

**BIG FIVE PERSONALITY TRAITS AND ASTROLOGY:
THE RELATIONSHIP BETWEEN THE MOON VARIABLE AND
THE NEO PI-R**

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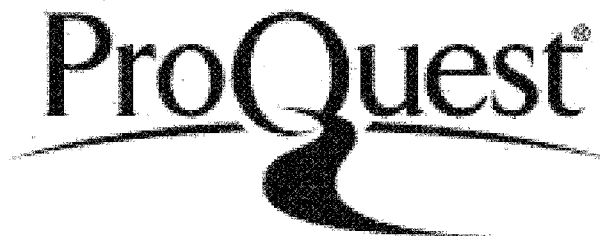


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Abstract

Big Five Personality Traits and Astrology: The Relationship Between the Moon Variable and the NEO PI-R

by

Keith Burke

The purpose of this study was to contribute to the general body of research and literature concerning the horoscope as a valid instrument for measuring personality traits by comparing the natal chart Moon variable, an established major factor in horoscope analysis and interpretation, to personality domains measured by the NEO PI-R. This study was in response to a research gap in testing the Moon as an independent variable in the natal chart, as well as the use of the Five Factor personality model, as measured by the NEO PI-R, as a validated comparison measure. The prediction was that the Moon would be discernible by elevated mean *T* scores on specific NEO PI-R domains when located in the element that has a theoretical correlation with a particular domain. This study used an archived data sample of 192 participants who volunteered to complete the NEO PI-R and other assessments, as well as provide the birth data necessary to construct a natal or birth chart. In addition to completing the assessments and providing basic demographic information, participants also answered a data control question about whether they had previous knowledge of their Moon sign to control for previous knowledge of astrology as an artifact. Test results did not reveal any significant differences in participants' mean scores in the selected personality domains and did not support the theory that the Moon, as an isolated independent variable in the archived data sample, is a valid measure of personality as assessed by the NEO PI-R. An additional test found no significant difference in the scores between those participants with the

Moon in the Fire element who had previous knowledge of their Moon sign and those who did not, which did not support the theory that previous astrology knowledge can affect how participants answer personality assessment questionnaires.

Keywords: astrology, horoscope, Moon, personality, assessment, NEO

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The style used throughout this dissertation is in accordance with the *Publication Manual of the American Psychological Association* (6th Edition, 2009), and *Pacifica Graduate Institute's Dissertation Handbook* (2011-2012).

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Definition of Astrology Terms

There are astrology terms used throughout this text that are not common in everyday speech. The following basic definitions are provided to facilitate understanding of these terms. If the reader is interested in learning more detailed definitions of astrology terms there are a number of astrology textbooks referenced in Chapter 3 that provide in-depth astrology horoscope descriptions and interpretive guidelines.

Ascendant. The Ascendant is also known as the Rising Sign. It represents the sign of the zodiac that is at the point on the ecliptic that intersects the Eastern horizon at the time of a person's birth.

Aspects. Aspects are specific degree relationships between planets or points in the horoscope. In horoscope interpretation, aspects inhibit or facilitate combined personality factors with different angular relationships interpreted as easy or hard aspects. For example, in astrological tradition the planet Mars represents assertiveness and the planet Mercury represents communication. Thus, an aspect brings those two personality characteristics together to form "assertive communication." An easy aspect between these planets can suggest someone who appropriately asserts himself or herself in communication and a hard aspect can suggest someone who struggles to appropriately assert himself or herself in communication.

Birth chart. Also called the *natal chart*. The birth chart is an astrological representation of where the planets were positioned when a person was born. A birth chart is considered a blueprint of a person's life that predicts the emergence of specific personality characteristics.

Ecliptic. The ecliptic is the apparent path that the Sun creates in the sky during its 24-hour movement between day and night. The ecliptic also moves with the Sun as it moves along its seasonal path during the year (i.e., as the Sun rises and sets at slightly different points in the horizon during the day-by-day course of a year, the ecliptic follows that same path). As the Sun appears to move in the sky in relation to the stars, so the apparent movement of the planets follows the same path throughout the course of the day and year.

Elements. The elements are related to the signs. Each of the signs belongs to one of four elements—Water, Fire, Air, and Earth—with each element consisting of three signs. In horoscope interpretation, each of the three signs in an element share similar qualities. (The specific qualities associated with the elements are defined in Chapter 3.)

Ephemeris. An ephemeris can be a table or software data file that calculates the positions of the planets and points used in an astrology horoscope during given periods of time.

Horoscope. The word *horoscope* has multiple meanings in astrology depending on the type of astrology considered. In predictive astrology the term horoscope has a somewhat different meaning than when it is used in reference the natal or birth chart. For the purposes of this study, the term *horoscope* is used interchangeably with the term *natal chart*, with *horoscope* generally representing the sum total of all the variables in the natal chart that can be considered in interpretation.

Houses. The houses are twelve partitions of the 360° zodiac, measured from the Ascendant and Midheaven axes. Although there are a variety of house systems that separate the house segments differently, the basic partitioning of the zodiac into 12

partitions is nearly universal in Western astrology. Each house represents a different area of life experience, such as self or other, and home or work. An astrologer interprets the planets that are positioned within houses in terms of the house location. For example, a planet located in the “work house” will presumably be most influential in that arena.

Midheaven. The Midheaven is the sign of the zodiac that is at the point on the ecliptic that intersects with the Meridian line—the highest point the Sun will reach during the day before beginning the descent back toward the horizon—at the time of a person’s birth.

Planets. In astrology, the major planets include the main planets in the solar system and include the Sun and Moon. In horoscope interpretation, the planets in the natal chart represent major personality characteristics.

Sidereal Zodiac. A zodiac that is based on the actual constellations in the sky along the ecliptic and follows the astronomical precession of the equinoxes. The sidereal zodiac is generally associated with Eastern or Vedic astrology.

Tropical Zodiac. A zodiac determined by the equinoxes and solstices instead of the actual star positions of the constellations. The date of the equinoxes establish 0° Aries and 0° Cancer, whereas the solstices establish 0° Cancer and Capricorn. The tropical zodiac is generally associated with Western astrology.

Zodiac Signs or Signs. The zodiac is an imaginary belt in the heavens approximately 20 degrees wide that follows the path of the ecliptic. Depending on whether a tropical or sidereal zodiac is used, it is either calculated using the actual constellations along the ecliptic at any given time, or is mathematically calculated based on the solstice and equinox points. The zodiac is partitioned into 30° equal parts or signs:

Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricorn, Aquarius, and Pisces. In horoscope interpretation, the sign represents a basic attitude, style, or orientation that moderates the interpretation of the planets.

Chapter 1

Introduction

Purpose Statement

The purpose of this study was to test the theory that individual factors in the astrology *birth chart*, hereafter referred to interchangeably with the common astrology terms of *natal chart* or *horoscope*, can predict definable, recognizable personality characteristics as measured by the Revised NEO Personality Inventory (NEO PI-R) (Costa & McCrae, 1992b; McCrae & Costa, 2010). Although the Sun as an independent variable has been repeatedly tested, very few studies have tested the Moon as an independent variable. Astrology literature strongly supports that the Moon is a main, distinct factor in the horoscope (among many factors used in interpretation). This study established theoretically supported hypotheses that the Moon as an independent variable in the horoscope will be discernible in the mean scores of participants who completed the NEO PI-R. This study compared the independent variable Moon in the natal chart, subsampled by *element* categories (defined in Chapter 3), to four of the “Big Five” personality factors as measured by the NEO Personality Inventory (NEO PI-R): Neuroticism, Extraversion, Openness to Experience, and Conscientiousness (also defined in Chapter 3). Archived data from previous assessments conducted by the California Institute for Open Studies (CIOS) were used for the study, providing a sample of 198 participants who, in addition to completing the NEO PI-R, also provided the birth information required to construct a natal chart.

Theoretical Perspective

The theoretical perspective for this study is that there are stable psychological personality constructs that can be measured by the NEO PI-R assessment instrument and these constructs may be related to the astrological Moon variable. To test this theory, one independent variable (the Moon) from a set of interrelated variables that presents a systematic view of personality development (the astrology horoscope) was compared to another set of interrelated variables that also present a systematic view of personality development (*T* scores from the NEO PI-R personality assessment instrument) to test whether there was a relationship between the two. A series of statistical *t* tests were performed for four categorical element groups of the independent Moon variable to test for a statistically significant difference in the mean scores of the theoretically linked personality factor in the NEO PI-R (established in Chapter 3). The overarching hypothesis was that if the Moon as an independent variable in the horoscope does predict elevated domain scores in the identified personality dimensions, then there would be a positive relationship with the corresponding self-report domain score in the NEO PI-R.

Relevance of the Topic for Clinical Psychology

Personality assessments and tests of temperament have a long and productive history in clinical psychology as an aid in case conceptualization, treatment planning, consulting, and analysis (Ashton, 2007; Beutler & Groth-Marnat, 2003; Groth-Marnat, 2009; Murphy & Davidshofer, 1997; Weiner & Greene, 2008; Yost & Corbishley, 1987). Generally, psychologists will use an assessment *test battery* (a series of psychological assessments administered in an attempt to develop a complete picture of the person) with the goal of developing a global description of the person using objective measures

(Groth-Marnat, 2009). Often when selecting a test battery a clinician will choose a personality profile assessment in deference to *trait theory* (the theory that individual personalities are composed of broad, stable, personality traits that cause individuals to behave in certain ways) to provide insight into how a person will tend to behave, perceive, or react in certain situations (McCrae & Costa, 1997; Weiner & Greene, 2008).

Theoretically, the means by which astrologers use the astrology horoscope suggests that it potentially belongs in the battery of personality assessment instruments used as personality profile measures. Astrologers claim that both independent and combined factors in the horoscope predict certain personality characteristics. Most astrologers (“intuitive” or “psychic” astrologers excepted) would consider the natal chart an objective measure. Although the interpretation of the horoscope has considerable variance among individual astrologers, the construction of the natal chart is universal and consistent, based on strict calculations from data including the birth date, birthplace, and exact time of birth. In other words, the instrument is objective and consistent, but it may not be reliable due to variance in interpretation or valid because the variables in the horoscope do not represent the personality factors according to astrological theory. If, in fact, factors in the astrology horoscope are shown to be a valid measure of personality characteristics, then it can take its place next to other instruments that are used in clinical diagnosis and treatment planning. This study was limited to a study of the Moon as one of the main factors considered in horoscope interpretation.

Autobiographical Origins of the Researcher’s Interest in the Topic

I became interested in astrology around 1996 when I was leafing through a book on horoscopes that was on a friend’s bookshelf. Unlike other astrology books I had seen

before, this was a textbook that had information about how to construct a natal chart with a listing of planet and sign interpretations that the reader could consult once you knew what the planet positions were in your own natal chart. At the time I knew I was a Gemini (learning later that this meant my Sun sign was Gemini), but I had no knowledge of anything else in my horoscope. Once I calculated some of the other planets in my horoscope and the signs where they were located, I flipped to the back of the book to read the interpretations. I remember feeling very shocked and surprised that the descriptions appeared to match personality characteristics that I recognized in myself. Intrigued, I borrowed the book, read it cover-to-cover, and then began ordering more astrology textbooks, learning to construct natal charts and conduct interpretations. I ordered astrology software that would construct natal charts quickly and participated in a “Master’s Degree Certification Course in Astrology” offered by Noel Tyl, a professional astrologer. I started interpreting horoscopes for friends and family members and eventually began charging money for the interpretations. People generally enjoyed the interpretations and many expressed similar surprise that the descriptions matched their personality characteristics.

Four years later, I was seeing one or two paying clients per week as an astrologer. I was also interested in teaching astrology and was looking for a means to develop a business where I could teach and learn more about other “metaphysical” subjects. (Note that *metaphysical* is a commonly used term to describe subjects like astrology, numerology, and tarot. It has a different meaning than the classic metaphysics of Greek philosophy.) In 2001, with a business partner, I co-founded a for-profit learning institution originally registered with the state of California as *The Cadent Cross Institute*

(CCI). Our business model was to create an organization that sponsored classes, lectures, and workshops taught by individuals who submitted proposals to teach coursework in psychology, mythology, metaphysics, and alternative health. I continued to see clients privately to conduct astrology interpretations and began teaching astrology classes and workshops through the institute. I also began writing astrology articles and an interpretive textbook and developed enough of a positive reputation to begin lecturing nationally at astrology conferences and for astrology organizations.

In 2003, we changed the name of the organization to the *California Institute for Open Studies* (CIOS) and I formally became the Managing Director. By 2006, the organization had three full-time staff members (including me) and 14 adjunct faculty members who taught regularly. We also had a seven-member volunteer board of directors that was initially created in 2005 to explore filing with the state of California as a nonprofit, 501(c)3 educational institution. Although we ultimately decided not to pursue nonprofit status (in part because three of the seven members of the board were paid staff, which was not allowed under California nonprofit law), the board of directors continued to meet monthly between 2005 and 2007 for strategic planning purposes. In early 2006, a strategic business decision was made by the board members to begin conducting metaphysical research studies, in an attempt to broaden the scope of the institute. I was part of a research committee that included a licensed psychiatrist and clinical social worker that first drafted the idea of collecting data from personality assessment instruments and comparing it to the natal chart. The goal of this research was to explore the validity of astrology and potentially publish articles based on that research

that would generate publicity for the organization. I had a strong personal investment in conducting astrology research because of my background as an astrologer.

We began soliciting participants by placing a notice in the CIOS monthly newsletter for 3 consecutive months in the fall 2006 and early winter 2007, requesting noncompensated volunteers who would be willing to “complete selected personality assessment questionnaires for use in a research project that will be looking for relationships between these types of assessments and the astrology horoscope.” Periodic invitations to participate in the study were also offered at lectures, workshops, and classes conducted by CIOS staff members between 2007 and 2009. Eventually, 198 volunteers completed the NEO PI-R (Costa & McCrae, 1992b) and two other personality assessments: the Personality Assessment Inventory (PAI) (Morey, 1991), and the Rathus Assertiveness Schedule (RAS) (Rathus, 1973). Ninety-two of those 198 volunteers also completed the Minnesota Multiphasic Personality Inventory (MMPI-2) (Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989). The CIOS research committee initially chose those four assessments as an assessment battery to capture a broad range of personality traits. In 2008, after 92 participants had completed the initial battery of assessments, the MMPI-2 was removed from this study after the committee decided that the clinical nature of the assessment instrument did not reflect our research interests.

When the participants completed the assessments, they were informed that it would take some time for their assessment results to be scored, but in the meantime the assessments would remain secure (in a locked filing cabinet at the CIOS offices) and that they would be provided feedback when the final assessments were scored. Although the first battery of assessments completed by the volunteers ($n = 65$) were scored and the

participants provided feedback, the remaining assessments were not scored. Participants were informed that their assessment results would remain secure and that they would eventually be provided feedback when they were scored. However, the project stalled as other members of the research committee had competing projects and I had become very busy in my doctoral studies in clinical psychology. None of us had the time to dedicate to the research project and the data remained unused and unanalyzed. We sent out an e-mail to the volunteers and apologized for the delay, informing them that the assessments would eventually be scored, but in the meantime, they would be archived. Unfortunately, the economic events leading up to the global recession of the late 2000s had a considerable impact on the organization. In 2007, we eliminated much of our curriculum and in 2009, the business ceased operations. The completed assessments were never scored or used in any study, and upon the closing of the business they remained in my possession in a locked cabinet in my home office.

My own practice as a part-time professional astrologer followed a similar trajectory to the organization. In 2006, I began my doctoral studies. As I learned more about clinical psychology and counseling individuals, as well as confounds and artifacts, I began to develop ambivalence about my horoscope-based interactions with paying clients. Although I was still lecturing about astrological archetypes and their relation to myth and symbolism, I ceased meeting with clients to interpret their horoscopes. However, my interest in astrology research grew. I wanted to know what research had been previously conducted and how questions about astrology's validity had been explored. I knew from personal experience that many people are interested in astrology and willing to pay money to learn more and be "assessed" by a professional astrologer. I

also recognized the face value appearance of astrology as a type of personality assessment. Yet, ultimately, I felt that I did not have enough information to answer the question of whether the horoscope does, in fact, independently reflect a person's personality development or whether there are contributing confounding factors. This question is the starting point for this doctoral study.

The Researcher's Predisposition to the Topic

As mentioned above, my predisposition to this topic includes my years of study and work as an astrologer and astrology teacher. One of my predispositions is that I know astrology "works" in that it clearly provides satisfaction and solace for millions of people; I experienced this first-hand in my interactions with clients and students. I know my own natal chart very well and there are many symbols in the horoscope that I can attribute to my personality. Without controlling for confounds or artifacts, I have experienced the apparent appearance of astrology variables that correlate with personality characteristics.

However, over time, I developed uneasiness with astrology. I had the same "wrong chart" experience that well-known professional astrologers David Hamblin (Phillipson, 2000) and Peter Niehenke (1983) had, where a natal chart is constructed and a well-received interpretation is given to a client, who expresses his or her amazement at the interpretation, and then it is discovered that you had the wrong birth information and thus interpreted the wrong natal chart. I read and identified with the "confessions" of other former professional astrologers who described similar initial amazement and then disappointment after researching astrology and concluding that confounds and artifacts play a key role in astrology's acceptance (Phillipson, 2000; Smit, n.d.). Mostly I

developed an uncomfortable unease with what was effectively becoming counseling sessions where clients were looking for external answers in a horoscope. Often I had the sense that my astrology clients had psychological concerns that were not being addressed and the reliance on a horoscope may actually inhibit potential insight and self-awareness. Yet, there were still times when the exactitude of personality characteristics and life events that astrology was able to predict about a complete stranger for whom I only had birth information was awe-inspiring. Although I have not practiced astrology for a number of years due both to my ambivalence and my evolving interests, there are still times that I miss the otherworldly feeling of those first astrology experiences.

Ultimately, having had an emotional and financial investment in astrology's success at one point in my life renders me vulnerable to charges of subjectivity. Additionally, when the institute's committee of individuals who were supporters and "believers" in astrology first conceived of doing this type of research, I was on that committee and a practicing astrologer, which certainly suggests a predisposition toward a positive result. However, my distance from a professional or personal astrology practice theoretically allows for some of the objectivity that can develop over time and space; at the very least, my transference reactions have the potential to be less powerful and more conscious (Høglend et al., 2008; Jacobs, 1993). Moreover, the argument has been made that pure objectivity by a researcher is a fantasy and the subjectivity of the researcher is not only intimately involved in the topics we choose, but is a valuable enhancement to the research process (Gergen, 2001; Ratner, 1997; Romanyshyn, 2007).

In the end, I learned enough about the proprieties of astrology to stand confidently next to any professional astrologer and subsequently invested myself completely in the

world of research science offered through the study of clinical psychology. I feel that this combination serves to protect the integrity of a study such as this. Unlike the skeptics, I am not out to disprove astrology or use the opportunity to scorn or condemn its practitioners (which has been done, as reviewed below). Nor am I one of the believers who are so invested in a positive outcome for astrology that anything else is dismissed as “bad science” or defended against with stubbornness and stoicism. Instead, I approach this study with interest and curiosity, the recognition of its limitations, and the investment to carry it through to the answers (and further questions) it reveals.

Chapter 2

Literature Review

The sheer number of publications about astrology is vast. A search of the Library of Congress's online catalog search returned 6278 book titles with reference to the keyword of *astrology* (Library of Congress, 2011); this does not include the considerable number of astrology references in journal publications, both peer and non-peer reviewed. Another difficulty is that there are distinct interpretive approaches to astrology that are roughly associated with geographically based cultural philosophies, such as Western, Vedic, Chinese, Babylonian, Mayan, and more. Additionally, the field of astrology includes many different methodologies for using and interpreting the symbols of the horoscope: this includes natal astrology (interpreting the natal chart cast at the moment of birth for personality characteristics), predictive astrology (using current planetary transits and other forms of astrological measurement to predict events), electional astrology (choosing astrologically beneficial dates), horary astrology (a divination technique in which the horoscope is used to answer specific questions), mundane astrology (the application of astrology to world affairs and world events), medical astrology (using astrology to predict specific health problems), synastry (comparing horoscopes to discern relational tendencies between individuals, groups, or both), intuitive astrology (using the horoscope as an object to direct "psychic" intuition), and other specialized niches (agricultural, astro-meteorology, esoteric, alchemical, etc.).

To accommodate the disparate number of sources concerning astrology and their relevance to this study, the literature to be surveyed was limited primarily to statistical, scientific, or research-based studies of Western, natal astrology, with a focus on

astrology's reliability, validity, and use as a diagnostic and personality assessment tool. Although this literature review does include a brief history of astrology, it does not include research studies of predictive astrology or any of the other subsets of astrology, nor does it include nonscholarly or case study publications. This review also does not include non-peer reviewed studies except where included as part of a meta-analysis.

History of Astrology

Astrology has a vast and varied history. The myth-making, storytelling, and image-creating references to the rising and setting of the Sun and Moon as they moved across the sky can be traced back as far as the Stone Age, circa 6000 BCE (Campion, 2008). By the 16th century BCE, the Babylonians had begun to compile lists of astronomical phenomenon and what they believed were correspondences with mundane events, which became known to historians from the *Enuma Anu Enlil*—a series of 68-70 tablets that interpret the observations in terms relevant to the king (Holden, 2006).

By the first century AD, astrology had developed as a system of observations and interpretations that would be readily recognizable to the modern astrologer (Holden, 2006; Whitfield, 2001). By the Middle Ages, astrology had spread throughout the world and attained a position of prominence until approximately the 17th century, when astrology became a focus of attack in the tide of scientific reason spreading through the universities (Bobrick, 2005; Tester, 1987). In the mid-17th century, astrology was banished from the universities in France and Europe and faded from the public sector. The Theosophical movement revived interest in astrology in Great Britain during the late 19th century and its re-kindled popularity spread to the United States (Lehmann, 1998).

With the dawning of the 20th century, astrology experienced a marked resurgence of interest throughout the world (Dean & Mather, 1977; Eysenck & Nias, 1982).

Popular View of Astrology as a Scientific Discipline

Astrology's popularity has remained intact into the 21st century. *The New York Times* reported that a Gallup poll conducted in June, 2005, indicated that 25% of Americans believe that the position of the stars and planets can affect people's lives (Rosenblum, 2005). A *Harris Poll* conducted in February, 2003, found that 31% of Americans believe in astrology, including 20% of college graduates and 16% of people with postgraduate degrees (Taylor, 2003). Worldwide, nearly one in four persons in Western countries believes in astrology (Dean, Mather, & Kelly, 1996). Nor is belief in astrology limited to entertainment, folklore, or religious practice. Twenty-five years of survey data collected by the National Science Foundation (NSF) indicates that since 1979, between 32% and 45% of Americans consistently report believing that astrology is "scientific"; the last survey in 2004 noted that at least 18% of Americans who believe that astrology is scientific have a baccalaureate, graduate, or professional degree (National Science Board, 2006). In 2001, the European Commission conducted a public opinion poll of all the Member States of the European Union and found that 52.7% of Europeans also believe that astrology is scientific (European Commission, 2001).

Academic Criticism of Astrology as a Scientific Discipline

In spite of the popular belief in astrology as a practice and a science, much of the academic and scientific community remains incredulous and critical towards astrology as a scientific discipline worthy of study. Richard Dawkins, one of the preeminent scientists of the twenty-first century and the author of *The Selfish Gene* (Dawkins, 1976), roundly

condemned astrology as an “enemy of truth,” a “wicked fraud,” and “an aesthetic front” that “cheapens astronomy” and “is an insult to psychology” (Dawkins, 1996, online). After surveying 133 child educators in Greece and finding that 59% of them viewed astrology and astronomy as equally scientific, Kallery (2001) concluded that the educators’ inability to discern “pseudo-science” was a potentially dangerous influence on children’s attitudes and development.

One of the strongest statements of condemnation was published in 1975 by *The Humanist: A Magazine of Critical Inquiry and Social Concern*, which produced a manifesto entitled, “Objections to Astrology: A Statement by 186 Leading Scientists,” in which a group of scientists, including 19 Nobel laureates, attempted to make the case that “believing” in astrology is unscientific and ignorant:

Those who wish to believe in astrology should realize that there is no scientific foundation for its tenets. . . . One would imagine, in this day of widespread enlightenment and education, that it would be unnecessary to debunk beliefs based on magic and superstition. . . . We believe that the time has come to challenge directly, and forcefully, the pretentious claims of astrological charlatans. It should be apparent that those individuals who continue to have faith in astrology do so in spite of the fact that there is no verified scientific basis for their beliefs, and indeed that there is strong evidence to the contrary. ("Objections to astrology: A statement by 186 leading scientists," 1975, September/October, p. 4)

It is noteworthy that although the article vigorously criticized astrology, it did not offer any evidence either for or against astrology. This led Carl Sagan (1976, September/October), an astronomer, and Paul Feyerabend (1978), a physicist, both of whom were leading scientists of the time, to publicly renounce the article because of its sentiment and unscientific content, in spite of their equally public skepticism of astrology.

Goodstein and Brazis (1970) conducted a large-scale study designed to test academic bias against astrology. In order to evaluate the potential effects of bias by psychologists, they sent 1000 randomly chosen members of the American Psychological Association (APA) a fictitious study of astrology with a questionnaire that asked the psychologists to rate the quality and scientific merit of the study. Two identical abstracts were distributed randomly among the sample, but one group of abstracts reported positive findings and the other negative findings. Of the 282 responses returned, those who received the abstract with the negative findings rated the study as having a better design and greater scientific merit than those receiving the abstract indicating positive findings for astrology. Additionally, Goodstein and Brazis report that some of the responses to the questionnaire included unsolicited commentary indicating strong affective reactions and prejudgments against astrology as a discipline.

Other academics have studied astrology's philosophy, tenets, and principles, and have criticized astrology at the level of its methods. Numerous detractors have claimed that there is little consensus among astrologers on the basic issues—theories, techniques, and interpretations—and the same horoscope is often interpreted in an idiosyncratic way by the particular astrologer doing the interpretation. These same critics contend that astrologers have a pervasive hindsight bias; the sheer numbers of variables allow astrologers to choose, after the fact, from multiple combinations to fit the event. Their conclusion, therefore, is that astrology is not a legitimate discipline because of its basic lack of reliability and validity (see especially Culver & Ianna, 1988; Dean & Kelly, 2001; Dean et al., 1996; Eysenck & Nias, 1982; Hines, 1988; Kelly, 1997; Van de moortel, 2002).

Ivan Kelly, an academic at the University of Saskatchewan, Saskatoon, Canada, and Chairman of the Astrology Subcommittee of the USA-based Committee for the Scientific Investigation of Claims of the Paranormal, has been a particularly vocal critic of astrology. Kelly has published a number of highly dismissive critiques of astrology and repeatedly concludes that astrology is too multifaceted and too contradictory to be a reliable source of information (Kelly, 1997, 1998, 2001, 2007). Unlike most published criticisms (including the “Objections to Astrology” manifesto mentioned above), Kelly’s critical essays are generally well researched with numerous citations of evidence against astrology. Because of this, his publications are often cited in the literature, making him a powerful influence in astrology research.

Kelly (1997, 1998, 2001), in partnership with Dean (Dean & Kelly, 2001, 2003; Dean et al., 1996), is also one of the most vocal critics of astrology practitioners. Kelly maintains that astrologers are biased and tend to consider confirming evidence, but not contrary evidence, maintaining that there is a willful ignorance of current research that fails to support astrology’s central tenets. He quotes Robert Hand, one of the foremost authors in modern astrology and a frequent speaker at astrology conventions, as stating that “positive results in the scientific study of astrology have to be taken seriously undeniably, but negative results not so seriously” (Perry, 1995, p. 37, as cited in Kelly, 2001). Kelly also mentions West, who wrote in his text *The Case for Astrology* (1991), that “intimate details of the bulk of the negative evidence do not really concern us” (p. 234).

Although Kelly (and Dean) has been subjected to criticisms of bias against astrology (e.g., Brockbank, 2003; Elwell, 2001; Harding, 2000), his position on

astrologers and research is not without merit. Phillipson (2000), who interviewed more than thirty leading professional astrologers, also found that many are either ignorant of the scientific research studies in astrology or are of the opinion that current astrology research is misguided and not a true reflection of the craft. Alexander (1983), a proponent of using the horoscope as a counseling tool, dismisses the astrology research as irrelevant: “We have enough cumulative experience to know that (astrology) works, whether the computer studies and the scientists agree with us or not” (p. xii). Although the above-cited comments may not be reflective of the astrological community as a whole, openness to scientific inquiry is an important component to gaining credibility in the academic communities that currently dismiss astrology.

Kelly (1997, 2001) also strongly criticizes astrology’s validity through the ubiquitous use of confirming evidence. Using as an example the marriage of Prince Charles and Lady Diana, Kelly (2001) cites Lilley-Harvey (1981), a well-known British professional astrologer, who compared Charles and Diana’s natal charts prior to their marriage and interpreted strong rapport, emotional compatibility, and harmony. Kelly then cited Campion (1993a), an equally well-known British professional astrologer, who interpreted emotional incompatibility, anger, and trauma when comparing the two natal charts after the divorce. Kelly (2001) dismissively stated that “an astrological horoscope generally provides planetary configurations for any number of conflicting predictions or after-the-fact explanations of events, so no wonder astrologers claim to see it ‘working’ everywhere” (p. 10).

In spite of the criticism from Kelly and others (Ankerberg & Weldon, 1989; Culver & Ianna, 1988; Jerome, 1977; Kelly, Culver, & Loftson, 1989; Kurtz, 2006),

astrology is currently being taught at the university level in England at Brasenose College (Oxford), Bath Spa University College, the University of Kent, and the University of Southampton; in Wales at Cardiff University; in France at Bibliotheca Astrologica; in Spain at University of Zaragoza; in Turkey at Dogus University; and in India at Benares Hindu University (Bobrick, 2005). Astrology's presence in academic environments is controversial and disparaged because of astrology's poor reputation among some academics (Evans, 2002; Jayaraman, 2001). For example, a group of interdisciplinary academics publically criticized France's Sorbonne University for granting Elizabeth Teissier, a popular French professional astrologer, a PhD after she completed her dissertation on postmodern societal attitudes towards astrology, merely because her dissertation topic included astrology and in spite of Teissier meeting all of the Sorbonne's rigorous academic criteria for a doctorate (Casassus & Holden, 2001). Other university professors use astrology as an example of "pseudo-science" (Lower, 2007), as a means of illuminating poor research methods (Balch, 1980), and as an example of how to misinterpret research data (Ward, Grasha, & Griggs, 2002).

This strong criticism of astrology as a scientific discipline when compared to the popular interest in astrology as a scientific field of study is interesting, and suggests, at the very least, that the debate is far from concluded. However, the argument that astrology is not a valid discipline and thus is not a worthy candidate for scientific study is an important assertion that cannot be ignored. Obviously academic subjects do not need to be scientifically valid in order to qualify for scholarly inquiry. History, religion, the arts, and virtually all the humanities are, for the most part, not scientifically reliable when looked at through a scientific lens but are considered appropriate fields for academic

study. Additionally, for research purposes, a topic does not need to be scientifically reliable to qualify for statistical study, especially using qualitative mixed methods.

