

# ASTROLOGY FOR THE PHYSICIST

BY IVAN KELLY, GEOFFREY DEAN, AND DON SAKLOFSKE

To an astronomer or physicist the stars and planets are balls of plasma, gas or rock with interesting physical properties. For example Venus is both our nearest neighbour and the nearest thing to hell, with the solar system's thickest (90 bars) and hottest (470 °C) atmosphere of mostly carbon dioxide laced with sulphuric acid. They can also be a source of beauty and wonder (think of Saturn's rings or the Crab nebula's crab-like filaments). But the one thing they definitely don't have is a particular meaning. No astronomer or physicist can look through a telescope and believe that Venus is harmonious, Mars is martial or Jupiter is jovial.

But to an astrologer it is the other way round. The only thing that matters is not physical properties but *meaning* based on metaphor and mythology. No astrologer can look at a birth chart and not see Venus as harmonious, Mars as martial or Jupiter as jovial [1].

## AS ABOVE SO BELOW

In antiquity astrology and astronomy were lumped together into judicial astrology (judging the future) and natural astrology (evaluating heavenly bodies). In due course the former became today's astrology and the latter became the science of astronomy and astrophysics.

Today's astrology rests on the classical occult idea that events in the visible world are a reflection of events in the unseen world. More specifically, whatever is born at a particular moment, be it a person, dog, event, nation, company or question, will manifest the quality of that moment, which can be conveniently seen in the heavens. So there will be a correlation between the heavens and terrestrial affairs. Or *as above so below*.

In the spirit of political incorrectness we might ask why the heavens should in some mysterious way be ordered for our personal benefit. But in the centuries before the invention of telescopes the idea made perfect sense and was a central feature of man's intellectual and social existence.

## SUMMARY

**There are no known physical ways (gravity, magnetism, radiation) that astrology could work. But there are many psychological ways, all supported by empirical tests.**

Whatever we may think of astrology today, it occupies a legitimate and important place in our history.

But right from the start astrology had its own problems. It was complicated, took a long time to learn (today just the basics takes a year part-time), fundamental disagreements were common, and calculating a birth chart was so time-consuming that large samples were impractical. So the hardest things to find in astrology were facts and clear outcomes. Anecdotes yes, facts no.

But the advent of home computers changed everything. Chart calculation and analysis were no longer a barrier to proper investigation. Dozens of charts could be calculated while you coughed. Judgement Day had come at last.

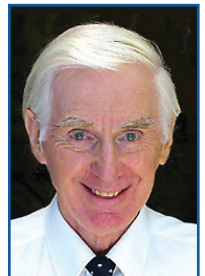
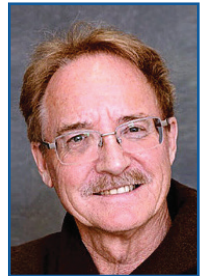
## ASTROLOGY TODAY

Sun sign columns are the most visible form of today's astrology because they are easy to commercialise — just follow the money. Critics rightfully dismiss them as nonsense; as do serious astrologers, albeit not as nonsense but because a birth chart (Fig. 1) contains so many factors that focusing on sun signs is like pulling tomato from a pizza and declaring it to be tomato pie.

But there is much more to astrology than sun signs. For the rest of us it can be entertaining, beautiful, dangerous, lucrative, or a load of codswallop. But always challenging, because half the population (more in Eastern countries) believes in it [2], skeptics deny it, vested interests distort it, and astrologers tend to disagree on mostly everything including what planets and which zodiac to use.

This challenging confusion exists in various forms from national astrological organisations in over 45 countries (in some of which conferences can attract a thousand people) to commercial practices and cosmic religions. It is the subject of over 100 periodicals, hundreds of websites, and about 3000 book titles in print of which about half are in English. In Western countries roughly 1 person in 10,000 is studying or practising serious astrology, of which roughly 1% make a living from it.

