THE EFFECT OF LUNAR PHASE

ON STUDENT BEHAVIOR

By

Anthony S. Johnson

A Research Paper
Submitted in Partial Fulfillment of the
Requirements for the
Master of Science Degree
In

School Guidance and Counseling K-12

Approved: 6 Semester Credits

Research Committee Chair

Research Committee Members

The Graduate School

University of Wisconsin-Stout

May, 2005

The Graduate School

University of Wisconsin Stout

Menomonie, WI 54751

ABSTRACT

Johnson Anthony S.

(Writer) (Last Name) (First Name) (Middle Initial)

The Effect of Lunar Phase on Student Behavior

(Title)

School Guidance and Counseling Dr. Denise Brouillard 5/2005 60

(Graduate Program) (Research Advisor) (Month/Year) (# of Pages)

American Psychological Association (APA), 5th edition

(Name of Style Manual Used in this Study)

Lunatic and lunacy are words commonly used to describe an unusual person or their aberrant behavior. These terms suggest that the abnormality is in some way connected with the moon, as the words are derived from the Latin root Luna which translates to moon.

Throughout human history there have existed tales and lore regarding this purported lunar influence on the human species as well as much of the natural world

including flora and fauna. Some of these beliefs have persisted to the present day. Many of these notions center on the phases of the moon, especially the full moon.

One belief held by some in the teaching profession, whether sincerely or in jest, is that student behavior is noticeably different on or around the day on which a full moon occurs. In teacher terms the students are generally described as "acting up" or "squirrelly," though the specific meaning of that phrase is open to wide interpretation. Is it possible that student behavior is somehow linked to the lunar phase?

The present study explored this question as it relates to students in a public school setting. Selected participants were asked to complete a brief survey about student behavior at the end of each school day. This inquiry ran for the period of five weeks, which approximates the time required for the moon to complete one entire phase cycle with a small buffer on each side of the cycle. The data was examined to determine if active behavior was reported to occur more frequently when the moon was full as compared to days that coincided with other phases of the moon. There was no statistical significance found between the behaviors reported during the defined moon phases and other times during the study. A conclusion was drawn that there was no correlation between the phase of the moon and student behavior. Any reported connection was determined to be largely attributable to the beliefs of those reporting the behavior.

ACKNOWLEDGMENTS

I would like to thank the following organizations and individuals that made this thesis possible through their encouragement and support.

I thank Dr. Denise Brouillard for serving as the chair of my thesis committee as well as general assistance and ongoing support during the entire course of the program.

I thank Dr. Barbara Flom for serving on my thesis committee.

I thank Dr. Robert Salt for serving on my thesis committee.

I thank all other professors, staff and adjunct faculty of UW-Stout who have served as instructors for courses that I have taken in my pursuit of a graduate degree in school guidance and counseling.

I thank all the reference librarians at UW-Stout for their assistance in the research and mechanics involved in completing this thesis.

I thank the staff and administration of the Stevens Point School District, particularly those at Stevens Point Area Senior High (SPASH) for allowing and encouraging me to pursue my educational goals.

I thank the staff of Schofield and Evergreen elementary schools in the D. C. Everest School District for their cooperation in providing data for this study.

I thank Robert Morgan who gave me direction and inspired me to follow the path of school guidance counselor.

I thank Karen Johnson, my spouse, for all the support in this and many other endeavors throughout our time together.

I thank Grant Johnson, my son, for lessons in life that I learned from him.

I thank Tyler Johnson, my son, for valuable insights on how to get through life.

TABLE OF CONTENTS

INTRODUCTION

"Now the hungry lion roars,

And the wolf behowls the moon…"

William Shakespeare

A Midsummer Nights Dream

Act 5, Scene 1

The opening quote is appropriate to begin this exercise for at least two reasons. First, it alludes to the supposed phenomenon of wolves and their propensity to howl at the moon. This is only one example pulled from many of popular lore as well as refined literature that associates behavior, in this case of animals, with the moon (Shedd, 2000). A belief in this association is harbored by at least some segment of the general populace even today. Second, it is fitting that the quoted verse comes from a work described as a dream by the author. Many trained researchers as well as casual observers believe that any connection between behavior and the moon is indeed a dream.

The moon has been an object of interest by humankind for millennia. There is even evidence to suggest that the moon played an important role in the lives of our distant ancestors long before the era of recorded history (Blainey, 2002). As humans began to form groups and societies emerged communication between individuals began. In this period it can be surmised that they began to wonder about the common environment around them including what they saw in the sky. At a time when the cycles of day and night were integral to simple existence the moon would have been impossible to ignore. It may be that during such a time the first ponderings about the changes in the appearance

of the moon and possible effects on the flora and fauna of the earth originated in human thought.

In some early civilizations the moon was regarded as a god or at least the dwelling place of gods (Moore, 1981). In a time well before the development of the scientific method and the technological ability to test ideas this was a natural way for our forbearers to explain the world and the heavens around them. As time passed some groups began to regard the moon less as divine but simply one part of the natural environment. The connections persisted, however, between changes in the moon and occurrences here on earth.

The moon and the changes in appearance became ingrained in the human experience and took on great significance as well as an explanation for the mundane. The phases of the moon were on one hand a reliable way in which to mark the passage of time. In early agrarian societies this was of utmost importance to the survival of the community (Blainey, 2002). In other instances the phases of the moon began to be associated with certain behavior in animals and humans alike. In many cases this associated behavior was abnormal to the observer in some way and the full moon especially was thought to have a particularly strong influence on these abnormalities.

The beliefs that connect the phase of the moon to events and behaviors are wide ranging and too numerous to be included in a single treatment of the subject. It is significant that despite much evidence to support the hypothesis that there is no relationship between the phase of the moon and any number of supposed occurrences many people continue to believe that the moon does, indeed, have an effect on people and events. It would be difficult to address the question as to why some people believe in this

lunar influence, but a simpler question can be entertained that asks how the moon could possible have an effect on earthly subjects. It could be asked what mechanism, in physical terms, could be responsible for any force exerted upon people or other things here on earth that would cause them to act differently? A few possibilities are offered here.

The most obvious of these possible forces is light. The light from the moon is the chief manner by which it is perceived by humans. The change in appearance is noted by visual means and is the way that we can most readily determine what phase is represented at any given time. It is interesting to note that although most information about the moon is based upon the light we see the moon produces no light independently and any image that we see from earth is a reflection of light from the sun. Because the moon is seen only in reflected light the magnitude of light striking earth even during the brightest phase is a small fraction of that light from the sun that permeates through the atmosphere even on the cloudiest of days (Rotton & Kelly, 1985). There seems to be some inconsistency in an idea that would attribute an effect on human behavior to the variance of light from a mere reflection as comparatively insignificant as the moon when variations in the amount of light produced by the sun, while vastly greater in intensity, has not a single tale in folklore to explain unusual behavior attributable to the sun.

One somewhat plausible possibility has come from the idea that light is responsible for changes in behavior. In times before electric lighting was widespread, and most of human existence was in such a time, a certain circumstance would occur during the time of a full moon. More light would be available for a limited period approximately once every month and it could be assumed that the population would be

prone to take advantage of that extra time for activities that were not usually done during normal hours of darkness. Thus, there may simply have been more activity of all types on those nights when it was light enough to see (Rotton & Kelly, 1985). Some people would have seen this as merely more activity due to the obviously lighter conditions, but others may have seen this as strange to be doing things at night that were normally not done in darkness. Also, the law of averages will dictate that when there is more activity of all kinds there will be some percentage of that activity that would be considered abnormal by some. That is one possible scenario in which strange behavior may have come to be associated with the full moon.

Another physical force exerted by the moon that is sometimes pointed to as the cause of disturbances on earth is that of gravity. It should not be surprising to current readers that no folk tales nor superstitious texts will make reference to gravity because prior to Isaac Newton and his groundbreaking work from 1687, *Philosophiae Naturalis Principia Mathematica*, gravitational forces had not been identified or at least understood by the masses. Since that time humankind has explained much about the movement of celestial objects as well as more earthly phenomena.

Although gravity is recognized in the daily lives of most contemporary humans the strength of the force is often outside the understanding of many. While it is true that the moon does exert a gravitational pull on the earth and it does change in accordance with the position in the orbit around the earth one needs to take into account the relative distance to the moon. All things exert a gravitational force including people, the earth, the sun or the apple in the tale that whimsically explains how the idea occurred to Newton. The gravitational force is proportional to the mass of the object and distance is

a geometrical factor. The moon is fairly massive but it is relatively far away so a mosquito that is perched on your shoulder, though much less massive than the moon, is much closer and thus exerts a greater gravitational force on your body than does the moon regardless of phase (Abell, 1979).

