STAR MAPS, EARTH CODES:
AN INTERDISCIPLINARY EXPLORATION OF ART AND ASTRONOMY

By

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Abstract:

The objective of this research-based creative activity is to formulate an experimental play that intersects fields of astronomy and art. My goal, in terms of audience reaction, is to provide: 1. A Sense of Wonder (emotional impact) 2. Opportunity for Involvement (physical impact) and 3. Information (intellectual impact) for my audience.

The play acts as a cross-cultural exploratory vehicle, utilized to make connections with the Universe by understanding how sky lore from various ancient civilizations reflect their ways of life. The main inquiry is whether or not I am able to appropriate archaeoastronomical data to create a viable, wondrous artwork for the modern day person to connect with, while conveying scientific information at the same time.

By researching peer-reviewed sources in both archaeoastronomy and art, I was able to come across an intersection—a few subjects of interest unbounded by cultures, religions, time, locations, and fields of study. The end result is the birth of a mixed media theatrical experience that envelops the singular Spectator with sky lore of the Orion constellation told across civilizations, animated by abstract puppets, lights, and sounds.

The puppet theatre structure, which was stationed at UC Riverside's Phyllis Gill Gallery, was open by appointment only from December 5th to December 9th of 2015. The experience was designed for one spectator at a time; although, I allowed two people to enter together by requests. More than 40 spectators experienced the show, and from the end survey with 34 responses, I can conclude with a 96% level of confidence that the Spectator knew more about the Orion constellation after the play (from a scale of 1 to 5) between intervals 4.2 and 4.8. Furthermore, from comments and conversations, I can conclude that interdisciplinary artworks, such as Star Maps, Earth Codes, do have the capability to bring wonder, involvement, and knowledge to the contemporary person.

Keywords: interdisciplinary, archaeoastronomy, experimental art, theatre production
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(Figure above) My father teaching me how to draw
Table of Contents:

Introduction------------------------------------------------------------------------------------------------------------------4
Objective Adam******************************************************************************************************************5
Hypothesis-----------------------------------------------------------------------------------------------------------------------8
Methodology------------------------------------------------------------------------------------------------------------------------8
Research---------------------------------------------------------------------------------------------------------------------------11
Art and Science-----------------------------------------------------------------------------------------------------------------------14
Observations and Insights------------------------------------------------------------------------------------------------------------------47
Potential Implications-------------------------------------------------------------------------------------------------------------------58
Statistical Analysis----------------------------------------------------------------------------------------------------------------------60
Results---------------------------------------------------------------------------------------------------------------------------------64
Post-Show Anonymous Commentaries-----------------------------------------------------------------------------------------------67
Production Notes------------------------------------------------------------------------------------------------------------------------68
Promotional Poster-----------------------------------------------------------------------------------------------------------------------69
Performance Information, Outline, and Script----------------------------------------------------------------------------------------70
References----------------------------------------------------------------------------------------------------------------------------------79
Project Documentation DVD----------------------------------------------------------------------------------------------------------------83
Introduction:

In the West, we often perceive science and art as two sides of the same coin. In fact, according to a thesaurus\textsuperscript{1}, the antonym for "artist" is literally "scientist". When the average person attends a piano concert, he would most likely not be thinking about the possibility of any science behind the harmonies. Likewise, when the average person sits in a physics lecture, chances are he would not be contemplating how these equations on "time" and "space" speak in the artistic sense. It is as if we made Art and Science into enemies.

The more accurate description is not, however, that art and science exist on opposing sides, but that they exist on parallel planes. Furthermore, the two worlds might not be as apart as we think. I have been pursuing this topic for a few years now. Through my investigations, I found people who shared this similar concern. For my last project, Mark-Making, I attended the 2014 ABAI event in Chicago, an international convention for communicating new behavioral research findings. I spoke with an art therapist through an Art Specialized Group, and I was surprised by how many questions we both shared about the gap between art and science. For instance, the art therapist was frustrated by a book written by a behavioral analyst, dismissing art therapy completely due to its lack of scientific credibility. The author claims that since there is no scientific proof that art therapy works, people should not use it. However, the art therapist I talked to told me that it does work—she has seen it help many people. In addition, she said that when she incorporates behavioral analysis techniques, it works even better than art therapy techniques alone. It occurs to me that people in harder sciences often disregard

\textsuperscript{1} thesaurus.com
works done by people in softer sciences. However, Diamond (1987) points out that sometimes topics such as “societal-frustrations” are immeasurable by decimals. Either way, the fact stays that art therapists and behavioral analysts are so segregated, parallel to the worlds of art and science that they rarely communicate with one another. She said that she does not feel like she belongs to either group fully, since she is interested in both fields. That is why she feels a strong need to bridge the gap between the two. What if the two parallel worlds just open their boundaries with each other?