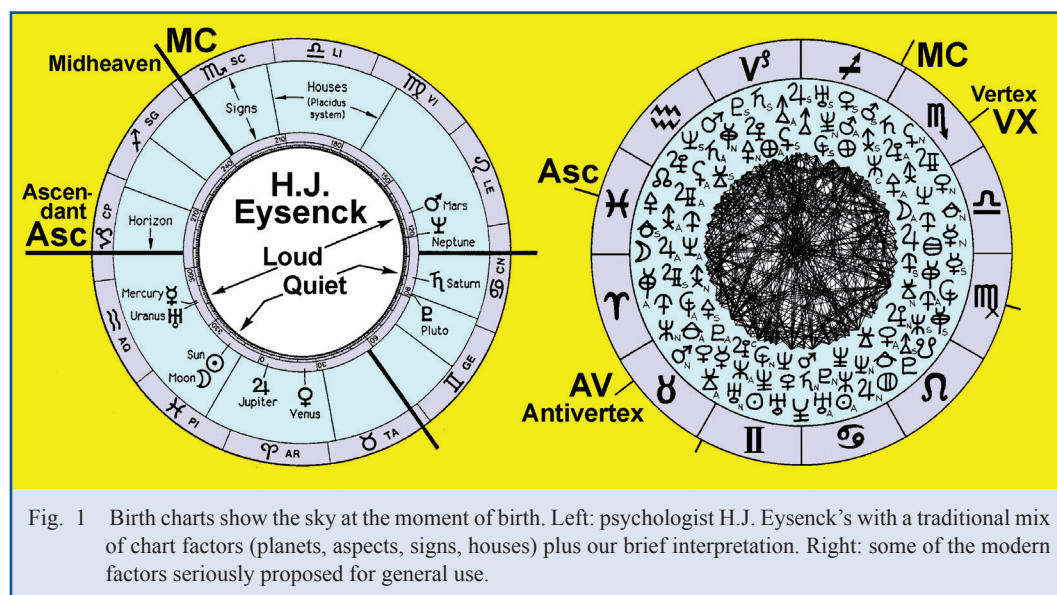
Important here is astrology's Golden Rule, the only rule that serious astrologers have ever agreed on, namely that all relevant factors must be weighted and combined before any chart is interpreted. But having agreed on the rule,



Ivan Kelly <ivan.kelly@usask.ca>, Professor Emeritus in Educational Psychology and Special Education, University of Saskatchewan, Saskatoon, Saskatchewan S7N 0X1

Geoffrey Dean <gdean466@tpg.com.au>, Analogic, Box 466, Subiaco 6904, Western Australia

Don Saklofske <dsaklofs@uwo.ca>, Professor for Dept. of Psychology, Univ. of Western Ontario, London, Ontario N6A 3K7



astrologers immediately disagree on how it should be applied and on what factors are relevant in the first place. Which then allows them to fit almost anything to any chart after the event, which is a feature they firmly deny but (as we shall see) controlled tests confirm.

### MORE THAN BEING TRUE OR FALSE

Astrologers see that birth charts seem to fit the person or event (what matters is the fit, not whether it is better than a control or the result of artful selection), and are thus convinced that astrology works. Clients find the fit to be meaningful and helpful in understanding themselves and their lives, as in “his Mars on yours explains why you and your boyfriend get on” (or don’t get on). So they invariably end up satisfied, which then reinforces the astrologer’s belief that astrology works.

But notice how the client’s satisfaction may merely reflect the undivided personal attention they are getting, so the chart may be working only as a means of changing the subject. So there may be more going on than meets the eye [3]. In other words (and this is the crucial bit) there is more to astrology than being true or false, which is a point missed by most critics.

For many centuries there was a tradition of defending astrology by physics [4] as in theories about rays emitted by different planets. Eventually it became clear that authentic physical phenomena — gravity, magnetism, radiation — could not defend astrology (if they did then scientists would have rushed to be the first to discover how it worked) whereas *as above so below* worked in unknowable ways that put astrology above criticism. To astrologers it was a valuable bonus.

Today they vigorously defend astrology despite having no clear idea about why it works. When in 2007 Liz Greene, a Jungian

psychoanalyst and a famous leading astrologer, was asked by Danish ethnographer Kirstine Munk why astrology worked, she replied: “I really have no idea. I explain to a client how I am going to interpret a chart ... but why it works I don’t think anyone knows. ... But this doesn’t stop me from using it. I don’t know why my car works either” [5].

