**Ptolemy's Digression: Astrology's Aspects and Musical Intervals**

@ Joseph Crane, 2007

**Statement of the Problem**

This essay addresses a problem in the development and continuity of astrology: how do astrologers, past and present, account for the astrological aspects? Aspects are the means by which a planet or position (such as Ascendant or Lot of Fortune) has contact from another planet or other planets. Once an astrologer has designated a planet or position to answer a question posed to the astrological chart, aspects to the designated position provide information to help form an answer. Aspects contribute in a major way to answering question and determining outcomes.

How does this connection by aspect occur? Because aspects are based on the distances of two positions from each other along the zodiac, their rationale is not obvious.

Of course, one needn't question rationales for aspects at all. The view of aspects in Indian astrology is very straightforward. All aspects are cast forward in the zodiac, and each planet aspects the house (and sign) opposite to it. In addition, Mars aspects the fourth and eighth houses from itself, Jupiter aspects the fifth and ninth, and Saturn aspects the third and tenth from itself.[1] These rules are part of the astrological craft passed down within their tradition. Most ancient western astrologers also used aspects without questioning them and were not different from their Indian cousins in this regard.

However, the Hellenistic mind, exemplified by Ptolemy in Book I of his *Tetrabiblos*, sought to give astrology a coherent theoretical form, and integrate astrology more firmly with other fields of understanding. Because of the enduring influence of the *Tetrabiblos* during the subsequent history of astrology to the present day, his views are important and require close examination.

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[1] See J. Braha, *Ancient Hindu Astrology for the Modern Astrologer*. (Hollywood, Fl.1986) p. 55.

We will study *Tetrabiblos I* Chapter 14[2]. Here Ptolemy gives two accounts for aspects. The first one, the subject of this paper, is based on what we might call "fractions" and "super-fractions," *moria* and *epimoria*. The second argument of Chapter 14 depicts sympathetic and unsympathetic aspects through the nature of the zodiacal signs (*zoidia*) brought into aspect.

Ptolemy's first account, although of a different style than the surrounding material, gives a provocative and critical account of aspects – one related to harmonics and the diatonic musical scale in particular. Later astrologers, from the Renaissance into the modern era, used arithmetical and geometrical templates to account for aspects. They have brought more information to astrological analysis but perhaps with a shakier theoretical foundation: it is musical harmonies not simply properties and combinations of numbers that can account for the astrological aspects.

When I first learned about aspects as a new astrology student, the account given was wholly arithmetical and geometrical: because we can divide the whole circle by halves, quarters, thirds, and sixths, we can connect planets to one another by aspect. These relationships give us the opposition, square, and what astrologers call the trine and sextile[3]: geometrically the sides of a triangle and hexagon inscribed within a circle. These aspects divide the whole circle into sections divisible twelve.

We might also ask, however, why it is that we do not use the dodecahedron, a twelve-sided figure containing sides of 30° each, to add another aspect? This should fit conveniently with the others, but the 30° interval was not considered a true aspect in the ancient tradition, nor is it considered one by most modern astrologers.

What is it about number relationships that empower planets to act upon one another, in spite of their distance from each other? Paradoxically, aspecting planets act upon one another *because* of their distance from one another.

The modern mind has an easier time comprehending action at a distance because the physics of the modern era has made it possible for us to imagine this. If we are not of a theoretical bent, we have our various remotes to unlock our cars, open the garage door, control our televisions and radios, and so on.

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[2] Using the numbering of the Boer-Boll (Leipzig, 1940, repr. 1957), Hübner (Stuttgart/Leipzig, 1998) and Schmidt (Claudius Ptolemy, *Tetrabiblos Book I*, trans. R. Schmidt, Berkeley Spring, 1994) editions. The Robbins translation (Ptolemy *Tetrabiblos,* F.E. Robbins trans., Cambridge, Ma., 1940. repr. 1994) has this as Chapter 13.
[3] These are angles of 120° and 60° respectively.

 Because of our background in popular science and technology, modern astrologers tend not to raise a skeptical eyebrow to the understanding and use of astrological aspects. This does not solve the problem, however, since electro-magnetic waves cannot account for the effects of aspects.

Most of the Greek words for aspects are those of seeing or looking. Directly or indirectly, aspects are acts of visual perception.

