

Astronomy and Astrology

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Un missionnaire du moyen âge raconte qu'il avait trouvé le point
où le ciel et la Terre se touchent...

1. Introduction : what is astrology ?
 2. Astrology & Society
 3. Astrology & Astronomy
 4. Astrology & Science
 5. Conclusion : the success of Astrology and the role of Science
- *References*

1. Introduction : what is astrology ?

2. Astrology & Society

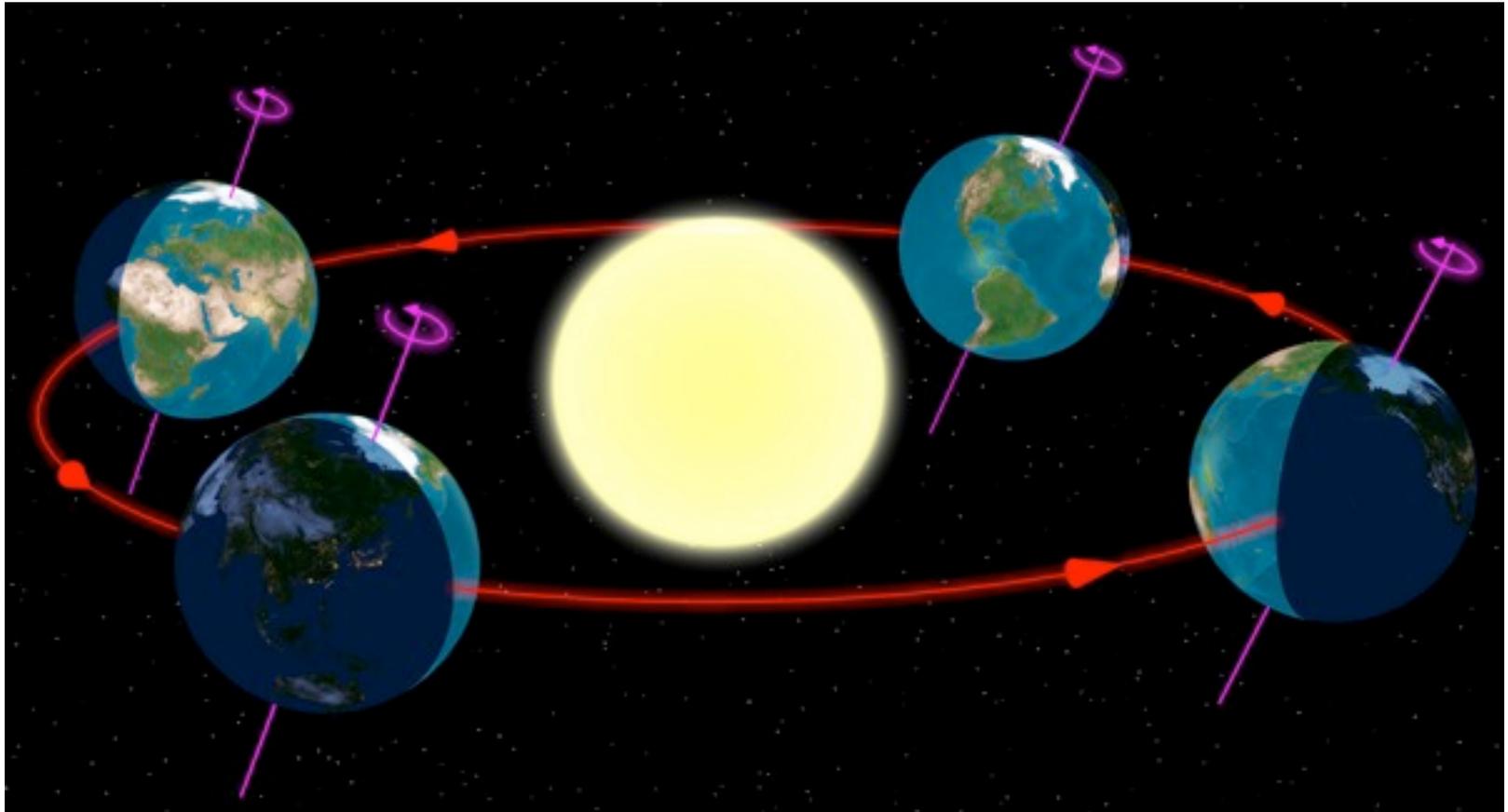
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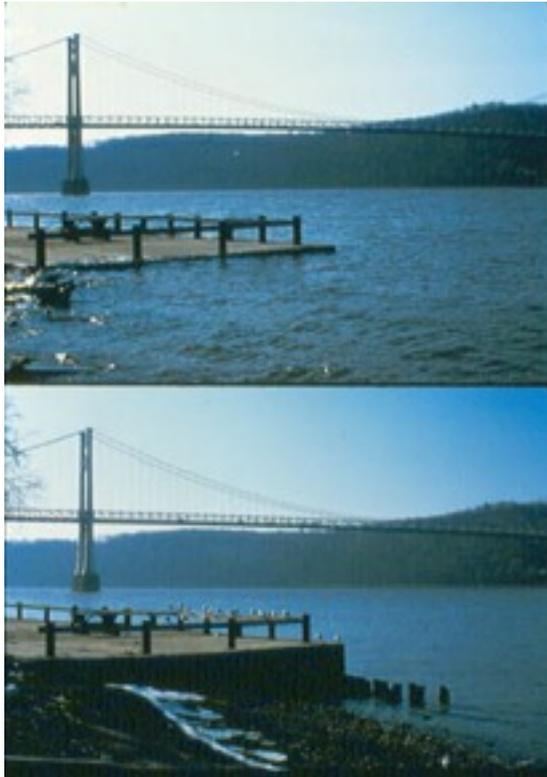
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The influence of celestial bodies on Earth has several obvious manifestations : life on Earth depends on the Sun, seasons are linked to its position in the sky (due to the non-perpendicularity of the Earth's rotation axis with respect to the ecliptic plane), ...

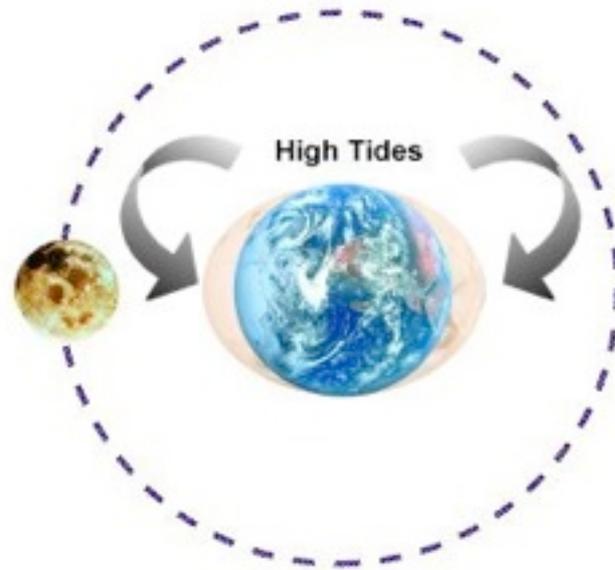


Seasons

... ocean tides are controlled by the position of the Moon (via its differential gravitation) and of the Sun, and eclipses are due to Sun-Moon-Earth alignments.



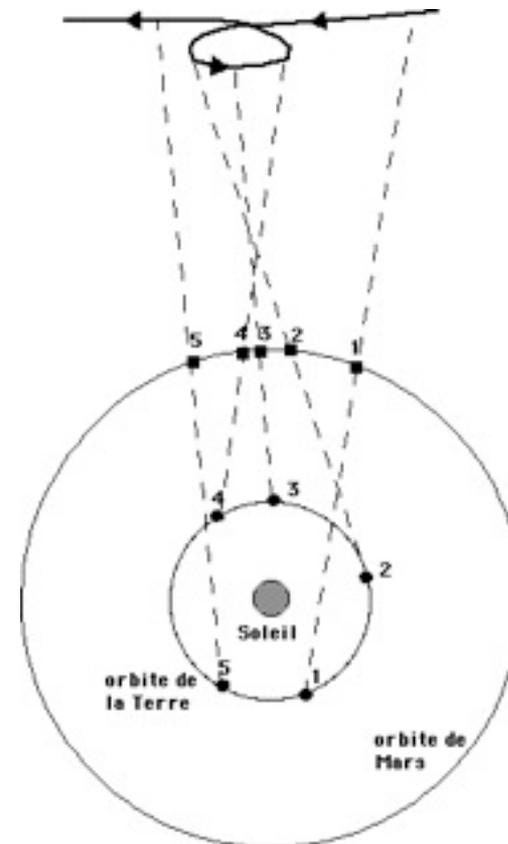
High/Low tides



Solar eclipse

Astrology extrapolates these factual influences by postulating that the positions of the Sun, Moon and 8 planets* other than Earth (hereafter the « luminars ») with respect to the sky background, as well as with respect to each other, influence terrestrial events and human psychology and destiny.

**wandering celestial bodies*

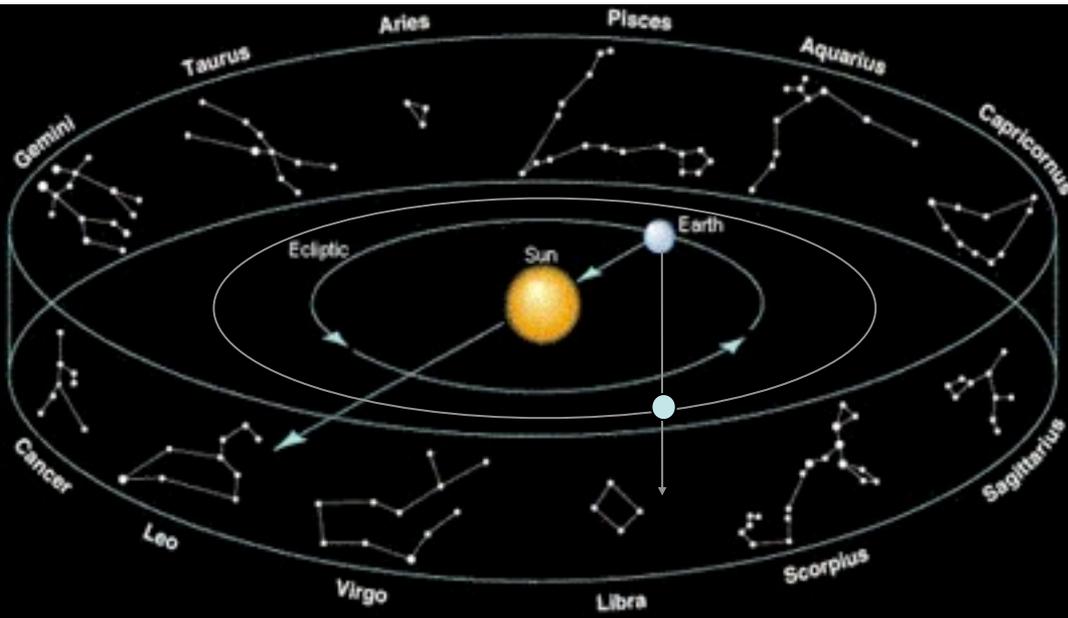


Apparent trajectory of Mars as seen from Earth, and explanation

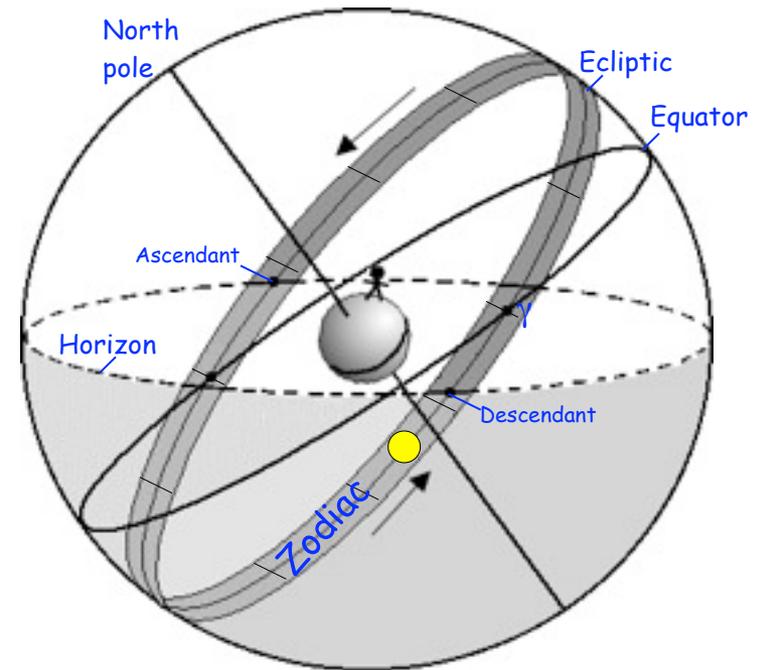
The position of luminars is considered

- relative to the tropical zodiac, defined by Hipparchus* : 12 « signs » dividing in 30° sectors the band of constellations upon which the motions of the Sun and planets are projected during the year, with an arbitrary origin at the vernal - spring - equinox (γ), and
- relative to the « houses », a local reference frame dividing the local sky in 12 sectors.

**one of the fathers of western astronomy, who rediscovered the precession of equinoxes about 130 BC*



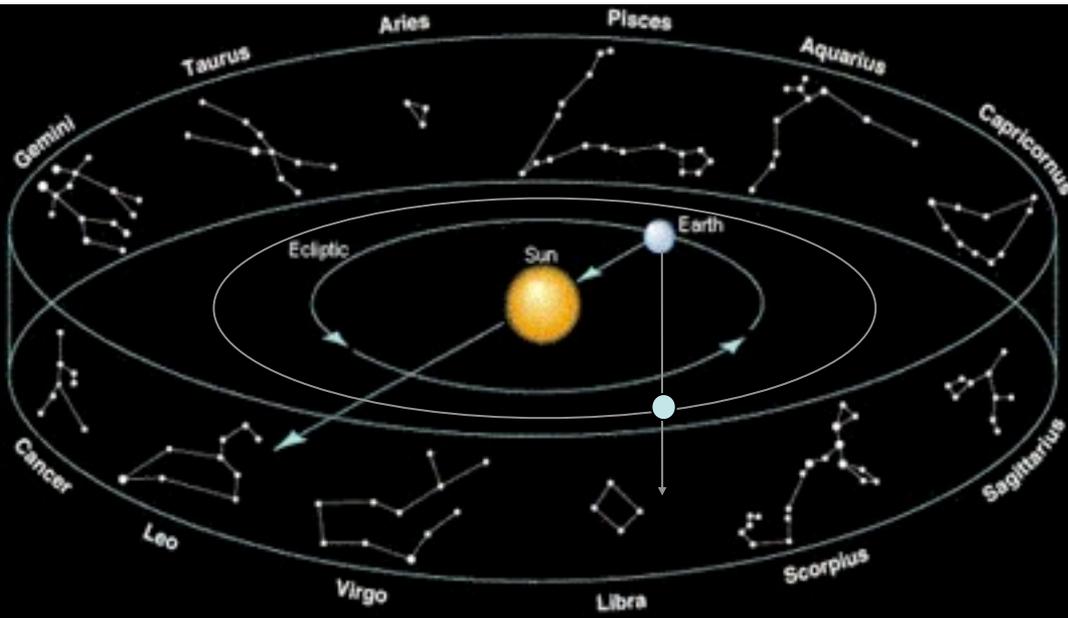
Projection onto the zodiac



Geometric representation of the zodiac

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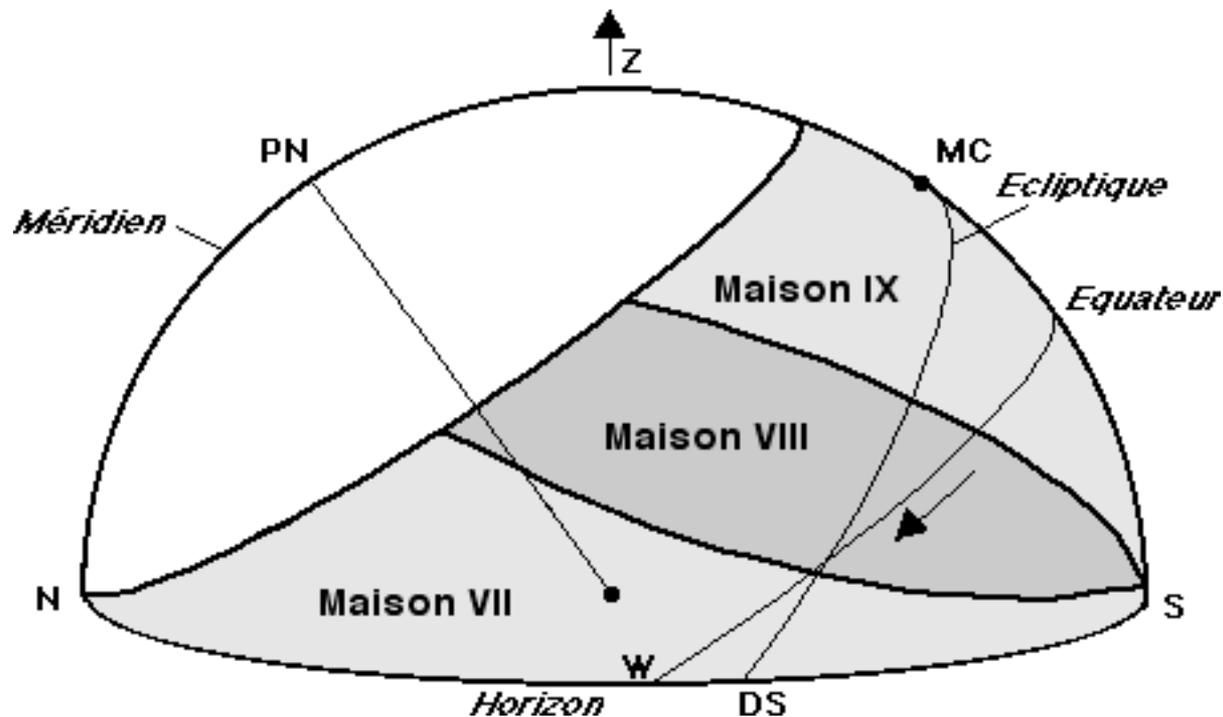
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Symbolic representation of the zodiac