Students of automotive engineering might wonder at this. As might students of psychology, who these days will know two very good reasons why astrology seems to work.

### REASONS WHY ASTROLOGY SEEMS TO WORK

The first good reason is the many biases in thinking that people are normally unaware of (we call them hidden persuaders). They make astrology seem to work when in fact only hidden persuaders are working — astrology is merely a misdirection. Most were unknown before the rise of experimental psychology in the previous century, and they remain unknown to most astrologers in the present one. They are also surprisingly numerous. Here are just a few:

- Barnum effect (*reading specifics into generalities*).
- Cognitive dissonance (*seeing what you believe*).
- Confirmation bias (*remembering only the hits*).
- Dr Fox effect (*blinding you with jargon as in this list*).
- Illusory correlation (*seeing meaning where none exists*).
- Immunity from disconfirmation (*nonfalsifiability*).
- Social desirability (*I’m firm, you’re obstinate, he’s ...*).

There are more than 30 others [6]. Each can create the illusion that astrology works, and all lead to client satisfaction.

The second good reason is the surprising range of excuses that can be called upon should an error occur. They include:

- Stars incline and do not compel.
- Birth time is unreliable.
- Client does not know herself.
- Potential shown is unfulfilled.
- The manifestation is untypical.
- Other factors are interfering.
- Astrologers are not infallible.

Which together *unfailingly* explain away all conceivable errors of interpretation. It means that astrology must always work even if all input data are wrong, which is why astrologers and clients are so easily convinced that astrology works (we say more about this later), and why astrologers could never learn from experience in the same way that repairmen could never learn to make repairs if faults could never be identified [7].

Other biases include artifacts of *astronomy* (sun spends more time in Cancer than in Capricorn), *demography* (monthly birth rates vary between and within countries), *age incidence* (selection by performance at a given age and date, e.g., junior ice hockey teams will tend to pick births longest at that age), and *data* (think of statistical variations). All have led to arguments about astrology.

## A NEVER-ENDING SHOUTING MATCH

Astrology has always been a never-ending shouting match in which each side shouts from entrenched positions. Part of the conflict arises because astrologers usually judge astrology by how *helpful* it is, while critics usually judge it by how *true* it is, so they can reach opposite conclusions from the same evidence. The following examples show how little has changed:

### Arguments attacking astrology

Few predictions are accurate. *Many are successful.*  
Time twins do not lead similar lives. *Some do.*  
Signs ignore precession. *Precession is not important.*  
Tests are negative. *Better tests may be positive.*

### Arguments defending astrology

Researchers are biased. *Many were astrologers.*  
Has great antiquity and durability. *So has superstition.*  
Extraterrestrial influences exist. *None are relevant.*  
Astrology works. *Same claim was made for phrenology.*

Which side should we believe? Even after 2000 years and a literature too enormous for anyone to read in their lifetime (the largest

astrology collections fill over 200 shelf-metres, internet book finders typically return over 1000 new or used titles in English and in stock), the arguments leave us none the wiser. But why have arguments when you can have tests?

## A BITTER LESSON FOR CRITICS

As Jonathan Swift put it in 1720: “Reasoning will never make a Man correct an ill Opinion, which by Reasoning he never acquired” [8]. So critics are largely wasting their time if they challenge cherished but wrong beliefs. Once the human mind is made up it resists being confused by evidence. Nevertheless empirical tests have failed to find support commensurate with the often grandiose claims made by astrologers. Here the key word is *commensurate* – a useless effect size may be statistically significant but it is still useless. Yes, astrology may seem to work, but it comes from seeing faces in ambiguous clouds of never-ending chart symbolism, not from *as above so below*. The next three figures illustrate this point.

In Fig. 2 odd-numbered signs starting from Aries are said to be extraverted, the rest are said to be introverted. When the results of sun-sign-vs-extraversion studies are plotted (left), they seem to support this. But controls (right) show they are due to knowledge of astrology. Ask Sagittarians (said to be sociable and outgoing) a question related to extraversion such as “do you like parties” and astrology might tip their answer in favour of yes rather than no, and vice versa for Capricorns (said to be shy and solitary). The effect may seem like astrology but it has a non-astrological explanation. The mean effect size is uselessly small (0.062) but it has inspired psychologists to explore the effects of such knowledge on their own personality tests.