Ancient astrologers thought of aspects in terms of seeing and being seen. A planet "looks ahead" – *epothoreõ* -- to another planet, forward in the zodiac, to which it is in aspect. In return, the aspected planet "casts rays" – *aktinoboleõ* – back to the aspecting planet. [4] In addition, an aspecting planet may "testify to" or "witness" – *epimarturõ* – another planet.

Our English "aspect" is also a seeing word, as is the Sanskrit word for an astrological aspect, *drishti*, a "gaze" or "glance."

Two planets in the same sign (*zoidion)* – the modern "conjunction" -- are not in aspect. Seeing words are not used for these relationships; instead, planets in the same sign are considered to be *with* one another. A planet must be outside its own immediate zodiacal environment in order to see or be seen.

Modern astrologers might say that vision is action at a distance, since we routinely see things distant from us.  Our science tells us that light waves form a segment of a vast vibratory spectrum that surrounds us. These waves provide a bridge between an observed object and us, although an otter or a bat might "see" something quite different.

Ancient theories about the workings of vision are not very helpful to us, or presumably to Ptolemy either, since he did *not* use visual perception to account for aspects.

Ancient tradition gives a variety of accounts for visual perception itself.  To our modern sensibilities, they range from the relatively straightforward to quite strange.

Aristotle's *De Anima* regards touch rather than vision as the most basic – and paradigmatic –sense faculty, and posits that vision, like the other sense faculties, uses a medium (*metaxu)* by which the object carries itself to the perceiving subject.  For vision, this medium is *light*.  The object alters the light by which the view of the object comes to the subject:

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[4] Hephaistio, Book I Chapter 16; Tr. Schmidt (Cumberland, Md. 1994), Antiochus, Chapter 20 Tr. Schmidt (Cumberland, Md. 1993)

"For what is to be colour is, as we say, just this, that it is capable of exciting change in the operantly (actual) transparent medium: and the actuality of the transparent is light." (418b)[5]

According to the Stoics, what binds together the object of perception and the subject is the tensing of *pneuma*. In the case of seeing, "the seeing-*pneuma* in the eye makes the object visible by 'tensing' the air-*pneuma* into a kind of illuminated cone with the object at base and eye at apex; the tension of this air is experienced as sight."[6]

The Epicurean school posited images flowing from the objects themselves in a constant manner that the eye picks up.[7]

Another possibility, of uncertain seriousness, is found in Plato's *Timaeus*, 45 B-D. After commenting on the fact that the human body is well suited for the faculty of sight, especially to look up toward the heavens, Plato notes that vision occurs by means of the fire of daylight, another kind of fire in one's eye faculty and fire emanating from the object. As they all connect, we see something[8].

When discussing how various life issues are determined from the natal chart, Ptolemy also uses words for seeing and looking (as well as witnessing or testifying) when referring to aspects. However, he does *not* use these words in *Tetrabiblos I* when giving an account of the aspects themselves.

If the act of looking or seeing requires a medium to connect the object of sight with the subject, it is not at all clear what medium could transmit the aspects of astrology. The medium must be the aspect intervals themselves, but how?

**Outside and Inside Ptolemy's Digression**

Before we discuss the harmonic and musical material in *Tetrabiblos* I Chapter 14, we need to place this material in context.

Preceding and following Ptolemy's account of aspects in Chapter 14 is material solely related to classification and operation of the signs of the zodiac as discrete units.

Chapter 12 discusses them as cardinal (related to a solstice or an equinox), fixed and mutable (double-bodied). Chapter 13 classifies them as masculine or feminine.

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[5] Translated by R.D. Hicks, in *Aristotle's De Anima In Focus* Ed. M. Durrant. (London, 1993) 419a
[6] J. Annas, *Hellenistic Philosophy of Mind*. (Berkeley, CA 1992), p. 72.
[7] *Ibid*, pp. 158-159
[8] F. Cornford, *Plato's Cosmology* ((Indianapolis, 1935/1997), p.152

The end of Chapter 14, continuing the topic of aspects, states that trines and sextile are harmonious (*sumphõnoi)* because their genders agree and squares are disharmonious (*asumphõnoi)* because their genders differ.