Other possibilities exist that attempt to connect moon phase with behavior. One idea stems from observations of marine life and how research has supported hypotheses that link moon phase and certain predictable behavior (Salini, Brewer, Farmer & Jones, 2001). The connection may be indirect, however, because the marine creatures are intimately connected to the tides that affect their very existence and the tides, in turn, are governed by the position of the moon. The marine organisms are actually responding to the tides but not directly to the phase of the moon. Although this line of reasoning regarding marine life seems inconclusive other ideas have been extended from that precept. Some believe that humans evolved from marine organisms over eons and claim that our receptiveness to lunar influence is a vestigial trait left over from a time when our evolutionary ancestors swam in vast primeval oceans. Additional evidence for this line of thought is suggested by the fact that humans still possess an appendix, an organ for which there is no apparent function but is speculated to have been useful at some point in our evolutionary past.

Regardless of the reasons that are postulated to be the cause of lunar effects on behavior the fact remains that many maintain a belief in those effects. Among those believers are teachers who work closely with students on a daily basis. The continued belief in outside forces influencing student behavior has a very real effect how those students are perceived and, in turn, how vital services are delivered. Classroom tactics

employed to deal with identified behaviors need to be determined based on more convincing and concrete principles. There will be those that will argue the influence is due to the man in the moon and others will counter that it is the moon in the man. In any case the premise that the apparent change in the face of the moon and the attributed effect on human behavior is truly much ado about nothing.

"It is the very error of the moon;
She comes more near the earth than she was wont,
And makes men mad."
William Shakespeare
Othello
Act 5, Scene 2

Statement of the Problem

The purpose of this study is to determine if there is an effect on student behavior relative to lunar phase. The study was implemented during February and March of 2005 at two elementary schools in the D. C. Everest School District, located in central Wisconsin. Selected teachers completed a log at the conclusion of each day that included their impression of the behavior of students in their charge. These logs were analyzed with respect to the phase of the moon and the reported behavior.

Null Hypothesis

There will be no relationship between reported behavior and lunar phase.

Definition of Terms

Lunar – Referring to or associated with the moon of the earth. Derived from the word Luna which, translated from the Latin, means moon.

Lunar Cycle – The period of time required for the moon to complete one orbit around the earth from one specific point back to that same point. Although there are several methods used to express this period it will be recognized as twenty-eight days for the purpose of this study. Along this orbit around the earth the moon appears to change visibly as experienced by earth bound viewers. The change is in the portion of the moon illuminated by the sun and thus visible to observers. These changes in appearance are referred to as the phases of the moon. Although the visible change is gradual and continuous over every day during the lunar cycle there are eight distinct phases generally recognized with each covering the span of approximately three days. In addition to referencing the portion of the moon visible the stated phase can include a descriptive term that specifies if the illuminated portion is greater or less than that as compared to immediately preceding days.

New Moon – Usually regarded as the first of the phases of the moon, but is an arbitrary designation. This is where the moon is directly between the earth and the sun as if all three celestial bodies were aligned. The moon will not be visible at all during this phase because, due to the alignment, the side that is illuminated by the sun is turned away from the earth.

Crescent Moon – This phase is one step away from the invisible new moon, and thus appears only as a thin curved slice somewhat reminiscent of a pastry of the same name or the symbol that has come to be associated with Islam.

First Quarter Moon – This phase is where half of the potentially visible portion of the moon is illuminated and appears as a disk that has been perfectly

bisected. This is also sometimes called a half-moon, as it indeed appears as half the visible portion of the full moon. Quarter moon is more technically accurate, however, because one quarter of the moon is visible in comparison to the entire surface of the moon including the far side, which is never visible from earth. This phase differs from the third quarter phase in that it occurs when the illuminated portion is increasing.

Gibbous Moon – This phase is one step away from the completely visible full moon. It appears nearly complete except that the perceived disk will not be completely circular but will have with a flat spot on one edge.

Full Moon – This phase will appear as a complete disk with all the potentially visible surface of the moon revealed. The significant characteristic of this phase is that the moon is in exactly the opposite position as it is during the new phase. The sun, earth and moon are again in alignment but the moon is on the other side of the earth as compared to the position during a new moon and the side of the moon facing the earth is receiving full illumination from the sun. This term, like quarter moon, is a misnomer as only half of the entire surface of the moon is visible when the constantly hidden far side is taken into consideration.

Third Quarter Moon – The visible portion during this phase is similar to that of the first quarter phase. This phase differs from the first quarter phase in that it occurs when the illuminated portion is decreasing.

Waxing – This term describes the half of the lunar cycle in which the portion of the moon illuminated appears to be increasing up to but not including the full moon. The full moon is neither waxing nor waning. This descriptor can

precede the terms crescent and gibbous, but not usually first quarter even though that phase falls within the waxing segment of the lunar cycle. A waxing phase can be distinguished from a waning phase by the orientation of the illuminated and non-illuminated portions of the surface of the moon. The non-illuminated portion will appear to the left side of an imaginary vertical meridian that bisects the moon and the illuminated portion will appear to the right side for observers in the northern hemisphere of the earth. This orientation will be reversed when viewed from the southern hemisphere.

Waning – This term describes the half of the lunar cycle in which the portion of the moon illuminated appears to be decreasing down to but not including the new moon. The new moon is neither waning nor waxing. This descriptor can precede the terms crescent and gibbous, but not usually third quarter even though that phase falls within the waning segment of the lunar cycle. A waning phase can be distinguished from a waxing phase by the orientation of the illuminated and non-illuminated portions of the surface of the moon. The non-illuminated portion will appear to the right side of an imaginary vertical meridian that bisects the moon and the illuminated portion will appear to the left side for observers in the northern hemisphere of the earth. This orientation will be reversed when viewed from the southern hemisphere.

Assumptions of the Study

There are at least two identifiable assumptions in place at the onset of this study. The first is that the phase of the moon will be known for every day that observations are recorded. This is a very secure assumption as information for lunar phase is based upon well-known and documented movements of celestial bodies over the course of history. Charts and calendars are readily available to accurately describe the phase of the moon for any given date past, present or future.

The second assumption is that the behavior of the subjects of the study is consistently measurable. This factor is far less certain than the first assumption and is much more likely to be open to interpretation by individual respondents than to be considered a truly objective measure.

Limitations of the Study

Several limitations are found in the current study and are presented here for consideration.

There will be great difficulty in isolating any effect attributable to lunar influence from other variables that may figure into the behavior of students. Some of these factors may include day of week, the weather, upcoming events, familial issues, school workload, relationships and a host of other factors that are unidentifiable. Also, the degree to which these factors influence behavior patterns is difficult to ascertain.

Defining aberrant behavior is an inexact exercise and asking each participating teacher to report on it is a concern for the integrity of the data. Most teachers, like any sample of the population at large, will hold varying ideas as to what constitutes active behavior and may even change their own definitions depending upon the student or the situation. Add in the factors of possibly skewed perception on the part of the participant due to their own psychological and physiological state at the time of reporting and it is clear that objective and consistent data will be difficult to obtain.

The method of data collection in this study may also be termed a limitation. The respondents were asked to complete a Likert type scale that rates student behavior every day for a period of approximately one-month. First, this was much to ask of school staff who are already overburdened with work and it is also likely to be simply forgotten during the busy daily routine. This may have lead to surveys being completed some time after the day has already passed resulting in inaccurate information. Also, since the true purpose of the study to look at behavior in relation to lunar phase was not be known to those completing the survey, only that behavior over a one month period was being studied, perhaps that is not the best method by which to collect data. This method could have enabled bias to creep into the manner in which the survey is completed due to a teacher looking for certain behaviors to occur or not occur based upon what they believe the study is researching.

LITERATURE REVIEW

Much literature exists on the topic of lunar phases and influence on behavior and events. This literature can be broadly divided into two main categories. The first of these divisions is folklore and popular beliefs. This body of literature can be taken from ancient texts and oral histories as well as modern popular books, periodicals and music. Also, there is much to be found linking lunar activity to hunting and gathering techniques as well as traditional agricultural wisdom. The second group of literature is that of research. This consists typically of more recent treatments of the subject and usually some type of controlled methodology is in place to gather data and analyze and interpret the findings. Both of these categories of existing literature will be examined in this chapter.

Lunar Presence in Folklore

There exist stories in many cultures both ancient and more recent that include the moon and possible effects on terrestrial events. The fact that these tales come from civilizations that span the globe give a good indication that moon stories are almost universal in the human experience. Perhaps the most ancient of tales that has been handed down to the present day comes from the Euahlayi tribe of aboriginal people of Australia. The story takes place in what many aboriginal people believe to be the beginning of time that they refer to as dreamtime. It tells of a young man named Baloo who was wooing girls by a riverbank. His antics caused him to fall into the water with a splash that made the girls laugh. Baloo was greatly embarrassed by the laughter and he shrunk away and disappeared into the water. He now resides on the moon where he

grows and shrinks with embarrassment each month as the moon appears to grow and shrink according to phase (Moroney, 1995).