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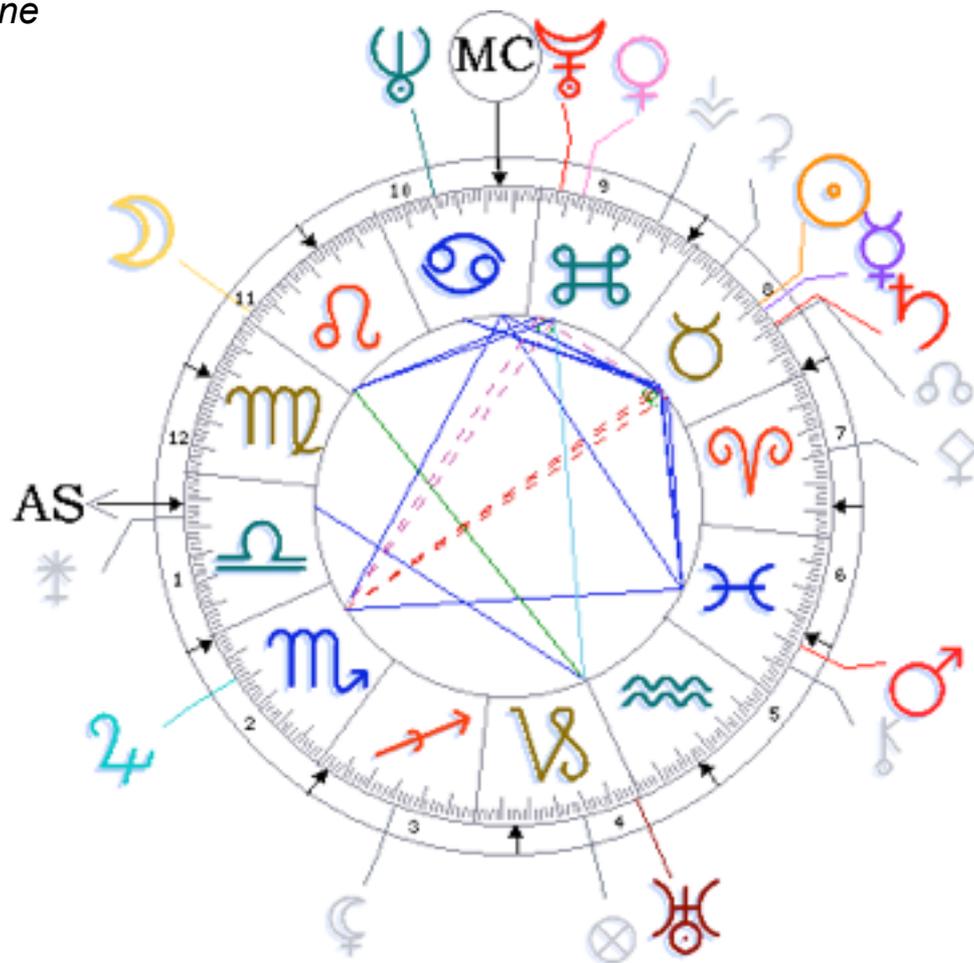
Placidus system for houses :

dividing the local sky from sunrise to sunset and from sunset to sunrise in 6 sectors each

The position of luminars at a given time and place can be calculated through celestial mechanics, and their graphical - and objective - display is the « horoscope* ».

**from the greek hora+skopein = hour+examine*

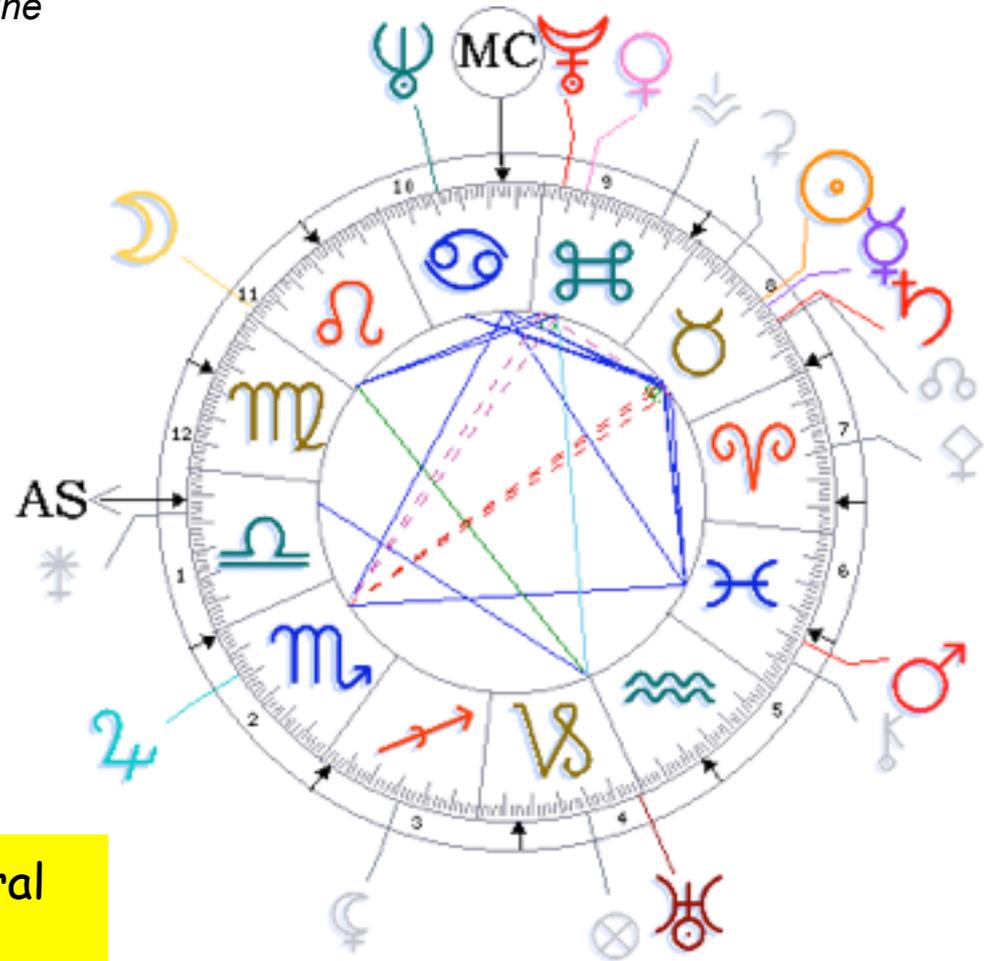
		Signes
Soleil	☉	Bélier
Lune	☾	Taureau
Mercure	☿	Gémeaux
Vénus	♀	Cancer
(Terre)	♁	Lion
Mars	♂	Vierge
Jupiter	♃	Balance
Saturne	♄	Scorpion
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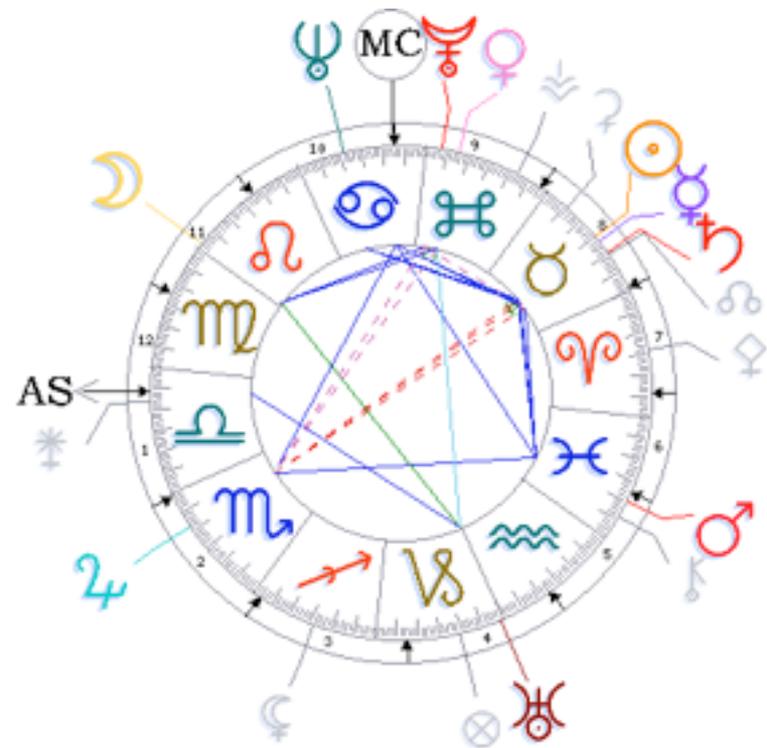
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The horoscope, which reveals astral conjunctions at a given time and place, is the basic tool of astrology ...

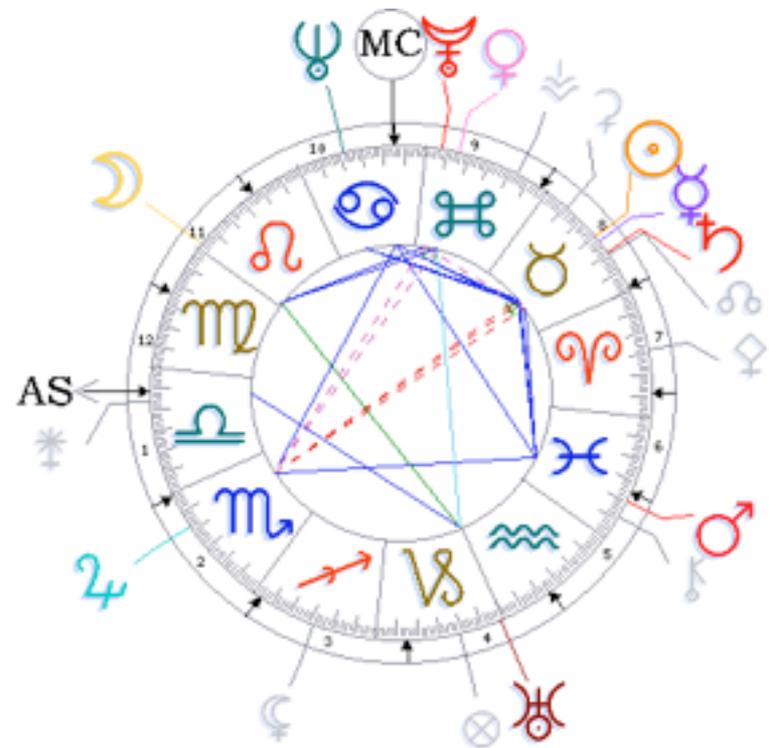
... It allows to define the solar sign (sign « containing » the Sun at the considered time), the ascendant (rising sign at eastern horizon) and descendant (opposite), the middle of the sky, the positions of luminars in signs and houses, the « aspects » (angles formed by triplets of luminars), the transits (a luminar passing over another one or over a former particular position), etc.

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The interpretation of the horoscope is the subjective part which truly characterizes the astrological practice. It is also the point from where *Astrology divorces Astronomy.*

Many astrology « schools » exist, from esoteric to rational, the latter assuming material influences from the celestial bodies.

The so-called « scientific » astrology strongly opposes commercial practice and claims for academic recognition, which would give it access to public funding and academic positions (professorship, researcher...) and at the same time reinforce its legitimacy and, not least, a strong support from the public.

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Is that enough to make it Science ?

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Since the 1930's, astrology meets a large success in the media and politics. It benefits from a widespread public belief. Public inquiries reveal that:

- 41% believe in astrological characterology
- 26% believe in predictions
- 13% have consulted at least one astrologer

These percentages are stable since the 1980's*.

The infatuation of the public for astrology evolves towards a psychology aimed at "liberating the potentialities of individuals".

An astrologer works in the field of affectivity, not rationality.

The "client" finds himself in the position of "expectant believer", by which he only hears what he wants to hear, and discounts what does not fit in within his expectations. This deprivation of free-will engenders alienation and a strong risk of psychological manipulation.

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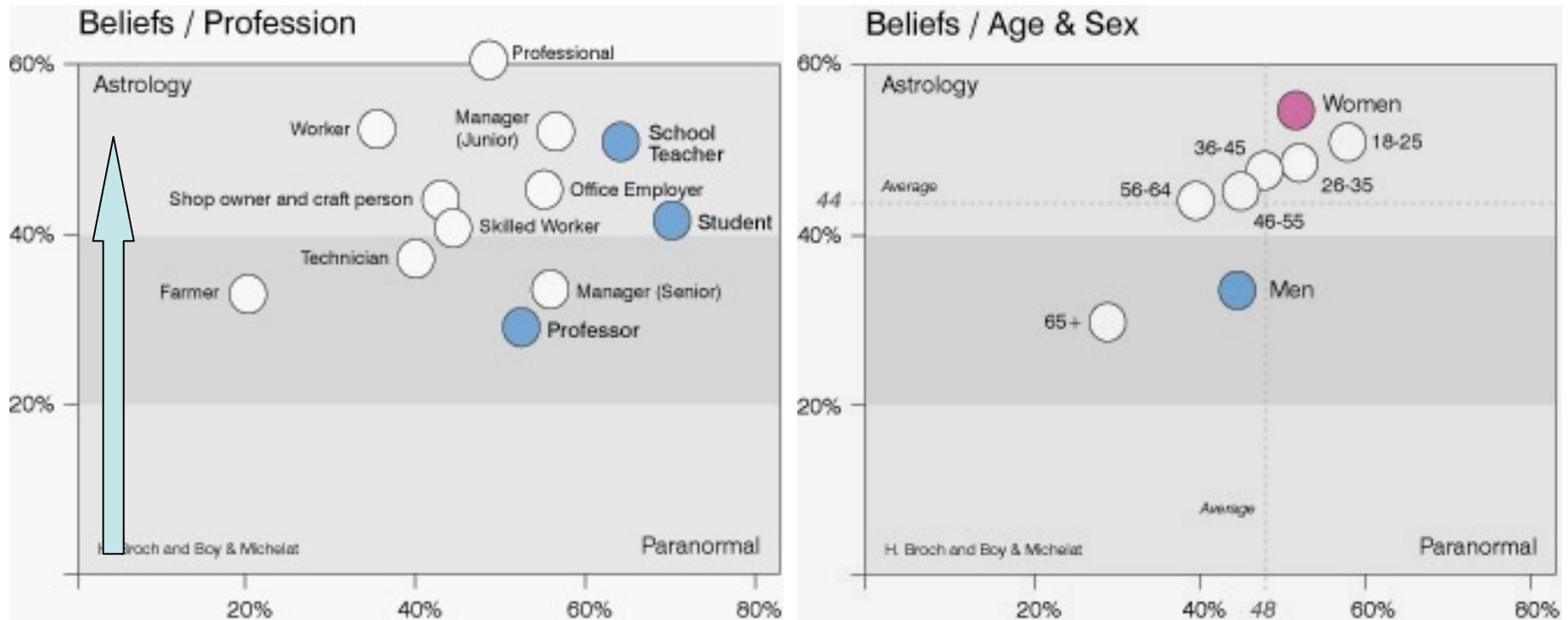
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This is true in particular for political leaders (F. Mitterrand, R. Reagan, C. de Mèdicis, R. Nixon, Hassan II ...)

