, the standpoints of the antagonists and their adherents were incompatible, since Einstein, who began with the reality of spatially detached objects, held fast to the principle of local causes and rejected "action-at-a-distance"; while Bohr accepted non-local connections, since material particles in isolation were incompatible with observations in the subatomic realm. Few physicists were unsettled by the EPR experiment. They took it for a somewhat eccentric mental creation far removed from practice and leading to controversies between people who were less physicists than philosophers.

This situation changed fundamentally when the physicist John S. Bell, who was active in European nuclear research, published his sensational mathematical proof, known today as Bell's theorem.³¹ This proof opened up for the first time the possibility of testing the EPR assertion with concrete experimentation and of settling the dispute over the existence of non-local connections and the principle of local causes. It has the following peculiarity: the spin of elementary particles can be represented as a vector. Thereby one can imagine an arrow assigned to the elementary particle, which is tied to the direction of the "rotation axis" of the particle. Through projection in three-dimensional space, the vector can be resolved into three spin components (A, B, and C), whose direction is fixed through the respective component axes. Here also there exist the two possibilities of a parallel or antiparallel orientation, which are designated by "+" and "-". Thus there result the following combinations: A+, A-, B+, B-, C+, C-. For a single subatomic particle, it is always only possible on quantum-mechanical grounds to measure just one of the spin components along one of the axes, A, B, or C. If, as in the EPR experiment, only a pair of particles is allowed which form a system because they have come into close

30. N. Bohr: "Can Quantum-Mechanical Description of Physical Reality Be Considered Complete?" *Phys. Rev.*, 48 (1935), 696.

31. J. S. Bell: *Physics* 1 (1964), p. 195.

interaction, a measurement that produces A+ also establishes that the companion particle is characterized by A-. However, sufficient information about all the axes can only be gathered with a sufficiently large random sample of particle pairs that allows sufficient measurement data concerning all the axes to permit statistical evaluation. The cases AA, BB, and CC — combinations resulting in no new information — are excluded. AB, AC, and BC cover the remaining combinations, with variations due to a parallel or antiparallel orientation: A+B+, A+B-, A-B+, etc. The number of such pairs can be designated by n(A+B+), etc., respectively. It is of interest whether these numbers produce any informative ratios. They in fact do, as John S. Bell has discovered. If we postulate with Einstein that there exist cosmic objects that appear as separable elements of reality (separability) and obey the principle of local causes, then in the described measurement and enumeration of the particle pairs determinate boundary values result for the correlation of the number of respective particle pairs with a determinate combination of axis orientation. The number of pairs A+B+ cannot exceed the sum of the number of pairs A+C+ and B+C+. This may be expressed in the form of an inequality bearing Bell's name:

$$n(A+B+) \leq n(A+C+) + n(B+C+)$$

Further inequalities of the same structure can be derived for other combinations of axis orientations. Rigorous set-theoretic arguments prove the correctness of these inequalities.

However, this holds only when one proceeds from the assumption that the particles in question exist as spatially separated elements of reality subject to the principle of local causes. Thus Bell's inequality can be regarded as a prediction about the outcome of an experiment. It is decisive that quantum mechanics, which (counter to Bell's inequality) proceeds from non-local connections, comes to quite a different prediction. According to a quantum me-

chanical calculation, more pairs of A+B+ are to be expected than pairs of A+C+ and B+C+ taken together. The two predictions deviate more than 40%. Bell's inequality is thus a very sharp criterion.

In 1964, the relationships and mathematical proofs put forth by Bell relied exclusively on consideration in a thought experiment, which plainly called for a real experiment. In 1972, John Clauser and Stuart Freedman³² actually carried out such an experiment with pairs of low-energy protons. The experiment was fraught with great technical difficulties. But the result, awaited with great interest, confirmed the prediction of quantum theory and thus violated Bell's inequality. In years following, different groups of researchers repeated the experiment with increasingly refined technology. Pairs of protons in the singlet state were likewise tested, as were pairs of high-energy protons and protons of lower energy. Beyond that, a full dozen experiments are being discussed, all of which violate Bell's inequality and agree with the predictions of quantum mechanics. In the newest experiments, which also achieve the greatest range of data and are the most exact, the deviation of the observed values from the inequality comes to more than 13 standard deviations. Moreover, the deviations correspond exactly to the predictions of quantum mechanics. The outcome of one experiment with photons, especially subtle in conception, was awaited with particular interest. This experiment was to show that a transmission of "information," if such a thing took place, occurred with a velocity greater than that of light; practically, in fact, without any time lag. In 1981, A. Aspect, P. Grangier, and G. Roger³³ performed this experiment. Despite the exacting experimental condition, the result was once again in violation of Bell's inequality and a precise confirmation of the prediction of quantum mechanics. Thus scientists such as

32. J. F. Clauser, S. J. Freedman: *Phys. Rev. Lett.* 28 (1972), p. 938.
33. A. Aspect, P. Grangier, G. Roger: "Experimental Test of Realistic Local Theories via Bell's Theorem." *Phys. Rev. Lett.* 47 (1981), p. 460.

Bernard d'Espagnat,³⁴ Max Jammer,³⁵ Franco Selleri,³⁶ and Franz R. Kneeger,³⁷ who have carefully taken the results into consideration, agree in the judgment that the local realistic theories that proceed from the principle of local action and Einstein's notion of separability have not withstood the Bell test and are inescapably false. One who wishes to ignore this inference would have to accept that the observed particles and their behavior have no physical reality. Up to now, no physicist has been able to venture such a view.

The proof of the existence of non-local connections raises serious physical problems. It must be clarified how it is possible to have instantaneous interactions between particles at arbitrarily great distances, even though this violates the spirit of the special theory of relativity. O. Costa de Beauregard, Hugh Everett, and Jack Sarfati³⁸ have already proposed hypotheses that lead to such unorthodox conceptions as time-reversal, a multiplicity of universes of different kinds existing parallel to one another, and "superluminal transfer of negentropy without signals" (energy-free transmission of information faster than the speed of light). By the way, this shows that the conceptual world of theoretical physics makes no fewer demands on the "normal human understanding" than the ideal world of astrology. There can as yet be no talk of a solution to these newly arisen problems. Nobel prize laureate Paul A.M. Dirac³⁹ stated in 1974, "It seems obvious to me that we still do not know the fundamental laws of quantum mechanics." However, this does not change the fact that, even now, far-reaching and sound consequences can be drawn from the recent discussion of the EPR experiment and the

experimental test of Bell's inequality. I have already called attention to such results at the beginning of this article. David Bohm⁴⁰ has summed up the new vision of a holistic universe (one that is not based on speculation but on physical observations and the Bell test) in a concise formulation: "Parts are seen as standing in a tight nexus, in which their dynamical relationships depend in an irreducible manner on the state of the entire system and, in reality, on the state of greater systems of which they are a part, and which finally encompasses the entire universe. Thus we are led to the idea of an uninterrupted whole, which rejects the classical idea of the divisibility of the world into separate and independently existing parts." This is the serene formulation of a physicist. Gary Zukav,⁴¹ not a physicist, is less reserved in expressing his amazement over the peculiarities of the Einstein-Podolsky-Rosen paradox: Quantum mechanics points to the fact that...

...subatomic 'particles' apparently make continual decisions. In addition, the decisions that they seem to make depend on decisions that were made somewhere else. Subatomic 'particles' seem to know instantaneously the decisions that were made somewhere else, and this 'somewhere else' can be in another galaxy. The key word here is 'instantaneously.' How can a subatomic 'particle' here know what decision another 'particle' over there has made, at the same time that the 'particle' makes its decision? The answer is that the 'particle' makes its decision in the realm of the same human mind that did not reach far enough to describe subatomic phenomena. Bell's theorem shows that the conceptions of the same human mind do not even reach far enough to describe macroscopic, everyday processes.... [B] projects the irrational aspect of subatomic phenomena into the midst of the macroscopic realm. It says that it is not only processes in the realm of the very small that run their course in a manner that sharply distinguishes them from our view of the world, which is founded on the same human mind, but that even processes in the world at large, in the world of freeways and sports cars, take place in a manner completely different than that which seems reasonable to the working of the healthy human mind.

Even physicist Henry Stapp⁴² has emphasized this aspect: "The most important thing about Bell's theorem is that it imports the dilemma

40. D. Bohm, B. Hiley: *On the Invariant Understanding of Non-Localities as Implied by Quantum Theory*, University of London, 1974, Birkbeck College.
41. Gp. cit. Zukav, pp. 65, 325.
42. H. Stapp: *Quantum Cognition: Interpretation of Quantum Theory*, p. 140.

The EPR experiment and Bell's inequality have been explicated so thoroughly only in order to put the reader in a position of forming a personal judgment as to what extent this is true. In addition, it has become clear that scientists — who in their argument with the foundations of astrology still bring up the principle of local action and demand evidence of causal connections and the macroscopic influence of energy — are still in the second half of the 19th century with their argumentation. The fundamental idea of astrology, developed many centuries ago, that the cosmos is a holistic process binding together all particular microscopic and macroscopic processes into a unity, turns out to be a progressive concept that is in agreement with the most up-to-date research.

Here the question arises whether the birth of a living creature — the moment in which it is first exposed as a newly structured, independent aggregate of particles — to the evolutionary process of the cosmic "objects" that already form an inseparable whole — can be regarded as an "encounter" in the quantum mechanical sense, one that makes the new "aggregate" a member of the already existing unitary system.

It is a remarkable but repeatedly corroborated experience that the same developmental tendencies surface at the same time in fields as different as mathematics, physics, biology, painting, music, and literature, leading to the development of singular forms.⁴⁴ This also holds for the ideas of holistic interconnection. Parallel to the discussion of Bell's theorem, the biologist Ludwig von Bertalanffy⁴⁵ formulated general systems theory, which in the meantime has turned into an interdisciplinary field of re-

invoked by quantum phenomena into the realm of macroscopic appearances. This shows that our usual conceptions of the world are very deficient, even at the macroscopic level."

The strange indivisible unity, in which according to quantum mechanics even the measuring instruments and the observer are included, is of course tied to the presupposition that something happens at least once to permit "particles" and the "aggregates of particles" in question to turn into a system. An "encounter" must take place; "particles" must arise jointly or enter into intensive interaction. However, Bernard d'Espagnat⁴⁶ has rightly pointed out that in the long developmental history of the universe, which has probably lasted more than 10 billion years, most "particles" and "aggregates of particles" up to the level of galaxies and supergalaxies have "acted" upon one another at some point or other, with the result that these "objects" form an indivisible unity. Here the question arises whether the birth of a living creature — the moment in which it is first exposed as a newly structured, independent aggregate of particles — to the evolutionary process of the cosmic "objects" that already form an inseparable whole — can be regarded as an "encounter" in the quantum mechanical sense, one that makes the new "aggregate" a member of the already existing unitary system. As with subatomic "single particles," it would result that, from this moment on, changes in the state of the other "aggregates" could influence the newly introduced "aggregate" independent of causal connections and without energy exchange, whereby it is possible that the conditions that existed at the moment of the "encounter" played an important role. I will not maintain here that this is actually the case. In the present state of our knowledge, an exact proof cannot be forced. But as the remarks up to this point show, there is a logical possibility that this is so. It is totally compatible with the most progressive results of scientific research.

