Cosmobiology Institute
Principles and Guidelines for Research

As stated in the Mission Statement, the Cosmobiology Institute continues, and seriously advances, the spirit of the investigations brought forth by Johannes Kepler and others. In this tradition, scientific principles and methods are applied to the study of the relationship of celestial motions with the experiences and behavior of humans and other living things. The Cosmobiology Institute is consistent with the emphasis in many modern professions on evidence-based practices and careful adherence to high academic standards and principles. Fundamental to this process is determining and evaluating levels of confidence, effect sizes, and other assessments of research results.

The information below is divided into 5 sections:

1. Perspectives: Goals of Research
2. Research Designs
3. The Rapid Rise of Evidence-Based Practices in the Late 20th Century
4. Questions for Researchers
5. References

1. Perspectives: Goals of Research

Modern Research Methods is a very broad topic and covers an enormous breadth of methods and procedures. Just as a musician may have expertise playing particular styles of music with particular musical instruments and have little facility in working in other styles of music or other instruments, researchers typically focus on the research methods that are relevant and useful for the particular area in which they work.

There are also some basic principles that are consistent among all forms of research conducted at a high academic level. At the core of sophisticated research are:

(a) a reliance on trusted data, and

(b) a relentless pursuit of ways in which one's observations and conclusions from these observations may avoid being biased, limited, or distorted -- even when the researcher is trained and very careful.

Research needs to be peer-reviewed, especially from researchers with different relevant areas of expertise. There is no simple way to conduct research starting at one point with simple, well-defined steps that lead to **evidence-based** results. For most research projects, there are alternative paths and various trade-offs that depend on the chosen path. Pitfalls and challenges that one researcher notices may be overlooked by others. The Cosmobiology Institute seeks to provide excellent depth and breadth of understanding and expertise to facilitate real progress in understanding relationships of cosmic phenomena to human behavior. The mission of the Cosmobiology Institute is discovery, but people who utilize the services of Cosmobiology Institute may utilize these discoveries for practical applications.

The focus of the Cosmobiology Institute, as stated in the mission statement, is *"empirical verification of relationships between cosmic phenomena with organic life, and to the practical application of these observations and discoveries."* Although very important, the Cosmobiology Institute is not likely to engage (for example) in research that is purely of a sociological or historical nature.

Another key ingredient in research is to focus on the practical and pragmatic circumstances in which the research is conducted. Sometimes tough decisions must be made about the research procedures employed, based on what steps will give the best results with the available resources.

A primary goal of research is to increase understanding. A very helpful, but not essential, quality of some research is that it also addresses relevant social issues and provides data and information that is actionable and fosters practical solutions to problems.

How might we evaluate whether a research project assists in achieving this goal? The answer to this question is to determine

(a) whether the research addresses a question that is important at the time that the research is conducted, and

(b) to what extent might the research increase our confidence that the relationship between the cosmic phenomena and organic life really exists.

2. Research Designs

First, we discuss important components of virtually all research projects. Then, we identify various specific research methods that are appropriate for cosmobiology research.

Eleven basic principles and procedures common to research designs:

1. The research attempts to answer a question. Questions vary in breadth from very specific to very broad. An example of a broad question is "what is common in the birth charts of musicians?". An example of a specific question is "do jazz musicians have Venus conjunct, square or opposition Uranus at the time of birth more often than other people?"

If the question is very broad rather than specific, very often exploratory research methods are used. More specific questions can be approached with either an exploratory research design or a confirmatory research design

Exploratory research provides us a way to see what cosmobiology variables appear to be potentially important. By "cosmobiology variable" we mean a celestial phenomenon which is hypothesized to have a relationship with human behavior, personality or the behavior or personality of other living things. The more that the researcher narrows down the question to be more specific, the more that the research can be of a confirmatory nature rather than merely exploratory. The more confirmatory the research is, the more confidence we have that the findings can be replicated with new data. However, exploratory research can alert us to potential variables that we would otherwise not be able to identify.

If there are sufficient resources to sustain research over a sufficiently long time, then building a model with exploratory research eventually leads to the pinnacle of research: a strict hypothesis test. In such a test, researchers state very precisely what is measured and what the hypothesis is. Suppose that you hypothesize that people who were born with the Sun in the zodiac sign Leo are likely to be actors. Your hypothesis is that a higher proportion of people with Sun in Leo are actors than can be expected by chance. A peculiar convention is that the null hypothesis is stated, namely that the hypothesis is not true. If a significantly higher proportion of people with Sun in Leo are actors than other professions, then we say that the null hypothesis is rejected.

2. Appropriate data is required. All research analyzes data. In cosmobiology research the celestial phenomena are called predictor variables, or independent variables. The behavior or personality trait is called the outcome variable, or dependent variable. For example, in research on celestial variables that are associated with a particular profession, such as musicians or scientists, the profession is the outcome variable.

Typically, the data studied is a sample of some population. The population which the sample is drawn from must be specified. For example, suppose that you are interested in what celestial variables correlate with musical talent, so you analyze the data of 1,000 musicians. If 75% of the musicians are rock and pop singers, the population is not well defined. Results from analyzing this data might suggest that there is a relationship of the predictor variables to the rock and pop singers only and not to the other musicians. When the population is not well defined, it is unclear to what population the findings apply. There are various sampling techniques that researchers use to collect data. An introductory book on research methods usually describes many of these sampling methods.

If possible, the data should be made available in some form to other researchers so that the research can be replicated and the results of the research can be confirmed by other researchers. Note that future research using the same data as the original research gives only the ability to confirm the statistical results and to analyze the data in alternative ways. To increase confidence in the findings researchers must collect new data.

Another issue with data involves measurement error. For example, birth times that are recorded on a birth certificate or birth record to the minute have much less measurement error than birth times that are rounded off to the nearest half hour. There might also be errors in recording the data, such as someone mistakenly recording the time as AM instead of PM, or the time not being noted exactly at the time of birth but instead being estimated after the baby was born.

3. Research should be conducted with an awareness of unavoidable limitations. Researchers need to clearly state the limitations and constraints of the research and account for these weaknesses in drawing conclusions from the findings. These weaknesses lower our confidence in the findings, although may not completely invalidate their usefulness. Research typically is incremental, in that each study tends to make some modest progress in better understanding a situation. Some advancement in understanding is better than none. For example, a researcher studying a mental illness such as schizophrenia may have only 50 cases and it would be preferable to have hundreds of cases so that the analysis of the data has much greater statistical power. Another limitation can be that the experimental group is more heterogeneous than is preferable such as, for example, a study of bipolar disorder and some people have BD I and some have BD II and the kind of BD is not specified by the data collectors. Separating the cases of BD into 2 groups of Type 1 BD and Type 2 BD is preferable but may not be possible. These limitations are unfortunate but new understanding of the relationship of cosmobiology variables to these mental conditions is still possible.

4. When feasible, consider potential non-cosmobiological predictor variables. Suppose that you are investigating cosmobiological indicators of heart disease. There are known indicators of heart disease, such as diet and exercise. If information about the diet and exercise habits of the people in the research is available, this improves the ability to discover how the cosmobiological variables contribute to heart disease. There can also be interactions between variables. For example, it is possible that an aspect between Venus and Jupiter in the birth chart contributes to the likelihood of heart disease only for people who have a particular diet or lack of exercise.

Including non-cosmobiological variables is not essential, but, when feasible, including these variables can increase the potential for obtaining useful

information from the research.

5. A thorough literature review is important. Relevant information outside the limited focus of your question is necessary. Has anyone else conducted similar research? If so, what did they find? A fundamental principle of research is to build upon previous research to advance knowledge – or to refute it.