What are their motivations ?
Credulity ? Isolation ? Desire to
manipulate people ?

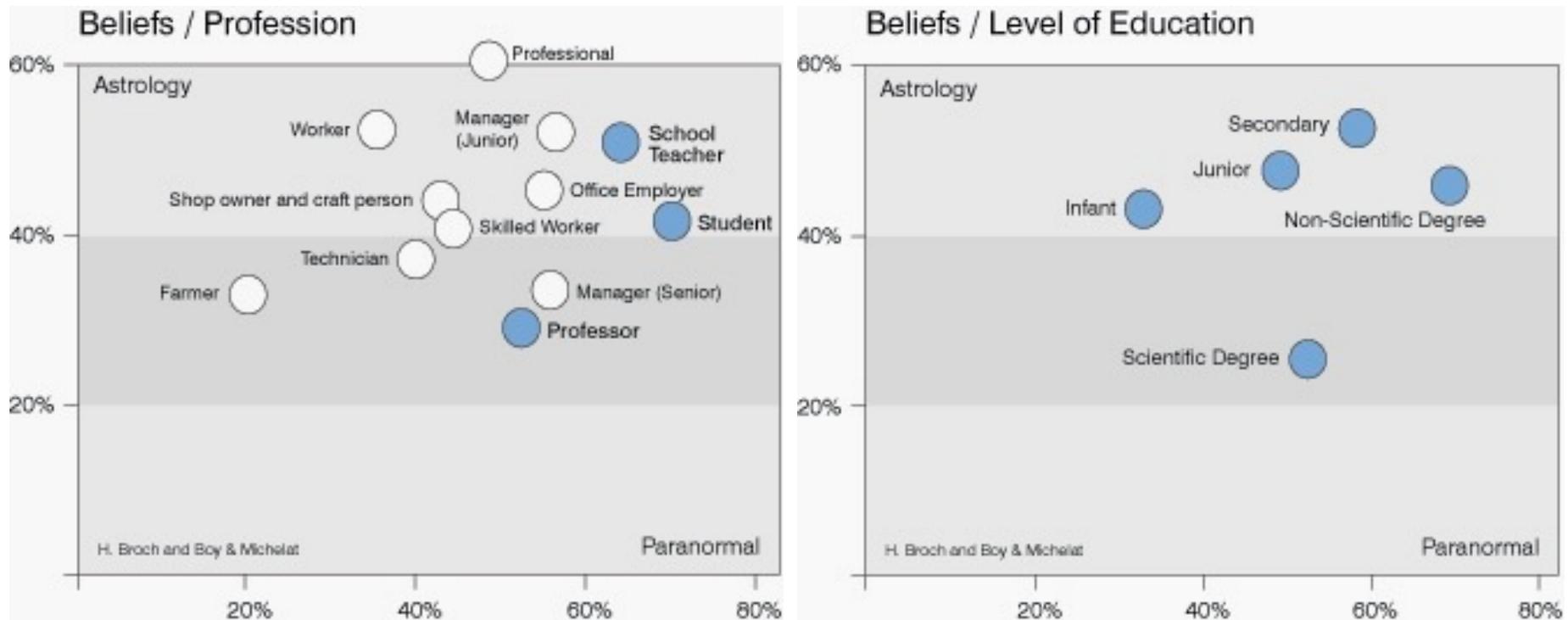


Astrological belief depends on many sociological factors



Examining the relationship between beliefs and life factors : Boy, D., Michelat, G., 1986.

It is not the **privilege** of those who have or don't have access to thorough academic instruction but thrives in an in-between state :
 Belief in astrology statistically increases with declared interest in science, peaking among the salaried middle-class holding an intermediate-level degree, then lessens among those with a postgraduate education.



Examining the relationship between beliefs and life factors : Boy, D., Michelat, G., 1986.

Sociologist T. Adorno pointed out that belief in astrology is characterized by what he called **semi-erudition**.

The semi-erudite follows non-scientific shortcuts to answer questions regarding the future (or his destiny) as a result of an unsuccessful conversion to the system of scientific thought.

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Most scientists as well as researchers in humanities (sociologists...) are strongly opposed to all forms of astrology.

Does this result from corporatism or protectionism of the « official science », or from ethical reasons ?

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**writing the heavens*

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- Kepler (1571-1630) was selling horoscopes (albeit without conviction).



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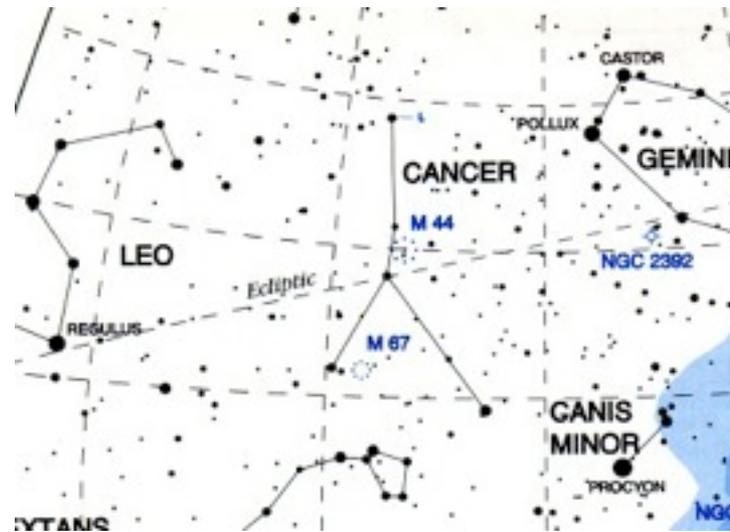
In France, astrology was evicted from the Faculty (by Colbert in 1660).

At first sight, Astronomy and Astrology appear as « disciplines » both dealing with the sky. The horoscope is an objective sky map, and « researchers » in astrology postulate the existence of physical (material) influences.

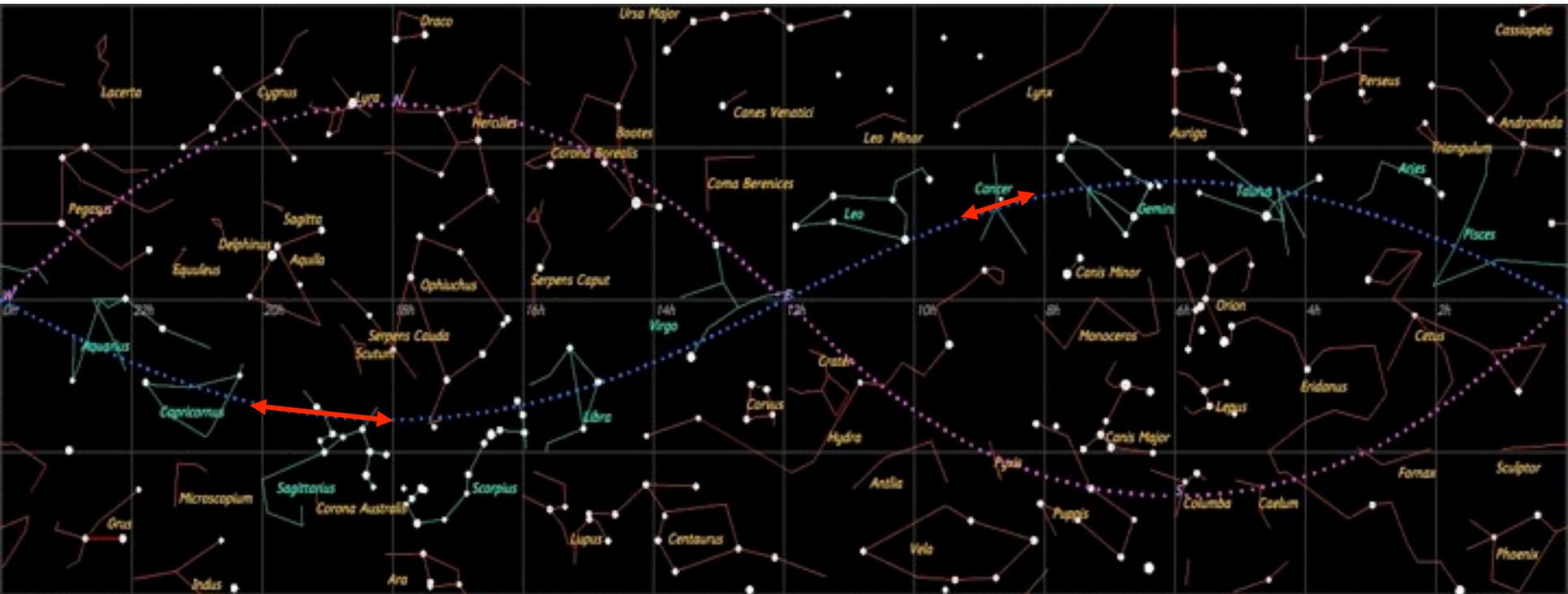
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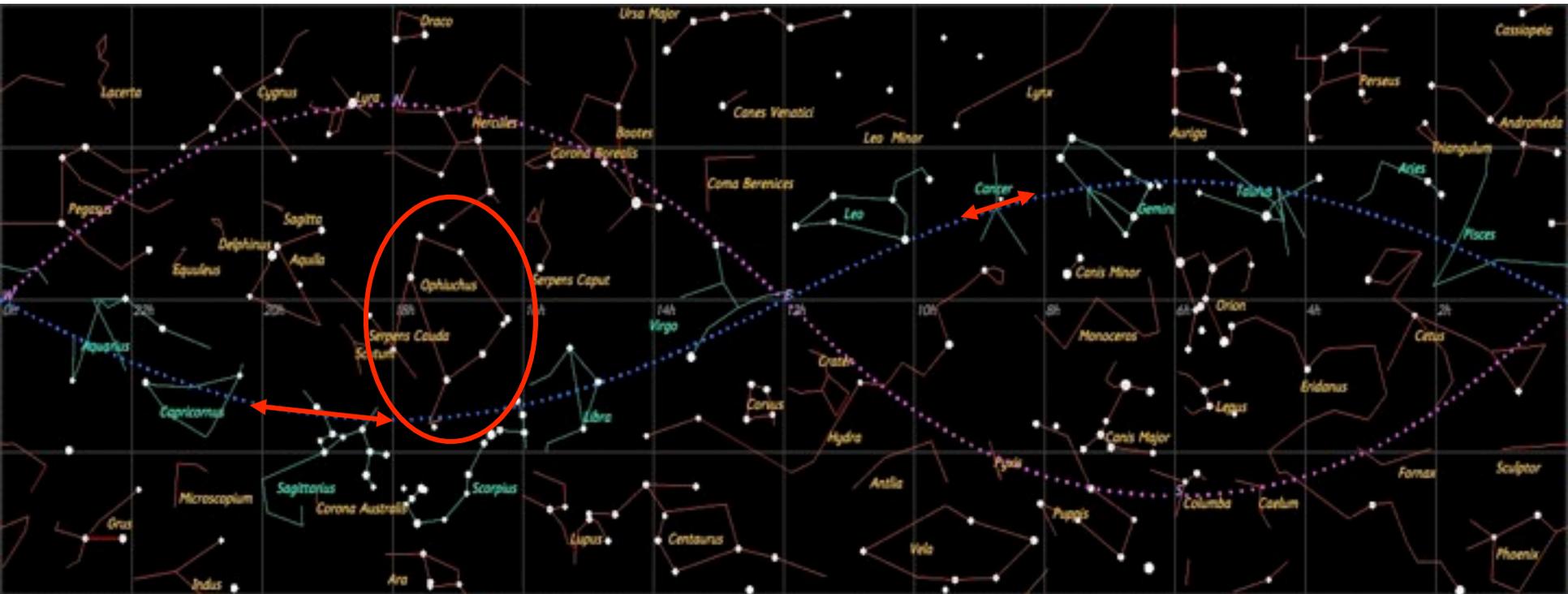
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- ① the constellations, from which signs are named, are 3D structures ; the figures formed by their stars by projection on the plane of the sky are thus mere illusions

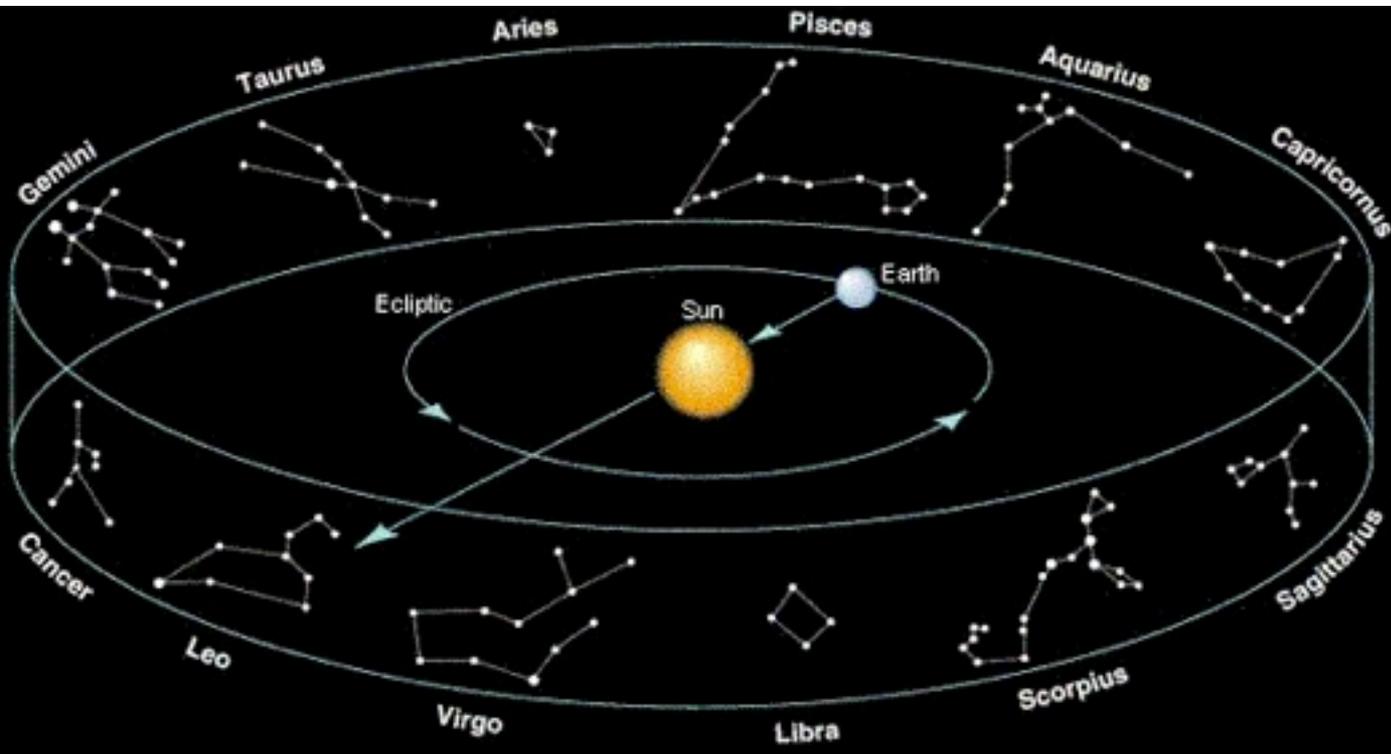


② the zodiacal constellations have very diverse widths along the ecliptic, while astrological signs all have been set to a 30° width

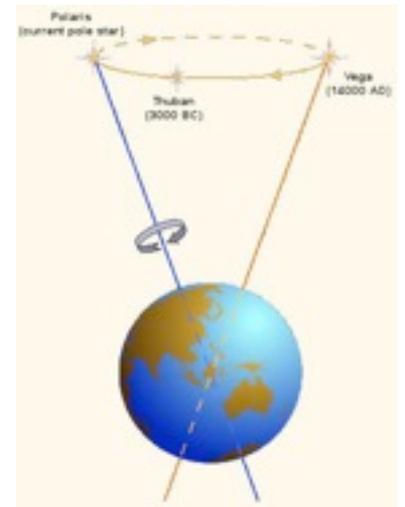


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③ 13 constellations actually intersect the zodiacal band (which has a $\pm 8.5^\circ$ extent around the ecliptic) : the usual 12 plus Ophiuchus