43. Gp. cit. d'Espagnat, p. 140.

44. A. Unold: *Evolution kosmischer, biologischer und geistiger Strukturen*, Stuttgart, 1981, Wissenschaftliche Verlagsgesellschaft, p. 117.
45. L. von Bertalanffy: *General Systems Theory*, New York, 1968.

search that reaches from the interconnections between subatomic particles all the way to the boundaries of the universe – and does not even leave out psychological and sociological phenomena. Thus the Canadian politician Manning has formulated a political program, at the basis of which is system-theoretical thinking: "There exist reciprocal relationships between all the elements out of which society is built. The essential components of all public affairs and problems, of all political policies and programs, must be viewed – and accordingly dealt with – as interdependent parts of the whole system." System theory gives precision to the traditional insight that the whole must be more than the sum of the parts: it considers systems to be indivisible, dynamical wholes whose subsystems are interwoven with one another in such a way that their process functions can be understood only within the framework of the overall process of the system. This way of considering things is closer to home than reductionist scientists admit. The physicist and astronomer Arthur Eddington⁴⁶ clarified this in an illuminating formulation: "We often believe that when we have studied 'one' carefully, we also know everything about 'two', because 'two' is 'one and one'. But in this we forget that we must still consider the 'and'." Frederic Vester⁴⁷ has made clear with the help of convincing examples how often the true interconnections are falsified by ignoring the "network" of the individual elements: "Moreover, what happens in systems appears to be quite independent of the nature of the things themselves, but all the more dependent on their interactions instead, on the manner in which they are organized, which structures they form." These system laws have "hitherto always escaped scientific notice because they concern constellations and thus complex occurrences between things.... Fundamentally, the cause of an event is always such a constellation, an overall pattern, and never an individual element that we arbitrarily pick out as a cause."

46. A. Eddington: *The Nature of Physics*. Ann Arbor, 1958, p. 103.

This proposition points in the same direction as the EPR thought experiment and Bell's theorem, but also agrees with the fundamental astrological thesis of the universe as a framework with a holistic structure. Astrology deals with the constellations and overall patterns of complex networks that Frederic Vester appeals to, in that it includes the whole solar system in its structural investigations and thereby comprehends the "network" of the Sun, Moon, and planets through geometric bonds that it calls aspects. On the other hand, it remains to be seen whether the meaning claimed by astrologers fits this relational structure as grasped holistically. However, it can be maintained that the operative view as such is thoroughly compatible with the concepts and results of modern science. That this is so does not speak well for the competence of the 186 leading American scientists who maintained in their exposition against astrology that the fundamental principles of astrology were incompatible with modern scientific thought. Quantum mechanics and the violation of Bell's inequality prove that the worldview that corresponds to the "sound human understanding" falsely interprets fundamental features of reality, not only in the microcosmic realm, but even on the macrocosmic level. It is not the "solid substance of separate objects" that is the real and abiding substratum, but rather the form that realizes itself in the holistic process of the integrated universe. Since according to historical experience, the physical law of the inertia of masses seems to be effective even in the sociological and ideological realm, it will be still another century until the new worldview becomes common knowledge. For now, the "belief" in solid, spatially separated objects is an impediment to a deeper insight into what is "real reality." Thus it is taken to be self-evident that the immediate spatial surroundings have an effect on the development of man; however, anyone is regarded as a dreamer who considers it to be possible that more distant environments like the

47. F. Vester: *Neuland des Denkens*. München, 1984, Deutscher Taschenbuchverlag, p. 59.

terrestrial matter. Raymond Ruyer⁵⁰ has graphically portrayed the results of this influence: "Whenever the bus brakes quickly and I take a tumble, this shows that I am not bound to the vehicle, not even to the Earth, but that I am one with the universe." From another angle, Dennis W. Sciama⁵¹ has shown that gravity can itself be regarded as a case of static interaction of inertia-interactions. As for establishing the fundamental meaning of Mach's principle, Arthur Koestler⁵² has stressed that it does not only state that the universe as a whole influences local terrestrial events, but also that local processes act on the universe as a whole, even though this influence may be minimal. This agrees with the message of the *Tubula Sinaraginata* and the above-cited statements of Paracelsus, Thomas Ring, Ernst Cassirer, and Hermann Keyserling concerning the fundamental thesis of astrology, that in the universe everything is interconnected with everything else, and everything exerts an influence on everything else.

In their declaration against astrology, the 186 leading scientists point to the enormous distances between the Earth and the planets and the even more distant fixed stars. They emphasize that the gravitational effects originating from these cosmic bodies and any other effects would be so vanishingly small as to have no consequences. In the light of Mach's principle, quantum mechanics, the EPR experiments, and the refutation of the principle of local action through the Bell test, no further exposition is required to show that this claim can no longer be accepted in this absolute form. Even very ordinary calculations within the framework of classical theory show that we cannot immediately deprive the planets in the solar system of every possibility of affecting conditions upon the Earth.

50. R. Ruyer: *Jenseits der Erkenntnis*. Wien, Hamburg, 1977, Paul Zsolnay, p. 73.
51. D. W. Sciama: *The Physical Foundations of General Relativity*. New York, 1969.
52. A. Koestler: *Die Art der Psychologie*. Bergisch Gladbach, 1980, Bassen Lathke, p. 101.

solar system, or even the Milky Way and yet more distant cosmic bodies and systems, have such an influence. This is true even for long-familiar physical propositions like Mach's principle, which proceeds from the assumption that the inertial properties of matter on the Earth are determined by the total mass of the universe surrounding us. In a modification of his original formulation of the theory of general relativity, Einstein took Mach's idea into account. The mathematician and astronomer Hermann Bondi⁴⁸ to whom Mach's principle was obvious, drew out of it far-reaching consequences for the evaluation of "isolated" laboratory experiments: "It appears as if the universe as a whole plays a role in every experiment because ultimately it contributes the inertial properties that bodies have in our experimental arrangements."

"Whenever the bus brakes quickly and I take a tumble, this shows that I am not bound to the vehicle, not even to the Earth, but that I am one with the universe."

An effect like this, in which invisible masses exert an influence on terrestrial events from vast distances, makes our everyday understanding uncomfortable. The philosopher Bertrand Russell gave expression to this with the statement that Mach's principle was formally correct but "smacked of astrology."⁴⁹ With that he gets to the heart of the matter. Mach's effect is to bring up the question of why the relatively close masses of the planets of the solar system should have practically no influence on bodies on the Earth, when even masses of cosmic bodies at the edge of the universe have a voice in their behavior by contributing to the inertia of

48. H. Bondi: *Assumption and Myth in Physical Theory*. Cambridge, 1967, University Press.
49. D. W. Sciama: *The Unity of the Universe*. London, 1959, p. 99.

In comparison with other forces, gravitation is unimaginably weak. The magnetic field of a toy magnet that attracts a nail is stronger than the gravitational field of the Earth. Nevertheless, the vanishingly small gravitational force that proceeds from an electron at the edge of the universe makes the motion of a terrestrial oxygen molecule incalculable from the 56th collision on.⁵³ At the same time, it must be kept in mind that in the space of one second, an oxygen molecule in the atmosphere collides with other molecules a billion times. The mathematician Emile Borel⁵⁴ has calculated that if a mass of a gram on Sirius were shifted about a centimeter, it would lead to a change of the gravitational field of the Earth of about 10⁻¹⁰⁰. At first glance, this seems to be completely insignificant. However, Borel has proved that this tiny disturbance permits the calculation of the motion of a gas particle on the Earth only up to the tiny time period of one millionth of a second; prediction for a longer period of time is impossible. This restriction on calculability also holds for macroscopic objects like billiard balls. The disturbance that proceeds from the extremely weak gravitational field of a spectator standing next to the billiard table has to be taken into account as soon as a collision with nine balls is to be calculated.⁵⁵ In comparison with a single electron at the edge of the universe, a mass of a gram on Sirius, or a person at a billiard table, the planets of the solar system, with 445 times the mass of the Earth, represent a powerful potential for disturbance, especially since they move relatively quickly and constantly form new constellations. Thus the claim of 186 leading scientists that the planets could not have an effect on the Earth is demonstrably false, even with regard to the classical theories of the mechanistic conception of the world.

53. U. Deker, H. Thoma: "Die Chaos-Theorie." *Bild der Wissenschaft* 38, 1980, p. 73.
54. E. Borel: *Introduction géométrique à quelques théories physiques*. Paris, 1914, Gauthier-Villars, p. 94.
55. L. Ekeland: *Das Vorherrschen und das Unvorherrschen*. München, 1985, Harnack, p. 87.

The physicist and philosopher Carl F. von Weizsäcker,⁵⁶ an expert in quantum theory for whom the "unity of nature" is a living reality, has made a more careful judgment than those 186 scientists: "As a physicist, I would not know what would really have to be the case if astrology were empirically true. Yet on the other hand, I have gotten the impression, simply by working with it, that empirically there is something to it."

Thus the claim of 186 leading scientists that the planets could not have an effect on the Earth is demonstrably false, even with regard to the classical theories of the mechanistic conception of the world.

Against this, scientific critics of astrology, who still argue as if the findings of the 20th century did not exist, ought to keep in mind what the mathematician Ivar Ekeland⁵⁷ has said in the context of an analysis of the celestial mechanics of Henri Poincaré:

From a narrow, strictly scientific standpoint, one can only acknowledge a single reality, indeed only a single thing: the universe in its totality as perceived by the senses, the sum total of all phenomena since the beginning of time. Strictly speaking, there is no closed system in which the laws of physics could be applied in isolation. The smallest electron at the furthest edge of the known universe exerts an influence upon the Earth, and just as much in the Newtonian model (through its gravitational field and its magnetic field) as in quantum mechanics (since its wave function never vanishes). Certainly these actions are minimal, but to maintain that they are negligible amounts to being guilty of *petitio principii* [when something to be proved is taken for granted].

Of course, the fact that the whole cosmic environment, thus also the entire solar system, influences behavior on the Earth still does not prove that this happens in just the way that astrology claims. However, it can be regarded as proved that the foundations of the astrological conception of the world can be

56. C. F. von Weizsäcker: Interview in "Sammelstadium." *ARD*, 7. Jan. 1976.
57. *Op. cit.* Ekeland, p. 81.

thoroughly reconciled with the findings of modern science.

This holds true all the more, since von Neumann's theorem of the completeness of quantum theory has proved untenable. Now scientists favor the view that even quantum mechanics, successful as it has been, is still not a complete theory.⁵⁸ According to this approach, there exist things, properties, or processes in the real external world that cannot be grasped by the theory. Who can rule out the possibility, at least at the present time, that it is here that the interconnections claimed by astrology belong? Often it is simply an insufficiently advanced technology that stands in the way of proving a proposition, especially with respect to the technology of measurement. Thus the scientist Franz K. Krueger⁵⁹ has explained, to the surprise of his colleagues in physics, that Goethe could easily have refuted Newton in the famous controversy over the theory of color if he had had modern lasers and nonlinear optical instruments at his disposal:

Newton supposedly prepared a pure red, since he screened this by means of a yellow filter and a red aperture. He then showed that other colors do not further resolve this red. With this, he is saying something about his prism, but nothing at all about the 'red'. That is, let us now take a set of laser instruments in hand and produce a red light, of whose putative 'redness' we have convinced ourselves by means of a prism. Now let us not immediately take another prism, but first a crystal of a special kind, on which we focus the light, and after it has passed through this crystal, let us again study it by means of a prism and see here that it is not only red light that we behold, but also blue and ultraviolet (made visible by a fluorescent indicator, for example). Does the 'pure' red light still contain blue and ultraviolet? Newton would have to accept the fact that the 'red' light contains more than red light, the more it contains a disproportionately large amount of blue and ultraviolet.