However, natal astrology's dominant, central thesis is that the horoscope can reliably predict personality characteristics at the moment of birth; that is, persons born with certain astrological configurations or *significators* (points or positions in the natal chart), such as the Sun in Gemini, will tend to have personality characteristics that are distinct from others born with different astrological significators, such as the Sun in Scorpio. This hypothesis, at the very least, puts astrology in the realm of testable, experimental study, and academic research of this type requires a careful consideration of reliability and validity (L. Cohen, Manion, & Morrison, 2007; Fraenkel & Wallen, 2009). These types of studies are the central focus of the research review below.

Overview of the Astrology Research to Date

Perhaps the best single-volume overview of modern astrology and research is Phillipson's wide-reaching survey text, *Astrology in the Year Zero* (Phillipson, 2000). It is a highly thought provoking and rigorous book based upon more than thirty interviews with professional astrologers and researchers, and provides a synopsis of the academic arguments between astrologers and scientists regarding astrology's validity as a discipline. Included in the text is an extensive, comprehensive, collective interview with five of the leading researchers of astrology: Geoffrey Dean (Australia), Ivan Kelly (Canada), Arthur Mather (Scotland), Suitbert Ertel (Germany), and Rudolf Smit (Netherlands). Each of the researchers quoted in Phillipson's text has studied astrology for over twenty years. Two are former, full-time practicing astrologers (Dean and Smit) and two are university professors. Collectively, they have written over two hundred

scholarly articles about astrology, as well as several books. Smit maintains the website, www.astrology-and-science.com, arguably the most comprehensive collection of scientific research into astrology available in the English language.

Dean and Mather, under the auspices of the Astrological Association of Great Britain, compiled one of the earliest and most important collections of modern astrology research. The resultant text, *Recent Advances in Natal Astrology: A Critical Review 1900-1976* (Dean & Mather, 1977), is a massive review that includes 1,020 references. It was the first of its kind and became a bible of sorts for astrology researchers world-wide (Kelly, 2007). Dean, in particular, is a controversial figure in the field of astrology. Prior to abandoning his astrology practice, he was a full-time practicing astrologer and astrology instructor who served as the founding president of the Australian Astrologers, Western Australia branch (Phillipson, 2000). Since leaving the field, he has been a prolific author and has written some of the most damaging publications challenging astrology's validity (see especially Dean, 1983, 1985b; Dean & Kelly, 2001, 2003; Dean, Kelly, & Mather, 1998; Dean & Loftson, 1996; Dean et al., 1996).

Phillipson (2000) asked the researchers to summarize their position on the astrology research conducted to date. Collectively, these researchers identified four main points:

1. Many important questions regarding astrology's scientific validity have been researched extensively and the results have been overwhelmingly negative. Of the positive studies, most have failed to replicate or withstood postpublication peer review of faulty methods. It is noteworthy that the increasing evidence against astrology, as well as some personal experiences

with astrological inconsistencies, caused a number of high-profile astrologers to cease practicing astrology, including David Hamblin, a former chairman of the British Astrological Association; Terry Dwyer, a former tutor for the Mayo School of Astrology; and Jan Kampherbeek, a former editor of the now defunct, Dutch astrological periodical *Spica* (Phillipson, 2000).

2. The sheer number of persons who claim that astrology works is substantial. However, from a scientific perspective, it is not enough to identify correspondences to astrological calculations and symbols. All nonastrological factors that could be contributing to the same result need to be considered and ruled out. These researchers argue that astrologers have generally done a poor job identifying confounding variables and artifacts when citing evidence for astrology's validity. Most astrological studies published by non-peer reviewed publications tend to rely on anecdotes or testimonials as central evidence.
3. Astrology as a field has not done a reasonable job of identifying and discussing reasoning errors that may contribute to the conclusion that astrology is valid; these include reasoning by analogy (things similar in one respect are also similar in other respects), confirmation bias (interpreting to confirm pre-existing beliefs), illusory correlation (interpreting correlations that are not statistically significant), placebo effect (the tendency for an intervention to work simply because the recipient believes it will), the Dr. Fox effect (the tendency for complexity, jargon, expressiveness, and style in presentation to influence acceptance (see especially Abrami, Leventhal, &

Perry, 1982; Marsh & Ware, 1982)]), and the Barnum Effect (the acceptance of general personality descriptions as unique to one's self (see especially Dickson & Kelly, 1985; Snyder, Shenkel, & Lowery, 1977)]). These reasoning errors can explain many of the mistakes made in data analysis and need to be carefully controlled in all scientific research, including astrology.

4. One cannot deny the historical importance of astrology or the fact that many people find satisfaction with astrology. It is important to note that astrology does not need to be a scientifically valid perspective to provide solace, meaning, and perspective for interpreting one's life and worldview, much like a religious orientation. Additionally, although there have not been many positive tests of astrology and most failed to replicate, there are studies that warrant further inquiry and astrological tenets that remain unexamined. The existing research represents the conclusions up to date, but scientists should remain open-minded to possible future discoveries in astrology research.

Recent Empirical Research in Astrology

Very little astrology research was conducted prior to 1950, but by 1975 more than one hundred empirical studies were in print (Dean & Kelly, 2001; Dean & Mather, 1977; Dean et al., 1996; Kelly, 1997). Currently over five hundred empirical studies of astrology have been published, although many have not been subjected to peer review and are not easily retrievable (Dean, 2003; Phillipson et al., 2003). In addition, there are numerous astrology studies, generally published by astrologers, that use the term *research*, but almost all of these studies use anecdotal evidence and do not meet the rigorous standards of scientific research (Urban-Lurain, 1995a). The majority of the

empirical studies have not supported astrology's ability to predict personality characteristics and the few promising results have generally not been replicated or withstood postpublication peer review (Dean, 1986; Dean & Kelly, 2001, 2003; Dean et al., 1996; Eysenck & Nias, 1982; Groome, 2001; Heukelom, 1991; Kelly, Dean, & Saklofske, 1990; Martens & Trachet, 1998). To date, most of the peer-reviewed, empirical studies of astrology have been either blind matching studies, where the ability to match the correct horoscope to a person or a personality profile is tested, or single variable and multivariate experiments, where variables in the natal chart are compared to personality profiles, case histories, or standardized scores from personality assessment questionnaires.

Matching studies. There are at least fifty matching experiments conducted to date in which either the astrologer is asked to match the correct horoscope to an individual who has participated in a questionnaire or personality profile assessment or the participant is asked to identify the correct horoscope interpretation that applies to his or her birth data (Dean & Kelly, 2001). Many of the studies are obscure and it is difficult to locate the original publications. However, meta-analysis data is available, which includes most of the important early studies (see especially Dean & Kelly, 2001, 2003; Dean & Mather, 1977; Dean et al., 1996; Kelly et al., 1990). The major matching studies are reviewed below.

Carlson experiment. Perhaps the most well known and most cited of all the matching studies is Carlson's (1985) experiment that was published in *Nature*, one of the world's most prestigious scientific journals. Carlson proposed to test "the fundamental thesis of astrology" that the moment of birth can be used to predict general personality

traits, temperament, and behavior (p. 419). In an attempt to provide fair conditions for his experimental design, Carlson reported participation from an advisory panel of three astrologers from the National Council for Geocosmic Research (NCGR), an international astrological organization dedicated to education and research in astrology, during the test design stage.

The study consisted of two distinct experiments. The first experiment consisted of two parts. In the first part, 83 subjects were given three narrative horoscope interpretations that were generated by the participating astrologers. One was the correct horoscope interpretation and two were selected randomly from the pool of horoscope interpretations for the other participants. The subjects were asked to select the correct one that corresponded with their birth information, ranking the three interpretations in the order of best fit. The interpretations included descriptions of personality, relationships, career, education, and current life situation. A control group of 94 subjects was asked to complete the same task, but none of the three horoscopes actually belonged to the subject. Carlson's control group consisted of a mixed group of people that included subjects who strongly disbelieved in astrology, subjects who previously had a natal chart constructed for them, subjects under 17 years old, and persons who did not know their exact birth time, birthplace, or birth location. In the second part of the first experiment, 56 subjects and 50 control subjects were given three psychological personality profiles derived from the California Psychological Inventory (CPI) (Gough, 1957) and a two-page summary of the 18 CPI scales used for the profile. They were then asked to select their correct CPI profile, again ranking the three profiles in terms of best fit.

In the second experiment, a group of astrologers were given packets that included a horoscope and three CPI profiles, and asked to match the horoscope to the correct profile. Unlike the subjects, the astrologers were provided with a 28-page interpretation manual of the CPI scales. Once they made their selection, the astrologers were then asked to rate their level of confidence in making that selection. It is important to note that although Carlson mailed out envelopes with the data to 28 astrologers, he reported that some astrologers “refused to participate” after receiving the packets in the mail (Carlson, 1985, p. 421). Unfortunately, Carlson does not say how many astrologers did participate, so the actual number of astrologers who completed the study is unclear (Ertel, 2009; Vidmar, 2008).

Carlson reported that the test subjects could not select their correct horoscope interpretation any better than chance, ranking the correct interpretation 28, 33, and 22 times in first, second, and third place respectively ($p = .57$). The control group ranked the correct interpretation 42, 34, and 18 times in first, second, and third place, which is both in the right direction and is nearly significant as compared to chance ($p = .07$). This is odd, as the control group was selecting from three interpretations, none of which was actually theirs. Carlson referred to this as a “statistical fluctuation” (1985, p. 423), whereas Cornelius (2003) and Vidmar (2008) suggest that the control group may have been compromised and did not serve as an adequate control. Neither the test group nor the control group was able to correctly match the correct CPI profile at a significant level, although it was in the right direction for both: 25, 16, and 15 in first, second, and third place for the test group ($p = .46$) and 21, 13, and 16 in first, second, and third place for the control group ($p = .61$). In the second experiment, the astrologers matched the correct

CPI profile 40, 46, and 28 times in first, second, and third place, which is again in the right direction, but Carlson's analysis was that this was no greater than chance ($p = .32$). From these results, Carlson concluded that "the experiment clearly refutes the astrological hypothesis" (Carlson, 1985, p. 425).

Carlson's article was widely popularized and upon publication, his "proof" that astrology was false was immediately reported in newspapers and on television programs throughout the US, UK, and Canada, causing many in the astrological community to criticize the "media circus" (Vidmar, 2008, p. 14). In spite of its popular appeal immediately following publication, the article has been subjected to withering criticism since then for its poor design, improper methods and procedure, and faulty data analysis (Cornelius, 2003; Ertel, 2009; Eysenck, 1986a, 1986b; T. W. Hamilton, 1986; McRitchie, 2011). Criticisms of the study include the basic research design. Very little demographic detail is provided for the participants in the study, save for the statement that "approximately 70% of the subjects were college students" (Carlson, 1985, p. 421). No demographic information was provided in the study about the astrologers. In particular, noticeably missing is any information about their years of study or practice, education level, or what criteria were used to establish them as experts, which is a considerable flaw in the study considering Carlson's emphasis on the importance of the astrologers participation in designing the study (Vidmar, 2008).

For his experimental methods, Carlson decided to require a 2.5 standard deviation increase over random chance to interpret the results as significant ($p = .01$). This is a rigorous requirement for an exploratory hypothesis study and runs the risk of failing to correctly reject the null hypothesis (Box, Hunter, & Hunter, 2005; Kuehl, 1999). It is

also a higher standard of proof than is typical in the social sciences (Gravetter & Wallnau, 2008) and places a very high demand on the participating astrologers. Using standard deviation, which is a measure of variance, as a criterion for acceptance or rejection of the null hypothesis is also a curious and atypical decision for this type of experimental study (Ertel, 2009).

Additionally, rather than a clearly defined hypothesis or a statement of a null hypothesis, Carlson stated that he was testing “the fundamental thesis of astrology,” which he defined as the proposition that the horoscope can be used to determine the subjects personality traits (1985, p. 419). However, he then tested the ability for astrologers and subjects to recognize a psychological assessment profile and then reached the conclusion that “the experiment clearly refutes the astrological hypothesis” and that although “astrology was given every reasonable chance to succeed . . . it failed” (p. 425). Carlson has been criticized for concluding that astrology doesn’t work instead of concluding that astrologers cannot match a horoscope to a psychological profile that they were not trained to use or interpret (Cornelius, 2003; Eysenck, 1986a; Vidmar, 2008). Ertel (2009) notes that the limits of experimental science dictate that such a definitive conclusion cannot be drawn whether or not the experimenter is able to reject the null hypothesis in a particular study. McGrew and McFall (1990) note that both the subjects and the astrologers failed to select the CPI profile that corresponded to the subject and the horoscope. The test subjects’ inability to select their correct CPI profile (from a validated assessment instrument) could not have been due to the invalidity of astrology. Their failure to complete the task instead suggests some nonastrological difficulty; the same nonastrological factor that may have made it difficult to identify the correct CPI

interpretation may have also contributed to the astrologers' failure. Given this methodological inadequacy, the results should be considered inconclusive, at best.

Carlson (1985) wrote that "care was taken to include all suggestions by the astrologers provided they could be followed without biasing the experiment for or against the astrological thesis" (p. 419). However, after the study was published, Hamilton (1986), one of the participating astrologers cited by Carlson as assisting with the research design, claimed that she wrote Carlson a letter in 1981 (4 years prior to publication) that outlined her objections to the study. Her concerns included the composition of the control group, the fact that astrologers were not told whether the subjects were male or female (a requirement for the CPI), the limitations and complexity of the CPI, and the lack of qualifications to use the CPI. In addition, Erin Sullivan, another of the participating astrologers, since produced a photocopy of a registered letter she sent Carlson in 1981, outlining her questions about the experiment and its validity (Vidmar, 2008). None of these concerns would, at face value, appear to bias the "astrological thesis," but the objections were not noted in the Carlson publication, which Ertel (2009) criticizes as "misleading." Questions about the study's supposed double-blind procedure have also been questioned. Vidmar (2008) published a photocopy of a letter from Carlson to one of the participating astrologers stating that "we are very near interpreting the results as FAVORING [sic] the astrological thesis," while asking her to complete her assigned data submission (p. 21). This would suggest that the study was not double blind and was, in fact, being analyzed prior to and while data was still being gathered.

Ertel (2009) noted that Carlson's data analysis was incomplete according to his own research design. In his methods description, Carlson (1985) stated that "we had

decided to test to see if the astrologers could select the correct CPI profile as either their first or second choice at a higher than expected rate” (p. 425). Instead, Carlson analyzed the first, second, and third choice data separately without providing an analysis of the total effect for those who selected the correct description as either the first or second choice, as proposed. Carlson does not provide a reason for this exclusion. Ertel criticized this type of analysis of the test and control groups, arguing that separate calculation of the deviation from expectancy for both the test and control group violated the logic of control group frequencies, where the test group frequencies were compared to the control group frequencies. Ertel noted that “the actual expectancy of the null hypothesis is no difference between test and control data,” not separate and distinct deviations from expectancy (p. 132). Ertel reanalyzed Carlson’s data, this time combining the first and second choice hits, as Carlson initially planned. Ertel found that astrologers made the correct selection as the first or second choice 86 times versus the expected 77.3, which is marginally significant ($p = .054$) and further discredits Carlson’s claim of having clearly refuted the astrological hypothesis.

It is worth noting that Carlson has also been accused of bias in publishing his article due to his association with the Executive Council of the Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP) (Ertel, 2009; Vidmar, 2008). The CSICOP has long been highly critical of astrology. Paul Kurtz, CSICOP’s chairman-for-life, initiated the “Objections to Astrology” publication where 186 scientists claimed that astrology was unscientific (“Objections to astrology: A statement by 186 leading scientists,” 1975, September/October) and has publically stated that he and the CSICOP encouraged Carlson to conduct the experiment (Kurtz, 2006). Carlson’s advisor

for the project, Richard Muller, is a CSICOP Fellow, and John Maddox, the editor of *Nature* at the time, was also a CSICOP Fellow. Maddox has publically stated that “astrology is a pack of lies in the literal sense. . . . every horoscope is, by denying the objective view of the planets, an attack on the probity of science” (1994, p. 185), which is a very strong statement and could suggest a lack of objectivity regarding astrology research. Vidmar (2008) noted that Carlson’s seven-page article was approved by Maddox for the Commentary section of the journal, which is the editorial opinion section of the journal and is not peer reviewed. Vidmar also made the point that although the support of CSICOP does not, by itself, prove bias, Carlson’s research was privately funded with money from a CSICOP grant, which suggests a possible agenda behind the project. Carlson does acknowledge Muller’s funding, but makes no mention of CSICOP in the article (Carlson, 1985).

Clark experiments. The other widely read and popularized matching experiments are those conducted by Vernon Clark (1970). Clark, a psychologist who sat on the UK Faculty for Astrological Studies, conducted three matching tests of astrologers between 1959 and 1961. Collectively, the tests included 50 astrologers from the United Kingdom, Europe, the United States, and Australia, all of whom had over four years experience as an astrologer. The first experiment was a blind test in which 20 astrologers were asked to match five male horoscopes with the correct five occupations: a snake breeder, musician, accountant, veterinarian, and art teacher. The same astrologers also asked to match five female horoscopes with the correct five occupations: art critic and historian, librarian, musician/poet/playwright, prostitute, pediatrician. In addition to the horoscope, the astrologers were provided with brief narrative descriptions of the horoscope owners’

hobbies, marriage status, and health. Each of the subjects were at least forty-five years old, established in his or her career, with reliable birth times that were either exact or within the quarter hour. A group of 20 psychologists and social workers with no astrological knowledge was used as a control.

The second experiment was also a blind test. Twenty astrologers were given 10 pairs of horoscopes. For each pair, the astrologers were given one case history and had to decide which horoscope was the correct match to that history. In each pair, one horoscope was genuine and the other was generated from a random time and place close to the genuine horoscope's birth data (birth date, birthplace, or time of birth). The third experiment was a double-blind test. Thirty astrologers were provided 10 pairs of horoscopes. One in each pair had been assessed as having a high intelligence (+140 IQ) and the other had brain damage (cerebral palsy). Independent physicians and psychologists supplied the data for the subjects and an independent astrologer created the natal charts, so that Clark had no knowledge of the data or answers.

The astrologers average scores on the three tests are a statistically significant: 6.4, 7.2, and 5.9 out of ten ($p < .01$). The average scores for the control groups controls for the three tests were 5.0, consistent with chance. The success of Clark's matching tests was widely popularized in astrological circles and spawned a series of similar experiments that have been collectively referred to as "Vernon Clark experiments" (McGrew & McFall, 1992; Phillipson et al., 2003). However, Clark's results have never been replicated, and although a handful of studies showed slightly better than chance results (Joseph, 1975; Vidmar, 1979, March), meta-analysis of 54 existing matching tests where a total of 742 astrologers matched a total of 1,407 horoscopes show results no

better than chance (Dean et al., 1996). Additionally, as Eysenck and Nias (1982) note, the participant selection is questionable in many of the matching tests because of the failure to control for previous astrological knowledge. Eysenck and Nias also contend that the results of virtually all the matching tests done to date are consistent with the use of small samples where sampling variations are mistaken for genuine effects (pp. 86-87).

McGrew and McFall experiment. Although the Carlson (1985) and Clark (1970) studies dominate the literature, McGrew and McFall (1990, 1992) conducted a little-known, but well-designed matching study. In collaboration with the Indiana Federation of Astrologers (IFA), McGrew and McFall's experiment tested the ability of six professional astrologers and one control subject (a graduate student in clinical psychology with no astrological knowledge) to match the correct horoscope to 23 individual, volunteer test subjects. With the participation of the IFA, McGrew and McFall created a 61-item questionnaire that each of the test subjects completed. The questionnaire covered a broad range of personal information, including (but not limited to) hobbies, interests, religious beliefs, physical characteristics, personal talents and achievements, family background, dates of significant life events (births, deaths, major geographical relocations), and attitudes toward authority, sex, and commitment. The test subjects also completed two standardized psychological tests—the Strong-Campbell Interest Inventory and the Cattell 16PF—to provide further information about general interests, potential vocations, and personality traits. Additionally, two photographs of the test subjects, frontal and profile, were provided to determine body types. The final experimental protocol was approved by the IFA as fair and the organization agreed to sanction the project.

All of the 23 test subjects were Caucasian (4 men, 19 women). Each of the volunteer test subjects had responded to an announcement in the local newspaper for free vocational testing for native-born American adults who were at least thirty years old. Soliciting volunteers for vocational testing was chosen to control for astrological bias in the study. The age range was a request by the IFA to ensure mature personality characteristics. The volunteers were asked to bring accurate information about their birth date, birth place, and time of birth, and told that the experiment included testing for the possible influences of the maternal diurnal cycle on personality development. The volunteers were not informed of the astrological nature of the study until after they had completed the testing, although McGrew and McFall reported that two of the volunteers said during debriefing that they had suspected the study had something to do with astrology.

The astrologers and control subjects were given two sets of information. One set had all the materials completed by the test subjects, grouped into 23 personal information files. The other set had the birth information and horoscopes for the test subjects. The astrologers and the control were asked to match the horoscope to one of the personal information files as the best fit and rate their level of confidence in the match (0 to 100 with 100 = total confidence). They were also offered the option of selecting an unlimited number of alternative choices for each case; confidence levels were not recorded for alternative choices.

The number of correct matches by the astrologers ranged from 0/23 to 3/23 with a median of one correct match, which is no better than chance ($p = 0.53$). The control subjects, who matched the horoscopes randomly, achieved three matches, equal to the

most successful astrologer. When the astrologers' alternative choices were substituted for their incorrect first choices, they still performed no better than chance ($p = 0.79$). Additionally, there was little relationship between the astrologers' confidence-level and the accuracy of their predictions. The mean confidence level for the correct matches was 76.4 as compared to 72.8 for the misses, which is not statistically significant ($p = 0.64$). Pair-wise comparison of the agreements between astrologers yielded 25 agreements versus the 15 expected by chance, which is statistically significant ($p = .01$). However, the percentage of agreements is very small: just 7% of the 345 total judgments, which is an important reliability consideration when astrologers are expected to be able to perform consistent interpretive analyses.

In their analysis, McGrew and McFall (1992) report that Mull, one of the participating astrologers in the study, referenced the complexity of the horoscope as a confounding factor after the study was completed; specifically, the test subject was matched to a natal chart with Sun in Sagittarius when the correct natal chart had the Ascendant in Sagittarius (Mull, 1986, as cited in McGrew & McFall, 1992). Elwell also criticized the study as flawed due to the nature of a subject pool that was solicited with an offer of free personality and vocational testing, arguing that these types of volunteers are limited in self-understanding and self-awareness as exemplified by their interest in personality testing (Elwell, 1991, as cited in McGrew & McFall, 1992). Although this argument is not without merit, McGrew and McFall's use of the carefully constructed, IFA-approved questionnaire and the two additional, well-validated psychological assessment instruments was a thorough and comprehensive manner to assess for current personality and behavioral characteristics, self-awareness notwithstanding.

Nanninga experiment. Nanninga (1996) also conducted a matching test he titled “The Astrotest” in which professional astrologers were involved in the experimental design. Initially, Nanninga placed an advertisement in a Dutch national newspaper offering \$5000 Dutch guilders (~\$US3000) to any astrologer who could successfully match seven horoscopes to their owners. Nanninga reported that more than seventy astrologers initially replied. Nanninga then asked the volunteers to participate in the creation of a personality profile questionnaire to give to the test subjects. The volunteers sent in an average of ten questions each that Nanninga synthesized into a master list of 25 questions that covered subjects such as education, vocation, hobbies, interests, goals, personality, relationships, and health. Nanninga added three multiple-choice questions about family background and 24 questions from the Berkeley Personality Profile (Harary & Donahue, 1994) to round out the questionnaire. Nanninga reported that he gave the questionnaire to “eight experienced astrologers” who “had no major objections” (Nanninga, 1996, p. 17); unfortunately, Nanninga did not provide any more demographic details about the astrologers who approved the questionnaire.

Ultimately, 44 astrologers participated in the actual experiment. Each participant was asked to match seven horoscopes to seven test subjects who completed the questionnaire. For his test subjects, Nanninga selected seven people who were born “around 1958” (date range = June 2, 1957 to August 7, 1959) who supplied birth certificates with birth times. Nanninga did not provide any details regarding where or how he found his volunteer test subjects. The test subjects’ occupations varied widely: biology researcher, TV director/writer, social welfare coordinator, marketing manager, hotel owner/cook, medical secretary, and meditation trainer. The astrologers who

volunteered to participate in the matching test were surveyed prior to the test about their levels of experience. Over half reported doing more than one hundred professional interpretations of horoscopes, nearly one-third reported that they were frequently paid for their services, and a quarter of the astrologers were members of the Dutch Society of Practicing Astrologers. The participants were also invited to submit their level of confidence in the task prior to completion. Thirty-six participants responded to the confidence-level questions; 18 expected to match all seven horoscopes and only six expected to match less than 60%.

Twenty-two (50%) of the participating astrologers scored no hits. The most successful participant matched three of the seven horoscopes to the correct test subject, which is strikingly low compared to the level of confidence expressed by the participants. The mean level of hits expected by chance was 1.0; the average number of hits by the participants was .75 with a mean effect size of -0.04. Nanninga also tested for astrologer agreement. The mean agreement between all the participants was 0.01. Of the 49 possible combinations, none was selected more than 12 times by the 44 participants. Only two of the 44 participants submitted the same seven solutions, but their seven choices for best fit were no better than chance. Although he does not supply the actual data, Nanninga reported that there was no difference in success rates or agreement between the most and least experienced of the astrologers.

Matching studies analysis. As a whole, matching studies in astrology have failed to confirm the hypothesis that the horoscope influences personality. Dean and Kelly (2003) reported more than forty studies involving astrologers matching horoscopes with information from personality profiles or case histories, with $n = 700$ astrologers and

$n = 1150$ horoscopes. A previous meta-analysis of those studies by Dean, Mather, and Kelly reported a mean effect size as a correlation of .05, with a standard deviation of .118 (Dean et al., 1996). Generally, an effect size of .20 is considered small, .50 represents medium effect, and .80 is a large effect size (J. Cohen, 1988). Thus, the mean effect size of .05 for the matching studies is very small to the point of almost no effect.

However, that reported effect size should be approached with some caution. Dean, Mather, and Kelly (1996) appear to have used a method to calculate the meta-analysis effect size, in which they adjusted the effect size to what they referred to as the “true effect size” by a formula in which the true effect size = the “observed effect size” divided by the square root of the reliability measure (p. 72). Unfortunately, the meta-analysis publication did not provide any data for the reliability measures, nor a list of the studies on which the original observed effect size and reliability were calculated, which in itself is unusual for a scholarly meta-analysis publication. Additionally, the authors report that most astrology studies are poorly designed, but presumably included those studies in the meta-analysis. According to Slavin (1995), using poorly designed studies in a meta-analysis contaminates the resulting measure; in other words, the low correlation measure could be a result of the selection of the studies as much as a statement about the ability of astrologers to match horoscopes.

In addition to having the astrologer match the horoscope to the test subject, other matching studies involve having subjects select their own horoscope interpretation from a selection of interpretations that have cues such as dates or astrology interpretive keywords removed (i.e., not including words like *emotional*, which is an astrology keyword for the Water signs: Cancer, Scorpio, or Pisces). Dean, Mather, and Kelly

(1996) reported a meta-analysis of 17 self-selection studies totaling 438 people in which the first choice selection (best fit) has a mean effect size of .13 with a standard deviation of .14. However, when the studies were divided into those that controlled for astrological cues (such as Sun-sign keywords), the effect size for the controlled studies was .06 versus .25 for self-selection studies without cue control. Martens and Trachet (1998) conducted a meta-analysis of seven self-selection studies with a total of 230 participants. The studies ranged from two to six interpretive horoscope descriptions from which the subject had to choose the correct one. The meta-analysis indicated that the subjects selected the correct horoscope interpretation 80 times versus the 83 expected by chance. Again, however, neither of the two meta-analyses provided a list of the studies or the data for which the meta-analysis was conducted.

Although the meta-analysis studies suggest that the existing research has failed to support an astrological effect, the failure to provide the data or a list of the studies considered is unfortunate. Additionally, drawing conclusions from the matching tests is difficult. Some of the studies were designed with the participation of professional astrologers, but many of the matching studies do not clearly state whether the experimenter had training or experience with natal chart construction or analysis, which introduces the question of whether these individuals understood the subject well enough to establish the test limits and account for test error, as well as identify their own assumptions. Many of the matching studies (and resulting meta-analyses using these studies) have been designed and conducted by skeptics of astrology, which implicates potential bias in the experiment. Additionally, the matching studies do not have clearly defined predictor variables except for the ability to select the correct horoscope better

than chance. Although this allows for the “whole chart” analysis (see Dean, 1985b; van Rooij, 1994b), this does not allow for determining which astrological variables the astrologers were using and is a challenge to detailed and rigorous construct validity measures of the horoscope. Additionally, matching tests require individual astrologers’ interpretations, whether in creating the horoscope interpretation reports or in their own analysis. This introduces the question of reliability in the astrologers’ abilities, which is a confounding factor when testing the validity of the horoscope; in other words, poor performance by astrologers does not necessarily mean that the horoscope is invalid.

However, the overall meager agreements between astrologers when matching the horoscopes to personality profiles are cause for concern. Dean and Kelly reported a meta-analysis of 25 studies of astrologer agreement involving close to 500 astrologers with a mean agreement of only 0.10 as a correlation (Dean & Kelly, 2001; Dean et al., 1996), although once again no data or a list of the studies considered was provided and the correlation was calculated to adjust for a “true effect size” as defined by the authors. Comparatively, in the social sciences, usually anything below .40 would be considered poor agreement (Fleiss, Levin, & Paik, 2003). Astrology’s presupposition that the horoscope allows the astrologer to determine personality structures is essentially a diagnostic position and is comparable to a psychologist’s use of a personality assessment instrument. Like personality assessment scores, the horoscope needs to be interpreted; it does not exist as an independent diagnostic entity and agreement between astrologers about the horoscope’s meaning is crucial. The diagnostic inter-rater reliability for psychiatrists and psychologists typically range from .65 to .90 (Felner, 1994; Matarazzo, 1983; Skre, Onstad, Torgersen, & Kringlen, 1991). Dean, Mather, and Kelly (1996)

conducted a comparative meta-analysis of inter-rater reliability on psychological assessment measures and reported ranges between .60 and .92. Comparatively, the .10 reportedly achieved by the astrologers in the studies considered for the Dean, Mather, and Kelly meta-analysis is meager.

Inter-rater reliability and agreement are essential for scientific measurement because without scoring agreement and consistency, it is generally not possible to determine most other reliability and validity measurements (Cone, 1988; Fleiss et al., 2003). Kolbe and Burnett (1991) assert that “high levels of disagreement among judges suggest weaknesses in research methods, including the possibility of poor operational definitions, categories, and judge training” (p. 248). In other words, the apparent inability for astrologers to consistently diagnose and interpret the horoscope consistently, as compared to their peers, makes measuring the validity of the horoscope difficult, introduces questions about astrologer training methods, and suggests poorly defined variables. For the purposes of this study, the historically poor inter-rater reliability among professional astrologers suggests that individual astrologer interpretations of the horoscope is a questionable means by which to test the hypothesis that the horoscope can predict personality measures. More objective, standardized assessment instruments correlated with the factors in the natal chart is one way to control for the questions of astrologer reliability. Existing single variable and multivariate analysis studies of astrology are reviewed below.