In reality, there is something that gaps science and art: *creativity*. Creativity is much needed in both worlds, since any fields require minds that think outside the box. The well-known TED talk on Creativity by Sir Ken Robinson, *Do Schools Kill Creativity?* astoundingly pinpoints the issue on how education has been built to force students into a mold. It is time for us to remarry the two realms, and this is where my piece comes in. Although there are already other artist-scientists and scientist-artists who have been investigated interdisciplinarity, I would like to personally examine whether or not I can create a work that merges art and astronomy and is educational at the same time. If it were truly possible, what would be the end result? Would I be creating a Pandora’s box that entraps clashing worlds, or a theatre-machine that creates wonder?

My interest in using art as a medium to communicate astronomy cultivated from my own limitations in knowledge on the subject. I must admit that my understanding of the sky is still elementary. I am guilty of being one of those people who often traps myself inside little digital boxes without noticing the rest of the world, enslaved by false-emergencies created by technological stimuli. By the completion of this project, I aspire to be more aware of what is all around us, by thinking outside the box. In fact, there is no
box to begin with. The infinite space that is larger than the life as we know it is unimaginable and frightening; however, the curious minds in history have challenged the limits of human knowledge. I am not trying to connect with the Universe in the way the traditional sky watchers did. I want to do so through my own methods, connecting my own stars. I desired to widen perceptions of the Universe, both my own and others by creating a place for us to connect, breathe, and be mindful of our surroundings.

**Objective:**

My three objectives are to provide a sense of wonder, opportunity for involvement, and information.

1. *Sense of Wonder* (emotional impact): The instructions given to the Spectator\(^2\) as they enter are free-flowing, since rigidness defeats the purpose of the piece. As the Spectator enters, I gave them the choice of going through the tunnel and using the space however they wish. It is not necessary for the Spectator to crawl through the tunnel. Instead, they may enter the theatre through a side door. Once they are inside the theatre, they then have the opportunity to be interactive with the environment or reserved throughout the show. They are free to make the space comfortable for themself. When given this freedom, the Spectator has more control over their personalized experience than in most gallery spaces. The Spectator will most likely feel a sense of curiosity if they choose to crawl through the tunnel, unable to predict what will be waiting at the end of it. The suspense, I

\(^2\) The term 'Spectator' with a capitalized 'S' throughout the paper refers to the singular individual who is the performance’s nucleus. I use the capitalized 'S' to distinguish the key figure from the generalized form of the term.
hypothesize, will exaggerate the sense of wonder once they reach the interior of the dome structure, where most of the layering, distorting, transforming of light and sounds occurs.

The topics of the piece are very grand. The entire structure can be interpreted as a representation of both the human mind and the Universe. The surrounding darkness tricks the mind, making the space seem infinitely larger by misguiding our sense of visual depth. Lighting and sounds create the atmosphere. They are the crucial pieces to creating a wondrous experience. I aim to make the Spectator forget that they are in a small gallery in Riverside. I want the theatre-machine to send them light years away, perhaps even back into childhood, where the child recreates the world in a fort.

2. *Opportunity for Involvement* (physical impact): Spectator participation is vital; they are the nucleus of this work. The involvement of the Spectator is brought forth by the theatre’s design itself. There are plenty of opportunities for interaction between the attendee and the performers. There is no invisible line between the theatre and the audience as in the traditional sense. The theatre is literally surrounding the observer, and the observer gets to interact with the performer and the artistic elements from within the structure. The Spectator and performers have the potential to be in dialogue via sounds and/or gestures.

3. *Information* (intellectual impact): Based on archaeoastronomical research, the piece is an assemblage of cultural observations and lore surrounding the Orion constellation. The information originates from peer-reviewed articles and conversations with Dr. Mario De Leo-Winkler and Dr. Gabriela Canalizo, my mentors in astronomy and physics. I aim to
deliver information about archaeoastronomical and ethnoastronomical findings through both nonverbal and verbal means, via abstract visual elements and dialogues.

**Hypothesis:**

The principle question I ask in this investigation is: can I use archaeoastronomical data to create a viable, wondrous artwork for the contemporary person to connect with, while conveying information at the same time? I chose to focus the topic on the Orion constellation due to its cross-cultural references. Since it is easily identified in the night sky, three bright stars in a straight line, Orion is one of the most well-known constellations. By exploring the connections both traditional and modern sky watchers have with this constellation, I can gain valuable information about human civilizations' perception of the night sky. When I finally created the three-dimensional structure of the Orion constellation, I realized that our perception of the Universe and our conception of reality could be transformed as easily as I could shift my theatrical Orion structure. That realization was both enlightening and terrifying, because this fact may indicate that what we think we know can be easily dismissed or altered, despite the methods we used to achieve that knowledge. This theatre allows us to take a break from trivialities, be more aware of the present, interconnect among one another, be in-tune with the Universe, and understand ourselves by finding the links within cultures, time, space, art, and science.

**Methodology:**

The overall process is to, first, investigate ancient sky watchers' connections with the constellation, second, understand the dichotomy between art and astronomy, and third,
explore modern spectators' associations with the Universe, utilizing interdisciplinary methods.

By analyzing various cultures’ primitive tales, cosmic records, and rituals relating to the Orion constellation, I get a glimpse of how various human civilizations in the past connected with the sky, specifically how their reminisce of translated sky lore reflect different social structures and ways of life.