With his critique of the Newtonian experimental arrangement, Goethe anticipated the findings of quantum mechanics. As Franz R. Krueger has stressed, Goethe succeeded in finding a feasible paradigm for the observation of nature, one that was free from contradictions, "namely, that of the inseparability of the knower and the known, the measurer and the measured." Something

58. *Op. cit.* Selleri, p. 32.
59. *Op. cit.* Krueger, p. 59.

that a short time ago was regarded as a refuted and backward stand has now turned out to be a leap into the future over a gulf in time of one and three-quarters centuries.

To the incompleteness of quantum theory — the most widely developed physical theory, which still leaves room for the inclusion of experience not yet assimilated — we add the fact that astrology is constantly assailed by its critics with arguments that are grounded on classical logic, even though in 1936 the mathematician John von Neumann⁶⁰ had already pointed out, with an example of a well-known macroscopic phenomenon, that it is impossible to describe experience correctly with the help of classical logic. This is because the real world follows rules other than those of this restricted form of logic, which must accordingly be replaced with a more comprehensive quantum logic. Hereafter, the reality of astrological experience can be thoroughly reconciled with a contradiction to the propositions of classical logic.

60. G. Birkhoff, J. von Neumann: "The Logic of Quantum Mechanics." *Annals of Mathematics* 37 (1936), no. 4, Oct. 1936.

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The Right Conception of the Sphere and its Circles

by Thabit B. Qurra

translated by Robert E. Zoller

TRANSLATOR'S INTRODUCTION

Thabit, or Thebit: full name Thabit ibn Kurrah ibn Marwan ibn Karaya ibn Ibrahim ibn Marinon ibn Salamonos; Abu Al Hasan; or Thabit ben Currah ben Zahrun el Harrani, etc. Thabit was born in Harran in Mesopotamia about 836 AD and spent much of his life in Baghdad. He lived until about 901 AD. His dates — it is not clear whether they are given in lunar or solar years — are uncertain. He wrote in Arabic and Syriac and was not a Muslim but a Harranian Sabian (or Sabean) — that is, a hermetic philosopher and semi-clandestine astral polytheist theurgist. Roger Bacon (13th century) considered Thabit a Christian, perhaps due to the fact that in Thabit's day the Sabians were accorded religious toleration under Islam — as long as they could show that they were "a people of the book," which generally meant at least

This text by the medieval hermetic philosopher, astronomer, and mathematician Thabit B. Qurra was intended to provide beginning students of astrology with the correct understanding of the celestial sphere. Originally written in Arabic, it was translated into Latin, perhaps in the 14th century, and possibly reworked by Campanus.

nominal acceptance of either the Old or New Testament. Several sects, such as the gnostic Mandaeans or Christians of St. John, received such acceptability at the time, without ever really accepting Islam, and managed to survive in the Middle East until fairly recently.

Thabit considered his people to be "the inheritors of classical antiquity." The Sabians perpetuated the paganism and astrology of Babylonia but also accepted the hermetic writings and the neoplatonic Agathodemon. They practiced astrologically timed animal blood sacrifices, prayed to the spirits of the planets, and were widely renowned as the most mathematically and astronomically competent people in the region (perhaps in the world) at that time. They survived until the pressure of the Crusades (with a rising tide of Islamic fundamentalism) suppressed them and other heterodox sects in Islam.

Thabit is recognized by modern historians of science as having rather accurately fixed the rate of the precession of the equinoxes at about one degree in 72 years. It is not clear whether he arrived at this rate by studying old observations or if he or his people merely preserved the records of Hipparchus. In any case, he combined this fairly correct rate with a thoroughly fatuous theory of the "trepidation of the equinoxes," according to which the equinoxes moved retrograde for a period and then went direct for a while before turning retrograde again. The mean motion of the back-and-forth oscillation or 'trepidation' was said to be one degree in 72 years.

LEGEND FOR DIAGRAMS

Z = ZENITH
N = NADIR
NP = POLUS SEPTENTRIONALIS (NORTH POLE)
SP = POLUS MERIDIONALIS (SOUTH POLE)
EQ = EQUINOCTIAL CIRCLE = CELESTIAL EQUATOR

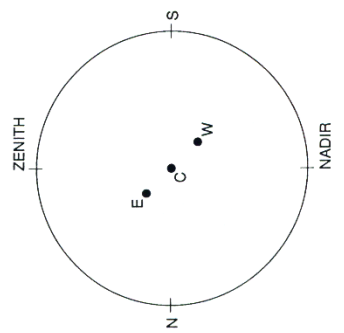


Fig. 1

1. Eastern.
2. Western.
3. Southern.
4. Northern.

DE IMAGINATIONE SPHERE, BY THABIT B. QURRA

1. As beginners in astrology, let us understand by a correct conception that the world is a spherical and solid body whose center is a point which is in the middle of the Earth and is called the center of the Earth. We may understand that the Earth is, as it seems, the center of the world, since it is in the middle and, for the purpose of measuring its magnitude, as if it were an indivisible body. We may also understand that the world is immobile and at rest.

2. We, residing as it seems at the center of the Earth and not on its surface, may understand that on the surface of the world seven points are taken: one oriental,¹ a second occidental,² a third meridional,³ a fourth septentrional,⁴ a fifth directly above, a sixth in its opposite below the feet, and a seventh, the middle way, namely the center of the world. [Fig. 1]

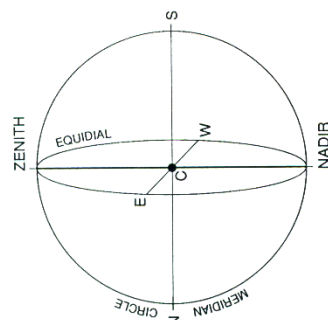


Fig. 2

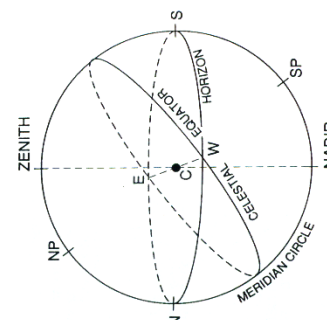


Fig. 3

3. Let us picture one chord⁵ from the oriental point to the occidental point, another from the meridional to the septentrional point, a third from the point directly overhead to its opposite below the feet, all of which pass through the center. [Fig. 2]

4. Also, let a circle be understood as passing through the point directly overhead, through the occidental point, and then through the point below the feet, returning to the oriental point. This circle is called the equinoctial, equator of the day, or equidial. Let there be another circle through both the meridional and septentrional points and through the point directly overhead and its opposite and let this circle be called the meridional circle. Let there be a third circle passing through both the meridional and septentrional points and through the oriental and occidental points; let this circle be called the horizon or circle of the hemisphere.

[Fig. 3]

5. These three chords are thus joined to these three circles so that the meridional/septentrional chord may be called the axis of the equinoctial or equinoctial circle and the extremes of this chord called the antinomastics of the pole. Thus the astrologers define the extremities of the pole to be the axis. But the chord of the orient and the occident is the axis of the meridional circle, and the extremities of that chord (sc. the oriental and occidental points) are called the poles of the meridional circle.

6. But the chord from the point directly overhead to its opposite below the feet is the axis of the horizon, whose extremities are called the poles of the horizon. And thus it is manifest that the center of these circles is the center of the world.

7. Each of these circles is a great circle and the center of a great circle is the center of the world. Indeed, we call that circle great which divides a sphere into two equal parts. Each of these circles, as well as any other, is either

5. A straight line joining two points on a curve.

great or small⁶ if it is understood to be in a sphere. Moreover, it is divided into 360 parts, each of which is called a degree. And note that these three circles are interconnected so that each of them is intersected by the two others and is divided into four equal parts of 90 degrees each.

8. We also imagine that between the equinoctial circle and the septentrional pole there are 90 circles equally spaced from each other,⁷ which are intersected through the middle by the meridian circle at one point above the Earth and at its opposite below the Earth.

9. They are also intersected through the middle at one point in the east and its opposite point in the west by the horizon. There are also understood to be 90 degrees from the equinoctial circle to the septentrional pole. Moreover, the first of the 90 circles intersects the first of the 90 degrees, the second circle the second degree, and so on with the others. An equal number of circles are also understood from the equinoctial circle to the meridional pole. Note that the closer these circles are to the pole the smaller they are, and the closer to the equinoctial circle the larger they are.

10. Each circle, whether great or small, understood in a sphere, consists of 360 degrees, although the degrees of the larger circle are greater than the degrees of the smaller one. Note also that the centers of these circles are contained in the axis of the equinoctial circle.⁸ [Fig. 4]

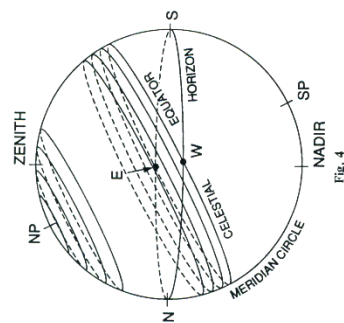


Fig. 4

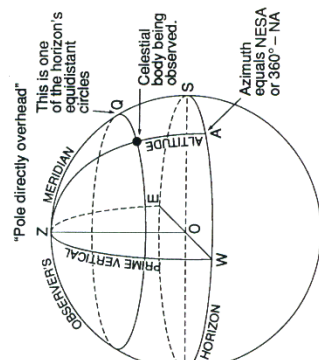


Fig. 5

6. A great circle is a circle inscribed on the surface of a sphere having the same radius as the sphere; by definition, its center is the center of the sphere. A small circle is any circle inscribed on the surface of the sphere, whose center is not the center of the sphere. The equator is a great circle. Circles of declination, parallel to the celestial equator, are small circles.

7. Alimantar, *pl* alimantar — circles on the celestial sphere parallel to the horizon, also called circles of altitude; an alimantar is the horizon.

8. The axis of the north and south poles.

11. And so we imagine that there are 180 great circles, all of which pass through both poles of the equinoctial circle in two opposite degrees. These circles are called by some "colures."

12. And so it appears that all the degrees of the equinoctial circle are separated from each other by the intersection of these [circles with them], and indeed that the degrees of all the circles are equally spaced, and the meridian circle an equal number [of degrees away in any direction]. The meridian circle has its circles disposed in the same way, equally spaced to its poles; that is, descending in number to the eastern and western points. The representation of these may be held to be similar in every way to the circles equally spaced along the equinoctial.