At least two other significant ancient cultures include moon stories in their legends and lore. The first I will explore is that of China, a culture that has long been a leader in astronomy and the observation of the heavens. The rulers of ancient China regularly employed astronomers to keep watch over the skies and report anything of significance that they believed may affect the operation of the state. They also consulted astrologers to interpret any astronomical observations and many decisions were no doubt based on their advice. Today, astrology is largely at odds with the scientific community but remains popular among millions throughout the world both for entertainment or taken in earnest by many (Crowe, 1990). In ancient China, before the advent of the scientific method the society likely found comfort in the predictable movement of the celestial objects, such as the phases of the moon, as a way to put order into a world that sometimes seemed random or arbitrary and controlled by unseen forces.

One story that includes the moon, which the ancient Chinese sometimes referred to as the pearl of heaven, tells of a rabbit and a frog. It begins with a young noblewoman who discovered a vial of magic liquid known as the water of life. She drank the water and began to spin out of control until her gyrations carried her all the way up to the moon. When she hit the surface the vial was smashed and turned into a white jade rabbit. Unfortunately the noblewoman turned into a lowly frog, and to this day when the full moon is viewed from earth her image can still be seen along with the jade rabbit (Moroney, 1995).

India is another ancient culture that is rich in astronomical tradition and even today many rhythms of daily life including social and religious are determined by lunar cycles. The traditional calendar, still in use in many parts of India, is based on lunar cycles, as are the calendars of many other Asian cultures ancient and modern. One story tells of the mother earth figure, Astangi Mata, who had twin children whom she loved very much. Her love for them was so great that she chose to bestow everlasting life upon them. One was to become the sun and the other the moon. Thus the mother and the children could live out eternity together as the earth and the rulers of the heavens.

Somewhat more recent in the timeline of history there can be found tales in western civilizations as well in which the moon plays a prominent role. This next tale comes from Scandinavia during Viking times between ninth and eleventh centuries. This is the story of Hjuki and Bil, brother and sister who were forced to draw water from a well day and night (Moroney, 1995). They were spotted by the moon one night and pitied for their unceasing labor. The moon decided to relieve the two of their constant chore and took them up to live with her. Now the two need to complete their task of gathering water only once per month during the full moon. Though this fable names Hjuki and Bil as the main characters, this tale may be better know to contemporary Americans as Jack and Jill which were derived from the original Norse tongue. Most American children learn the nursery rhyme of Jack and Jill and their pail of water. Thus, by way of older stories, the moon folklore is kept alive in cultures that follow.

In the more relatively recent past during the fourteenth or fifteenth century the native people of at least one area of North America told a tale connected with the moon. This story from the Iroquois tells of an old woman that went to live on the moon with her

cat. This woman was a weaver and was engaged in weaving a headband, which grew larger each night. As the weaving became larger so did the moon, and when the weaving was complete the moon was full. One night her cat jumped onto the finished garment and, as cats will do, tore it to small pieces and the moon responded by getting smaller as well (Moroney, 1995). So the old woman had to begin her weaving all over again as she continues to do every month right up to the present day, and that is why the moon changes face each month.

Though the previous examples come from older sources the fascination with the moon and suggested connections to human events has kept a place in stories and literature through more recent ages. One folk tale theme familiar to most in contemporary western cultures is the vampire legend. Many of these stories were passed down through the centuries beginning in the Middle Ages when superstition and belief in the supernatural reigned unchecked. These tales were especially prevalent in central and Eastern Europe. Most of these stories connected the activity of the vampires to the phases of the moon. One particular tale was later written down, embellished upon and became the popular novel *Dracula*, by nineteenth century British author Bram Stoker.

As time and technology march on the medium changes for the dissemination of stories and popular culture but many of the same themes from ancient times continue to be the topic including the supposed link between earthly events and the stage of the moon. Of course the aforementioned *Dracula* has by itself almost become a genre in the film industry and many other spin-offs have come into the popular movie repertoire that include the effect of the moon on characters from film. The entire wolfman premise and all other derivatives are intimately connected to the idea that the moon has a profound

effect on humans and non-humans alike. More people have probably seen these mass media features than the entire line of generations of most ancient cultures and is probably more responsible for causing these lunar beliefs to persist in the minds of those in modern civilization than any other single factor.

These lunar themes can also be found in other mass media outlets, specifically the recorded music industry. At least one hit record from the rock era of popular music sang of catastrophe and calamity as a result of the influence of the moon. *Bad Moon Rising* by the group Creedence Clearwater Revival was a best selling record that warned, albeit not too seriously, of hurricanes, lighting and other natural disasters that could be expected as a result of the effect of the moon on events on earth. This song, regularly heard even today more than thirty years after it debuted, has brought into the consciousness of many radio listeners and audiophiles the idea that the moon exerts forces on our lives, even if just in song. The oral tradition or tribal folklore of the past was a more personal way of communicating with your people but in many ways it is analogous to the mass media cultures of today. Both are ways to transmit knowledge, culture and beliefs to a specific audience. Although the method has changed, the message is still the same in regard to the lunar effect. After millennia of human history many of the same beliefs about the effects of the moon that were held by our ancient ancestors are being perpetuated today.

Lunar Presence in Hunting and Gathering Lore

Among those who consider hunting and fishing one of their favorite pastimes the belief in cycles in the activity of their quarry is widespread. There seem to be two periods within a twenty-four hour period in which sportsmen are more likely to be successful as compared to other times during the day. These cycles have come to be

called the solunar periods, the word having been derived from sol, meaning sun, and lunar, meaning moon. There have been studies regarding the relationship between the position of the moon and sun and possible relationships to wildlife behavior. Although there seems to be some connection, not all species react the same and it is not consistent across all types of fish and game. The extent to which sportsmen believe it, however, can be evidenced in the publication of every major hunting or fishing periodical the solunar table for the month as well as the inclusion of the upcoming daily cycle as reported on many local television newscasts. The mechanism by which these cycles are alleged to work will be discussed in the paragraphs to follow.

For anglers the idea of daily cycles in fish does not seem so farfetched if one considers that all aquatic life is likely related, that is freshwater and ocean creatures. As stated earlier all life in the ocean is directly affected by the tides, and perhaps the fish that now live in waters unaffected by tidal action are exhibiting vestigial behaviors that are no longer useful for survival but remain nonetheless. When these daily cycles were first being investigated, largely by amateur anglers and not scientists, a connection was observed between tidal times and these periods of activity among inland fish species. It was found that if the times of the tide from the Atlantic coast of North America were continued through to the middle of the continent, the fish in inland waters were reacting at about the same time there would be a tide in the local area if the ocean continued uninterrupted over what is now a land mass (Knight, 1942). Stated another way, the inland fish seemed to have a higher level of activity when the tide would occur at the given longitude if a seacoast were present at that location. Also, there are two tides each day in coastal regions and there are two corresponding periods in areas removed from the

sea. Any graph or table of the solunar periods will show a major and minor peak for fish and game activity, analogous to the daily tidal cycles.

If these assumptions are accurate, and they certainly are believed by many, it would mean that certain times of the day would bring the likelihood of a better catch as compared to other times. Furthermore, those times could be predicted in areas far inland by the position of the moon and the sun, just as the tides are predicted in coastal areas. Of course, the visible phase of the moon is directly related to position of the moon relative to earth and this is how the connection to the phase of the moon began to be associated with fish and game cycles.

While convincing arguments can be made as to why these prediction tables may have an effect on fish, due to their common ancestry with ocean species, it is less clear why these cycles should affect non-aquatic creatures. There exist some explanations as to why this is as well as some evidence that shows there are other cycles at work or even little or no correlation between animals and moon position. Some of these ideas will now be explored.

At least one source states that the reason these cycles apply to other animals is the interdependence of all organisms in nature. For instance, many birds are dependent upon the water creatures for sustenance, either as a direct or indirect food source. These birds are then in turn relied upon by the next level predators as a food source. This reliance and interdependence is then carried out to all successive levels of the food chain all the way to the highest predators. In this way, a long but direct link is assumed from the creatures that are unquestionably tied to the lunar and tidal cycles to those creatures that are further removed from the original creatures but are nonetheless part of the larger

organization of the natural world (Murray, 1995). This line of thinking is sometimes carried further, although with little solid evidence, in stating that all creatures in nature are more in tune with all natural forces, not just the cycle of the moon. These forces are purported to have a greater effect on all other life on earth except humans, who have lost the ability to sense these forces as humankind becomes further disconnected from the natural world over time (Shedd, 2000).

There is at least one animal that has been studied that seems to follow natural cycles, but in a somewhat different way than others. In popular lore the full moon is thought to cause a greater level of activity than during other times during the lunar cycle. The white tailed deer, for one, seems to ignore this trend among their counterparts in the natural world. According to at least one study, white tailed deer distinctly prefer to increase their activity during the quarter moon phase as compared to the full phase for many other animals (Murray, 1995). It is theorized that perhaps this is due to the lower level of light at that time as compared to the full moon. Perhaps the white tailed deer is just more comfortable roaming about with less light available. There are those that counter this idea however, as this trait would also benefit many nocturnal predators yet many of them prefer to hunt during the full moon.