In Fig. 3 left, red dots show the effect size and sample size for 69 studies in which astrologers had to match birth charts to various objective criteria such as case studies, occupation, or responses to questionnaires. Light blue circles simulate the astrologers in each test making 100 judgements at random, so each red dot has 100 light blue circles at the same sample size

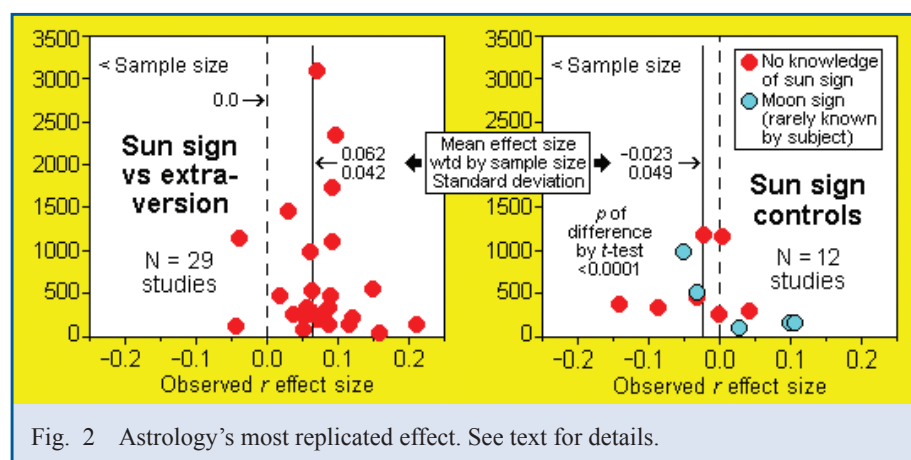


Fig. 2 Astrology’s most replicated effect. See text for details.



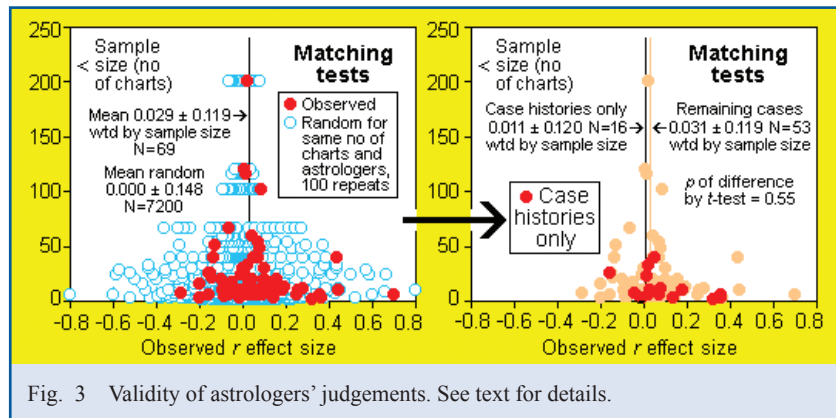


Fig. 3 Validity of astrologers' judgements. See text for details.

over a range that depends on the number of astrologers. Here duplicated circles appear as single circles.

As the sample size increases, the scatter due to sampling errors decreases and the results converge on reality, so the plot resembles an inverted funnel. Red dots are generally engulfed by light blue circles, which suggests that the observed effect sizes are due to sampling error. Meta-analysis confirms this — the variance due to sampling error is  $0.041$ , nearly three times the observed variance of  $0.119^2 = 0.014$ , so the scatter is entirely explained by sampling error, which leaves nothing for astrology to explain. Especially as effect sizes for hidden persuaders can be much larger, for example the acceptance of Tarot readings increases with their Barnum content and social desirability, the effect size  $r$  being about  $0.3$  in each case [9].

In theory the red dots should be symmetrical about the mean, but more are on the far right than on the far left, indicating the presence of publication bias against negative results (which of course is a problem in any area of study, not just astrology).

Right: In their textbooks astrologers routinely deal with case histories, which suggests that studies based on case histories should give the best results. But if anything they are slightly worse. Such selection can be repeated to test particular criteria of interest including the effect of removing low quality studies, which in this case happens to make little difference [10, p. 21].