Sun sign experiments. Sun sign astrology is the means by which most people know about astrology. Although it is nearly impossible to know the points and positions in the natal chart at any given time without making calculations using charts, tables, an

ephemeris, or computer software, one can identify the astrology sign that the Sun is located in simply by knowing the day of the month. Thus, Sun sign astrology is the most common means by which people are introduced to astrology. When people identify themselves by an astrology sign, such as “I am a Virgo,” they may not even know that this means that the Sun in their natal chart was in the sign of Virgo at the moment of birth (using a Western, Tropical zodiac). In fact, it is likely that most people think that their Sun sign *is* their astrology sign.

Accordingly, there have been numerous single variable analyses of Sun signs and personality traits. Generally, all of them have found little or no relationship between the Sun sign and personality (e.g., Abdel-Khalek & Lester, 2006; Bastedo, 1978; Clarke & Gabriels, 1996; Culver & Ianna, 1988; Gauquelin, 1982; Hentschel & Kiessling, 1985; Jackson & Fiebert, 1980; McGervey, 1977; Saklofske, Kelley, & McKerracher, 1982; Startup, 1984; Tyson, 1980, 1984; van Rooij, 1993; von Eye, Lösel, & Mayzer, 2003; Woolson, 1988). Outside the realm of testing for correlations between Sun signs and personality variables, but notable nonetheless, Vermeer (1992) tested whether there was a relationship between astrology Sun signs and the length of life with special attention given to the commonly held astrological theory that people with Sun signs in Capricorn live longer than people with other Sun signs. Vermeer collected birth and death data from all the tombstones in seven cemeteries in the Netherlands. Vermeer excluded any infants who died within six months of birth for a total sample size of 7,136 individuals. One-way ANOVA revealed no relationship between life span and Sun sign, and Capricorns scored below the mean for longevity.

Reichardt (2010) recently published a study that is remarkable because of its extraordinarily large sample, which would make it sensitive to even very small effects (J. Cohen, 1988). Reichardt tested a number of common, well-known astrological descriptions for various Sun signs related to sex and marriage (e.g., people born under the sign of Cancer are family oriented and desire the emotional security of marriage). To conduct his test, Reichardt used data from the General Social Survey (GSS). The GSS database is publically available and is compiled from the responses to hundreds of questions related to demographics and social attitudes (Smith, Marsden, Hout, & Kim, 2010). The GSS has been conducted yearly or every other year since 1972 and currently has a cumulative sample of over 53,000 adult respondents. Reichardt cross-tabulated responses from the data set about sexual and marriage activity with the respondents' available birth information to establish a sample size of 22,337, from which he then compared data responses to Sun signs. Overall, there was very little difference between Sun signs in the frequency of sex in the past 12 months with differences of $\pm 0\text{-}2\%$ from the statistical norm for all but one of the cross-tabulation cells: 8% of those with their Sun in the sign of Aquarius had sex once a month compared to 11% of the norm, which is statistically significant. However, the effect disappears in significance when compared with the other frequency categories for Aquarius: 19% of Aquarians have sex 2-3 times a month (norm = .17), 19% have sex weekly (norm = .19), 21% have sex 2-3 times per week (norm = .21), and 7% have sex 4+ times per week (norm = .07). Similarly, there was little difference between signs for extra-marital affairs or marital status. There was also little difference between Sun signs in reported political views. In fact, the results were slightly in the wrong direction for a couple of strongly held astrological beliefs. For

example, the data indicated that Sagittarius is more politically conservative than Taurus or Capricorn (.36 compared to .35 and .35 with $N = 40,637$), and Gemini is less likely to have an extra-marital affair than Cancer (.12 compared to .13 with $N = 21,012$), neither of which is supportive of common astrological associations for Sagittarius and Gemini.

Eysenck experiments and astrological self-concept. The Eysenck Personality Inventory (EPI) (Eysenck & Eysenck, 1964) and the revised version, the Eysenck Personality Questionnaire (EPQ) (Eysenck, 1975), have been the most common psychological assessment instruments used in astrology variable experiments since 1978. The EPI measures two personality dimensions: Extraversion and Neuroticism. The EPQ added a third factor: Psychoticism. The Extraversion and Neuroticism traits in the EPI and EPQ are very similar to the Extraversion and Neuroticism factors in the Big Five personality model (Costa & McCrae, 1992b; Draycott & Kline, 1995; Saggino, 2000). In systems, the Extraversion scale measures introversion and extraversion traits along a spectrum and the Neuroticism scale measures the spectrum of emotional stability with calm, even-tempered, and stable on the low-end and high experiences of positive or negative emotion on the other end. (Although it has not been a factor in the majority of the studies that use the EPQ, the Psychoticism scale measures the spectrum of aggression and hostility with agreeableness.)

The principal reason for the popularity of the EPI and EPQ in astrology research is likely the influence of the first major study in which the EPI was used. At the time of its publication, the Mayo, White, and Eysenck (author of the EPI) study (1978) was one of the largest statistical analyses of astrology that had ever been conducted. Utilizing the EPI, the authors set out to test the common astrological theory that the positive Sun signs

(Aries, Gemini, Leo, Libra, Sagittarius, and Aquarius) are more extraverted than the negative Sun signs (Taurus, Cancer, Virgo, Scorpio, Capricorn, and Pisces). The study also tested the common astrological belief that the three water Sun signs (Cancer, Scorpio, and Pisces) are more emotional than the other nine Sun signs. In order to test the hypotheses, 917 male and 1407 female adult subjects completed the EPI and their scores on the Extraversion and Neuroticism scales were correlated with the Sun sign groups. The results clearly supported both hypotheses. All six of the positive Sun signs had significantly elevated scores on the Extraversion scale with all six of the negative Sun signs scoring lower than average. Additionally, all three of the water Sun signs had significantly elevated scores on the Neuroticism scale and every other Sun sign (except for Aries) had below average mean scores. The results of the study were widely dispersed and hailed as the most important development in astrology research that had been conducted to date (Dean et al., 1996; Eysenck & Nias, 1982), although it is noteworthy that no effect size was provided in the analysis.

One of the initial appeals of the study's findings was the size of the sample, which was much larger than anything previously tested in an astrology study. However, this was not a random sample. Each of the participants initially contacted Mayo requesting a predictive astrology horoscope and was then asked to participate in the study. The fact that every participant initially contacted a professional astrologer for a predictive horoscope strongly suggests that all the participants valued or believed in astrology prior to participation in the study (Martens & Trachet, 1998). Eysenck later reported that many of the subjects were, in fact, "particularly interested" in astrology and some were actually astrology students (Eysenck & Nias, 1982, p. 57). Mayo et al. (1978) attempted to

control for previous knowledge of astrology by dividing their sample into two groups: one-third were classified as knowledgeable about astrology and the other two-thirds were considered naïve about astrology. Comparing the results of the two groups did not reveal any statistically significant difference in their scores, causing the authors to conclude that “knowledge of astrological principles was not a causal factor” (p. 234). However, Eysenck later clarified that the naïve group was classified into this group because they answered “nothing” to the question “how much do you know about interpreting an astrological chart?” (Eysenck & Nias, 1982, p. 52). Interpreting a horoscope is a complex endeavor. It often takes months or years of training to learn all the rules, factors, and associations. However, this does not mean that the naïve group was unaware of the main characteristics associated with their Sun sign. As popular as astrology is, people who have never seen a horoscope may still know a fair amount about their Sun sign, as is evidenced in countless social engagements where the conversation starts with questions like, “What’s your sign?”

With this in mind, Pawlik and Buse (1979, 1984) set out to test the proposition that previous astrological knowledge was an artifact in the Mayo et al. findings. A sample of $n = 799$ was solicited via a large, Hamburg, daily newspaper. The participants were informed that the study was a “scientific investigation of astrology” and participants were invited to take part “regardless of their attitude toward astrology” (Pawlik & Buse, 1984, p. 17). In the same manner as the original study, Pawlik and Buse first had the subjects complete a German translation of the EPI (Eggert, 1974) and they were sorted into their corresponding Sun sign groups. After completing the EPI, the subjects were also asked to complete an additional questionnaire designed specifically to identify

knowledge of astrology as an intervening variable. The 11-item questionnaire addressed three aspects (established through factor analysis): frequency (if any) and purpose for consultation with an astrologer, frequency (if any) and purpose of reading horoscopes, and personal belief about a connection between astrology and personality. Subjects who believed in a connection between astrology and personality (item 4) and recognized the personality profile that belonged to their Sun sign (item 6) were rated as “believers in astrology,” as were any subjects who answered at least four of the ten questions in favor of astrology (32% of the sample). Any subject with at least six positive answers for astrology were labeled “strong believers” (38% of the sample) and the remaining subjects were labeled “non-believers” (30% of the sample). Based on this rating, Pawlik and Buse further divided the Sun sign groups into their respective sub-group and correlated the scores of the EPI. Although the scores for the believers and the strong believers confirmed the Mayo et al. findings, the nonbelievers showed no discernible effects greater than chance. Pawlik and Buse concluded that simply having a positive view toward astrology could be sufficient to alter one’s perception of their own character and cause a person to answer a personality questionnaire with the corresponding attitude. In their discussion of the results, Pawlik and Buse strongly cautioned against any attempt to investigate a personality hypothesis without appropriate control provisions.

Following the Pawlik and Buse study, Eysenck and Nias (1982) designed a different protocol to test whether people who were genuinely ignorant of astrology would tend to select traits associated with their Sun sign. Using a sample of 122 adults selected from adult education classes in art and economics, as well as some trainees in the Salvation Army, they gave each participant 12 sets of personality traits descriptors

presented in random order. Each set had six descriptive words or phrases that were similar in nature, such as “proud, magnanimous, generous, domineering, conceited, shows off” and “cautious, practical, persevering, selfish, exacting, narrow mind.” Although the sets were common keywords for the 12 astrology signs, participants were not told that there was any astrological element to the experiment and there were no identifying factors to alert participants.

Eysenck and Nias then asked the participants to choose the set of descriptors that best matched their personality characteristics, along with a second-best and third-best set. After the participants made their three selections, they were informed that the 12 sets represented the 12 signs of the zodiac. The second part of the experiment consisted of asking the participants to identify which set they thought corresponded with their astrology Sun sign (irrespective of whether they identified with it or not), again making a best match, second-best, and third-best selection. Participants who said that they had no idea which set corresponded with their astrology sign were encouraged to guess. The participants were then divided into three groups according to their responses to the second part of the experiment. Those who correctly selected the set of descriptors associated with their astrology sign were classified as “knowledgeable” (46/122, 38%). Those who guessed wrong with all three of their selections were classified as “ignorant” (50/122, 41%). Those who guessed correctly on their second or third selection were classified as “borderline” (26/122, 21%).

Eysenck and Nias then examined each of the three groups and their original best, second-best, and third-best selections of the personality descriptors (prior to knowledge that they were astrological keywords) that most matched their self-identified personality

characteristics. Although 17 of the 46 the participants in the knowledgeable group selected the set that corresponded to their astrology Sun sign as the best match (versus the 3.8 expected by chance), only three participants in the ignorant group selected the corresponding astrology sign set as the best match (slightly under the 4.2 expected by chance), and only two of the borderline group selected the corresponding set (exactly the 2.2 expected by chance). Eysenck and Nias concluded that the marked tendency for the knowledgeable group to assess their personality characteristics in accordance with their astrological sign's professed attributes suggests that people can be influenced in their own self-assessment by knowledge of astrology.

Since then numerous additional studies have confirmed that previous knowledge or belief that astrology affects personality development is a confounding factor in astrology studies, as well as a powerful influence on self-identification and self-concept (Dean, 1983; Fichten & Sunerton, 1983; M. M. Hamilton, 1995, 2001; Shaughnessy, Neely, Manz, & Nystul, 1990; Snyder, Larsen, & Bloom, 1976; van Rooij, 1994a, 1999). The argument has been repeatedly made that this "self-attribution" factor or artifact can potentially contaminate any astrology study that compares self-identified traits with astrology Sun signs unless the study considers and identifies the level of astrological knowledge (see especially Dean, 1986; Dean & Kelly, 2001; Eysenck & Nias, 1982; Kelly, 1997; Kelly et al., 1990; Martens & Trachet, 1998; Phillipson et al., 2003). Eysenck and Nias (1982) further argue that even people who claim no knowledge of astrology still may have some knowledge of their Sun sign simply due to the pervasive popularity of astrology in newspapers and magazines. In their study, most of the participants in the borderline group said that they did not know what traits were

associated with the astrology signs, but when they were encouraged to guess, their trace knowledge may have contributed to them getting it right in the second or third-best selections.

These studies are important because of the suggestion that individuals' knowledge of astrology or their own horoscope can affect how they answer personality assessment measures. However, the studies do not clearly explain how knowledge of astrology affects personality development if, in fact, it does. The question of whether previous astrology knowledge contributes to a self-selection for personality characteristics or whether knowledge of astrology becomes incorporated into stable personality characteristics is unclear. It may also suggest that individuals are exposed to astrology (through the prevalence of Sun sign discussion) and the characteristics "fit" some aspect of their personality with which they already identify. More research needs to be conducted into this phenomenon; regardless, previous knowledge of astrology is a likely artifact that must be considered carefully for any astrology-based personality research.

Other astrology variables. There are surprisingly few statistical studies of variables in the natal chart beside the Sun sign. In one of the most varied, Dean (1985a) used an existing sample of 1198 subjects who completed the EPI, all of whom had known birth times. Dean identified 54 "extreme" subjects in four categories: high/low scores on the Extraversion scale and high/low scores on the Neuroticism scale. Using multiple discriminant analysis, Dean tested many factors in the natal chart, including signs, elements, *aspects*, *angularity* (planets located at the Ascendant or *Midheaven*), and *hemispheric dominance* (a majority of planets grouped on one side of the horoscope). The results of 132 tests showed that no factor performed consistently above chance level.

After an initial pilot study that found a significant lack of individuals with the Moon in the sign of Pisces in a sample of 359 professional athletes (16 observed vs. 30 expected, $p = .05$), Woolson (1988) conducted a larger study of 1,210 eminent football (soccer) players that failed to replicate the Pisces deficit in Moon signs in initial study (99 observed vs. 101 expected, $p = .84$). Dwyer (1987) designed a 36-item questionnaire (answers on a 7-point scale) designed to test common astrological associations with the planet Pluto in the natal chart. After administering the questionnaire to 175 volunteer participants and correlating the answers with the subjects' planet to Pluto *aspects* in the subjects' natal charts (astrologically important angular degree relationships between planets and points in the 360° horoscope), Dwyer found no relationship to support the Pluto associations. Dean and Smit (1987) conducted a follow-up analysis of Dwyer's data, using factor analysis to identify three distinct themes, none of which appeared to have any relationship to Pluto in the natal charts. Riley (1984) tested the sign positions of the Ascendant, Sun, Moon, Mercury, Venus, and Mars by comparing them with extreme Extraversion and Neuroticism scores from 24 subjects who completed the Eysenck Personality Inventory (Eysenck & Eysenck, 1964). Although a very small sample comparatively, Riley found no significant relationship between any of the variables ($r = .02$ for E and $-.02$ for N).

A little-known study by Tiggle and Fiebert (1979) is one of the few to report a positive correlation. Tiggle and Fiebert tested the hypothesis that there would be a significant relationship between hostility as assessed by the Buss-Durkee Hostility-Guilt Inventory and the positions of Mars and Pluto in the natal chart. As a control analysis, a nonsignificant relationship between the hostility scale and the effects of Venus was

predicted. As predicted, the results of the study indicated that there was a significant correlation between hostility scores and the placement of Mars in the natal chart, and no significant correlation with Venus and Pluto placements. The lack of discussion about the study is curious. A Google Scholar search (2011) indicated that the Tiggie and Fiebert study has only been cited three times in a scholarly article; one publication also had Fiebert as a co-author and simply referenced the study results as “largely unexplored” (Jackson & Fiebert, 1980, p. 156).

Gauquelin studies. The most cited, reviewed, praised, and reviled statistical research of horoscope variables is that conducted by Michael and Françoise Gauquelin (his co-author on many studies), and their prodigious volume of work must be considered in any literature review of astrology research. Michael Gauquelin was a French psychologist, statistician, and prolific author who studied and analyzed multitudinous factors in the horoscope, using extraordinarily large samples of birth data (e.g., Gauquelin [1955] used a sample of 5824 participants and Gauquelin [1960] used 20396 participants), in an attempt to determine whether or not there was statistically significant relationship between an individuals’ natal charts, their psychological character or temperament, and their success at a given profession (see especially Gauquelin, 1955, 1960, 1969, 1970, 1979, 1983, 1988). Gauquelin did find relationships between certain planetary placements (Mars, Jupiter, Saturn, and the Moon) located in specific areas of the natal chart and professional eminence in distinct career paths (these areas in the horoscope roughly correspond to the *angles* of the natal chart (represented by the Ascendant and Midheaven line). For example, the research demonstrated that the planet Mars at these points in the natal chart corresponded with professional athletes and sports

champions, which was considered to be validation of the characteristics of assertiveness, aggressiveness, and competitiveness, all of which are attributed to Mars in astrology. This intriguing discovery is collectively referred to as the Mars Effect and the specific areas of the horoscope that Gauquelin identified are commonly referred to as the Gauquelin Zones. Gauquelin's research findings have withstood rigorous tests and intense controversy (best summarized in Ertel & Irving, 1996). Ertel and Irving (1996) replicated the effect after reanalyzing data collected by U.S and French skeptics. Müller and Ertel (1994) also replicated the effect, using a more recent 1972 version of the French Académie de Médecine directory than the 1939 version that Gauquelin (1955) used for his initial study.

Gauquelin's Mars Effect has been hailed by astrologers as the best research available to support the field. Addey (1996) claimed that "never again will scientists be able to close their eyes to one of the primary truths about man's relationship to the cosmos" (p. 69). West (1991) called Gauquelin's studies "the single most compelling body of evidence supporting astrology" (p. 433), and Malsin (1997) stated that "because of the magnitude of his experiments, his findings constitute the strongest experimental case yet made for astrology" (p. 77). However, Gauquelin himself was very clear that his findings did not fit traditional astrological patterns (Gauquelin, 1979). In addition to the Mars Effect studies, Gauquelin tested virtually every variable in the horoscope, including signs, aspects, and transits, and his results were uniformly negative (Gauquelin, 1970, 1982, 1983). Gauquelin also tested the ability of astrologers to predict people's character and traits from interpreting the natal chart (an early form of matching studies) and found no reliable effect, leading him to conclude that "the majority of the elements in a

horoscope seem not to possess any of the influences which have been attributed to them” (Gauquelin, 1991, p. 20).

Although Gauquelin’s research is intriguing and worth continued inspection and replication, the research protocols for the Mars Effect and the overall results from his other studies are not directly applicable to the research proposals of this study. One possible avenue for further research in which Gauquelin’s work would be crucial is the theory that the planets located in the Gauquelin Zones or near the angles of the horoscope will influence personality characteristics.

Single variable and multivariate experiments analysis. Although the single variable and multivariate experiments potentially allow for more nuanced analysis of the horoscope and its effect on personality, the overall results have not performed any better than the matching studies. Dean, Mather, and Kelly (1996) identified 40 existing studies in which factors in the horoscope were correlated with personality tests, IQ tests, or case histories. Meta-analysis of those studies indicated a mean effect size, as a correlation, of .05, the same meager effect as the matching studies (once again using the authors’ modified “true effect size” calculation, described previously in this chapter in the matching studies analysis, without providing data or a list of the studies considered). However, the overwhelming dominance of Sun sign studies when compared to studies of other variables in the natal chart suggests a gap in the research. As noted previously, Sun sign studies are easily corrupted by previous knowledge of astrology signs, which is near ubiquitous because of the widespread publication and discussion about Sun sign horoscopes; even those who despise astrology cannot help but hear some of the common general keywords for the Sun signs (e.g., Aries = impatient, Gemini = talkative, Scorpio

= intense, Virgo = detail-oriented). There have been few studies of any factor other than the Sun sign and even less experiments where combined factors, such as the Sun and Moon signs, are tested. Unlike the limits of the matching studies where either the correct horoscope is identified or not, the promise of multivariate experiments is that many different factors in the horoscope can be tested individually and in combination. The review of the literature suggests that this is a significant gap in the existing research.

Summary of the Literature Review

Astrology is an ancient discipline with a long and varied history as a field of study and means of predicting and measuring events and personality characteristics. Although astrology virtually disappeared in Europe with the dawning of the scientific revolution, it has achieved a resurgent popularity since the turn of the 20th century. Although astrology is currently taught in some universities and other academic settings worldwide, academics are generally critical of astrology. Some critics have dismissed astrology outright as a pseudoscience; others have studied astrology's tenets and principles and have criticized the field at the level of its methods. Numerous detractors assert that there is little consensus among astrologers on the basic theories and techniques and contend that the sheer number of factors allow astrologers to choose, after the fact, from multiple combinations of factors to fit the event. The general conclusion by critics is that astrology is not a valid discipline because of its basic lack of reliability.

Thus far, the majority of the astrology research studies have either been blind matching studies that test the astrologer's ability to match the correct horoscope or single variable studies of the Sun sign and personality factors. Meta-analysis of both types of studies has not supported astrological theories. It is notable that few studies have

considered horoscope variables other than the Sun or combinations of major horoscope variables and the relationship (if any) between personality factors as measured by validated assessment instruments. Additionally, previous horoscope studies that have compared psychometric data from personality assessment measures almost exclusively used the Eysenck Personality Inventory (EPI) or the revised Eysenck Personality Questionnaire (EPQ), in spite of there being a number of other personality assessment instruments available, including the NEO PI-R, currently one of the most widely used and validated personality assessment instruments (Costa & McCrae, 2003). Addressing this gap, this study is designed to contribute to the research in astrology by testing the relationship, if any, between the personality domains of the NEO PI-R and the independent Moon variable in the natal chart.

Chapter 3

Theoretical Basis for the Research Hypotheses

Testing Astrology Variables

Although millions of people believe that the natal chart reliably reflects personality characteristics, critics have argued that the belief in astrology is simply a hypothesis until it is verified under artifact-free conditions (Dean, 2003; Dean & Kelly, 2001; Kelly, 2001; Phillipson, 2000; van Rooij, 1994b). Yet, this position generates controversy. Some astrologers disagree that the horoscope can be empirically studied, contending that the “entire horoscope” needs to be considered to do an interpretive synthesis (multiple variables) or that statistical studies fail to capture the meaningful interaction between astrologer and client (Arroyo, 1989; Brockbank, 2003; Harding, 2000; Perry, 1993, 1995; Phillipson, 2000, 2006; Vaughan, 1998, August/September). Arroyo (1989) claimed that statistical studies of astrology are “almost universally pointless (because) only experiments with living people in a clinical situation can show astrology’s value and validity in its guidance, counseling, and psychotherapy applications” (p. 13). However, Arroyo’s statement is embedded in a chart interpretation handbook that provides a listing of single variable interpretation guides (a type of guide commonly referred to as an astrology *cookbook*) for the various positions of the horoscope’s planets, signs, and *houses* in relation to personality characteristics. These types of factors are similar to the personality scales of well-validated personality instruments and theoretically, it suggests their validity as factors can similarly be tested.

Perry (1993) asserted that “astrology does not deal with quantities that can be objectively measured” because the horoscope reflects both conscious and unconscious

personality dynamics (p. 7). Yet, prior to this statement, Perry explained astrology's origins by claiming that:

The stargazers of antiquity systematically recorded their observations of heavenly movements and correlated these with observable events on earth. Through ongoing inductive analysis, these early explorers gradually reached certain conclusions as to the meaning of the variables in question and passed these down to succeeding generations. (p. 2)

If the origins of astrology theoretically took root after stargazers isolated the movements of the planets through the signs of the zodiac and compared them to events on earth, then some form of modern variable analysis should conceivably render reliable, observable, consistent factors. Additionally, astrologers universally agree that astrology does not manifest 100% of the time, but is typically evident most of the time. This is a probability-based orientation, which suggests that quantitative, statistical approaches to astrology research are suitable (Phillipson, 2000).

Defining Astrology Variables

When astrologers say that they use the “whole chart” to interpret a horoscope, it is important to note that the natal chart can only be interpreted by distinguishing variables, identifying which ones are most important, and analyzing them in the context of other natal chart variables; in other words, there is no whole chart that exists independent of the variables from which it is constructed. Using the whole chart simply means that astrologers use more factors than just one in a combined manner to identify the main themes. In theory, one simply needs to identify the most important variables in the natal chart. However, astrology is a highly complex system based on symbolism, analogy, numerology, and myth, which can create methodological problems in trying to establish stable variables to examine (Dean & Kelly, 2003; Kelly, 1997). Definitions of variables

usually have common core features, but descriptions can also entail the vague, duplicitous, and multifaceted nature of symbolism. Thus, identifying the core features used to define an astrology variable are the most important considerations for the purposes of using these factors in a test or experiment.

Another difficulty with designing astrological tests is that astrologers, at their discretion, typically have around 40 factors in the natal chart that can be considered in the interpretation (Phillipson, 2000). Of the many variables in a natal chart, the planets (the Sun and Moon are considered planets for astrology purposes) and the angles of the horoscope (Ascendant and Midheaven) are the most easily identified. Most Western astrologers primarily use the Sun, Moon, Ascendant, and the eight planets in the solar system (excluding the Earth) to identify personality characteristics in the horoscope, but others include dwarf planets and asteroids that have stable orbital patterns. Others also incorporate hypothetical (undiscovered) planets and *Arabic Parts* (a mathematical calculation using the degrees of distance between three planets or points in the horoscope) in their analysis. Additionally, there are moderator attributes that affect a planet's interpretation. When a single variable such as the Sun is identified, in order to interpret that variable, the astrologer must also consider its sign. Other moderator variables such as the house position in the natal chart, as well as the aspects it makes with other planets or points, also affect the planet's interpretation. Represented numerically, a planet can be located in one of 12 signs and one of 12 houses, and can make at least nine kinds of aspects (five major, four minor) to nine other (major) planets. This means that there are $12 \times 12 \times 9 \times 9$ or 11,664 possible unique combinations that could be considered for just that one planet (Dean & Mather, 1977; Phillipson, 2000). It is worth noting that

Zipporah Dobyns, one of astrology's internationally recognized experts (Cunningham, 2003), lamented in the introduction to her astrology textbook that "astrology is almost as confused as the earthly chaos it is supposed to clarify" (Dobyns & Roof, 1973, p. 4).

Ultimately, no matter how many variables are used by the astrologer, there are always a restricted number of factors considered for interpretation and there are relatively consistent guidelines for interpretation of the major variables provided by astrology textbooks. Therefore, the main research design consideration for any test of astrology is to identify and select those factors for inclusion that are considered most important and establish how those variables are defined (van Rooij, 1994b). The number of variables that can be included are abundant, but incorporating many factors into a research design increases the chance of spurious interactions (Stevens, 2009). Therefore, the challenge is to identify the main variables that astrologers must incorporate into horoscope analysis and interpretation, while excluding secondary or minor variables that, theoretically, may be influential but are not dominant factors reflected in the personality.

This central idea of how the horoscope is used as an assessment instrument is comparable to trait theory in psychology, which has established that there are multiple central, identifiable traits that are basic factors in personality with secondary traits that are distinct, but peripheral (Allport & Odbert, 1936; Cattell, 1966; Costa & McCrae, 1992a; Eysenck, 1991; Goldberg, 1993; McCrae & Costa, 1987, 1997, 2010). The essential use of the horoscope in personality interpretation is very similar to the orientation of traditional personality tests in their ability to assess underlying personality traits. The theoretical orientation underlying personality testing is that there are distinct tendencies in personality with various degrees of strength that suggest that people will

both act in a certain way and have certain internal experiences and perceptions based on these personality structures (Groth-Marnat, 2009; Wiggins & Pincus, 1992). This theoretical orientation—that there are discrete, major personality factors that can be separated and measured—was applied to this study in an attempt to evaluate the horoscope as a valid instrument that can measure personality characteristics and traits.

Main Independent Planet Variables in the Natal Chart

For a sound research programme which does justice to the complex and dynamic interplay of horoscope factors which traditional astrologers emphasize, it would be necessary . . . to poll astrologers on which predictor variables would best predict a limited range of criterion variables (e.g., extraversion, aggressiveness, manifest anxiety). (Sargent, 1986, p. 352)

Not all variables are considered equal in the horoscope, and astrology has a long history of “weighting” or assigning greater importance to certain variables (Addey, 1996; Campion, 1993b; Carter, 1925; Davison, 1988; Hamaker-Zondag, 1994; Hone, 1978; Mayo, 1964; Tyl, 1994). There is general agreement that the planets are the most important independent variables used to identify personality characteristics in the horoscope, moderated by the signs, houses, and aspects (Burk, 2001; Campion, 1993b; Carter, 1925; Davison, 1988; Fearrington, 1999; L. Greene & Sasportas, 1987; Hamaker-Zondag, 1985; Hone, 1978; Mayo, 1964; Sakoian & Acker, 1973; Tyl, 1994). Burk summarized the primacy of the planets in the horoscope:

The planets are the most important part of astrology. Everything else in astrology relates to the planets, describes how they act and interact, and even modifies their expression; but without the planets, nothing happens. The signs only exist to describe where the planets are located. Aspects show relationships between planets. Even the houses, which can be interpreted without planets, are traditionally linked to the planets by rulership. That the planets are so fundamentally important may be a surprise to many people, particularly because a popular misconception about astrology is that the signs are the most important things. . . . The thing to remember is that when people are asking “What’s your

sign?”, what they’re really asking is what sign your Sun (planet) is in. (Burk, 2001, p. 13)

The planets in the horoscope are described in astrology textbooks as representing basic personality characteristics (Mayo, 1964), behavioral orientations (Davison, 1988), and psychological inclinations (Campion, 1993b). Another way to describe the planets is to see each of them as representing a core personality factor, such as self-concept, emotional orientation, communication style, or will power (Farrington, 1999; Hamaker-Zondag, 1990; Tyl, 1994). Greene and Sasportas (1993) refer to the planets as building blocks that provide the structure of personality. For example, assertiveness is a basic personality characteristic common to all people; some people may be strongly assertive, others may be almost completely nonassertive, but all people have the core personality structure of assertiveness in all its expressive variations (Borgatta, 1964; Goldberg, 1993). In astrology, assertiveness is a personality characteristic that is signified by the planet Mars (Bell, Costello, Greene, & Reinhart, 2001; Hamaker-Zondag, 1985; Van Toen, 1988); how the assertiveness is expressed is dependent upon other moderating factors, such as the sign or aspects made to the planet Mars in the natal horoscope (discussed further in this chapter).

Unfortunately, although there are generally clearly defined rules and associations for each planet and its representative personality factor, sometimes each planet or point can represent more than one personality factor and sometimes more than one planet or point may represent a single personality factor. For example, there is general agreement that assertiveness is represented by Mars, but in some instances assertiveness can be represented by both Mars and Uranus (Bills, 1998). This reflects the difficulty in clearly defining horoscope variables. Rarely are these theoretical associations established

through hypothesis testing, despite the rich theoretical basis for such an experiment. Although it is not the primary focus of this study, astrology is ripe for well-defined, theory-based hypothesis testing using traditional planetary associations and specific, distinct personality factors, such as the Mars-assertiveness example above. For the purposes of this study, the theoretical, generally agreed-upon factor associations for the planets were used to identify variables for hypothesis testing.