13. The meridian circle has great circles through its poles (like the equinoctial circle) which divide the meridian and its equidistant circles⁹ into 360 degrees. Also there are 90 equidistant horizon circles¹⁰ between the horizon and its pole directly overhead. These circles occur one over the other; the higher they are, the smaller they are and the closer to the pole. These are the circles called alimantar or semi-circles, so-called because on the astrolabe some of them are depicted as semicircles, not whole circles.¹¹

14. The horizon has 180 great circles through its poles, as do the equinoctial and meridional circles, all of which pass through the poles of the horizon, dividing its equidistant circles into 360 degrees; these circles the Greeks called azimuth. Azimuth are the arcs of these circles from the horizon all the way to the pole directly overhead.¹²

9. Circles parallel to the equator, parallel to declination.

10. See Alhimi, *The Book of Instruction in the Elements of Astronomy*.

11. R. Ramsey Wright, Luzak and Co., 1934, pages 194-209.

12. Azimuth is misleading and may be an interpolation from another author. Azimuth is the arc of the horizon from the point where the celestial body is observed, passing through the zenith and the celestial body being observed. The circles of azimuth as described above are perpendicular to the horizon; where they cross the horizon determines the azimuth distance, generally measured from the north point on the horizon (called 0°) eastward, although some authors measure it westward. The elevation of the body—called altitude—is measured from the horizon up along the vertical circle passing through the celestial body and the nadir. Should the body in question be below the horizon, it would of course not be visible, yet its position could still be measured along the vertical circle passing through it and the zenith. The altitude of the body is the angle between the horizon and the vertical circle passing through it and the zenith. The altitude of the body is called "elevation" instead of altitude. [Fig. 5]

15. And thus from what has been said, it follows that every alimantar intersects some azimuth arc and that each azimuth arc is intersected by all the alimantar. Azimuth are extremely important for determining the place of the Sun or stars — by the alimantar, the altitude of the Sun or stars is discovered; that is, how many degrees a body is elevated above the horizon, measured in the quadrant of the horizon in which the intersection of the azimuth occurs. There are four quarters of the horizon: one of these is from the east to the south and is called the southeast quadrant; the second is from the south to the west and is called the southwest quadrant; the third is from the west to the north and is called the northwest quadrant; the fourth is from the north to the east and is called the northeast quadrant.

16. Thus from the aforesaid it is clear that each great circle of the sphere is cut into two equal parts and that each great circle divides another great circle, whether or not this intersection is at right angles. The right-angle intersection produces a perpendicular cross. The intersection that is not at right angles produces an oblique cross.

17. Furthermore, we may imagine two points on the meridian circle, called solstices, one of which is understood as 24 degrees distant from the equinoctial circle and above the Earth in the south while the other, likewise 24 degrees distant from the equinoctial circle, is in the north under the Earth.¹³ Through these two points and through the east and west points¹⁴ there is a certain great circle that the Greeks called the zodiac but the Latins call the Signifer or Circle of the Signs. [Fig. 6]

the horizon, it would of course not be visible, yet its position could still be measured along the vertical circle passing through it and the zenith. The altitude of the body is the angle between the horizon and the vertical circle passing through it and the zenith. The altitude of the body is called "elevation" instead of altitude. [Fig. 5]

13. Thabit is referring to the obliquity of the ecliptic, approximately 23½°. The southern solstice point is 0° Cancer, the northern 0° Capricorn.

14. Thabit is referring to the Aries and Libra points, the intersections of the celestial equator and the ecliptic in the east and west respectively. The "east point" and "west point" are the two intersections of the celestial equator and the horizon.

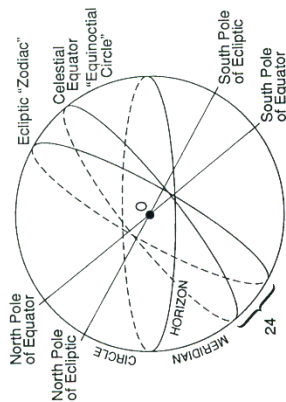


Fig. 6

18. This circle intersects the equinoctial circle obliquely: part of it (called the septentrional or north part) is under the Earth while the southern part is above the Earth. This circle is divided into four quarters, the first of which is from the east to the septentrional solstice, the second from this solstice to the occidental point, the third from the occidental point to the southern solstice, and the fourth from the solstice to the oriental point.¹⁵

19. Each of these quarters is divided into three equal parts and thus the zodiac is composed of twelve parts, each of which is called a sign. The first part is called Aries, the second Taurus, etc. These names are imposed on or transferred to these parts on account of certain stars in or near these parts, whose position or arrangement seems to signify forms of these kinds of things. Each of these twelve parts is divided into 30 degrees and thus the zodiac contains 360 degrees.

15. The "septentrional solstice" is 0° Capricorn, the "occidental point" 0° Libra, the "southern solstice" 0° Cancer, and the "oriental point" 0° Aries.

20. This circle also has two poles; one is understood to be in the south on the meridian circle and under the Earth 24 degrees distant from the meridional pole and 66 degrees distant from the equinoctial circle; the other is understood to be in the north on the meridian circle above the Earth 24 degrees distant from the septentrional circle and 66 degrees distant from the equinoctial circle.

21. Therefore the axis of the zodiac is a chord that is extended from one of its poles to the other passing through the center of the world. And to the zodiac are connected 90 equally spaced circles that go all the way to its north pole, and an equal number in the southern hemisphere between it and its southern pole. The centers of these circles are contained in its axis. This circle has 180 great circles through its poles, as we said the other circles did, which divide it and its equidistant circles into 360 parts.¹⁶

22. For us — who it seems are residing at the center of the world — it is seen from the above conception of the world, totally in the intellect, and now formed, so to speak, in the Creator, that there are three principle chords and three primordial circles.

23. We have also given their axes and equidistant circles and the great circles of their poles; we have a fourth, the zodiac, with its appendices not less efficacious than the others. These are the things that occur to me as those which ought to be imagined first as an introduction to this study.

Explicit Thebiti de imaginatione speræ

SOURCE OF LATIN TEXT

The Astronomical Works of Thebit B. Qurra, ed. Francis J. Carmody, University of California Press, Berkeley and Los Angeles, 1960. Carmody's comments are on pages 118-119, the text on pages 140-143.

16. The "equidistant circles" are parallels of latitude — small circles parallel to the ecliptic.

The Moment of Birth

by Vladimir Bogdanov

When are we what we are? Is it at this moment, reading this article? But then what were we yesterday, and what we will be tomorrow? Do we have a constant nature throughout our lives, or is our life a continuous path, a way of becoming and approaching our essence?

Astrology answers this question in its own way: who we are, and what we become, are based on our moment of birth. *That* moment is who we are. All the rest is merely variation on the "birththeme."

Astrologers differ in their opinions about the significance of the birth moment. Some give it the role of a higher determinant that not only prescribes each of our steps, but also each thought, each feeling, and even an awareness of being determined. Others consider the birth moment an external coordinator, something that predisposes us but does not block our will. In any case, everybody agrees that knowing the "moment of beginning" gives us a key to understanding different aspects of human nature.

Because of its logical and metaphysical consistency, the idea of a birth moment influencing life is beyond criticism. There is no need to provide arguments or proofs for this idea. What is more important is to show the multiple and

The modern development of astrology has been hampered by the inconsistency of astrologers' attempts to describe real, dynamic phenomena via traditional static schemes such as natal or progressed charts.

In this introduction to "continuum astrology," Russian mathematician and programmer Vladimir Bogdanov opens a discussion on a new kind of astrological software that evaluates the interconnectedness of moments in time.

annoying consequences resulting from the mechanical application of this idea to the calculus of the human destiny.

What is a birth? It is a moment, a border, a frontier that separates "not yet existing" and "already existing." It is a moment of becoming, creation, and novelty. But what then is a human birth? An answer to this apparently simple question depends completely on our understanding of the human nature. If we think of a human being as a complex manifold unity, it is natural to ask, which part do we consider born at the birth moment?

Against all opinions, authorities, and common sense otherwise, neither a human being nor his or her smallest part has a moment of birth.

We may say there is some intrinsically higher part to the human condition, something specifically human and essential that is a starting-point and basis for one's entire existence. We may take only this part into consideration, believing all other parts to be external and thus non-significant attributes — such as body, mind, personality. But the point is that all of these non-significant attributes are themselves the objects of astrological study and can be treated as having their own moments of birth.

Let's put astrology aside for a minute and try to see things as they appear to be, not restricting ourselves with logic or the pursuit of ultimate truth. Generally, it is obvious enough that each part of a human being has its own moment of birth. This is definitely true for embryonic growth, where organs develop in a definite sequence (while at the same time there is great variety in terms of rates and the chronology of transition). The same situation exists with social initiations. Modern psychology describes socially significant moments as moments of personality transformation. It seems that the personality breaks up naturally into several parts. New parts become independent entities, each having its own attitudes, preferences, orientation to feeling, and mind. We all have such personalities: son, father, boss, employee, lover, victim, dictator, and so on.

It is important to realize from the very beginning that all of our parts should be associated with their own astrological moments. This means we are dealing with a whole series or chain of independent births.

A chain of births may correlate with some primordial "true" moment of birth. We are used to calling this a natal moment. Unfortunately, this is most common of astrological postulates, is contradicted within astrology itself. For this formula is applicable to post-natal events only, in order to avoid recursive self-references, though most metabolic systems and energetic centers of the physical body are born long before an astrological birth. But what is even more important is that this formula contradicts one of the most fundamental postulates of the astrology: Different positions of the celestial objects give different meanings.

Now we can sum it up: the multifariousness of our nature inevitably leads to a multiplicity of birth moments. Our origins are hidden in the universal unity. Our ways and goals meet in this unity. But all the same, we are human beings, constrained to a world of limitless multiplicity of forms organized into some purposeful process. And being involved in this process, we should stop pretending that we are something atomic and indivisible — become aware, in short, of our manifold nature.

Modern astrology has undertaken a no-lose position in this question. It considered the desirable as real: that is, from the astrological point of view, a person is a certain and definable oneness. But as always, an elegant theory has a price, which in this case is a rather schematic and formal approach to life, a reduction to several astrological factors such as planets, signs, houses, etc. It is this aberration that constitutes a barrier against the further development of astrology as a humanitarian science.

One might think, "It's not all of astrology that I am loosing with this new theory. I am used to casting one horoscope for one person. Now it will be ten or probably twenty in each case. This is obviously much more work, but with a computer, no matter. The important thing is that this new theory won't call my favorite methods and techniques into question."

But I am bound to disappoint you! This article asks you to change not only your methods and

habits in the field of astrology, but the entire foundation of this rather old astrological building. *Against all opinions, authorities, and common sense otherwise, neither a human being nor his or her smallest part has a moment of birth.*

A moment of birth and its influence on a human life remains an essential facet according to traditional astrological thinking. For most astrologers, an astrology without a moment of birth is probably literally unthinkable — not to be believed. But the question is how to combine or not believe. The question is how to combine our theories with our everyday experience. So let's try merely to follow our own quite natural and obvious views and ideas and apply them to astrology directly as they are.

If a person is actually born, appears in this world by some act of creation, then without a doubt he or she has this time as a moment of birth. But it is not so. In fact, we are not born, but formed as a regular part of the already existing order. Being nothing more than a reflection of this order, we can only make a pretense of participation and assume the role of bystander — or in-stander in the best case — but never presume to be the conscious coordinator. To be more precise, we should agree that each person is endowed to some degree with a free will and pure creativity. But for astrology, as a specialized science, it is important only how free will can be treated in the context of pre-determination and resonance with cosmic laws.

The human body is a certain compound of the organic material of the Earth's biosphere. The principle elements of this compound are defined directly on the physical level as the sets of parental chromosomes. The same is true of a personality, which is a reflection of a common cultural matrix of this particular nation, race, and humanity. On one hand, human personality seems to be a blueprint of the whole history of cultural development; on the other, it is a result of conventional norms and the standards of any given society. Thus it seems almost impossible to separate a human unity from a general cultural context, and what's more, from the entire history of the Earth.