Chapter 15 divides the signs into commanding and obeying, based respectively on their northern or southern declination, symmetrical to the 0°Aries/0° Libra axis. (They are symmetrical with respect to their rising times.)  Chapter 17 concerns itself with those of "equal power," symmetrical to the 0° Cancer/0° Capricorn axis, and spending equal amounts of time above the horizon. Chapter 16 takes up aspects again and tells us that zodiacal signs are averse (*asundeta)* when they are not familiar by aspect relationship, nor in a relationship of commanding/obeying or equal power, i.e. symmetrical to the cardinal axes.

Chapters 18-20 discuss the affiliations of the zodiacal signs to planets by means of domicile, triplicity, and exaltation.  Up to this point Ptolemy had been considering signs only as indivisible units.  The exception is his first account for the astrological aspects, which is the topic of this paper.

Now let us return to the first part of Chapter 14.

Although in *Tetrabiblos* Books III and IV uses conventional terminology based upon vision, in the presentation of Book I Chapter 14, Ptolemy uses the words *schêmatizô* and *suschêmatizô* for aspects.  These words allude to forming a figure or posture, as a group of dancers in an ensemble performance.

This is a rather striking metaphor. It appears that instead of referring to the conventional sense of planets looking to and back from each other when in aspect, Ptolemy alludes to *our* perceptions when watching the planets arranged with one another.  Anyone who observes the planets in the night sky over time admires their interweaving movement, similar to the performers of a slowly moving ritual dance. Ptolemy reminds us here that aspects are not geometrical arrangements between static points but meaningful moments captured within the larger patterns of planetary motion.

Ptolemy talks about the aspects as intervals consisting of specific numbers of degrees, rather than as relationships between signs. Many modern astrologers, including me, at first read this passage uncritically, as if there was nothing unusual happening here. Yet in the context of his emphasis on the fact that aspects for planets are made between whole signs in this part of *Tetrabiblos I*, the degree numbers seem out of place.

Using aspects from sign to sign, from one planet in Aries and another in Gemini, for example, planets could be in aspect to each other regardless of where in their respective signs they happen to be. Two planets in sextile by whole signs could be distant from each other anywhere from 31° (late Aries to early Gemini) to 89° (early Aries to late Gemini). As long as these planets are two signs from each other, they are in a hexagonal interval, i.e. in sextile.

Why, then, does Ptolemy specify 180° for the diameter or opposition, 90° for a square, 60° for a hexagon, and 120° for a triangle? To derive the aspects, he employs fractions *(moria)* and "super-fractions" (Schmidt) or "super-particulars" (Robbins) *(epimoria).*of specific numbers.

Ptolemy begins by explaining that the diameter causes the sign and its opposite to meet on a straight line. (See AB in the diagram below) This is clear enough and also corresponds to the visible sky: if two planets are in opposition, one will be seen to rise at the same time as the other is seen to set.

The next step is to inscribe a semi-circle above the straight line, to relate significant numbers to one another.

Let us first discuss the fractions or *moria*. Bisecting the line that is the diameter into two right angles gives us the square of 90° in the form of two right angles (AFC and BFC below). One-third of the circle above the diameter gives us the side of a hexagon (AD), 60°, which is one-third of the diameter of 180°. Doubling the size equivalent to the hexagon gives us 120° which is the triangular interval (AE) that is two-thirds to the diameter along the circle.
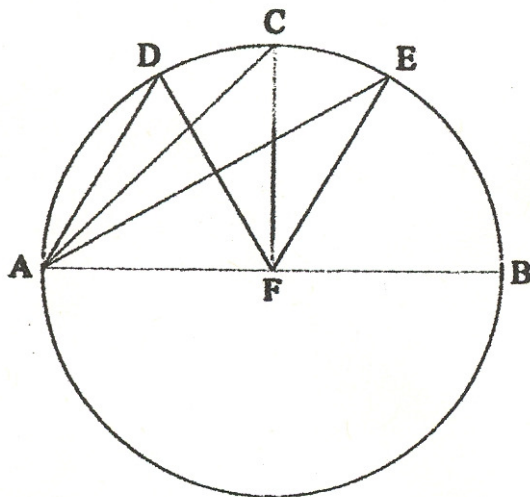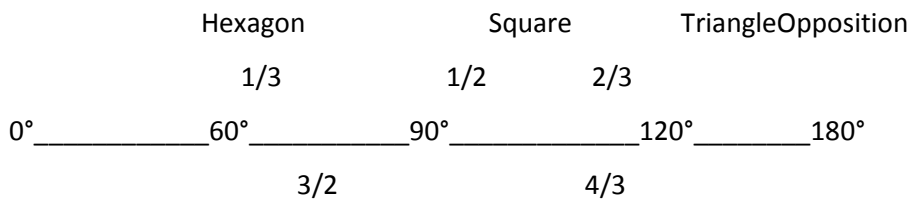