Prior to continuing the discussion of the planets as independent variables below, it is important to reiterate what has been previously mentioned about astrology's theory that the planets are moderated by the signs where they are placed. Although there are other moderator variables like the houses and aspects, the signs are considered the most important moderator of the planets (Arroyo, 1975; Davison, 1988; Hamaker-Zondag, 1985, 1994; Harvey & Harvey, 1994; Mayo, 1964). It is a common rule in astrology that whereas the planets represent core personality structures, the sign will affect how the planet expresses those characteristics and is a critical component to interpreting the planet's meaning in the horoscope. Davison (1988) wrote that "the signs represent the manner in which the functions denoted by the planets express themselves, according to the nature of each sign" (p. 16). Another way to conceptualize the signs is to see them as attributes of the planets core characteristics. Conceptually, if there were a planet X in the natal chart that represented "running" (there is not, so far as I am aware), the sign where planet X was located would indicate how the person would be expected to run—if planet X were in the "fast" sign, he or she would run fast; if it were in the "slow" sign he or she would run slow, etc. Using the example mentioned above with an actual planet, if Mars represents assertiveness, then the attitude or style of how the person asserts himself or

herself would be affected by the sign where Mars is placed in the horoscope. If Mars is in the sign Pisces, then there will tend to be an emotional or subservient component to the assertiveness; if Mars is in the sign Aries, there will tend to be an energetic or combative style of assertiveness (Hamaker-Zondag, 1985). It would be difficult, therefore, although not impossible, to isolate the planet as a personality factor without the attributes of signs as categorical moderators in any comprehensive study of the horoscope and personality. (The Gauquelin research, reviewed above, is an example of an exception where an isolated planet factor was studied with house and angle location as the moderating variable, rather than the sign, but it was comparing the horoscope to occupations, not personality factors.) The role of the signs as categorical moderators of the independent planet variables is discussed further below.

Although many different variables can be included in a horoscope analysis and interpretation, but the Sun, Moon, and Ascendant stand out as the most important variables in the horoscope when reviewing the literature. Mayo addressed this point directly:

Each factor in the chart (planet, sign, house, etc.) has its own relative importance to the whole pattern, but the three factors that are always considered of prime importance are the Ascendant, Sun, and Moon. . . . *In fact, a very true assessment of an individual's character can be made from those three factors alone—judged by the signs they are associated with and the houses and aspects involved, or even just by signs [italics added].* (1964, p. 156)

It is worth noting that Solar Fire 5.0 astrology software (Dawson & Johnson, 2000), one of the most popular and recommended astrology software programs currently available (Burk, 2001), numerically weights the planets and points in the horoscope, in deference to their presumed influence on the personality, for its narrative interpretive reports and to provide analytical guidance for astrologers. In support of the Sun, Moon, and Ascendant

as the most important factors in the horoscope, those three variables are each multiplied by three, whereas the other planets and points are multiplied by two or one, dependent upon the level of their presumed (lesser) importance in analysis.

For the purposes of the review below, the Sun, Moon, and Ascendant are considered independent planet variables with their signs assumed to be attributes that moderate their expression.

The Sun. The Sun (and its sign) is the most easily identified variable in the horoscope. While previous Sun studies (reviewed in Chapter 2) have generally not validated a relationship between the Sun sign and personality dimensions when controlling for artifacts, the Sun is claimed to be the most influential factor in the horoscope in virtually every astrology textbook. Sakoian and Acker (1973), for example, referred to the Sun as “the most important single factor in interpreting the horoscope” (p. 33). The Sun is often described as representing the central personality factor or the “life-principle” (Mayo, 1964, p. 22). Hamaker-Zondag (1990, 1994) compared the Sun to the ego in psychology, representing the center of consciousness and a main factor in developing a self-concept. Campion (1993b) claimed that “the sign containing the Sun will reveal dominant personality traits” (p. 16). Tyl (1994) described the Sun as a type of the primary “fuel” or energy that dominates and influences all the other factors in the horoscope (p. 65).

With the Sun representing such a dominant factor in personality development, any study of astrology should include and theoretically be able to detect an influence of the Sun with a large enough sample size. As van Rooij points out, the repeated declaration of the Sun’s importance in the horoscope suggests that:

If one takes one hundred people with the Sun in Aries, they should have something in common, irrespective of other astrological factors. And this commonality should be different from the common factor in one hundred people with the Sun in Taurus, irrespective of additional factors. (van Rooij, 1994b, p. 55)

For the purposes of this study, the Sun is established as a main personality factor representing the ego or *self-concept*.

The Moon. Although the research reveals comparatively few studies of the Moon, astrology textbooks firmly assert the Moon as equal in importance to the Sun (Arroyo, 1978; Champion, 1993b; Davison, 1988; Fearrington, 1999; L. Greene, 1978; Hamaker-Zondag, 1985; Hand, 1981; Harvey & Harvey, 1994; Lewi, 2002; Mayo, 1964; Tyl, 1994; Woolfolk, 1990). Hand (1981) affirmed the importance of both the Sun and Moon: “the Sun, as yang, is polar counterpart to the Moon, as yin” (p. 47). Arroyo (1978) asserted that “everything in the chart should be related to the person’s Sun and Moon signs” (p. 26).

Generally, the Moon is distinguished from the Sun as representing more of an internal, emotional orientation or a subconscious identity factor in personality development, which may or may not include outward emotional expression (Cunningham, 1989; Davison, 1988; L. Greene & Sasportas, 1992; Hamaker-Zondag, 1985, 1990; Hand, 1981; Mayo, 1964; Sakoian & Acker, 1973). Harvey and Harvey (1994) depicted the Moon as having an imaginative, “right (brain) hemisphere” impact on the personality that is more creative, feeling-oriented, and intuitive as compared to the more analytical, “left hemisphere” Sun (p. 16). Similarly, Hamaker-Zondag (1985) described the Moon as representative of the “subliminal emotional life,” “unconsciously acquired habits,” and “the unthinking reaction pattern” (p. 186). Tyl (1994) described the

Moon as representative of a type of need that must be met for emotional fulfillment, which is best attained through the actions and behaviors represented by the Sun. Greene (1978) compared the “harmonious integration” of the Sun and Moon to the alchemical symbol of the “coniunctio or sacred marriage” (p. 36). In making a declaration for the Moon’s significance in terms of its influence on the personality, Woolfork (1990) wrote: “Many people ask me, ‘How can two people who have the same Sun sign be so different from each other?’ I usually answer this question by asking another question: ‘What are the Moon signs of these two people?’” (p. 144).

Based on the strong descriptions of the Moon as a powerful influence on personality development, theoretically the influence of the Moon sign should be discernible as an independent factor in personality characteristics. Although the descriptive words used for the Moon—feeling, intuitive, creative, subconscious—are in keeping with “right brain” concepts that emerged from the cognitive neurosciences (Springer & Deutsch, 1998), for the purposes of this study, the Moon is established as a main personality factor with the more generalized term of *emotional orientation*.

The Ascendant. The Ascendant in the horoscope is the sign of the zodiac on the eastern horizon at the time of birth. Although the Ascendant is not technically a planet, it is interpreted similarly in horoscope analysis as representing an independent natal chart factor that is moderated by the sign where it is placed. Along with the Sun and Moon, the Ascendant is considered to be one of the most important variables in the horoscope (Burk, 2001; Campion, 1993b; Davison, 1988; Fearrington, 1999; L. Greene, 1989; Hamaker-Zondag, 1990; Mayo, 1964; Sakoian & Acker, 1973; Woolfolk, 1990). Traditionally, the qualities associated with the Ascendant represent how a person

expresses themselves in social settings or around other people (Davison, 1988; L. Greene, 1978; L. Greene & Sasportas, 1987). Conceptually, the Ascendant can be seen as a representation of a “social mask” or *persona* as described by Jung (Hamaker-Zondag, 1990; Jung, 1963). Burk (2001) described the Ascendant as the “front door” of the personality and “the first thing people see about us” (p. 176). Campion (1993b) affirmed that “the sign containing the Ascendant is as important as the Sun sign” and has “general rulership over the entire personality” (p. 46). Sakoian and Acker (1964) described the Ascendant as “always predominant in an individual’s personality makeup” (p. 91). Greene, co-founder and director of the popular Centre for Psychological Astrology school in London, wrote that “in many ways, the Ascendant is more obvious in people than the Sun” (L. Greene, 1989, p. 26).

With the Ascendant theoretically being such a key factor in personality expression and easily observed by others, theoretically the influence of the Ascendant sign should also be discernible as an independent factor in personality characteristics. For the purposes of this study, the Ascendant is established as a main personality factor representing the *persona* or *social personality*.

Combined planet variables. As reviewed previously, there is general consensus that the Sun, Moon, and Ascendant variables in the natal chart are distinct, individual factors in personality development. However, many astrology textbooks also emphasize that the overall interpretation of a horoscope is best accomplished through a synthesis or blend of combined factors (Campion, 1993b; Davison, 1988; Fearrington, 1999; L. Greene & Sasportas, 1987; Hamaker-Zondag, 1994; Hand, 1981; Mayo, 1964; Tyl, 1994). This is comparable to personality assessment instrument manuals, which

emphasize that interpretation of results must account for a blending of the factors (e.g., R. L. Greene, 2000; McCrae & Costa, 2010; Morey, 1991; Weiner & Greene, 2008). For example, a person who took the NEO PI-R assessment may score high on both the Extraversion and Openness to Experience domains—meaning that each of those factors is independently discernible in the personality profile—but the final interpretation must include recognition and synthesis of both factors in the overall personality profile (McCrae & Costa, 2010; Weiner & Greene, 2008).

The Sun, Moon, and Ascendant are often identified as the most important blend of variables in horoscope interpretation. Some astrology textbooks isolate the Sun-Ascendant blend as the decisive combination to identify dominant, outwardly expressed personality characteristics (Avery, 1982; Fenton, 2005; L. Greene, 1978; Lamb & Harris, 2004; Woolfolk, 1990). Others argue that the Sun-Moon blend alone can provide much of the predictive basis for the major personality characteristics (Arroyo, 1978; Fearington, 1999; Lewi, 2002; Tyl, 1994). Tyl (1994) emphasized the Sun-Moon blend as the “basis for synthesis that is all-pervasive within analysis of a particular horoscope” (p. 65). Arroyo used symbolic analogy to assert the importance of interpreting the Sun and Moon together:

Although the scientific world-view describes the Sun as immensely larger than the Moon, it has always seemed to me to be an especially striking symbol that the relative diameters and distances of the Sun and Moon are such that, *when seen from the earth*, both discs subtend almost exactly the same visual angle (0.5°) and *appear to be the same size*. . . . The fact that the Sun and Moon are visually of such equal size should give astrologers even more reason to consider the Moon sign to be of equal importance with the Sun sign in any chart and to base their interpretations on a synthesis of the Sun and Moon positions in relation to each other. (Arroyo, 1978, p. 27; italics in the original)

In short, whereas the importance of the Sun, Moon, and Ascendant as independent variables in the horoscope is well established, there is also a theoretical basis for testing combinations of factors, reflecting the importance of blended variables as used by professional astrologers when analyzing and interpreting the horoscope.

Selection of Variables and Limitations of the Archived Data

For the purposes of this study, each of the three variables identified has a strong theoretical basis as an independent factor in the horoscope to establish the basis for testing each variable's individual effect on personality characteristics as measured by a comprehensive personality assessment instrument. Unfortunately, there are crucial limitations in the archived data sample selected for this study that do not allow for testing of all three variables, for the reasons established below.

Throughout the literature, the Sun has been tested repeatedly because it is a well-established, dominant factor in the horoscope. The difficulty with any test of the Sun is the pervasive influence of previous knowledge of the Sun sign attributes, as discussed previously in Chapter 2 (see especially Eysenck & Nias, 1982; Pawlik & Buse, 1984). Any test involving the Sun must carefully and thoroughly control for previous knowledge as a confounding artifact, as even individuals who identify themselves as having no previous knowledge of how to interpret an astrology horoscope can have enough basic recognition of his or her own Sun sign's qualities to influence test results (Eysenck & Nias, 1982). Although there is a strong theoretical basis to test for the independent Sun variable, in this study the archived data selected did not have sufficient controls for previous Sun sign knowledge to select the Sun as a variable for this study.

The Ascendant is also strongly supported in the astrology literature as a main factor in the horoscope. A key consideration for using the Ascendant as a test variable is the speed with which it changes signs. In most latitudes, dependent on the time of year, the Ascendant changes signs roughly every two hours. Comparatively, the Moon changes signs approximately every 2.3 days and the Sun changes signs about once a month. Because of the rapidity of Ascendant sign changes, an exact birth time is crucial. In the archived data sample, 22 participants reported that their birth time was an estimate, 25 said that their birth time was told to them by their mother or another family member, and 4 participants did not know their birth time. This is over 25% of the study's participants. Estimates and reports from family members are generally considered reliable enough for astrologers to interpret a horoscope with caution, but it does not allow for the type of exactitude and confidence in measurements for a research study. Additionally, although previous knowledge of the Ascendant sign is not nearly as prevalent as knowledge of the Sun sign, there were no controls in place in the original data collection for the Ascendant, and knowledge of the Ascendant is reported as more prevalent than knowledge of the Moon (Eysenck & Nias, 1982). Because of this uncertainty, the Ascendant is also not a variable selected for this study.

Fortunately, the original study did control for previous knowledge of the Moon (as described in Chapter 4). Thus, the Moon is selected as the independent planet variable to be tested in this study. One potential argument against testing the Moon is the astrological definition of the Moon as an internal emotional orientation, compared to the outwardly expressive characteristics of the Sun and Ascendant. Theoretically, this could complicate the measurement of personality characteristics if, in fact, the Moon's

orientation is not expressed as a function of self-identified personality characteristics. Greene (1978; L. Greene & Sasportas, 1992) and Hamaker-Zondag (1985, 1990), in particular, both repeatedly commented on the Moon's "unconscious" influence on the personality. Also, both Tyl (1994, 2000) and Fearington (1999) described the Moon as a representation of an inner need or desire that finds expression by "using" the expressive characteristics of the Sun sign.

Even so, all four of the aforementioned authors strongly emphasize the importance of interpreting the Moon as a major factor in their astrology textbooks with Hamaker-Zondag clarifying the Moon's importance in terms of personality and behavior:

The Moon, so closely interwoven with the unconscious, can also play an important role for consciousness. The Moon is a very personal content [sic]; it represents unconscious learned behavior, part of our past and our youth, and above all indicates the way we behave in order to feel comfortable or the attitude in which we feel best. (1994, pp. 102-103)

Thus, whether the Moon is more representative of an internal state or an externally expressed personality characteristic, it is a strong indicator for attitude and behavior, and few astrologers would argue against its importance as a main factor in horoscope interpretation. With this in mind, an important consideration in support of testing the Moon by comparison to personality assessment scores is that most personality assessment instruments, including the NEO PI-R that is used in this study, measure internal states, desires, and emotional orientations as aspects of personality (McCrae & Costa, 2010; Weiner & Greene, 2008). This consideration, with the Moon's importance as a variable in the horoscope, forms the theoretical basis for its selection as the independent variable to be tested in this study.

Unfortunately, although there is sound theoretical basis for testing natal chart variables in combination, the relatively small sample size of the archived data used in this study does not provide a large enough sample of participants to discern the potential effect of the combined variables on personality. This is a key limitation to the study, as a single independent variable test does not provide information about the relationships between variables in the horoscope. Urban-Lurain (1984, 1995b) strongly advocated for multivariate techniques in astrology research because of the superior ability to provide information about the structural relationship among variables in the horoscope.

If there are astronomical concomitances of human behavior, they probably are interrelated and non-univariate. Many of the studies cited assume that sun signs, moon signs, and other singular zodiacal positions are a sufficient description of an astrological process. Yet few astrologers interpret a horoscope in such simplistic fashion; most consider a large number of variables in “weighted” combinations. Therefore, any model which purports to test this process should stimulate the interrelation of the astronomical variables. (Urban-Lurain, 1984)

Perry (1995) argued forcefully against single variable studies of the horoscope. He emphasized that the horoscope “suggests the unfoldment of a complex, ongoing story with multiple interrelated and often conflicting themes, all of which take place on both conscious and unconscious levels” (p. 125), something that Perry believes that single variable studies cannot capture. Perry also noted that situational specificity is a key component of horoscope interpretation, with people exhibiting different personality attributes in different situations, and any study of horoscope factors should consider the houses, as they represent different life situations.

The argument for testing combined horoscope factors is convincing and applicable. Future studies of natal chart variables and personality characteristics would ideally include a sample large enough to test combinations of the three major horoscope

factors, as well as other combinations. However, this does not negate the theoretical support for testing isolated independent planet variables. This is comparable to validating single scales of personality assessment measures that form the basis of combined scales, e.g., the single clinical scales of the MMPI-2 that are the basis of the two and three point MMPI interpretation codes (R. L. Greene, 2000). In addition, as previously mentioned, almost every astrology textbook includes an interpretive guide for independent variables considered in isolation, much the same that manuals for personality assessment instruments include single, independent variable interpretation guides (e.g. R. L. Greene, 2000; McCrae & Costa, 2010; Weiner & Greene, 2008).

Clearly, when there are numerous factors in an instrument to consider, there must be some degree of interpretive blending of factors. However, if there is a theoretical factor in any assessment instrument that is independently significant, as the Moon is theoretically purported to be in the natal chart, it should be evident in some capacity if the measurement is reliable, valid, and able to capture the factor. The strong theoretical support for the three independent natal chart variables identified above, including the Moon, suggests any or all are appropriate factors to be considered for hypothesis testing, both in isolation and in combination.

Dependent Personality Assessment Variables

There are many different personality assessment instruments available to select from when designing a personality-based research study. For the purposes of this study, one means of establishing the basis for criterion validity of the horoscope as a personality assessment instrument is to compare natal chart variables to variables measured by an existing, validated personality assessment instrument. As mentioned during the review of

the literature above, the majority of the single variable and multivariate studies of the horoscope that had this type of design relied on the Eysenck Personality Inventory (EPI) (Eysenck & Eysenck, 1964) or the revised Eysenck Personality Questionnaire (EPQ) (Eysenck, 1975). This is presumably because of the widespread impact of the initial, positive study (Mayo et al., 1978) that utilized the EPQ, which included Eysenck as one of the principal co-authors (this is the study that was later invalidated due to the participants' interest and previous knowledge of Sun sign astrology as a confounding artifact). It is also true that many of those initial studies were conceived when the EPQ and the three-factor model were arguably the best standard in personality research, prior to the emergence of the *Big Five* or five-factor personality model (Digman, 1990; Goldberg, 1993; Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993; Zuckerman, Kuhlman, Thornquist, & Kiers, 1991). Eysenck repeatedly argued that the EPI and EPQ were the most valid personality assessment instruments at the time because they were developed using factor analysis rather than hypothesized personality constructs (Eysenck, 1975, 1981, 1984; Eysenck & Eysenck, 1964, 1969).

The current, five-factor personality model emerged from continued development in personality research and was, in part, constructed from factor analytic studies of the EPQ (Zuckerman, Kuhlman, & Camac, 1988; Zuckerman et al., 1993; Zuckerman et al., 1991). Studies established that the five-factor model provides a framework for all previous personality factor models, including the EPQ (Briggs, 1992; Costa, Busch, Zonderman, & McCrae, 1986; Costa & McCrae, 1988; Goldberg, 1981, 1993; McCrae & Costa, 1989; McCrae, Costa, & Busch, 1986; Piedmont, 1998). The evidence in support of the five-factor model as the current best means to assess personality trait descriptors is

considerable and well established (see especially Briggs, 1992; Digman, 1990; Goldberg, 1981, 1993; John, Angleitner, & Ostendorf, 1988; John, Naumann, & Soto, 2008; McCrae, 1989; McCrae & Costa, 2008; McCrae & John, 1992). Briggs (1992) referred to the five-factor model as “the model of choice for the researcher wanting to represent the domain of personality variables broadly and systematically” (p. 254).

The archived data to be used in this study comes from participants’ scores on four of the five domains of the NEO PI-R. The archived data was obtained prior to the release of the NEO-PI-3, a modification of the NEO PI-R in which 37 of the 240 items have been replaced. (The NEO PI-3 retains the validity and interpretation of the NEO PI-R domains and facets (McCrae & Costa, 2010)). The NEO PI-R was selected for the original study because it was designed specifically to measure the five trait dimensions implied by the five-factor model (Costa & McCrae, 1992b; Digman, 1990; McCrae & Costa, 2010). Since its inception, it has been validated across a broad spectrum of studies (for an overview, see especially Briggs, 1992; Costa & McCrae, 1988; Digman, 1990; McCrae, 1989; McCrae & Costa, 2008, 2010).

In comparing the EPQ and NEO PI-R, both instruments have the two major factors, Extraversion and Neuroticism, and these two factors are highly convergent in both instruments (Angleitner & Ostendorf, 1994; McCrae & Costa, 1985; Zuckerman et al., 1993). Thus, either instrument would be appropriate if the goal was to measure only Extraversion or Neuroticism (or both). However, the EPQ measures one additional factor, Psychoticism, whereas the NEO PI-R measures three additional factors, Agreeableness, Conscientiousness, and Openness to Experience. Various studies have shown that the Psychoticism factor loads on all three of the NEO PI-R additional factors

(less robustly on Openness to Experience), suggesting that the three additional NEO PI-R factors, compared to the one EPQ Psychoticism factor, allows for greater specificity and applicability in personality measures (Aluja, García, & García, 2004; Costa & McCrae, 1992a, 1995; Digman, 1990; Draycott & Kline, 1995; García, Aluja, García, & Cuevas, 2005; McCrae & Costa, 1985; Sagginò, 2000; Zuckerman et al., 1988).

Ultimately, the three-factor model and the EPQ do not represent the most current and widely accepted model of personality factors or means of assessing personality trait descriptors. The five-factor model is the gold standard for personality assessment research and the NEO PI-R is one of the most suitable research instruments. Briggs (1992), in his overview assessment of the five-factor model, endorsed the NEO PI (the article was published prior to the release of the revised version that added the facet scales for Agreeableness and Conscientiousness) as an “appropriate choice” for personality research:

If a researcher is interested in exploring one or more of the five factors with some precision, perhaps in order to understand how and why a measure (or construct) is working, the appropriate choices are probably the NEO-PI or the HPI (the Hogan Personality Inventory (Hogan, 1986)). . . . The NEO-PI provides a faithful representation of the five-factor model, along with more precisely identified facets within each of the major domains. (Briggs, 1992, p. 287)

Self-report assessment instruments like the NEO PI-R (and the EPQ) are not without controversy. Edwards' (1957) highly influential exploration and study of the social desirability construct contributed to an often cited criticism of self-report personality assessment instruments in general (see especially Messick, 1991; Paulhus & John, 1998; Robinson, Shaver, & Wrightsman, 1991) and the NEO PI-R (Paulhus, Bruce, & Trapnell, 1995) as vulnerable to distortion. There is an established consensus that the tendency to give socially desirable responses is a meaningful construct in self-report

personality assessments (Paulhus, 2002). However, when compared to assessments made by others, the correlations between self-reported and peer-reported personality traits are typically higher than 0.5 (McCrae & Costa, 2003) and correlations between self-rating and other-rating remain consistent even after adjustments to self-report measures are made to control for impression management (Pauls & Stemmler, 2003). Other studies have concluded that, in some cases, controlling for social desirability can produce significant decreases in self-other rating agreements and does not increase the validity of personality scales (Konstabel, Aavik, & Allik, 2006).

Although self-report measures remain vulnerable to criticism regarding socially desirable responses, in an influential study, Ones, Viswesvaran, and Reiss (1996) conducted a meta-analysis of the social desirability literature to examine social desirability responses as a predictor, suppressor, or mediator and found that social desirability responses are not as pervasive a concern as perceived in personality assessment. In a follow-up study, Ones and Viswesvaran (1998) concluded that, based on meta-analytically derived evidence, it appears that social desirability influences do not significantly affect the convergent and discriminant validity of the Big Five dimensions of personality. Thus, based on the generally robust support of the five-factor model and the NEO PI-R assessment, it is surprising that no major study of the horoscope has used the NEO PI-R in comparison with horoscope variables. This study aims to contribute to the existing body of research by using participants' scores on the NEO PI-R to test for relationships between the NEO PI-R's personality domains and three major variables in the horoscope.

Astrology Elements as Variable Categories

As mentioned previously, astrological theory strongly supports the hypothesis that the planets in the natal chart, representing personality factors, are modified by the signs where they are located. Mayo (1964) described the relationship as “the basic life-principles in man (planets) find expression through the signs” (p. 45). Davison (1988) maintained that “the signs represent the manner in which the functions denoted by the planets express themselves, according to the nature of each sign” (p. 16). Thus, astrology theory would support the hypothesis that the relationship between independent planet variables and the NEO PI-R scores will change according to the sign placement of each variable. In terms of the research design for this study, the sign is considered an attribute or moderator that it will potentially affect the direction or strength of the relationship between the independent Moon variable and the dependent NEO PI-R variables. A moderator of this type can be viewed as a qualitative descriptor that provides and defines subsample categories for an independent variable (Frazier, Tix, & Barron, 2004). In other words, an independent planet variable, such as the Moon, can be tested by partitioning the sample into subsample categories based on the sign in which it is placed.

Unfortunately, the sample size used in this study is potentially too small to measure large effect sizes if the Moon variable is categorized by the twelve signs. Using the final study sample of 192 participants (after applying the exclusion criteria discussed in Chapter 4) and 12 signs for the Moon variable creates categories that range from $n = 12$ in Capricorn to $n = 21$ in Libra (see Table 1). However, in astrology each of the 12 signs belongs to one of four elements. Using the four elements instead of the 12 signs in

Table 1

Independent Moon Variable: Frequency by Sign

Sign	Moon	
	Frequency	%
Aries	16	8.3
Taurus	18	9.4
Gemini	16	8.3
Cancer	14	7.3
Leo	17	8.9
Virgo	17	8.9
Libra	21	10.9
Scorpio	11	5.7
Sagittarius	13	6.8
Capricorn	12	6.3
Aquarius	22	11.5
Pisces	15	7.8
Total	192	100.0

the research design allows for a greater number of participants in each subsample category. Using the four elements for the Moon variable in place of the signs creates subsamples that range in frequency from $n = 40$ in Water to $n = 59$ in Air (see Table 2).

Although most of the previous astrology studies used the individual signs as categories, a few used the elements (Dean, 1985a; Riley, 1984; van Rooij, 1993). Conceptually, there is ample evidence in astrology texts to establish that the elements are considered “parent entities” for each of the 12 signs (see especially Arroyo, 1975; Burk, 2001; Campion, 1993b; Costello, 1998, 1999; Davison, 1988; Fearington, 1999; Hamaker-Zondag, 1990, 1994; Mayo, 1964; Sakoian & Acker, 1973; Tyl, 1994). Each of the four elements—Fire, Air, Earth, and Water (defined below)—provide exclusive categories for three of the 12 signs (see Table 3). In turn, the signs are defined by the element to which they belong (i.e., the signs of Cancer, Scorpio, and Pisces are referred to as the Water signs due to being members of the Water element). In horoscope interpretation, the elements also provide common keywords for all three of those signs. This type of categorization is clearly reflected in Baron and Kenny’s (1986) description of a categorical moderator that “partitions a focal independent variable into subgroups that establish its domains of maximal effectiveness in regard to a given dependent variable” (p. 1173). In other words, the elements provide categories or groups for the Moon variable and the attributes of the elements will theoretically affect the strength of the relationships with the dependent domain score variables on the NEO PI-R.

As discussed below, each of the four elements has a very strong theoretical correlation to one of the five domains measures by the NEO PI-R, providing a clear

Table 2

Independent Moon Variable: Frequency by Element

Sign	Moon	
	Frequency	%
Fire	46	24.0
Earth	47	24.5
Air	59	30.7
Water	40	20.8
Total	192	100.0

Table 3

Signs by Element Categories

Element		Signs	
Fire	Aries	Leo	Sagittarius
Earth	Taurus	Virgo	Capricorn
Air	Gemini	Libra	Aquarius
Water	Cancer	Scorpio	Pisces

hypothetical model to compare the independent Moon variable, subsampled by element category, to the identified dependent variable domain scores. Although it is not a crucial consideration for this study, it is worth noting that while the three signs in an element have common interpretation keywords (associated with that element), the three signs each have a different *mode* of expression from the other two signs in that element. The mode is interpreted like an adverb, describing how the particular sign expresses the essential qualities of the element in different ways according to the attributes of its mode (e.g., initiate, stabilize or maintain, and change or adapt). More importantly for this study, in astrology tradition the mode does not change the basic core characteristics of an element.

In summary, planet variables in the natal chart theoretically represent major personality characteristics or traits, such as self-concept (Sun), emotional orientation (Moon), and persona or social personality (Ascendant), and are recognized as factors when analyzing or interpreting a horoscope. Each planet variable is located in a particular sign in the natal chart. Whereas the planets represent personality factors, the signs are variously described as types, styles, attitudes, qualities, and perceptions that affect and moderate the expression of the personality factors represented by the planets according to the particular qualities of the sign (Arroyo, 1975; Burk, 2001; Costello, 1998, 1999; Davison, 1988; Fearrington, 1999; Hamaker-Zondag, 1990, 1994; Mayo, 1964). Each of the twelve signs belongs to one of four elements, which both categorize and provide descriptive keywords for the signs. Theoretically, each of the four elements has distinct characteristics or traits that differentiate them from the other elements.

Astrology theory suggests that the elements, in terms of their associated core attributes, will moderate the expression of planet variables. For example, one of the core characteristics associated with the element Air (and its three signs) is intellectual curiosity; the signs of Gemini, Libra, and Aquarius, for example, are all associated with intellectual curiosity. Providing an example of how the Air element will moderate the expression of the variables, the Sun in the Air element suggests intellectual curiosity as a core component of the self-concept, the Moon in the Air element indicates a need to satisfy intellectual curiosity for emotional fulfillment or potentially an intellectual detachment when presented with emotional situations, and the Ascendant in the Air element represents intellectual curiosity as a social personality factor or a type of persona that may or may not be aligned with the self-concept (e.g., someone who is talkative about the latest political or academic ideas at a dinner party, but sees themselves more as a practical, grounded, material-oriented person).

It is important to clarify that while an individual planet can only be located in one sign in any horoscope, more than one planet can be located in the same sign in a horoscope, depending on the positions of the planets along the elliptic when that person was born. If the Sun is in Taurus in a person's horoscope, for example, it cannot be in any other sign, but the Moon, Ascendant, or any other planet may also be in Taurus in that horoscope. As the elements are parent entities of the signs, it is also true that although an independent planet variable can only be in one element in one horoscope, other planet variables can potentially be in the same element. If one of the three main planet variables (the Ascendant, for example) is in the Air element, astrological theory suggests that there would be discernible intellectual curiosity manifest in that person's

personality, in this case in terms of the persona or social personality. If two or more of the variables were in the Air element (Sun and Moon, for example), intellectual curiosity would simply be more pronounced and manifest in multiple personality structures. In other words, intellectual curiosity traits would be discerned whether one or all three of the planet variables were in the Air element and would generally be more pronounced if this were true for two or more variables.