We are inseparable from our environment, inseparable from our history, inseparable from our future. And only being provided with a sufficient spatial and temporal perspective can

we hope to have an adequate approach towards human beings and human nature.

A frog is capable only of seeing moving objects. What is not moving actually does not exist for it. Human eyes are much more complicated and better designed. We can see fixed objects because of micro-movements of the eyeball. But if these micro-movements are stopped with some special equipment, we will see nothing but light and dark. The same is true when applied to other perceptions. In any case, our perceptive abilities depend upon the dynamics and duration of what is happening. We are doomed to have duration in the most general sense; an experience forcibly reduced to a point is something similar to what we can see in a crack between cars in a fast train — the disorderly flashing of some shadows and shapes.

We cannot describe a human being at some particular point in time without losing all vividness, concreteness, and significance. A point has no size, no shape. It is indifferent to shifting angles or changing perspectives. Running your video, you understand the difference between the still frame and the moving images: In first case it is a dead, frozen picture, while in the second it is a natural stage in the entire dynamic of the frames.

An astrological moment is like a single note, neither bad nor good in itself, leading neither to consonance nor to dissonance. The same note can belong to various harmonic orders, but in each of them it will play quite a different role. In a melody, this note can be only an intermediate stage between two melodic parts. It can also be a culmination of the music phrase, a cadenza for the whole work.

Taken by itself, each moment of the human life, as well as any single note, allows any interpretation and can be imbued with any meaning and significance. Such uncertainty is not the consequence of the amorphousness of the situation, but rather of the inadequacy of our methodology. We deal not only with a problem of multi-context (which means that each single meaning is observed against a great variety of backgrounds, and thus seems to be different in each case) but with a problem of the absence of the meaning itself as some definite point. What we have is not even a set of meanings; it is a continuous field, which cannot be effectively reduced to any particular location.

During our life, we find ourselves involved in different stages of change. Some of them appear to be new, others a repetition of previous changes. We die and we are born again. The past exists in the form of memories, the future in the form of expectations, the present in the form of perception. That's all we have. And there is no certainty about our possession. How can we measure fate, not being sure it is ours? Nothing is stable or definite except "now" or "here" — the only moment in the stream of life. And what shall we do when our breadth of being is too wide for any one moment to represent us comprehensively, accurately?

We cannot base an adequate model of human life on any single moment. The same is true for any set of moments. Even being provided with a great number of various key moments, we are not able to represent changes and dynamics, which are continual by their nature. An astrological description of our life should include some kind of melodic invariant, a brief dynamic form resonant with the flow of our life.

Two of the most powerful methods of dealing with infinite complexity are harmonics and the theory of reflection. Everything that exists repeats itself in a mosaic of self-reproductive images. This multiscale self-coexistence is a symbol of order and regularity, resulting in a simple formula: We are much less than we are. What we really need is some extraction, some part of us; the rest can be reconstructed from this information. The difference between this and a traditional outlook is that we no longer need any essence or root of the whole structure — just some part, some example.

The problem is to make the example *complete*, that is, without gaps. Put like this, the problem has no ultimate solution to this, but it gives us a key. Now at least we know what we are searching for. It is a tuning fork, sounding a basic pitch for the whole tune.

In a traditional astrology, the tuning fork is a natal chart. Being in consonance with it seems to be the most significant point in determining the influence of a cosmic moment. At first glance, it is quite a satisfactory theory. But it conceals a significant methodological mistake. The weakness of this approach is not that such a correlation does not exist or cannot be applied to all the situations, but that it is always correct and provides us with any desirable correlation. Any two notes can be compared with each other, but the only positive information we can derive from this comparison is that they are the same or they are not. (In astrological terms, does a transit chart repeat a natal configuration, or not?) The same notes can have entirely different roles in different tonal scales, and therefore represent different musical meanings. Again in this case, it is not a question of context, but one of common framework, harmony, and concord — dynamic form given *a priori*.

It would be silly to try to measure the similarity between two tunes by comparing notes they have in common. The same melody in C-major and in D-minor does not have the same set of notes, but a listener can recognize the similarity easily. So it is obvious that note by note comparison is not the best judge. Finding a way to compare melodies is not an easy task. These difficulties are a reflection of an objective irreducibility of the dynamic objects to any single qualitative index.

We cannot base an adequate model of human life on any single moment. The same is true for any set of moments. Even being provided with a great number of various key moments, we are not able to represent changes and dynamics, which are continual by their nature. An astrological description of our life should include some kind of melodic invariant, a brief dynamic form resonant with the flow of our life.

It is quite probable that we are about to apply our traditional logic to this new idea, perhaps like this: We have no moment of birth. Let's then consider not a moment, but the whole period of time, in which the moment of birth is included. During this period, the theme of our life is especially clear.

Though old and trivial, this is still a good way of thinking. We may hope to succeed in this

direction. We should nonetheless remember that the moment of birth itself is not the very beginning, nor is it a primary factor in our future. It is only a variation on the theme of our already existing existence.

There is no last or first. There are intermediate stages, sometimes incomplete, with gaps and blanks. If we take the events of our life as a mirror of fate, the mirror is broken mirror and of no use — no more than a chaos of light and shadow. Fortunately, in astrology we deal not with mirrors, but with creatable holographic images, creating and repeating themselves within themselves.

Any piece of a holographic image can be used to reconstruct the whole picture. Even the smallest part provides us with some general traits of the original picture. The larger the piece, the clearer our perception. An astrological holograph consists of any kind of life information referred to celestial objects.

How much information should we use to get a distinctive picture? There seems to be a natural limit to our choice: the duration of this particular life. But with a greater precision of analysis, we can easily see this is not true. One's personal pre-history has its beginning billions years ago. The proof is in our genetic structure. One's post-history does not end with our death — we have existence in the memories of other people, in the form of work legacy and ideas, in our children, and simply as a part of human history. We may say only that we were, we are, and we will be, but to say this is to say nothing.

As living beings, we have no definite location, neither in time nor in space. The moment of birth was "invented" as something generally correct, something that promises a kind of solid foundation in a relative world. As with any artificial construct, this cornerstone of astrology has its own natural limits of applicability.

Modern astrology has already grown beyond these limits while stubbornly relying on old notions.

We are faced with the necessity of making a transition to an astrology that deals not with points or separate moments in time but with periods and phases — "continuum astrology." Having only decided to make this transition, we may hope to collect all the separate parts, traits, and factors embedded in astrological theory and find not an astrology reducing human beings to a point, but one pointing to human beings.

There seems to be no reasonable solution for the "moment" problem. It's important to accept the necessity of having no solution. This gives us the ability to look with open eyes. Being aware of a problem is half the solution, even if there is no solution at all.

This article is hardly pure theory or a claim to a better future. It grew out of several years of computer investigation into advanced statistical techniques. The fruit has been a theory of rectification that encompasses the breadth of the entire birth dynamic and algorithms for extensive psychological analysis of individuals and collective groups.

"Continuum astrology" is a flexible approach that can be applied to almost any astrological issue on different scales of time and space. It does not contradict traditional astrology, since all traditional techniques can be considered its natural subset.

This new theory is so complicated in terms of calculations that only computers can handle it. At the same time, it is extremely simple and natural, for it refers to the real dynamics of life and to the real celestial movements. It is very old in its foundations, but very modern in its methods — and no more than another step in our eternal attempt to grasp the ever-changing world.

On a Consistency Argument for Astrological Principles

by Robert Schmidt

Part Two Zodiacal Bias

The astrological postulate of a changing planetary efficacy as a result of zodiacal position is interpreted in terms of the changing relative velocity between the Earth and the planet in question. The various components of planetary motion are examined in the style of Ptolemy, and the equant is seen to be the only component to produce a bias on the barest kinematical assumptions. Further kinematical assumptions are entertained, capable of producing a more pronounced bias. An explanation is offered for the negative result of Gauquelin's investigation of zodiacal bias according to sign.

This is the second in a series of articles advocating a new way of dealing with the legitimacy of astrology as a scientific question. Rather than speculating on possible causal mechanisms (Seymour), or performing statistical analyses to establish the mere existence of astrological phenomena (Gauquelin, et al.), the present approach investigates the consistency and coherence of astrological principles. It does this by disentangling the various kinematical and dynamical factors of planetary motion that may have an astrological import. This may be accomplished by translating all the fundamental astrological claims into statements about relative velocity. With this as their common denominator, it may be seen to what extent they are irreducible, consistent, complementary, and complete. This is not to say that relative velocity is the traditional or ultimate meaning of these astrological axioms. Nevertheless, their consistency within such a system would give them a formal intelligibility that would seem to have some objective basis. That is, it would make it unlikely that they derive simply from fanciful, metaphorical, or mythological thinking, as many have surmised. Far from consisting of distinct and arbitrary statements, astrology could turn out to be a comprehensive language of the details of planetary motion.

The first article in this series (*Matrix Journal*, Vol 1, Number 1) concerned astrological house bias, which is the only astrological phenomenon supported by any substantial statistical evidence (namely, Gauquelin's "Mars Effect.") Provisionally ignoring any dynamical factors that might govern the strength of the effect, the article attempted to isolate the purely kinematical factors. Accordingly, it considered the hypothesis that the effectiveness of a planet is sensitive to changes in the relative velocity obtaining between the planet and the point on the surface of the Earth where it is supposed to act. It argued that the Gauquelin distribution could be accounted for by changes in relative velocity brought about by diurnal motion alone.

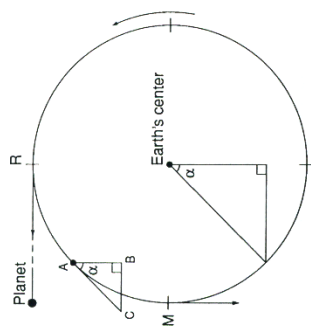
By kinematical, we merely mean assumptions that have to do only with the motions of the planets (more exactly, lengths of time and distances related to their motions) and not with the magnitude or quality of any influences. This is quite in keeping with Grant Lewi's conjecture (*Astrology for the Millions*) that both the varying strength and the individual qualities of the planets can be attributed simply to the speeds of the planets and the corresponding lengths of time that they are apt to work on us while in various locations of the zodiac. Our specific hypothesis about relative velocity could be understood as an elaboration and fuller articulation of Lewi's own hypothesis. By arguing that the amount of time that the planet is effective is a function of its relative velocity, we can include a broad range of astrological concepts within Lewi's hypothesis.

This article deals with zodiacal bias. It must not only account for a changing planetary efficacy according to zodiacal position, but for the null result of Gauquelin's statistical investigations into zodiacal signs—namely, the lack of correlation between professional eminence and the simple presence of a planet in a sign at birth. Using reasoning analogous to that of the first article, this article will investigate zodiacal bias in terms of the remaining component of the total relative velocity, which deals with the velocity of approach or recession between the planet and the Earth itself.

Because the reasoning in this article is similar to that in the first, it will be helpful to recapitulate the results and methodology used there.

II

The first article made the provisional assumptions (1) that the number of births influenced by a given planet while it is in a certain zone (house) is directly proportional to the total amount of time that the planet is active in that zone, and (2) that the planet can be effective only when the relative velocity falls within certain boundaries.



