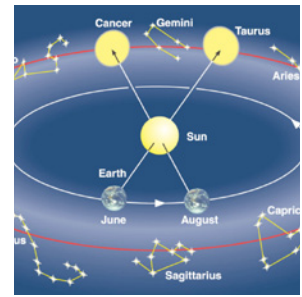


An Astronomer Looks at Astrology

by Andrew Fraknoi
(Foothill College)



Sometimes, when astronomers or astronomy hobbyists tell someone about their interest in the heavens, they quickly get drawn into a debate about astrology. For many, it's hard to know how to respond politely to someone who takes this ancient superstition seriously. Yet, many well-meaning people develop an interest in astrology because of its constant play in the media and simply don't have the background in science to know the problems with it.

The revelation in the 1980's that daily schedules in the Reagan White House were arranged and rearranged based on the predictions of a San Francisco astrologer focused new attention on astrology's widespread public acceptance and people wondered whether there could be something to the claims of astrologers. Here, then, is a quick guide to some of the responses you can make to astrologers' claims.

The Tenets of Astrology

The basis of astrology is disarmingly simple: a person's character and destiny can be understood from the positions of the Sun, Moon, and planets among the pattern of the stars at the moment of his or her birth. Interpreting the location of these bodies using a chart called the *horoscope*, astrologers claim that they can predict and explain the course of life and to help people, companies, and nations with decisions of great import.

Implausible as such claims may sound to anyone who knows just what and how distant the Sun, Moon, and planets really are, a 2005 Gallup Poll revealed that one in four of Americans express a belief in the power astrology. And every day thousands of people around the world base crucial medical, professional, and personal decisions on advice received from astrologers and astrological publications.

The details of its precise origins are lost in antiquity, but astrology is at least thousands of years old and appears in different forms in many cultures. It arose at a

time when humankind's view of the world was dominated by magic and superstition, when the need to get some grasp on the patterns of nature was often of life-and-death importance.

Celestial objects seemed in those days to be either gods, important spirits, or, at the very least, symbols or representatives of divine personages who spent their time tinkering with humans' daily lives. People eagerly searched for heavenly signs of what the gods would do next.

Seen in this context, a system that connected the bright planets and "important" constellations with meaningful life questions was appealing and reassuring. (Astrologers believe that the important constellations are the ones the Sun passes through during the course of a year; they call these the constellations or *signs* of the zodiac.) And even today, despite so much effort at science education, astrology's appeal for many people has not diminished. For them, thinking of Venus as a cloud-covered desert world as hot as an oven is far less attractive than seeing it as an aid in deciding whom to marry.

Ten Embarrassing Questions

A good way to begin thinking about the astrological perspective is to take a skeptical but good-humored look at the logical consequences of some of its claims. Here are my 10 favorite questions to ask supporters of astrology:

1. What is the likelihood that one-twelfth of the world's population is having the same kind of day?

Proponents of newspaper astrology columns (which appear in more than 1,200 dailies in the United States alone) claim you can learn something about what's in store for you by reading one of 12 paragraphs in the morning paper. Simple division shows that this means more than 500 million people around the world will all have the same kind of day, every single day. Given the need to fill so many bills at once, it is clear why astro-

logical predictions are couched in the vaguest and most general language possible.

2. Why is the moment of birth, rather than conception, crucial for astrology?

Astrology seems scientific to some people because the horoscope is based on an exact datum: the subject's time of birth. When astrology was set up long ago, the moment of birth was considered the magic creation point of life. But today we understand birth as the culmination of nine months of steady development inside the womb. Indeed, scientists now believe that many aspects of a child's personality are set long before birth.

