

An Invitation To Philosophy of Science

ASSIGNMENT 1

Graduate Course, HOMI BHABHA CENTRE FOR SCIENCE EDUCATION

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1. What do you understand by ‘science’? How is it different from other disciplines of inquiry?
2. What do you understand by the scientific method?
3. What is meant by “pseudo - science”? Make a list of activities you consider as pseudo - scientific? Give your reasons for doing so.
4. Do you agree with Lord Rutherford’s statement: “Science is what scientists do”. Explain your reasoning.
5. Consider the following claims made about the effect of different planets on human beings.

Astrology: The Psychological Dimension of Astronomy

(This article dwells on the connection between various astronomical discoveries related with planets and other cosmic bodies, with their Psychological impact on human beings, as described in Astrology. It is an effort to deepen the logical and scientific foundation of Astrological knowledge.)

There have been immense debates about the inter relationship of Astrology and Astronomy for a long time.

There are astronomers who brush aside Astrology as a superstition and can not understand how the far off objects in the sky can impact the human being. On the other side there are astrologers whose knowledge have been reduced to the horoscope placements of planets and these vast cosmic objects have just got reduced to figures on a paper. They seem to have lost their understanding that these are real objects in the skies which impact us because of their very nature. As a consequence their astrological knowledge is still backdated and remains restricted to the classical texts and they are not able to benefit from the recent astronomical discoveries.

The connection between astronomy and astrology is very crucial to understand for every astrologer, as this provides with highly scientific basis for Astrology.

Every new revelation of astronomical facts by way of scientific methods can add to the reservoir of astrological knowledge, if one is aware of this connection.

This article will explore the various astronomical facts related with various cosmic entities such as planets, Nakshatras and Zodiac signs and their various dimensions as experienced by human beings on the planet earth.

The purpose of this article is to make you familiar with the fact that the astronomical qualities of any cosmic body have a direct bearing on the thought patterns experienced by the humans on earth. The magnetic field of such entities also interacts with the magnetic field of earth and hence impacts the events taking place on the planet earth.

Now let us now consider the character of some of the planets. These examples are just to demonstrate the connection between astronomy and astrology and hence are not supposed to be exhaustive details.

Sun

- Sun personality is associated with ideas and intelligence, which leads to immense energy for creation. Why? Because constant nuclear fusion of Hydrogen into Helium is going on at the core of the Sun, which releases immense energy. Life on earth depends on this energy. That is why Sun depicts the personality and the energy, with which we live our lives. Why Sun oriented person is a poor listener? Because the sound travels poorly through sun, as the mass density is quite low. Why Sun based person is so much stressed? Because there is a constant burst of gaseous pressure created by the explosions.

Moon

- Moon based people always appear to be controlled by the past memories, both good and bad. He never forgives for your bad deeds as well as never forgets the good you do to him. Why? Because Moon is full of craters, which are created by the striking asteroids and they get filled very slowly because of the inert atmosphere and absence of water. Why a Moon person always likes to depend on someone or follow someone? Because Moon has no light of its own and it has to depend on Sun for that.

Mercury

- Why Mercury based person never takes a firm stand and he can be swayed so easily? Because all its magnetic field has been burnt because of its proximity with Sun. Why he like to follow and appears to have no followers? Because it has no satellite Moons. Why he never appears to be in tension? Because there is no atmospheric pressure on Mercury.

Mars

- Mars have always been associated with the courage and bravery. Why? Because the surface of Mars contains 13% Iron. Hence clearly the impact of Mars is to ignite the Iron like qualities in us. Why he forgets quickly, both the good and bad done to him? Because the craters gets filled quickly because of its deserts like surface. Why he give vent to the anger boiling inside him so frequently? Because there are mega volcanoes on Mars, which keep erupting regularly.

Venus

- Why Venus person look glamorous and attract the powerful? Because Venus is the brightest of all the planets, as the clouds around its surface traps the solar energy. Why Venus person is always in tension and hence keep scheming? Because Venus has a very dense atmosphere, which is full of poisonous gases. Hence she may appear very bright from outside, but the inner reality is starkly different. (Isn't this the story of those involved with the glamorous professions, which are controlled by Venus?)

Jupiter

- Why Jupiter based person appears to be expanding his horizons without much struggle? Because raging storms are always on, which move in beautiful colourful patterns effortlessly. Why he often attracts the people around him? Because it has huge number of satellites (27 have been discovered till now) moving around it, as well as a huge magnetic field which is supposed to be double than that of Sun.

Saturn

- Why Saturn based person appears dull and restricted? Because it has a dull atmosphere of frozen gases and restrictive rings surrounding it. Why he is not transparent? Because planet Saturn has difficult to see through cloud patterns. Why Saturn people are very good to give concrete shape to ideas? Because Saturn consists of gases (Ideas) , which have gotten solidified (concretization) because of cold (hard working)atmosphere.

Uranus

- Why Uranus oriented people display eccentric and radical behavior, which is not in tune with general society? Because magnetic field of Uranus is slanted at an angle of 60 degrees from its axis, while for all other planets it is parallel.

Neptune

- Why Neptune based people are so dreamy and have feel oneness with the whole humanity? Why they have a special interest in anything related with ocean? Because Neptune have got the deepest and largest oceans known on any planet.