I have one claim when it comes to the dichotomy between art and science. I believe we, as individuals and groups, are all connected with one another and with the Universe. Both seekers of truth, artists and scientists use various methods and ways of exploring the truth.

Throughout the entire process, I was constantly taking an advice from the book Art and Fear by David Bayles and Ted Orland. While working, I was constantly mindful of balancing imagination and calculation. I had to merge the two, but like the book said, "it's a delicate balance. Lean too far one way and your head fills with unworkable fantasies, too far the other, and you spend your life generating 'TO DO' lists" (Bayles, 35). I found tremendous truth in these words. In my past works, I usually begin by researching topics of interest, and then I find ways to link those ideas with imagination by creating multiple draft ideas. Repetitively, I conclude by sorting out what is mine and what is not. My drafts become my mind-map. The calculation and planning come after I pile the table with all the ideas. Sometimes, it was difficult, but necessary, for me to gut out great ideas, in attempt to make a coherent work that is clear and authentic. To do that, I have to make two sides of my being, the dreamer and the thinker collaborate. Once I
manage to tame imagination and calculation, art and science, then, my new friends can aid me to express wonder.

The audience I targeted represents the modern, sophisticated, western, and educated, the people influenced by mass literacy. The following is what I wish to investigate in terms of reactions: How does learning about traditional groups' perception of the Orion constellation make the contemporary viewer relate to their own perception of it? How do they relate themselves with the sky? What do they think about "experiencing" new information? Do they perceive this experience through Astronomy or through Art? Or perhaps through both—Archaeoastronomy?

The question is, why tucking the piece in a cranny of the UCR Arts building? Why not open the theatre to everyone who happens to pass by in the middle of the streets; why not to kids at a school? The main reason is that I want to communicate with people within a setting where interdisciplinary-learning has already been implemented. An ideal art gallery is one without a focused discipline, since art topics are boundless. Therefore, Phyllis Gill Gallery in University of California, Riverside becomes the most appropriate location, where people from various disciplines can be gathered. By stationing the work at the University, I receive a pool of potential spectators from ranging fields of interest. Of course, a more obvious reason the theatre-installation is placed here is that it is indeed an art piece. My audience members find their ways to the planetarium theatre through their own connections; perhaps something about the ideas or images led them to RSVP. Once they find their ways into the piece, I aim to hold on to their curiosities and exchange conversations on a disciplinarily diverse ground.
Research:

In the beginning of our conversations, Dr. De Leo-Winkler and I focused on looking into the origin of astronomy in cultures around the world, not limited to the Greeks. I did not even know a term existed (archaeoastronomy) for the study of prehistoric cultures' astronomical knowledge. I simply wanted to know what their relationships with the sky were like, such as what it was like having the stars being the main spectacle night after night, observing the sky with bare eyes without any viewing instruments, city lights, or digital devices. What made them want to pass down stories about the constellations throughout the generations? What was subjective and objective about their observations? What did they see in the sky, and what does that say about their collective relationships with the Universe? Dr. De Leo-Winkler's role is to supervise the accuracy of scientific data behind the work, and he has supplied me a generous amount of peer-reviewed astronomical readings and knowledge on astronomy. I was intrigued by the truth behind astrology and how so many people still believe in it. However, most of all, I was surprised by my own ignorance for barely understanding why astrology is now considered pseudoscience.

The initial questions, which got me started on this investigation, are: Why did the ancient shamans, politicians, travelers, hunters, farmers, and sky-watchers study the sky? What can the sky provide them that the Earth cannot? Since I cannot directly interview them with these questions, the next thing I could do is to speak with the two astronomers I do have access to. What got them to begin their studies of the sky?

Dr. Canalizo questioned the opposite—why wouldn't one want to learn about the Universe? It is such a grand place we are a part of, and there are endless topics to
discover out there. How could anyone not be curious? A motivation that linked both Dr. Canalizo and Dr. De Leo-Winkler in their field is its aesthetics. The Universe is breathtakingly beautiful. For sky watchers before the invention of the telescope, they only had their naked eyes to rely on to observe sky phenomena. Their view of the night sky without modern pollution is most definitely amazing; however, telescopes opened humanity's understanding of the sky beyond our imagination. Growing with the technology of photography, the Universe continues to prove itself to be more and more magnificent than we have ever conceived. I might add that fact is indeed beautiful, but also haunting. It haunts me to know that a smear below the Orion's belt is the same as that visual of the enchanting nebula, where stars are being born, and that a little plate-shaped spot in an enlarged photograph is a whole other galaxy, a whole other "Milky Way". It is haunting how insignificant we can feel in comparison to all that is out there. Dr. De Leo-Winkler says the frustration lies in the fact that he can never touch the celestial objects. He can observe, but can never interact with them himself. Astronomical equipment is now essentially an extension of the bodies of astronomers. Like cameras to photographers, equipment aids our limited human vision, and all the modern research data and our current knowledge of the Universe are now inseparable from technology. The evolution of astronomical equipment can aid us in finding more and more about what is out there, but it can never make us into Gods. That was when I began to wonder if perhaps the ancient sky watchers with their naked eyes had more of a connection with the Universe than us with our sophisticated telescopes. Modern people in populated areas are living in rapid speeds and trivialities, and the average person is much more drawn to
bright screens and artificial lights, rather than the sky polluted above. I want to make that connection again with the sky by bringing the sky closer to people down here.