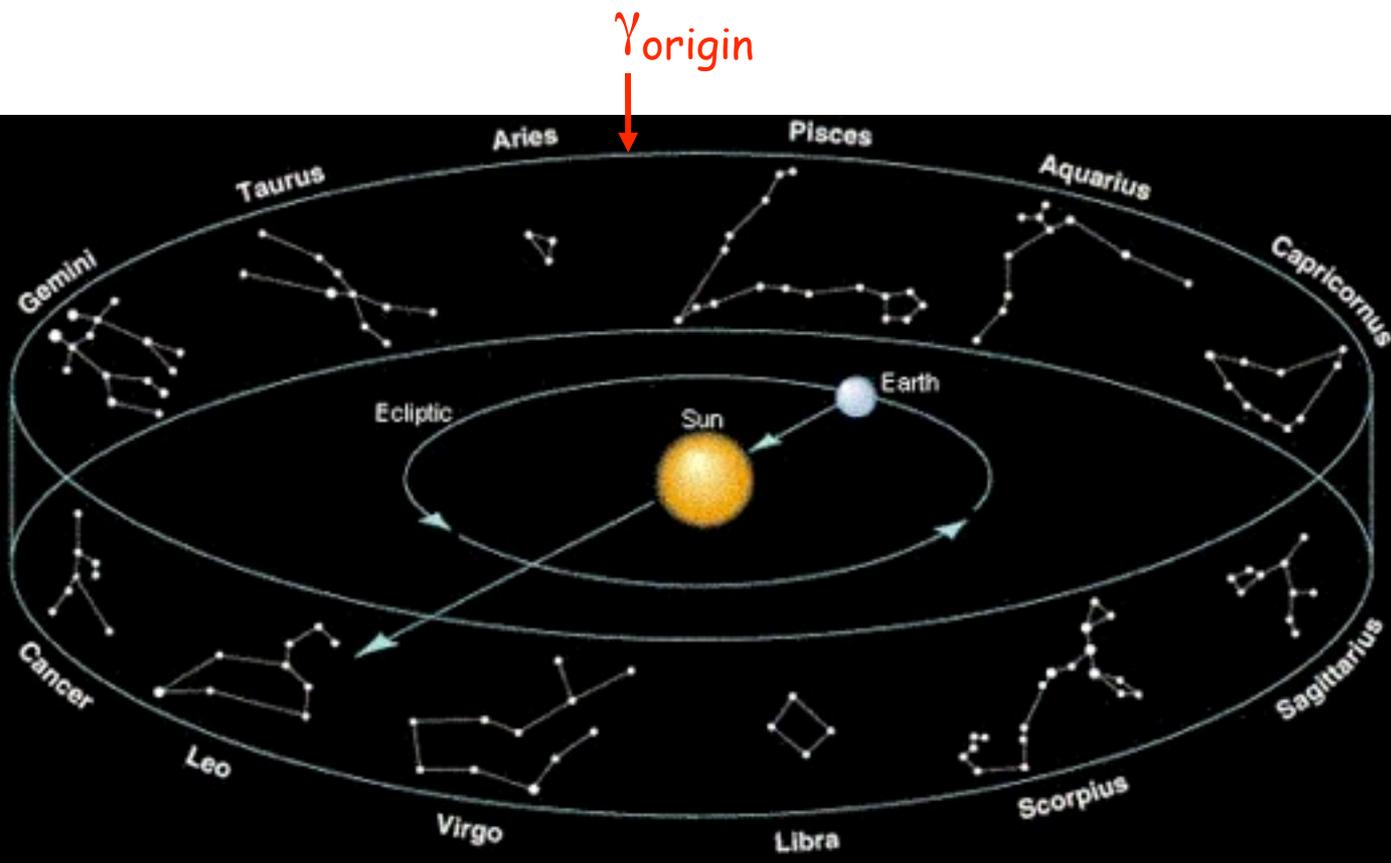


Signes	Constellations
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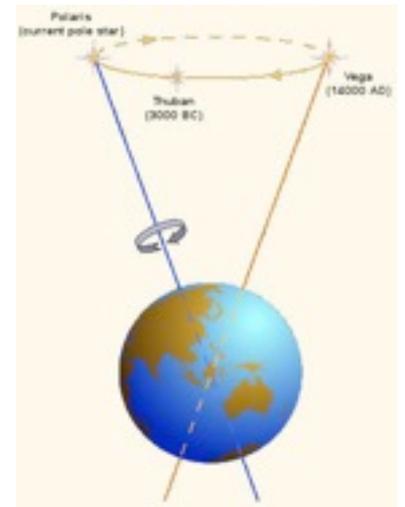


④ the slow precession of equinoxes* causes constant shift of signs wrt background constellations ; as a consequence, the vernal point defining the origin of the « Aries » sign, also corresponded to the edge of the Aries constellation at the early days of astrology, while today it points at the constellation « Pisces », and will soon enter that of « Aquarius »

**which results from the motion of the Earth's polar axis due to combined Solar and lunar gravitational attractions*

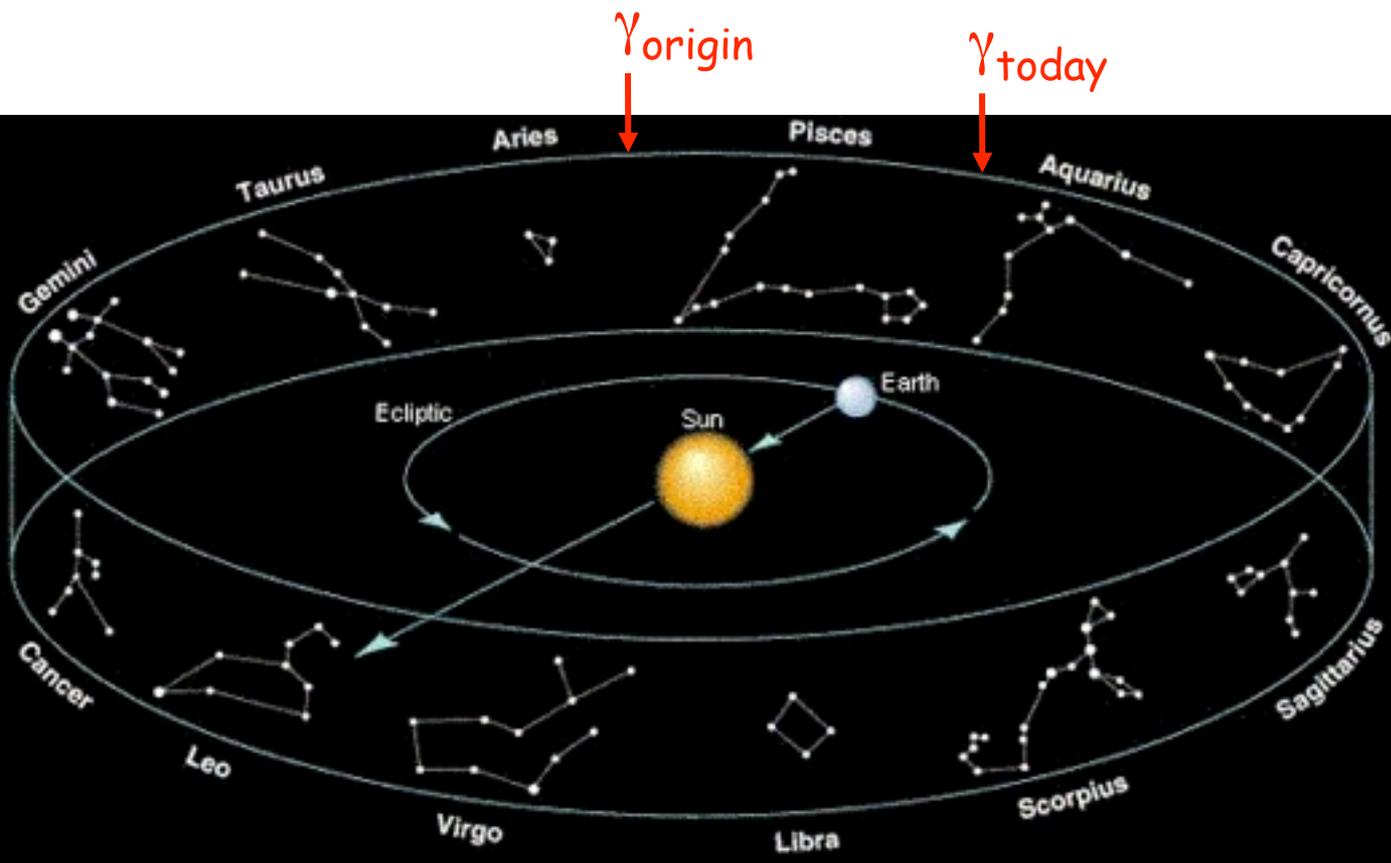


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Scorpion	♏	♏	♏
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Poissons	♓	♓	♓

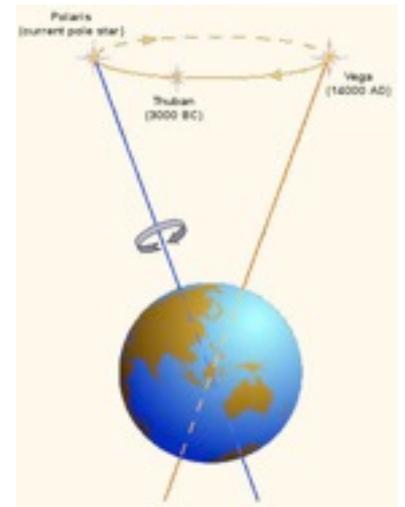


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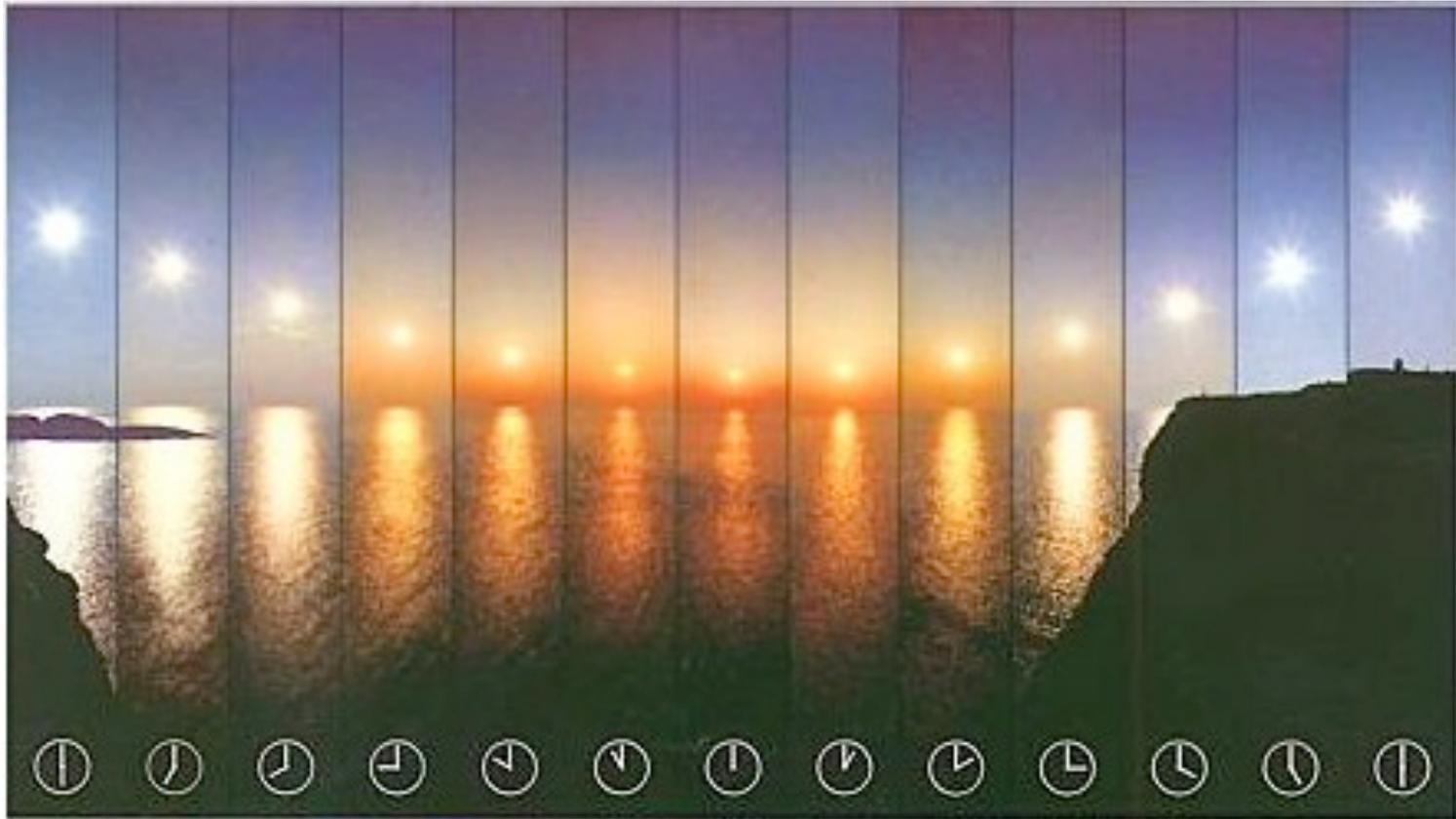


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Midnight Sun at North Cape, 71°10'21"N

⑤ the horoscope cannot be fully drawn beyond the polar circles, as there is no more diurnal cycle allowing to define the « houses »*

**at least in the system of Placidus de Titis, inherited from Ptolemeus, based on the day/night cycle, and used by « modern » astrology*

⑥ the slow motions of luminars imply that many people share the same horoscope

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⑦ the symbolic of the signs is well suited to the northern hemisphere people, not for the southern one*

**Leo is a good illustration : symbolic of the Sun, energy, etc., it is obviously a summer sign. This is only true in the northern hemisphere.*

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- To ①②③④, astrologers respond that the tropical zodiac* is a mere reference frame along the ecliptic (divided in 12 slices of 30° longitude)**

**in which seasons always return at the same position*

***formerly used by astronomers themselves !*

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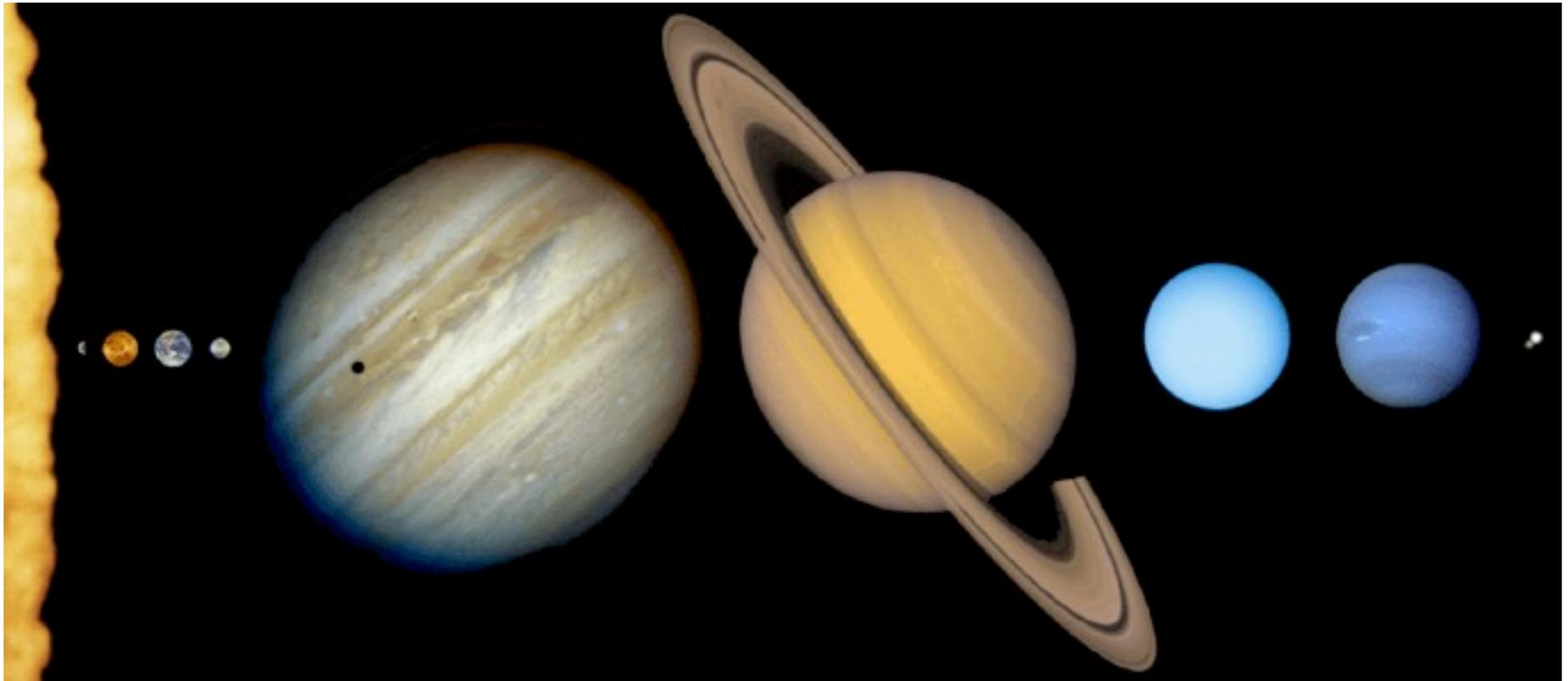
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Overall, WEAK criticisms, perceived by the public as reserved to specialists, and thus no impact on the public's opinion about astrology.