There is at least one unresolved link between the solunar cycle idea and a link to the phase of the moon. That is while the moon phase stays constant over the period of one day, the solunar cycle rises and dips twice during the same twenty-four hour period. This would suggest that the influence is not due to the phase of the moon, which is determined by the position of the moon in the orbit around the earth, but the position of the moon relative to the horizon of the earth, which is determined by the rotation of the

earth. In any case, the belief in cycles of nature related in some way to the moon, persist in those engaged in hunting and fishing, the very techniques that were once responsible for the survival of what became the human species.

Lunar Presence in Agricultural Lore

Many of the native peoples of North America were hunter and gatherer societies before contact with European cultures. Once these two groups began to interact the landscape of the continent began to change both literally and figuratively. The Europeans were mainly agrarian in their early settlements and by that time the native population had also developed a tradition of agriculture. As a result of both of these traditions there is a great wealth of lore surrounding agricultural practices that are traditionally tied to lunar cycles. Some of this folk wisdom will be shared here.

Agriculture was a way of survival to many in times past. Most immigrants who settled on the land on this continent were not highly educated or persons of high station in the societies from which they came. Many possessed, however, a great deal of folk wisdom, and much of that centered on natural cycles including the phases of the moon. With no empirical evidence to back any claims but in the absence of anything better, these people followed the rhythms of life that their forbearers passed on to them. This is reflected in the fact that both indigenous and immigrant peoples had names for the full moon that occurred throughout the year. Some of these are quite obvious to the modern reader such as the so-called harvest moon in September and the snow moon of February. Others are more obscure and contemporary readers may be puzzled at the origins of names like the beaver moon for November or the crow moon for March (*The Old Farmer's Almanac,* 2004).

The weather was and still is of particular interest to those engaged in agriculture, so if the type of weather to be expected could be foreseen somehow that could be of great benefit in planning activities around the farm. At least one writer produced just such predictions during the first half of the nineteenth century based upon observation in previous years taken during the appearance of the moon quarters, curiously not the full moons. This was probably anecdotal information at best, but again for lack of anything better many farmers followed the advice and planned according to the predications based on lunar cycles (*The Old Farmer's Almanac,* 2004).

Some of the charts from that period go much further and even predict when the best times for doing most anything around the farm including the most mundane and seemingly unrelated tasks as cutting your hair and castrating animals. How these events could possibly be linked to the moon, and in more sophisticated yet blatantly unscientific astrological charts the movements of all objects observed in the heavens, is beyond belief to the skeptical person yet these ideas continue to hold sway long after the former age of folk wisdom. Even today, the agricultural publications in which these ideas are disseminated sell very well, and although the survival aspect of growing crops is gone for the vast majority of the readership there are many modern suburban gardeners who prefer plant their roses according to the advice offered in these archaic journals.

Research in Lunar Influence

Within the category of research literature there can be found several specific areas that have been isolated and studied. One specific area of research has concentrated on the possible influence of the light reflected from the moon that reaches earth. Since the change in the light is the largest part of how humans perceive the change in the phase of

the moon it seems an obvious concentration for research. Gravitational factors are another area that has been systematically scrutinized. Although the full effects of gravity are not as noticeable to most humans as light it has been a topic of interest and experiment since the time of Isaac Newton. Lastly a third category of research needs to be included and will simply be termed as other theories. This category is not as discrete and well defined as the first two and will include research that has been performed in wide ranging niche fields within the wide spectrum of lunar research. Some of these specializations deal with research methods that are outside of commonly accepted scientific procedure and sometimes border on what this author would consider pseudoscience. Even though some of the ideas presented in this section of the chapter may be seen as less convincing than the other formal studies they are presented here as alternative possibilities for the reader to independently explore further.

Moonlight Effects

There are those who believe that the supposed lunar effects are a result of the light emanating, or more accurately, reflecting from the moon. This indirect sunlight is somehow surmised to have an ill effect on those on which it falls. This is only indirectly related to the phase of the moon because although moonlight is almost always falling on the earth to some degree the intensity is related to the apparent size of the moon portion visible in the sky. I will explore here at least one mechanism that has been suggested to be at work in this theory.

In the living memory of some of the oldest people in our society today there exists, or at least once existed, a notion that night air is harmful. Even slightly further back in the nineteenth century many maladies were attributed to exposure to night air.

One celebrated case documented the illness and subsequent death of a youth that spent the night outdoors in a New England pumpkin patch and contracted an unspecified fatal sickness. This report was prepared by a trained physician of the day and was not the mere conjecture of lay persons familiar with the case. And so this idea of harmful night air persisted into the early to mid-twentieth century (Knight, 1942).

Any person who spends a great deal of time in the outdoors will report that the air does indeed perceptibly change during the transition from daylight to the nighttime hours. The present author has personally experienced this phenomenon. One explanation offered as to what the difference between day air and night air involves the light striking the air during the two divisions of a twenty four hour period (Knight, 1942). During the part of the day that the sun is shining, or at least would be shining during periods of overcast sky or other obscuring conditions, the sunlight strikes the air and breaks the molecules into certain constituents, one of which is a negative ion. This makes available more negative ions for absorption by air breathing creatures and presumably has a positive effect on body function. Even today there are many devices on the market that are sold under the premise that the negative ions that they produce are beneficial to health and stake many other claims that are generally unsubstantiated.

During the hours of the day when there is no sunlight, but only moonlight, these allegedly beneficial negative ions are not produced in as great an abundance. It is theorized by some that the weak reflected light from the moon can only produce positive ions when the feeble rays collide with the air molecules (Knight, 1942). Positive ions are popularly associated with negative effects on humans and animals. In the same advertisements that extol the benefits of negative ions produced by the myriad of gadgets

being marketed, positive ions are vilified and blamed for having generally ill effects for both man and beast. This association between moonlight and the purported production of positive ions at night, thus producing the supposedly harmful night air, is one way by which the moon is again linked to negative effects here on earth.

Lunar Gravitational Effects

As stated elsewhere in this document the moon exerts a definite gravitational tug on the earth as they both rotate around a common point in space along their journey around the sun. This results in the ocean tides as earlier stated but is also responsible for other effects that will be explored here.

Gravitational forces are a function of mass of the object and distance. This relationship is not linear so the moon, even though it is fairly massive compared to objects on earth, exerts a relatively weak force on earth due to the relatively large distance. This force is, however, enough to cause some measurable, if not perceptible, effects on earth. One of these effects is responsible for a slight bulge in both heavenly bodies aimed toward each other as they pass overhead as viewed from a point on the surface of each celestial globe (*Moons and Rings*, 1991). There is a mutual attraction between the bodies and as they rotate around each other the moon appears in a different position throughout the orbit. This, of course is responsible for the changing appearance of the moon which is the main topic of this paper, but it is also responsible for the slight deformation of the surface of the earth through each individual lunar cycle. There is some difference in where the bulge occurs on earth during the cycles throughout the year with their slightly different overhead positions because of the angle of the orbit of the moon relative to the plane of the orbit of the earth around the sun. Perhaps in our

prehistoric past our distant ancestors could sense this minuscule change in the shape of the earth and it somehow had an effect on their survival tactics.

Another effect due to gravity is the fact that when viewed from earth, the portion of the surface of the moon that is visible to an inhabitant of earth is always the same. Of course, the portion of the face of the moon that is illuminated changes throughout the lunar cycle, but the face never changes. This is because that over a vast stretch of time, the gravitational forces have slowed the rotation of the moon to exactly the rate that it orbits the earth, sometimes referred to as synchronous rotation (*Moons and Rings*, 1991). Thus, the gravitational aspect of the mutual dance between the moon and earth in the heavens is in some measure responsible for the lunar phases that so many believe influence people and events here on earth.

Other Theories of Lunar Influence on Behavior

Several theories not related to those already discussed have been proposed as reasons why a link between lunar phase and behavior might exist. These will be explored in the space to follow. First, the concept of biological tides will be presented. Electromagnetic variations produced by the movement around the earth by the moon will then be probed. Finally, psychological factors that may influence moon phase-behavior relationships are examined with an emphasis on the belief itself in such a connection as a possible explanation for a link.

Biological Tides

The idea that there are cycles to be found throughout nature is not new. The concept of cycles permeates folklore as well as established science. Indeed, we live in a world where some of these cycles are quite obvious and we experience them first hand as

weeks, seasons, school years and animal migrations as well as the main topic of this literature review, the phases of the moon. Many civilizations past and present as well as numerous individuals have and continue to recognize these recurring events. That these cycles of nature are a fact is not in dispute, but the relationship to human behavior should be a topic of thoughtful inquiry.

