

Testing astrology

Manoj Komath

The commentary 'A statistical test of astrology' by Narlikar *et al.*¹ attracts attention as a pioneering attempt at the critical evaluation of 'jyothisha' (or Indian astrology). It marks the dawn of a new paradigm in Indian science, indicating the methods to scientifically test a body of knowledge branded as pseudoscience. As it seems, the work did not get proper attention or exposure, despite the fact that it trails the most intense and elaborate debate in the history of *Current Science* (2000, 79, No. 9 through 2001, 81, No. 2), following the controversial decision of the University Grants Commission (UGC) in 2001 to start graduate, postgraduate and research courses in 'Jyotir vigyan'. The implications and ramifications of the work are worth discussing.

The astrology muddle

The UGC wanted 'Vedic astrology' (or jyothisha, the version of astrology practised in India) to be introduced in the science stream of the university curriculum. However, the Indian scientific community and academia reacted vehemently against the UGC decision, as astrology has been considered as a pseudoscience lacking rational basis. The UGC portrayed jyothisha as an empirical science based on our traditional and classical knowledge, which can help the society to see the unforeseen, and having obvious and potential applications in meteorological studies, agricultural science, space science, etc.

There remained a perplexing question; why did an apex academic body like the UGC regard astrology worthy to be considered as a science, as there was not even a remotely related evidence for claiming so? Nor any proponent of astrology was able to produce any statistically valid evidence that astrology can really foresee any event. Despite the apparent success in personal predictions, astrology used to fail pathetically in predicting social events like calamities or mishaps, which could have saved innumerable lives. Even the name 'Vedic astrology' is identified as a misnomer, as the *Vedas* do not contain astrology².

On a closer look, it could be realized that the UGC had been echoing the feeling of the common public. Though astrology is practised globally, in India, jyothisha is deeply woven into the social fabric, and to a certain extent, remained a part of religion. People have their births assigned to 'nakshatras' (or lunar mansions) and consider their lives to be governed by 'dashas' (the system of planetary periods). The UGC plan appeared to be a boon to the masses, as it would generate 'academically qualified' astrologers (jyothishis), who could extend more reliable service to the people, to describe what destiny had in store for them.

The attempt of scientists and rationalists to resist the move of the UGC through special leave petition (SLP) was overturned by the judiciary in 2004. The Supreme Court of India dismissed the petition, expressing the inappropriateness to interfere in the policy decision of the Government, unless it was found to be contrary to the law or made on extraneous considerations (as reported in *The Hindu*, internet edition, 6 May 2004).

It is quite disturbing for rational minds to see that science, despite the technological advances and practical usefulness, cannot win against the public appeal of pseudoscience. The developments were dismal, as there appeared to be no democratic way to reinstate rationality, the soul of scientific activities. The common public, who are not keen to know about scientific methods, may consider scientists to be against the interests of the society. In their view, astrology has sound theories (based on astronomical data), and its own rules and techniques. And the practical success is validated by innumerable personal testimonies of correct predictions. Apparently it satisfies the criterion of a useful science. Above all, astrology enables the predictions of events in life, something science is not able to provide. No wonder, the common people tend to criticize scientists for their 'holier than thou' approach.

It would be worthwhile to introspect as to why our approach appears dogmatic and becomes ineffective in front of the common public. Interestingly, our firm belief in the 'scientific method' does not

help in debunking astrology. The lack of theoretical basis cannot be put as a criterion to reject astrological practices as baseless, because several branches of science have been established through empirical steps. We are confident about the well-structured theoretical framework related to the celestial phenomena. This elaborate knowledgebase in astronomy and cosmology, however, does not close the doors for new hypotheses on the planetary effects. The convention to decide whether a body of knowledge is science or not, is to conduct objective tests.

The general trend of scientists is to discard the success of astrology in predicting personal events as purely incidental². These 'incidental successes' cannot be ignored, as every believer in astrology would be able to give at least a few examples of prediction being right. Scientists never tried to explore, even for curiosity, the secrets of this apparent success of astrology. We do not even have the preliminary data to convince a common man that his day-to-day experience with astrology is flawed or 'unscientific'.