*Figure 1: Aspect Measurements Along the Line and Semi-circle*

This gives us all the aspects by degrees that have come down to us as "Ptolemaic aspects," using what appears to be an arithmetical and geometrical method.  The *epimoria,* however, give us a different perspective.

Ptolemy then discusses the "superfractions" or *epimoria,* the *hêmiolos* and the *epitriton*. These correspond to one and a half (3/2) and one and a third (4/3) respectively. (In Latin these proportions of 3/2 and 4/3 were rendered respectively as the *sesquialter* and the *sesquiterian*.) Multiplying the *hêmiolos* (3/2) by the hexagon yields the square (90°), and multiplying the *epitriton* (4/3) by the square yields the triangle (120°).

Here is a schematic of fractions and super-fractions upon a straight line.

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        Hexagon              Square           TriangleOpposition
           1/3             1/2       2/3
0°_____60°_____90°_____120°_____180°
           3/2                        4/3
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*Figure 2: Ptolemy's Superfractions*

Having mentioned these proportions at the beginning of Chapter 14, Ptolemy drops the matter entirely. However, he is nothing if not intentional and I cannot imagine that he would make a random point and just leave it.

In fact, both the *moria* and the *epimoria* he cites relate to ancient music and, in particular, the diatonic musical scale. The fact that musical tones correspond to specific number ratios is a discovery attributed to Pythagoras and throughout history has been associated with the teachings of the Pythagoreans.

Using a string or a wind musical instrument, the *fundamental* tone arises from a vibrating string or vibrating column of air.  Other tones relating to the fundamental can be produced by stopping the vibrating string or air column somewhere up or down its length.

If you pluck a string or stop an air current and put your finger exactly halfway, you produce the fundamental tone one octave higher. This is the same relative tone but at a higher pitch, e.g., the interval from C to c or F to f. These two tones are *homophonic.*

The beginning tone, the fundamental, is given a ratio of 1:1. A note one octave higher gives a proportion of 2:1. This interval is the *diapason*.  If you stop the string or air column halfway between the distance halfway that produced one octave, this yields two octaves and a

proportion of 4:1. Moving through many octaves, the ratios for intervals yield successive multiples of 2.

If you divide a string or an air column into thirds and pluck the string or stop the air current within the smaller segment, you get a tone between the higher and next higher octaves. If you drop this tone one octave you produce the musical fifth, which has a ratio of 3:2 and is the interval from C to G or F to c. This interval is the *diapente.* These tones are not homophonic but *consonant*.

If you take the original string or air column and lengthen it by half of its length you get a tone that is somewhat lower than the fundamental but higher in pitch than the full octave below. If you raise this lower tone by an octave, you obtain the interval of the musical fourth, which gives a ratio of 4:3. Using the fundamental C, we arrive at our F, or from G we arrive at c. This is the *diatessaron*. This interval is also harmonious.

Taken together with C as the fundamental, this yields the fixed tones of C – F – G – c. The octave or *diapason* is from C to the c above, or, in the key of G, from G to g. The fifth or *diapente* is the interval from C to G and from F to the c above. The fourth or *diatessaron* is the interval from C to F and from G to the c above

From these fixed ratios other notes were derived, giving rise to the diatonic scale of seven tones. However, the construction of the diatonic scale in ancient Greek music varied according to the seven "modes", e.g. Lydian, Phrygian, Dorian, and so on.[9]

Ptolemy's single line for the 180° opposition, with the semi-circle drawn around, divides into one-half and one-third, 90° and 60° respectively, yielding the square and sextile. The full diatonic scale however spans eight notes, bounded by the two homophonic notes one octave away. This scale traditionally consists of two tetrachords, consisting of two intervals of the