One of these cyclic phenomena is the ebb and flow of the oceans of the world. The nearly twice daily rise and fall of the tides has been known by coastal dwellers since before recorded history. This constant movement of the oceans is called tidal action or simply the tide. Although this advancing and receding of the water was known for millennia, it was not until Isaac Newton in the seventeenth century that it was understood to be related to the movement of the moon and could be accurately predicted. As science advanced through time more cycles of nature became apparent through more diligent study and familiar cycles began to be linked to other natural occurrences that were previously thought to be unrelated. This search for connections has accelerated in the years since the beginning of the twentieth century and has now claimed many linkages, perhaps too many to be credible.

It is in this environment that the concept of biological tides has emerged. As stated earlier, many natural cycles are established as fact but some researchers are too eager and willing to see connections sometimes based on weak evidence. Biological tide is a term that is applied to a supposed link between lunar phase and behavior based on similarities between human beings and the oceans of our planet. In this theory it is noted that the human body consists of approximately seventy percent water. It is further theorized that since the oceans are obviously comprised of water and are unquestionably

affected by the phase of the moon humans, with the large percentage of water making up their bodies, must be subject to the same forces that act upon the waters of the oceans (Lieber, 1978). This conjecture may seem credible on initial examination and even intuitive. It could be argued that if the moon can have such a drastic effect on the vast quantity of water that is found in all the oceans of the world then it would stand to reason that it must have an effect on human beings who are much less able to resist lunar forces than a mighty body of water like an ocean. Yet it is in this vary parallel that has been drawn that the flaw is revealed.

Though the human body does in fact claim a large portion of water among the components there are some very distinct differences between that water and that which comprises the oceans. There are even important differences in large bodies of water as compared to the oceans. Those who live inland and away from any ocean coastline will notice that there is no noticeable tide in rivers and lakes that are not connected to the ocean. Even the largest inland bodies of water such as Lake Superior or Lake Baikal are relatively unaffected by the pull of the moon and exhibit no apparent tidal action. This underscores an important concept, that of bounded versus unbounded waters. The oceans are considered to be unbounded as they flow freely over the entire surface of the earth and thus the relatively weak gravitational attraction exerts enough force to cause movement. Lakes and rivers, in contrast, are bounded in comparison and the same gravitational force acting upon them does not cause them to ebb and flow like the ocean (Crowe, 1990).

The water in human beings is bound even more than that found in inland waterways. The biological tides theory suggests that humans are somewhat like a bottle

containing liquid water where the contents are free to slosh about inside the glass vessel with the slightest jostling. This is of course inaccurate and the water inside a human body is even more tightly bound than the liquid in rivers and lakes. All the fluid in a human is contained in smaller structures such as arteries, capillaries and cells. The largest amount of free water in any single location within the human body is no more than a few milliliters. This is far too small an amount in too tightly bound a container to be seriously compared to the greater volume and open conditions of the ocean. Thus, the biological tide idea is difficult to support on a scientific basis.

Other researchers have been attracted to the idea of cycles as an explanation of human behaviors. Several settings have been used as a place to study such possible effects and have ranged from law enforcement agencies to hospitals to crisis call centers (Lieber, 1978). Types of studies have included simple surveys to double blind clinical type trials. Few studies reviewed by the present author found a link between lunar phase and behavior and virtually no credible studies established such a link. Some of these studies did find relationships however, and in retrospect it is not surprising to see what relationships were revealed.

Researchers who were looking for a link to lunar phase found instead that behavior in school age students was highly correlated to the day of the week (Owen, Tarantello, Jones & Tennant, 1998). Students tended to be much more active on Friday as compared to Monday. This comes as little surprise to many in the teaching profession as anticipation of the weekend has a well known effect on students and teachers alike. Other periodic occurrences also had an effect on behavior such as holiday schedules, school events and season of the year. In addition to conditions that acted upon all

students in a school collectively many individual factors were found to have a strong affect on behavior. Some of these factors included individual student health, family issues and personality and general outlook Vance, 1995).

This research puts some considerations into focus for anyone wishing to do studies that look at a possible lunar phase-behavior relationship. There are many confounding factors that may conspire to limit the ability of the researcher to isolate any cause and effect and attribute that effect to any single factor. It may be impossible to discern with an acceptable level of certainty that the observed behavior is due to lunar influence and not the lunch being served in the cafeteria that day.

Electromagnetic Effects

Some have attributed the alleged lunar effect to variations in the electromagnetic field of earth brought about by the position of the moon around our home planet. Earth is, after all, a huge magnet due to the iron-rich molten core that circulates and churns like rivers deep within the innards of our world. In addition, the waves of particles that radiate outward from the sun are electrically charged and our planet lies in the direct path of this solar wind. This does, in fact, create an electromagnetic aspect to our world and many believe that it is this force that is influenced by the position of the moon and in turn is what has an effect on earthly goings on.

The earth, like any other magnet, radiates lines of magnetic flux out and away from itself. These lines have a definite pattern according to the way in which the poles are aligned. Also, these lines are fixed in direction and are intersected by the particles from the solar wind. The way in which these particles cross the magnetosphere of earth result in variances in magnetic fields locally on earth. The position of the moon, as

shown by the phase, is purported to have an effect on how the solar wind intersects with the magnetic flux lines of the earth (Knight, 1942). As in other areas of discussion in this paper, the question to be answered is whether these electromagnetic variations could have an effect on people and events that could not be attributable to other factors. Again, perhaps the answer lies in the distant past when our ancestor were more in tune to natural forces that have become imperceptible to modern humans.

Psychological Considerations

One line of thought in lunar effect research centers on psychological factors rather than physical forces. The light reflected by the moon and gravitational pull are both tangible and measurable. The factors examined in the research discussed in this section are more difficult to objectively and precisely measure and center more on belief than quantifiable facts. While it is possible to measure whether a particular person holds a specific belief, it is more difficult to ascertain the reasons why a certain belief is held. Research was conducted in this area by use of the survey technique and results were reported as to what beliefs were held and by whom. This part of the chapter will explore these beliefs and their possible effect of behavior relative to the phase of the moon.

A crisis call center in a metropolitan area was the site for one study on the topic of belief in lunar effect. A survey was administered to the employees that consisted of uniformed law enforcement personnel as well as trained civilian workers of diverse backgrounds. A control group of professionals not associated with the crisis call center was also given the survey to complete. This sample also contained a wide range of professions and the subjects ranged widely in age and ethnic and cultural background. The data from the survey was analyzed and some patterns became apparent. Many

people who were in certain professions tended to harbor similar beliefs with regard to lunar phase and behavior. These beliefs were held by persons in similar professions regardless of whether they were in the control group or in the crisis center workforce. Professionals who were employed in the law enforcement field or medical related career tended to believe that the phase of the moon did have an effect on the behavior of people. Thus, the persons employed at the crisis call center, being all engaged in the field of law enforcement, had a greater tendency to believe in a lunar phase-behavior association (Wilson & Tobaczyk, 1990).

Another study looked at the relationship between the phase of the moon and criminal activity as reported by law enforcement professionals in a municipal police setting. This research did not attempt to link belief in lunar effect to the rates of arrest for criminal activity but simply collected raw data about number of and types of offenses according to police records. This data was compared to the lunar phase for each day during the study. After statistical analysis was performed no relationship became apparent between the number of arrests or the severity of the crime and lunar phase. Arrest frequency did show a pattern but it was clearly linked to day of the week and time of day but not lunar phase (Leflet, 1998). Although there may be higher rates of belief in lunar effect among members of the law enforcement community as evidenced by the previously mentioned study it did not affect the data gathered in this study

Other studies have focused primarily on the belief in lunar effect and how that very belief may play a part in the outcome of such studies. At least one of these studies has confirmed that professionals in the fields of law enforcement and medical related careers tend to have rates of belief in the lunar effect above what is found in a sample of

the general population. This finding seems to fly in the face of common wisdom. Most of these people are highly trained or educated individuals and it would seem that the more exposure one has to diverse sources of knowledge the less likely one would be to believe in what some consider folk beliefs (Lieber, 1978). The author of that study does not pursue the question of why many of those types of professionals believe the way they do but that seems like a topic worthy of further study.

Another study did take the next logical step however and looked at how a belief in lunar effect may itself become a factor in any study on the subject. It found that people who hold such a belief may be more prone to attribute daily events as well as unusual occurrences to the phase of the moon. This is all very unscientific on the part of the believer though, as the very same events may occur on days that the moon phase should have no effect according to the belief but goes unnoticed due to decreased desire to see any association on that particular day (Vance, 1995). This situation then becomes a self-fulfilling prophecy in the same way as other expectations come to pass because of a desire to see them occur. This is an error in the perception of events however and does not represent a true correlation or establish cause and effect. This study is an unintentional but powerful message to all researchers that the perception of a thing is sometimes stronger than the reality and it is often difficult or even impossible to distinguish between the two.

Summary

Several possible explanations regarding lunar influence on human behavior have been presented in this chapter. Some ideas are more plausible than others based upon the integrity of the method of research. There are theories that seem to be contradictory to

one another and some rely on matters of faith, which is outside the scope of this work. Much of the information offered is based upon the preconceived notion that a connection between the phase of the moon and behavior is a fact and researchers had only to determine the mechanism by which this influence is manifested. This author would urge caution when engaged in an examination of any explanations offered on the lunar connection to behavior. It would be wise to enter into any examination of such connections with no preconceptions, but complete objectivity and a measure of skepticism.