AC = rotational velocity of Earth = $k = 1$
BC = velocity component of AC toward planet = u

Fig. 1

With reference now to Fig. 1, BC—the velocity vector of the Earth's uniform rotation that points in the direction of the planet—is greatest at point R (when the planet is rising), and least at point M (when the planet is culminating). However, the change in velocity is greatest when at point M and least at point R. This latter observation led to the thought that the amount of time that the planet is effective—the amount of time it takes for BC to go from u_1 (at which point it begins to act) to u_2 (at which point it ceases to act) will be shorter in a zone nearer the midheaven and longer in one nearer the horizon. At the same time, over the period of a year, a given band of u will have a greater probability of falling near the midheaven than near the horizon, for the simple reason that u is changing more quickly at the midheaven. Thus,

the total amount of time that the planet is likely to be active within a given zone is the product of these two factors.

Let us consider some zone within the horizon and midheaven. Suppose that u has the value of V_1 at the beginning of this zone and V_2 at the end. Suppose further that the planet begins to act at u_1 and ceases to act at u_2 . Then the probability that the planet will act within this zone is

$$\frac{\Delta V + \Delta U}{m} \quad (1)$$

where m is the additive inverse of the total change in velocity from horizon to midheaven.

To calculate the average amount of time that the planet is active while in a given zone, it was first necessary to calculate the exact amount of time that the planet would be active as a continuous function of u passing from u_1 to u_2 , using the relation

$$t(u) = \int \frac{du}{\frac{du}{dt}} = \int dt = t$$

and the fact that

$$u = k \cdot \sin \alpha. \quad (2)$$

Then the mean value theorem was applied to determine the average amount of time that a planet would be active within a given zone whose termini possessed the velocities V_1 and V_2 , also taking into account the possibility that the body begins to act slightly before its velocity reaches V_1 , and also the possibility that it continues to act slightly beyond the point where its velocity becomes V_2 . When these three separate integrals were averaged with a weighted mean, and multiplied by (1), the result was

$$\frac{\Delta u(\alpha_1 - \alpha_2)}{m} \quad (3)$$

This says that the amount of time that the planet is within active bands for a given zone is directly proportional to the difference in the angles corresponding to the beginning and end of the zone. That is, on the average, equal arcs of the circle encompass equal amounts of time during which the planet would be effective, even if one of these arcs is near the horizon or midheaven, and the other somewhere between. Thus, in this simplest of all scenarios, there would be no distribution at all, for the average amount of time during which the planet is effective in a given zone, and the average number of times that it is effective within that zone at all, turn out to be exact reciprocals of one another.

III

Two tacit assumptions were made in this argument: 1) that even if the planet was effective for only a short time, it would nevertheless influence the birth, and 2) that even if a birth is accompanied by only a single period of planetary activity, it will nevertheless be influenced.

Let us speculate on two modifications of these simplest assumptions that would produce something resembling the Gauquelin distribution, although these new assumptions are purely ad hoc at this point.

A) First—making the effectiveness of planetary action on a given individual depend on the length of time that the planet acts while in a given zone. That is, the longer it acts, the more likely it is that the action will "take." This hypothesis would bias the distribution in favor of planet acts longer in these sectors, the average relative velocity being least.

B) Second—making the effectiveness be a function of the number of distinct times the planet is effective while in a given zone (requiring numerous individual "bands" of relative velocity that permit the planet to be effective.) This would be equivalent to giving the individual a number of separate shocks—the first might not take effect, but several are almost sure to.

These are both still kinematical assumptions and quite in the spirit of Lewi's hypothesis mentioned above. And as long as they are not mentioned above.

selves exact reciprocals—there is no reason to think they would be, since they are due to quite separate causes—they might produce something resembling the Gauquelin distribution.

Instead of making these arbitrary assumptions, we could also try to work backwards, characterizing the distribution itself as the composite of a third and fourth harmonic in the manner of Addey. The first derivative of this function would correspond to the relative velocity component u . We could then speculate on the kinematical assumptions that could yield this new version of u . (This will be pursued in a later paper.)

IV

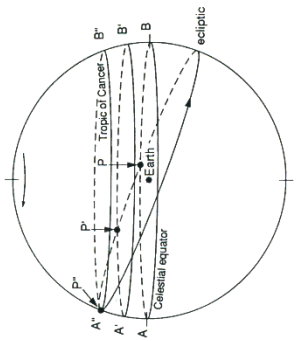
We have not yet discussed the constant m in (3), which arose from the fiction that the planet was in the equatorial plane. When we refer the planet to the ecliptic, as is more proper, m will vary over the course of the year. When the planet is at the Aries point [Fig. 2], its diurnal arc will in fact be in the equatorial plane; but as it moves into Taurus, its diurnal arc will no longer be part of a great circle, but a small circle parallel to the equator. When it reaches the summer solstice point in Cancer, it will have travelled its greatest distance from the Aries point and will describe its smallest diurnal circle, after which it reverses its direction. And so forth.

Thus, in order to calculate the true velocity component w directed toward the planet in the plane of the ecliptic, we would have to multiply the component u in the equatorial plane by $\cos \beta$, β being the planet's declination for that day. And so

$$\begin{aligned} w &= u \cdot \cos \beta \\ &= k \cdot \sin \sigma \cdot \cos \beta \\ &= -m \cdot \cos \beta \cdot \sin \sigma. \end{aligned}$$

Effectively, all this has done is change the multiplicative constant of $\sin \sigma$. Thus it in no way affects the calculation of the time of planetary efficacy for any given day. However, referring again to (2), we can see that as the diurnal circles get smaller and m also becomes smaller, the time of planetary efficacy increases. Presumably, this is because the planet takes a

longer amount of time to change its velocity from u to u . Therefore, by itself, this kinematical factor may tend to make the planets efficacious for a slightly longer period of time around the solstice points, and a slightly shorter period of time around the equinox points. It may be offset, however, by a decline in the probability that the planet will act at all on certain days, since the decreased variation in relative velocity due to diurnal motion may make it impossible for the component u to bring the total relative velocity into an active band at any point during the day. The relationship between these two opposing kinematical factors requires further study.



for a planet successively at P (Aries point), P', P'' (summer solstice point), AB > AB' > A'B''

Fig. 2

V

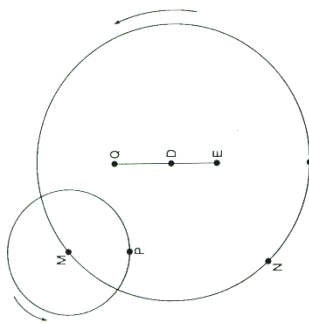
The discussion of m has provided a natural transition to the investigation of the proper ecliptical motion of the planets. Astrology has always claimed that the position of a planet in the zodiac is of great importance in estimating its effect at a given moment. Now, as the planets move around the ecliptic, the relative velocity

of their approach and recession changes from day to day. (In the first article, this component of the total relative velocity was called v .) Thus, if we maintain the general assumption of the first article that the planets will only be effective when the total relative velocity between the planet and a point on the surface of the earth where it is supposed to act falls within certain boundaries, the velocity component v also needs to be taken into account. We need to investigate how this component regulates the amount of time that the planet is within these bounds, and thus the number of births that it can influence, to see whether this amount of time is greater when in certain parts of the zodiac than in others.

For better comparison with the methodology of the first part, and because of possible ancient connections between Ptolemaic astronomy and astrology, we will apply an analogous analysis to the epicycles, eccentric circles and equant circles that compose the motion of the planets in Ptolemy's *Almagest*. The goal is to isolate those factors that may contribute to a zodiacal bias, even prior to the introduction of any special assumptions such as A) and B) in section III.

Ptolemy's explanation of the motion of Mars.

Fig. 3



VI

Fig. 3 represents Ptolemy's explanation of the planet Mars. There are two separate circular motions. The planet at P is moving on an epicycle whose center is at M. At the same time, M is moving about its own circle MNO, called the deferent. The Earth E is not at the center of the deferent, but is displaced a bit, or eccentric. If the motion of M were uniform when viewed from the center of its circle D, then the circle MNO can also be called the eccentric circle. But when the motion is uniform only about some other point (as here the point Q) then the circle is called the equant. It takes all three features to account for the observed motion of Mars, to "save the appearances."

We will consider the pure epicyclic hypothesis first. In Fig. 4, E is the Earth, and the planet at P is moving uniformly on its own epicycle with D as its center.

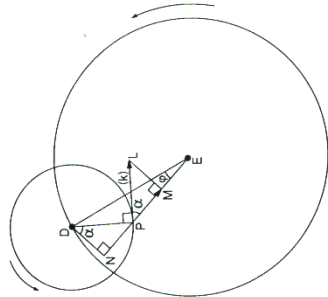


Fig. 4

tain favored signs. However, it may be possible to perform a Gauquelin-style statistical analysis, were it possible to gather enough data within, say, a two year period.

As for Saturn and the outer planets, they make so many loops within a given sign that the extrema are repeated many times and bunched closely together. In the case of Pluto, the extrema would appear to be nearly continuous with each other in the zodiac, though they would be produced only for comparatively short periods of time Pluto was in a given degree.

It should be stressed that this part of the analysis has been somewhat different than that in the first article, where the distribution was one merely of probability. We were considering a very large number of days. The number of births during a single day, or a week even, would not be enough to be statistically significant. Here we are seeking the actual places where the planet comes to be effective—the real distribution of the extrema—and because this occurs for a relatively long period of time compared to the two hours or so that a planet stays in a certain house, it could perhaps involve enough births to make a statistical analysis possible. Eventually, it should be possible to pin down the efficacious times even to the hour.

It is only a matter of identifying the efficacious hands of relative velocity, and there is some hope that this could be done through the modified Gauquelin-style analysis proposed here.

It is possible that over very long periods of time, there comes about, on the average, a certain bias on the part of certain planets for certain signs. But in order for this to have any bearing on the result of this zodiacal analysis, it would have to take in many more years than are covered in any existing analysis—in fact, it would have to extend back many hundreds of years. Otherwise, it would be as if Gauquelin, when he investigated the Mars Effect, only considered births on 50 or so successive days.

I would like to conclude with a conjecture. In view of this discussion, it is clear that we are in need of additional criteria for determining just when and how a planet will be efficacious. It is not enough to note simply that a planet is in a certain sign. It is possible that the systems of dignities found in ancient astrology provided the additional conditions necessary to be assured that a given planet would be efficacious at a given time. In the progress of this investigation, I will attempt to translate this qualitative language into more kinematical terms.

Ascension on the Ecliptic

(And Criteria for Choosing a House System)

by Tom Bridges

Students of astrology, confronted with the variety of house systems available, take some solace that regardless what system is used, the angles on the chart remain the same. But there are exceptions worth noting.

Most astrologers accept a particular house system, or two or three, depending on the type of chart they are reading or perhaps based on a teacher's example. On the other hand, some astrologers have construed the inconsistency of intermediate cusps as a justification for nonuse.¹ Even so, there are house systems in which the first, fourth, seventh, and tenth cusps are not the traditional ascending and culminating axes defined by the intersecting horizon, meridian, and ecliptic great circles. These alternate angular cusps are likewise defined by intersecting great circles—the criterion for an angle—and for this deserve a look. The question of which house system to use cannot be based on intermediate cusps alone.