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[9] The "species of the octave" or "modes" preserved the fifth or *diapente* and fourth or *diatessaron* in the Lydian, Phrgyian, and Hypophrygian modes, although they did not in the others. The Dorian and Hypodorian modes have a diminished *diapente*, and the Hypolydian and Mixolydian modes have a diminished *diatessaron*. See R.P. Winningham-Ingram, "Ancient Greece" (from *Greece*). In *The New Grove Dictionary of Music and Musicians* Ed. S. Sadie,(London1980). p.665. Melodies derived from these modes pervaded the practice of ancient music, and theoreticians tried to classify them in terms of their effect on an audience. Plato, in *Republic* (Book III, 398 C- 399 D), characterized some effects but banished most of them from an ideal state; Aristotle gave a more tolerant description of their effects (*Politics*, Book VIII Chapter 5. 1339-1342). If adhering to the general principles of harmony can make for the well-proportioned soul, the different musical modes seem to conform to discrete personality styles.

fourth between the lower and upper notes, and a tone in between both tetrachords.[10]  Again using the key of C, one tetrachord is between C and F, another between G and c, with a tone between F and G.  In his account of aspects, Ptolemy uses the musical ratios that yield the octave, fifth, and fourth to supply us with a rudimentary musical scale in order to account for astrology's aspects.  As yet we do not know why he would choose to do so.

**Ptolemy's *Harmonics***

We find similar material in another work by Ptolemy, *The Harmonics*[11] that is probably earlier than the *Tetrabiblos*.[12]  Although Ptolemy is well-known for his astronomy and astrology, he is also one of the ancient sources for theories of harmony. The *Harmonics* deals with a universal field of knowledge for which music and geometry are considered subsets. Much of the material in the *Harmonics* is exclusively concerned with music, including setting up exact number ratios for the different modes of ancient music.

Book III of the *Harmonics* applies intervals, scales, and ratios to ethics and psychology, to astronomy and astrology. Unfortunately, some of this book has been lost to us.

In Chapter 9 of Book III, Ptolemy presents the astrological aspects and their ratios to one another.  In this presentation Ptolemy curiously does *not* use degree numbers for the aspects. Instead, he considers the twelve zodiacal signs as discrete units, and the whole number relationships between them that yield *moria* and *epimoria.*  This discussion might have fit better into *Tetrabiblos* Book I, in the context of his treatment of the qualities and relationships between whole signs.

Ptolemy does not begin this discussion with line but the complete circle measuring twelve units for the twelve signs of the zodiac. I have provided a diagram below[13]

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[10] In The Greater Perfect System, which was dominant in ancient harmonic theory, generally covers two full octaves.  Tetrachords could also be found in chromatic and enharmonic forms, although our interest here is in the diatonic scale.  See R.P. Winningham-Ingram, as cited above.

[11] J. Solomon, *Ptolemy's* Harmonics: *Translation and Commentary* (Leiden/Boston, 2000):

[12] N.M. Swerdlow, "Ptolemy's *Harmonics* and the 'Tones of the Universe" in the *Canobic Inscription*" Charles Burnett, Jan P. Hogendijk, Kim Plofker, Michio Yano  Ed. Studiesin the History of the Exact Sciences in Honour of David Pingree, (Leiden/ Boston 2004) pp. 137-180 Vol. 54).

[13] N. Swerdlow, (as cited above, note 13). P.154.
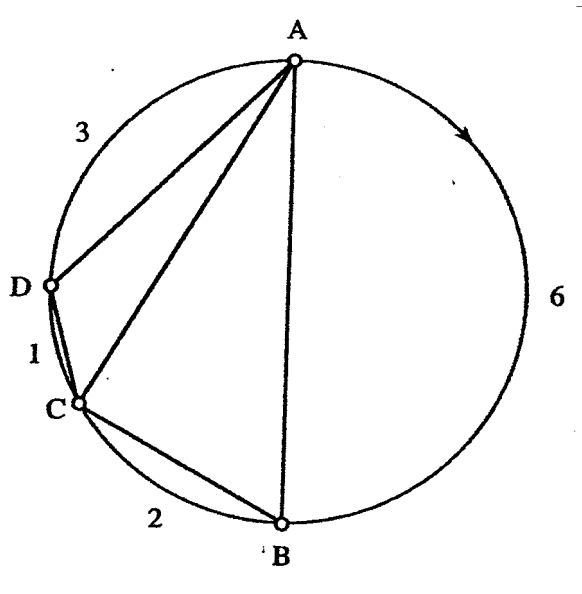
.AB represents the diameter and 6 of the signs of the zodiac (the opposition); AC represents 4 signs and one third of the circle; AD represents 3 signs and one quarter of the circle. This yields the diameter, triangle, and square of the circle.  (The hexagon is not represented here.)  Ptolemy proceeds to give many permutations of these numbers that yield the same ratios seen in *Tetrabiblos I* Chapter 14.  I will give the proportions most relevant to our discussion.