6. Clearly articulate what the counterfactual is and how well the counterfactual can be considered in the research design. A counterfactual is the result if the predictor variables are removed. For example, in research that attempts to answer the question "What cosmobiology variables incline a person to become a professional musician?" a counterfactual is what the person's profession is if the person was born at a time when the celestial predictor variables were not occurring.

Because we cannot rearrange the sky at the time people are born, we cannot conduct the research method known as an experiment. In an experiment, the predictor variables are manipulated to determine the effect. Very often, the counterfactual is estimated by having another group of data that is known as the control group. The group of people being studied is sometimes referred to as the experimental group.

Even in purely exploratory research there is a counterfactual. If, for example, the research is to explore possible celestial variables that occur at the time of birth, then a counterfactual is that people who are not musicians are less likely to be born when these celestial variables occur at the time of birth.

7. If possible, compare results to a control group. Suppose that research shows that politicians are born when there is a Sun trine Jupiter aspect more than square aspects and other aspects. Jupiter is often associated with politics and other activities that require a person to meet a lot of people and travel. However, because of the way Jupiter turns retrograde at certain places in its orbit, the Sun and Jupiter are in a trine aspect more often than they are in a conjunction or square aspect. Consequently, Sun is trine Jupiter more often for all people, not just politicians. A control group enables us to detect this fact so we do not incorrectly conclude that politicians are born with a Sun trine Jupiter aspect more often than other professional groups. In cosmobiology research, a

control group called a shuffled control group is often used. It is created by taking the date, time, and place of the individuals and randomly swapping them. For example, suppose that the research is of birth charts of musicians. Suppose that musician Alice was born on January 1, 1950 at 9:30 AM in Rome, Italy, musician Barbara was born on February 15, 1960 at 3:15 PM in London, England and musician Charles was born on March 30, 1970 at 7:18 PM in Seattle, Washington. Software is used to shuffle this data and it produces a control group with data that might combine the birth date of Alice with the time of Charles, and the birth place of Barbara. Similarly, the data for the other people is comprised of random dates, times, and places of people in the database.

This shuffled control group is similar to the experimental group in the range of dates, times and places than any other actual group of charts. Some researchers have shuffled 5 items: The month, day, year, time and place. Others combine the month and day so they are shuffling 4 items: month-day, year, time and place. Either method is reasonable for creating an excellent control group. This control group is very careful to remove the possibility of results being a consequence of different distributions of variables between the experimental group and control group. A shuffled control group is a conservative control group. It is more conservative in the sense that it is more difficult with this type of control group to reject the null hypothesis. In statistical jargon we would say that this control group minimizes the possibility of a Type 1 error, but what is important for researchers is simply to understand that a statistically significant result in a study that uses a shuffled control group, all other things, equal, has a better chance of being replicated in future studies than if a less conservative control group is used.

8. Explain clearly what the specific results are, and how the results are evaluated. The research design must specify how the results of the research are presented. These results are either quantitative or qualitative. If the results of the research are numeric values that quantify the findings, then we refer to these numeric results as quantitative and the research project is referred to as a quantitative research design. In this case, typically an appropriate statistical test is also conducted, probability values (p-values), effect sizes and levels of confidence in the results are reported.

An example of qualitative research is an extreme case sampling study of zodiac signs. In this research design, the biographies of people who have an extreme emphasis of planets in a zodiac sign at the time of birth are studied to see if there are common themes in the lives of these people. Even though the results of qualitative research are not as definitive and results from quantitative research, not everything in life can be easily quantified and sometimes a researcher prefers qualitative research in order to analyze something that cannot easily be quantified.

9. An abstract of the research is written after the research is completed. An abstract is typically a paragraph that explains what the questions, methods, and findings were. This allows readers to skim through and get to the essence of the research topic quickly. An abstract is a requirement for research that is submitted in a manner consistent with academic standards.

10: Conclusions and discussion are an important part of the research paper.- A discussion of the relevance and impact of the research is equally important to the data collection, obtained results, and overall conclusions drawn from the research. This allows readers to understand the ways in which this research relates to issues or applications of the findings.

11. Indications for future research is another important part of any research study. Any particular research study is considered to be a stepping-stone in the ongoing quest for understanding. Assisting the reader in understanding potential ways in which future research can build upon previous research is important. You may not be able to anticipate every possible future development in research, but usually the researchers are aware of potential ways in which this research can be a stepping-stone towards other research or applications of the research. Sharing these thoughts is important to help facilitate future progress.

12. Enthusiasm and perseverance: Discovering new insights that meet rigorous academic requirements is much more demanding than many people who are new to research anticipate. The researcher's burning interest in the question and the determination to make progress are often critical for success.

Commonly Used Cosmobiology Research Designs:

Next, we discuss some research designs that are commonly used in cosmobiology research. This list of research designs is not exhaustive. There are many variations of research designs, and several research designs can have overlapping characteristics. Nevertheless, the following summary of relevant research designs can help you develop a research study that best answers the questions that you wish to answer. Note that some of the terms are defined earlier in this paper.

1. Exploratory qualitative research on extreme cases of predictor variables determines if predictor variables show promise for being confirmed in future studies. As mentioned earlier: (a) in exploratory research designs we do not have strict expectations of what will be found. Exploratory research helps us build a model. (b) In qualitative research, the results are not numeric. (c) The predictor variables are the celestial variables that are associated with some behavior, event or personality trait. Thus, this research design incorporates these three features.

In this research design, extreme cases of a celestial variable (predictor variable) are selected for a group of people in a database. The biographies of the people are studied to see if there are recurring themes in the lives of these people that are consistent with theoretical expectations for effects from the predictor variable. This research could refute commonly believed ideas about the predictor variables. Another benefit of this research design is identification of potential associations with outcome variables that can be confirmed in future studies.

An example of this type of investigation is the research completed by David Cochrane on tropical zodiac signs. A weighted score for each planet in a zodiac sign was assigned. Biographies of individuals with the highest scores for each of the 12 zodiac signs were studied to see if themes in their lives reflected the common themes associated with the zodiac signs.

The findings of David's research established with very good confidence that there are personality traits that are associated with zodiac signs. These traits have some similarity to common beliefs about zodiac signs, although they are also different in significant ways. Thus, there is confirmation of some common ideas about zodiac signs, and rejection of other common ideas about zodiac

signs. Because this research is free of the huge effects of selection bias and confirmation bias, this research improves understanding of zodiac signs in a manner that is consistent with an Evidence-Based Practice.

Note that many exploratory research studies are not purely exploratory. There are some general expectations of what will be found rather than a specific hypothesis such as we have in confirmatory research. David Cochrane's research on zodiac signs is an example of this in that the expectation is that some of the traits that astrologers assign to each zodiac sign will be confirmed. Because there are many traits assigned to the zodiac signs, only some of them are expected to be confirmed, and it is unclear which of these traits will be confirmed, we classify this research as exploratory. However, having some general expectations is very different from having no expectations. If there are no expectations in the research and a large number of variables are being investigated, then some consistent findings are likely by chance. If, for example, there are 100 possible outcomes and each outcome has a random possibility of 1% of occurring, there is a good chance that at least one of these variables will be found to occur consistently. A commonly used statistical correction for multiple hypotheses is the Bonferroni correction. Exploratory research is used to narrow down some potentially important variables that can be confirmed in future research.

Cosmobiology, unlike astrology, is an evidence-based discipline. The evidence demonstrates that many common beliefs regarding zodiac signs need to be replaced. The results of such research can provide greater confidence in the revised understanding of zodiac signs because (a) Selection bias and confirmation bias are not so big problems as they are in personal observations; (b) Extreme cases are more information-rich than other cases; and (c) The findings are not completely antithetical to the observations of astrology, so there is support for the overall conclusions from this research from an enormous body of personal observations over centuries prior to this research.