Now, Narlikar *et al.*¹ indicate a way out of this muddle, with a sensible investigation, namely testing the predictive power of astrology. The test, as they mentioned, is based on the investigations of Silverman³ and Carlson⁴. Unfortunately, the report did not touch upon the intensive studies on Western astrology in the past decades, which had revolutionized our understanding of astrology in general.

Studies on Western astrology

Critical studies on astrology in the West have been conducted during the past six decades. By 2000, over one hundred publications had appeared in psychology journals and four hundred in astrology journals, as estimated by Smit (<http://www.rudolfhsmit.nl/u-gran1.htm>). This is equivalent to about 200 man-years of scientific research (with a text size of 470,000 words!); however majority of the literature remains unknown. Ninety-one typical studies could be traced on the internet (most of the available data were found compiled at [1568](http://www.astrology-</p>
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and-science.com/). It would be appropriate to present here a concise review of these studies, as they may serve as good models for our endeavour of critically evaluating Indian astrology.

Till 1950, the scientific community had been continually discrediting astrology as an illegitimate branch of knowledge or a pseudoscience. They did not find it worthy of serious investigation, as there was hardly any evidence to do so. The correlation between the positions of certain heavenly bodies and human affairs, as proposed by the astrologers, has been alleged to be a chance phenomenon. The turning point came when the French psychologist and statistician, Michel Gauquelin, started rigorous studies on the claims of astrology by statistically comparing birth charts and professions of large populations. In 1955, he arrived at a hypothesis called the 'Mars effect', which mentions that the rising and culmination of Mars at the time of birth has an apparent correlation to the career of athletes⁵.

This was perplexing to the scientific community, because an objective evidence (though empirical) had emerged for the mysterious planetary effects on humans. It confused the astrologers as well, as the correlations obtained did not corroborate with the traditional astrological theories. The Mars effect was analysed for more than four decades by astrologers, psychologists and skeptics. There were several attempts to recheck and reanalyse the proposed 'effect', through statistical investigations of birth charts. The Mars effect has been rationally explained later, by correcting the artifacts and biases and with the help of additional data⁶.

This opened up a new trend of investigating astrology with a scientific spirit. The most notable consequence was the formation of the Astrological Association in 1958 by research-minded British astrologers. They started designing and conducting investigations on various features of astrology, taking care to avoid biases and arranging for peer review of the results. The outcomes of the first two decades (involving 54 researchers from ten countries) were compiled in the massive critical review *Recent Advances in the Natal Astrology*, in 1978. This served as a precursor for the first refereed journal for astrology, i.e. *Correlation*, launched in 1981.

The journal acted as a platform for scientists and astrologers to exchange

their ideas and rationally approach the subject. Since its inception, about 70-odd studies have been published in it, most of which produced negative results on the alleged predictive power of astrology. The positive ones, did not correlate with the basic principles followed traditionally in astrology. This, of course, led to discontentment amongst the astrologers and to interruptions in the publication of the journal.

Validity of natal charts and ability of the astrologers

The initiatives in Great Britain provided a better insight for other researchers to plan and conduct critical investigations on a subject like astrology. Regular outcomes could be seen from early 1970s onwards.

A notable work among the earliest published studies is by Barth and Bennett, in which the relationship between the zodiac signs of a set of population and their occupation, medical problems, height and longevity was examined. The positions of Mercury, Venus, Mars and Jupiter at the time of birth did not show any correlation with any of these parameters⁷.

There were intensive efforts to verify the alleged relationship between sun signs and occupations, in various extents and combinations. Three consecutive studies during 1976–79 failed to reveal any such correlations⁸. John McGervey looked at biographies and birth dates of some 6000 politicians and 17,000 scientists, to see if members of these professions would cluster among certain signs, as astrologers predict. He found the signs of both groups to be distributed completely at random⁹. No correlation was found between occupation and sun sign in other studies also done in the same line¹⁰.