For three places together, ADB yields 9, ABC yields 8, and ADC yields 4.

Ptolemy notes the distances that are double from one another (AB doubles AD, and the whole circle doubles AB), which give us the octave or *diapason.*  He also notes the distances that give the fifth and the fourth, the *diapente* and *diatesseron*.

For the 3:2 ratio (the *diapente)*, Ptolemy notes that the whole circle (12) is 3:2 to ABC (8), as ABD (9) is to AB (6), and AB (6) to AC (3).Ptolemy also repeats his finding from the *Tetrabiblos*: the proportion of AB (the diagonal) to AD is 3:2.

For the 4:3 ratio (the *diatesseron*), Ptolemy notes the ratio from the whole circle (12) to ABD (9), ABC (8) to AB (6), and AC (4) to AD (3).

Ptolemy notes that the ratio of AB (the diagonal) to AD is 3:2 (the square) or the *diapente*, and that the ratio of AB to AC is 4:3 or (the *diatesseron*.)

The difference between AD and AC is 1: one-twelfth of the circle.  The difference between 4 and 3 spans one zoidion.  This would correspond to the *emmelic* interval between

the two tetrachords that constitute the diatonic scale in the Greater Perfect System.[14] and is more of a transitional than a concordant interval according to that system.  It is important to note that one cannot combine or subtract these segments of the circle to form five units or give a 5:12 ratio.  This would be discordant, *ekmelic*, and conform to the astrological aspect of the quincunx.[15]

We can now place Ptolemy's account into a larger context.


**Harmonic Scales  and the Soul of the World**

Plato's *Timaeus,* concerned on its surface with cosmology and natural philosophy, is considered to be the most overtly "Pythagorean" dialogue in the Platonic corpus.  In a famous passage on the construction of the world, Plato (or Timaeus) depicts the Demiurge constructing the soul of the cosmos, within which time, motion and form could be realized sensibly, and matter could have a measure of intelligibility (35B-36B). The cosmos' soul will take the form of two bands constituting mixtures of Same and Difference that will eventually gives form to the celestial sphere surrounding the earth.

Prior to this, the Demiurge has to put together the material of the world's soul and then sort it out according to specific quantities that conform to universal ratios.  He begins by arranging two series of numbers.

One series uses the multiples of 2 to arrive at $1 - 2 - 4 - 8$, etc. The other uses multiples of 3 to arrive at $1 - 3 - 9 - 27$, etc.  These numbers can continue indefinitely.  The Demiurge then fills the intervals between them, using *arithmetical and harmonic means*.[16]

The arithmetical and harmonic means from 1 to 2 are $1 - 4/3 - 3/2 - 2$. This corresponds to the skeleton of the diatonic scale and the model Ptolemy uses to account for the astrological aspects.

However, by continuing exponential progressions indefinitely and including multiples and means related to the numbers 2 and 3, Plato expands his harmonics further than the realm of ordinary music.

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[14] See p. 8 and note 11.

[15] Planets five signs away from each other were said to be "averse" or "disconnected," having no relationship at all.

[16] A fuller explanation is in D. Zehl, *Plato's* Timaeus. (Indianapolis, 2000) pp xl-xli, 20-21 and F. Cornford, *Plato's Cosmology* (cited above note 8). pp. 66-72

Here we should explain more thoroughly the arithmetic and harmonic means that Plato employs.

The *arithmetic mean* between two numbers exceeds the lower number *by the same number* as that number is less than the greater number. We all learned this in grade school and we still know how to do this calculation by adding together the numbers of the two extremes and dividing them by two. This gives us 3/2 between 1 and 2, 2 between 1 and 3, and 6 between 3 and 9.  There are no surprises here.