This research method and the second research method described below are extreme case sampling studies, and they are similar to Extreme Phenotype Sampling studies that are conducted in genetics research.[8]

2. Mixed Methods research on extreme cases of an outcome variable
determines if the predictor variables show promise for being confirmed in future

studies. In a mixed methods study, data is analyzed with qualitative and quantitative methods to obtain different perspectives on the data.[9] As mentioned earlier, in qualitative research the research findings are not numeric, while in quantitative research findings are numeric. Thus, in Mixed Methods research, some findings are reported as non-numeric, and some are reported as numeric values. Also, in this research design the data collected is based on the outcome variable, i.e., the behavior or trait of interest.

In this Mixed Methods research design, there are two phases to the research: Phase 1 is a Qualitative study of extreme cases of some behavior, and Phase 2 is a Quantitative study in which the model is refined and a statistical analysis is done. Both phases of the research are designed to build a model that shows promise of being confirmed in future research.

In both phases of the research a group of people who exhibit some extreme behavior are analyzed. For example, in one research study the greatest athletes of all time were studied; in this study the extreme behavior is exceptional athletic performance. In another research study the most popular rock 'n roll musicians were studied; in this study the extreme behavior is exceptional success and popularity as a rock musician. The birth charts are analyzed to see if there are astrological planetary configurations that the individuals have in common. A model is built from these observations. The model is essentially a regression model, i.e. a model in which there are multiple weighted predictor variables.

The sampling method for collecting the data must minimize the possibility of selection bias and the population that the sample makes inferences to must be clear. In the research on the greatest athletes the data was obtained by a google search for "greatest athletes of all time". Two websites with a list of the greatest athletes of all time in sorted order from the very greatest were found. All athletes on these two websites that have AA birth data (from a birth certificate or birth record) are included in the study. By using all data on these websites, there is no cherry-picking of data. The population that inferences are made to are individuals with extraordinary performance in all popular sports.

In this study measurement error was also minimized by using only birth data with an AA birth time accuracy. The AA rating is the most trustworthy accuracy rating for birthtimes. An AA rating means that the birth time was obtained from a birth certificate or birth record, so it is not subject to problems of inaccurate memory recall or misunderstandings through miscommunication from one person to another. In some research studies, birth times that are on the hour are also removed. By chance only 1 in 60 charts should be on the hour, and 1 in 60 on the half hour, but in many studies we see that far more than 1 in 60 charts is on the hour, and there are also more than 1/60 of the charts are also on the half hour. Vincent Godbout published in Correlation magazine his analysis of on one group of the Gauquelin data, which showed that over 70% of the data collected by the Gauquelins is rounded to the nearest hour. Godbout went a step further in his analysis to find that distributing these rounded off birth times over a time span of 20 minutes before the hour to 20 minutes after the hour produced evenly distributed data, which indicates that the rounding of birth times was frequently used even when the birth time was not within a few minutes of the hour. Godbout also found that removing rounded birth times in one of his studies improved p-values. His research demonstrates very clearly how rounded off birth times can weaken the significance of the research results. Thus, even recorded birth times are sometimes rounded off to the nearest hour or half hour. The additional step of removing birth charts that are on the hour and optionally also on the half hour can help ensure that there is less measurement error in the recording of the birth times, but it also reduces the number of subjects in the experiment. Fewer cases results in statistical analyses having less power (less ability to detect an actual effect, so there is a tradeoff in removing birth times that are on the hour and half hour. The researcher decides if removing data that is on the hour is better. Some issues to consider is whether the research is exploratory or confirmatory, and how quickly the astrological variables change over time.

This Mixed Methods research design uses Extreme Case Sampling. The use of Extreme Case Sampling has increased tremendously in the 21st century. Geneticists are using a form of Extreme Case Sampling called “Extreme Phenotype Sampling” to make exciting discoveries on the genetic markers for many physical, mental and emotional conditions. Remarkable insights were achieved into the genetic markers for obesity using Extreme Phenotype Sampling. Because Extreme Case Sampling has started to be used extensively

with great success in identifying quantitative relationships between variables in the early 21st century, some researchers are not yet familiar with how effective and powerful this research method is. For additional information, here are links to some articles on Extreme Phenotype Sampling:

Powerful extreme phenotype sampling designs and score tests for genetic association studies.
Thea Bjørnland , Anja Bye, Einar Ryeng, Ulrik Wisløff, Mette Langaas
https://pubmed.ncbi.nlm.nih.gov/30088284

Using Extreme Phenotype Sampling to Identify the Rare Causal Variants of Quantitative Traits in Association Studies
Dalin Li, Juan Pablo Lewinger, William J. Gauderman, Cassandra Elizabeth Murcray, and David Conti,
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4238184/

Extreme sampling design in genetic association mapping of quantitative trait loci using balanced and unbalanced case-control samples
Yi Li, Orna Levran, JongJoo Kim, Tiejun Zhang, Xingdong Chen & Chen Suo
https://www.nature.com/articles/s41598-019-51790-w

Powerful extreme phenotype sampling designs and score tests for genetic association studies.
Thea Bjornland, Anja Bye, Einar Ryeng, Ulrik Wisloff, Mette Langaas
https://ntnuopen.ntnu.no/ntnu-xmlui/bitstream/handle/11250/2585308/bjornland_main.pdf

In Phase 1 of the research data visualization tools, like graphs of distributions of planetary angles between planets, are used to identify potentially consistent themes in the data. In this first qualitative research phase, researchers try to identify planetary configurations that theory suggests can reasonably be associated with exceptional athletic talent. A set of weighted variables that are consistent with theory is developed by evaluating the traits of the athletes and relating these to the planetary configurations that appear frequently in the birth charts of the athletes. In this first phase of the research is to develop a set of variables that is elegant and consistent with theory. An example of an inelegant model is the following 2 variables:

Mars conjunct Uranus with a 3 degree orb and a weight of 2.

Mars square Uranus with a 2 degree orb and a weight of 20.

There are three peculiar features to this set of two variables: (1) Why is the square given 10 times the weight of a conjunction, (2) Why does a square have a slightly smaller orb than a conjunction and (3) Why are oppositions not included? It feels as if the formula jumps from conjunctions to squares, and skips over oppositions. If the researcher can provide a good rationale for these seeming peculiarities, then the model is more elegant. As it stands, this model is very inelegant, i.e., it lacks internal consistency and simplicity. Without internal consistency and simplicity, the model is likely to fail to be confirmed in future research. In the initial stages of research some researchers give the same weight to all variables in order to keep the model simple and straightforward and free of complexities that might overshadow the fundamental hypothesis that is being tested.

In Phase 2 of the research a shuffled control group is created, and a t test to compare the means of the experimental group (exceptional athletes, extreme musicians or whatever the outcome variable being studied may be) with the shuffled control group. Predictor variables are added and removed and weights (coefficients) may be adjusted as well. However, great care must be taken because, just like adding and removing variables, adjusting weights to improve statistical significance when there is not a strong theoretical rationale for the adjusted weights is likely to result in overfitting. Overfitting means that a replication study is unlikely to confirm the findings because the predictor variables are fitting the variations in this particular dataset rather than to an actual relationship between the predictor variables and outcome variables. Adjusting weights can have a dramatic effect on the p-value produced by the regression equation, so the possibility of overfitting when the formula lacks elegance and theoretical justification is very high. An optimization method like regression analysis is usually not used because it is more important that the model is internally consistent and simple than that the effect sizes of the statistical analysis is large. The goal of this Mixed Methods research design is to build a model that is likely to be confirmed in future research and a model that

includes predictor variables that are inconsistent with each other and are difficult to justify theoretically is very unlikely to be confirmed in future research.