Data accuracy and criterion validity are crucial for the tests in Fig. 3 but are not always easy to establish, thus leaving room for the return of shouting matches. That is the bad news. The good news is that such things no longer matter in tests of astrologer agreement — in fact it would make no difference if all birth charts were invented and all calculations were wrong, because the test is now about *agreement between astrologers* and not about

*agreement with reality*. Thus if all astrologers agreed that cats were black they would show perfect agreement ( $r = 1.00$ ) even if cats were actually white. A related advantage exists when giving several chart readings to clients to see if they can pick their own. Both approaches are tested in Fig. 4.

Figure 4 left: As before, the plot is shaped like an inverted funnel, but the observed mean effect size  $r$  is barely  $0.1$ , showing there is almost no agreement between astrologers on what a birth chart means. It is also a long way from the  $0.8$  generally recognised as desirable for psychological tests applied to individuals (as astrology is). It shows how different astrologers can see different faces in the same cloud. So a second opinion on your birth chart it is likely to differ substantially from the first.

Furthermore most of the studies were conducted not by hostile critics but by astrologers anxious to demonstrate the value of their craft, so the studies cannot be dismissed as biased. But if astrologers cannot even agree on what a birth chart *means* then their entire practice is reduced to absurdity.

Right: Clients are unable to pick their own chart reading from several (typically 3-5) when cues such as sun sign meanings (which many people are familiar with, such as *Leos are generous*) are absent. They are more successful when cues are present, so success is due to cues and not astrology [10, p. 22]. Remove cues and the client's success at seeing their own face in their own clouds disappears. The agreement results are even more telling in the variation of this test described next.

## TESTS OF WRONG CHARTS

The information conveyed by astrology can be anything from assurances like “women who have Mars with the Moon are all

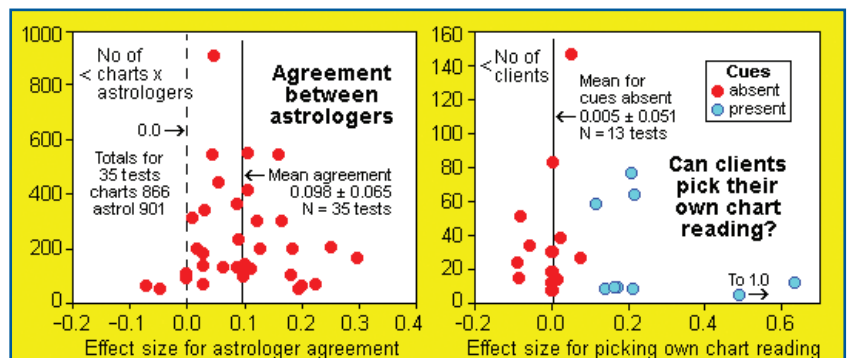


Fig. 4 Left: Agreement between astrologers interpreting the same birth chart. Right: Ability of clients to pick their own chart reading from several. See text for details.

right”, which was personally guaranteed by the early Italian astrologer Jerome Cardan, to modern psychological insights like “Moon-Saturn suggests early problems in childhood with your mother”. According to astrology textbooks, right answers can come only from right charts, i.e., charts based on correct birth data. But should we believe it? Is it actually true?

The idea might seem difficult to test — what astrologer would willingly read *wrong* charts — but it happens by accident and is surprisingly common. The birth chart can be wrong by hours, days or years, yet on receiving a bona fide interpretation (typed, spoken, or recorded) from the unknowing astrologer, the unknowing client still accepts it without question. Indeed often with high praise for its penetrating insight and accuracy. Which agrees with the earlier results and confirms that:

- Astrology doesn’t work (at least not factually) otherwise astrologers would get wrong answers from wrong charts.
- Charts are superfluous but are still necessary for astrologers and clients to believe in the system.
- Astrology is a useful fiction if the focus is on meaning and not facts.