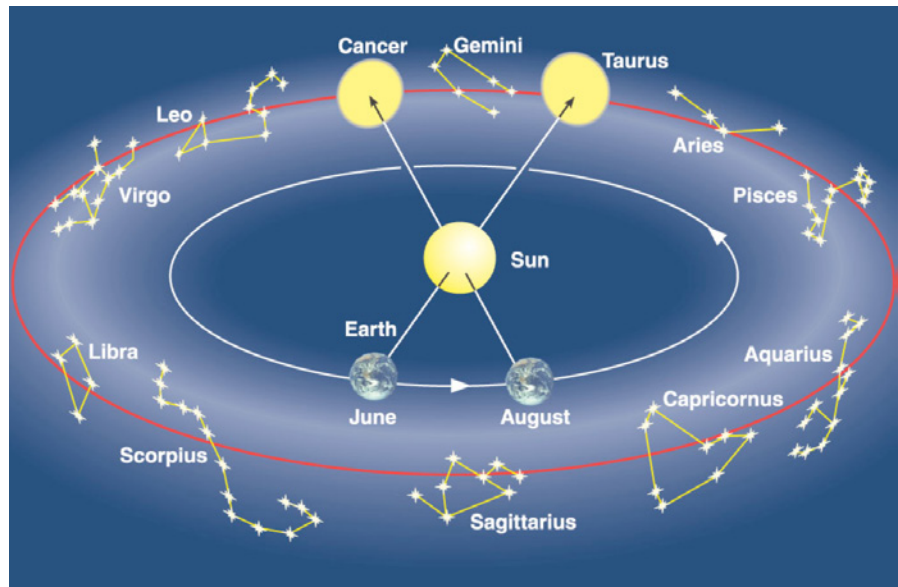
I suspect the reason astrologers still adhere to the moment of birth has little to do with astrological theory. Almost every client knows when he or she was born, but it is difficult (and perhaps embarrassing) to identify a person's moment of conception. To make their predictions seem as personal as possible, astrologers stick with the more easily determined date.

3. If the mother's womb can keep out astrological influences until birth, can we do the same with a cubicle of steak?

If such powerful forces emanate from the heavens, why are they inhibited before birth by a thin shield of muscle, flesh, and skin? And if they really do and a baby's potential horoscope is unsatisfactory, could we delay the action of the astrological influences by immediately surrounding the newborn with a thin cubicle of steak until the celestial signs are more auspicious?

4. If astrologers are as good as they claim, why aren't they richer?

Some astrologers answer that they cannot predict specific events, only broad trends. Others claim to have the power to foresee large events, but not small ones. But either way, astrologers could amass billions by forecasting general stock-market behavior or commodity futures, and thus not have to charge their clients high fees.



As the Earth goes around the Sun in the course of the year, we see the Sun against different constellations. Astrologers call the star grouping which the Sun is in front of when you are born your "sun sign." (Illustration from *Voyages through the Universe* © 2004 Cengage/Brooks-Cole.)

Yet, how many astrologers actually foresaw recent stock market or real estate tumbles and warned their clients about it?

5. Are all horoscopes done before the discovery of the two outermost planets incorrect?

Some astrologers claim that the Sun sign (the location of the Sun in the zodiac at the moment of birth), which most newspaper horoscopes use exclusively, is an inadequate guide to the effects of the cosmos. These "serious" practitioners insist that the influence of all major bodies in the solar system must be taken into account — including the outermost planets Uranus and Neptune, which were not discovered until 1781 and 1846.

If that's the case, what happens to the claim many astrologers make that their art has led to accurate predictions for many centuries? Weren't all horoscopes cast before 1846 wrong? And why didn't the inaccuracies in early horoscopes lead astrologers to deduce the presence of Uranus and Neptune long before astronomers discovered them?

6. Shouldn't we condemn astrology as a form of bigotry?

In a civilized society we deplore all systems that judge individuals by sex, skin color, religion, national origin, or other accidents of birth. Yet astrologers boast that they can evaluate people based on another accident of

birth — the positions of celestial objects. Isn't refusing to date a Leo or hire a Virgo as bad as refusing to date a Catholic or hire a black person?

7. Why do different schools of astrology disagree so strongly with each other?

Astrologers seem to disagree on the most fundamental issues of their craft: whether to account for the precession of the Earth's axis (see the box below), how many planets and other celestial objects should be included, and — most importantly — which personality traits go with which cosmic phenomena. Read ten different astrology columns, or have a reading done by ten different astrologers, and you will probably get ten different interpretations.