In a successful study a p-value of at least < .001 is obtained, and the set of predictor variables is elegant and consistent. A very low p value is required because the set of weighted variables is developed with training data, and the effect size typically is much weaker when evaluated in the future with test data. If the p-value with training becomes 10 times less statistically significant when evaluated with test data, then the p-value will be $p < .01$ with the test data. If the p-value becomes less statistically significant by a factor of 50 instead of 10, the p-value with the test data will be $p < .05$. Even when the model is elegant and theoretically consistent, overfitting can be this large so a much stricter cutoff point for p-values is needed with training data than with test data. The quantitative phase of this research is a regression model, in that a list of weighted predictor variables is used to determine the outcome variable, and regression models are prone to overfitting.

The research on most popular musicians was conducted in the same manner by a google search for “the best rock ‘n roll musicians”. The research on eating disorders by Michele Love was conducted with an existing database of people who were diagnosed with these conditions. In all cases these Mixed Methods research designs eliminated the possibility of selection bias.

3. Quantitative research on a database of people who share a particular outcome variable determines whether existing theories can be confirmed and new models can be developed. Because this is quantitative research, the results reported are numeric. The data collected is of people with a shared outcome variable, i.e., a similar behavior or personality trait.

A Compatibility Research study conducted by David Cochrane on tropical zodiac signs of over 20,000 married couples that was collected by Michel Gauquelin is an example of this research. Using this database and a shuffled control group, it was found that there was no relationship between the zodiac signs of the Sun, Moon, Ascendant, Mercury, Venus and Mars in the charts of husbands and wives. This research strongly indicates that tropical zodiac signs are extremely poor, negligible, or non-existent in their ability to determine the choice of a

marriage partner, despite their continued use by astrologers.

In this research, data visualization tools can be used to see patterns in the data. Tables of totals and probability values can be produced. Data mining and machine-learning tools can be used, such as classification and regression trees, support vector machines, random forests, and artificial neural networks. Statistical methods like linear discriminant analysis and clustering algorithms can also be used to identify patterns in the data.

Cosmobiology contrasts sharply with conventional astrology in that astrologers use subjective and historical criteria for determining valid celestial variables, whereas cosmobiology is an evidence-based discipline unconstrained by the limitations of convention and personal bias.

4. Improving the model proposed in previous quantitative research by improving the set of predictor variables and/or the effect size. This research design is used to improve the results of previous research. The findings from previous research are analyzed to see if the model can be made more elegant by removing some predictor variables or making the predictor variables more consistent with each other. Increasing the effect size, typically measured as the p-value is another way in which the research results can be improved.

This research method was used by Gisele Terry and David Cochrane in some of the phases of research on bipolar disorder.[7] The findings from earlier phases of the research were periodically reviewed and reanalyzed to see if the model could be made more elegant and/or the effect size of the findings improved.

5. Data visualization of predicted and actual predicted behavior with a line graph: In this research design, the emphasis is on visualizing the relationship between predictor variables and outcome variables. Graphs and diagrams can reveal relationships in an intuitive way that statistical results and descriptive results may not convey.

Data visualization tools like graphs of distributions of planetary angles between planets are used to identify potentially consistent themes in the data. In this first qualitative research phase, the researchers try to identify planetary

configurations that cosmobiology theory suggests can reasonably be associated with an outcome variable. One example of this research is research on exceptional athletic talent. A set of weighted variables that are theoretically consistent is defined from observations of the graphs. It is developed in a consistent way by evaluating the traits of the athletes and relating these to the planetary configurations.

This is a powerful research method used to increase confidence. This research method is described in the book on bipolar disorder by David Cochrane.[7] The AstroSignature for bipolar disorder includes components that indicate a tendency for unrestrained behavior, lack of impulse control (manic phase), and components that incline towards seclusion and introversion (depressive phase).

The researchers developed an advanced theory indicating that people who experience unbridled behavior resulted in drug overdoses, sexual promiscuity, and other extreme behaviors. These people are inclined to have low impulse control, and have particular planetary configurations at the time of their birth, even if they are not diagnosed with bipolar disorder until much later.

Actresses Marilyn Monroe and Judy Garland died from either drug overdoses, excessive alcohol, or dangerous medical treatments to treat mental and emotional stress. There are different theories of the cause of particularly Marilyn Monroe's death but all suggest that her stress at this time was very intense. When the transiting planets activated their planetary configurations, an episode of extreme behavior was expected. Software was used to create the graphs shown in the book. One graph shows the peak at the time of death by drug overdose. This data visualization increases our confidence in the model. If the graph is unable to indicate times of manic or dangerous behavior, then our confidence in the model decreases.

In Figure 1 is a screen capture of a list of cosmobiological variables that are hypothesized to be involved at the time that actress Judy Garland would experience an episode of unstable emotions. Figure 1 is taken from the *book The Astrology of Bipolar Disorder: A Scientific Breakthrough* by David Cochrane. Although this list of variables is very long, the underlying concept behind it is very simple: any transit-to-natal combination of the three of the four planets Venus, Mars, Uranus and Neptune in a direct midpoint structure in the 11-Vibration chart is likely to trigger an unstable emotional state. Figure 1 lists only

half of the variables, which are the ones involving Mars, Uranus and Neptune on the left side of Figure 1 and the ones involving Venus, Mars and Uranus on the right side of Figure 1. The configurations that involve Venus, Mars and Neptune or that involve Venus, Uranus and Neptune are organized in the same manner. It is not important if you are unfamiliar with the details of what these variables are. The point being made here is that there is a list of dozens of planetary configurations that are hypothesized to increase the probability of an episode of emotional instability. How do we test this hypothesis?