METHODOLOGY

Information related to subject selection, instrumentation, data collection procedure and data analysis can be found in this chapter. Also included is a discussion of the assumptions and limitations as they relate to subject, instrumentation and data issues.

Subject Selection and Description

Subjects were selected based on two main factors. The first of those factors was the willingness to participate in the study. Stated another way this was a sample of convenience. Each staff member had the option to participate or not depending upon their individual choice. There were some that chose not to provide data and that decision was respected by this researcher. The second factor was that of convenience. The author of this study was engaged in a practicum experience at the schools included in this study and that situation facilitated the gathering of data from staff members at those buildings where the practicum was being completed. This circumstance fostered communication between the researcher and those that performed the actual data collection and hopefully encouraged more diligent and accurate reporting.

Respondents that completed the rating forms were carefully selected according to specific criteria. Care was taken to select participants that represented a cross section of the staff and subsequently the students within the building. This was done by selecting a roughly equal number of teachers from all grade levels within the building as well as including those outside the regular classroom setting such as art, music, physical education and special education.

The subjects were not made aware that their behavior was being monitored with regard to the phase of the moon. They were informed that this was to be a study of

student behavior over a one-month period. This would minimize the potential for a Hawthorne effect where respondents tend to provide data consistent with the hypothesis if that is known to them.

Instrumentation

A single instrument was employed in this study. A Likert scale for rating daily behavior was be completed by each participating staff member. The instrument consists of a five-point scale with one indicating low activity, three indicating an average level of activity and five indicating high activity. Additional information was provided to participants as to what types of behavior might constitute these levels of behavior. These details were provided in written form as well as verbal and via electronic means. Reliability and validity for this instrument were not tested. The concept for this survey was originally developed by Aaron Staut for a similar study.

An established table or calendar was used to determine moon phase during the period of the study. Such information is readily available and is predictable well in advance for any given date.

Data Collection Procedures

A five point Likert scale was provided to selected staff members who worked directly with students on a daily basis. Refer to appendices A and B for Likert scale explanation and data collection instrument. They were instructed to complete the scale as close to the end of the school day as practical. The data collection was conducted for a period of five weeks between February 7, 2005 and March 11, 2005. The data were retrieved from the participants from one school on a weekly basis and only at the end of the entire five-week period at the other school. There was some concern that this slight

variation in data collection procedures may have an effect on the consistency of the data. This possibility will be further explored in a later chapter in this work. The combined data were then compiled into a single report at the end of the collection period for ease of manipulation.

Data Analysis

Data were combined, graphed and compared to the phase of the moon for each day during the study. Appropriate statistical analysis was performed and discussion of this will be expanded upon in the following chapter.

Limitations

Limitations exist in this study in the three main areas of method, sample and procedure. These will be discussed here.

A five point scale may not be the most precise method by which to measure student behavior. Many variables enter into the rating and it is also difficult for a school staff member to make judgments that fit neatly into one of the choices offered by the rigid scale. A scale with more points, a multiple answer option or an instrument in which the rater must construct their own response with no preconstructed descriptions may be more accurate in the description of student behavior but could prove unwieldy in the data analysis phase.

The representative nature of the sample in this study is affected by several factors. The teachers who were asked to participate as data collectors are those who would be most willing to cooperate with such a project and are not necessarily those who have the most representative sample of students in their charge.

The practicality of consistent daily data collection from each teacher is a procedural limitation. Due to factors of time some were more conscientious in data collection and others were not as timely in completing the survey each day as requested by the present researcher.

RESULTS

In this chapter the results of this project will be presented. The purpose of this study was to determine if there is a correlation between the phase of the moon and the behavior of students. This was determined by means of a survey completed by educators over a period of time that roughly coincided with one complete lunar cycle. First, demographic information will be provided with the compiled data to follow. The hypothesis will also be restated with statistical information included.

Demographic Information

The data for this study was collected at two separate elementary schools in the D.C. Everest School District near Wausau, Wisconsin. The first school chosen for this study is in a more relatively urban setting situated in an older neighborhood and the main part of the building was constructed in 1928. There are approximately 350 students in attendance at this school with about 23% non-Caucasian, those being mostly Hmong with a few Hispanic students. Seven educators from this school chose to complete the survey forms for this project.

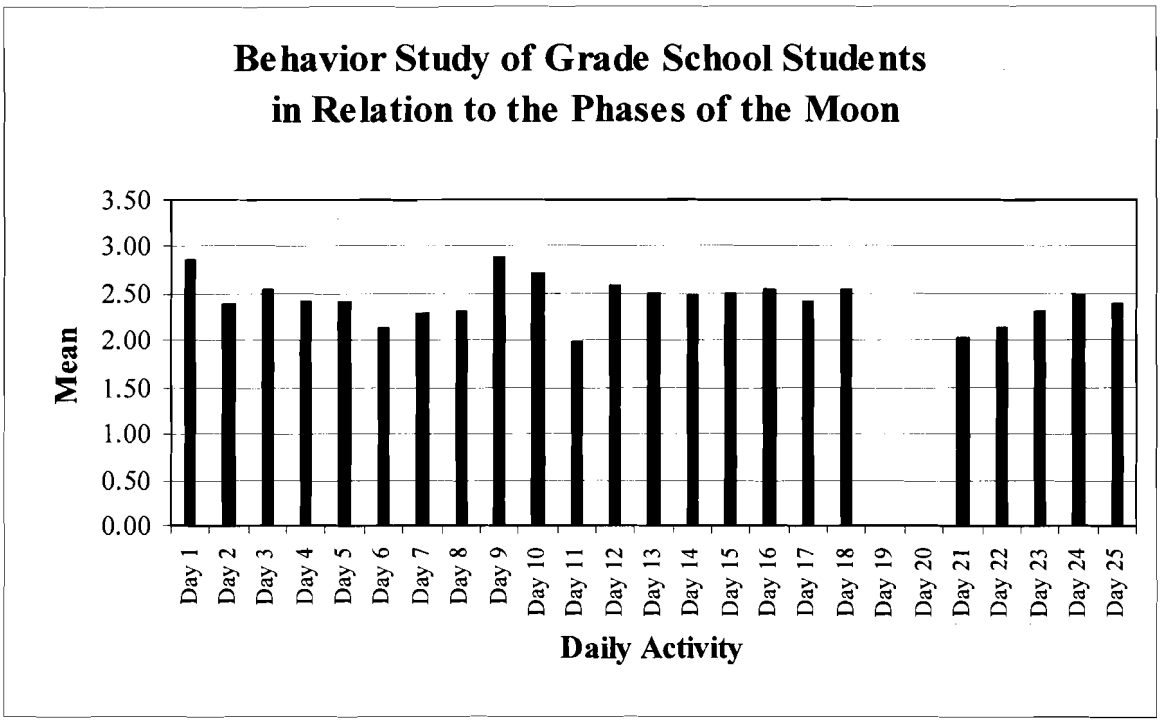
The second school included in this study is somewhat less urban and is located in a developing subdivided area and the main building was constructed in 1976 with significant additions in 1995. There are approximately 500 students in attendance at this school with about 18% non-Caucasian, again those being mostly Hmong with a few individual Hispanic students. Thirty-three educators completed surveys to provide data. All grade levels were represented approximately equally among the respondents at both sites. The data from both schools were merged to create a composite for the purpose of statistical analysis.

Lunar Phase and Daily Behavior Ratings

After collection of the raw data there appeared to be little connection between the lunar phase and the behavior reported by the respondents. On the days in which significant phases of the moon occurred, such as the quarters and especially the full moon, the average rating did not vary either way as compared to days when the moon phase was in transition. On any given day there was a range of scores reported by individual respondents but a collective consensus of the behavior of students was never observed. Although there was variance in the collective scores throughout the period of the study no clear pattern emerged.

Hypothesis

There will be no relationship between reported behavior and lunar phase. Statistical analysis performed on this data included analysis of variance (ANOVA). The results of this analysis indicated that there was no statistical significance to correlate the phase of the moon to student behavior. Thus, this researcher failed to reject the null hypothesis for this project.



Daily Activity:
Day 1: Monday, February 7
Day 2: Tuesday, February 8 (New Moon)
Day 3: Wednesday, February 9
Day 4: Thursday, February 10
Day 5: Friday, February 11
Day 6: Monday, February 14
Day 7: Tuesday, February 15 (First Quarter)
Day 8: Wednesday, February 16
Day 9: Thursday, February 17
Day 10: Friday, February 18
Day 11: Monday, February 21
Day 12: Tuesday, February 22
Day 13: Wednesday, February 23
Day 14: Thursday, February 24 (Full Moon)
Day 15: Friday, February 25
Day 16: Monday, February 28
Day 17: Tuesday, March 1
Day 18: Wednesday, March2
Day 19: Thursday, March 3 (No School, Last Quarter)
Day 20: Friday, March 4 (No School)
Day 21: Monday, March 7
Day 22: Tuesday, March 8
Day 23: Wednesday, March 9
Day 24: Thursday, March 10 (New Moon)
Day 25: Friday, March 11

DISCUSSION

This chapter will include discussion of the results of the survey. After the data was analyzed it appeared that there was little correlation between the phase of the moon and student behavior. This chapter will explore some possibilities as to why this may have been the case. In addition some suggestions for further research and possible ways to avoid certain drawbacks of this type of research will be offered.