The *harmonic mean* is a more complex calculation and is more difficult to grasp. The harmonic mean exceeds the lower number *by the same fraction,* as the mean is less than the greater number.  Thus:

- Between 1 and 2, 4/3 exceeds 1, the lower number, by 1/3.
- This same fraction, 4/3, is less than the number 2 by 1/3 of 2 (converting 2 to 6/3); in other words 6/3 – 2/3 = 4/3.
- 4/3 is therefore the harmonic mean between 1 and 2

We see the same pattern between 4 and 8, where 5 1/3 exceeds 4 by 1/3 of 4. 5 1/3 is less than 8 by 1/3 of 8. 5 1/3 or 16/3 is the harmonic between 4 and 8.

There are two ways to compute the harmonic mean between two numbers.

One is the following formula. A and B being the two numbers at the extremes. This will work perfectly to find this mean between any two numbers you choose.

2 (AB)

A + B

The other way uses the multiples of 2 and 3 that Plato uses. One converts the numbers into thirds or halves (multiples of 2 convert into thirds and multiples of 3 convert into halves.) One adds the lower number to the converted numerator of the lower number, and subtracts the higher number from the converted numerator of the higher number.[17]

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[17] I will use one example from multiples of two and another from multiples of three. Between *4 and 8, again:*
- Convert the former to 12/3 and the latter to 24/3.  We are converting multiples of 2 to fractions with 3 as the denominator.
- Add the lesser whole number 4 to 12 (the numerator of the lower number) and you get 16.
- Subtract the higher number 8 from 24 (the numerator of the greater number), and you get 16.
- Therefore the harmonic interval between 4 and 8 is 16/3.

This method requires simple calculations, and it shows the interdependence between the multiples and divisions of 2 and 3. We should also note that this second procedure breaks down when attempting to find harmonic means between multiples of 5, 7, and so on.

Let us return to Plato's Divine Worker.  He combines the means between multiples of two and three into a single band.  The series of the multiples of 2 and 3 are as follows.

**1** – 4/3 - 3/2 – **2** – 8/3 – 3 – **4** – 16/3 – 6 – **8,**

**1** – 3/2 – 2 –**3** – 9/2 – 6 – **9** – 27/2 – 18 – **27**

They will make,

1 – 4/3 – 3/2 – 2 – 8/3 – 3 – 4 – 9/2 – 16/3 – 6 – 8 -- 9 – 27/2 – 18 – 27

And so on.

Plato's Demiurge fills the numbers in between by units of 9/8, corresponding to single tones in music. The remaining amounts would be filled in by units of 256/243, which are the semi-tones as represented in Greek musical theory.

Then, having divided the main substance according to these proportions, the Demiurge fashions a very large circular band that he then cuts lengthwise into two and fashions them into the form of a Chi. One length becomes the Circle of the Same, our celestial equator, upon which the fixed stars move and which moves from east to west, the diurnal cycle.  The other length becomes the Circle of the Other, the ecliptic.  This circle moves from west to east and divides itself further so that the seven planetary bodies can move along it.  This ordered time becomes possible.

Plato's proportions show intimate relationships between number, music, and of the soul of the world.  All this seems necessary to explain how the world becomes intelligible: how true opinion could arise, and how true knowledge may be found reflected in the world.

This cosmological story brings us into the motif of the harmony of the planetary spheres, an idea that was pervasive in the Hellenic and Hellenistic worlds and lasted well into the Renaissance. Johannes Kepler's 1619 work *Harmonice Mundi* was probably the last full

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Between *1 and 3*:
- Convert 1 to 2/2 and 3 to 6/2.
- The lesser whole number (1) plus its numerator (2) is 3.
- The lesser whole number (3) from its numerator (6) is also 3.
- This will give us 3/2.

attempt to bring together the motions of the planets and harmonic ratios, and use Ptolemy's *Harmonics* as a resource.[18]

Returning to astrology's aspects, we can now use a sequence of ratios that we see in the *Timaeus.*

1 – 4/3 – 3/2 – 2

They are the same as Ptolemy uses for his account of the astrological aspects in *Tetrabiblos I* Chapter 14. If 1:1 is the fundamental, 2:1 yields the opposition, 4/3 yields the hexagon or sextile and 3/2 yields the square