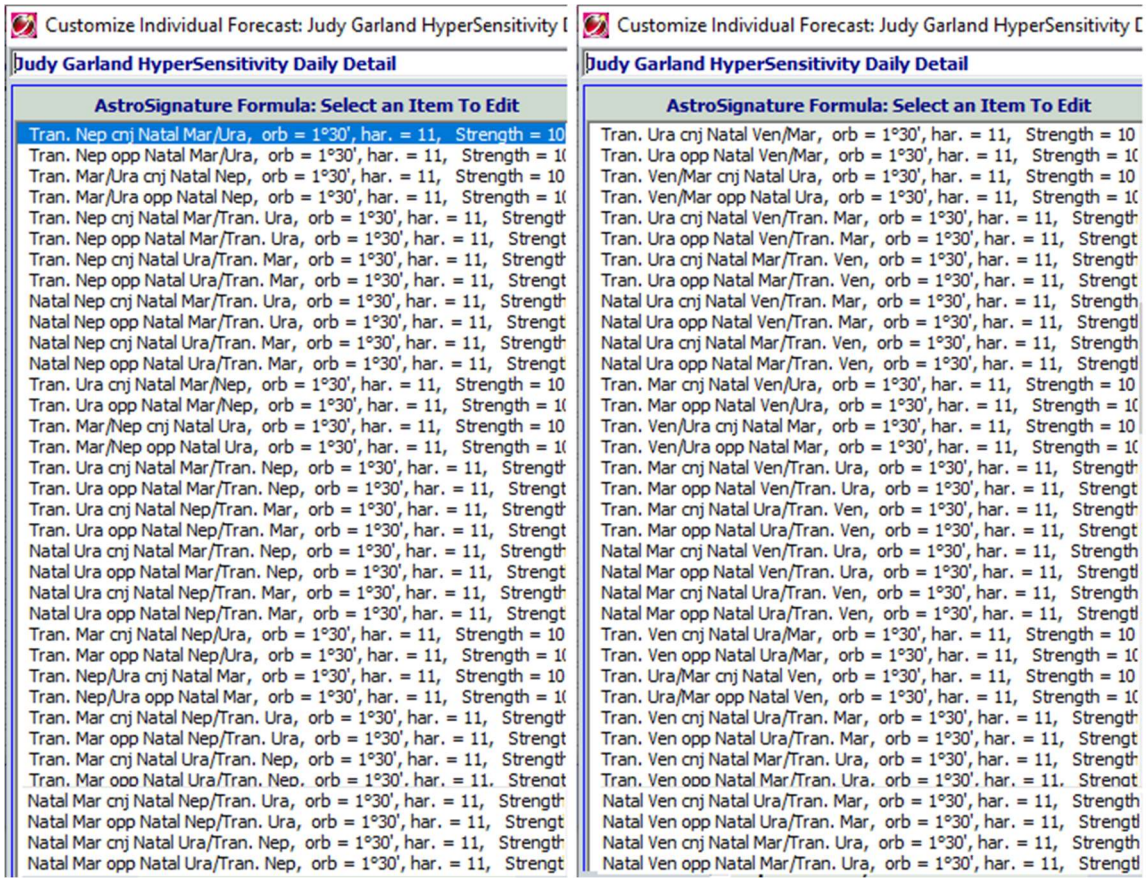

Figure 1. A list of half of the variables that are hypothesized to incline to emotional instability for Judy Garland. This figure is taken from the book *The Astrology of Bipolar Disorder: A Scientific Breakthrough* by David Cochrane

Rather than jump directly to a statistical analysis of the data, a visualization of a forecast of when an episode of emotional instability is likely to occur can help us evaluate how well this hypothetical model works.

In Figure 2 is a graph of emotional instability for Judy Garland that was produced by simply having a software program calculate whether any of these planetary

configurations occurred on a particular day, determining how exact the configuration is, and then adding up the points assigned to each of these planetary configurations on that day. Figure 2 shows two graphs for the prediction of emotional instability for the month of June, 1969. The graph at the top of the figure is a simplified graph in which planetary configurations which last only a few days or removed. The graph at the bottom of the figure includes all of the planetary configurations. Amazingly, the graphs pinpoint very precisely the time when Judy Garland died of a drug overdose. The biographical studies of what happened at the time of her death describe how she was extremely distraught and the drug overdose was largely a consequence of her emotional distress. This graph was created by applying the principles discovered in an analysis of birth charts of people with bipolar disorder. That the principles applied to forecasting work so well increases our confidence in the model. Also, the forecast model is elegant and simple. For example, all of the planetary configurations are given the same weight. We can, for example, given less strength to the faster moving planetary configurations and then the graph at the bottom of Figure 2 would show more clearly the peak at the time of the death, but keeping the AstroSignature very simple for now is advisable and perhaps adjusting the weights of some of the planetary configurations can be done at a future time if future research confirms that this improves the performance of the model.

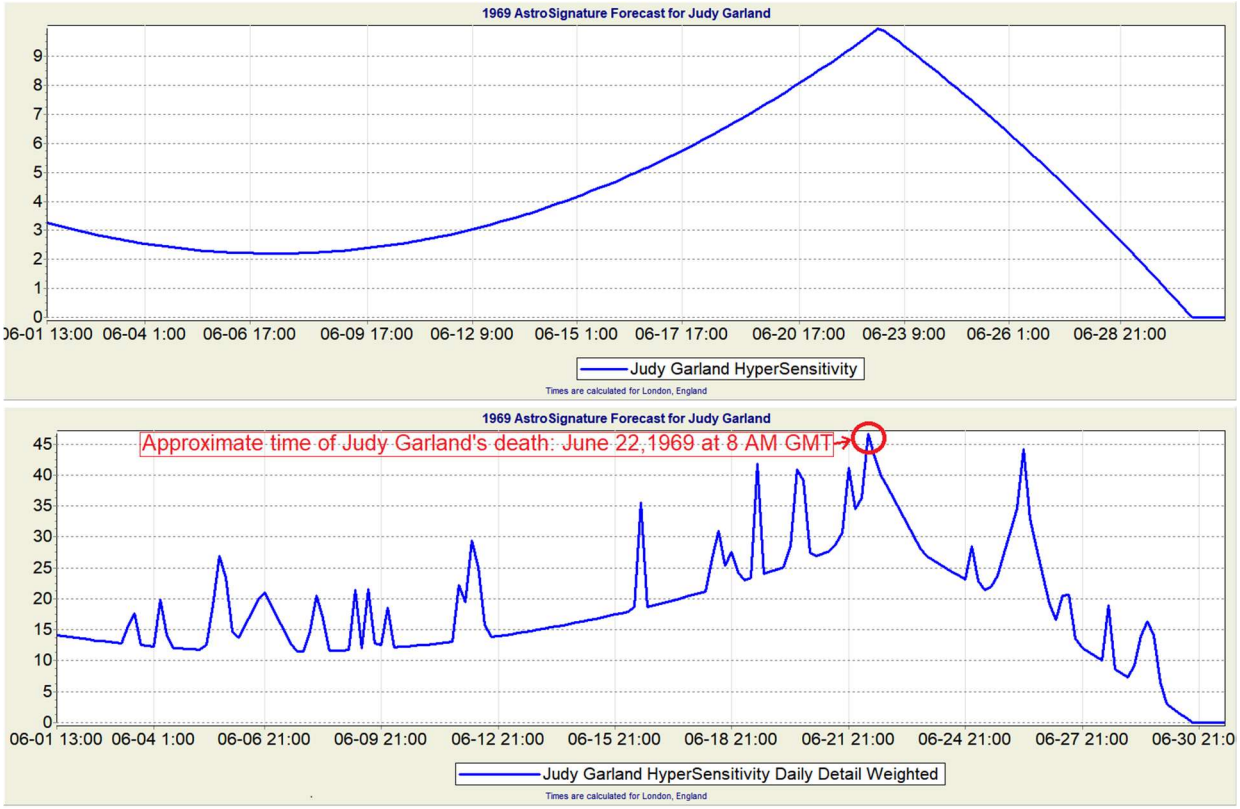

Figure 2. Graph of Emotional Instability for Judy Garland for the month of June, 1969. Taken from the *book The Astrology of Bipolar Disorder: A Scientific Breakthrough* by David Cochrane

Data visualization does not replace tables of actual values and appropriate statistical analysis of the data. The details of the data and statistical analysis are extremely important to determine precisely how well the model works. The data visualization helps us to intuitively appreciate and to understand the way that the data is distributed.

Lastly, it is important to use proper methods for presenting data in a graphic format. There are various visual tricks that can be employed that can make the results appear to be stronger or weaker. To illustrate this point compare the graphs in Figure 3 and Figure 4. Both of these graphs show the same results. Both graphs show the distribution of the Sun in the zodiac signs of 620 astrologers. Both graphs show that Sun in Aquarius is high, and Sun in Virgo and Scorpio is low.