If astrology is a science, as its proponents claim, why are its practitioners not converging on a consensus theory after thousands of years of gathering data and refining its interpretation? Scientific ideas generally converge over time as they are tested against laboratory

or other evidence. In contrast, systems based on superstition or personal belief tend to diverge as their practitioners carve out separate niches while jockeying for power, income, or prestige.

8. If the astrological influence is carried by a known force, why do the planets dominate?

If the effects of astrology can be attributed to gravity, tidal forces, or magnetism (each is invoked by a different astrological school), even a beginning physics student can make the calculations necessary to see what really affects a newborn baby. These are worked out for many different cases in Roger Culver and Philip Ianna's book *Astrology: True or False* (1988, Prometheus Books). For example, the obstetrician who delivers the child turns out to have about six times the gravitational pull of Mars and about two thousand billion times its tidal force. The doctor may have a lot less mass than the red planet, but he or she is a lot closer to the baby!

The Precession of the Earth: Are You Reading the Wrong Horoscope?

Our Earth moves through space in a variety of ways. In addition to rotating on its axis (giving us our day) and orbiting the Sun (giving us our year), Earth has another — more gradual — motion that few people know about. Our planet's axis tips around in a circle, very much like a child's top tends to tip around slowly as it spins. The Earth's tipping motion — called precession — is quite slow. Our planet's axis takes over 25,000 years to make a full circle.

As a result of precession, the Earth's axis will point in a different direction as time goes on. (The star right above our planet's north pole today, Polaris, was not always above our pole!) As we tip relative to the constellations (signs), the place where we see the Sun against the background of stars in a given month also changes. The band of constellations that the Sun appears to move through over 12 months is called the zodiac. If the full circle of precession takes roughly 25,000 years and the zodiac is divided into 12 signs, it follows that precession tips the Sun over by one sign every 2,000 years or so. Now it just so happens that the rules of modern astrology were codified just about 2,000 years ago (by Ptolemy in his great summary work *Tetrabiblos*.) This means that the constellations the Sun finds itself in month after month have shifted over by one.

Let's give a concrete example. Someone born on August 1 is considered by astrologers to have the Sun sign Leo. And, indeed, two thousand years ago, the Sun would have been in the constellation of Leo on August 1. But in the 21st century, the Sun is no longer in Leo on August 1 because of precession. Instead it is in the constellation of Cancer. The astrological signs and the real constellations from which they are derived are now "out of synch."

Since many of the personality characteristics associated with each sign are based on what the constellations (star patterns) looked like to the ancients — a fish in water or a bird in the air, for example — this misalignment certainly calls the whole system of astrology into question.

9. If astrological influence is carried by an unknown force, why is it independent of distance?

All the long-range forces we know in the universe get weaker as objects get farther apart. But, as you might expect in an Earth-centered system made thousands of years ago, astrological influences do not depend on distance at all. The importance of Mars in your horoscope is identical whether the planet is on the same side of the Sun as the Earth or seven times farther away on the other side. A force not dependent on distance would be a revolutionary discovery for science, changing many of our fundamental notions.

10. If astrological influences don't depend on distance, why is there no astrology of stars, galaxies, and quasars?

French astronomer Jean-Claude Pecker has pointed out that it seems very small-minded of astrologers to limit their craft to the influences of the bodies in our solar system. Billions of stupendous bodies all over the universe should add their influence to that of our tiny little Sun, Moon, and planets. Has a client whose horoscope omits the effects of the star Rigel, the Crab Nebula pulsar, and the Andromeda Galaxy really had a complete reading?

Testing Astrology

Even if we give astrologers the benefit of the doubt on

all these questions — accepting that astrological influences may exist outside our current understanding of the universe — there is a devastating final point. Put simply, astrology doesn't work. Many careful tests have now shown that, despite their claims, astrologers really can't predict anything.

After all, we don't need to know how something works to see whether it works. During the last few decades, while astrologers have somehow always been a little too busy to conduct statistically valid tests of their work, physical and social scientists have done it for them. Let's consider a few representative studies.