In the famous 'New York suicide study', Press *et al.*¹¹ examined the birth charts of 311 suicide cases in New York from 1969 to 1973. A computer program was used to test 100,000 different astrological factors in each case and these were compared with an equal number of random control subjects. None of the factors consistently correlated with the suicide cases.

Another topic investigated was the compatibility of signs in marriages. It is a popular practice in civilian life to choose partners born under compatible

signs, of course, after seeking advice from an expert astrologer. Silverman³ looked at the birth dates of 2978 couples who were getting married and 478 who were getting divorced in Michigan. He found that astrological compatibility of the horoscopes did not correspond to compatibility in real life. All the well-conducted statistical studies negated the predictions based on natal charts depending on the conventional astrological theories.

In 1987, Dean¹² conducted an interesting experiment by reversing all of the 'planetary aspects' of natal charts. He procured correct natal data from astrologers for the subjects and for half of the subjects, the charts were fabricated by retaining the sun sign and reversing all the planetary aspects. The charts were then blindly given to astrologers for their predictions about the subjects. There was no correlation between the perceived accuracy of the charts and whether the subject was given a correct or reversed chart.

The skill of astrologers in their profession also has been subjected to investigation. Culver and Ianna¹³ conducted a double-blind test on an astrologer who claimed 80% success rate in choosing the correct natal horoscope for a subject out of three false ones. The astrologer had seven successes out of 28 trials, exactly the number predicted by chance. In another study¹⁰, six expert astrologers independently attempted to read 23 astrological birth charts to identify the corresponding personal data files of each person (four male and 19 female volunteers). The files, which were provided blinded, contained life histories, full-face and profile photographs and personality test profiles of each subject. Astrologers did no better than chance or than a non-astrologer control subject at matching the birth charts to the personal data. Also, different astrologers failed to agree with one another's predictions.

Sun signs and personality

The core feature of Western astrology is the assignment of the 'sun sign' (the solar mansion corresponding to one's birth) to the personality. For this reason, the correlation between sun sign and personality became a favourite topic in astrological research. In an early study, Pellegrini¹⁴ found a small correlation between the femininity index (based on

Astrology and psychology – The Forer effect

The proof for the success of astrology are the personal testimonies of its believers. Though astrology fails pathetically in general predictions of events in the society, it is highly successful in predicting in the case of individuals. Even non-believers sometime find uncannily accurate hits in their predictions. This irony could be explained with the 'Forer effect' (also called or the 'Barnum effect'), a psychological bias originating from an individual's affinity to descriptions touching his/her personality. This bias (called the personal validation fallacy) prompts a person to take descriptions which are vague and general enough to apply to a wide range of people, to be tailored specifically for them.

The predilection of people to believe positive statements about themselves (even when there is no particular reason to do so) has been exploited professionally by P. T. Barnum, the 19th century American showman and entertainer. In 1948, Bertram R. Forer, an American psychologist, tried to approach it academically and designed a classroom demonstration (*J. Abnormal Soc. Psychol.*, 1949, **44**, 118–123). He gave his students a personality analysis to rate themselves on a scale of 0 (very poor) to 5 (excellent). The text of the analysis was as follows – 'You have a need for other people to like and admire you, and yet you tend to be critical of yourself. While you have some personality weaknesses you are generally able to compensate for them. You have considerable unused capacity that you have not turned to your advantage. Disciplined and self-controlled on the outside, you tend to be worrisome and insecure on the inside. At times you have serious doubts as to whether you have made the right decision or done the right thing. You prefer a certain amount of change and variety and become dissatisfied when hemmed in by restrictions and limitations. You also pride yourself as an independent thinker; and do not accept others' statements without satisfactory proof. But you have found it unwise to be too frank in revealing yourself to others. At times you are extroverted, affable, and sociable, while at other times you are introverted, wary, and reserved. Some of your aspirations tend to be rather unrealistic'. Though all the students were provided with the same personality analysis (obviously coined from newspaper 'sun sign' columns), the class average evaluation was 4.26 out of 5. The Forer test has been repeated hundreds of times over the years and the average was still around 4.2 out of 5 (84% accuracy).