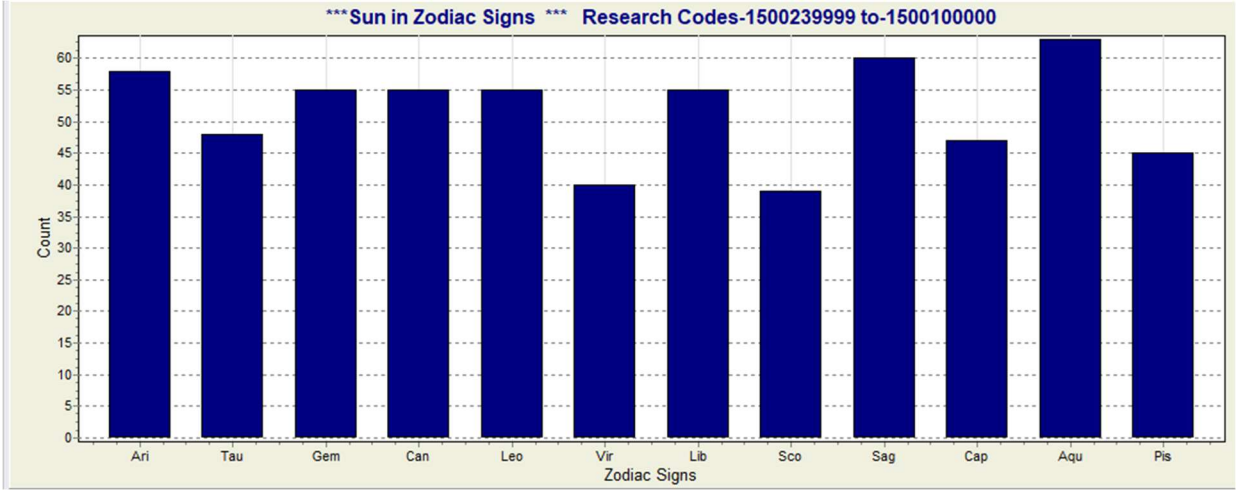

Figure 3. Distribution of Sun Signs of 620 Astrologers with A or AA Data Accuracy. Note that the y axis starts with a value of zero. This graph shows the same data that is in Figure 4, but the results look different.

In Figure 4 the y axis starts at 35 instead of at zero. Some people will see Figure 4 as showing more dramatic differences in the scores than is shown in Figure 4 because, for example, in Figure 4 the bar for Aquarius is several times higher than the bars for Virgo and Scorpio, while in Figure 3 the differences in the height of the bars is less dramatic.

Figure 4. Distribution of Sun Signs of 620 Astrologers with A or AA Data Accuracy. Note that the y axis starts with a value of 35. This graph shows the same data that is in Figure 3, but the results look different.

6. Pearson correlation coefficient of predicted and actual behavior over time: In this research design a line graph of the likelihood of a particular behavior going up and down and a line graph of actual behavior are produced. How well the graph of predicted behavior matches the actual behavior can be calculated as the correlation between the predicted and actual values. This correlation is called the Pearson correlation coefficient. In the case of the deaths of Marilyn

Monroe and Judy Garland, there is no daily or monthly score of how unrestrained and dangerous their behavior was, so this kind of analysis cannot be done quantitatively.

However, baseball batting performance is measured in various ways; batting average, on-base percentage, and the on-base percentage plus slugging statistic. Predicted batting performance and actual batting performance graphs can be produced and compared statistically with the Pearson product moment coefficient. There is software to do this analysis. A team of researchers spent about a year developing an AstroSignature to predict batting performance. The research was discontinued in favor of pursuing other research that was giving more promising results more quickly.

Research on gold prices was also conducted with some success. However, a problem with the gold research occurred. There was limited data, which prevented continued testing and improvement of the AstroSignature with new data.

7. Replication studies: The main goal of a replication study is to determine whether confidence in previous findings can be increased. Replicating an earlier study helps strengthen the foundation of ideas upon which future research will be built. Replication studies are not constrained to serve just the purpose of duplicating earlier results.

Typically, there are some differences in the replication study versus the earlier study. The replication study may suggest additional variables that are important or increase confidence in the earlier study. Failure to confirm previous findings lowers our confidence in the model.

David Cochrane conducted a replication study towards the end of 2023 or in 2024 on compatibility that was done by Professor Kyosti Tarvainen.[10]

8. Quantitative hypothesis test: Quantitative hypothesis tests confirm the association of predictor and outcome variables**.** This research design is the gold standard for all research. In a strict hypothesis test, the researcher states very specifically what the predictor variables are, how the data is gathered, and what

the expected results are. A quantitative hypothesis test gives the greatest confidence. In scientific research, nothing is ever "proven". We only gain or lose confidence in a model based on the findings. Medicine, psychology, and cosmobiology are evidence-based practices that have a body of research and discoveries that give good confidence in some of the models. The successful hypothesis test of cosmobiology variables associated with bipolar disorder is the final crowning achievement in the many stages of research that were conducted on this research.

9. Applications research: Applications research focuses on the feasibility of applying models to solve real world problems**.** Rather than focusing on theory, this research design focuses on real-world applications. In Applications Research variables that have been confirmed with good confidence to have an association with particular outcome variables are used In products or services. An example of applications research is training therapists to use cosmobiology variables to better understand and assist clients. Again, only predictor variables with good support from research should be used in applications. A variation on this research is development of software that produces information in the form of scores and/or text. Therapists, counselors, teachers, employers, and others can use this tool to evaluate and guide clients, employees, and students.

Great care needs to be taken in Applications Research to ensure that no harm is done to others. The Barnum effect is the tendency of people to believe that personality and medical assessments about them are correct even if these assessments are fictitious. Many studies have confirmed the Barnum effect. Some of these studies have determined that the Barnum effect is especially strong for socially desirable traits and for information that is supposedly from particular kinds of assessments.[11, 12] Applications research can appear to be giving useful and accurate information or therapies, when, in actuality, people are simply inclined to give positive responses to particular kinds of statements and therapies even if they are not valid or effective. If researchers take into account potential problems like the Barnum effect, Applications Research can provide new perspectives and insights into understanding how the variables function, in addition to providing useful services for people.

3. The Rapid Rise of Evidence-Based Practices in the Late 20th Century

As mentioned above, Modern Research Methods cover a wide range of research procedures and techniques. In this section of this document, we specify the guidelines for research that are important for the various kinds of research supervised, conducted, or endorsed by the Cosmobiology Institute. Such research should be done in accordance with the principles of an evidence-based practice. Fields such as psychology and medicine are evidence-based practices that rely on research to determine approved methods and procedures for practitioners. The American Psychological Association's policy statement of evidence-based practice states that "Evidence-based practice in psychology (EBPP) is the integration of the best available research with clinical expertise in the context of patient characteristics, culture, and preferences."[1] The best available research is a requirement, and this document identifies the criteria for research. "Evidence derived from clinically relevant research on psychological practices should be based on systematic reviews, reasonable effect sizes, statistical and clinical significance, and a body of supporting evidence." Similarly, the Centre for Evidence-Based Medicine states that "Evidence-based medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients."

The emphasis on Evidence-Based Practice places great focus on using the best evidence to determine the procedures and methods that practitioners should employ. This may sound like a very reasonable and obvious concept, but the concept of Evidence-Based Practice was not introduced until the 1970's, resulting in a growing impact on many professions in the 1980's.

In the 21st century, Evidence-Based Practice is fundamental to virtually all professions that involve mental, emotional, or physical health and well-being. In 1974 Dr. David M. Eddy discovered that medical practices frequently relied on tradition and individual preference rather than scientific evidence.[3] Another problem identified by researchers is the influence of the profit motive to steer medical research in directions that produce financial benefit to companies and this heavily biases findings. In addition to the problem of professionals not using empirical evidence as a foundation for clinical practice is the problem that many of the research methods employed were not effective. Daniel Stufflebeam

describes how U.S. President Lyndon B. Johnson's administration funded research in the 1960's to determine which schools and teaching methods are most effective. However, at that time, "The evaluation technology available in the early 1960's was mainly limited to controlled, variable-manipulating, randomized, comparative experiments; the outcomes-oriented objectives-based approach to determining whether behavioral objectives were achieved."[4] Unfortunately, these research methods failed to reach conclusive findings. Stufflebeam and Zhang explain that ""Experimental designs didn't work in the dynamic world of War on Poverty projects."[5]

The growing emphasis on Evidence-Based Practice throughout all disciplines involved in well-being, health, and psychological assessment throughout the 1980's,1990's and into the 21st century has spurred a great amount of attention and effort on developing effective research designs and tools. The failures that Stufflebeam and others experienced in using the standard research designs of the 1960's have also inspired research methodologists to determine which research designs are the most effective. An additional influence on research methods is the explosion of available databases and software tools to analyze the data. New insights into research methodology fuel dynamic pioneering developments in research in many different disciplines. Some of these innovations are simple and straightforward. The increased use of Extreme Phenotype Sampling in genetics research, and the rapid increased interest in artificial intelligence propelled by the release of ChatGPT on 30 November 2022, are just two prime examples.

