

Undergraduate Research Opportunities Programme in Science
The Mathematics of Astrology
Does House Division Make Sense?

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ABSTRACT

Astrology is the belief that there exists a meaningful relationship between the positions of celestial bodies and human experience, and that we can systematically determine this relationship. The only possible method to test the validity of astrological influences or predictions is using statistical studies. This means gathering large samples of individuals, tabulating their character traits, and checking if there exists a correlation between these and their horoscopes. This is not the focus of the project. Instead, the aim is to highlight some mathematical problems in the formalism of astrology. The focus is specifically on geometric problems encountered in house division. Basically, there will be five important sections:

1. A Brief Overview of Astrology
2. Formalism of Astrology
3. The Planets
4. The Zodiac
5. The Houses

The first four sections are an introduction to the subject of astrology. A proper mathematical structure is constructed for the most common methods used in astrology. To attain a complete understanding and appreciation of certain aspects, historical references are added. The fifth section analyses the main topic of the project.

PROBLEMS WITH HOUSE DIVISION

House division is an attempt by astrologers to introduce a local element to the horoscope. However, there are a few fundamental problems encountered.

Uneven Probability Density of Ascendant at Different Latitudes

The problem of house division, at different latitudes, reduces to investigating the speed of the ecliptic when it crosses the horizon. We shall let this be V . Let the speed at which the celestial equator crosses the horizon be V_0 . This is the uniform speed of rotation of the Earth on its own axis. Let ϵ be the angle between the ecliptic and celestial equator,

which is always 23.5° . Let ϕ be the angle between the ecliptic and horizon. Let L 90° plus latitude. Let c be the distance along the ecliptic.

First, we shall derive a formula for V when the angle is ϕ . Since speed is defined locally, we can use Euclidean geometry.

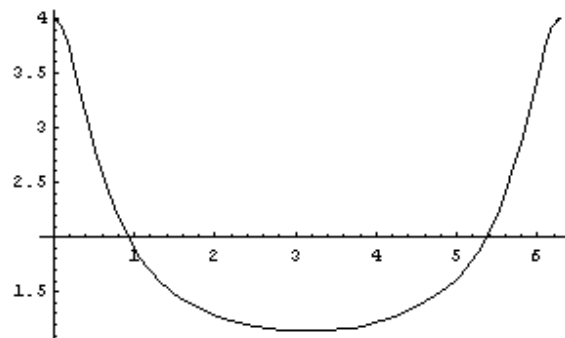
$$V = V_0 \sin L / \sin \phi \quad (1)$$

We will then use spherical trigonometry to determine how ϕ changes as the ecliptic moves along the horizon.

$$\cos \phi = \frac{-\cos \epsilon \cos L \pm \sin \epsilon \cos c [\sin^2 L - \sin^2 \epsilon \sin^2 c]^{1/2}}{(1 - \sin^2 \epsilon \sin^2 c)} \quad (2)$$

$$V = \frac{V_0 \sin L}{\sin [\cos^{-1}(\cos \phi)]} \quad (3)$$

Notice that there are two roots: '+' and '-'. The next step is to determine which root gives the correct graphical solution. Let l be latitude. It follows that for any l , ϕ is monotonically increasing between $c = 0$ and $c = \pi$. Subsequently, the graph of $\cos \phi$ is monotonically decreasing between $c = 0$ and $c = \pi$. Only the '+' root satisfies these two conditions.



Graph of $1/\sin\phi$ vs. c (from $c=0$ to $c=2\pi$), for 52° latitude

Hence, the speed of the ecliptic, when it crosses the horizon, varies from place to place on Earth. It follows that the probability density of the Ascendant is uneven at a given latitude, no matter which system of house division we use. Assuming that the birth rate is fairly even, we can conclude that at that latitude there will be more people born with a certain Ascendant. Since the Ascendant is supposedly an important part of the horoscope, the question to ask is do we really believe that character traits vary with latitude?

The Polar Problem in House Division

The idea of a division of the zodiac in houses arose in the Greco-Roman world, where the zodiac stands high in the sky. However, some serious problems arise when one considers the Arctic and Antarctic regions (66.5° latitude onwards). They are collectively called the polar regions.

1. Ill-Defined Ascendant and Descendant

At a certain moment on the Arctic and Antarctic Circles, the ecliptic coincides with the horizon at a certain time of the day. This means that the Ascendant and the Descendant are either everywhere or nowhere. There is also no MC or IC. Since these four points form the basis of house division, it follows that houses cannot be defined.

2. No Ascendant / Stationary Ascendant

Inside the polar regions, a part of the zodiac never rises above the horizon. Hence, certain signs can never be Ascendant there. In the extreme case, on the north pole, the two intersections of the zodiac with the horizon remain forever the same (the vernal and autumnal equinoxes). Not a single sign sets or rises, and the Ascendant is forever stationary. The situation is similar at the south pole.

3. Ill-Defined MC

Above the Arctic Circle, there is a problem in determining the Midheaven. If the MC is defined as the southernmost point of the zodiac, then it is under the horizon part of the time. If it is defined as the highest point of the zodiac, then it happens to be at the northernmost point.

4. Discontinuous Ascendant

In the polar regions, there is a discontinuity of the Ascendant at a certain moment. Initially, the Ascendant is in the east. In the course of the day, it will then move southwards along the horizon, until it is eventually situated in the south. At the very next moment, the Ascendant will then “jump” to the north. This is discussed in depth using “band” theory.

REFERENCES

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