To test the Moon as a major independent planet variable, the elements as moderating attributes are used as categories in the statistical model. These categories, reflecting their moderator attributes, provide the basis for the theoretical relationship between the independent Moon variable and the dependent NEO PI-R domain score variables, as discussed below. The keyword qualities for each of the four elements have very strong theoretical correlations with the descriptions for four of the Big Five personality domains measured by the NEO PI-R. This connection between the elements and the personality domains provide the overarching theoretical basis for the hypotheses to be tested.

The Horoscope Elements and the Five Domains of the NEO PI-R

Note: In the *NEO Inventories Professional Manual* (McCrae & Costa, 2010), the authors refer to the five factors of the NEO PI-R as “domains” (p. 19). In keeping with such precedent, the term domain is used when referring to the NEO PI-R factors in the subsequent paragraphs.

Neuroticism and the Water element. The Neuroticism (N) domain in the NEO PI-R primarily measures emotional stability. The general tendency for individuals who score high on the *N* domain is to experience negative affects such as fear, sadness,

embarrassment, anger, and guilt at a level greater than the general population (Costa & McCrae, 1992b; McCrae & Costa, 2010; Weiner & Greene, 2008). Individuals who score high in the *N* domain also tend to have irrational ideas, are likely to be impulsive and become easily upset, whereas individuals with low scores in the *N* domain tend to be calm, rational, and even-tempered (McCrae & Costa, 2010; Weiner & Greene, 2008). It is important to note that while the name *Neuroticism* suggests psychopathology, McCrae and Costa (2010), in the administrative manual, clarify that the domain measures a general personality dimension and caution that individuals with high *N* scores do not necessarily have a psychiatric disorder and not all psychiatric disorders imply high levels of *N*. Conceptually, the Neuroticism domain should correlate positively with the Water element in astrology, as indicated by the following keywords listed in Table 4 and selected from astrology textbook keywords that are representative for Water.

Table 4

Water Element Keywords

Keywords	Source
Moved by feelings, irrational, imaginative	(Harvey & Harvey, 1994)
Emotional, intuitive	(Mayo, 1964)
Sensitive, intuitive	(Sakoian & Acker, 1973)
Unstable	(Hone, 1978)
Emotional security, sensitive, receptive	(Tyl, 1994)
Impressionable, restless, despondent	(Hall, 1975)
Subjective, sensitive, protective, demanding, yearning	(Hamaker-Zondag, 1994)
Relational, instinctual, unconscious, irrational, perceptive	(L. Greene, 1978)
Longing for unity; "issues of separation, abandonment, and neglect"	(Costello, 1998, p. 4)
Compulsive, emotional, intuitive, irrational, oversensitive, secretive, vulnerable, unstable	(Arroyo, 1975)

Extraversion and the Fire element. The Extraversion (E) domain in the NEO PI-R measures the broad traits associated with extraverts. Individuals who score high in the E domain tend to be dominant, assertive, active, energetic, and leaders in social settings (McCrae & Costa, 2010; Weiner & Greene, 2008). These individuals tend to like excitement and stimulation (McCrae & Costa, 2010). Conceptually, the Extraversion domain should correlate positively with the Fire element in astrology, as indicated by the following keywords listed in Table 5 and selected from astrology textbook keywords that are representative for Fire.

Table 5

Fire Element Keywords

Keywords	Source
Dramatic, enthusiastic, active, forceful, eager, impatient	(Harvey & Harvey, 1994)
Energetic, explosive, volatile, enthusiastic, adventurers, leaders, impatient	(Campion, 1993b)
Energetic, assertive	(Mayo, 1964)
Positive, aggressive, ardent, creative, masculine	(Sakoian & Acker, 1973)
Assertive, leadership, influential	(Tyl, 1994)
Possibility, discovery, intuition	(Hamaker-Zondag, 1994)
Vitality, spontaneous, theatrical, ego-centric, enthusiastic	(L. Greene, 1978)
Excitable, enthusiastic, inspired, self-motivated, impatient	(Arroyo, 1975)

Openness to Experience and the Air element. Individuals who score high in the Openness to Experience (O) domain in the NEO PI-R tend to be curious, imaginative, and broad minded (Weiner & Greene, 2008). They enjoy thinking about abstract ideas and solving problems, maintain an overall intellectual curiosity and independence of judgment, and are willing to entertain new and unconventional social, political, or ethical ideas (McCrae & Costa, 2010). Research indicates that the Openness to Experience domain correlates positively with creativity, divergent thinking, and crystallized intelligence (Geary, 2005; McCrae, 1987). However, the O domain is only modestly associated with education and general intelligence (McCrae & Costa, 2010). In other words, the intellectual curiosity associated with the O domain is a distinct personality characteristic that may or may not be reflected in the high scorer's personal accomplishments, training, or career path. Conceptually, the Openness to Experience domain should correlate positively with the Air element in astrology, as indicated by the following keywords listed in Table 6 and selected from astrology textbook keywords that are representative for Air.

Table 6

Air Element Keywords

Keywords	Source
Open, social, sharing of ideas, breezy, intellectual, communicative, curious, cooperative	(Harvey & Harvey, 1994)
Intellectual activity, thought, communication	(Campion, 1993b)
Communicative, mentally active	(Mayo, 1964)
Social, communicative, "strong mental abilities and intellectual attributes"	(Sakoian & Acker, 1973, p. 15)
Social, innovation, intellectualism	(Tyl, 1994)
Abstract, theoretical, ideas, rational	(Hamaker-Zondag, 1994)
Detached, fair, principled, refined	(L. Greene, 1978)
Abstract, objective, perspective, rational, social	(Arroyo, 1975)

Conscientiousness and the Earth element. The Conscientiousness (C) domain in the NEO PI-R measures the broad traits associated with self-control. Individuals who score high in the C domain tend to control their impulses and participate in an active process of planning, organizing, and carrying out tasks (McCrae & Costa, 2010). They are generally purposeful, determined, goal-oriented, and orderly (McCrae & Costa, 2010; Weiner & Greene, 2008). Other keywords for the C domain include punctual, reliable, and competent. Weiner and Greene (2008) refer to high scorers on C as individuals who “like to keep everything in its place so they know just where it is” (p. 333). Conceptually, the Conscientiousness domain should correlate positively with the Earth element in astrology, as indicated by the following keywords listed in Table 7 and selected from astrology textbook keywords that are representative for Earth.

Table 7

Earth Element Keywords

Keyword	Source
Matter-of-fact, solid, productive, grounded, security-oriented	(Harvey & Harvey, 1994)
Cautious, reliable	(Campion, 1993b)
Practical, restrained	(Mayo, 1964)
Material-oriented, manage resources	(Sakoian & Acker, 1973)
Cautious, controlled	(Hone, 1978)
Ambition, structure, discrimination	(Tyl, 1994)
Concrete, reliable, efficient, foundational	(Hamaker-Zondag, 1994)
Well-organized, disciplined	(L. Greene, 1978)
Ritualistic, disciplined, organized	(Costello, 1999)
Material, persistent, conventional, dependable, "addiction to routine and order"	(Arroyo, 1975, p. 100)

Agreeableness. The Agreeableness (A) domain in the NEO PI-R is primarily a measure of interpersonal tendencies (McCrae & Costa, 2010). Individuals who score high in the A domain tend to be courteous, thoughtful, considerate, and would prefer to cooperate than compete (Weiner & Greene, 2008). Although certain social qualities of the Air element could hypothetically have a correlation with the Agreeableness domain, there is not a clear theoretical link to any of the four elements. Thus, the Agreeableness domain will not be included in this study.

Chapter 4

Hypotheses, Methodology, and Procedures

The Research Gap

This study will test whether the Moon variable in the horoscope can predict elevated scores in personality domains as measured by the NEO PI-R, when located in particular elements. This hypothesis readily lends itself to a quantitative research design. The existing quantitative studies of astrology have been almost universally negative and the few positive results have generally failed to replicate or withstood post-publication peer review (as reviewed in Chapter 2). Many of the studies have focused on testing the astrologers' abilities to identify horoscopes or subjects under blind conditions, rather than testing factors in the horoscope with an objective measure. The majority of the natal chart experiments that did test horoscope factors have relied on tests of the Sun alone. Comparatively, there are few studies of other variables in the horoscope and even less that analyze multiple variables in combination. Additionally, almost all of the experimental studies that compared horoscope variables to personality assessment measures used the Eysenck personality instruments (the EPI and EPQ), which reflect a two-factor and three-factor model of the personality. This is not consistent with the current research that supports a five-factor model of the personality. This study aims to address that gap and contribute to the existing literature by conducting a quantitative analysis of the Moon, a rarely tested, major planet variable in the natal chart, by comparing the Moon in specific elements to four major domains of personality as measured by the NEO PI-R personality assessment: Neuroticism, Extraversion, Openness to Experience, and Conscientiousness.

Hypotheses

The overarching hypothesis for this study is that if the Moon, defined as an emotional orientation in Chapter 3, can be discerned as a personality factor in the NEO PI-R, it will be most evident in terms of elevated *T* scores in the archived data sample when located in the element that best matches the corresponding NEO PI-R domain; e.g., when a person has the Moon in the Fire category, he or she will have elevated *T* scores in the Extraversion domain of the NEO PI-R. As such, the Moon variable was tested by independent subsample measures defined as the “variable-in-element” compared to the “variable-not-in-that-element” categories.

- H1. For those individuals whose Moon is in the Fire element category, the mean *T* scores for the Extraversion domain in the NEO PI-R will be significantly greater than those individuals who have the Moon in one of the other three elements.
- H2. For those individuals whose Moon is in the Earth element category, the mean *T* scores for the Conscientiousness domain in the NEO PI-R will be significantly greater than those individuals who have the Moon in one of the other three elements.
- H3. For those individuals whose Moon is in the Air element category, the mean *T* scores for the Openness to Experience domain in the NEO PI-R will be significantly greater than those individuals who have the Moon in one of the other three elements.
- H4. For those individuals whose Moon is in the Water element category, the mean *T* scores for the Neuroticism domain in the NEO PI-R will be

significantly greater than those individuals who have the Moon in one of the other three elements.

Participants

The archived data used in this study originally came from an unfinished research project conceptualized by the California Institute for Open Studies (CIOS). Participants for this study were solicited through a series of notices in the CIOS monthly newsletter for three consecutive months in the fall 2006 and early winter 2007, requesting noncompensated volunteers who would be willing to “complete selected personality assessment questionnaires for use in a research project that will be looking for relationships between these types of assessments and the astrology horoscope.” Periodic invitations to participate in the study were also offered at lectures, workshops, and classes conducted by CIOS staff members between 2007 and 2009. CIOS staff also solicited participants through e-mail and social media outlets. Additional participants came to the study after being referred from other volunteers. Unfortunately the means by which the participants came to the study was not tracked.

Materials

Revised NEO Personality Inventory (NEO PI-R). The NEO PI-R (Costa & McCrae, 1992b; McCrae & Costa, 2010) assesses five broad domains of the five-factor model of personality (Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness), as well as six underlying facets for each of the five domains. The NEO PI-R and its scales were developed with a combination of rational and factor analytic methods (McCrae & Costa, 2010) and the instrument has been the subject of extensive research publications (Costa & McCrae, 2003). The internal

structure of the NEO PI-R corresponds well to the predictions of the five-factor model of personality. When five varimax-rotated principal components were examined, correlations between the item factor scores and the five domain scores ranged from .89 to .95 (McCrae & Costa, 2010). The NEO PI-R scores have strong test-retest reliability, ranging from .91 to .93 for the five factors (Costa, Herbst, McCrae, & Siegler, 2000; Costa & McCrae, 1992b), and good cross-cultural applicability. The reliability coefficients for domain scores range from .86 to .92 (Costa & McCrae, 1992b). There are two versions of the NEO PI-R: Form S, for self-reports, and a lesser-used Form R, for observer ratings. Virtually all the research on the NEO PI-R has been conducted with Form S (Weiner & Greene, 2008) and this was the measure used in this study.

The NEO PI-R (Form S) is a self-report measure that consists of 240 items designed to assess the five factors of personality. Form S is a paper-and-pencil assessment in which each subject reads an item and chooses a response. Each item consists of a statement (e.g., “I seldom give in to my impulses” and “I have a wide range of intellectual interests”) for which the individual rates the item on a Likert scale with the options *strongly disagree*, *disagree*, *neutral*, *agree*, or *strongly agree*. After subjects have read the instructions, if they have no questions they may complete the assessment without assistance. There is no time limit to completing the NEO PI-R (Costa & McCrae, 1992b). Test subjects are encouraged to complete every item on the measure, but the instrument can be scored if not more than 10 items are missing using the neutral response option for the missing items (McCrae & Costa, 2010).

All the subjects in the archived data sample completed the hand-scorable (HS) answer sheet for Form S. The HS answer sheet has eight columns and 30 rows with each

cell corresponding to one of the 240 items. On the top-level, carbon-copy page, the subject endorses his or her response to each item by circling SD for *strongly disagree*, D for *disagree*, N for *neutral*, A for *agree*, and SA for *strongly agree*. The top page is fastened in such a way that the bottom page is not viewable by the subject. To score the assessment, the scorer detaches a perforated stub at the top of the HS answer sheet and removes the top page. Underneath, the carbon imprint from the circled responses correspond to a numerical score. Each row in the answer sheet corresponds to the items in one of the 30 facet scales that make up the five domain scales. The scorer sums the numerical values of the eight columns in each row and enters the sum at the right of the row. Each row has a label that represents one of the 30 facet scales that correspond to one of the five domains; e.g., N1, N2, N3, N4, N5, and N6 correspond to the Neuroticism (N) domain. The sum scores for each of the six rows that correspond to a domain are added together for a final sum score for the domain. The raw scores for each of the 30 facet scales and the summed raw scores for each of the five domain scales are then transferred to a profile form that converts the raw scores to standardized *T* score conversions based on different normative samples. Male and female subjects use different profile forms. Although neither the NEO PI-R or the NEO PI-3 use normalized *T* scores, the converted *T* scores for the domain scales for both inventories approximate normal, bell-shaped distributions with approximately 38% of individuals obtaining scores in the average range ($T = 45$ to 55), 24% scoring in the high and low range ($T = 56$ to 65 ; $T = 35$ - 44) and 7% scoring at either end ($T = +66$; $T = -34$) (McCrae & Costa, 2010). Although each of the six facet scales that compile a domain scale can also be converted to *T* scores and used as separate measures for research purposes, in this study only the

converted *T* scores for four of the five domains were used. Descriptions of the five domains were defined in Chapter 3 and are not repeated here.

Validity checks for the NEO PI-R include three items at the end of the assessment that ask the subject if he or she completed the items honestly and accurately, answered all the items, and marked the responses in the correct places. The three validity questions are primarily intended as a prompt for the subject to double-check their answers before submitting the completed assessment. Any “no” answers to these three questions should be discussed with the subject to determine whether or not the data is valid (McCrae & Costa, 2010). Two additional validity checks may be used in scoring the assessment. Based on the results of item response patterns in a volunteer sample (Costa & McCrae, 2008), the authors concluded that more than six consecutive *strongly disagree* responses, more than nine consecutive *disagree* responses, more than 10 consecutive *neutral* responses, more than 14 consecutive *agree* responses, and more than nine consecutive *strongly agree* responses invalidate formal scoring and interpretation of the assessment (McCrae & Costa, 2010). The administration manual also indicates that the person scoring the assessment can screen the answer sheet for additional validity checks with +150 or -50 items answered *agree* or *strongly agree* suggesting that the assessment should be interpreted with caution.

Astrology birth horoscope or natal chart. The astrology birth horoscope or natal chart is a geo-centric, two-dimensional, 360° map or chart of the Sun, Moon, planets, and other points (such as the Ascendant), at the moment of a person’s birth. The planets and points are positioned according to their angular degree and the zodiac sign. The chart is divided into 12 segments that are referred to as houses. To create a

horoscope for a person the exact time, location, and day of birth is required. Horoscopes can be created by hand by using a set of tables and an ephemeris or by using a computer software program that processes all the necessary calculations. An astrologer (a person learned in the construction, interpretation, and analysis of a horoscope) analyzes the position of the planets and points in the horoscope, in relation to the signs, aspects, and houses, and interprets the data as personality correlates by using standard interpretive rules or guidelines for the variables. For this study, planet variables and their signs/elements were identified using Solar Fire 5.0 astrology software (Dawson & Johnson, 2000).

Research Procedures

Data collection. A nonrandom sample of 198 volunteer participants completed a battery of assessments and provided the birth information necessary to construct a natal chart. Ninety-two of the participants completed the NEO PI-R (Costa & McCrae, 1992b) and three other personality assessments: the Minnesota Multiphasic Personality Inventory (MMPI-2) (Butcher et al., 1989), the Personality Assessment Inventory (PAI) (Morey, 1991), and the Rathus Assertiveness Schedule (RAS) (Rathus, 1973). The other 106 participants were not given the MMPI-2, but did complete the NEO PI-R, PAI and RAS.

The first group of participants ($n = 92$) completed the assessments in two administrations: first the MMPI-2 and the RAS, then the NEO PI-R and the PAI. Eleven of the initial 103 volunteers declined to complete the first administration after being presented with the MMPI-2 and other participants commented on the length and clinical nature of the MMPI-2 assessment. Although, at the time, we still did not have a clear research question, after discussion among the CIOS research committee members, a

decision was made to exclude the MMPI-2 from any further assessment administrations as its clinical nature was not representative of the non-clinical population we were interested in testing. The remaining 106 participants completed the NEO PI-R, PAI, and the RAS in one administration, providing a final sample of 198 participants that completed the NEO PI-R, the instrument selected for this study.

When the participants completed the assessments, they were informed that it would take some time for their assessment results to be scored, but in the meantime the assessments would remain secure (in a locked filing cabinet at the CIOS offices) and that they would be provided feedback when the final assessments were scored. Although some of the first battery of assessments completed by the volunteers were scored ($n = 65$) and the participants provided feedback, the remaining assessments were not scored due to competing projects by the CIOS research committee members and limited time. In 2009, CIOS ceased business operations, causing the research project to stall. Participants were informed that their assessment results would remain secure and that they would eventually be provided feedback when they were scored. The completed assessments were never scored or used in any study and upon the closing of the business they remained in my possession in a locked cabinet in my home office.

Inclusion and exclusion criteria. The only inclusion criteria established for the original sample was an interest to volunteer as a participant in a proposed research project by CIOS that would be looking at the relationship between personality and the astrology horoscope. In addition to completing the assessments and providing basic demographic information, participants answered two key data control questions. The first question established potential exclusion criteria by asking participants whether their birth time was

exact, an estimate, or unknown and how they knew this (from a birth certificate, baby book, or told to them by their mother or a family member; see Appendix A). Although the research committee had not established clear research hypotheses before collecting data, we knew that an exact birth time is critical for calculating the Ascendant and Moon positions in the horoscope (it is also crucial for people who are born on days that the Sun changes signs). For those individuals who have an estimated or unknown birth time, it is not possible to accurately establish the Ascendant sign or element and presents challenges to identifying the Moon sign or element.

For the purposes of this study, the birth time question established exclusion criteria for participants in relation to the Moon variable. The Moon changes signs approximately every 2.3 days. For those individuals who reported an unknown birth time, an ephemeris was consulted and if the Moon changed signs on their birth date, that participant was excluded from the study. For those participants who reported an estimated birth time, it was assumed that the estimate would establish the time of day with reasonable confidence. For example, if an estimated birth time of 10:00 a.m. was reported, it was assumed that the participant knew that he or she was born in the morning. The day can roughly be broken into quadrants: morning, afternoon, evening, or night. This corresponds to approximate six hour brackets ($24 \text{ hours} = 4 \times 6\text{-hour time periods}$). Thus, for those participants with estimated birth times, if the Moon changed signs within 3 hours in either direction of the reported time, the participant was excluded from the study. In the final analysis, 1 of the 4 participants with an unknown birth time and 5 of the 22 participants with an estimated birth time were excluded from the data analysis, providing a study sample of 192 participants.

Control question for data analysis. The second data control question was whether or not participants had previous knowledge of their Moon sign (see Appendix A). The Moon sign question was selected to control for previous knowledge of astrology as an artifact. Of the 192 participants selected for this study, 100 participants knew their Moon sign (52.1% of the sample) and 92 did not know their Moon sign (47.9%), providing nearly balanced subsample categories based on previous Moon sign knowledge. The Moon sign was chosen based on a study performed by Eysenck and Nias (1982), which tested the influence of previous Sun sign knowledge on astrology experiments. In the Eysenck and Nias study, of the 46 people who were able to identify the correct set of keywords associated with their Sun sign from 12 unlabeled sets of personality trait descriptions (each of the 12 sets were descriptive keywords associated with one of the 12 signs), only four knew what their Ascendant sign was and only one knew the Moon sign in his or her horoscope.

At the time of the original data collection, the CIOS committee thought that previous knowledge of the Moon sign was a good control question for previous general knowledge of the horoscope beyond the Sun sign, with the potential confounding previous knowledge of natal chart variables, such as the planets. It is very difficult, if not impossible, to know the sign of the Moon in the natal chart without consulting an astrologer, an ephemeris, or using astrology or astronomy software. The assumption was that if someone knows his or her Moon sign, there is a very strong chance that he or she knows something about the variables in the horoscope and the associated qualities for those variables. For the purposes of this study, the ability to control for previous knowledge of the Moon was critical in selecting the Moon as the independent variable to

be tested. In the test results section (Chapter 5), an additional within-groups analysis was conducted to determine whether previous knowledge of the Moon had effect on participant scores when the mean *T scores* were in the direction predicted by the hypothesis, in order to test for the effect of previous knowledge of the Moon.

Data Analysis

To test for the significance of group differences between dichotomous independent variable subsample categories (the Moon variable in one of four elements) and the mean *T scores* for the selected dependent variables, a series of two-tailed, independent measures *t* tests were conducted using the statistical software program SPSS™. A series of four independent subsamples *t* tests were run comparing the mean *T scores* of the Moon variable in one element category (the “variable in-element”) to the mean *T scores* of the Moon variable in the other three categories (“variable not-in-element”) in the hypothetically linked NEO PI-R domain, to test for statistically significant differences between the two groups. The independent samples *t* test is appropriate when the independent variable is defined as having two categories (e.g., the Moon in-Fire category compared to the Moon not-in-Fire categories) and the dependent variable is quantitative (e.g., *T scores* on the Extraversion domain) (Box et al., 2005; Gravetter & Wallnau, 2008; Mertler & Vannatta, 2005; Warner, 2008).

The theoretical basis for these *t* tests is summarized in the introductory paragraph of the hypotheses section of this chapter and defined in Chapter 3, where each of the four possible element categories for independent planet variables are shown to have a strong theoretical correlation with one of the five personality domains measured by the NEO PI-R. The overarching hypothesis for this study is that if an independent planet variable is

discernible as a factor in the NEO PI-R domain scores of the archived data sample set, it will be differentiated by the mean *T scores* in the NEO PI-R domain that best corresponds to the element category. Each of the element categories have a strong theoretical relationship with four of the domains measured by the NEO PI-R: the Fire element and the Extraversion domain, the Earth element and the Conscientiousness domain, the Air element and the Openness to Experience domain, and the Water element and the Neuroticism domain.

As mentioned previously in the literature review, Dean, Mather, and Kelly (1996) conducted a meta-analysis of 40 existing studies in which variables in the horoscope (almost always the Sun) were correlated with personality tests, IQ tests, or case histories. Meta-analysis of those studies indicated a mean effect size of .05. Since the effect size of previous studies is so low, the conventional alpha level of $p = .05$ was initially established to measure for statistical significance. However, because there are multiple hypotheses and the dependent variables are not perfectly correlated, the experimental error rate for multiple hypothesis tests must be applied to counteract the probability of a Type I error across all four hypotheses in the study (Thompson, 2006). Using the standard Bonferroni correction to counteract inequality, the selected alpha level in this study was adjusted to control for the overall Type I error rate. The procedure consists of computing the adjusted rate as alpha divided by the number of statistical tests to be performed and then using the adjusted rate as the critical value in each separate test (Cleophas, Zwinderman, Cleophas, & Cleophas, 2009). In this case, with a four hypotheses and a selected alpha of .05, the Bonferroni correction for the adjusted alpha is $.05/4 = .0125$ or $p = .01$. Additionally, if a significant difference was calculated for any

of the hypotheses, a statistical power effect was planned, in which the effect size would be calculated by converting the t -statistic into a value of r to measure whether the effect is substantive.

Sample power

An initial power analysis of sample size was considered to test whether or not the archived data sample sizes were appropriate for this study. A theoretical projection to test for sample power was conducted using the software SPSS Sample Power™ using the first hypothesis: that those individuals whose Moon is in the Fire element category will have higher mean T scores in the Extraversion domain of the NEO PI-R than those individuals who have the Moon in one of the other three elements. The computation of sample size was based on the following assumption:

1. The expected means for the groups Moon in Fire and Moon not-in-Fire were set to 127 and 109, respectively. Although the NEO inventories use normalized T scores, the professional manual provides normative data for adults in raw scores (Costa & McCrae, 1992b; McCrae & Costa, 2010). Using the raw scores, the Extraversion domain has a standard deviation of 18.5 and a mean of 108.5, so 127 would be one standard deviation above the mean. Using astrology theory, the argument could be made that greater than one standard deviation in the means could be expected since Fire and Extraversion have a strong theoretical relationship, but one standard deviation would be significant, while still relatively conservative.
2. The within-group standard deviation is assumed to be 19.
3. In computing the sample size there is no missing data.

4. The criteria for statistical significance was set at $p = .01$.

Using the above assumptions, the SPSS Sample Power™ software calculated that with a sample of 28 subjects per group the study would have a power of 80%. As the smallest category in the sample is the Moon in Water ($n = 40$), the subsample size is more than adequate to measure a significant difference in means if a difference does exist.

Ethical Considerations

The purchase, administration, and interpretation of the instruments was supervised by a licensed psychiatrist and member of the CIOS board of directors and research committee and by a licensed psychologist with whom the initial pilot project was discussed, who acted as a consultant for the project. Prior to completing the assessments, the purposes of the study were explained to the participants and they were asked to sign a consent form (see Appendix B). Participants were given the right to ask questions and request clarification prior to and during the assessment process. Participants were informed that their confidentiality would remain secure and that they would not be identified by name in any reports using information obtained from these questionnaires. Participants were also informed that any subsequent uses of the data recorded would be subject to standard data use policies, which protect the anonymity of any individual participating in a research study. Additionally, participants were informed that the assessment measures would be kept in a locked cabinet at the CIOS offices until they were scored. Finally, the participants were informed that, upon completion, they would be given feedback based upon their assessment results and given the contact information of the licensed psychiatrist if they needed any follow-up counseling or consultation.

The study does not pose any major risks that are not commonly involved in the assessment of personality characteristics. During the data collection, participants were able to elect not to participate or not complete the assessments after initially agreeing to participation. Participants were also offered feedback and consultation following completion of the assessments, which will still be provided to those whose assessments have not been completed when scoring is complete. There may or may not be any direct benefit to participants. The personality assessment feedback may assist participants in developing self-concept. Even if participants do not directly benefit from the study, their participation may ultimately help clinicians evaluate the natal chart as a valid personality assessment instrument for diagnostic purposes. Given the potential benefit to clinical and personality psychology and the minimal risk, the risk benefit ratio appears to be appropriate.

Chapter 5

Results

This chapter presents the research results for this study. The first section verifies the screening of the data. Next, the sample population is described with descriptive statistics. The third section presents the results of the statistical analysis of each independent natal chart variable by element categories. Finally, the conclusion of this chapter presents a summary of the results.

Data Screening

Prior to analysis, each of the NEO PI-R answer sheets was checked for accuracy, including faulty entries and missing data. All responses were within range and there was no missing data. Additionally, the NEO PI-R provides simple validity checks in the form of three follow-up questions at the bottom of the answer sheet: Item A asks if the respondent answered all of the questions honestly and accurately, Item B asks if the respondent answered all the questions, and Item C asks if the responses are in the correct areas. So long as the participant does not answer *disagree* or *strongly disagree* with Item A, and does not respond negatively to Item B and C, the NEO PI-R may be scored and assumed valid. No respondents in this study answered negatively to any of the three validity check items.

Description of the Sample Population

Although there are no dominant demographic considerations to interpret an astrology horoscope (i.e., the horoscope does not distinguish gender, age, race, marital status, etc.), the sample for this study is a broad representation of a mature, well-educated population, skewed toward female participants. The sample included 149 females

(77.6%) and 43 males (22.4%). The age of the participants approaches a normal distribution with a mean age of 49.0 at the time of completing the assessments, a median of 48.0, and a range from 22 to 86 years old (one participant declined to give his or her age; see Figures 1 and 2). Marital status at the time of completing the assessments was evenly distributed: 32.8% (63) were single, 32.8% (63) were married, 25.0% (48) were divorced, 5.7% (11) were widowed, and 3.1% (6) provided a response of “other” (one participant declined to identify his or her marital status). Participants were generally well educated with the level of education ranging from 12 to “more than 20” years of schooling completed (median = 16 years completed, $n = 40$; see Table 8).

Hypothesis Testing Results

Distribution and variance in the sample. Prior to testing the data, parametric assumptions were checked to ensure that the data conformed to a normal distribution and a homogeneity of variance with an unrestricted range. Levene’s test for equality of variances was performed for each of the independent measures t tests. For all tests, Levene’s test was not significant (i.e., $p > .05$), indicating that the variances are roughly equal and the assumption of the homogeneity of variances is tenable. Additionally, histograms were plotted for each of the four dependent variable domains to check the frequency distribution of T scores for the sample used in this study. The domain scores of the NEO PI-R in the normative samples approximate normal, bell-shaped distributions (Costa & McCrae, 1992b). For three of the domains in this study—Neuroticism, Extraversion, and Conscientiousness—the frequency distributions of T scores also approximate normal distributions (see Figures 3, 4, and 5).