Faced with the above results astrologers usually respond by claiming astrology is above empirical tests even though this denies they could know anything about astrology in the first place. But the results are supported by veteran US astrologers Zip Dobyns and Nancy Roof who famously complained that “astrology is almost as confused as the earthly chaos it is supposed to clarify” [11]. And by Austin Prichard-Levy, then owner of Australia’s largest computerized birth chart calculation service, who commented: “I often get the feeling, after talking to astrologers, that they live in a mental fantasy world, a kind of astrological universe where no explanations outside of astrological ones are permissible, and that if the events of the real world do not accord with astrological notions or predictions, then yet another astrological technique will have to be invented to explain it” [12].

## EXPERIENCE RULES OK?

The above reactions show how completely astrologers have been persuaded by their experience and their ignorance of hidden persuaders that astrology really works. Indeed, their experience of astrology is so convincing that they tend to automatically dismiss all negative findings. But tests have consistently shown that the *as above so below* links claimed by astrologers do not exist. Venus is not harmonious, nor is Mars martial or Jupiter jovial. Seemingly meaningful outcomes from chart readings are entirely explained by hidden persuaders and by seeing faces in clouds of astrological symbolism.

But does it matter? Many people find spiritual comfort and guidance in astrology. Astrologers tend to be caring people who provide support regardless of what a chart says. *It is the*

*astrologer that matters*. But astrology alone is not counselling. People with problems need to learn coping skills, which will not happen unless the astrologer is trained to do so. Helping is a powerful process that is all too easy to mismanage.

## THE PICTURE SO FAR

To recap, there are no known physical ways (gravity, magnetism, radiation, quantum effects) that astrology could work, but there are well-known ways (at least to psychologists and sociologists) that explain both why people believe in astrology and why it seems to work. Except there is a snag:

Many empirical studies have been published in obscure books and journals that may never be accessible on line. Their retrieval would require personal visits to foreign collections at a cost far beyond what any university department could justify. So any critical survey of astrology including this one will suffer from incomplete empirical data. That is the snag.

## CASE FOR AND AGAINST ASTROLOGY

However, since the mid 1970s a dedicated pro bono team has been retrieving these elusive empirical studies from libraries and astrological collections around the world. It has taken over forty years, but the results have just been published in a large thick book *Understanding Astrology: A critical review of a thousand empirical studies 1900-2019* [13].

As it happens the results confirm our conclusions. They also suggest a social solution to the puzzles re *Gauquelin’s planetary effects* (links between occupation and the diurnal position of visible planets, but only for eminent professionals and only for occupation). The effect size was trivial (typically  $r = 0.04$ ) but was independently replicable, and contrary to all expectation was larger for less-precise birth times, which is like saying the more we tune our radio the worse the reception. Such puzzles had challenged our earlier 1990 review [14, pp. 63-70], and had become a last-ditch defence of astrology, but all are consistent with social effects [13, pp. 165-196]. So we can at last summarise the case for and against astrology:

The case for astrology is that it can provide meaning for human existence, at least for those who find it hard to accept the world revealed by the sciences. The case against astrology is that it has the potential to mislead those who believe in it. It is also literally untrue. Meaning, yes. Truth, no. Your choice. But before proceeding to a conclusion we need to provide better evidence for our reliance on seeing faces in clouds:

## CHALLENGING THE FACES-IN-CLOUDS IDEA

In 1983 the idea that astrology is seeing faces in clouds was directly challenged by a \$US5000 “superprize” competition sponsored by astrology groups from four countries including Canada: “The superprize will be awarded for convincing [i.e., convincing to the eight judges] evidence that the

accuracy of chart interpretations cannot be explained by non-astrological factors [i.e., hidden persuaders and other artifacts]” [15].

The interpretation could be of any kind but subjects had to be typical of those who visit astrologers. To win \$US5000 — then the world’s biggest astrology prize — entrants had to show that astrology worked when artifacts were controlled as in matching tests. If it did then the idea of faces in clouds would be publicly discredited and astrologers could trumpet this result from the rooftops. It was an offer no astrologer should refuse.

News of the superprize appeared in astrology journals everywhere and probably reached 250,000 readers in the USA and over 5000 elsewhere. Over 60 intentions to enter were received from a total of 14 countries and were encouragingly diverse — the breakdown of topics was roughly one third personality, one third events, and one third other relevant areas such as compatibility and divination.