With the increased interest in basing medicine, psychological therapy, and other fields on the best available evidence since the 1980's, the rapid acceleration of computer information systems and digital technology, the field of research methodology is also in a phase of rapid development and growth. Given that there are so many researchers focused on their particular area of interest and that there are ongoing rapid developments in research methods in different disciplines, one needs to incorporate insights from several different sectors of the research community to assemble a good list of guidelines. If you are engaged in research, you will notice that the guidelines given below draw upon many different sources of insight into research methods; from classical quantitative experimental designs to innovations in quasi-experimental designs and developments in biostatistics, machine learning and data mining.

Cosmobiology is an emerging new field that is sometimes referred to as Cosmic Cybernetics and sometimes referred to as Evidence-Based Astrology. It is a field that relies on strict criteria for determining the level of confidence that can be derived from research, investigations, and observations. Cosmobiology represents a radical shift in the 21st century. Ancient belief systems have become integrated into a fully modern epistemological paradigm.

The criteria for evidence can be put into an Evidence Hierarchy Pyramid. An Evidence Hierarchy Pyramid that is used in medicine is shown in Figure 5.

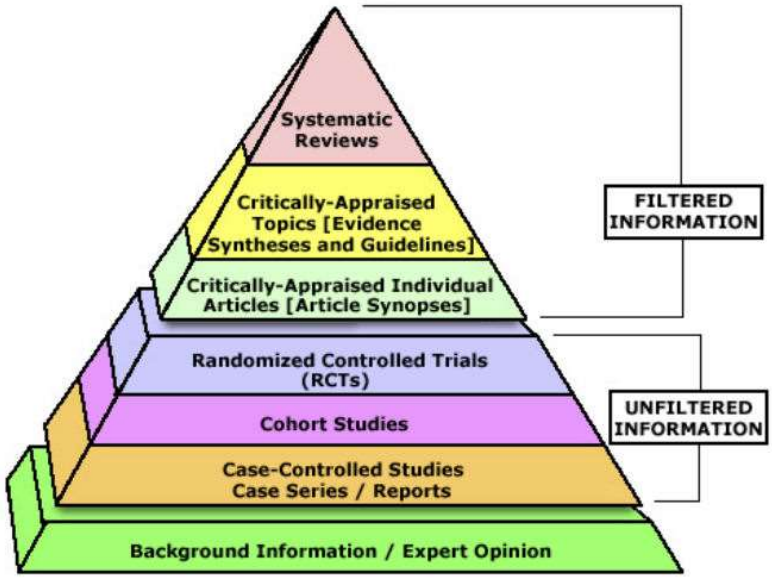

Figure 5. An Evidence Hierarchy Pyramid in Medicine. Source: https://pressbooks.umn.edu/evidencebasedpractice/chapter/evidencehierarchy

Different research methods and procedures are available in different disciplines. In Figure 6 is an Evidence Hierarchy Pyramid for cosmobiology. The Evidence Hierarchy Pyramid shown in Figure 6 can be developed and improved over time, but the essential information provided in Figure 6 is unlikely to change very significantly.

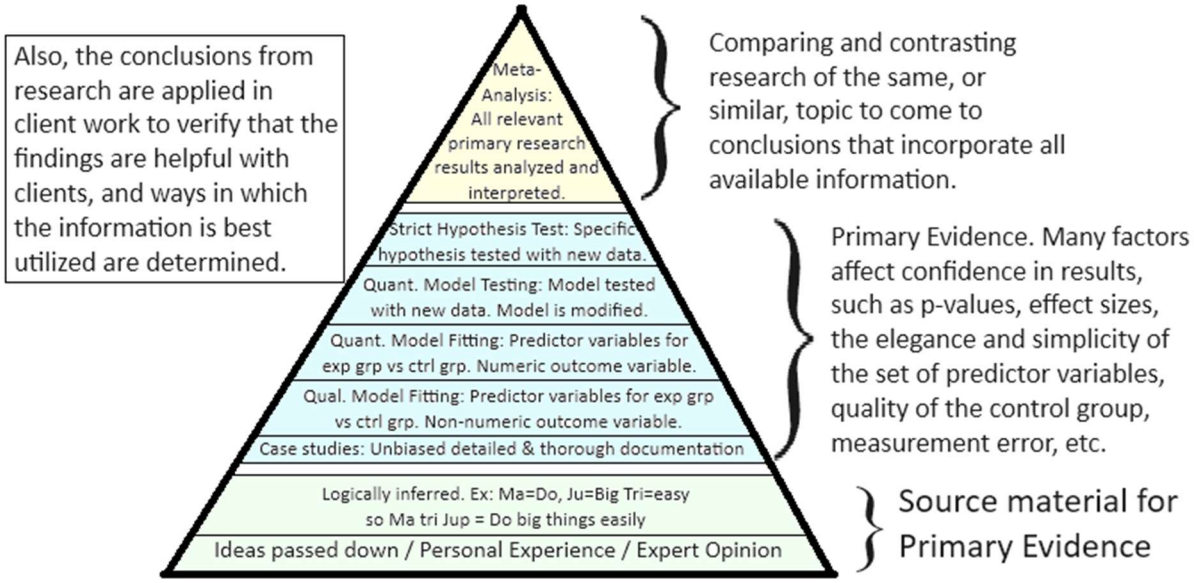

Figure 6. An Evidence Hierarchy Pryamid for cosmobiology.

If you would like to learn more about the development of Evidence-Based Practice, you can watch these 4 videos:

Evidence-Based Practice versus Science, Part 1
https://youtu.be/7ecLbptddkA
Evidence-Based Practice versus Science, Part 2
https://youtu.be/rCNwbVuly50
Evidence-Based Practice versus Science, Part 3
https://youtu.be/SduqGWO7Q3c
How Astrology Works: A New Theoretical Framework
https://youtu.be/2tFr8hNIjWI

4. Questions for Research

If you would like the Cosmobiology Institute to assist with your research, please review the following questions which also serve as guidelines. As a first step in applying for assistance, please email answers to the following questions to the Cosmobiology Institute.

1. State the question that your research attempts to answer. The fundamental question can be stated in a single sentence. If the research attempts to answer several questions, the essential nature of each question can be stated in a single sentence. You can elaborate with additional information. There may also be possible suggestions and indications from the research in addition to the primary question(s) that you can also describe.

2. Where is your research located on a spectrum from pure exploratory research to a hypothesis test? If your research is purely exploratory, it is an early stage of building a model. If your research is a hypothesis test, then your research tests a model. If your research is not a strict hypothesis test, what expectations, if any, do you have for the results of the research? Is there previous research to support your expectations? How rigorous was this previous research? If you have more than one research question, are you applying a Bonferroni correction or other statistical correction for multiple hypotheses?

3. Explain precisely what the data is that you will analyze. How is this data collected? How prone to errors like selection bias is your data? Random sampling is the best sampling method, but in cosmobiology research this is often not feasible. Research is practical, pragmatic, and always conducted within the context of real-world constraints and limitations. Is your data collection method still sufficiently robust for your research to give meaningful results?