Psychologist Bernard Silverman of Michigan State University looked at the birth dates of 2,978 couples who were getting married and 478 who were getting divorced in the state of Michigan. Most astrologers claim they can at least predict which astrological signs will be compatible or incompatible when it comes to personal relationships. Silverman compared such predictions to the actual records and found no correlations. For example "incompatibly signed" men and women got married as frequently as "compatibly signed" ones.

Many astrologers insist that a person's Sun sign is strongly correlated with his or her choice of profession. Indeed, job counseling is an important function of modern astrology. Physicist John McGervey at Case Western Reserve University looked at biographies and

Jetology

One good way to get people to think about the validity of astrology is to suggest a similar "science" that is not so weighed down with tradition and history. I like to ask people to consider the new science of jetology, which contends that the positions of all the world's jumbo jets at the moment a person is born affect his or her personality and destiny.

To get the full benefit of a jetological reading, a customer must wait until the professional jetologer carefully analyzes the pattern of jet positions the world over. (Since a computer will help get the data and organize it, jetology must be a scientific discipline! This was, in fact, the claim made by President Reagan's astrologer — that the fact that she used computers made astrology scientific.)

But even when your jetological chart is finished, a person without advanced knowledge will not be able to make sense of it. Years of jetological training are required to interpret such a chart properly. Take that bunching of jumbo jets over San Francisco — its significance for the subjects' love life will require a great deal of study by an experienced jetologer.

As your listener begins to chuckle over the absurdity of this example, you can ask them what makes it amusing. Someone will surely ask WHY the position of those things in the sky should have anything to do with our lives — and then you can ask them the same question about astrology.

birth dates of some 6,000 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 random.

To overcome the objections of astrologers who feel that the Sun sign alone is not enough for a reading, physicist Shawn Carlson of the Lawrence Berkeley Laboratory carried out an ingenious experiment. Groups of volunteers were asked to provide information necessary for casting a full horoscope and to fill out the California Personality Inventory, a standard psychologists' questionnaire that uses just the sorts of broad, general, descriptive terms astrologers use.

A "respected" astrological organization constructed horoscopes for the volunteers, and 28 professional astrologers who had approved the procedure in advance were each sent one horoscope and three personality profiles, one of which belonged to the subject of the horoscope. Their task was to interpret the horoscope and select which of the three profiles it matched.

Although the astrologers had predicted that they would score better than 50 percent correct, their actual score in 116 trials was only 34 percent correct — just what you would expect by guessing! Carlson published his results in the December 5, 1985, issue of the prestigious scientific journal *Nature*, much to the embarrassment of the astrological community.

Other tests show that it hardly matters what a horoscope says, as long as the subject feels the interpretations were done for him or her personally. Some years ago French statistician Michel Gauquelin sent the detailed astrological profile for one of the worst mass murderers in French history to 150 people and asked how well it fit them. Ninety-four percent of the subjects said they recognized themselves in the description.

Geoffrey Dean, an Australian researcher who has conducted extensive tests of astrology, reversed the astrological readings of 22 subjects, substituting phrases that were the opposite of what the horoscopes actually stated. Yet the subjects in this study said the readings applied to them just as often (95 percent of the time) as people to whom the correct phrases were given. Apparently, those who seek out astrologers just want guidance, any guidance.

Some time ago astronomers Culver and Ianna tracked

the published predictions of well-known astrologers and astrological organizations for five years. Out of more than 3,000 specific predictions (including many about politicians, film stars, and other famous people), only about 10 percent came to pass. Veteran reporters — and probably many people who read or watch the news — could do a good deal better by educated guessing.

If the stars lead astrologers to incorrect predictions 9 times out of 10, they hardly seem like reliable guides for decisions of life and affairs of state. Yet millions of people seem to swear by them.

Clearly, those of us who love astronomy cannot just hope that the public's infatuation with astrology will go away. We must speak out whenever it is useful or appropriate — to discuss the shortcomings of astrology and the shaky ground it is based on. Those of us working with youngsters can use these ideas to develop a healthy skepticism in the students and encourage an interest in the real cosmos — the one of remote worlds and suns that are mercifully unconcerned with the lives and desires of the creatures on planet Earth. Let's not allow another generation of young people to grow up tied to an ancient fantasy, left over from a time when we huddled by the firelight, afraid of the night.

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