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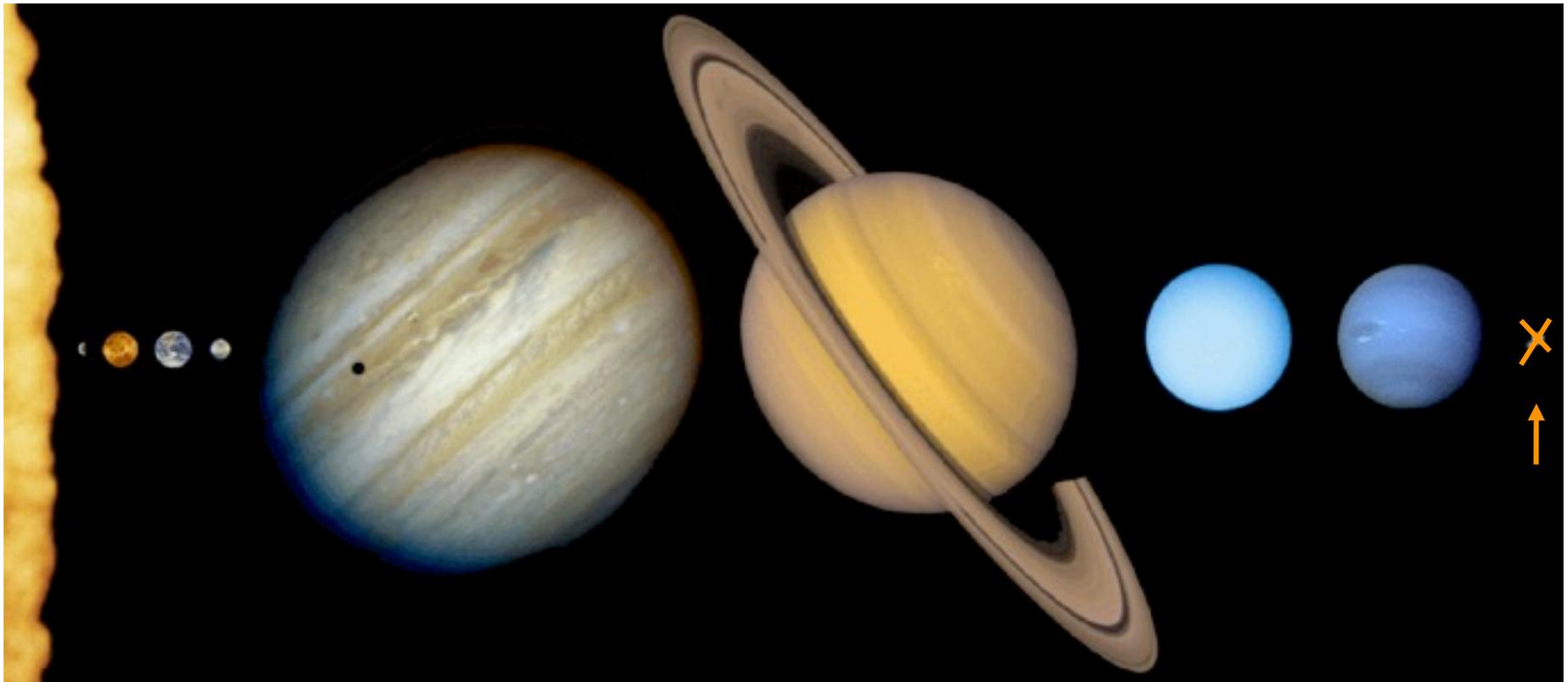
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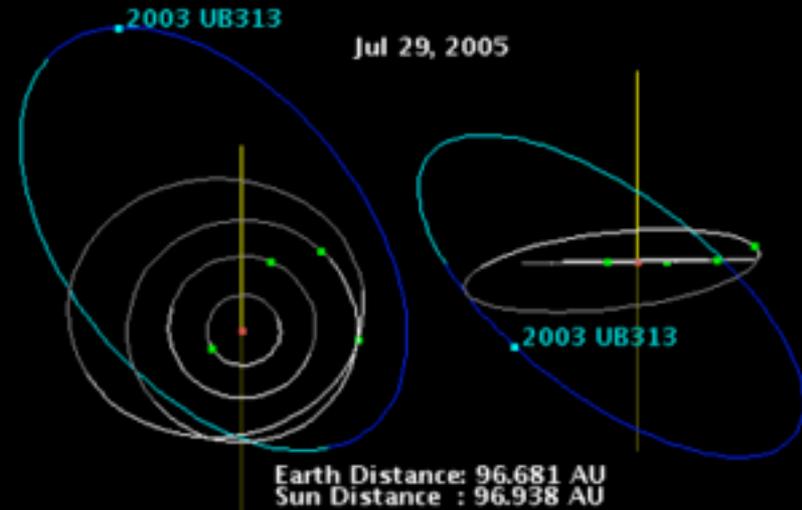
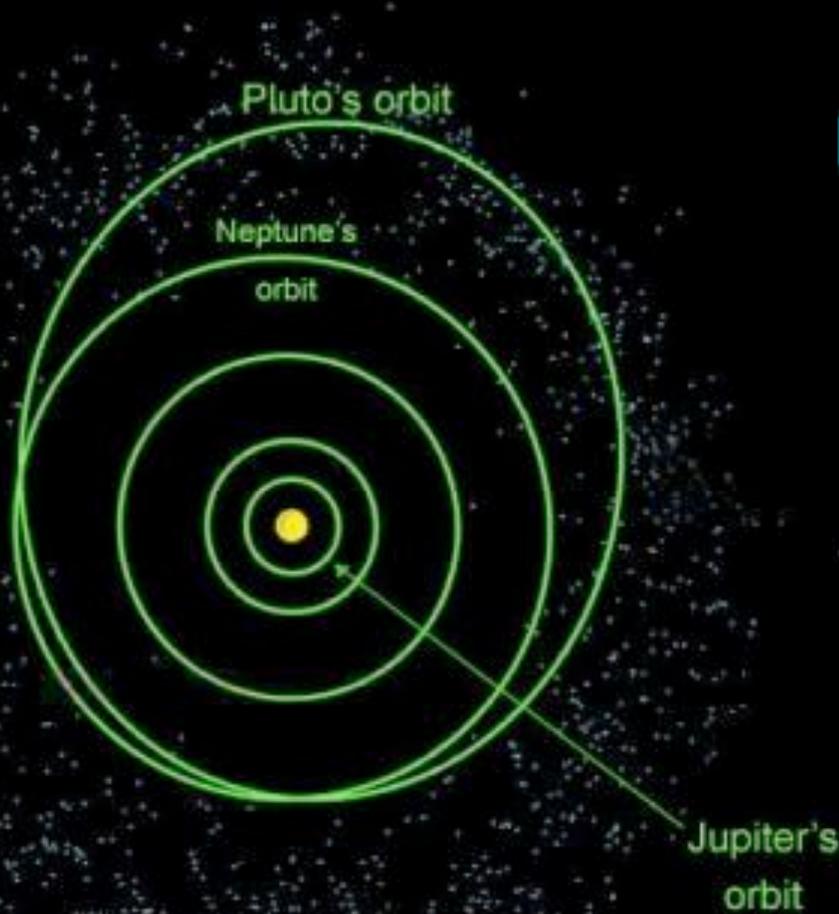
A few BETTER (but less used) astronomical objections :

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But Pluto is no more a major planet (IAU).



→ Should astrologers remove Pluto from the list of luminars and confess that it did not actually bring any improvement ?

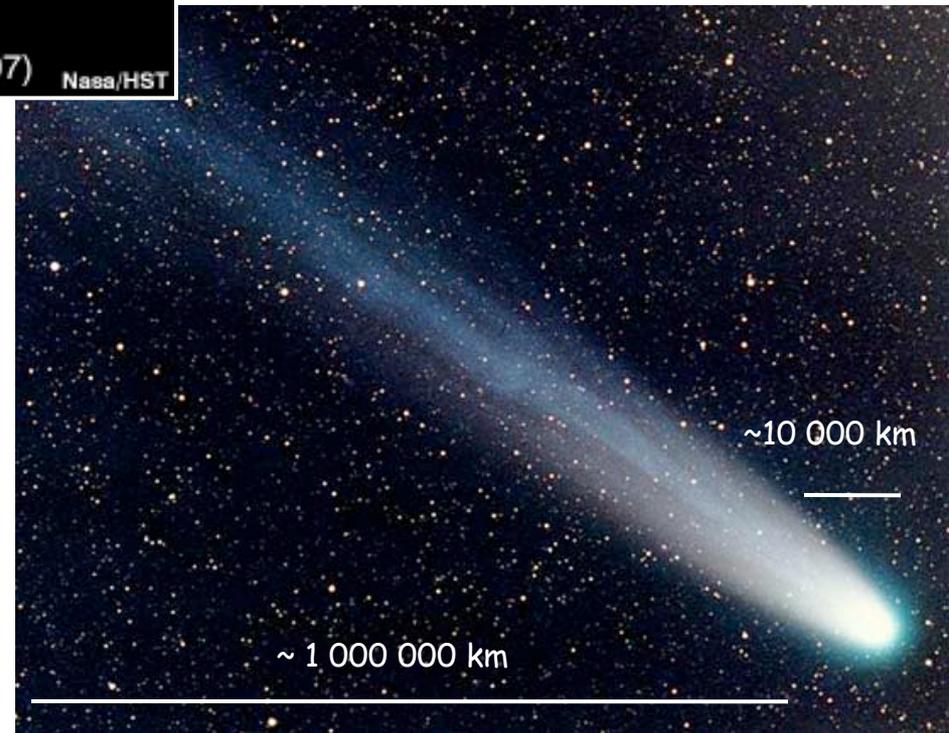
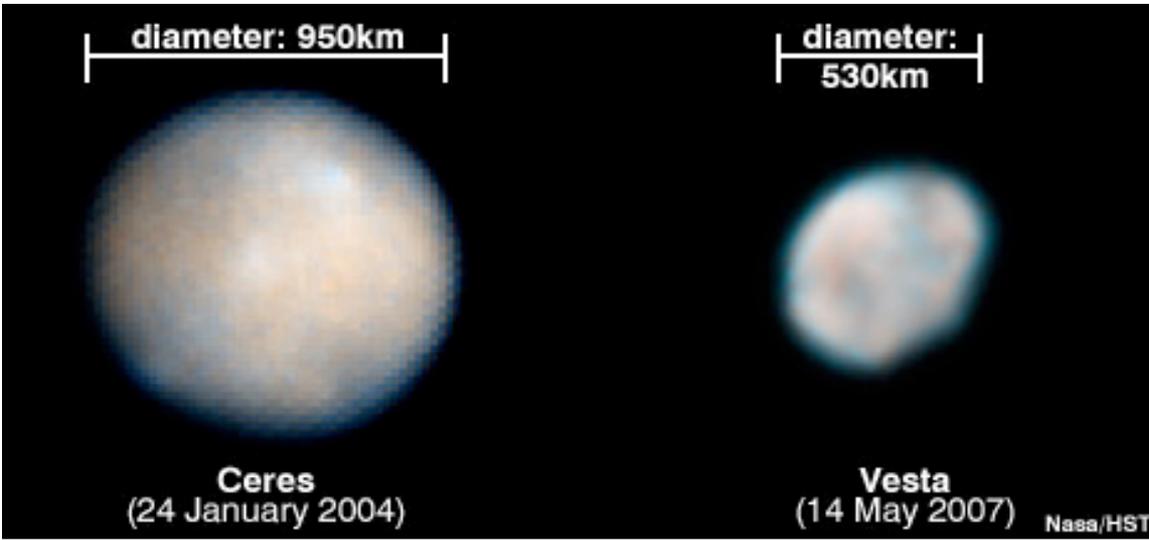
- Should astrologers remove Pluto from the list of luminars and confess that it did not actually bring any improvement ?
- If they keep it, what about recent Pluto-like Sedna, Quaoar, Xena, 2003EL61 ... and their satellites ?



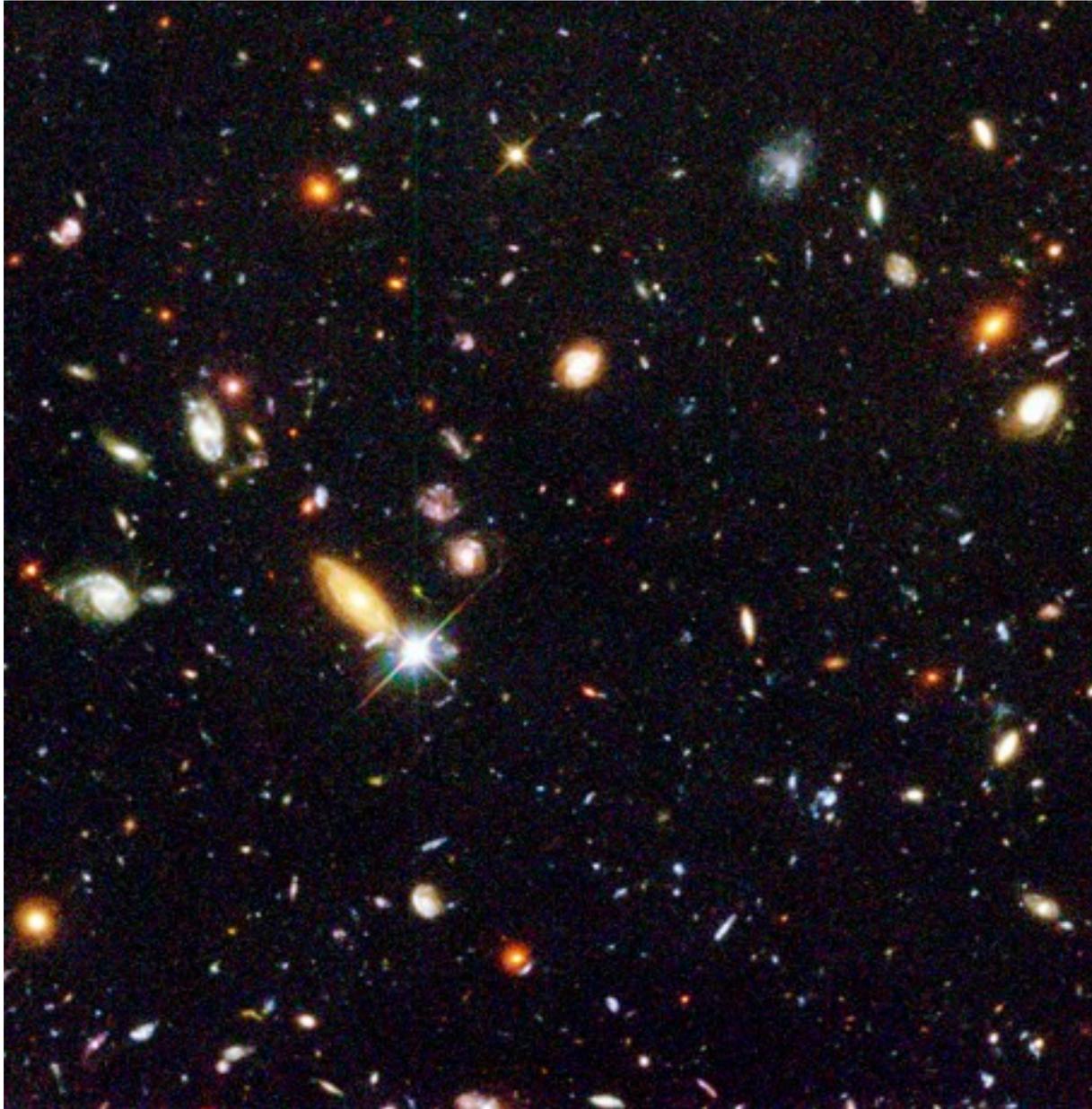
Largest known Kuiper Belt objects



⑨ What about (large) asteroids ? Comets (very extended coma and tail, possibly Earth-grazing) ...



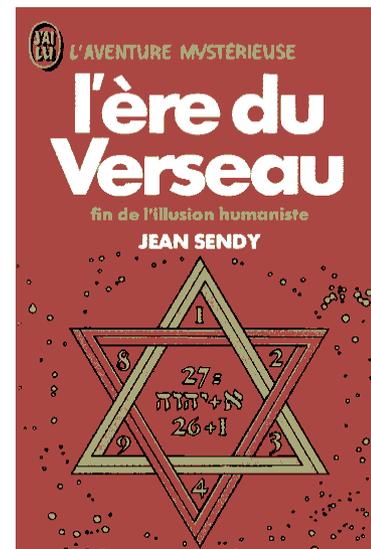
⑩ ... ALL THE UNIVERSE ? Does it play no role ?