Limitations

One limitation in this study was the size of the sample. As in most studies, this research could have benefited from a larger and more diverse sample to obtain data that would be more representative and better able to be generalized to other school populations. The diversity issue could have been addressed by distributing the survey throughout the other schools in the district, but in this case the demographics of those schools do not vary significantly and it would not have been practical in this situation.

Another limitation was in the instrument employed to gather the data. A five-point Likert scale may not have been sufficient to describe the behavior of students. It was at best a compromise survey that made an attempt to gather as much and as accurate a picture of behavior with enough ease and simplicity that the respondents would willingly take part in the study. Perhaps a similar scale with more points may have been appropriate or an entirely different instrument in which the respondent has to construct a response would have produced more useful data. This would have required more thought and effort on the part of the respondent, however, and accuracy may actually be diminished in this case as the already overworked educator may be tempted to write

down a quick response with little thought as to the accuracy with the intent of completing the report for the day in the least amount of time possible.

Yet another problem in this study was the difficulty in isolating the variable. During the course of gathering data for this study the present author realized that there are many more variables involved in the day to day behavior of students in an elementary school. Too many variables make it difficult to determine if the behavior is due to the lunar phase or some other factor that may have an even greater potential effect. One of these other factors, which the author has discovered, is the influence of the respondent themselves.

Each respondent is a human being. That means that the report on behavior is inherently subjective and is often influenced by the daily mood of the person providing the rating. It is impossible to correct for this and establish some sort of baseline for expected data, as each individual will vary day to day in the response they report even to identical situations that occur on different days.

Discussion

An area that was one of active discussion early on in the data collection phase of the project was how unusual behavior was to be defined. There were as many opinions on this topic as there were respondents and it was two weeks into the study before some sort of norm was established and certain respondents felt comfortable providing a behavior rating on a daily basis. Even after some routine had been established some unexpected situations cropped up.

For instance, in an unsolicited remark one day a teacher relayed that it was likely to be a good day in terms of student behavior because the students had three special

periods that day that took them out of the main classroom for nearly two hours. The teacher said that the students were always better behaved on days when they were out of the regular classroom more often. Later that same day a different teacher in casual conversation stated that this was likely to be a bad behavior day because their students were also out of the room many times that day and they always exhibited poor behavior on such days. This represents the exact same circumstance and yet was perceived just the opposite by two different teachers in the same building. This author thought perhaps the first teacher, who felt the students would be well behaved on that day simply had more time away from their students which resulted in a generally brighter personal outlook for that individual on those days. Conversely, perhaps the second teacher was personally disturbed by all the coming and going of such days and behavior that would not normally irritate that teacher was bothersome on those days and they were more likely to report that the behavior of the students had been bad that day. This underscores the variability in responses when dealing with human beings, as there seems to be no absolute reference point.

Other anecdotal information that the author found fascinating came from staff members that worked with special education students. Most of the individual reports that may have suggested some relationship between the phases of the moon and active behavior came from these staff members. Even more interesting is that the lower the function of the student the more that this connection seemed to be reported. The staff members who worked with the most severely cognitive disabled and those students identified with autism spectrum disorders were much more likely to report that the students in their charge were noticeably more sensitive not only to the phase of the moon

but all other natural events and cycles. It is curious to note that those who are considered to be mentally impaired in some way as compared to the non-disabled student are observed to be actually more in tune with natural forces that the other students who have largely tuned out as insignificant information. In any case, more students in special education of all categories were reported to be more active at the significant phases of the moon, as well as during other periods of change in the natural world.

Conclusions

The results of the present research corroborated some previous studies and contradicted others. As demonstrated in the literature review portion of this paper some researchers claim to have found evidence of a link to the lunar phase and some particular event or behavior and others state that the evidence points to little or no correlation. Indeed, at least one researcher conducted a review of a previous study that purported to find a lunar phase link and, upon review, published their own findings that seemed to discredit the earlier study (Abell, 1979). This disagreement is typical in the realm of lunar phase research and will seem puzzling to most readers until one major point is understood.

Also in the literature review portion of this paper is much information that was gathered not from scholarly sources, but folklore and anecdotal or amateur observations. It occurs to the present author that this link between the phase of the moon and largely unspecified unusual behavior is entirely a matter of faith on the part of the reporter. Many of the authors of the sources reviewed were professionals in some given field, but the reporting of data was glaringly unscientific and would not likely hold up under objective scientific scrutiny. Some professions with the largest percentage of believers in

this lunar phase phenomenon are trained professionals such as emergency room workers and law enforcement personnel.

Based on that knowledge the present author states that although there is little actual evidence to support this lunar link, many in our modern society choose to cling to ancient beliefs. For some this may be a deep-rooted belief and seen as a fundamental truth and to others it is merely entertaining to believe in something that is considered a mystery or anachronism in our modern world that has otherwise explained away most myths of the past. This then, is a matter of faith, and as is also the case with many religious beliefs it is in a different category and in the opinion of many, it is not subject to the same scrutiny as other physical phenomena. The idea is believed by those inclined to believe in it without question, and no objective inquiry is made by the believer.

Recommendations

Several suggestions for changes in practice for this research are offered in the in the paragraphs to follow.

This study, as well as most other studies, could benefit from a larger sample. A greater number of respondents would provide a more representative sample. Also, the sample could be expanded to include not only elementary school students but middle levels and high school as well.

The period of the study could encompass more than one complete lunar cycle. Ideally this would be over the span of twelve cycles, or one calendar year. This would help to eliminate errors due to variations in the day of week on which the different phases occur and seasonal variations.

The five-point Likert scale could be modified to give a greater range available to those evaluating behaviors. Alternatively a completely different instrument may be employed that does not use a Likert scale at all but rather requires the respondent to construct their own response, perhaps resulting in more accurate data.

Although the present author has no specific suggestions on how to accomplish this, more could be done to isolate the variable in this research. The behavior that is a result of the phase of the moon would need to be separated from the behavior that is the result of the anticipation of a special event the next day. And that behavior, in turn, would need to be isolated from the behavior that is only perceived to be bad by a respondent who is not feeling well that day.

The last recommendation for the present research is to address the human factor alluded to in the last point. There would need to be some method of obtaining more objective data that is not tainted by the individual bias of the human respondent. Perhaps a baseline could be established around which the respondents would have a more concrete reference point.

Future research could explore the perception of the respondent as the main point of the study. Due to the observed variation in similar behavior reported very differently by different individuals the perception itself becomes the variable and worthy of further study in the opinion of this author.

Additional research could be done that compares the results in a lunar phase behavior survey between special education students and regular education students. Through anecdotal information, casual conversations and personal experience the present author is aware of a greater number of reports of anomalous student behavior by special

education staff as compared to those who work in regular education. These more frequent reports suggest there may be a greater connection among certain segments of the special education population with natural phenomena.

Other future research could include additional variables such as day of the week, proximity to holidays and special events, and weather phenomenon such as precipitation and barometric pressure. Perhaps separate studies of these discrete variables mentioned could be performed by multiple researchers using the same sample and the findings superimposed to reveal the interconnection and effect of all variables taken collectively.

References

Abell, G. (1979). [Review of *The lunar effect* by Arnold Lieber]. *Skeptical Inquirer, 3(4),* 69-73.

Blainey, G. (2002). *A short history of the world.* Chicago, IL: Ivan R. Dee.

Crowe, R. (1990). Astrology and the scientific method. *Psychological Reports, 67,* 163-191.

Knight, J. (1942). *Moon up moon down.* New York, NY: Charles Scribner's Sons.

Leflet, B. (1998). *Lunar phase effect on criminal activity and crisis calls: Does a correlation exist?* Retrieved June 5, 2004, from: http://clearinghouse.mwsc.edu/manuscripts/139.asp

Lieber, A. (1978). *The lunar effect: Biological tides and human emotions.* Garden City, NY: Anchor Press.

Moons and Rings. (1991). Alexandria, VA: Time-Life Books.

Moore, P. (1981). *The moon.* New York, NY: Rand McNally.

Moroney, L. (1995). *Moontellers.* Flagstaff, AZ: Northland Publishing.

Murray, J. (1995). *Moonstruck.* Duluth, MN: Full Moon Press.

The Old Farmer's Almanac. (2004). Dublin, NH: Yankee Publishing.