In due course 34 entries from seven countries were received totalling over 1500 pages plus several in book form, but only one entry was successful. Unknown to the judges this was a 17-page control disguised as a genuine entry (it reported positive results from tests of transits) and was designed to address hostile views that the superprize was unwinnable due to supposed bias among the eight judges (who were mostly academics). It was not flawless — too good a result might have aroused suspicion — but it was good enough to merit approval from an impartial judge. In fact the judges gave it unanimous approval except for one (an astrologer) who remained silent.

In other words this international response to the world’s then biggest astrology prize failed to disconfirm a very simple hypothesis — that astrology is the result of artifacts like hidden persuaders, not the result of *as above so below*.

Today substantial prizes are on offer from more than twenty skeptic groups around the world for empirical confirmation of paranormal claims including astrology. In their own local currency they include *Quebec Skeptics* \$100,000, *Australian Skeptics* \$100,000, *James Randi Educational Foundation* \$1,100,000, and *Indian Skeptics* Rs100,000. The latter began in 1970 as a Rs100,000 challenge to astrologers by Dr A.T. Kovoov, president of the Sri Lankan Rationalist Association. In 2010 former astrologer Rakesh Anand offered Rs1,000,000 (about \$US20,000) to any Indian astrologer who could show under controlled conditions that astrology works [16].

To date none of these prizes have resulted in empirical support for astrology commensurate with the claims. If astrology really worked then such a result is hard to explain.

## CONCLUSION

The findings from half a century of empirical research explain two key observations that any modern discussion of astrology must address before proceeding further:

- The universal personal experience of astrologers that astrology seems to work.
- The failure of astrology to work when artifacts and biases are controlled.

The findings indicate that astrology is simply a time-honoured cover for the operation of artifacts that better explain the outcomes. In effect astrology is seeing faces in clouds.

So the claim that astrology involves *as above so below*, or psychic powers or transcendental mental faculties or special links with the divine or other mysteries, achieves no more than smokescreen status. One final question:

## DOES ASTROLOGY HAVE A FUTURE?

Arguably astrology has little to contribute to human understanding except fantasy. Yes, it is undeniably part of our past, but why should it be part of our future? That some people feel astrology works for them is hardly a problem for the rest of us.

But here we can learn from phrenology, a system of reading character from head shape that began in the 1800s. It shared the same aims as astrology (“know thyself”) and in 1896 *The British Phrenological Year Book* said it was “so plainly demonstrated that the non-acceptance of phrenology is next to impossible” (p. 64). By the 1830s about 1 person in 3000 was studying or practising phrenology, making it more popular than astrology is today. It was accepted because, like astrology, it seemed to work. But character is unrelated to head shape [14, pp. 60-61]. Like astrology, phrenology had historical importance but no truth. By the 1900s it was effectively dead

Nevertheless, in 1898 Alfred Russel Wallace FRS, one of the most eminent scientists of his time and a prominent supporter of phrenology, predicted “phrenology will assuredly attain ... one of the highest places in the hierarchy of the sciences”. Ironically it was almost identical to the prediction made in 1971 by John Addey MA, the leading UK astrologer of his time, that astrology “seems destined to assume an almost central role in scientific thought... its impact will be felt in the next twenty years” [14, pp. 76-77] This was based on his many years of heroic empirical testing. But nearly 50 years later, no such impact is apparent. Could this be telling us something?

That said, astrology could hardly be better suited to the scientific study of pseudoscience. In terms of longevity and ongoing popularity it has a clear edge over other questionable beliefs. For every student of pseudoscience, astrology would seem to be a good place to start.