Thousands of
galaxies
(Hubble deep
field)

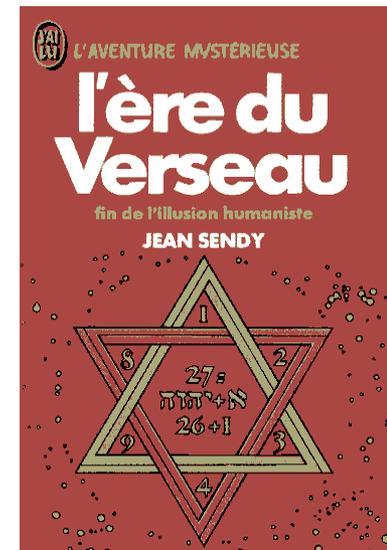
⑪ Mentioning an "age of Aquarius (Ere du Verseau)" explicitly refers to the motion of the vernal point through constellations (γ) ...

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Oriental (e.g. indian) astrology refers to the zodiac of constellations and thus does not suffer from that particular inconsistency.

⑫ For Astronomy :

Mars → red → iron → water → Life



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Mars → red → iron → water → **Life**

For Astrology :

Mars → red → blood → war → **Death**



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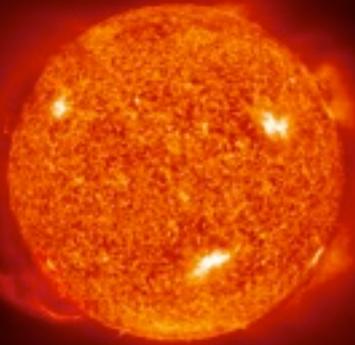
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Astrology deliberately ignores the physical nature of luminars, reducing them to geometrical points entitled with symbolic concepts only.



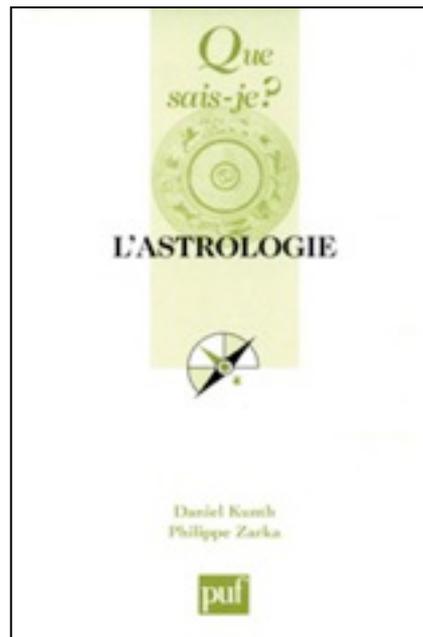
→ Fundamental hiatus between Astronomy and Astrology :

They both deal with the sky, but...

NOT WITH THE SAME SKY !

The astronomical sky is physical while

the astrological one is symbolic



« *L'astrologie* », D. Kunth & P. Zarka, *Que sais-je ?*, n°2481, Editions P.U.F., Paris, 2005.

1. Introduction : what is astrology ?
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Astronomical objections alone are not sufficient to fully refute the scientificity of astrology

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True correlation requires causal relationship ...
Why not elucidated since 2500 years ?!

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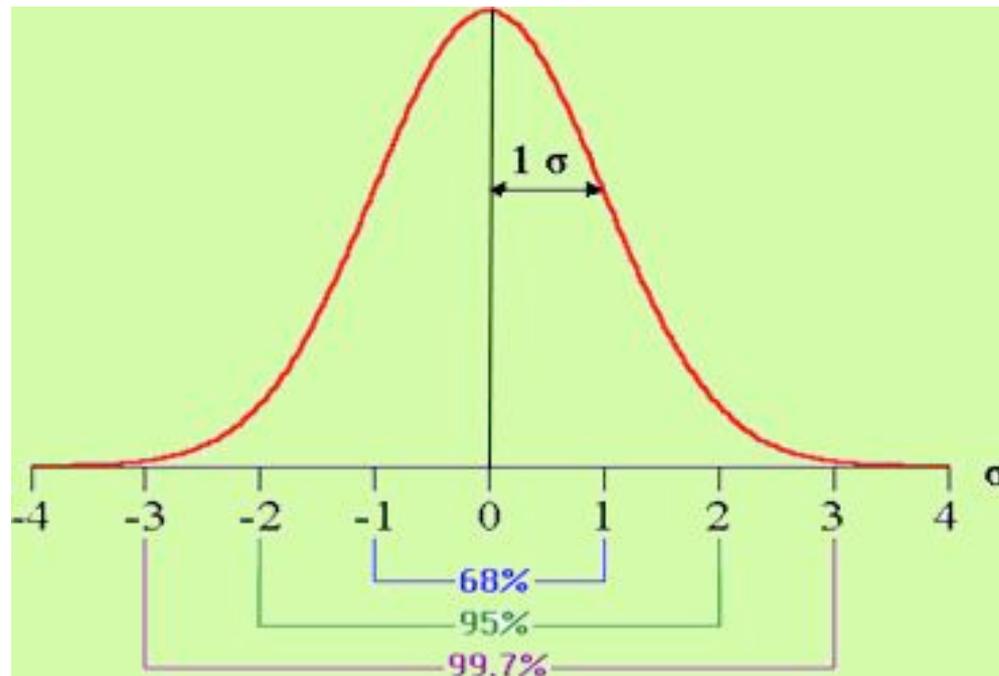
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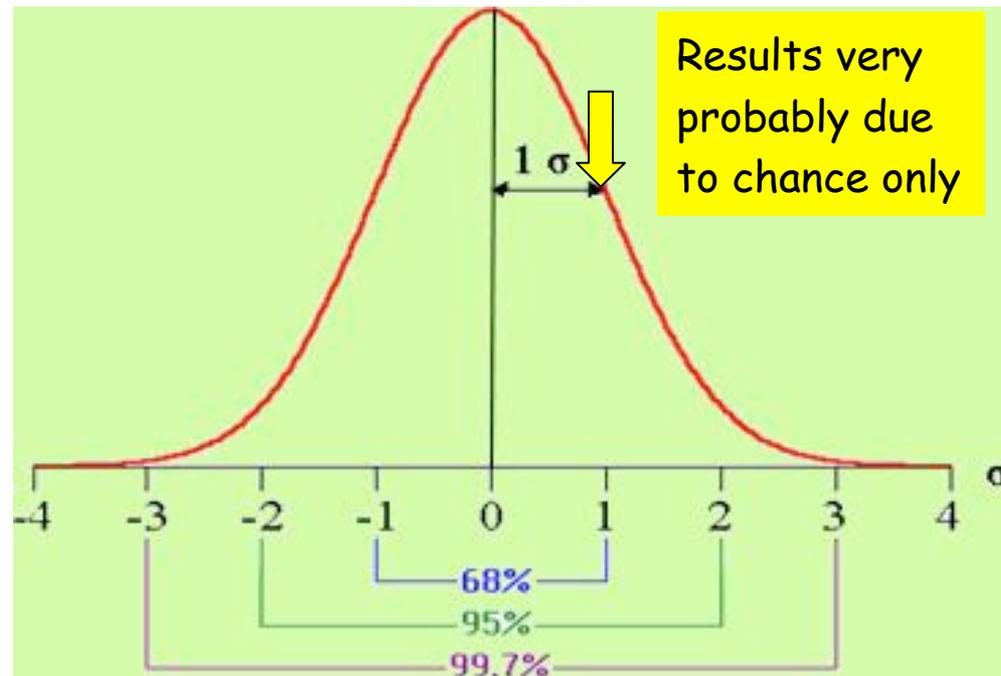


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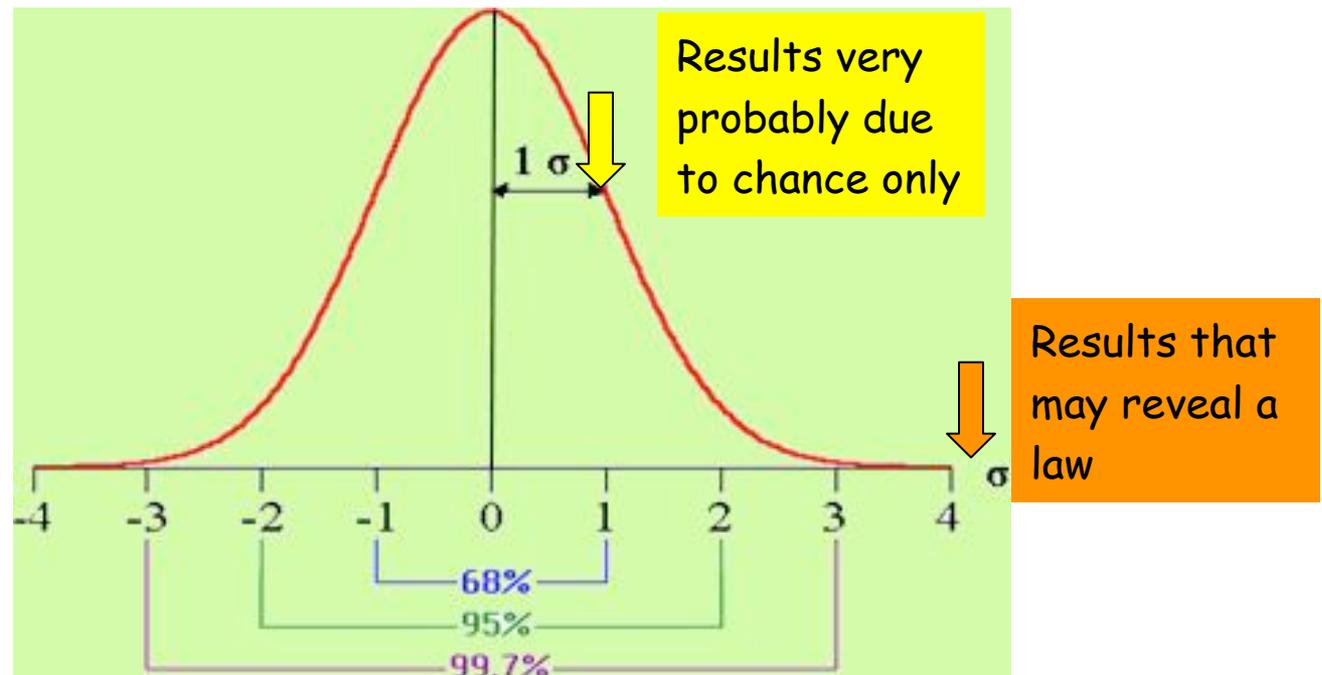


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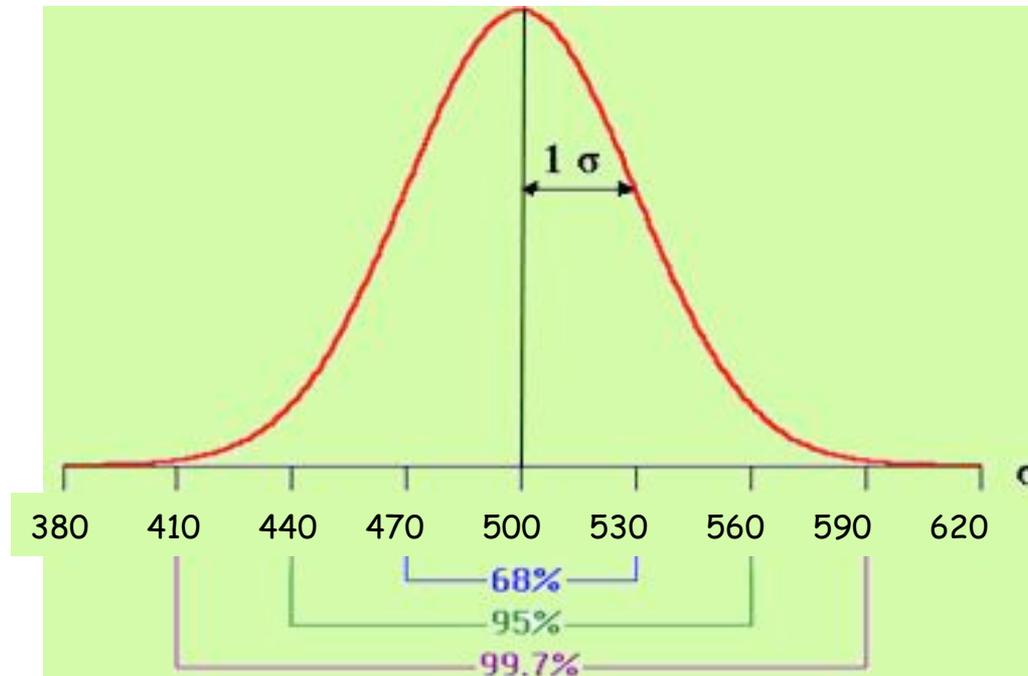
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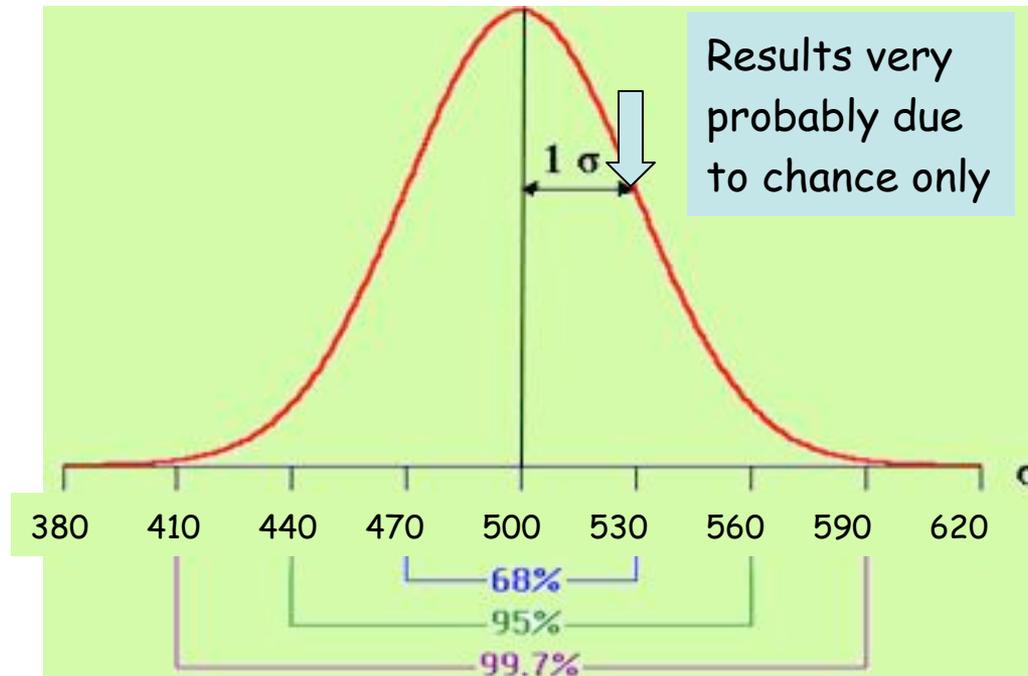
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 realization = number of « heads »