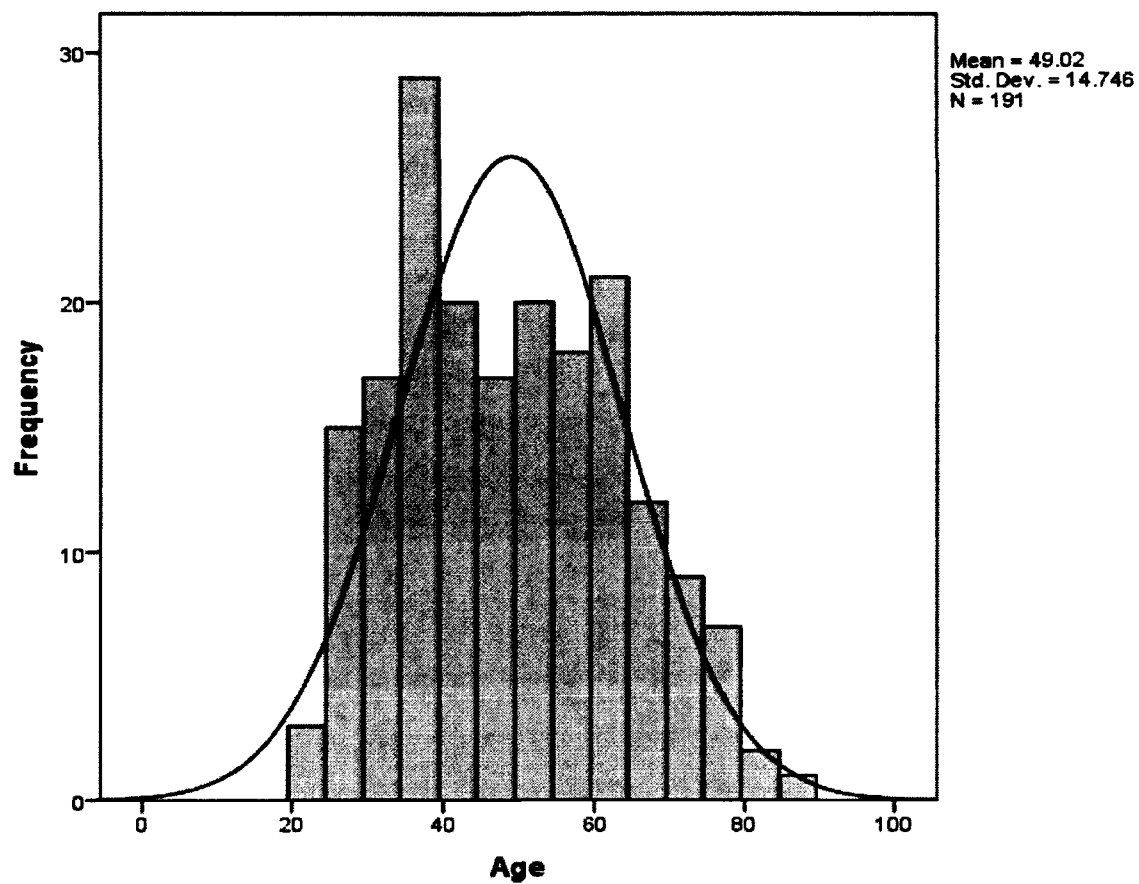


Figure 1. Ages of the study participants in the archived data sample at the time of completing the NEO PI-R assessment.

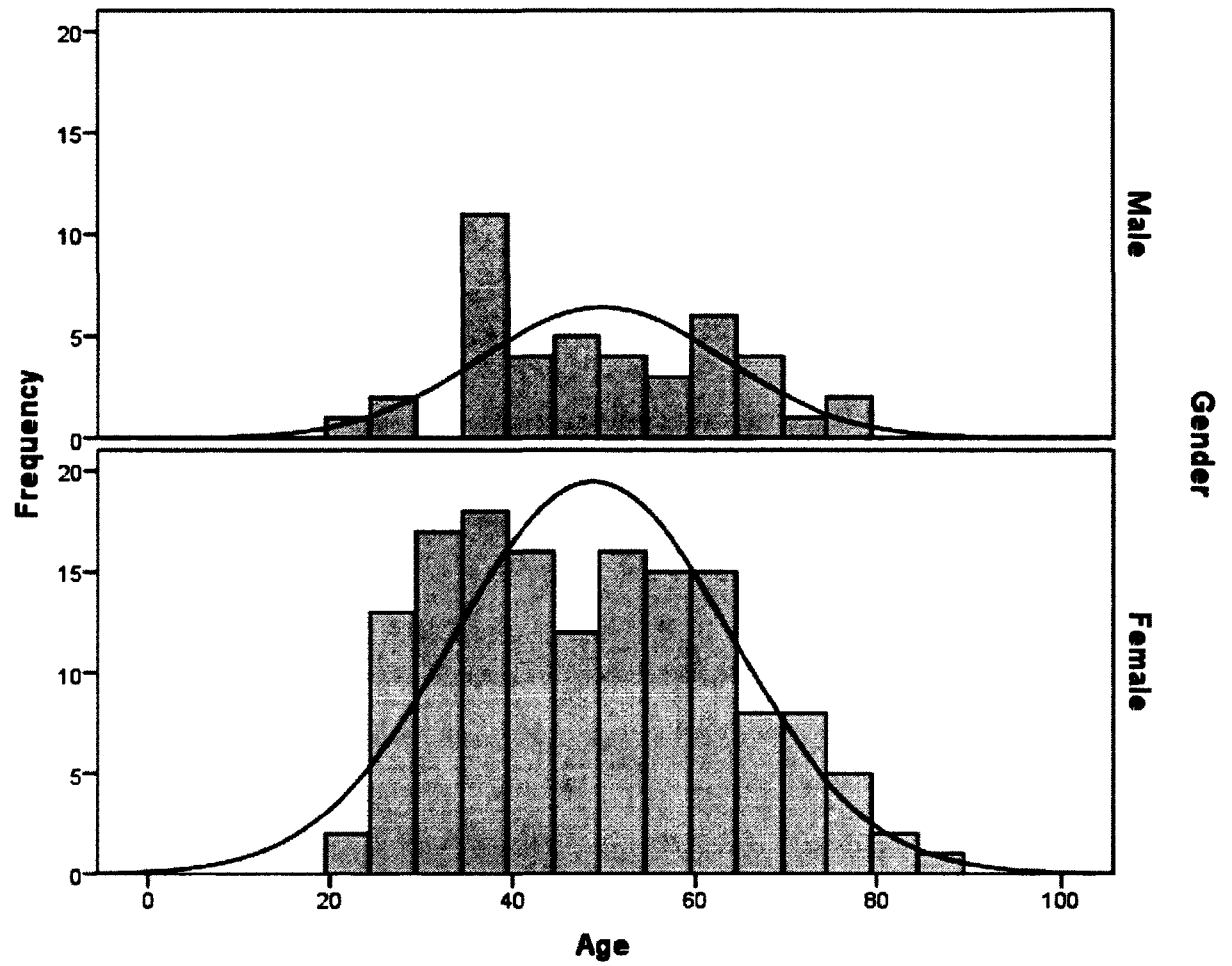


Figure 2. Ages of the study participants in the archived data sample by gender at the time of completing the NEO PI-R assessment

Table 8

Archived Data Sample: Years of Education Completed by Participants

Years of Education Completed	Frequency	%
12	20	10.4
13	10	5.2
14	17	8.9
15	12	6.3
16	40	20.8
17	18	9.4
18	40	20.8
19	7	3.6
20	6	3.1
More than 20	17	8.9
Unknown	5	2.6
Total	192	100.0

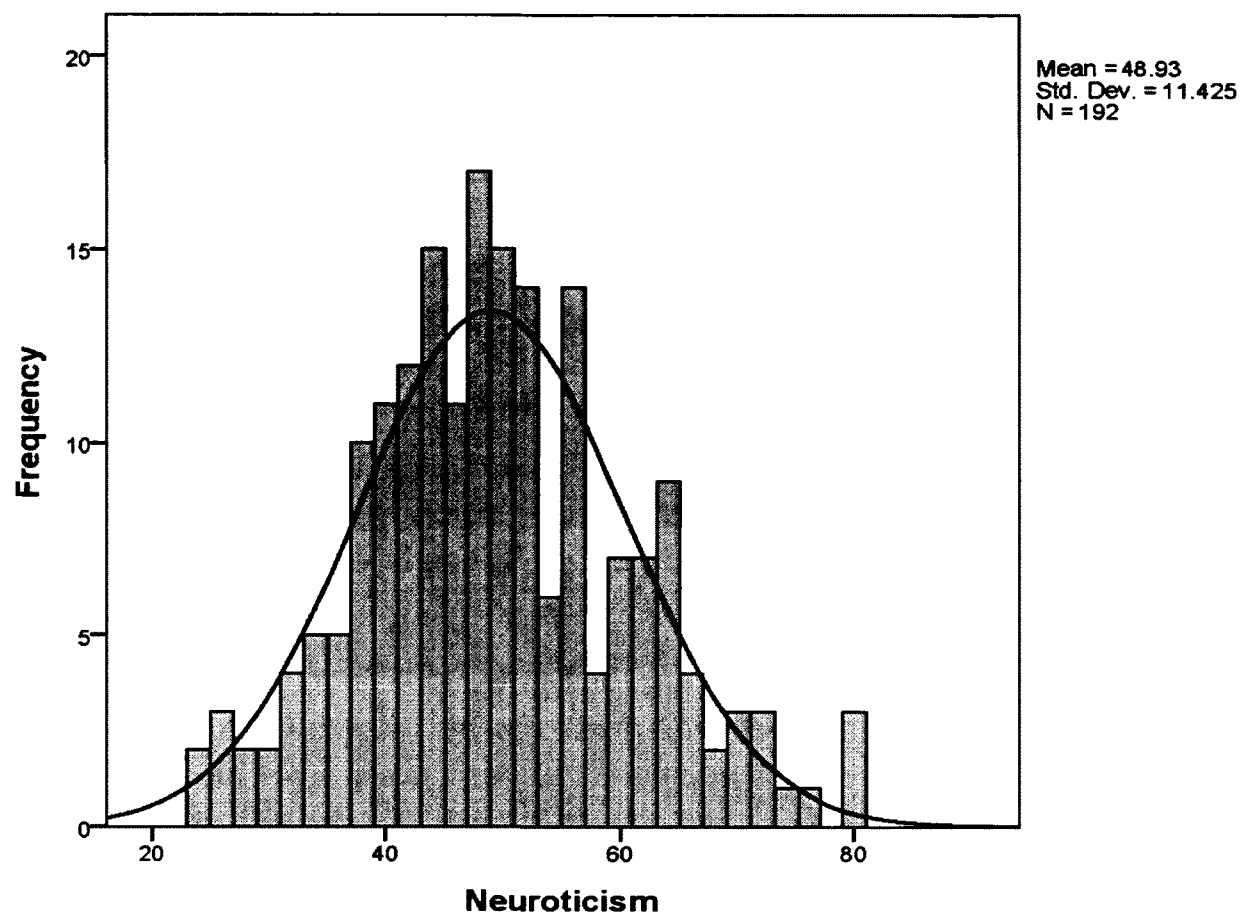


Figure 3. Frequency distribution of total sample T scores on the Neuroticism domain of the NEO PI-R

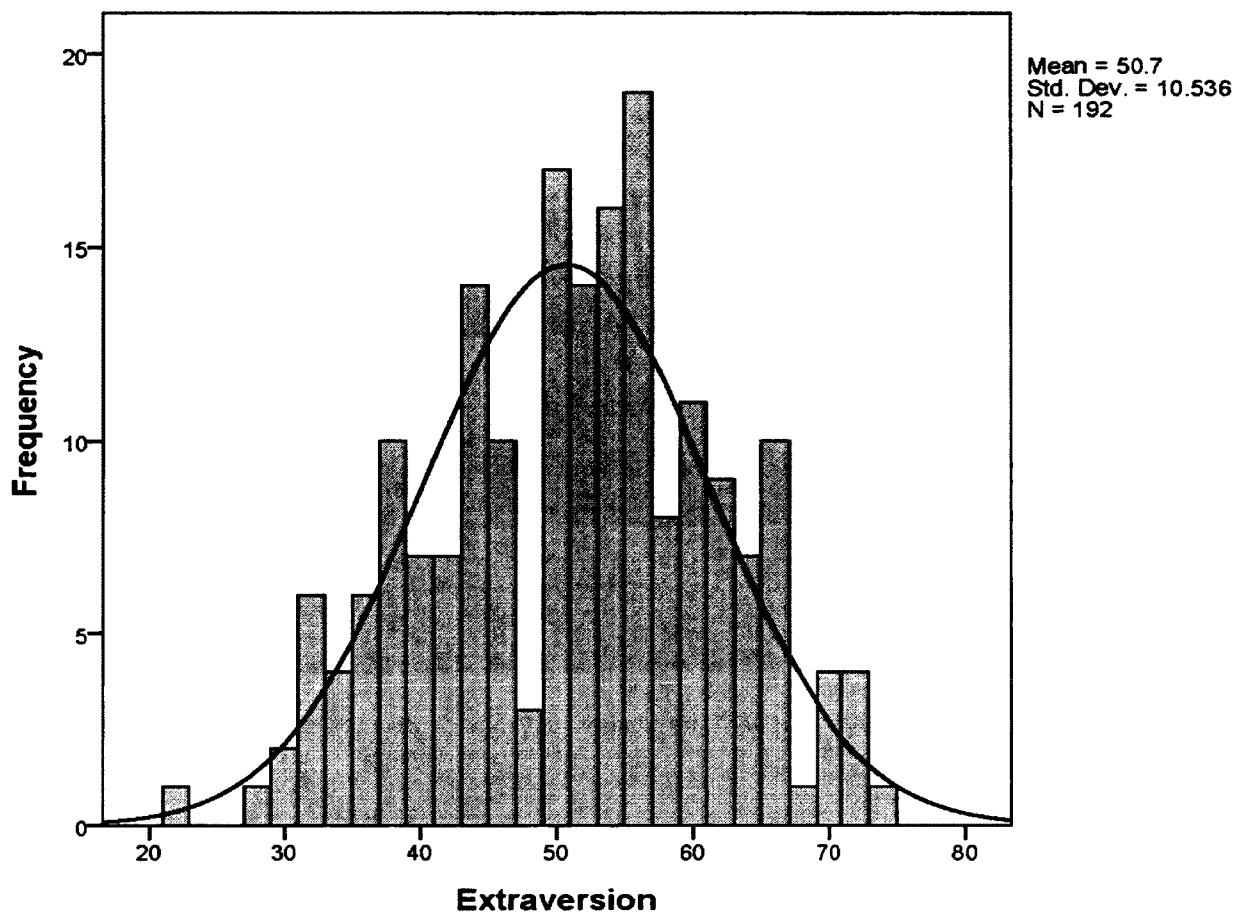


Figure 4. Frequency distribution of total sample *T* scores on the Extraversion domain of the NEO PI-R

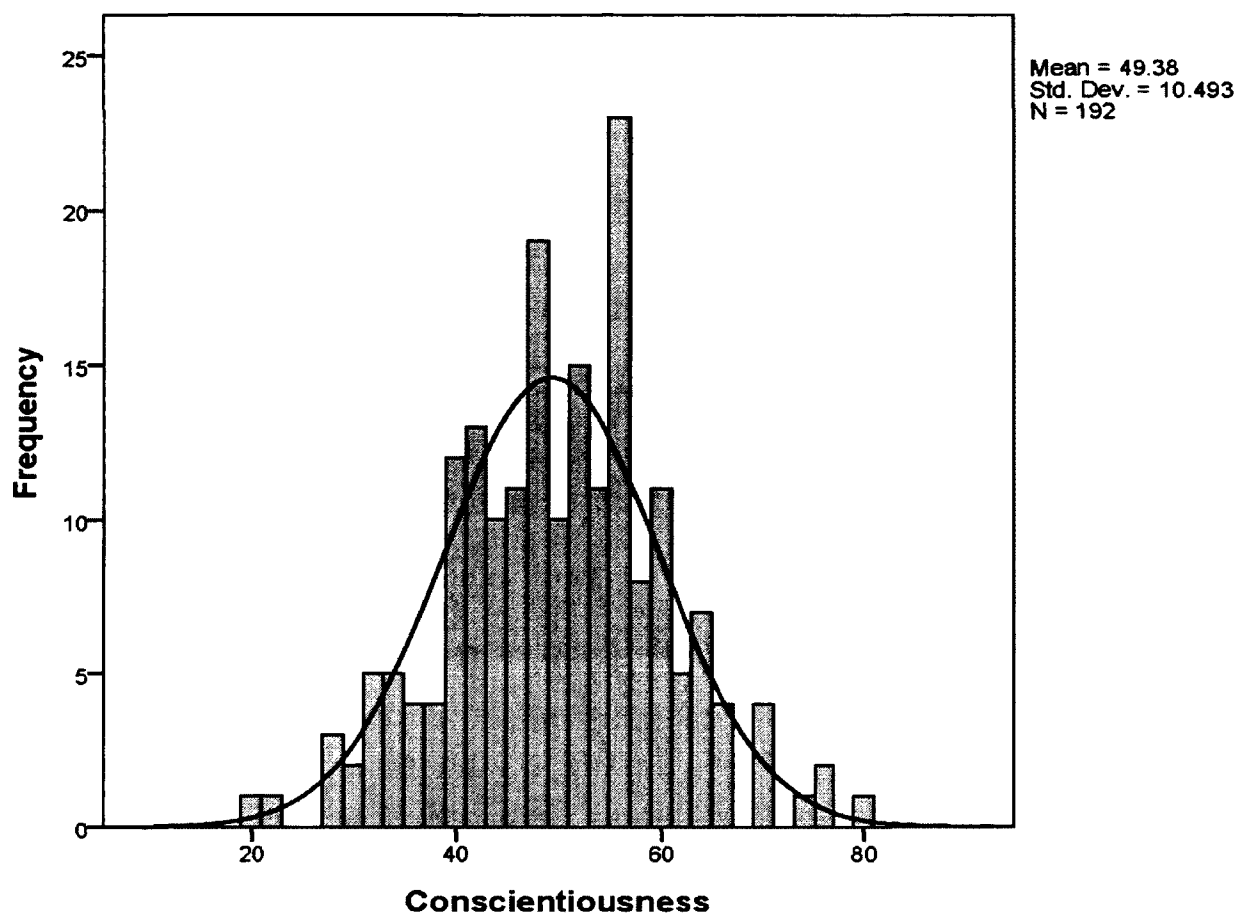


Figure 5. Frequency distribution of total sample *T* scores on the Conscientiousness domain of the NEO PI-R

For the Openness to Experience domain, the frequency distribution of T scores is skewed to the right (see Figure 6). The z score for skewness in the Openness to Experience domain is -2.023 , which is significant at the $p = .05$ level (see Table 9). This could initially suggest that the entire sample was disposed to answer questions related to the domain positively. This would not be entirely unexpected as the sample represents individuals who volunteered to participate in a study exploring the horoscope and its relation to personality. Interestingly, those in the sample who have the Moon in Air closely approximate a normal distribution (skewness = 0.048 ; $z = 0.154$) whereas those who do not have the Moon in Air represent the difference from a normal distribution (skewness = $-.560$; $z = -2.667$), which is not the frequency distribution expected by the hypothesis (see Table 9). Further analysis indicated that in this case, seven participants or 3.7% of the sample are the reason why the sample appears skewed with four participants self-reporting significantly elevated scores on the Openness to Experience domain at the $p = .05$ level, and three participants self-reporting elevated scores that are significant at the $p = .01$ level (see Figure 7). Although the power analysis described in Chapter 4 indicated that the sample size was appropriate for this study and would have a power of $> 80\%$ with $p = .01$, the relative paucity of the sample size likely accounts for the impact of these outliers on the skewness. These participants could have been removed from the study. However, the nature of the self-report measure allows participants to self-select the personality traits that they most identify with and these participants belong to the population that was intended to be sampled—that is, they were part of the group who volunteered to participate, irrespective of their Moon sign or element. Because of this, they were included in the hypothesis testing.

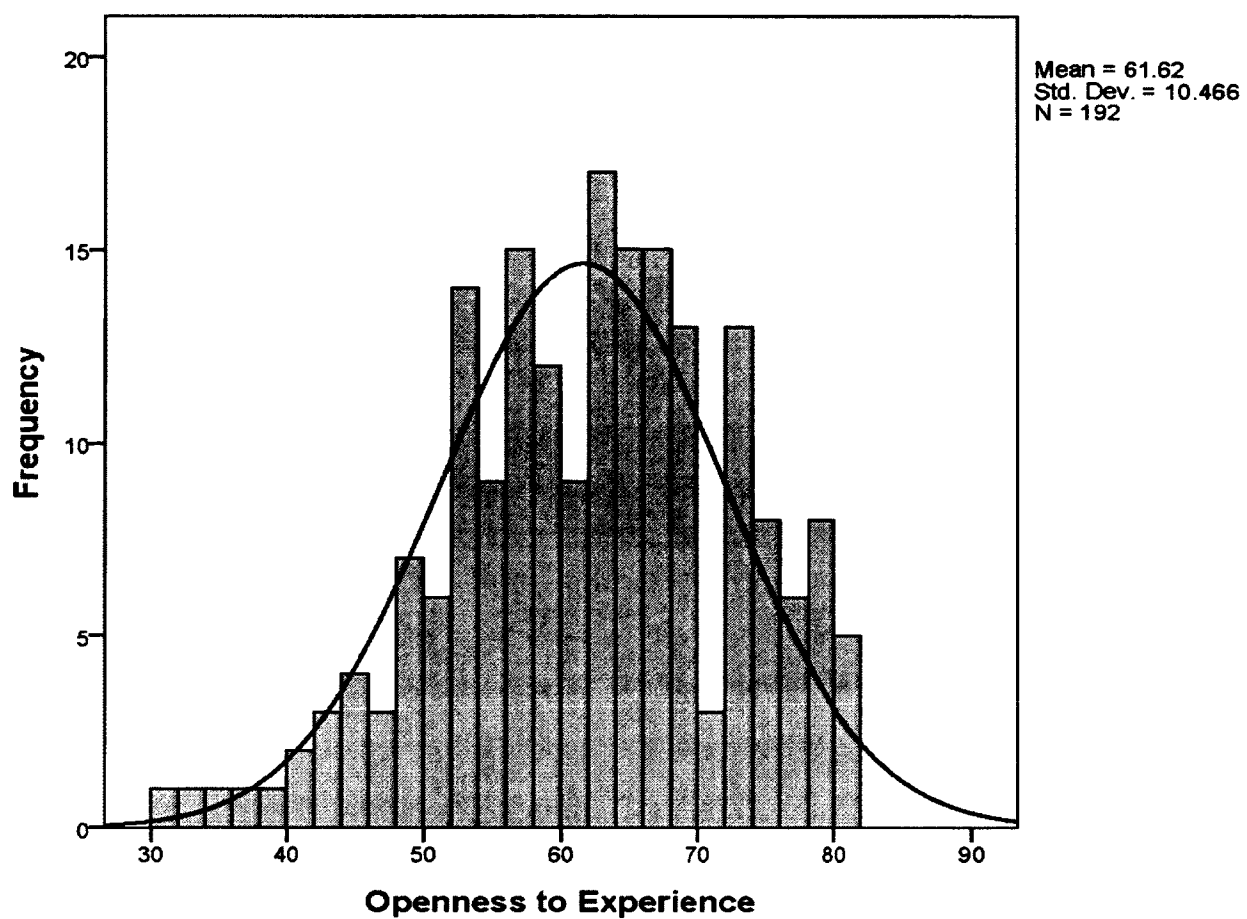


Figure 6. Frequency distribution of total sample *T* scores on the Openness to Experience domain of the NEO PI-R

Table 9

Sample Distribution of T scores by NEO PI-R Domain

Variable	<i>n</i>	Skewness	SE Skewness	<i>z</i>	Kurtosis	SE Kurtosis	<i>z</i>
Neuroticism							
Total Sample	192	.297	.175	1.697	-.004	.349	0.011
Moon in Water	40	.203	.374	0.543	-.159	.733	0.217
Moon not in Water	152	.326	.197	1.655	.077	.391	0.197
Extraversion							
Total Sample	192	-.138	.175	-0.789	-.519	.349	1.487
Moon in Fire	46	-.254	.350	-0.726	-.641	.688	0.932
Moon not in Fire	146	-.114	.201	-0.567	-.459	.399	1.150
Openness to Experience							
Total Sample	192	-.354	.175	-2.023*	-.163	.349	0.467
Moon in Air	59	.048	.311	0.154	-.747	.613	1.219
Moon not in Air	133	-.560	.210	2.667**	.325	.417	0.779
Conscientiousness							
Total Sample	192	-.053	.175	-0.303	.167	.349	0.479
Moon in Earth	47	-.841	.347	-2.424*	1.225	.681	1.799
Moon not in Earth	145	.048	.201	0.239	-.117	.400	- 0.293

* $p < .05$. ** $p < .01$.

Openness to Experience Outliers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Absolute z-score less than 1.95	185	96.4	96.4	96.4
	Absolute z-score greater or equal to 1.96 ($p < .05$)	4	2.1	2.1	98.4
	Absolute z-score greater or equal to 2.58 ($p < .01$)	3	1.6	1.6	100.0
	Total	192	100.0	100.0	

Figure 7. Frequency analysis of total sample z scores on the Openness to Experience domain of the NEO PI-R

Presentation of the data. Below are the test results for the Moon variable compared to the NEO PI-R domains. As discussed previously in Chapter 4, all p -values are two-tailed with an alpha of .01, established after applying the Bonferroni correction to the initial $p = .05$, to control for Type I errors.

The first hypothesis predicted that participants with the Moon in the Fire element would have higher mean T scores on the Extraversion domain of the NEO PI-R than those who did not have the Moon in the Fire element. The results indicate that those participants with the Moon in Fire did have higher mean T scores on the Extraversion domain ($n = 46$, $M = 51.63$, $SD = 11.74$) than those who do not have the Moon in Fire ($n = 146$, $M = 50.40$, $SD = 10.15$), $t(190) = .687$, $p = .493$. However, this difference was not statistically significant and represents a negligible effect size ($r = .05$). Although this result is not statistically significant, an additional test for the effect of a previous knowledge of the Moon sign on the mean T scores on the Extraversion domain revealed that there was no statistically significant difference between those participants with the Moon in Fire who knew their Moon sign prior to completing the assessments ($n = 28$, $M = 51.32$, $SD = 12.42$) and those with the Moon in Fire who had no previous knowledge of their Moon sign ($n = 18$, $M = 52.11$, $SD = 10.94$), $t(44) = -.220$, $p = .827$.

The second hypothesis predicted that participants with the Moon in the Earth element would have higher mean T scores on the Conscientiousness domain of the NEO PI-R than those who did not have the Moon in the Earth element. The third hypothesis predicted that participants with the Moon in the Air element would have higher mean T scores on the Openness to Experience domain of the NEO PI-R than those who did not have the Moon in the Air element. Finally, the fourth hypothesis predicted that

participants with the Moon in the Water element would have higher mean *T* scores on the Neuroticism domain of the NEO PI-R than those who did not have the Moon in the Water element. There were also no significant differences in the mean *T* scores for the second, third, and fourth hypotheses (see Table 10).

In summary, 192 participants who completed the NEO PI-R personality assessment also provided the data needed to calculate a natal chart. This study hypothesized that the Moon, as an independent variable in the natal chart, would be discernible in relation to the mean scores of four personality domains as measured by the NEO PI-R, when measured by subsample element categories. A series of independent measures *t* tests did not reveal any significant differences in the means of the selected NEO PI-R domains by element categories. Additionally, and somewhat surprisingly based on the research reviewed in Chapter 2, for the one hypothesis for which the mean *T* scores were higher in the expected domain (Moon in Fire participants in the Extraversion domain), there was no significant difference in the scores of those who knew their Moon was in Fire and those who did not know that their Moon was in Fire.

Table 10

Summary of Independent Measures *t* tests

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i> (190)	<i>p</i>
Extraversion					
Moon in Fire	46	51.63	11.74	.69	.49
Moon not in Fire	146	50.40	10.15		
Conscientiousness					
Moon in Earth	47	47.89	9.11	-1.12	.27
Moon not in Earth	145	49.86	10.89		
Openness to Experience					
Moon in Air	59	60.47	11.12	-1.01	.31
Moon not in Air	133	62.13	10.17		
Neuroticism					
Moon in Water	40	48.80	11.79	-.08	.94
Moon not in Water	152	48.96	11.37		

Chapter 6

Discussion

Overview of the Research Findings

The purpose of this study was to contribute to the general body of research and literature concerning the horoscope as a valid instrument for measuring personality factors by comparing the natal chart Moon variable, an established major factor in horoscope analysis and interpretation, to personality domains measured by the NEO PI-R. This study was in response to a gap in the research, both in the testing of the Moon as an independent variable in the natal chart, as well as the use of the five-factor personality model, as measured by the NEO PI-R, as a validated comparison measure. The goal was to provide data to contribute to closing that gap. The prediction was that the Moon would be discernible by elevated mean *T* scores on specific NEO PI-R domains when located in the element that had a theoretical correlation with a particular domain.

The results of this study did not find a relationship between the Moon and the expected personality characteristics as measured by the NEO PI-R. This is not entirely unexpected given that previous research has also not found statistically significant relationships between horoscope factors and personality assessment instruments (see review in Chapter 2). In addition, the results do not challenge the contentious and widespread criticism that astrology is not a valid assessment instrument because of its basic lack of reliability and validity. However, while recognizing that astrology is a controversial field of study with numerous passionate supporters and detractors, it is not the intent of this study to make statements about the validity of astrology as a whole,

provide decisive conclusions about whether astrology “works,” or make cause-and-effect statements about the effectiveness of independent variables in the natal chart.

It is important to be clear that any test of the isolated Moon variable alone is too limited to make a statement about the horoscope in general. Carlson’s (1985) widely disparaged conclusion that his experiment “clearly refutes the astrological hypothesis” (p. 425, reviewed in Chapter 2) stands as a cautionary statement against making claims that go beyond the limitations of what research studies of this nature can or cannot assert. The most that can be said about this study is that it failed to support that the Moon, as an isolated independent variable in the archived data sample, is a valid measure of personality domains as indicated by the NEO PI-R.

Limitations and Strengths of the Study

One of the strengths of this study was that it addressed the self-attribution consideration that previous knowledge of astrology factors can contribute to artifacts in the testing data. Specifically, it has been found that previous knowledge of one’s Sun sign and the corresponding characteristics for that sign can be sufficient to alter a person’s perception of his or her own character and cause him or her to answer a personality questionnaire with the corresponding attitude (Eysenck & Nias, 1982; Pawlik & Buse, 1984). Whereas the previous research focused on the Sun variable, the current study is the first to consider previous knowledge of the Moon variable. The fact that there was no statistically significant difference between mean scores for the two groups in the Moon in Fire variable, the one group for which the effect of previous knowledge was tested, is an interesting counter argument to the belief that those who know something about astrology will use that knowledge, consciously or otherwise, as a means

of conceptualizing their own self-identity. There may be an underlying difference in how the Moon variable is interpreted or some other consideration that is not immediately apparent. This is something that warrants further testing and suggests the possibility for further research studies that consider the impact of self-reported personality as influenced by previous knowledge of astrology variables other than the Sun.

Another strength of this study was the strong theoretical basis for which the hypotheses were constructed. Many tests of the horoscope do not establish the theoretical bases for their hypotheses by referencing astrology literature, which brings test design into question. In this case, it was interpretive descriptions and guides published by professional astrologers that provided the basis for testing the selected variable by element through a careful screening of astrology textbooks.

Although care was taken in the test design, there were a number of important limitations in this study. As stated in the Methodology section, this study used a nonrandom sample of participants who initially agreed to volunteer for a study that proposed to compare their horoscope and personality through solicitations by a school that specialized in metaphysical studies. That most of the participants were interested in volunteering for such a study suggests that there may have been an existing interest in astrology, whether passive or at the practitioner level. Even though the results did not end up in the direction that could be anticipated by such a group of volunteers, the sample used in the current study was not representative of the overall population.