Because Ptolemy uses specific numbers in *Tetrabiblos I* Chapter 14 for the astrological aspects, he expands the possibilities for aspects beyond those that are between whole signs*.* By employing the means that Plato uses, the astrologer finds a wide range of new possibilities. .[19]

**Conclusions**

It is clear, from Ptolemy's digression in *Tetrabiblos I*, Chapter 14, that using degree numbers makes it possible for astrological aspects to manifest universal laws of harmony and thus account for their effects. Ptolemy presents a correspondence between aspects and musical harmony that allows us to see astrological "action at a distance" in a new and profound way

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[18] See N.M. Swerdlow, cited above, pp. 137-138

[19] There are interesting implications for modern astrologers. Taking the distance between two different numbers and superimposing that on the first 180° of the zodiac gives more intriguing possibilities.

If one uses the numbers between 1 and 3, however, you get something we haven't seen before and that Ptolemy would not recognize. If between 1 and 3 we have the extremes, how would the values of the arithmetical and harmonic means become astrological aspects? Here are the numbers involved:

1 – 3/2 – 2 – 3

The proportion 3/2 corresponds not to the sextile but the *semi-square*, an astrological aspect of 45°, half the square of 90°. This aspect requires using degree numbers, not whole signs. The semi-square violates Ptolemy's use of whole masculine and feminine zoidia to describe the effects of different aspects.

Using the sequence using numbers 1 through 9:

1 – 3/2 – 2 – 3  -9/2 – 6 – 9

The proportion 3/2 is the semi-sextile of 30°; 2 yields the aspect of 40° which astrologers know as the *novile*, which divides the 360° circle into ninths and is the foundation of the modern Ninth Harmonic: 3 is the sextile, 9/2 is the square, and 6 is the trine. Modern astrologers who use Ninth Harmonic can derive some justification of their methods from these proportions.

How does harmonic theory help us account for the aspects of astrology?

Harmonious tones (homophonous or consonant), can be said to meet each other, to interact with each other. In music they act upon each other *because* of their distance along the scale. I know of no other phenomena in nature in which interaction is based upon number ratios related to distance between two agents.

The contrasting experience is also quite familiar – the discordant and ugly result of striking the *wrong* note. Within the context of tonal music, this is the result of producing an unmelodic interval in the context of the harmonics established within the piece being played. An accomplished musician or composer may find a way to resolve the discord, but does so by finding a way back to the original harmonic intervals. Unmelodic intervals may correspond to disharmony in the world, in the individual soul, and between planets affiliated by dispositorship but in disconnected zodiacal signs*.*

In addition, two or more harmonious tones played together create a blend of sameness and difference that is analogous to the relationship between a visual perceiver and its objects of perception.

Musical tones and intervals can be represented by numbers and ratios. Their arithmetical properties allow us to move from the aural sense perception of musical tones to an analogous intellectual concept of harmony. This harmony may manifest in the soul of the world, or in the soul of the individual, and accounting for the aspects of astrology.[20]

The logical model for principles of harmonics is music, not geometry, since the parts of a geometrical figure do not interact with each other based upon the ratios of their distances.

Because divisions and multiples of 5 or 7 do not fit into these harmonic models, they cannot themselves form the basis for either musical harmonies or astrological aspects, if the correspondence between aspects and harmonic intervals is to be taken seriously..

Ptolemy's argument in the first part of Chapter 14 is indeed a digression. The remainder of *Tetrabiblos I* uses the natural philosophy of his day to account for astrological effects in general. His argument for aspects, however, derives from Pythagorean and Platonic sources as

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[20] The topic of the harmony of the soul is beyond the scope of this paper. It is suggestive that Plato's *Timaeus* is supposed to have taken place the morning after the long discussion of the "just" – well proportioned – soul in the *Republic*. (Also see E. McClain, *The Pythagorean Plato*(York Beach, Me 1978) In *Harmonics III*, Chapter 5, Ptolemy brings together the harmonious activity of the soul as the integration of its parts resembling the familiar intervals of the *diapason, diapente,* and *diatesseon.*

evidenced in his earlier *Harmonics*.  Yet his digression roots us in some of the basic principles of the western intellectual tradition, and gives us the possibility that the symbols of astrology have something to do with the nature of reality.