Owen, C., Tarantello, C., Jones, M. & Tennant, C. (1998). Lunar cycles and violent behaviour. *Australian and New Zealand Journal of Psychiatry, 32,* 496-499.

Rotton, J. & Kelly, I. (1985). Much ado about the full moon: a meta-analysis of lunar-lunacy research. *Psychological Bulletin, 97(2),* 286-306.

Salini, J., Brewer, D., Farmer, M. & Jones, P. (2001). Lunar periodicity of prawns and by-catch in trawls from the Gulf of Carpentaria, northern Australia. *Marine Biology, 138,* 975-983.

Shedd, W. (2000). *Owls aren't wise & bats aren't blind.* New York, NY: Harmony Books.

Vance, D. (1995). Belief in lunar effects on human behavior. *Psychological Reports, 76,* 32-34.

Wilson, J. & Tobaczyk, J. (1990). Lunar phases and crisis center telephone calls. *Journal of Social Psychology, 130(1),* 47-51.

Appendix A: Consent to Participate in a Research Study

This research has been approved by the UW-Stout IRB as required by the Code of Federal Regulations Title 45 Part 46.

UNIVERSITY OF WISCONSIN-STOUT
CONSENT TO PARTICIPATE IN A RESEARCH STUDY

TITLE OF STUDY:
"Teacher Reports of Student Behavior over a One Month Period."

INVESTIGATOR:
Mr. Anthony Johnson, Guidance Practicum Student working with Marlin Block
Evergreen Elementary School
Phone: 715-359-6591
Email: ajohnson1@dce.k12.wi.us

PURPOSE:
You are being asked to participate in a research study examining changes in student behavior over the course of approximately one month. This voluntary study is seeking classroom teachers to respond to a survey regarding the behavior of students. The purpose of this study is to better understand possible patterns in student behavior.

PROCEDURES:
If you choose to participate, you will be asked to complete a survey asking you to respond to a survey about your impressions of student behavior. The survey will be in the form of a five-point scale that rates overall classroom behavior. This survey will cover each day for the period of five weeks. DO NOT put your name on the survey. Mr. Anthony Johnson will collect all survey materials from participants at the end of the survey period. An envelope has been provided in which to return the completed survey.

RISKS:
The risks associated with this study are minimal, as all survey responses will be anonymous. Only group data will be reported and tabulated, and thus identification of individual responses will not be possible.

BENEFITS:
This survey will aid in the determination of possible patterns in student behavior with the goal of identifying the relationship of such patterns to other occurrences.

CONFIDENTIALITY:
Mr. Anthony Johnson will collect the survey responses at the end of the survey period and insure that the materials are anonymous and not individually identifiable. Individual responses will not be available for review by others, or for publication. Any data provided to the public will be in group format.

RIGHT TO REFUSE OR WITHDRAW:
Participation in this study is voluntary. You may refuse to participate in this study for any reason. You may also withdraw from this study after it has begun with no penalty for completing only a portion of the requested information. By completing and allowing the surveys to be collected you are consenting to participation.

QUESTIONS:
If you have any questions or concerns please contact Mr. Anthony Johnson at Evergreen Elementary School (715) 359-6561 or email: ajohnson1@dce.k12.wi.us. You may also contact the thesis advisor for this study, Dr. Denise Zirkle Brouillard at her office phone (715) 232-2599; email: brouillardd@uwstout.edu, or the Director of Research Services at UW-Stout, Dr. Sue Foxwell at her office phone (715) 232-2477; email: foxwells@uwstout.edu.

Appendix B: Five Point Likert Scale Explanation

This research has been approved by the UW-Stout IRB as required by the Code of Federal Regulations Title 45 Part 46.

FIVE POINT LIKERT SCALE

A Likert scale has been devised for this study. It includes five points that represent a continuum. A score of 1 indicates a low level of activity and a 5 indicates a high level of activity. A 3 indicates an average level of activity. A score of 2 or 4 indicate a level of activity that is slightly below or slightly above the average level respectively. Participants will rate students once daily at the close of the school day. The duration of the study will encompass a period of approximately five weeks.

1	2	3	4	5
Low Activity		**Average Activity**		**High Activity**

Appendix C: Behavior Study Weekly Data Record

This research has been approved by the UW-Stout IRB as required by the Code of Federal Regulations Title 45 Part 46.

BEHAVIOR STUDY DATA RECORD

Week Number and Date_____

Monday	**1**	**2**	**3**	**4**	**5**
Tuesday	**1**	**2**	**3**	**4**	**5**
Wednesday	**1**	**2**	**3**	**4**	**5**
Thursday	**1**	**2**	**3**	**4**	**5**
Friday	**1**	**2**	**3**	**4**	**5**
	Low Activity		**Average Activity**		**High Activity**

Additional Comments_____

_____

_____

_____

Appendix C: Behavior Study Weekly Data Record

This research has been approved by the UW-Stout IRB as required by the Code of Federal Regulations Title 45 Part 46.

BEHAVIOR STUDY DATA RECORD

Week Number and Date_____

Monday	**1**	**2**	**3**	**4**	**5**
Tuesday	**1**	**2**	**3**	**4**	**5**
Wednesday	**1**	**2**	**3**	**4**	**5**
Thursday	**1**	**2**	**3**	**4**	**5**
Friday	**1**	**2**	**3**	**4**	**5**
	Low Activity		**Average Activity**		**High Activity**

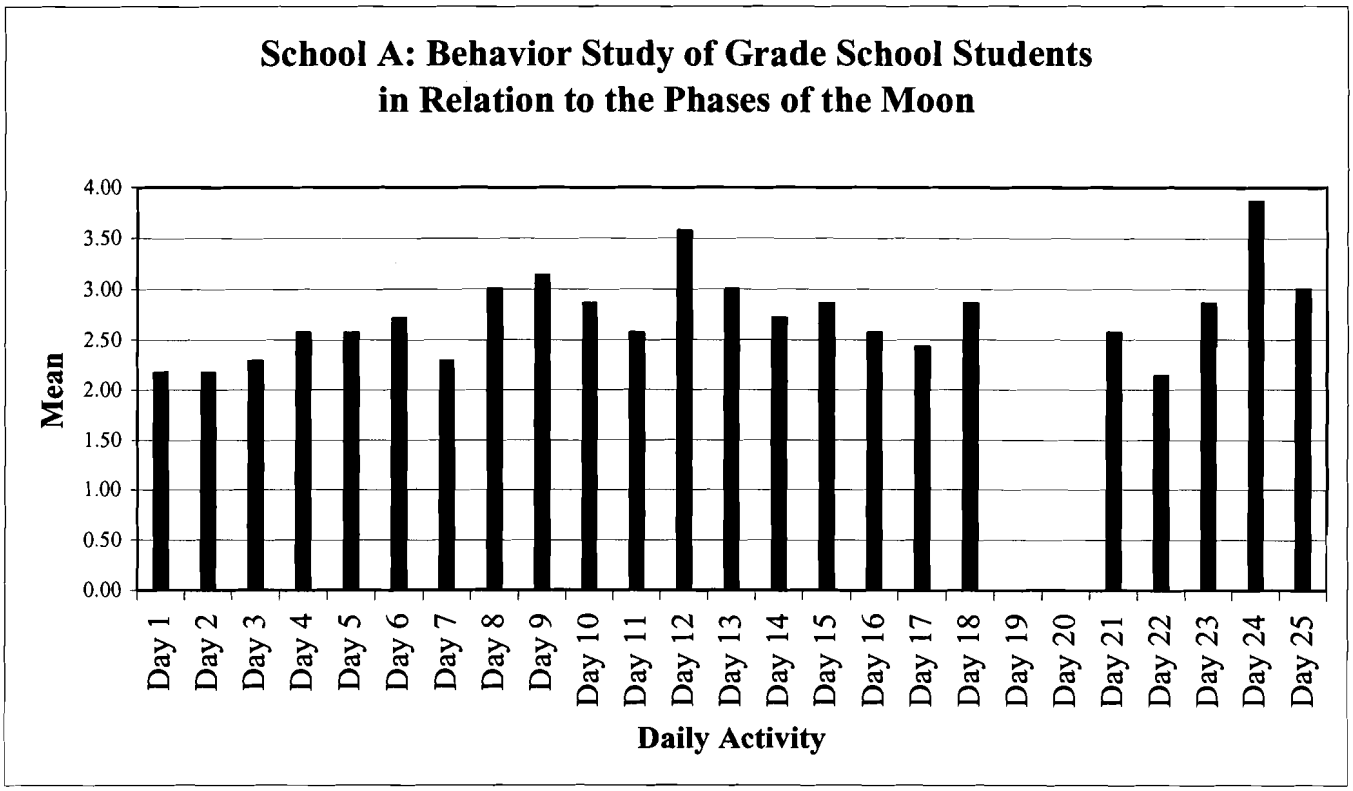
Additional Comments_____

_____

_____

_____

Appendix D: School A Mean Data Graph



Appendix E: School B Mean Data Graph