With Dr. De Leo-Winkler's assistance in fact checking and educating, I created a list of connections between the astronomical papers and decided to engrave an actual celestial map into the external dome structure, a 360º band of celestial objects surrounding the Orion constellation.

The stars in the external geodesic dome that is the sky are based on actual stellar maps—hence, the name of the play, Star Maps, Earth Codes. Dr. De Leo-Winkler provided me a celestial map (See Figure 1). The dome is drawn and drilled from -40°00' to +10°00' of latitude of the chart in ecliptic coordinate system as seen from Riverside, CA. I flipped the chart horizontally, enlarged the cropped section, and wrapped the paper around the dome. This way, the constellations would be estimated in their place. The star spatial relationships at the lid of the dome have smaller ratios than those at the lower supports of the dome. Instead of viewing the Orion band from any particular location on the globe, the perspective of the Spectator would be from Earth itself.

Enclosing the body of the singular Spectator, I built a copy of the sky that is an extension of the Spectator's and the Earth's body. Perhaps, this can allow the Spectator to be quiet, be still, and feel whole again. Perhaps in this environment, people will start to pay attention again to what is all around us. This is where the artistic role of the experimental hybrid comes into play. Before I go deeper into that, I wish to first examine further the connection which binds the worlds of art and science together.
Figure 1: The external dome, that is the sky, is drawn and drilled from -40°00' to +10°00' latitude of ecliptic coordinates.

Art and Science:

There is one fundamental feature that solidly connects [Art and Physics]. Revolutionary art and visionary physics are both investigations into the nature of reality... While their methods differ radically, artists and physicists share the desire to investigate the ways the interlocking pieces of reality fit together. This is the common ground upon which they meet. (Shlain, 1991, p. 16)
According to Shlain (1991), Physics is the base of all sciences, including astronomy. Therefore, I agree with Shlain that the interdisciplinary study of astronomy and art is connected by the individual’s rigorous attempt to understand the forces of the Universe. In fact, in Joseph Cornell's (2002) biography book, Cornell’s fascination with the cosmos and birds led to his intuitive piece about birds’ flight paths matching the paths of the stars clearly demonstrates how art and science can be interconnected. Scientific American later verified Cornell's intuition in the article “The Stellar-Orientation System of a Migratory Bird” by Stephen T. Emlen (1975), which provides astonishing proof of songbirds utilizing star positions as cues for direction during migratory seasons (p. 107).

Cornell is known for being a pioneer of *assemblage*, a form of art-making involving the gathering of unrelated or found objects. Picasso is also another famous example in this area. The Surrealists often heavily influence his works, but more importantly, his assemblages are guided by both academic discoveries and his own intuition. Although Cornell is sometimes associated with the Surrealists, he didn’t consider himself one. The end result resembles an educated guess of the world. In Emlen's (1975) article, the indigo buntings were in funnel cages under a controlled planetarium while ink track measured the direction the bird attempted to travel in the funnel. An experiment, which ran with all stars in the planetarium turned off, caused the indigo buntings to hop randomly. This result suggests confusion in the birds without their main directional cues: the stars. Further experiments also proved that the birds indeed use the planetarium stars as their map, even when the stellar information was altered (p. 6). Experiments noted in the article suggest that birds orient themselves not only through a

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singular source, but they also use a combination of Earth’s magnetic field, wind, sunset’s direction, landmarks, and even other birds' calls as sources of information (p. 11). Although the stellar-orientation system is only one of many sources in which the birds reference in their position, it still intrigues me how Cornell was able to sense the birds’ connections with the stars through art-making activity, even before the article came out.

Many advocates of science may find the "parallel vision in exploring nature" thesis unconvincing and flaky. They may claim that art is closer to pseudoscience than science since it begins with objective observations but concludes with infinite possible interpretations. Emotions play a critical role in art in most cases, so it is not the best at withstanding sustained scrutiny. Science, on the other hand, attempts to stay as closely to objectivity as possible when in search of the truth. That argument is indeed justifiable to a certain degree, but it is worth noting that our knowledge will not reach absolute truth.

Everything we know is influenced by human perceptions and experiences. Therefore, in a way, art and science are both subjective thinking, in which our entire encyclopedia exists within our minds. Furthermore, my goal here is not to inquire which of artistic approach and scientific method is the better experiment process. Instead, I am investigating how the two fields can work together to amplify the achievement, and what would be the result if we find a way to combine the two ways of thinking.