Beginning students of astrology see "Eq" or "Vx" on a horoscope and ask about the meaning of these points. Or they see a long list of house systems, try them, and learn that the ascendant and midheaven are not always the first and tenth cusps. Compared to what has been written about the traditional ascending and culminating angles, very little is available on alternate angular cusps, which, as the intersections of great circles, have equal astrological properties of these sensitive points is a step toward reliable interpretation. The ascendant, equatorial ascendant, vertex, and first cusp of the Morinus house system are covered in this article.

1. This is so in spite of the intrigue and occasional compelling instance of Arabic parts (planetary formulas), transits, and progressions involving intermediate cusps.

I. House Systems with Alternate Angles

Equal Houses. The equal house system, in which the midheaven² is not the tenth cusp, is the most common example (the intersecting ecliptic and horizon still define the first and seventh cusps). In equal houses, the midheaven is a sensitive point, plain and simple. The midheaven house system, taught in England, is a version of equal houses in which the midheaven is the cusp of the tenth and the ascendant is not the first cusp.³

Meridian Houses. Meridian houses, the chosen method in the Uranian system of astrology, are equal midheaven houses on the equator, projected to the ecliptic via meridians of right ascension. The cusp of the first house in the Meridian system is the equatorial ascendant—a point often inserted in charts that have not been calculated with Meridian houses. The midheaven is the cusp of the tenth house.

Morinus Houses. The Morinus house system (named after the 17th-century physician, mathematician, and astrologer Jean-Baptiste Morin) is another in which the angular cusps are not the traditional angles of the chart. This system presents an interesting interplay between the ecliptic and the equator and is characterized by a pair of ascending and culminating squares: The first Morinus cusp is square the traditional midheaven; the tenth cusp is square the equatorial ascendant. Equal arcs on the equator are projected to the ecliptic via meridians perpendicular to the ecliptic.

Horizon Houses. The Horizontal house system is another whose angular cusps are distinct from the traditional angles. Perpendiculars to the horizon are projected to the ecliptic starting at the east point. This system's ascensional plane contains the anti-vertex/vertex axis, while the culminating plane contains the traditional midheaven axis (the meridian cuts both horizon and ecliptic).

2. Except when 0° Aries or 0° Libra rise on the ecliptic, as will be discussed in more detail.
3. Unless 0° Cancer and 0° Capricorn culminate.

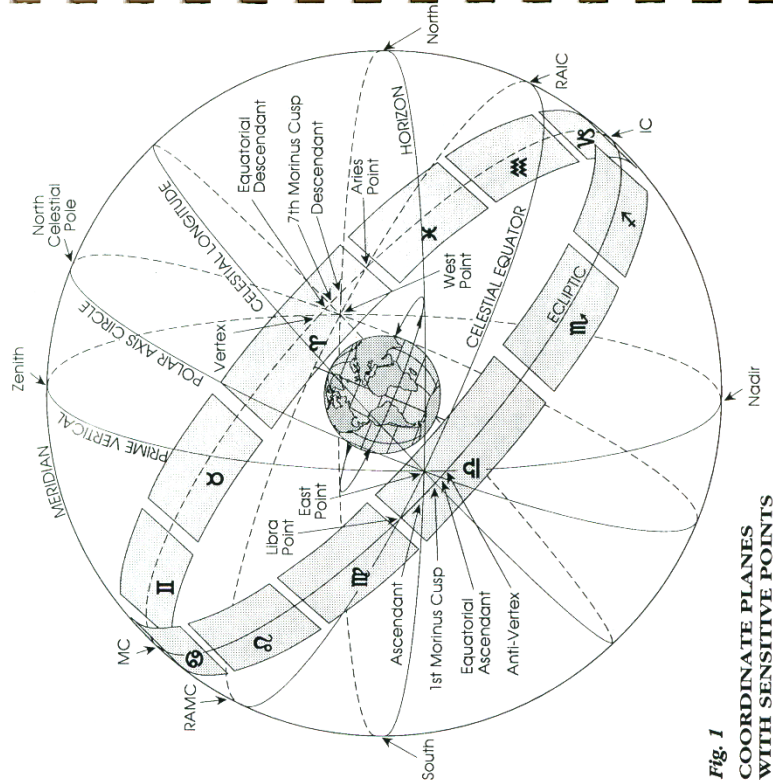


Fig. 1
COORDINATE PLANES
WITH SENSITIVE POINTS

It was in studying these house systems that I began to add nontraditional angular cusps to a traditional chart (hardly a new practice). I calculated a chart with Morinus houses but included the midheaven, ascendant, and equatorial ascendant. Fig. 2 shows what this looks like in Michel Gauquelin's chart:

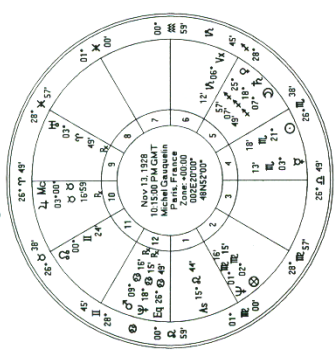


Fig. 2. The Angular Cusps in One Chart—Morinus Houses
There are four sets of angular arcs and twelve distinct cusps, appearing on a 90° dial as four composite points (ascendant, midheaven, equatorial ascendant, and vertex). [Fig. 3]

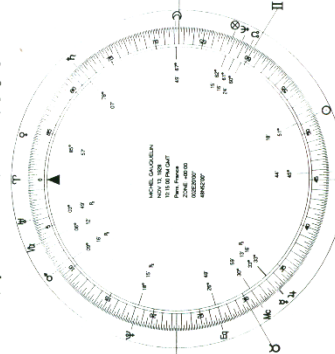


Fig. 3. Composite Angular Cusps on a 90° Dial

	MORINUS	MERIDIAN	HORIZONTAL	TRADITIONAL
1	00°59' LE	26°49' CA	06°12' CA	15°44' LE
4	26°49' LI	00°59' SC	00°59' SC	00°59' SC
7	00°59 AQ	26°49' CP	06°12' CP	15°44' AQ
10	26°49' AR	00°59' TA	00°59' TA	00°59' TA

Fig. 4. Angles of Michel Gauquelin's Horoscope

Fig. 4 gives these points in tabular form. The horizontal and Meridian systems duplicate the fourth and tenth cusps of the traditional system, leaving twelve distinct points. I could not resist wondering whether *these* are the twelve cusps most worth looking at.

II. The Equinox Points

Before discussing the properties of these angular cusps in more detail, we shouldn't forget the significance of the equinox points in this scheme. More than points of zero solar declination, the equinox points 0° Aries and 0° Libra are the common ground of angular cusps in a horoscope.

To observers in the northern hemisphere, tropical 0° Aries is the rising node of the Sun—where the Sun cuts the celestial equator moving from south to north declination, or simply when the Sun has zero declination. It is one of two equinoxes, the other being 0° Libra, which (to observers in the northern hemisphere) is the descending node of the Sun. These are points in the year where, in the course of a day, the Sun spends equal amounts of time above and below the horizon.

The rising and descending nodes of the Sun are the intersections of two great circles on the celestial sphere that represent what Ptolemy called the two primary movements in the heavens:

- The first movement is the apparent east-to-west motion of the fixed stars circumparallel with the Earth's equator and representing the diurnal ascensional transit through the zodiac.
- Movement two is the west-to-east motion of the Sun, Moon, and planets along a circle oblique to the equator, called the ecliptic, representing the apparent annual path of the Sun through the zodiac.

III. The Four Types of Diurnal Ascension⁴

The equinox points determine the starting and halfway points in the ecliptic coordinate system. Among ecliptic phenomena are the forms of diurnal ascension and descension, or points where great circles on the celestial sphere, oblique or perpendicular to the ecliptic, cut the ecliptic, altering zodiacally with the diurnal or equatorial motion of the Earth (what Ptolemy called the east-to-west motion of the fixed stars).

Of the four types of diurnal ascension covered in this article, only one is a direct intersection—that of the horizon and the ecliptic, determining the ascendant of a traditional horoscope.

4. Throughout this article, the vagaries of ascension in extreme latitudes treated in James Neely's article, beginning on page five—are ignored.

The remaining three types are indirect intersections, meaning that the intersection occurs off the ecliptic but is projected to the ecliptic via a perpendicular to one of three great circles: the horizon, the equator, or the ecliptic itself.

The Ascendant. This is the intersection of the horizon and the ecliptic in the east. For a given midheaven, it varies with latitude. Its separation from the midheaven varies with the length of a sign's ascension on the ecliptic.

Astrologers have sometimes used the term east point interchangeably with the equatorial ascendant; these are distinct points. The east point is the confluence of the horizontal and equatorial great circle crosses on the celestial sphere. The equatorial ascendant is a projection of the east point along one of those circles (the polar axis circle) to the ecliptic.

Equatorial Ascendant. The intersection of the polar axis circle with the ecliptic in the east, the equatorial ascendant is the ascendant of the zero-latitude midheaven and, in the Morinus house system, is always 90° from the cusp of the tenth house.

Vertex: The intersection of the prime vertical with the ecliptic in the west, the vertex is the ascendant of the immo coeli at the co-latitude of birth (90° minus the latitude of birth) and the first-seventh house axis in the horizontal house system. Since the prime vertical is always at right angles to the horizon, the ascendant at a given latitude is equal to the anti-vertex at that latitude minus 90°. See Fig. 5—Gauquelin's chart calculated for 41S08 latitude (48N52 minus 90°). In general, the vertex is in houses five, six, seven, or eight. Its computation becomes problematic in equatorial or torrid regions for similar reasons that computation of

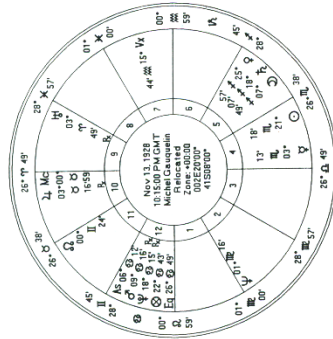


Fig. 5. Gauquelin's Chart Relocated to Birth Latitude - 90° Relocated Anti-Vertex Equals Original Ascendant Morinus Houses

The "Morinus Ascendant" (the first cusp in the Morinus house system). The intersection of the ecliptic with a perpendicular to the ecliptic that passes through the east point, the first cusp of the Morinus house system is always 90° east of the midheaven (dexter square). The Morinus tenth cusp is 90° from the equatorial ascendant (sinister square).

Note that the angular cusps in the Morinus system and the equatorial ascendant (first cusp in the Meridian system) are not conditioned by the birth latitude.

IV. The East Point

What do these angular cusps have in common? The Morinus first cusp is determined by the one perpendicular that does not have an accepted or commonly acknowledged name but is the only one perpendicular to the ecliptic and passing through the east point. The east point is the basis of these three points—all three indirect (projected) types of diurnal ascension result from perpendiculars originating from it. Note that the equatorial ascendant is not the east point (except when the horizon intersects the ecliptic at 0° Aries or 0° Libra). Astrologers have sometimes used the term east point interchangeably with the equatorial ascendant, but these are distinct points. The east point is the confluence of the horizontal and equatorial great circle crosses on the celestial sphere. The equatorial ascendant is a projection of that point along one of those circles (the polar axis circle) to the ecliptic.