4. Describe how the data is modeled. Some issues involved in how the data is modeled are: (a) Is there a known mechanism or a hypothesis for how predictor variable and outcome variables are related? For example, the predictor variables and outcome variables may be related through a set of concepts such as ruling planets of zodiac signs as described by astrologers since the work of Vettius Valens in the 2nd Century AD or according to the meanings of zodiac signs as first described by astrologers in the 20th century, and these meanings are mostly different from the ancient meanings of the zodiac signs. This clarification of the nature of the mechanism or source of the relationship clarifies what the basis of the ideas is. Some people may assume, for example, that the meaning of zodiac signs used in a particular study are ancient when, in fact, many of the concepts were introduced by Linda Goodman and other 20th century astrologers. (b) Why have you chosen these particular variables to study, and why have you left out others? For example, in research that includes astrological aspects, the

researcher chooses what aspects to include in the research. Perhaps the 5 Ptolemaic aspects (conjunction, opposition, square, trine, sextile) are included in the study or perhaps the semisextile and quincunx aspects are included. A theoretical or historical basis for these decisions and the reasonableness of this decision should be included in the study. (c) Are there potential extraneous variables that are not being considered? For example, in research on introversion-extraversion, the age of the person can be an extraneous variable because previous research by psychologists shows that older people have scores that are more introverted than younger people. (d) Are there ways in which variables may interact with each other? For example, having the Sun and Moon in the same zodiac sign might produce extreme qualities of the zodiac sign that are more pronounced than one would expected by from the simple addition of these two variables. (e) Is there a direct connection between predictor variables and outcome variables, or are there intermediate processes that you suspect are occurring that affect the relationship between predictor variables and outcome variables? For example, in research on introversion-extraversion it was found that outer planets in zodiac signs are associated with introversion-extraversion scores, but only because the signs of the outer planets correlate with the age of the person, and it is the age of the person that is the cause of these differences in introversion-extraversion scores.

All of these questions relate to how your hypothesized model works, and the part that the variables play in this model.

5. Related to question #4: In what academic areas are your research designs and methods used?

6. Describe clearly in what form the results will be presented. What is the measurement of variables that may affect the results? How do you determine levels of confidence in the findings? Are there total calculated? Is there a statistical test? How much measurement error is likely? Is there an estimate of the effect size? What level of confidence in the results is reasonable? Is there a control group? Is it possible to create a Shuffled Control Group?

7. In what ways do the reported results give us a better understanding of what is being studied? Given issues like measurement error, limitations of the control group, possible extraneous variables and other problems, to what extent does

your research give us confidence that the research advances our understanding? Keep in in mind that many research projects make only a modest incremental improvement in understanding. Few research projects make dramatic breakthroughs in understanding. It is important to present a realistic assessment of what the likely improvement is in understanding the relationship of variables is.

8. Have you conducted any literature review on this previous research topic? If so, what information is available on the investigative question that you are addressing in your research?

9. Are there any ethical considerations for any part of the research project?

Research must be conducted in an ethical manner. Any potential harm to those included in the study must be avoided. Potential harm may be caused by revealing or exposing the identity of an individual included in the study if the person is still alive or living relatives are affected. Releasing private information, exposure of sensitive data and negative evaluations of individuals studied must not occur if personal harm is a realistic possibility. Researchers must endeavor to the best of their ability to present information as honestly and completely as possible. Hiding relevant information that would cast any doubt on the integrity of the research procedures and research findings must also be avoided. If there is communication with subjects of the study, researchers need to have proper training in consulting skills and consulting ethics. All sources of information must be properly referenced and verbatim quotes properly quoted with permission for use obtained when material is explicitly or implicitly copyrighted.

The following information is quoted from *The Menlo Report, Ethical Principles Guiding Information and Communication Technology Research*, August 2012 (https://www.dhs.gov/sites/default/files/publications/CSD-MenloPrinciplesCORE-20120803_0.pdf)

Principle	Application

Respect for Persons	Participation as a research subject is voluntary, and follows from informed consent; Treat individuals as autonomous agents and respect their right to determine their own best interests; Respect individuals who are not targets of research yet are impacted; Individuals with diminished autonomy, who are incapable of deciding for themselves, are entitled to protection.
Beneficence	Do not harm; Maximize probable benefits and minimize probable harms; Systematically assess both risk of harm and benefit.
Justice	Each person deserves equal consideration in how to be treated, and the benefits of research should be fairly distributed according to individual need, effort, societal contribution, and merit; Selection of subjects should be fair, and burdens should be allocated equitably across impacted subjects.
Respect for Law and Public Interest	Engage in legal due diligence; Be transparent in methods and results; Be accountable for actions. Table 1: Proposed guidelines for ethical assessment of ICT Research.

Table 1: Proposed guidelines for ethical assessment of ICT Research.

Table 1 is from The Menlo Report, page 8. Following Table in the Menlo Report is a detailed description of each of the above 4 principles. The Menlo Report is written as guidelines for Information and Communication Technology Research and some of the language is directed specifically for this context. The principles given in Table 1 above from the Menlo Report and nearly all detailed description of these principles applies directly to research conducted under supervision of the Cosmobiology Institute.

10. Have you identified software and other tools that will be needed for your research project? Can you think of additional tools that can be developed, or need to be developed, for you research project to be successful?

11. What is your personal interest in this research? Why are you passionate about this topic? Does it have any personal significance for you?

12. Related to question #9: do you have experience and knowledge in the topic? For example, if your research is on a physical illness, do you have any knowledge or training related to this illness, health care or medicine in general? If you do not, do you think this can limit your ability to conduct this research?

13. What do you see as the biggest unknowns in your research? Where might the time needed to conduct the research be greater than anticipated because you are venturing into new territory?

14. What is the estimated time that you believe this research will take?

15. What benefits do you see for astrology and additional analytic approaches from your research? Does your research improve our understanding of astrology or related areas? Are there potential applications of your research?

16. Explain how your research is consistent with the principles of an Evidence-Based Practice. This is fundamental and essential for the Cosmobiology Institute.

17. What lineages of astrological systems, research methods and theoretical frameworks is your research aligned with? For example, is the research aligned with principles of Vedic Astrology, ancient western astrology, modern psychological astrology, modern physics, modern mathematical models, neurobiology, modern psychological paradigms or particular ancient beliefs?

18. What are your greatest strengths for this research project and in what areas will you need assistance? What are the most important ways in which the Cosmobiology Institute can assist you? What kinds of technical assistance will be helpful? Would you like to collaborate with experienced researchers? Would financial assistance be helpful? If so, would modest financial support from the Cosmobiology Institute make a significant difference?

19. Have you consulted with other experts in modern research methods? Someone involved in developing the research design should be familiar with very basic fundamentals of research such as confidence intervals, effect sizes, p-values, Type I and Type II errors, selection bias, etc. There are also the many kinds of statistical analyses such as t-test, chi square test, binomial test, Pearson

product-moment correlation, ANOVA, regression, linear discriminant analysis, decision trees, and the list goes on. Before starting the research project, consultation with people who are trained in research methods and have worked in cosmobiology research is essential. A team of several people is very helpful. There are many different issues that can arise in research and even those with expertise and training can sometimes overlook some important issues. With several people involved, oversights are less likely.

20. Research papers will be submitted in APA (American Psychological Association) format. There are many websites that discuss APA format. Here is a concise one: https://und.edu/academics/writing-center/apa-format.html

21. Do you have any thoughts about possible Indications for future research and possible applications of the findings? Until the research is conducted, this may not be entirely clear. However, having a sense of how your research builds on earlier research and can provide a platform for future research is important.

22. Please feel free to add any additional information that will be helpful.

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