## REFERENCES

1. I.W. Kelly, "Modern astrology: A Critique", *Psychological Reports*, **81**(3), 1035-1066 (1997). A minor update with better headings (2005) is at <http://www.researchgate.net/publication/275866394>. Concludes that astrological concepts are deeply problematic but lack the resources needed for change. Detailed (74,000 words) with nearly 250 references and many quotes from leading astrologers.
2. That half the population of Western countries reads sun sign columns at least sometimes, but only 5% of the population take them seriously, shows how problematic sun signs are in the minds of readers. Nevertheless 1% of the population read them often and take them very seriously, like horoscope junkies unable to operate without their daily fix. From UK and US surveys reported at the 1992 annual meeting of the American Association for the Advancement of Science, see *Skeptical Inquirer*, **16**, 344-347 (1992).
3. Felicity Carter, "I was an astrologer – here's how it really works, and why I had to stop", *The Guardian (UK)*, 7 November 2019, <https://www.theguardian.com/lifeandstyle/2019/nov/06/i-was-an-astrologer-how-it-works-psychics>. Carter was a science student in Sydney Australia who learnt how to read birth charts. Astrology was "one big word association game ... I loved it". To earn money while later studying music (this was the 1990s), she got a job as a fortune teller at \$50 an hour. She found that her readings were a co-creation – "I would weave a story and, later, the customer's memory would add new elements" – and that "what most people want is the chance to unload for an hour". Her readings were hugely successful but were clearly a con, so she gave up astrology for good, concluding "if you sprinkle magic on top, you can sell people anything". She had seen what was really happening during a chart reading and had reacted accordingly, albeit at the expense of discounting any genuine benefit that her clients may have received.
4. T. Gee, *Strategies of Defending Astrology: A Continuing Tradition*, PhD thesis, University of Toronto, 2012.
5. K. Munk, *Signs of the Times: Cosmology and ritual practice in modern Western astrology*, PhD thesis, University of Southern Denmark, p. 154, 2007.
6. R.E. Nisbett, *Mindware: Tools for Smart Thinking*. Doubleday, 2015. Also [https://en.wikipedia.org/wiki/List\\_of\\_cognitive\\_biases](https://en.wikipedia.org/wiki/List_of_cognitive_biases).
7. I.W. Kelly, "Why astrology doesn't work", *Psychological Reports*, **82**(2), 527-546 (1998). It has negligible empirical support but its many escape routes protect it from disconfirmation, 58 references. Also at <http://www.researchgate.net/publication/247880691>.
8. Jonathan Swift, "Letter to a Young Clergyman", *Writings on Religion and the Church* (9 January 1720).
9. S.J. Blackmore, "Divination with tarot cards: an empirical study", *Journal of the Society for Psychical Research*, **52**, 97-101 (1983).
10. G. Dean and I.W. Kelly, "Explaining Levitation by Denying Gravity" *Journal of Consciousness Studies*, **24**(7/8), 217-232 (2017). Also at <http://researchgate.net/publication/319176629>. Response to a 2016 JCS article that dismisses our 2003 JCS article (on how the performance of astrologers has no useful implications for consciousness or psi) as a case of ignorance and hostility. 27 references.
11. Z.P. Dobyns and N. Roof, *The Astrologer's Casebook*, TIA Publications, Los Angeles (1973), p. 4.
12. A. Prichard-Levy, "Rectification and predictions", *Australian Astrologers' Journal*, **6**(3), 19-23 (1982), p. 20.
13. G. Dean, A. Mather, D. Nias, and R. Smit, *Understanding Astrology: A Critical Review of a Thousand Empirical Studies 1900-2019*, AinO Publications, Amsterdam (2020). With 896 pages, 620,000 words, 1500 visuals (photographs, tables, graphs), and 2000 references, it meets the needs of those who want the full picture rather than bits selected to support preconceived ideas. Includes details of each study sufficient to avoid the need for their retrieval. Is open access and will be available for free download from [www.astrology-and-science.com](http://www.astrology-and-science.com).
14. I.W. Kelly, G.A. Dean, and D.H. Saklofske, "Astrology: A Critical Review", in Patrick Grim (ed.), *Philosophy of Science and the Occult*, 2nd edition, State University of New York Press, Albany, 1990, pp. 51-81. Covers reliability, effect size, the Gauquelin work, spiritual astrology, and the future of astrology, 78 references. Much is still relevant, but the rest is very dated compared with [13].
15. G. Dean and A. Mather, Did anyone win the world's biggest astrology prize no 2: The results and a new bigger superprize, *Astrological Journal*, **25**(3), 203-210 (1983), p. 209, with results in issues through 1987.
16. R. Anand, *Astrology Tested Fake*, God vs Life, New Delhi, 2010. Google title for more information.