Another limitation to this study was the lack of a comparison group, which could have included participants who did not know that the study was about astrology or otherwise clarified the level of interest in astrology prior to completion of the

assessments. Although this study did have a comparison group that did not know their Moon sign, they still knew that the study was about astrology and personality. Although the results of this study were not significant, the inclusion of a comparison group who did not have preexisting knowledge or interest in astrology could have provided additional controls against artifacts in the data and may have further influenced the variability of the scores on the NEO PI-R. For example, it is possible that there were participants who, knowing this study was testing astrology, may have had an investment in disproving a personality link. Finally, perhaps the most significant limitation was the inability to test for multiple interacting variables despite considerable theoretical support for doing so, because of the small sample size. Multiple, moderating variables are critically important considerations to be tested because of the nature of how the horoscope is interpreted and any future studies would ideally include a sample size large enough to be able to combine variables with reasonable statistical power.

Discussion of the Significance in Terms of Clinical Psychology

Personality assessment instruments have a well-established place in the field of clinical psychology and can be very useful to assist with identifying personality constructs that may be difficult to discern in a clinical interview alone. A personality assessment instrument is most useful when it reliably produces valid, objective results that are accurate measures of the construct that it proposes to describe (Groth-Marnat, 2009). In other words, personality assessments need to be able to measure what they say that they measure. Personality variables are quite complex, and assessment instruments need to be able to take this into account while still providing reliable and valid information that will be stable in a variety of contexts. To confidently use an instrument,

it needs to be validated in the context of history, observations, and relationships to other validated instruments (American Educational Research Association, American Psychological Association, National Council on Measurement in Education, & Joint Committee on Standards for Educational and Psychological Testing, 1999).

The utility of personality testing is not without controversy and has been challenged in many contexts (e.g., Eisman et al., 2000; Groth-Marnat, 1999; Morgeson et al., 2007). Clearly, no personality assessment measure is the final answer in terms of its ability to measure what people are “really like.” Test designers develop personality constructs and the fields of psychology and personality are littered with assessment instruments and items that did not survive rigorous empirical tests (Ones, Dilchert, Viswesvaran, & Judge, 2007). However, a comprehensive review of psychological testing, including over 125 meta-analyses of personality assessment validity studies, indicated that there is very strong and positive evidence of the efficacy of personality assessment testing, with well-validated personality scales generally representing a compelling and accurate measure of personality (Meyer et al., 2001).

The overarching purpose of this study is to examine the horoscope in terms of its relevance for clinical psychology, specifically as a personality assessment instrument. As stated in Chapter 1, when psychologists and other clinicians use personality assessment instruments, they often use a test battery that includes a variety of assessment measures that seek to identify a broad range of personality characteristics in order to answer questions and assist with making clinical decisions. Generally, all personality assessment instruments used by clinicians are designed to identify and provide insight into how a person will tend to think, behave, perceive or react in certain situations or settings (Groth-

Marnat, 2009; Groth-Marnat, Stolberg, Bongar, & Burke, 2011; Meyer et al., 2001).

Weiner and Greene (2008) provided a comprehensive summary for the purpose of assessment instruments:

Measures of personality characteristics help researchers examine individual differences in response style, unravel the origins of distinctive behavior patterns, and map developmental paths to diverse types of life adaptation. Personality assessment helps practitioners discern an individual's frame of mind and behavioral tendencies. They can then use this information to reach relevant conclusions and make useful recommendations. (p. xiii)

If you replace the phrases “measures of personality characteristics” and “personality assessment” with “the horoscope,” few practicing astrologers would argue with that as a summary definition of how the horoscope is used when sitting with clients. That puts the horoscope squarely in the realm of personality assessment and the argument made in this study is that if it can be proven to be reliable and valid, the horoscope deserves to be considered as part of a personality test battery.

However, as mentioned previously, the use of existing psychological assessment instruments to validate natal chart factors has been challenged as the best means by which to test the horoscope (Perry, 1995; Urban-Lurain, 1995b). The main arguments against validating the horoscope by comparing it to personality assessment results coalesce around the fact that it requires isolating factors and comparing them to similarly isolated factors in the personality assessment instruments. Perry (1995) argued that the interpretation of the horoscope entails synthesis of many factors and using isolated factors in these types of validation studies “distorts and misrepresents” the horoscope (p. 125). Yet, the argument against *interpreting* individual natal chart variables as standalone measures of personality are not inconsistent with the cautionary instructions for interpreting personality assessment instruments in general. All the way back in the

1930s, Allport (1937) and Murray (1938) were asserting that people are not a set of isolated traits and any assessment interpretation needs to account for the interchange of numerous personality factors that constitute a unique individual, which is an advisory note that is also present in virtually every personality assessment instrument manual, including the NEO PI-R (Costa & McCrae, 1992b; McCrae & Costa, 2010).

It is when interpreting assessments that the caution against focusing on individual factors is imperative. In terms of measurement, the importance of being able to identify reliable and valid individual factors in an assessment instrument, which will need to be synthesized in any comprehensive interpretation, continues to be a reasonable and critical consideration in selecting any assessment measure. This type of validity testing is similar to the principle of first validating the individual scales of the MMPI-2 (R. L. Greene, 2000) prior to interpreting (or testing) those individual scales in combination with the other scales. While there continue to be evolving (and contentious) developments of individual factors in personality factor models, at this point few would argue against the theoretical position that personality consists of distinct, stable personality traits that, interactively, constitute personality and many of these individual factors can be measured by a valid personality assessment instrument.

The interpretation of a natal chart rests on the theoretical position that the natal chart is an assessment instrument that measures distinct personality factors. The general consensus is that the Sun, Moon, and Ascendant, moderated by the sign or element in which they are placed, represent major, distinct factors in the natal chart to be used in interpretation, with other moderators also considered in the overall analysis. Specifically, in terms of this study, there is a consistent theoretical assertion in the astrology literature

that the Moon represents a distinct emotional orientation factor that must be considered in any horoscope interpretation. It is the ability of the horoscope to reliably identify emotional orientation through the Moon variable that was tested.

This study hinges on the use of the NEO PI-R as having a strong theoretical relationship with the constructs of planets and elements in the horoscope. One cannot assume with absolute certainty that the domains measured by the NEO PI-R are the definitive factors of personality or that the NEO PI-R is the assessment instrument that is able to most accurately measure personality factors as depicted by the horoscope. However, it has been established in this study that the NEO PI-R has withstood a lengthy inquiry across disparate fields of study, has been validated in hundreds of peer-reviewed studies (Costa & McCrae, 2003), and its constructs have a clear hypothetical link to the elements in the horoscope. The NEO PI-R's well-validated status and theoretical link to the elements are troubling in terms of the Moon variable's reliability and validity. If the Moon represents a core personality factor that is best discerned by its element placement, as was hypothesized in this study, then the failure to show consistent correlations with the NEO factors when using the archived data sample does not support the inclusion of the horoscope into a clinician's battery of personality assessment instruments.

Suggestions for Further Research

One crucial component of all personality assessment measures is that they have valid, reliable factors that can be measured by the instrument. Yet, if an instrument cannot discern a valid factor, this does not necessarily mean that the factor is not there. Content validity is defined as the degree with which an assessment instrument is relevant to and representative of the targeted construct for which it purports to measure (Groth-

Marnat, 2009). The continued failure of isolated factors in the natal chart to emerge in a statistically significant manner in the research literature is disturbing to those who find meaning in its tenets; however, it may also suggest that the factors may not be easily discerned with the use of comparative measures that are best suited to isolating factors. There may be another form of construct validity that is better suited to test the horoscope.

There are many factors in the horoscope considered by astrology practitioners in natal chart analysis and a tremendous body of theoretical literature available to establish hypotheses to be tested. One consideration for future research is that while there have been numerous single variable studies of the horoscope, there have been very few multivariate studies that may, in fact, be more accurate representations of the horoscope structure. Urban-Lurain (1984) conducted one of the few multivariate studies of the horoscope that rendered positive results and his statistical design was more complex than the majority of other astrology studies. Urban-Lurain compared a sample of Alcoholic Anonymous members ($n = 53$) to a sample of the general population ($n = 217$). He first did univariate analyses on a series of astrological variables, and then conducted a multivariate, discriminant analysis to classify the data into distinct groups: the Alcoholics Anonymous members and the general population. Using the discriminant function derived from these groups, the classification accuracy for the original samples was 80.7% compared to the 50% expected by chance, a positive and statistically significant result. To conduct tests such as these require a better-than-basic understanding of statistical models, as well as more than a passing familiarity with the factors in the horoscope. Although there may not be many mathematical or statistically trained members of

populace who know how to use these techniques and also study astrology, it is a relatively unexplored area for anyone so inclined.

The horoscope may also be more suited to other types of quantitative research considerations. There are few factor analytic studies of horoscope, or studies that assess the impact of moderator variables, or studies that use potentially more objective personality ratings by other persons in participants' lives, instead of self-report measures. These types of studies may be more suited to assessing how the horoscope is used and the validity of its interpretations. Just as validity research on personality instruments uses these multiple means of establishing validity, so should research on astrology.

Additionally, there are some recent publications exploring the horoscope in other contexts as a projective, symbolic, or synchronistic measure (e.g., Jennings, 1996a, 1996b; Pannone, 2007; Valentine, 1994). These types of orientations suggest that qualitative and hermeneutic studies of astrology are also potential areas for further research. Kochunas (1999) referred to astrology as "imaginal poetics" that is better placed in the humanities than the sciences, arguing that astrology's functional validity, more than its factual validity, is the most important consideration in terms of the horoscope's ability to add value, depth, richness and meaning to those who use it. This suggests that there are opportunities to use heuristic research, which uses personal experience as a valid research method (Moustakas, 1990), to develop further investigations and analyses of the horoscope.

Hermeneutic research of astrology is also relatively unexplored. Hermeneutics focuses on the phenomenon of shared linguistic meaning and hermeneutic research uses a rigorous interpretive analysis to study the complex of shared meanings between subjects

(Marshall & Rossman, 2011), which here could include astrologer and client, or researcher and subject. With this in mind, Willis and Curry (2004) promote the concept of astrology as a type of dialog with nature. They suggest that quantitative or strictly objective scientific tests of astrology eliminate the interaction with the astrologer and, hence, eliminate the symbolic and metaphoric exchange intrinsic to the astrological consultation. This orientation lends itself to a hermeneutic inquiry into astrology and could include exploration of the horoscope as a dialogical analysis (see Anderson, Baxter, & Cissna, 2004; Bergman, 1991; Linell, 2009). The hermeneutic model for astrology research could also include the collaborative therapeutic assessment model (see especially Finn, 2007, 2012; Finn, Fischer, & Handler, 2012; Fischer, 2012), through which the process of interaction and feedback between the astrologer and client can be studied. Finn (2007), in particular, has championed the importance of the interactive experience during assessment as potentially more important and impactful than the validity of any particular instrument used.

In the final analysis, this study did not establish a relationship between the Moon variable in element subsample groups to the personality domains measured by the NEO, PI-R. Nor did it challenge the prevailing criticism of astrology in academic circles. However, it did challenge the self-attribution theory, at least as it pertains to previous knowledge of the Moon element in the participants' own horoscopes. This study also highlighted a number of key areas of relatively unexplored research opportunities in astrology, both quantitative and qualitative. Ultimately, the popularity of the horoscope and astrology, in general, is not likely to significantly abate any time in the near future and, like any significant cultural, educational, or scientific practice, it demands continued

exploration and research by those who strive to understand people, their behaviors, and their beliefs.

Appendix A
Volunteer Participant Data

Name: _____

Date of Birth: _____

City or Town of Birth: _____

Time of Birth (precise as possible, please): _____

☐ My birth time is exact

☐ My birth time is an estimate (11:00 a.m. vs. 11:06 a.m.)

☐ UNKNOWN - I do not know my exact birth time

We need to clarify how the volunteer participants know their time of birth. Please check any box that applies:

☐ From a birth certificate

☐ Told to me by my mother

☐ Told to me by another family member

☐ From a baby book

☐ Other: _____

Finally, please answer the following question (if you do not understand the question simply answer "No"):

I know the Sign of the Moon in my astrology horoscope. ☐ Yes ☐ No

Best e-mail to contact you for feedback results: _____

Appendix B

Consent for Participation in Research

I am volunteering to participate in a research project conducted by the California Institute for Open Studies (CIOS). I understand that the project is designed to gather data from personality assessment questionnaires that I answer, which will be compared with my astrology horoscope.

My participation in this project is voluntary. I understand that this project will take anywhere from two to five hours of my time. I understand that I will not be paid for my participation. I may withdraw and discontinue participation at any time without penalty.

I understand that I will be answering questions about my life, feelings, and behavior. If I feel uncomfortable in any way about answering the questions, I have the right to decline to answer the questionnaire.

I understand that I will not be identified by name in any reports using information obtained from these questionnaires, and that my confidentiality as a participant in the study will remain secure. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of any individual participating in this study.

I have had all my questions answered to my satisfaction and I voluntarily agree to participate in this study.

Signature

Date

Printed name

References

- Abdel-Khalek, A., & Lester, D. (2006). Astrological signs and personality in Kuwaitis and Americans. *Psychological Reports*, 98(2), 602-607. doi: 10.2466/pr0.98.2.602-607
- Abrami, P. C., Leventhal, L., & Perry, R. P. (1982). Educational seduction. *Review of Educational Research*, 52(3), 446-464. doi: 10.2307/1170425
- Addey, J. M. (1996). *A new study of astrology*. London, England: Urania
- Alexander, R. (1983). *The astrology of choice: A counseling approach*. York Beach, ME: Weiser.
- Allport, G. W. (1937). *Personality: A psychological interpretation*. New York, NY: Holt.
- Allport, G. W., & Odbert, H. S. (1936). *Trait-names: A psycho-lexical study*. Princeton, NJ: Psychological Review
- Aluja, A., García, O., & García, L. F. (2004). Replicability of the three, four and five Zuckerman's personality super-factors: Exploratory and confirmatory factor analysis of the EPQ-RS, ZKPQ and NEO-PI-R. *Personality and Individual Differences*, 36(5), 1093-1108. doi: 10.1016/s0191-8869(03)00203-4
- American Educational Research Association, American Psychological Association, National Council on Measurement in Education, & Joint Committee on Standards for Educational and Psychological Testing. (1999). *Standards for educational and psychological testing*. Washington, DC: American Educational Research Association.
- Anderson, R., Baxter, L. A., & Cissna, K. N. (Eds.). (2004). *Dialogue: Theorizing difference in communication studies*. Thousand Oaks, CA: Sage.
- Angleitner, A., & Ostendorf, F. (1994). Temperament and the Big Five factors of personality. In C. F. Halverson, G. A. Kohnstamm & R. P. Martin (Eds.), *The developing structure of temperament and personality from infancy to adulthood* (pp. 69-90). Hillsdale, NJ: Erlbaum.

- Ankerberg, J., & Weldon, J. (1989). *Astrology: Do the heavens rule our destiny?* Eugene, OR: Harvest House.
- Arroyo, S. (1975). *Astrology, psychology, and the four elements: An energy approach to astrology & its use in the counseling arts*. Davis, CA: CRCS.
- Arroyo, S. (1978). *Astrology, karma & transformation: The inner dimensions of the birth chart*. Davis, CA: CRCS.
- Arroyo, S. (1989). *Chart interpretation handbook: Guidelines for understanding the essentials of the birth chart*. (J. Marshall, ed.). Sebastopol, CA: CRCS.
- Ashton, M. C. (2007). *Individual differences and personality*. Burlington, MA: Elsevier Academic Press.
- Avery, J. (1982). *The rising sign: Your astrological mask*. Garden City, NY: Doubleday.
- Balch, W. R. (1980). Testing the validity of astrology in class. *Teaching of Psychology*, 7(4), 247-250. doi: 10.1207/s15328023top0704_22
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173-1182. doi: 10.1037/0022-3514.51.6.1173
- Bastedo, R. W. (1978). An empirical test of popular astrology. *Skeptical Inquirer*, 3(1), 17-38.
- Bell, L., Costello, D., Greene, L., & Reinhart, M. (2001). *The Mars quartet: Four seminars on the astrology of the red planet*. London, England: Centre for Psychological Astrology Press.
- Bergman, S. H. (1991). *Dialogical philosophy from Kierkegaard to Buber*. Albany, NY: State University of New York Press.
- Beutler, L. E., & Groth-Marnat, G. (2003). *Integrative assessment of adult personality* (2nd ed.). New York, NY: Guilford Press.

- Bills, R. E. (1998). *The rulership book*. Tempe, AZ: American Federation of Astrologers.
- Bobrick, B. (2005). *The fated sky: Astrology in history*. New York, NY: Simon & Schuster.
- Borgatta, E. F. (1964). The structure of personality characteristics. *Behavioral Science*, 9(1), 8-17. doi: 10.1002/bs.3830090103
- Box, G. E. P., Hunter, J. S., & Hunter, W. G. (2005). *Statistics for experimenters: Design, innovation, and discovery* (2nd ed.). Hoboken, NJ: Wiley
- Briggs, S. R. (1992). Assessing the Five-Factor Model of Personality Description. *Journal of Personality*, 60(2), 253-293. doi: 10.1111/j.1467-6494.1992.tb00974.x
- Brockbank, J. (2003). The sceptical attack of Dean et al. on astrology. *C.U.R.A. The International Astrology Research Center*. Retrieved from <http://cura.free.fr/xxx/28brockb.html>
- Burk, K. (2001). *Astrology: Understanding the birth chart: A comprehensive guide to classical interpretation*. St. Paul, MN: Llewellyn.
- Butcher, J. N., Dahlstrom, W. G., Graham, J. R., Tellegen, A., & Kaemmer, B. (1989). *Minnesota multiphasic personality inventory-2 (MMPI-2): Manual for administration and scoring*. Minneapolis, MN: University of Minnesota Press.
- Campion, N. (1993a). *Born to reign: The astrology of Europe's royal families*. London, England: Chapmans.
- Campion, N. (1993b). *The practical astrologer*. Bristol, England: Cinnabar Books.
- Campion, N. (2008). *The dawn of astrology: A cultural history of Western astrology* (Vol. 1). London, England: Hambledon
- Carlson, S. (1985). A double-blind test of astrology. *Nature*, 318(6045), 419-425. doi: 10.1038/318419a0

- Carter, C. E. O. (1925). *The principles of astrology*. London, England: Theosophical Publishing House.
- Casassus, B., & Holden, C. (2001). French Panel Pans Astrologer's Ph.D. *Science Now*. Retrieved from <http://news.sciencemag.org/sciencenow/2001/08/17-02.html>
- Cattell, R. B. (1966). *The scientific analysis of personality*. Chicago, IL: Aldine.
- Clark, V. (1970). Experimental astrology. *Aquarian Agent*, 1(9), 22-23.
- Clarke, D., & Gabriels, T. (1996). Astrological signs as determinants of extroversion and emotionality: An empirical study. *Journal of Psychology*, 130(2), 131-140. doi: 10.1080/00223980.1996.9914995
- Cleophas, T. J., Zwinderman, A. H., Cleophas, T. F., & Cleophas, E. P. (2009). *Statistics applied to clinical trials* (4th ed.). New York, NY: Springer.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum
- Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education* (6th ed.). New York, NY: Routledge.
- Cone, J. D. (1988). Psychometric considerations and the multiple models of behavioral assessment. In A. S. Bellack & M. Hersen (Eds.), *Behavioral assessment: A practical handbook* (3rd ed., pp. 42-66). New York, NY: Pergamon Press.
- Cornelius, G. (2003). *The moment of astrology: Origins in divination* (2nd ed.). Bournemouth, England: Wessex Astrologer.
- Costa, P. T., Busch, C. M., Zonderman, A. B., & McCrae, R. R. (1986). Correlations of MMPI Factor Scales With Measures of the Five Factor Model of Personality. *Journal of Personality Assessment*, 50(4), 640-650. doi: 10.1207/s15327752jpa5004_10
- Costa, P. T., Herbst, J. H., McCrae, R. R., & Siegler, I. C. (2000). Personality at midlife: Stability, intrinsic maturation, and response to life events. *Assessment*, 7, 365-378. doi: 10.1177/107319110000700405

- Costa, P. T., & McCrae, R. R. (1988). Personality in adulthood: A six-year longitudinal study of self-reports and spouse ratings on the NEO Personality Inventory. *Journal of Personality and Social Psychology*, 54(5), 853-863. doi: 10.1037/0022-3514.54.5.853
- Costa, P. T., & McCrae, R. R. (1992a). Four ways five factors are basic. *Personality and Individual Differences*, 13(6), 653-665. doi: 10.1016/0191-8869(92)90236-i
- Costa, P. T., & McCrae, R. R. (1992b). *Neo PI-R Professional Manual*. Odessa, FL: Psychological Assessment Resources.
- Costa, P. T., & McCrae, R. R. (1995). Primary traits of Eysenck's P-E-N system: Three and five-factor solutions. *Journal of Personality and Social Psychology*, 69(2), 308-317. doi: 10.1037/0022-3514.69.2.308
- Costa, P. T., & McCrae, R. R. (2003). Bibliography for the Revised NEO Personality Inventory (NEO PI-R™) and NEO Five-Factor Inventory (NEO-FFI™). Retrieved from www4.parinc.com/webuploads/productinfo/NEO_bib.pdf
- Costa, P. T., & McCrae, R. R. (2008). The Revised NEO Personality Inventory (NEO PI-R). In G. J. Boyle, G. Matthews & D. H. Saklofske (Eds.), *Sage handbook of personality theory and assessment* (Vol. 2, pp. 179-198). Los Angeles, CA: Sage.
- Costello, D. (1998). *Water and fire*. London, England: Centre for Psychological Astrology Press.
- Costello, D. (1999). *Earth and air*. London, England: Centre for Psychological Astrology Press.
- Culver, R. G., & Ianna, P. A. (1988). *Astrology: True or false? A scientific evaluation*. Buffalo, NY: Prometheus.
- Cunningham, D. (1989). *Moon signs: The key to your inner life*. New York, NY: Ballantine.
- Cunningham, D. (2003). Zipporah Dobyns: Memorial. Retrieved from <http://www.solsticepoint.com/astrologersmemorial/dobyns.html>

- Davison, R. C. (1988). *Astrology: The classic guide to understanding your horoscope*. Sebastopol, CA: CRCS.
- Dawkins, R. (1976). *The selfish gene*. New York, NY: Oxford University Press.
- Dawkins, R. (1996). The real romance of the stars. (Originally published in *The Independent* newspaper on December 31, 1995). Retrieved from <http://www.astrologer.com/aanet/pub/journal/romance.html>
- Dawson, G., & Johnson, S. (2000). Solar Fire Five (Version 5.0.19) [Computer software]. Magill, Australia: Esoteric Technologies.
- Dean, G. (1983). Can self-attribution explain sun-sign guessing? *Correlation*, 3(2), 22-27.
- Dean, G. (1985a). Can astrology predict E and N? Part I: Individual factors. *Correlation*, 5(1), 3-17.
- Dean, G. (1985b). Can astrology predict E and N? Part II: The whole chart. *Correlation*, 5(2), 2-24.
- Dean, G. (1986). Can astrology predict E and N? Part III: Discussion and further research. *Correlation*, 6(2), 7-52.
- Dean, G. (2003). On being properly scientific. *Correlation*, 21(2), 43-44.
- Dean, G., & Kelly, I. W. (2001). Does astrology work? Astrology and skepticism 1975-2000. In P. Kurtz (Ed.), *Skeptical odysseys: Personal accounts by the world's leading paranormal inquirers* (2nd ed., pp. 191-207). Amherst, NY: Prometheus.
- Dean, G., & Kelly, I. W. (2003). Is astrology relevant to consciousness and psi? *Journal of Consciousness Studies*, 10(6), 175-198.
- Dean, G., Kelly, I. W., & Mather, A. (1998). Astrology and human judgement. *Correlation*, 17(2), 24-71.

- Dean, G., & Loftson, P. (1996). Some philosophical problems of astrology. *Correlation*, 14(2), 32-44.
- Dean, G., & Mather, A. (1977). *Recent advances in natal astrology: A critical review 1900-1976*. Subiaco, Western Australia: Analogic.
- Dean, G., Mather, A., & Kelly, I. W. (1996). Astrology. In G. Stein (Ed.), *The encyclopedia of the paranormal* (pp. 47-99). Amherst, NY: Prometheus Books.
- Dean, G., & Smit, R. (1987). The meaning of Pluto, part 2: Further analysis of Dwyer's data. *Correlation*, 7(2), 14-21.
- Dickson, D. H., & Kelly, I. W. (1985). The "Barnum effect" in personality assessment: A review of the literature. *Psychological Reports*, 57(2), 367-382. doi: 10.2466/pr0.1985.57.2.367
- Digman, J. M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology*, 41(1), 417-441. doi: 10.1146/annurev.ps.41.020190.002221
- Dobyns, Z. P., & Roof, N. (1973). *The astrologer's casebook*. Los Angeles, CA: TIA.
- Draycott, S. G., & Kline, P. (1995). The Big Three or the Big Five—the EPQ—R vs the NEO-PI: A research note, replication and elaboration. *Personality and Individual Differences*, 18(6), 801-804. doi: 10.1016/0191-8869(95)00010-4
- Dwyer, T. (1987). The meaning of Pluto, part 1: Experiment and primary analysis. *Correlation*, 7(2), 9-13.
- Edwards, A. L. (1957). *The social desirability variable in personality assessment and research*. Fort Worth, TX: Dryden Press.
- Eggert, D. (1974). *Eysenck-persönlichkeits-inventar EPI. Handanweisung für die durchführung und auswertung*. Hogrefe: Göttingen.
- Eisman, E. J., Dies, R. R., Finn, S. E., Eyde, L. D., Kay, G. G., Kubiszyn, T. W., . . . Moreland, K. L. (2000). Problems and limitations in using psychological assessment in the contemporary health care delivery system. *Professional*

Psychology: Research and Practice, 31(2), 131-140. doi: 10.1037/0735-7028.31.2.131

Elwell, D. (1991). Can astrology win through. *Astrological Journal*, 33, 6-16.

Elwell, D. (2001). The researchers researched: A reply to the cynics. Retrieved from http://www.astrozero.co.uk/astroscience/elwell_1.htm

Ertel, S. (2009). Appraisal of Shawn Carlson's renowned astrology tests. *Journal of Scientific Exploration*, 23(2), 125-137. Retrieved from http://www.scientificexploration.org/journal/full/jse_23_2_full.pdf#page=7

Ertel, S., & Irving, K. (1996). *The tenacious Mars effect*. London, England: Urania

European Commission. (2001). Eurobarometer 55.2: Europeans, science and technology. Retrieved from <http://ec.europa.eu/research/press/2001/pr0612en-report.pdf>

Evans, D. (2002). Unforeseen growth of academic astrology. *Nature*, 420, 359. doi: 10.1038/420359b

Eysenck, H. J. (1975). *Manual of the Eysenck Personality Questionnaire (Junior and Adult)*. Kent, UK: Hodder and Stoughton.

Eysenck, H. J. (1981). General features of the model. In H. J. Eysenck (Ed.), *A model for personality*. Springfield, IL: Thomas.

Eysenck, H. J. (1984). The comparative approach in personality study. *Behavioral and Brain Sciences*, 7, 440-441. doi: 10.1017/S0140525X00019014

Eysenck, H. J. (1986a). Critique of Carlson's double-blind test of astrology. *Astro-Psychological Problems*, 4(1), 7-9.

Eysenck, H. J. (1986b). A double blind test of astrology. *Correlation*, 6(1), 15-16.

Eysenck, H. J. (1991). Dimensions of personality: The biosocial approach to personality. In J. Strelau & A. Angleitner (Eds.), *Explorations in temperament: International*

perspectives on theory and measurement (pp. 87-103). New York, NY: Plenum Press.

Eysenck, H. J., & Eysenck, S. B. G. (1964). *Manual of the Eysenck Personality Inventory*. London, England: University of London Press.

Eysenck, H. J., & Eysenck, S. B. G. (1969). *Personality structure and measurement*. San Diego, CA: Knapp.

Eysenck, H. J., & Nias, D. K. B. (1982). *Astrology, science or superstition?* New York, NY: St. Martin's Press.

Fearrington, B. (1999). *The new way to learn astrology*. St. Paul, MN: Llewellyn

Felner, R. (1994). Reliability of diagnoses. In R. Corsini (Ed.), *Encyclopedia of psychology* (2nd ed., Vol. 3, pp. 299-300). Hoboken, NJ: Wiley.

Fenton, S. (2005). *What time were you born: Creating your complete astrological chart*. New York, NY: Sterling

Feyerabend, P. (1978). *Science in a free society*. London, England: Verso

Fichten, C. S., & Sunerton, B. (1983). Popular horoscopes and the Barnum Effect. *The Journal of Psychology*, 114(1), 123-134. doi: 10.1080/00223980.1983.9915405

Finn, S. E. (2007). *In our clients' shoes: Theory and techniques of therapeutic assessment*. Mahwah, NJ: Erlbaum

Finn, S. E. (2012). *Therapeutic assessment: Using psychological testing to help clients change*. New York, NY: Routledge.

Finn, S. E., Fischer, C. T., & Handler, L. (2012). *Collaborative/therapeutic assessment: A casebook and guide*. Hoboken, NJ: Wiley

Fischer, C. T. (2012). *Individualizing psychological assessment* (2nd ed.). Hillsdale, NJ: Erlbaum

Fleiss, J. L., Levin, B. A., & Paik, M. C. (2003). *Statistical methods for rates and proportions* (3rd ed.). Hoboken, NJ: Wiley.

Fraenkel, J. R., & Wallen, N. E. (2009). *How to design and evaluate research in education* (7th ed.). New York, NY: McGraw-Hill.

Frazier, P. A., Tix, A. P., & Barron, K. E. (2004). Testing moderator and mediator effects in counseling psychology research. *Journal of Counseling Psychology*, 51(1), 115-134. doi: 10.1037/0022-0167.51.1.115

García, L. F., Aluja, A., García, O., & Cuevas, L. (2005). Is openness to experience an independent personality dimension? Convergent and discriminant validity of the openness domain and its NEO-PI-R facets. *Journal of Individual Differences*, 26(3), 132-138. doi: 10.1027/1614-0001.26.3.132

Gauquelin, M. (1955). *L'Influence des astres*. Paris, France: Editions du Dauphin.

Gauquelin, M. (1960). *Les hommes et les astres*. Paris, France: Éditions Denoël.

Gauquelin, M. (1969). *The scientific basis of astrology*. New York, NY: Stein and Day.

Gauquelin, M. (1970). *Astrology and science*. London, England: Davies.

Gauquelin, M. (1979). *Dreams and illusions of astrology*. Buffalo, NY: Prometheus Books.

Gauquelin, M. (1982). Zodiac and personality: An empirical study. *Skeptical Inquirer*, 6(3), 57-65.

Gauquelin, M. (1983). *Birthtimes: A scientific investigation of the secrets of astrology*. New York, NY: St Mark's Press.

Gauquelin, M. (1988). *Written in the stars*. Wellingborough, England: Aquarian Press.

Gauquelin, M. (1991). *Neo-Astrology: A Copernican revolution*. New York, NY: Arkana.