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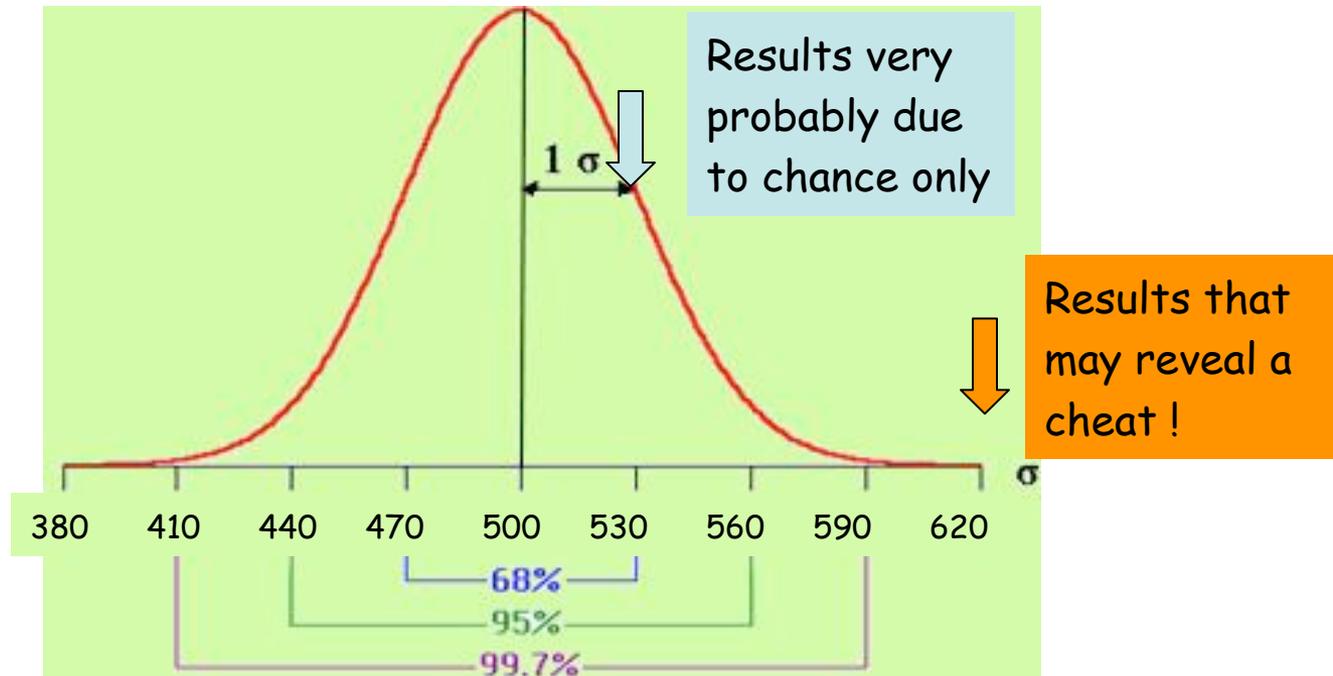
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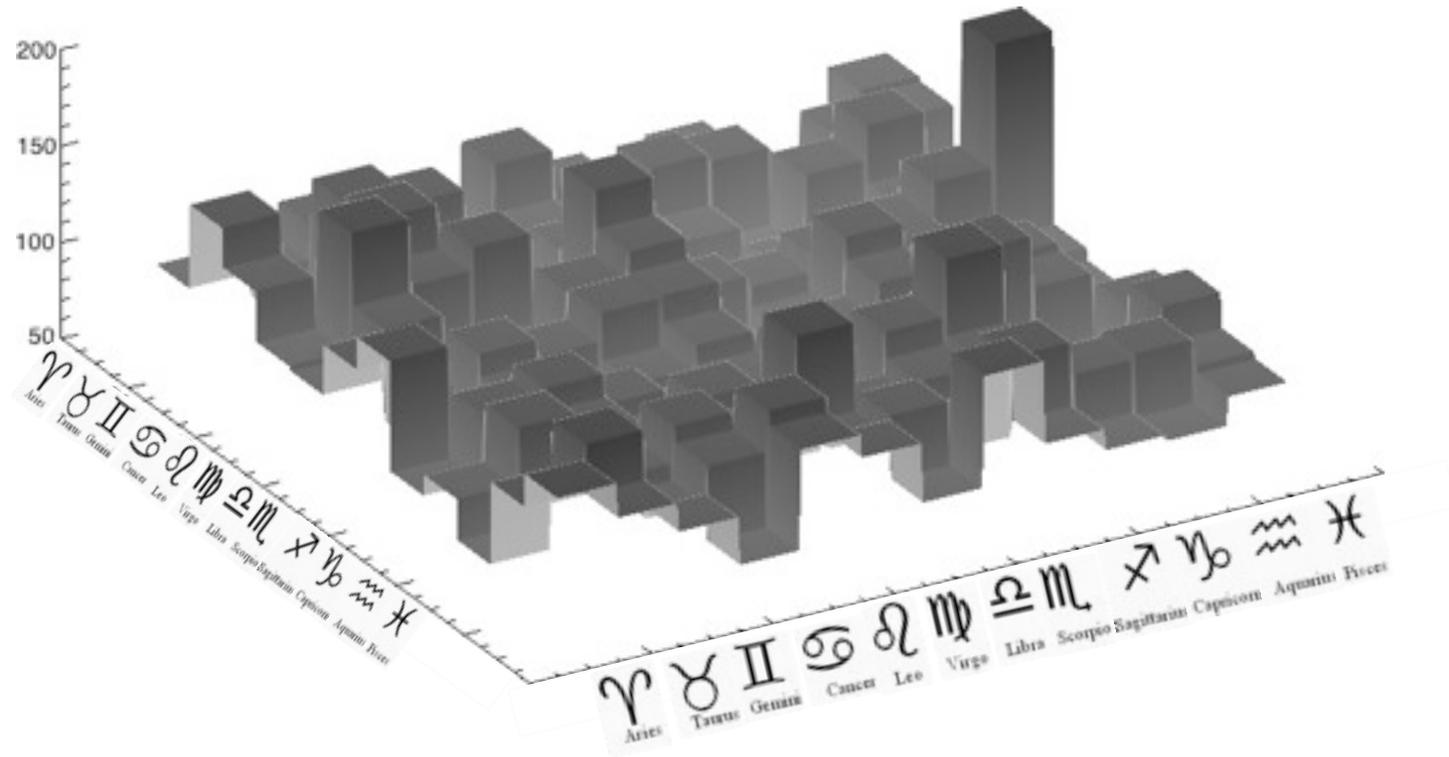
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Statistics permit to say that 530 can be attributed to chance with 16% probability (thus very likely),

while 620 can be attributed to chance with 0,003% probability only (suggesting a false coin !).

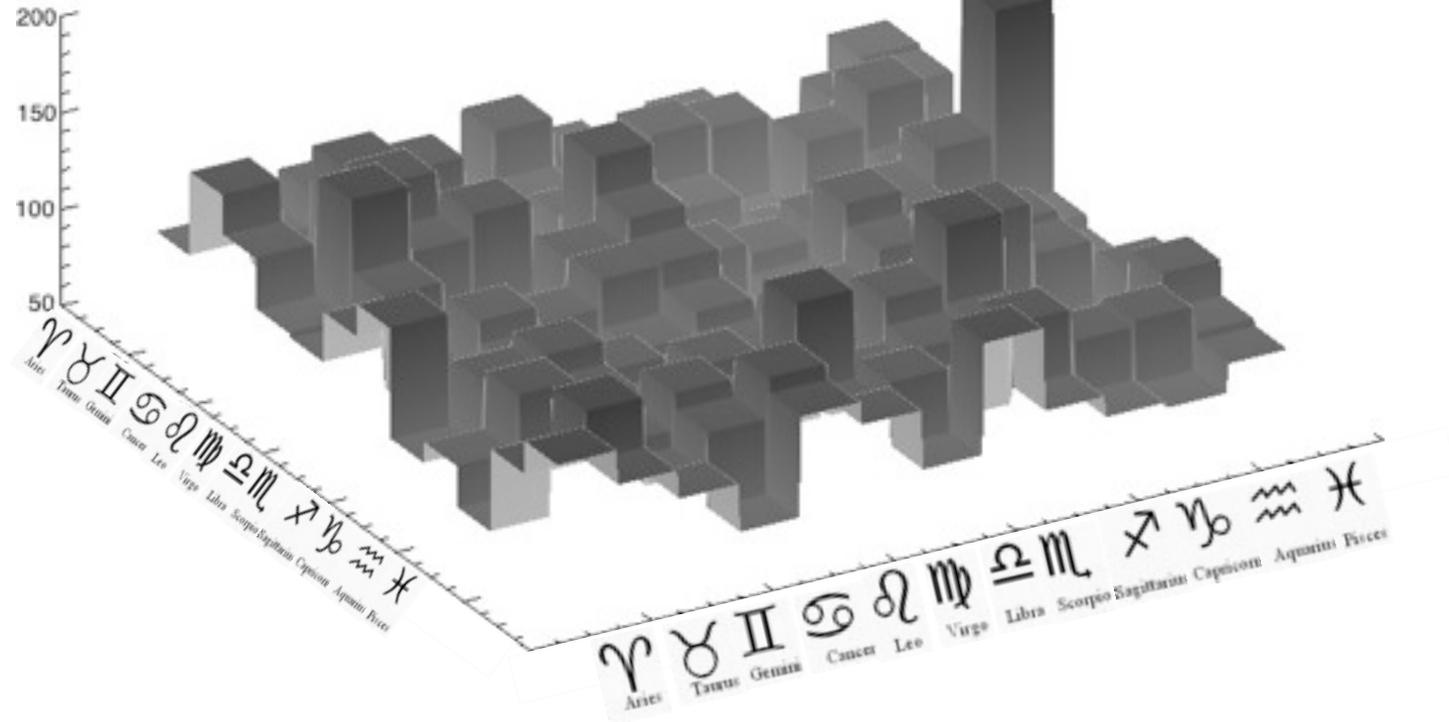
Example: test of 14400 marriages



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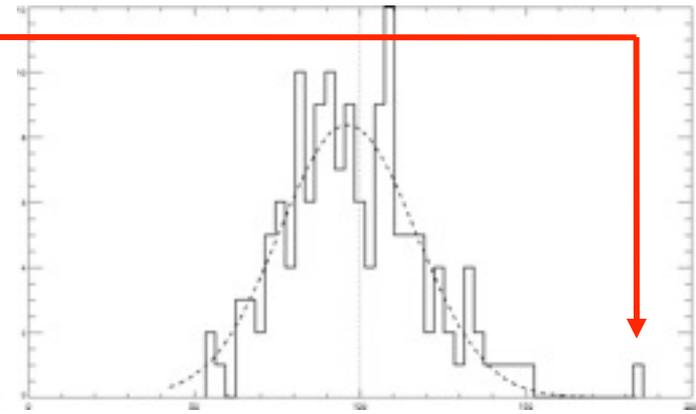
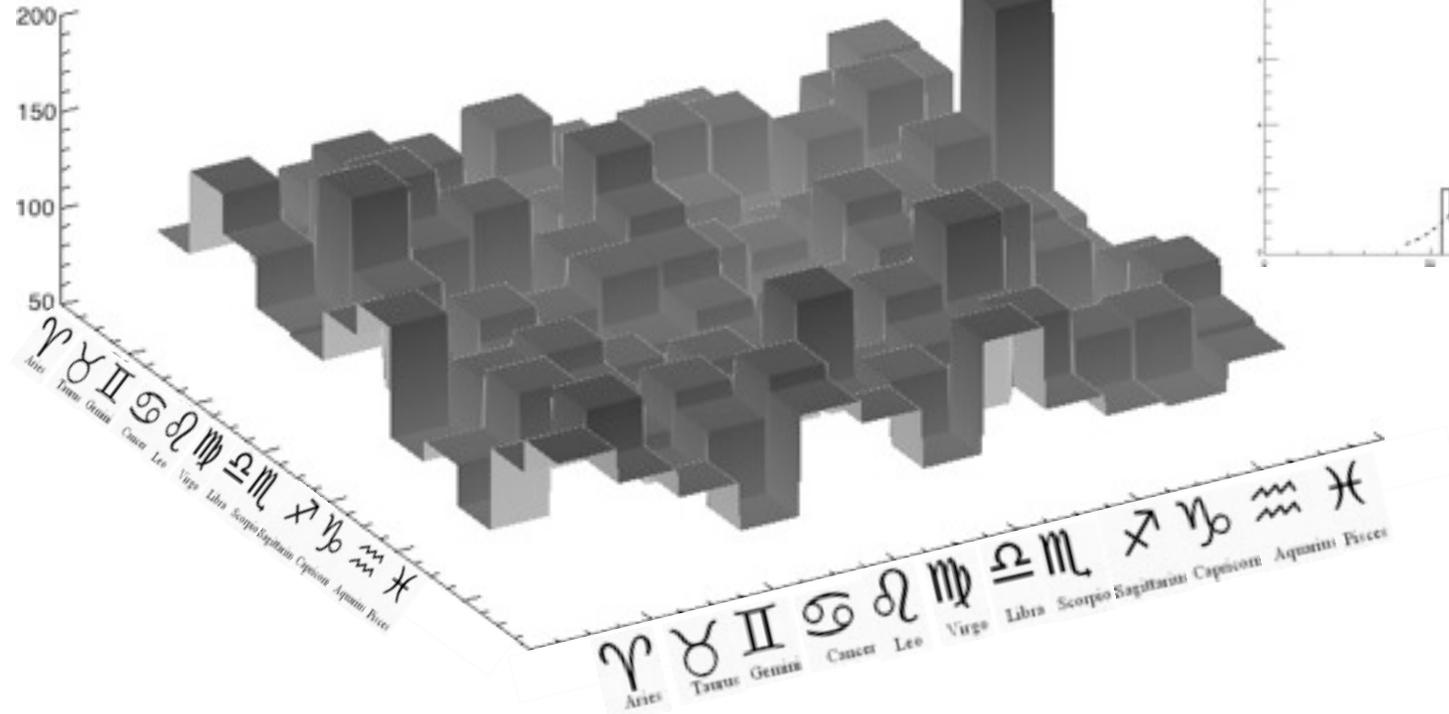
Cancer
Pisces



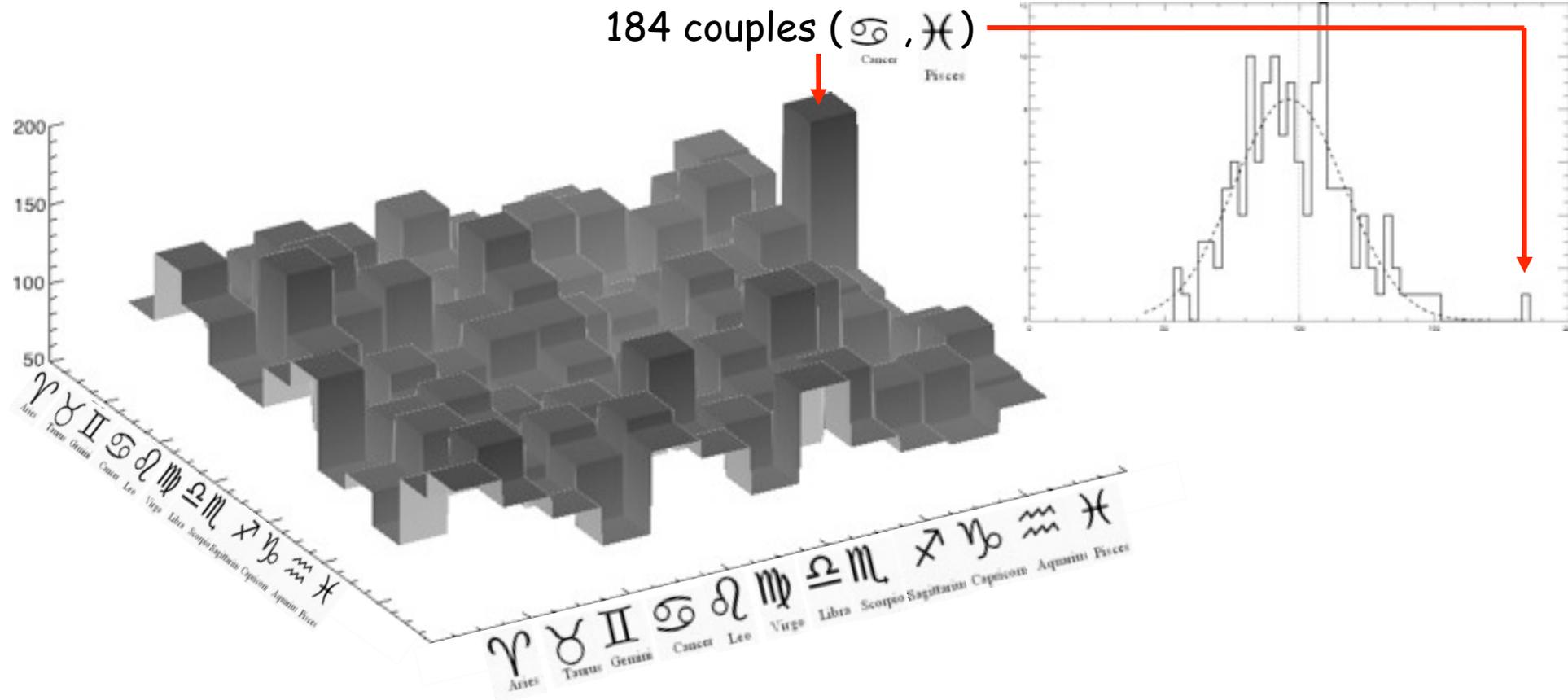
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- 4 σ peak at 184 marriages (♋, ♉)
- due to chance only with probability = 0.003% → law ?
- but 144 couples possible → ~0.5% chance
- if 20 samples tested → **10% chance**

3 fundamental conditions for the validity of statistical tests :

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Exception : S. Carlson, A double-blind test of astrology, Nature, 318, 419-425, 1985.