In short, Forer convinced people that it is possible to 'read the character' successfully, without any additional divine powers. This personal validation fallacy works behind the widespread acceptance of astrology and other practices like palmistry and fortune-telling.

California Personality Inventory) and season of birth. However, the follow-up studies did not show any correlation between sun sign and personality traits as measured by standardized psychological tests^{15–17}. Mayes and Klugh¹⁸ compiled natal charts and results of the Leary Interpersonal Check List for 196 subjects. The data were used to compare 13 personality traits with the sun signs and signs and houses of the moon and eight planets, at five planetary aspects. No statistically valid correlations were found. Some studies, which recorded correlations between astrological factors and behaviour, were later proved to be flawed¹⁹.

Gauquelin, continuing his earlier efforts to test astrology, compiled personality profiles from 2000 biographies of sportsmen, actors, scientists and writers, and compared them with personality traits associated with the sign of the sun, moon and ascendant according to eight astrology texts. He failed to detect any correlation either in sidereal or tropical zodiac²⁰.

This was followed by the most celebrated study by Carlson⁴, which tested the thesis that astrological natal charts can be used to describe accurately the personality traits of the test subjects (the

method is summarized by Narlikar *et al.*¹). The Carlson study stood apart in its double-blind design, meeting the stringent specifications of both scientific and astrological communities. Even after making efforts to ensure that the experiment was free of bias and giving astrology reasonable chances to succeed, the astrologers failed to perform better than chance⁴.

In 2001, Dean and Kelly²¹ conducted a meta-analysis of more than 40 studies which dealt with the correlation of birth charts and information such as personality profiles or case histories. The studies, published between 1975 and 2000, incorporated in total nearly 700 astrologers and 1150 birth charts. The meta-analysis put forward the conclusion that '... there is clearly nothing here to suggest that astrologers can perform usefully better than chance, once hidden persuaders are controlled'.

The Pune experiment

The work by Narlikar *et al.*¹, which tests the predictive power of natal astrology, should be viewed in this background. Their experiment (the Pune experiment) gains importance as the first venture in

India to critically investigate astrology. As mentioned by the authors, it is modelled on the 25-year old double-blind design of Carlson⁴. The criterion of choosing personality indices used in the original study is reduced here to the two parameters of intellectual brightness and mental retardation. This variation is justified, considering the difficulty in accessing standardized personality inventories in the country. However, it would have been much simpler, though counter-intuitive, to test the prediction of gender, which is a more clearly definable than mental abilities. In jyothisha, gender is the prime parameter in a horoscope and a double-blind prediction of whether the horoscope-holder is male or female, will reveal the validity of horoscope-reading.

Though the Pune experiment is apparently convincing, it is not free from artifacts – like the bias in reporting the birth time, possible ambiguities in remembering the correct birth time, the 'Ayanamsa' correction applied during birth-chart making, etc. In addition, the low population size makes the conclusion statistically weak. In a recent study, Hartmann *et al.*²² used a staggering sample size of 15,000! (This study investigated the relationship between date of birth and individual differences in personality and

general intelligence, and the results were negative, corroborating with earlier studies on the topic.) In jyothisha, the parameters are more individualized than in Western astrology, which necessitate more elaborate studies on a larger population to arrive at a sound conclusion.

One should be cautious while depending on the studies on Western astrology for designing tests, because it will be less meaningful to extrapolate the methods to jyothisha. Though natal chart-making is common to both Indian and Western traditions, jyothisha differs with the use of the sidereal zodiac (which links the signs of the zodiac to their original constellations), lunar mansions (nakshatras) and the system of 'planetary periods' in human life (dashas). The Western tradition is centred on the 'sun signs' and uses the tropical zodiac (in which the signs do not correspond to their original constellations). Therefore, the essential features of jyothisha should be tested individually for validity. Many different and independent studies (for example, correlation of nakshatras and personality factors predicted in the texts, validity of the dasha system in personal life, etc.) are to be performed and meta-analyses of such results are to be conducted to draw a meaningful opinion.