- Geary, D. C. (2005). *The origin of mind: Evolution of brain, cognition, and general intelligence*. Washington, DC: American Psychological Association.
- Gergen, K. J. (2001). Psychological science in a postmodern context. *American psychologist*, 56(10), 803-813. doi: 10.1037/0003-066x.56.10.803
- Goldberg, L. R. (1981). Language and individual differences: The search for universals in personality lexicons. In L. Wheeler (Ed.), *Review of personality and social psychology* (Vol. 2, pp. 141-165). Beverly Hills, CA: Sage.
- Goldberg, L. R. (1993). The structure of phenotypic personality traits. *American psychologist*, 48(1), 26-34. doi: 10.1037/0003-066x.48.1.26
- Goodstein, L. D., & Brazis, K. L. (1970). Psychology of scientist: XXX. Credibility of psychologists: An empirical study. *Psychological Reports*, 27, 835-838. doi: 10.2466/pr0.1970.27.3.835
- Google Scholar. (2011). Retrieved from http://scholar.google.com/scholar?hl=en&q=Tiggle+Fiebert+%22Development+of+an+astrological+hostility+scale%22&btnG=Search&as_sdt=0%2C5&as_ylo=&as_vis=0
- Gough, H. G. (1957). *Manual for the California Psychological Inventory (CPI)*. Palo Alto, CA: Consulting Psychologists Press.
- Gravetter, F. J., & Wallnau, L. B. (2008). *Essentials of statistics for the behavioral sciences* (6th ed.). Belmont, CA: Thomson Wadsworth.
- Greene, L. (1978). *Relating: An astrological guide to living with others on a small planet* (2nd ed.). York Beach, ME: Weiser.
- Greene, L. (1989). *Astrology for lovers*. York Beach, ME: Weiser.
- Greene, L., & Sasportas, H. (1987). *The development of the personality*. York Beach, ME: Weiser.
- Greene, L., & Sasportas, H. (1992). *The luminaries: The psychology of the sun and moon in the horoscope*. York Beach, ME: Weiser.

- Greene, L., & Sasportas, H. (1993). *The inner planets: Building blocks of personal reality*. York Beach, ME: Weiser.
- Greene, R. L. (2000). *The MMPI-2: An interpretive manual* (2nd ed.). Boston, MA: Allyn and Bacon.
- Groome, D. (2001). Astrology. In R. Roberts & D. Groome (Eds.), *Parapsychology: The science of unusual experience* (pp. 60-73). London, England: Arnold.
- Groth-Marnat, G. (1999). Financial efficacy of clinical assessment: Rational guidelines and issues for future research. *Journal of Clinical Psychology*, 55(7), 813-824. doi: 10.1002/(SICI)1097-4679(199907)55:7<813::AID-JCLP4>3.0.CO;2-B.
- Groth-Marnat, G. (2009). *Handbook of psychological assessment* (5th ed.). Hoboken, NJ: Wiley
- Groth-Marnat, G., Stolberg, R. A., Bongar, B., & Burke, K. (2011). Integrative personality assessment in special settings. In T. M. Harwood, L. E. Beutler & G. Groth-Marnat (Eds.), *Integrative assessment of adult personality* (3rd ed., pp. 329-353). New York, NY: Guilford.
- Hall, M. P. (1975). *Astrological keywords*. Totowa, NJ: Littlefield Adams.
- Hamaker-Zondag, K. (1985). *Planetary symbolism in the horoscope*. York Beach, ME: Weiser.
- Hamaker-Zondag, K. (1990). *Psychological astrology: A synthesis of Jungian psychology and astrology*. York Beach, ME: Weiser.
- Hamaker-Zondag, K. (1994). *Foundations of personality: Combining elements, crosses, and houses with Jungian psychological concepts in horoscope interpretation*. York Beach, ME: Weiser.
- Hamilton, M. M. (1995). Incorporation of astrology-based personality information into long-term self-concept. *Journal of Social Behavior & Personality*, 10(3), 707-718.

- Hamilton, M. M. (2001). Who believes in astrology? Effect of favorableness of astrologically derived personality descriptions on acceptance of astrology. *Personality and Individual Differences*, 31(6), 895-902. doi: 10.1016/s0191-8869(00)00191-4
- Hamilton, T. W. (1986). Critique of Carlson's double-blind test of astrology. *Astro-Psychological Problems*, 4(1), 9-12.
- Hand, R. (1981). *Horoscope symbols*. West Chester, PA: Whitford Press.
- Harary, K., & Donahue, E. (1994). *Who do you think you are? Explore your many-sided self with the Berkeley Personality Profile*. San Francisco, CA: Harper.
- Harding, M. (2000). Prejudice in astrological research. *Correlation*, 19(1), 17-33.
- Harvey, C., & Harvey, S. (1994). *Sun sign, moon sign*. London, England: Aquarian.
- Hentschel, U., & Kiessling, M. (1985). Season of birth and personality: Another instance of noncorrespondence. *Journal of Social Psychology*, 125(5), 577-585. doi: 10.1080/00224545.1985.9712031
- Heukelom, W. (1991). The devil and his advocate. *Astrologie in Onderzoek*, 6(1), 29-39.
- Hines, T. (1988). *Pseudoscience and the paranormal: A critical examination of the evidence*. Buffalo, NY: Prometheus Books.
- Hogan, R. (1986). *Hogan Personality Inventory manual*. Minneapolis, MN: National Computer Systems.
- Høglend, P., Bøgwald, K.-P., Amlo, S., Marble, A., Ulberg, R., Sjaastad, M. C., . . . Johansson, P. (2008). Transference interpretations in dynamic psychotherapy: Do they really yield sustained effects? *The American Journal of Psychiatry*, 165(6), 763-771. doi: 10.1176/appi.ajp.2008.07061028
- Holden, J. H. (2006). *A history of horoscopic astrology* (2nd ed.). Tempe, AZ: American Federation of Astrologers.

- Hone, M. E. (1978). *The modern text book of astrology* (Revised ed.). Southampton, England: Camelot Press.
- Jackson, M., & Fiebert, M. S. (1980). Introversion-Extraversion and astrology. *Journal of Psychology*, 105(2), 155-156. doi: 10.1080/00223980.1980.9915145
- Jacobs, T. J. (1993). *The use of the self: Countertransference and communication in the analytic situation*. Madison, CT: International Universities Press.
- Jayaraman, K. S. (2001). Angry researchers pour scorn on astrology classes. *Nature*, 411(6835), 227. doi: 10.1038/35077282
- Jennings, G. H. (1996a). The experience of archetypal symbolism and similarities in Jungian psychology and astrology. In G. H. Jennings (Ed.), *Passages beyond the gate: A Jungian approach to understanding the nature of American psychology at the dawn of the new millennium* (pp. 321-328). Needham Heights, MA: Simon & Schuster.
- Jennings, G. H. (1996b). Psychological astrology: Basic concepts in a symbolic language for understanding human nature. In G.-H. Jennings (Ed.), *Passages beyond the gate: A Jungian approach to understanding the nature of American psychology at the dawn of the new millennium* (pp. 302-320). Needham Heights, MA: Simon & Schuster.
- Jerome, L. E. (1977). *Astrology disproved*. Buffalo, NY: Prometheus.
- John, O. P., Angleitner, A., & Ostendorf, F. (1988). The lexical approach to personality: A historical review of trait taxonomic research. *European Journal of Personality*, 2(3), 171-203. doi: 10.1002/per.2410020302
- John, O. P., Naumann, L. P., & Soto, C. J. (2008). Paradigm shift to the integrative Big Five trait taxonomy: History, measurement, and conceptual Issues. In O. P. John, R. W. Robins & L. A. Pervin (Eds.), *Handbook of personality theory and research* (pp. 114-158). New York, NY: Guilford.
- Joseph, R. A. (1975). A Vernon Clark-model experiment distinguishing exceptionally gifted high performance from profoundly retarded low performance children. *Journal of Geocosmic Research*, 1(1), 55-72.

- Jung, C. G. (1963). *Memories, dreams, reflections*. New York, NY: Pantheon Books.
- Kallery, M. (2001). Early-years educators attitudes to science and pseudo-science: The case of astronomy and astrology. *European Journal of Teacher Education*, 24(3), 329-342. doi: 10.1080/02619760220128888
- Kelly, I. W. (1997). Modern astrology: A critique. *Psychological Reports*, 81(3), 1035-1066. doi: 10.2466/pr0.1997.81.3.1035
- Kelly, I. W. (1998). Why astrology doesn't work. *Psychological Reports*, 82(2), 527-546. doi: 10.2466/pr0.1998.82.2.527
- Kelly, I. W. (2001). The concepts of modern astrology: A critique. *Astrology and Science*. Retrieved from Astrology and Science website: www.astrosurf.com/nitschelm/Modern_criticism.pdf
- Kelly, I. W. (2007). Vested interests 1, scientific integrity 0. *Astrology and Science*. Retrieved from <http://www.astrology-and-science.com/d-vest2.htm>
- Kelly, I. W., Culver, R. G., & Loftson, P. (1989). Arguments of the astrologers. In S. K. Biswas, D. C. V. Mallik & C. V. Vishveshwara (Eds.), *Cosmic perspectives* (pp. 207-231). New York, NY: Cambridge University Press.
- Kelly, I. W., Dean, G., & Saklofske, D. H. (1990). Astrology: A critical review. In P. Grim (Ed.), *Philosophy of science and the occult* (2nd ed., pp. 51-81). Albany, NY: State University of New York Press.
- Kochunas, B. (1999). Why astrology works. *The Mountain Astrologer*. Retrieved from http://www.mountainastrologer.com/standards/editor%27s%20choice/articles/why_ast.html
- Kolbe, R. H., & Burnett, M. S. (1991). Content-analysis research: An examination of applications with directives for improving research reliability and objectivity. *The Journal of Consumer Research*, 18(2), 243-250.
- Konstabel, K., Aavik, T., & Allik, J. (2006). Social desirability and consensual validity of personality traits. *European Journal of Personality*, 20(7), 549-566. doi: 10.1002/per.593

- Kuehl, R. O. (1999). *Design of experiments: Statistical principles of research design and analysis* (2nd ed.). Pacific Grove, CA: Duxbury Press.
- Kurtz, P. (2006). Science and the public: Summing up thirty years of the Skeptical Inquirer. *Skeptical Inquirer*, 30(5), 13-19.
- Lamb, W., & Harris, W. (2004). *The secrets of your rising sign: The astrological key to getting what you want*. Gloucester, MA: Fair Winds Press.
- Lehmann, J. K. (1998). *The influence of the theosophical movement on the revival of astrology in Great Britain and North America in the 20th century* (Unpublished doctoral dissertation). Concordia University, Montreal, Quebec.
- Lewi, G. (2002). *Heaven knows what* (Rev. ed.). St. Paul, MN: Llewellyn.
- Library of Congress. (2011). Online catalog Retrieved June 30, 2011, from <http://catalog.loc.gov/>
- Lilley-Harvey, S. (1981). The synastry of Prince Charles and Lady Diana. *Astrological Journal*, 23, 167-170.
- Linell, P. (2009). *Rethinking language, mind, and world dialogically: Interactional and contextual theories of human sense-making*. Charlotte, NC: Information Age.
- Lower, S. K. (2007). Treating astrology's claims with all due gravity. [Letter]. *Nature*, 447, 528. doi: 10.1038/447528a
- Maddox, J. (1994). Defending science against anti-science. *Nature*, 368, 185. doi: 10.1038/368185a0
- Malsin, P. (1997). *The eyes of the sun: Astrology in light of psychology*. Tempe, AZ: New Falcon.
- Marsh, H. W., & Ware, J. E., Jr. (1982). Effects of expressiveness, content coverage, and incentive on multidimensional student rating scales: New interpretations of the Dr. Fox Effect. *Journal of Educational Psychology*, 74(1), 126-134. doi: 10.1037/0022-0663.74.1.126

- Marshall, C., & Rossman, G. B. (2011). *Designing qualitative research* (5th ed.). Los Angeles, CA: Sage.
- Martens, R., & Trachet, T. (1998). *Making sense of astrology*. Amherst, NY: Prometheus Books.
- Matarazzo, J. D. (1983). The reliability of psychiatric and psychological diagnosis. *Clinical Psychology Review*, 3(1), 103-145. doi: 10.1016/0272-7358(83)90008-9
- Mayo, J. (1964). *Teach yourself astrology*. London, England: English Universities Press.
- Mayo, J., White, O., & Eysenck, H. J. (1978). An empirical study of the relation between astrological factors and personality. *Journal of Social Psychology*, 105(2), 229-236. doi: 10.1080/00224545.1978.9924119
- McCrae, R. R. (1987). Creativity, divergent thinking, and openness to experience. *Journal of Personality and Social Psychology*, 52(6), 1258-1265. doi: 10.1037/0022-3514.52.6.1258
- McCrae, R. R. (1989). Why I advocate the five-factor model: Joint analyses of the NEO PI and other instruments. In D. M. Buss & N. Cantor (Eds.), *Personality psychology: Recent trends and emerging directions* (pp. 237-245). New York, NY: Springer-Verlag.
- McCrae, R. R., & Costa, P. T. (1985). Comparison of EPI and psychoticism scales with measures of the five-factor model of personality. *Personality and Individual Differences*, 6(5), 587-597. doi: 10.1016/0191-8869(85)90008-x
- McCrae, R. R., & Costa, P. T. (1987). Validation of the five-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology*, 52(1), 81-90. doi: 10.1037/0022-3514.52.1.81
- McCrae, R. R., & Costa, P. T. (1989). Reinterpreting the Myers-Briggs Type Indicator from the perspective of the five-factor model of personality. *Journal of Personality*, 57(1), 17-40. doi: 10.1111/1467-6494.ep8972588
- McCrae, R. R., & Costa, P. T. (1997). Personality trait structure as a human universal. *American psychologist*, 52(5), 509-516. doi: 10.1037/0003-066X.52.5.509

- McCrae, R. R., & Costa, P. T. (2003). *Personality in adulthood: A five-factor theory perspective* (2nd ed.). New York, NY: Guilford Press.
- McCrae, R. R., & Costa, P. T. (2008). The five-factor theory of personality. In O. P. John, R. W. Robins & L. A. Pervin (Eds.), *Handbook of personality theory and research* (pp. 159-181). New York, NY: Guilford.
- McCrae, R. R., & Costa, P. T. (2010). *NEO Inventories Professional Manual*. Lutz, FL: Psychological Assessment Resources.
- McCrae, R. R., Costa, P. T., & Busch, C. M. (1986). Evaluating comprehensiveness in personality systems: The California Q-Set and the five-factor model. *Journal of Personality*, 54(2), 430-446. doi: 10.1111/1467-6494.ep8970694
- McCrae, R. R., & John, O. P. (1992). An introduction to the five-factor model and its applications. *Journal of Personality*, 60(2), 175-215. doi: 10.1111/j.1467-6494.1992.tb00970.x
- McCrae, R. R., & Terracciano, A. (2005). Universal features of personality traits from the observer's perspective. *Journal of Personality and Social Psychology*, 88, 547-561. doi: 10.1037/0022-3514.88.3.547
- McGervey, J. D. (1977). A statistical test of sun-sign astrology. *The Zetetic*, 1(2), 49-54.
- McGrew, J. H., & McFall, R. M. (1990). A scientific inquiry into the validity of astrology. *Journal of Scientific Exploration*, 4(1), 75-83.
- McGrew, J. H., & McFall, R. M. (1992). A collaborative Vernon Clark experiment. *Correlation*, 11(2), 2-10.
- McRitchie, K. (2011). Support for astrology from the Carlson double-blind experiment *International Astrologer*, 36(2-11).
- Mertler, C. A., & Vannatta, R. A. (2005). *Advanced and multivariate statistical methods: Practical application and interpretation* (3rd ed.). Glendale, CA: Pyrczak.

- Messick, S. (1991). Psychology and methodology of response styles. In R. E. Snow & D. E. Wiley (Eds.), *Improving inquiry in social science* (pp. 161-200). Hillsdale, NJ: Erlbaum
- Meyer, G. J., Finn, S. E., Eyde, L. D., Kay, G. G., Moreland, K. L., Dies, R. R., . . . Read, G. M. (2001). Psychological testing and psychological assessment: A review of evidence and issues. *American Psychologist*, 56(2), 128-165. doi: 10.1037/0003-066x.56.2.128
- Morey, L. C. (1991). *Personality Assessment Inventory: Professional manual*. Odessa, FL: Psychological Assessment Resources.
- Morgeson, F. P., Campion, M. A., Dipboye, R. L., Hollenbeck, J. R., Murphy, K., & Schmitt, N. (2007). Reconsidering the use of personality tests in personnel selection contexts. *Personnel Psychology*, 60(3), 683-729. doi: 10.1111/j.1744-6570.2007.00089.x
- Moustakas, C. E. (1990). *Heuristic research: Design, methodology, and applications*. Newbury Park, CA: Sage.
- Mull, C. S. (1986). Encounter with academia. *Journal of Research of the American Federation of Astrologers*, 3, 49-52.
- Müller, A., & Ertel, S. (1994). *1083 members of the French Academie de Medecine* (Vol. 5). Waldmohr: Müller.
- Murphy, K. R., & Davidshofer, C. O. (1997). *Psychological testing: Principles and applications* (4th ed.). Upper Saddle River, NJ: Prentice Hall.
- Murray, H. A. (1938). *Explorations in personality*. New York, NY: Oxford University Press.
- Nanninga, R. (1996). The astrotest: A tough match for astrologers. *Correlation*, 15(2), 14-20.
- National Science Board. (2006). Science and technology: Public attitudes and understanding. *Science and Engineering Indicators 2006*. Retrieved from <http://www.nsf.gov/statistics/seind06/c7/c7s2.htm#c7s213>

- Niehenke, P. (1983). The whole is more than the sum of its parts. *Astro-Psychological Problems*, 1(2), 29-32.
- Objections to astrology: A statement by 186 leading scientists. (1975, September/October). *The Humanist*, 35, 4-16.
- Ones, D. S., Dilchert, S., Viswesvaran, C., & Judge, T. A. (2007). In support of personality assessment in organizational settings. *Personnel Psychology*, 60(4), 995-1027. doi: 10.1111/j.1744-6570.2007.00099.x
- Ones, D. S., & Viswesvaran, C. (1998). The effects of social desirability and faking on personality and integrity assessment for personnel selection. *Human Performance*, 11(2-3), 245-269. doi: 10.1080/08959285.1998.9668033
- Ones, D. S., Viswesvaran, C., & Reiss, A. D. (1996). Role of social desirability in personality testing for personnel selection: The red herring. *Journal of Applied Psychology*, 81(6), 660-679. doi: 10.1037/0021-9010.81.6.660
- Pannone, S. (2007). The hero's journey: The search for identity from a psychological, mythological, and astrological perspective. *Journal for the Study of Religion, Nature and Culture*, 1(2), 220-236.
- Paulhus, D. L. (2002). Socially desirable responding: The evolution of a construct. In H. I. Braun, D. N. Jackson, & D. E. Wiley (Eds.), *The role of constructs in psychological and educational measurement* (pp. 51-76). Mahwah, NJ: Erlbaum
- Paulhus, D. L., Bruce, M., & Trapnell, P. (1995). Effects of self-presentation strategies on personality profiles and their structure. *Personality and Social Psychology Bulletin*, 21(2), 100-108. doi: 10.1177/0146167295212001
- Paulhus, D. L., & John, O. P. (1998). Egoistic and moralistic biases in self-perception: The interplay of self-deceptive styles with basic traits and motives. *Journal of Personality*, 66(6), 1025-1060. doi: 10.1111/1467-6494.00041
- Pauls, C. A., & Stemmler, G. (2003). Substance and bias in social desirability responding. *Personality & Individual Differences*, 35(2), 263-276. doi: 10.1016/s0191-8869(02)00187-3

- Pawlik, K., & Buse, L. (1979). Selbst-attribvierung als differentiell-psychologische moderatorvariable. *Zeitschrift fur Sozialpsychologie*, 10, 54-69.
- Pawlik, K., & Buse, L. (1984). Self-attribution as a moderator variable in differential psychology. *Correlation*, 4(2), 14-30.
- Perry, G. (1993). Toward a postmodern astrology: A hierarchical model of the psyche. *The Journal of Astro-Psychology*, 6, 1-14.
- Perry, G. (1995). Assessing the feasibility of correlating psychological tests with astrology. In M. Pottenger (Ed.), *Astrological research methods volume 1: An ISAR anthology* (pp. 121-127). Los Angeles, CA: International Society for Astrological Research.
- Phillipson, G. (2000). *Astrology in the year zero*. London, England: Flare.
- Phillipson, G. (2006). Modern science, epistemology and astrology. *Correlation*, 23(2), 4-23.
- Phillipson, G., Dean, G., Ertel, S., Kelley, I. W., Mather, A., & Smit, R. (2003). Phillipson interview of researchers. *Astrology and Science*. Retrieved from <http://www.astrology-and-science.com/d-phil2.htm>
- Piedmont, R. L. (1998). *The Revised NEO Personality Inventory: Clinical and research applications*. New York, NY: Plenum Press.
- Rathus, S. A. (1973). A 30-item schedule for assessing assertive behavior. *Behavior Therapy*, 4(3), 398-406. doi: 10.1016/S0005-7894(73)80120-0
- Ratner, C. (1997). *Cultural psychology and qualitative methodology: Theoretical and empirical considerations*. New York, NY: Plenum Press.
- Reichardt, C. S. (2010). Testing astrological predictions about sex, marriage, and selfishness. *Skeptic*, 15(4), 40-45.
- Riley, B. (1984). A new test of zodiac signs. *Astro-Psychological Problems*, 2(2), 11-14.

- Robinson, J. P., Shaver, P. R., & Wrightsman, L. S. (Eds.). (1991). *Measures of personality and social psychological attitudes: Volume 1 in measures of social psychological attitudes series*. San Diego, CA: Elsevier Academic Press.
- Romanyshyn, R. D. (2007). *The wounded researcher: Research with soul in mind*. New Orleans, LA: Spring Journal Books.
- Rosenblum, S. (2005, August 28). Today's horoscope: Now unsure, *The New York Times*. Retrieved from <http://www.nytimes.com/2005/08/28/fashion/sundaystyles/28ASTRO.html>
- Sagan, C. (1976, September/October). Readers forum. *The Humanist*, 36, 2.
- Saggino, A. (2000). The Big Three or the Big Five? A replication study. *Personality and Individual Differences*, 28(5), 879-886. doi: 10.1016/s0191-8869(99)00146-4
- Saklofske, D. H., Kelley, I. W., & McKerracher, D. W. (1982). An empirical study of personality and astrological factors. *Journal of Psychology*, 110(2), 275-280. doi: 10.1080/00223980.1982.9915349
- Sakoian, F., & Acker, L. S. (1973). *The astrologer's handbook*. New York, NY: Harper & Row.
- Sargent, C. (1986). Parapsychology and astrology. In S. Modgil & C. Modgil (Eds.), *Hans Eysenck: Consensus and controversy* (pp. 344-360). Philadelphia, PA: Falmer Press.
- Shaughnessy, M. F., Neely, R., Manz, A., & Nystul, M. (1990). Effects of birth order, sex, and astrological sign on personality. *Psychological Reports*, 66(1), 272-274. doi: 10.2466/pr0.66.1.272-274
- Skre, I., Onstad, S., Torgersen, S., & Kringlen, E. (1991). High interrater reliability for the structured clinical interview for DSM III R Axis I (SCID I). *Acta Psychiatrica Scandinavica*, 84(2), 167-173.
- Slavin, R. E. (1995). Best evidence synthesis: An intelligent alternative to meta-analysis. *Journal of Clinical Epidemiology*, 48(1), 9-18. doi: 10.1016/0895-4356(94)00097-a

- Smit, R. (n.d.). Astrology my passion, my life, my personal disaster. *Astrology and Science*. Retrieved from <http://www.astrology-and-science.com/a-pass2.htm>
- Smith, T. W., Marsden, P., Hout, M., & Kim, J. (2010). *General social surveys, 1972-2010*. Chicago, IL: National Opinion Research Center.
- Snyder, C. R., Larsen, D. L., & Bloom, L. J. (1976). Acceptance of general personality interpretations prior to and after receipt of diagnostic feedback supposedly based on psychological, graphological, and astrological assessment procedures. *Journal of Clinical Psychology*, 32(2), 258-265. doi: 10.1002/1097-4679(197604)32:2<258::AID-JCLP2270320211>3.0.CO;2-O
- Snyder, C. R., Shenkel, R. J., & Lowery, C. R. (1977). Acceptance of personality interpretations: The "Barnum effect" and beyond. *Journal of Consulting and Clinical Psychology*, 45(1), 104-114. doi: 10.1037/0022-006X.45.1.104
- Springer, S. P., & Deutsch, G. (1998). *Left brain, right brain: Perspectives from cognitive neuroscience* (5th ed.). New York, NY: Freeman.
- Startup, M. (1984). Personality and planetary positions at birth: An attempted replication with ordinary people. *Correlation*, 4(2), 4-13.
- Stevens, J. (2009). *Applied multivariate statistics for the social sciences* (5th ed.). New York, NY: Routledge.
- Taylor, H. (2003). The religious and other beliefs of Americans 2003. *The Harris Poll #11*. Retrieved from <http://www.harrisinteractive.com/vault/Harris-Interactive-Poll-Research-The-Religious-and-Other-Beliefs-of-Americans-2003-2003-02.pdf>
- Tester, S. J. (1987). *A history of western astrology*. Suffolk, United Kingdom: Boydell Press.
- Thompson, B. (2006). *Foundations of behavioral statistics: An insight-based approach*. New York, NY: Guilford.
- Tiggle, R. B., & Fiebert, M. S. (1979). Development of an astrological hostility scale and its correlation with the Buss-Durkee Inventory. *Perceptual and Motor Skills*, 49(3), 858-858. doi: 10.2466/pms.1979.49.3.858

- Tyl, N. (1994). *Synthesis & counseling in astrology: The professional manual*. St. Paul, MN: Llewellyn.
- Tyl, N. (2000). *The creative astrologer: Effective single session counseling*. St. Paul, MN: Llewellyn.
- Tyson, G. A. (1980). Occupation and astrology or season of birth: A myth? *Journal of Social Psychology*, 110(1), 73-78. doi: 10.1080/00224545.1980.9924224
- Tyson, G. A. (1984). An empirical test of the astrological theory of personality. *Personality and Individual Differences*, 5(2), 247-250. doi: 10.1016/0191-8869(84)90059-X.
- Urban-Lurain, M. (1984). *Astrology as science: A statistical approach*. Tempe, AZ: American Federation of Astrologers.
- Urban-Lurain, M. (1995a). Anecdotal versus statistical research: The difference. In M. Pottenger (Ed.), *Astrological research methods volume 1: An ISAR anthology* (pp. 63-70). Los Angeles, CA: International Society for Astrological Research.
- Urban-Lurain, M. (1995b). Introduction to multivariate analysis. In M. Pottenger (Ed.), *Astrological research methods volume 1: An ISAR anthology* (pp. 269-284). Los Angeles, CA: International Society for Astrological Research.
- Valentine, C. (1994). Astrological counseling. In D. Jones (Ed.), *Innovative therapy: A handbook* (pp. 204-216). Maidenhead, England: Open University Press.
- Van de moortel, K. (2002). *Astro-Logics*. Ghent, Belgium: Koen Van de moortel. Retrieved from <http://www.astrovdm.com/astro-logics3.pdf>.
- van Rooij, J. J. (1993). Jungian typology and astrology: An empirical test. *Correlation*, 12(1), 28-32.
- van Rooij, J. J. (1994a). Introversion extraversion: Astrology versus psychology. *Personality and Individual Differences*, 16(6), 985-988. doi: 10.1016/0191-8869(94)90243-7

- van Rooij, J. J. (1994b). The whole chart and nothing but the whole chart. *Correlation*, 13(1), 54-56.
- van Rooij, J. J. (1999). Self-concept in terms of astrological sun-sign traits. *Psychological Reports*, 84(2), 541-546. doi: 10.2466/pr0.1999.84.2.541
- Van Toen, D. (1988). *The Mars book: A guide to your personal energy and motivation*. York Beach, ME: Weiser.
- Vaughan, V. (1998, August/September). Debunking the debunkers. *The Mountain Astrologer*, 11-17.
- Vermeer, F. (1992). Sun sign at birth versus life span for 7136 people. *Astrologie in Onderzoek*, 7(1), 10-11.
- Vidmar, J. E. (1979, March). Astrological discrimination between authentic and spurious birthdates. *Cosmecology Bulletin*, 8-9.
- Vidmar, J. E. (2008). A comprehensive review of the Carlson astrology experiments. *Correlation*, 26(1), 14-32.
- von Eye, A., Lösel, F., & Mayzer, R. (2003). Is it all written in the stars? A methodological commentary on Sachs' astrology monograph and re-analyses of his data on crime statistics. *Psychology Science*, 45(1), 78-91. Retrieved from http://www.pabst-publishers.de/psychology-science/1-2003/pdf_04.pdf
- Ward, R. A., Grasha, A. F., & Griggs, R. A. (2002). Using astrology to teach research methods to introductory psychology students. *Handbook for teaching introductory psychology: With an emphasis on assessment* (Vol. 3, pp. 197-199). Mahwah, NJ: Erlbaum.
- Warner, R. M. (2008). *Applied statistics: From bivariate through multivariate techniques*. Los Angeles, CA: Sage.
- Weiner, I. B., & Greene, R. L. (2008). *Handbook of personality assessment*. Hoboken, NJ: Wiley
- West, J. A. (1991). *The case for astrology*. New York, NY: Viking Penguin.

- Whitfield, P. (2001). *Astrology: A history*. New York, NY: Abrams.
- Wiggins, J. S., & Pincus, A. L. (1992). Personality: Structure and assessment. *Annual Review of Psychology*, 43(1), 473-505. doi: 10.1146/annurev.ps.43.020192.002353
- Willis, R. G., & Curry, P. (2004). *Astrology, science, and culture: Pulling down the moon*. Oxford, England: Berg.
- Woolfolk, J. M. (1990). *The only astrology book you'll ever need*. Chelsea, MI: Scarborough
- Woolson, D. (1988). A sun/moon sign analysis of football notables. *Kosmos*, 17(4), 15-17.
- Yost, E. B., & Corbishley, M. A. (1987). *Career counseling: A psychological approach*. San Francisco, CA: Jossey-Bass.
- Zuckerman, M., Kuhlman, D. M., & Camac, C. (1988). What lies beyond E and N? Factor analyses of scales believed to measure basic dimensions of personality. *Journal of Personality and Social Psychology*, 54(1), 96-107. doi: 10.1037/0022-3514.54.1.96
- Zuckerman, M., Kuhlman, D. M., Joireman, J., Teta, P., & Kraft, M. (1993). A comparison of three structural models for personality: The Big Three, the Big Five, and the Alternative Five. *Journal of Personality and Social Psychology*, 65(4), 757-768. doi: 10.1037/0022-3514.65.4.757
- Zuckerman, M., Kuhlman, D. M., Thornquist, M., & Kiers, H. (1991). Five (or three) robust questionnaire scale factors of personality without culture. *Personality and Individual Differences*, 12(9), 929-941. doi: 10.1016/0191-8869(91)90182-B