Pluto

-Why Pluto oriented people are so mysterious and secretive? Because Pluto is very small in mass (the manifest), but it has a huge magnetic field (unmanifest)

Similarly, if you study the astronomical characteristics of zodiac signs and Nakshatras, you will discover stark similarity between their astronomical characteristics and their astrological descriptions. For Example, Mula Nakshatra includes the black hole, which is the center of our galaxy. From this black hole even light can not escape and it is understood that whatever goes into it, gets transformed and reaches the root of life. Similar is the character of the Mula person. He always looks at the roots of life and have a tendency to suck and destroy the material world in his search for the eternal. Let us look at the astronomical character of the zodiac sign of Leo, which mostly consists of Nebulas, which are the stars in formation. Similarly, Leo person possess immense energy and intelligence towards any new creation.

Hence understanding the co-relation between Astronomy and Astrology deepens our astrological knowledge by studying new discoveries. At the same time it also provides the much needed scientific basis to the subject of Astrology. It will also serve a great purpose as the human race is able to feel its unity with universe and start to move in harmony with the cosmic plans.

NOTE: The text is copied verbatim from an astrological website ¹ and has no references. Pictures of the planets were removed.

Do you agree with any of the claims made above?

If yes, give reasons.

If no, give reasons.

Are there any falsifiable claims in this article?

What are arguments that you would give to counter the claims made in this article?

¹<http://energymatrixastrology.com/>

6. Consider the following dialogue that Alice is having with Faustus about nature of friction between surfaces. Faustus says that a rolling ball stops its motion due to demons.²:



Figure 1: “How do you know that it is friction that brings a rolling ball to a stop and not demons?”

ALICE: I don't believe in demons.

FAUSTUS: I do.

ALICE: Anyway, I don't see how demons can make friction.

FAUSTUS: They just stand in front of things and push to stop them from moving.

ALICE: I can't see any demons even on the roughest table.

FAUSTUS: They are too small, also transparent.

ALICE: But there is more friction on rough surfaces.

FAUSTUS: More demons.

ALICE: Oil helps.

FAUSTUS: Oil drowns demons.

ALICE: If I polish the table, there is less friction and the ball rolls further.

FAUSTUS: You are wiping the demons off; there are fewer to push.

ALICE: A heavier ball experiences more friction.

FAUSTUS: More demons push it; and it also crushes their bones more.

ALICE: If I put a rough brick on the table I can push against friction with more force, up to a limit, and block stays still, with friction balancing my push.

FAUSTUS: Of course, the demons push just hard enough to stop you moving the brick; but there is a limit to their strength beyond which they collapse.

²Text from: Eric Rogers - Physics for The Inquiring Mind

ALICE: But when I push hard enough and get brick moving there is a friction that drags bricks as it moves along.

FAUSTUS: Yes, once they have collapsed the demons are crushed by the brick. It is their crackling bones that oppose the sliding.³

ALICE: I cannot feel them.

FAUSTUS: Rub your finger along the table.

ALICE: Friction follows definite laws. For example, experiment shows that a brick sliding along the table is dragged by friction with a force independent of its velocity.

FAUSTUS: Of course, same number of demons to crush, however fast you run over them.

ALICE: If I slide a brick along the table again and again the friction is same each time. Demons would be crushed in the first trip.

FAUSTUS: Yes, but they multiply incredibly fast.

ALICE: There are other laws of friction: for example, the drag is proportional to the pressure holding the surfaces together.

FAUSTUS: The demons live in the pores of the surface: more pressure makes more of them rush out to push and be crushed. Demons act in just the right way to push and with the forces you find in your experiments.

Based on this dialogue can you choose which theory is better at explaining friction. Give explanations for your choice? If you were in place of Alice, how would you have argued with Faustus?

7. Some exercises in Logic.

Which of the following arguments are logically valid, explain your reasoning:

[a]

All carnivores eat meat.

Some birds are not carnivores.

Hence, some birds dont eat meat.

[b]

If I support India, they will win the world cup.

I support India.

Hence, India will win the world cup.

[c]

I support India.

Michael Clarke plays for Australia

Hence, India will win the world cup.

[d]

Alice drinks milk.

All cats drink milk.

Hence, Alice is a cat.

8. Give two examples of deductive and inductive arguments each.

9. Draw truth tables and give examples illustrating the basic logical operations: AND, OR, NOT.

10. What is a tautology? Draw a truth table and give examples of tautology.

11. Give an example of use of induction in mathematical proof.

³Faustus offers Alice a microphone attached to a glass table, with connections to an amplifier and loud-speaker. When Alice rolls a steel ball along the table, she indeed hears noises like crushing demons.

12. Do you know of any instance that a theory was ruled out due to observations? Did the adherents of the old theory attempt to 'patch' the theory in order to save it?
13. Do you know of any theories that were initially thought to be pseudo-scientific or wrong, but later found to be correct?
14. List theories which attempt to explain *same* phenomena in different ways?
15. If any article gets published in a respectable scientific journal, lets say *Nature* or *Science*, does it mean that the content of the article are true? Do you know of any articles which were published in these [or other] journals and later found to be frauds?
16. From any two scientific theories that you know, write down conditions for their falsifiability.
17. Popper said that Darwin's theory is a 'metaphysical research programme', find out why and explain his reasoning for this? [Though later he retracted this claim.] Is "the survival of fittest" a tautology?
18. What is Ockham's razor? Give an example illustrating its use. Can it be used in questions on astrology and dialogue on friction?