V. Practice with the Symmetry of the Points

As mentioned, the projection of the east point along the prime vertical intersects the ecliptic at the anti-vertex. To see coordinate symmetry in chart calculation, calculate a relocated chart using the co-latitude ($90^\circ - \text{latitude}$) and co-longitude ($180^\circ - \text{longitude}$), and change west to east, east to west [Fig. 6]. You will see, besides the flip-flop of midheavens and the first and seventh Morinus cusps, that the ascendant of the relocated chart is equal to the vertex of the original chart, while the vertex of the relocated chart is the original ascendant. You will also see that the equatorial ascendant of the new chart is opposite the original equatorial ascendant and on the other side of the ascendant—another flip-flop. (A subject for another article: the sensitivity of the relocated coordinates using locality techniques.)

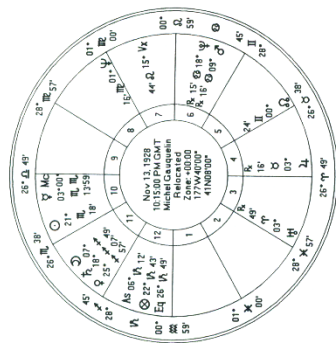


Fig. 6. Gauquelin's Chart Relocated to Co-Latitude and Co-Longitude — Relocated Vertex Equals Original Ascendant — Relocated Ascendant Equals Original Vertex

VI. Properties of Ascension

When 0° Aries or 0° Libra rise on the ecliptic, the prime vertical, polar axis circle, and "Morinus meridian" converge, becoming one and the same—altitude, latitude, and declination are measured along the same great circle. For individuals born with one of the equinox points rising, or close to it, there is little or no distinction to be made among these four types of ascension. In the Uranian system of astrology, the rising equinox in an individual's chart is considered very powerful (0° of the cardinal signs on the 90° dial)—one's orientation to the world (the angle all horoscopes have in common).

5. A suggested name for a meridian of celestial longitude perpendicular to the ecliptic and passing through the east point.

Between 0° Aries rising and 0° Cancer rising, the equatorial ascendant gradually moves above the horizon, reaching a maximum separation, at 0° Cancer rising, of almost a full sign.

Between 0° Cancer rising and 0° Libra rising, the equatorial ascendant gradually returns to the horizon, meeting it at 0° rising.

Between 0° Libra rising and 0° Capricorn rising, the equatorial ascendant moves below the horizon, reaching a maximum separation of almost a full sign at 0° Capricorn rising.

Between 0° Capricorn rising and 0° Aries rising, the equatorial ascendant returns to the horizon, meeting it at 0° Aries rising.

"Morinus Ascendant" (First Morinus Cusp). Projected along a perpendicular to the ecliptic, the east point intersects the ecliptic at the first cusp of the Morinus house system, which is simply the midheaven plus 90° . This is also the first cusp in the midheaven house system (equal houses begun at the midheaven) and a component in the composite midheaven on the 90° dial.

When 0° Aries and 0° Libra rise on the ecliptic, the meridian of celestial longitude passing through the east point is aligned with the prime vertical and the polar axis circle, creating a single circle along which the east point is projected to the ecliptic, so that ascendant, anti-vertex, equatorial ascendant, and first Morinus cusp are the same point.

Between 0° Aries and 0° Cancer rising, the Morinus ascendant moves above the horizon with the equatorial ascendant, up to over a full sign away at 0° Cancer rising. From there to 0° Libra rising it moves back toward the horizon, meeting it at 0° Libra rising. From there to 0° Capricorn rising it moves below the horizon with the equatorial ascendant. Then from 0° Capricorn and 0° Aries, it moves back toward the horizon, meeting it at 0° Aries rising.

Ascendant and Vertex. With 0° of Aries or Libra rising on the ecliptic, the midheaven is exactly 90° away from the ascendant (regardless of latitude) and vertex is equal to the descendant. The closer one is born to the equator, the closer the ascendant and midheaven are to being square, regardless what sign is rising on the ecliptic.

From 0° Aries to 0° Cancer rising, the separation between ascendant and midheaven increases from 90° up to a maximum (depending on latitude) of about 120° . The vertex moves below the horizon, reaching a maximum of 40-plus degrees when 0° Cancer rises.

From 0° Cancer to 0° Libra rising, the midheaven and ascendant gradually return to a square and the vertex moves back toward the horizon, meeting the descendant at 0° Libra rising.

From 0° Libra to 0° Capricorn rising, separation between midheaven and ascendant decreases from 90° to a minimum (depending on latitude) of about 60° and the vertex moves above the horizon, reaching a maximum of 40-plus degrees at 0° Capricorn rising.

From 0° Capricorn to 0° Aries, the separation between the midheaven and the ascendant gradually returns to 90° and the vertex returns to the descendant.

Equatorial Ascendant. Projected along the polar axis circle, the east point intersects the ecliptic at the equatorial ascendant—the projection of the celestial equator's rising node onto the ecliptic, or the ascendant as if a person had been born at the equator. The equatorial ascendant is the cusp of the first house in the Meridian house system and used as such in the Uranian system of astrology. On the 90° dial, it is the composite point of equatorial ascension and fourth-tenth Morinus house axis, since these angles are always square. At 0° Aries or Libra rising on the ecliptic, the equatorial ascendant is the same as the ascendant and anti-vertex.

and innum coeli, giving more possibilities for conjunctions when working with transits, progressions, and directions on the 360° wheel. In other words, there is a tendency among most astrologers to emphasize conjunctions over any other aspect—the first and seventh Morinus cusps justify an equal weighting for squares to the culminating angles, for here we have more than just a point, but great circle intersections defining a point.

Another idea is to use equatorial or primary arcs not only to the RAMC, but to the equatorial ascendant projected back to the equator, which is the east point (convert planets to right ascension before working with these arcs).

Charles Jayne and Michael Erlewine have given fairly well-known interpretations of the vertex in natal charts as destiny, fate, or fated contact, but the literal configuration of the vertex (and anti-vertex) suggest additional meaning.⁶

The vertex and equatorial ascendant represent a person's ascensional orientation to the equinox points. Inasmuch as the vertex/anti-vertex axis represents a person's orientation to the equinox points, we can also speak of "other" and "self" types of people—"other" people being those born with Aries through Virgo rising (vertex below the horizon and anti-vertex above it, often across the 6th-12th house axis—service types) and "self" people being those born with

6. Charles Jayne (on the vertex itself): "If the ascendant refers to one's *home* or personal inclinations, and the midheaven to one's *status*, then the vertex may refer to one's *role*. One's role or the 'part one plays' is not a matter of personal choice at all but is fated or destined, being determined by one's position in the zodiac and the position of the sun at the time of birth. The vertex is the point in the zodiac which usually takes the part he or she can get. The part was not written by the actor so that an actor is very much at the mercy of the playwright or director. Planets which are strongly linked by aspect to the vertex are, therefore, very much at the mercy of the director. The vertex is the life of that actor. One can't really change the things signified by the life, which is involved with the vertex since it has to do with one's 'lot in life', actually determined by one's past and thus peculiarly karmic."

Michael Erlewine (on the two dimensions of the azimuth or local space chart): "Where the azimuth local space chart has to do with action and consequence on our part, the prime vertical chart is about the consequences of our actions on the part of others. The prime vertical chart tells us about that which is fated or destined for us, the areas of life that will happen automatically and don't require effort on our part. The prime vertical charts those areas of life where we can't help but be involved. It is our destiny—there may be no way to go to us where the prime vertical (anti-vertex) are involved. It is fated."

POINT OF ASCENSION	INTERSECTIONS	PROJECT FROM
Aries Point	Earth's diurnal and annual orbits	no projection
Ascendant	Earth's annual orbit and the horizon, moving with the Earth's diurnal orbit	no projection
Vertex	Intersection of a perpendicular to the horizon due west and the orbit of the Earth around the Sun	west point
Equatorial Ascendant	Intersection of the Earth's diurnal orbit and the perpendicular to that orbit	east point
Morinus Ascendant	Intersection of the Earth's annual orbit and the perpendicular to that orbit	east point

Fig. 11. Points of Ascension on the Eclipse

VII. Suggested Interpretations

Figs. 7-8 on the facing page show the confluence of ecliptic ascension when the equinox points rise on the ecliptic. Figs. 9-10 show a divergence among these points ranging from about 28 to 42 degrees when the solstice points rise. Fig. 11 above sums up the points under discussion, describing these points in terms of intersecting orbits and perpendiculars, which is more suggestive than using the traditional names for the great circles previously mentioned.

One interpretive point I would like to present is that the Morinus angles are not new—we work with them all the time as square points to the midheaven and, on the 90° dial, the same as the midheaven. Similarly, the tenth Morinus cusp can be used in place of squares to the equatorial ascendant.

The first and seventh Morinus cusps can be read as angles equal in sensitivity to the midheaven

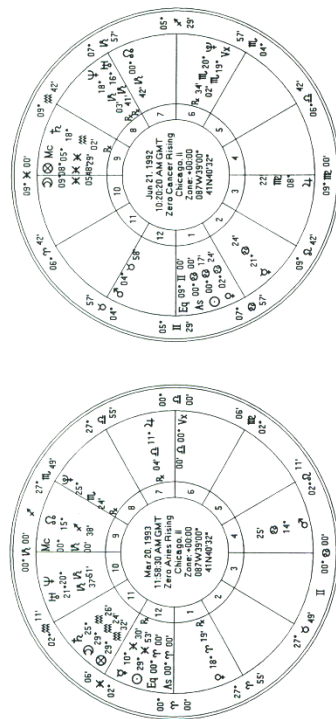


Fig. 7 - 0° Aries Rising on the Ecliptic
Morinus Houses

Fig. 9 - 0° Cancer Rising on the Ecliptic
Morinus Houses

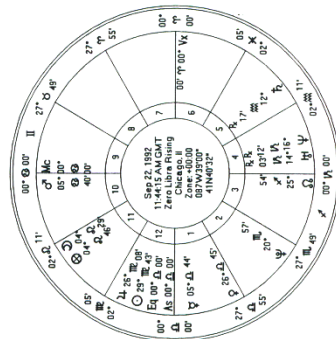


Fig. 8 - 0° Libra Rising on the Ecliptic
Morinus Houses

Fig. 10 - 0° Capricorn Rising on the Ecliptic
Morinus Houses

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Libra through Pisces rising (vertex above the horizon and anti-vertex below it, often across the first-seventh house axis—the first or go-getter types; these are ideas).

The equatorial ascendant is an individual's ascensional orientation to the celestial equator (the spatial representation of the Earth's diurnal spin axis). The equatorial ascendant is either in the first or twelfth house according to an easy pattern: first house for Libra through Pisces rising on the ecliptic (signs of negative declination, equatorial ascendant below the horizon); twelfth house for Aries through Virgo rising (signs of positive declination, equatorial ascendant above the horizon). Arlene Kramer has noted that the equatorial ascendant in the first house shows

that you never feel the real you is coming across to others. With the equatorial ascendant in the twelfth house, this is not a problem; there's no trouble getting across.

As noted, the angles move in patterns with relation to the horizon depending on what sign is rising on the ecliptic. The anti-vertex and equatorial ascendant are on opposite sides of the horizon and together define an ascensional zone. It would be interesting to do some research to see if planets are more prominent in a chart when they occupy this zone. The closer a chart rises to 0° Aries or 0° Libra, the smaller the zone is, down to nothing when the equinox points rise. Astrologers could research the breadth of the zone as a personality indicator.

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Ascension on the Ecliptic

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