Cornell's confirmed intuition is not the first instance of artists having included in their works “features of a physical description of the world that science later discovers” (Shlain, 1993). As we look back in history, artists have been introducing elements of symbolic communication that were ahead of the time for scientific ways of thinking.
Similar to the strange link between Cubism and physics⁴, there are multiple famous accounts of art and science parallels throughout the course of history. Like what Dr. Temple Grandin (2013) wrote in her book, The Autistic Brain, "the math doesn't even have to exist yet." Musical scholars often uncover composers such as Chopin to have written "music that incorporate forms of higher-dimensional geometry that hasn't yet been discovered." Likewise, in visual arts, physicists late observed an almost indistinguishable match between Vincent Van Gogh's paintings of starry whirlpools to Kolmogorov’s statistical model of turbulence flow in liquids. Van Gogh painted these pieces in the 1880s, while he was at his most psychotic stage of his life, yet the mathematical formula was not discovered until the 1930’s. Are they all coincidences? I beg to differ. Robert Hughes claims, “The essence of the avant-garde myth is that the artist is a precursor” (Shlain, 1991, p.145). The roles seem to be as if art prepares the society, while science reassures the society. Consequently, the reason for the dismissal of artistic practice is that the psyche of society’s majority is not yet able to comprehend.

I must clarify here that I do not suggest that art-making process is wholly intuitive and that the artists predicted the future purely through instinct. In fact, according to Asher, art practice is typically based in research, as subjective thinking is usually discouraged in art practice. Therefore, I do not wish to position the artists and musicians I mentioned earlier as savants, since they are also capable of scientific endeavor.

With that said, I find further need to link artistic activity with scientific research. Boiling down to the bottom is the essential, epistemological question of: How do we know the world? By studying both traditional and modern astronomy, perhaps I can

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uncover elements in the ancient stargazers’ stories that drew connections avant-garde to even modern thinkers. I choose to focus on examining the constellation of Orion due to the fact that these stars are the stellar groups that have attracted the curiosity of almost all human civilizations from nearly all locations on Earth, both young and old.

The archaeoastronomical articles, which examine ancient sky lore by those who gazed up at the stars and planets everyday with their naked eyes for thousands of years, made me consider the possibility that perhaps the traditional stargazers saw something those of us who live in dense populations could not have today, even with all our technological advancements. Perhaps, because of the technological inferences and light pollution, our contemporary lives are like the inflamed moths in Stan Brakhage’s film *Mothlight*—we no longer orient ourselves by the moon and cannot stop flying towards artificial lights, heading towards self-destruction. Stan Brakhage’s *Mothlight* is now considered an essential avant-garde masterpiece. It consists of actual moth wings and specimen placed on transparent film reel and directly onto the projector. This piece is one of my aesthetic influences, as I am attracted to the raw, sentimental, and abstract qualities of the aesthetics, which perfectly capture the reality of the moth’s tragedies, re-animating the inanimate, bringing the dead back to life in a tragic, gruesome, yet delicate way. Brakhage suffered from depression while making this piece, which is caused by his life-obsession with making films while his children starved. His methodology includes painting on 35 mm filmstrips, using chemicals with artificial and natural found objects, and using light projection directly with filmstrips to create organic forms. His aesthetics are raw, sporadic, lush, morbid and exquisite at the same time, speculating that we receive glimpses of moth corpses from time to time. These are the sensations I wish to
deliver to my audience through my dome structure. Perhaps, I am looking for methods that can be used to bring ancient myths back to life.

![Figure 2: An initial brain-map of my influences. Several visible aspects include: animal communication, Emlen's birds, celestial maps, moon-earth relationships, Stan Brakhage in his workspace, and a list of contradictions from the table of contents of Shlain's (1991) book: Art & Physics.](image)

As I have suggested before, perhaps like Brakhage's moths, we have been seduced, hypnotized, mesmerized by man-made lights and screens to the point that we have been thrown off-balance. In one of the articles, Javanese peasant farmers in Indonesian tribes are able to know exactly when to sow and harvest their wet rice, using their solar-stellar calendars (Ammarell, 2014, p.12). Yet today, the stars in our daily lives are no longer guides to many of us millennials. Those who check the cosmic calendar are few. Before we invented movies and the Internet, stars were the greatest show on earth. Now, most of us do not even bother to look up. Is this more pitiful than Emlen’s
migratory birds stuck in their funnels without star cues? Maybe it is time to look back at the words of our ancestors, and try to re-experience the old ways by deciphering possible codes in their sky lore. This interesting occurrence of code-breaking can be observed in the visual sound piece by scientist-artists of the Smithsonian, “Sound of Stars”, which showed at the African Cosmos Stellar Arts Exhibition in 2012. Dr. Elisabeth Guggenberger from University of Vienna, Austria managed to process ultra low frequencies of the star RR Lyrae into sound through a real-time cymascope, and it just so happened to match the spiritual rhythms of the West African Dogon tribe, which can be heard in a documentary. The West African Dogon people use a swirling instrument to emulate the sound of the "Dark Star," an important aspect of the tribe's spiritual system. This particular piece is also fascinating in terms of its technicalities: the methodology of translating stellar pulsations into audible octaves. To do so, Dr. Elisabeth Guggenberger sped up the long cycles of extremely low frequencies. This resulted in yet another peculiar example of intuitive thinking—in this case, by people of the Dogon tribe—matching the hidden codes of the Universe, which was proven later by scientific discoveries. Of course, the match between the African tribe and the stellar sound piece could be a coincidence, but what if it is not? What if it is yet another example of how subjective-thinking once again preceded the act of proving through harmonizing with a pattern or a subject of interest which was not previously there or thought of?