Considering these facts, the conclusion '... the test clearly demonstrated the hollowness of the basic claim of astrology...' of Narlikar *et al.*¹ seems too premature. The study, at best, implies that natal astrology cannot be used to predict mental abilities! Nor a study of the divorce rates (as suggested by the authors) would contribute anything significant to the venture of critical investigation of the validity of jyothisha.

Time-twin studies

Now we arrive at a big question – how far will these scientific tests help us discern whether astrology is a science or not? A review of the critical studies on Western astrology signifies that astrology fails to prove itself in double-blind controlled tests. But the negative results, even when they are cumulative, have been justified and dismissed in many different ways by astrologers (arguments like 'the stars incline, but do not compel', or 'neither the astrologer nor the technique is infallible'), allowing them to maintain their belief in astrology, what-

ever the evidence or criticism²³. The fate of the proposed studies on jyothisha may not be different.

The most important point here is that the investigations discussed and methods suggested are in fact a search for proof of evidence related to astrological practice. The absence of evidence (i.e. lack of correlation of the actual outcomes with the fundamental tenets of traditional texts), however, may not negate astrology. Astrologers can still argue that it is just a failure of the traditional texts of astrology and may propose that new correlation can exist (as Gauquelin²⁰ did when his studies failed to support conventional astrology). True scientific investigation is a search for the underlying phenomenon hypothesized by astrologers, which can cause planetary effects.

The phenomenon is presumably certain mysterious powers of planets which operate synergistically on mundane humans, thereby controlling lives and events. Interestingly, this hypothetical mechanism starts to operate on an individual at the time of his/her birth, implying that the power is impermeable to the human womb! Obviously it is difficult to conceive a mechanism which switches on at the time of birth and selectively affects human personality and life. Nor do any of the known theories in astrophysics and cosmology support a materialistic mechanism.

These facts, however, do not prevent us from hypothesizing such an effect! One may wonder whether a celestial phenomenon which enables the prediction of events in life could be operative, which still eludes scientific methodology. Albert Einstein proposed general relativity about a century ago, which seemed beyond commonsense then. Currently physics accepts dark matter and dark energy, the nature of which is not supported by any of the current theories. Therefore, we cannot refute astrology on the basis of current scientific understanding. The method of science tells us to search for the presence or evidence of such a phenomenon, whether the hypothesis makes sense or not.

Astrologers attribute the personal variations among the various individuals to this effect, which is apparently convincing for a common man. But, if that is to be taken as evidence, the converse also should be true – i.e. two people born at the same time at the same place should share similar personal characteristics and

the same patterns of life. That makes the venture of testing the scientific validity of astrology incredibly simple. One has to pick out people born at the same time at the same place (the time-twins) and compare their personal attributes and life events. If they have exceptional similarities than expected by chance, it could be taken as the scientific evidence for astrology (biological twins will not be suitable for this study because genetic and circumstantial similarities may operate predominantly). It is to be noted that birth-chart making and horoscope-reading are not involved, thereby eliminating errors and uncertainties, and the ability of the astrologers. As the proposed effects will be common to both Western astrology and jyothisha, the issue of difference in the zodiac references will not come into picture. Thus a time-twin study becomes a simple, straightforward, definitive and universal test for the scientific basis of astrology.

Earliest thought on this line was that of John Addey²⁴, a professional astrologer, who conducted a study on a set of time-twins. However, the population was too small to derive any statistically valid conclusion. The first systematic study of time-twins has been reported by British astrologers, Peter Roberts and Helen Greengrass²⁵, in which 128 people born not more than an hour apart on six dates during 1934–64 were included. Though some evidence of similarities in interests and occupation appeared among 18 pairs, it was not strong as predicted by astrology. Nevertheless, the authors claimed that in the full sample, the proportion of 'close resemblers' increased as the birth interval decreased. This interesting work was scrutinized by contemporary researchers and a re-analysis revealed some procedural artifacts²⁶. When these artifacts were controlled, the alleged similarity disappeared.