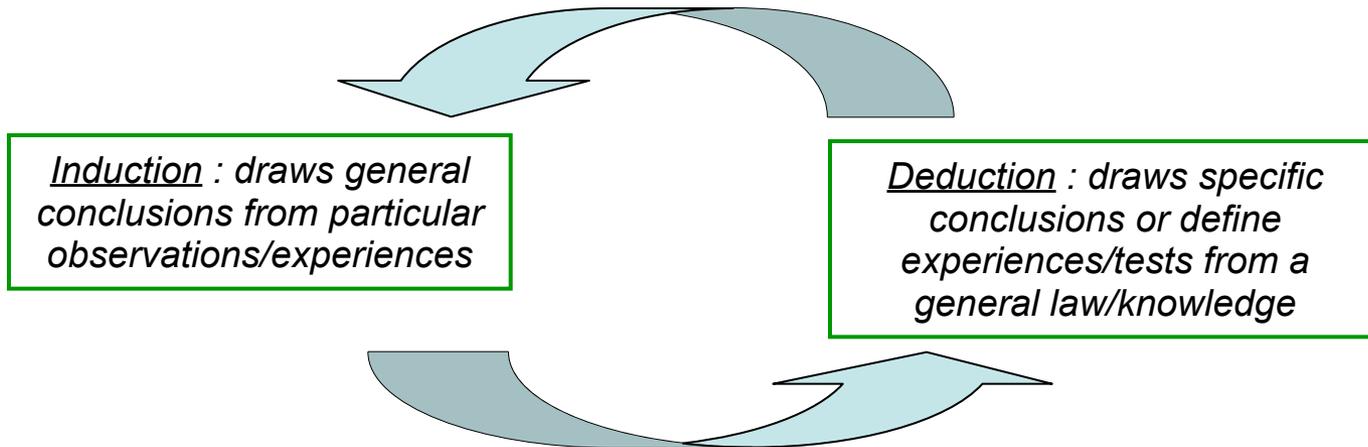
Astrological definitely fails at characterizing
personality from birth horoscope

The nature of Science

- Method = induction + deduction

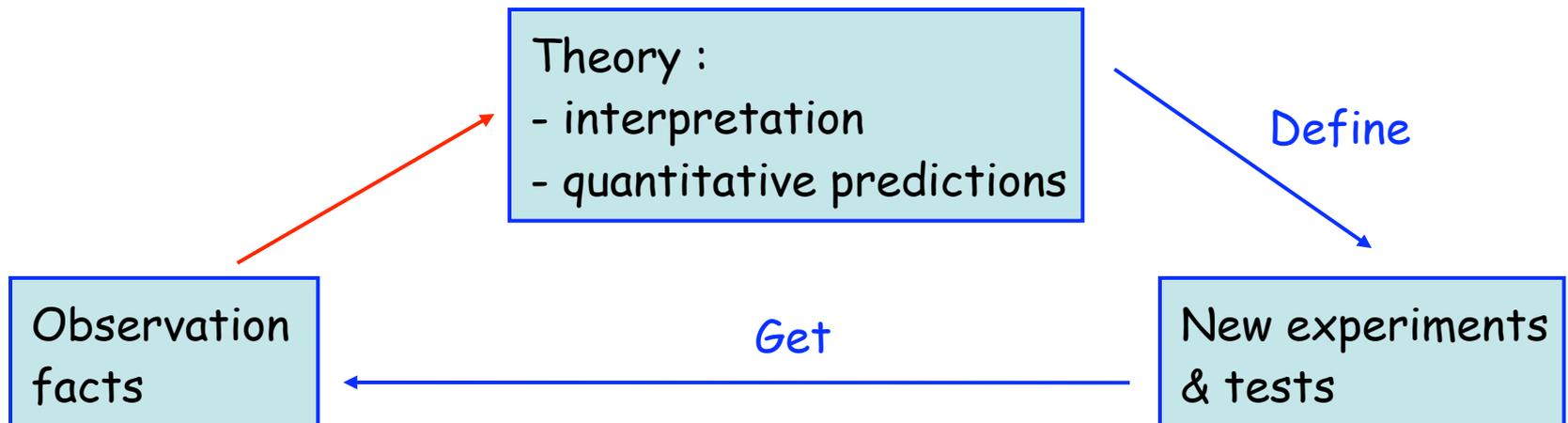
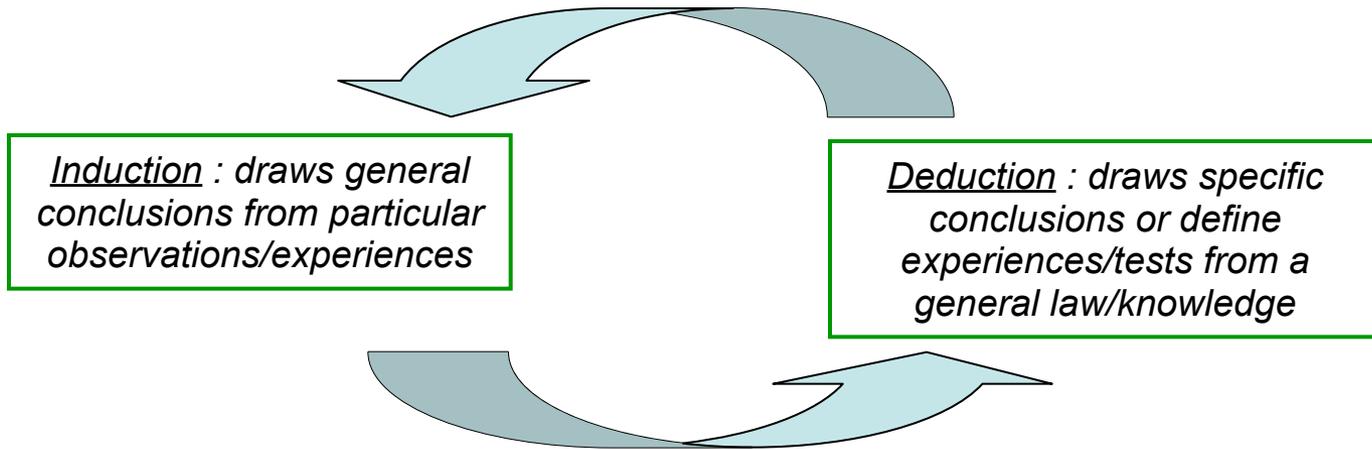
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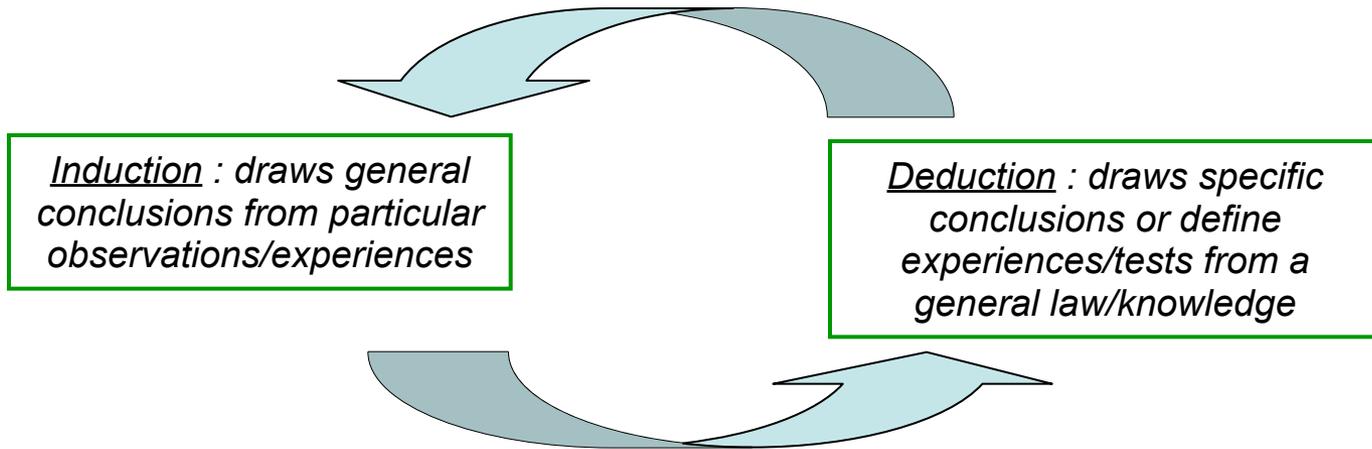
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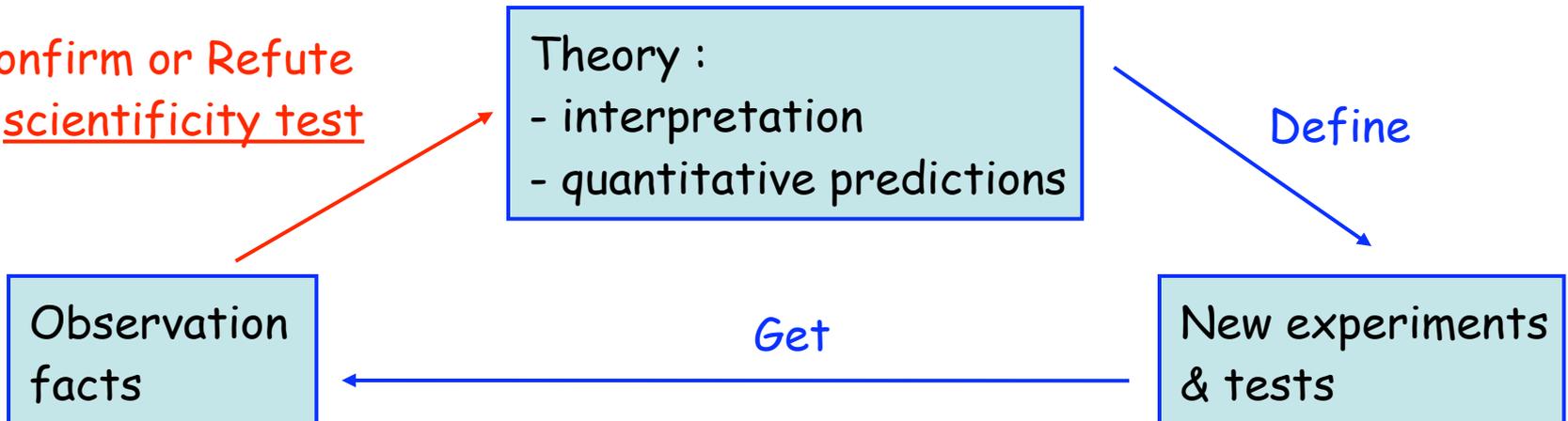


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Confirm or Refute
= scientificity test



The nature of Science

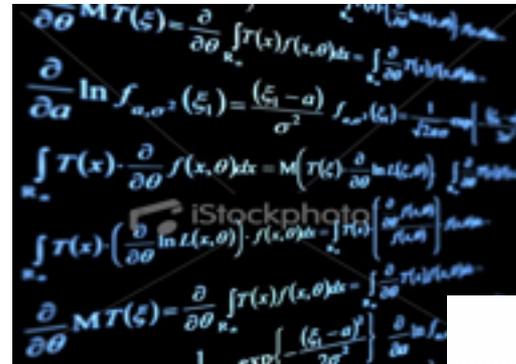
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Natural Sciences

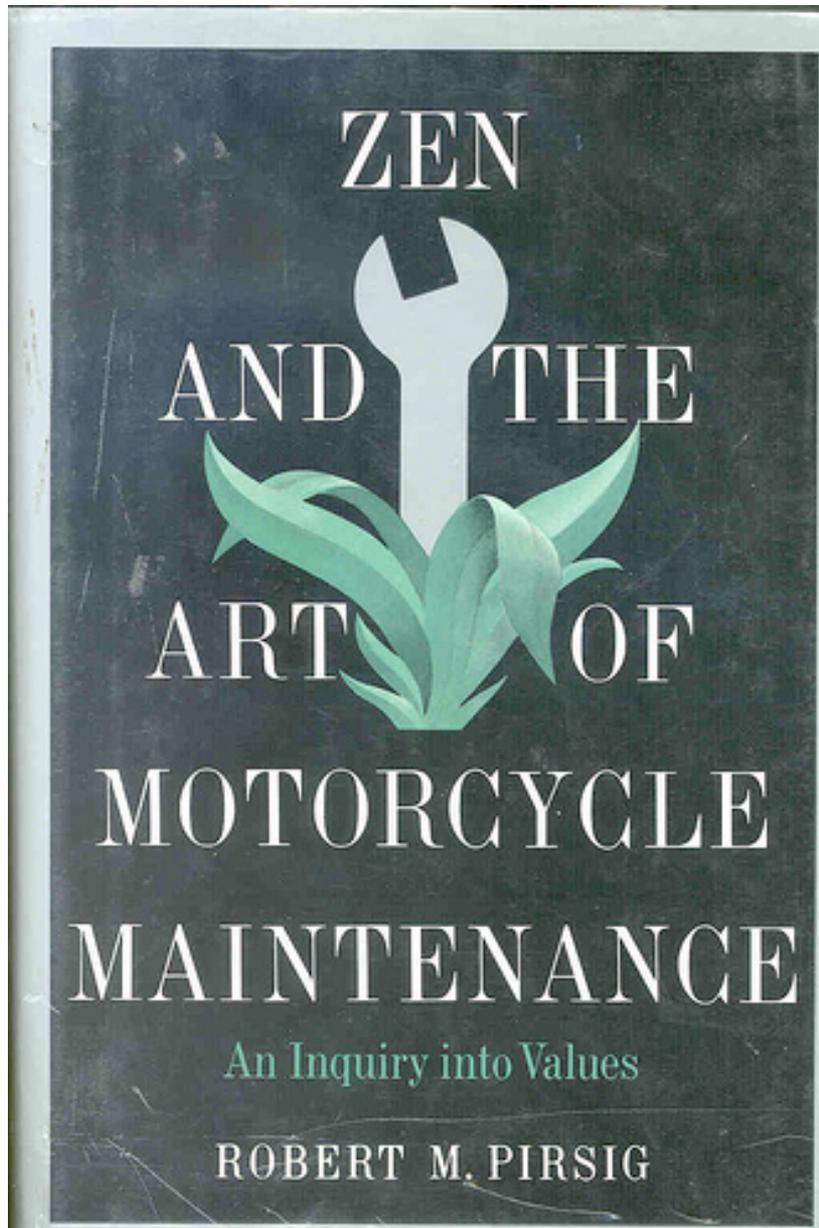
- Mathematical background
- Quantitative predictions
- Efficient operational applications (modern technology)



Hand-drawn mathematical equations on a blackboard background. The equations include:

$$\frac{\partial}{\partial \theta} M T(\xi) = \frac{\partial}{\partial \theta} \int_{x_0}^{\xi} T(x) f(x, \theta) dx = \int_{x_0}^{\xi} \frac{\partial}{\partial \theta} T(x) f(x, \theta) dx + T(\xi) \frac{\partial}{\partial \theta} \ln f_{x_0, \theta}(\xi)$$
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« The true aim of scientific method is to be sure that we don't imagine that we know what in fact we don't know »

Astrological practice

Purely deductive from a major original induction* interpreting selected facts into a very (too?) broad/general law. Basic postulate never questioned.

**correspondence principle relating man to the cosmos*

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Basic reference = Ptolemeus' Tetrabiblos (~140 ad !)

Conclusion is clear :

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In these conditions, what ensures the
long-standing success of astrology ?

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- *References*

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Evacuated magical thinking.

Focussing on the explanation of observational facts, Science* abandoned metaphysical speculations. Man is free to interpret beyond scientific explanation.

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Sociology of sciences carried a critical analysis of its tools and results. Science by nature doubts, + complexifies, specializes, evolves fast.

Science also enabled lethal technology (bomb...).

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Nowadays the Public does not perceive anymore the notion of a « global progress » related to Science.

Apparent loss of global sense = Disenchantment of Science
(or Disenchantment of the World by Science) ! (Max Weber)

However ...

Post-modern relativism* questioned the specific value and objectivity of Science, comparable to any other « belief »**.

** in the 1980's*

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Increasingly rational appearance of astrology (computer ephemeris, imitation of the scientific discourse) that mimics Science methodology.

Astrological belief is not a paradox in a world of scientifico-technological « black boxes ». Not easy to differentiate from Science by the Public.

Astrology ...

Proposes a global, holistic approach for apprehending the world, via a link between man and cosmos.

Seems to bring a psychological support to believers, especially to « fragile » populations (unemployed, students, isolated people, ...)

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Astrology speaks to and about Man, responding to its inescapable need to believe.



There is need to bring back
SCIENCE into the public



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SCIENCE into the public

ASTRONOMY is well adapted to
Re-enchant Science

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- **References**

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