It could be that the ancient astronomers, like the West African Dogon people were more in-tune. Although, modern civilizations have more complexity in the language

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6 In Search Of The Dark Star the Dogon AFRICAN TRIBE sirius planet star x. (2012). Retrieved January 14, 2016, from https://www.youtube.com/watch?v=g0oiYB5JQAg
systems, which replace our abstract thinking with literal thinking as we become more verbal, our inner connections appear to be less harmonious with the Universe. Therefore, this project aims to re-examine the myths told by the ancient astronomers, not so much in form of research language, but mostly through abstract images, gestures, sounds, time, and space. The goal is to learn the information, as an infant would, by first using abstract thinking then replace with literal thinking. Utilizing facts and findings of modern astronomy, we can gather assurance in the authenticity of the experiences and reconnect with our innate senses by tuning-in to the ancient astronomers’ more mindful means of communication with the great unknown.

Again, my method is to combine the diverged ways of associating with information. According to Shlain (1991), in *Art and Physics*, "the physicist ... sets out to break "nature" down into its component parts to analyze the relationship of those parts ... [while] The artist ... often juxtaposes different features of reality and synthesizes them, so that upon completion, the whole work is greater than the sum of its parts" (p. 16). In other words, the methods of the scientist and the artist may differ, but they share similar characteristics and they both end with new information about reality. Learning from methods of both disciplines, I will construct my work by, first, "breaking down" segments of archaeoastronomical data, second, by "analyzing the relationships" between them, third, by starkly contrasting elements of my research analysis, and finally, by reassembling the information into a unified design, including but not limited to: script flow, scene, character, lighting, sound, verbal audio segments, the puppet segments, and performance. The tone and style of the final assemblage will be appropriated to my findings.
It is worth mentioning that since many of the cultures I study have oral traditions, misinterpretation and mistranslation are already within the readings. For example, in Trevor Leaman and Duane Hamacher’s article (2014)\(^7\), aboriginal oral stories were transferred to Daisy Bates, who was more knowledgeable in anthropology than in astronomy. Their interactions may have resulted in bias, such as when speaking to the wrong person of a tribe, when mistranslating verbal traditions, or when being filtered eventually by the article’s authors. It is true that the articles could indeed be skewed after surviving through layers of language filters. However, on the bright side, without these articles, the rich sky lore would not have been made available to us in the first place. The stories would have been lost forever as, according to Medupe (2004), many oral traditions have already been in Africa right now.

My art mentor, Asher Hartman, also mentioned that cultural understandings can be stationed on misunderstandings. I should add that layers of distortions also affect our understandings: "Unconscious instinct, psychological motivation, linguistic distortion, cultural prejudice" (Martin-Smith, 2008). Consciously or subconsciously, these aspects morph and distort every person's perceptions. My work is the result of layers of strangers' perceptual filters, wrapped in context within context within context. Therefore, I keep in mind and welcome all the loss in translation and the misinterpretations the sky lore went through to get to the final article forms, which I have digested. I attempt to capture the overall sense of the sky lore and their relationships to one another to the best of my ability. Transitional qualities of the original tales themselves make an interesting topic for artist inquiry, even though this subject plays only on the side of my investigation. I accept these transitional qualities as an unavoidable part of my own meditative practice of cuing to the traditional storytellers' relationships with the Orion constellation.

The modern world is constantly “plugged in” and everyone can be a self-described photographer, writer, or painter. Where is contemporary art moving toward? Has the art world become more of an ironic mess of overflowing data moving towards virtual collective consciousness? I originally wanted to focus on technology in astronomy as my major topic, and how technology affected our mental processes today in understanding any new astronomical information. After listening to Asher's advice, I decided to switch to analogue. Technological influence is certainly an interesting topic,

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but it has been overplayed and may overwhelm the focus of my investigation. In addition, the Spectator is indifferent to anything digital because contemporary people are becoming extensively comfortable with it. If I attempt to create a sense of wonder through technology, I would have to have access to very sophisticated methods since today’s viewers are not easily impressed by technology, given the technology they hold in the hand daily.

The contemporary art market influences much of the art world that it substitutes the concept of “movement” with the concept of “trend”. Asher points out that since movement implies a sweeping intellectual concern, so it is debatable whether that can happen any time soon. Therefore in the end, I decided to not worry about categorizing art movements and just let my ideas flow. Art evolves naturally with societal needs anyway, building upon the mistakes, achievements, wisoms, and innovations of what came before. There are of course other artists who are also interested in merging with science as in the current interest in transhumanism. Mine is just one of countless subtle steps towards that giant leap. When a new art movement is ready to happen, it will.