A more powerful, systematic and elaborate test has been designed by Dean and Kelly²⁷ involving 2101 persons born in London during 3–9 March 1958. The birth data were collected from hospital records ensuring the reliability, and the astrological aspects were included with the advice of seven leading astrologers. The subjects were born on average 4.8 min apart, simultaneous enough for same astrological factors to operate upon. Each person was tracked for measurements at ages 11, 16 and 23 years, for 110 relevant variables, which are

supposed to be shown in the birth chart. The variables include test scores (for IQ, reading and arithmetic), physical data (such as height, weight, vision and hearing), ratings of teachers and parents (regarding behaviours such as anxiety, aggressiveness and sociability) and self-ratings (of ability such as art, music and sports) along with various other factors (such as occupation, being accident-prone and marital status). Curiously enough, the control data were sixteen variables for the mothers of each of these persons (such as age, blood pressure and length of labour, etc.), which are not supposed to be affected by planetary positions.

When the subjects were arranged in chronological order of birth, 2100 successive pairs of time-twins resulted. Seventy-three per cent were born 5 min apart or less, and only 4% were born more than 15 min apart. The similarity between time-twins for each variable was then measured as the serial correlation between successive pairs. The serial correlation is a direct measure of effect size and here, it is extremely sensitive due to the large sample size. So the test conditions could hardly have been more conducive to success.

According to astrology the statistical results should be strongly positive for subject variables and zero for mother variables. The mean serial correlation for subjects (1393, for which complete data were available, with 110 variables) was -0.003 and for the mothers (2066 with 16 variables) was 0.001. Both could be considered effectively zero. The difference (-0.004) is in the wrong direction and non-significant ($P = 0.56$, measured by t -test). Nor did the 110 individual serial correlations show any support for astrology – only five were significant at the $P = 0.05$ level, whereas 5.5 were expected by chance²⁷.

Concluding remarks

The extensive critical studies done on Western astrology for the past 60 years have established that the astrologers are not able to predict beyond chance. The time-twin studies negate the basic mechanism of planetary powers hypothesized in astrology. There are now sufficient evidences to conclude that science wins over astrology. These studies give

us a good roadmap to approach pseudo-science. The same strategy should be followed in the case of jyothisha in India.

At the same time it should be realized that such a venture, being just a search for evidence of hypotheses, has no grave scientific relevance; nor is it likely to contribute anything to knowledge. Scientists and institutions in astronomy and cosmology need not spend valuable funds and manpower just to reinvent that science is right. It is better to disseminate the idea to school students or undergraduates in humanities (preferably psychology or sociology), to be executed as project work in their curriculum.

Whatever the efforts we plan to put in, the results of the studies are not likely to bring about any drastic change in the approach of Indians towards jyothisha, for some pertinent reasons. One of the factors is the mindset of the public, to believe that astrology is able to provide some control over unexpected variables in life. Astrologers extend them low-cost, non-threatening therapy for mundane worries (ranging from marriage alliance to stock-market investment), that is otherwise hard to come by. We cannot deny the fact that our social psychology is so weak to accept astrology as a human need. The challenge here is to penetrate the social mind and try to strengthen it. Another factor is the business aspects. Astrological practice has proliferated extensively in the modern era with the help of technology making it ubiquitous, available on phone lines, television channels and the internet. This has opened up new business opportunities. Astrological practice in India has become a lucrative industry in its own right, which is worth Rs 40,000 crore (*Outlook*, 22 November 2004). Involving the younger generation in our venture of testing astrology will hopefully help in phasing out this unscrupulous business during the span of the next few generations.

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Manoj Komath lives in Flat No. B6, Biomedical Technology Wing, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram 695 012, India.
e-mail: manoj@scientist.com