That said, I began referencing various installation methods in order to build the intended Spectator Experience. Once again, my objective, in terms of audience reaction, is to bring the contemporary viewers a sense of wonder (emotional impact), opportunity for involvement (physical impact), and information (intellectual impact). Since my topic rests in nature, I looked into Earth art, an art movement that intertwines art-making and landscapes. *Sun Tunnels* by Nancy Holt (1976) captured my interest as Holt also worked with astronomers. Her work, like mine, also investigates perceptions of time and space. This particular work consists of four large concrete pipes in a desolate location. She
embedded small holes into the tunnels in order to direct the observer vision to her curated asterisms. She sized the holes by magnitudes of the stellar objects. I was surprised at how similar this concept of bringing the stars down to earth was to my own. My original blueprints illustrate how the tunnels work with the piece as well. I intended the Spectator to crawl through the space on their hands and knees as an infant would before they learn to walk. It is to bring out the Spectator's innate senses, preparing their physical awareness for the development of the "brain" segment of the theatre-machine.

Even throughout the construction stages of my work, I kept discovering intriguing coincidences, such as the shared qualities of my structure with Holts' tunnels. For instance, I constructed a miniature of my theatre to show my mentors after feeling well invested in my design. Asher pointed out that the structure itself reminded him of Integratron, "a resonant tabernacle and energy machine sited on a powerful geomagnetic vortex in the magical Mojave Desert." I immediately booked a sound bath session there to see the structure in person. The most bewildering part about my theatre design matching the structure of Integratron is that the latter was controversially a site for conducting extraterrestrial research. The owners of Integratron even marketed the structure as a site of fusion for science and art (and magic). 9

Another mind-boggling coincidence was found in Slotegraaf's (2013) article on sky lore from sub-Saharan Africa, he translates that "a widespread African concept is that the sky is a solid dome, perhaps made of blue rock, resting on the Earth, upon which the sun moves. The stars are holes in the rocky vault that is the sky" (p. 62). It was shocking

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to read about this blue stone vault. It felt as if Slotegraaf translated exactly what I had envisioned for the planetarium.

![Diagram of a stone vault](image)

*Figure 4: A visual comparison between my doodle for the planetarium (below) and my replica of an illustration of a well-known African notion in Slotegraaf's (2013) article (above).*

At first, I was stubborn in attempting to bring a vision of mine to reality, even though the budget, time, and people's commitments did not match up. Asher shared references to clever theatre concepts and techniques. One that stood out was Pepper's Ghost Mirror, named after the demonstration scientist, John Henry Pepper. This strategy is a cheap but effective magic trick, dated from the 16th century, utilized mainly to entertain customers. The viewer would see a ghost appear out of nowhere with the assistance of proper lighting and a hidden room perpendicular to a special glass acting as
a see-through mirror in the dark\textsuperscript{10}. Reading about such techniques in theatre design opened my eyes to possibilities and pushed me into strategizing how to utilize the limited space and resources to their maximum potential. Dr. De Leo-Winkler also agrees that a high-concept, low-budget work is much more interesting than a low-concept, high budget work. I saw truth in their advice and took it, and I knew exactly who to study from—the Brazilian visual artist, Hélio Oiticica.

Oiticica's works are vivid in aesthetics and are highly conceptual. A producer of intermedia collective activities, Hélio Oiticica, in his Cosmatoca "Block Experiments", focuses on building a new society powered by free people. Like Flux\textsuperscript{11} works, each room has its own agenda for spectators to participate in. Oiticica’s activity rooms are the "building blocks", where participation is crucial for the work, or "community", to come to life. In another example, his other work, "Nests", which was funded by Rockefellers in New York, provided a place for sensual experiences to be felt. The "Nests" are segregated cells, made comfortable by materials such as newspapers. My work, as works by Oiticica, contains open instructions. I gave the Spectator choices—to crawl through the tunnel or move straight into the dome. Moreover, they are also free to use the theatre space however they wish. Some participants sat up, some laid down, some tapped on the glass of the inner dome in response, some played with the cow-bell, while others chose to not participate in climbing through the tunnel and went straight into the theatre from the side. Those are all noteworthy reactions. It is true that occasionally, open instructions may lead to controversies, such as in the case of Oiticica's "Nests". When the funders provided a walk-through of the exhibition, authorities witnessed illicit acts. Though at

\begin{footnotes}
\item[11] Fluxus is another art movement that is diverse in disciplines. It is where artists, musicians, poets hold “events” or happenings, which typically contain anti-art or anti-commercial aesthetics.
\end{footnotes}
times uneasy, I hold the belief that open-instructions are still necessary steps in breaking the spectator-performer boundary. Active involvement of my Spectator celebrates the destruction of the rigid atmosphere found in most traditional galleries before the late 70s. The theatre direction must take its risks, as fixed instructions defeat the purpose of the play. After all, *opportunity for involvement* is one of my main objectives for this production.

As an ambassador of two fields, I am seen as a translator between our language system and pictorial representations. Therefore, the performance flow of *Star Maps, Earth Codes* naturally oscillates between the signifier and signified. After each abstract segment, provided by the performers and puppets, all inner light sources turn off. The Spectator's eyes then adjust gradually to the celestial bodies, which are illustrated by a light source shooting through arranged holes from outside of the geodesic dome. A short dialogue of pretend astronomers will then inform sky lore that the earlier abstract puppets were referring to. In my writing, I have to think carefully about wordings. After all, I am creating a work about mythology, cultures, and portrayals of these cultures. I do not wish to risk generalizing about various cultures as some people may rightly take offense to these generalizations. By inserting language after the abstract images, I aim to help the Spectator digest the visual information during the show: the abstract puppets, the puppeteer, and the movements. Literal-thinking takes over the abstract images, and the information will be learned after being in the presence of the ancient sky lore. This way, they will be able to first indulge in the experience and then learn the sky lore through an unconventional method. I can use this method to organize Spectator's perceptions, and we can interlock pieces of reality together. Hopefully, the method of juxtaposition will give
us a hint in my investigation. In order to make the oscillations feel natural, I have to strategize in how to direct the Spectator Experience. In other words, how do I provide a sense of wonder, opportunity for involvement, and information without making the Spectator feel physically uncomfortable in the planetarium-theatre?

As a scene designer, my task is to harmonize the elements of the play. The structure of the theatre is like a sculptural form, a still life. The play's setup is partially inspired by Emlen's (1975) indigo bunting experiment. In a similar role, I am observing the reactions of the Spectator inside my own planetarium. The theatre mechanism is also influenced by the planetarium show at Griffith Observatory and, later on in the project, Integratron, a place built for extraterrestrial research (another case of strange coincidence in my design). In the making of the blueprint, I also studied Omni art, which is an art movement that aims to merge science, consciousness, and art through the exploration of five dimensions of human experience. My Omni art and sacred geometry investigation helps me gather tools to stimulate the psychological state in the Spectator suitable for the intended purpose of the play. First of all, my lines are what make the machine feel alive. The silhouette of the form caused by the light sources are curved in the larger picture, but the detailed form consists of sharp, angular lines, like an origami creature. The result is something geometric, yet organic: irregular, yet technical and calculated.

Second, the composition of the stage is balanced with the arrangement of various elements, differing greatly in the way they are received. The piece contains, in a way, two stages: exterior stage and interior stage. As the Spectator first sets step inside the gallery, he sees the large caterpillar-like Machine, which dominates the rectangular space. He will be entering the Machine in order to receive his experience. Next, he crawls into the body
of the "caterpillar" and becomes the "food" of the play as he enters the Machine. The tunnel is full of darkness, like a black hole consuming the Spectator. The two red trails of light on the sides of the tunnel guide the way of the Spectator, while aiding in bringing out their instinctual, primitive psychological and physical senses. According to Susana Martinez-Conde and Stephen Macknik (2014), the color red acts as a psychological enhancer. Various tests in the Scientific American article concluded that drivers react quicker to red cars, bulls are more drawn to red capes than blue or green capes, and men see women in red lipstick as more attractive. I found these results fascinating and decided to utilize this finding to lure my visitors in with this powerful but subtle emotion enhancer. The tunnel is designed to make the Spectator yearn to find out what is hiding in the unknown—in other words, to intensify their innate human curiosity. When the Spectator finally reaches the dome section of the insect-device, or the "head" of the Machine, the Spectator becomes, quite literally, the "brain", the energy source (imagination) that makes the play come to life. The mind of the Spectator and the mind of the Machine interconnect, as the Spectator becomes the ghost in the shell, the soul inside the machine, formulating their own experience of the performance. The Spectator's perception constantly transforms even as the interior of the dome structure encases them inside. Darkness is heavy in mass while light acts as relief, yet not enough of it is accessible most of the time. The purpose is for the Spectator to further yearn for light, connection, and new information.

The "feel" of the project, texture, is in constant juxtaposition between organic and artificial, rough and smooth. I believe through the juxtaposition of extremes, I can capture everything else in between. Symmetric versus asymmetric, geometric versus organic,
harmonic forms versus squiggling, gut twisting visuals. Inside the dome is, for example, seemingly perfect when the ultraviolet lights are turned off. With them on, however, one can speculate the humanness quality of the dome, formed by its imperfections: the duck tapes, paints, glue, staples, and Sharpie. The makeshift aesthetics add to the sense of play, of wonder that a child might have crawling into a new environment, and also make its “mechanics” if you will, accessible.
The "centerpiece" of the external stage is no doubt the planetarium. Acting like an eggshell, the dome structure shields the embryo from the outside world. It is a womb holding both familiar and unfamiliar elements in balance. The familiar elements inside the structure are the stars, Orion, and the reassuring voices of the narrator, while the unfamiliar elements include the abstract shapes, the music, and the reappearing "bird" creature. At the same time, the dome structure creates the feeling of infinity, which makes the Spectator forget that they are in a small gallery in Riverside. The space sends them to a dimension light years away.

All the while, the planetarium acts as the sky that overarches all of humanity's knowledge and customs. It allows the Spectator to be one with Earth, one with the planet we call home; therefore, it helps create "the user experience", allowing the theater to be a larger embodiment of the Spectator's body. The Machine is an extension of the Spectator and they become the solitary traveler in space.
As a scene designer, my task is to harmonize the elements of the play. The structure of the theater is like a sculptural form, a still life. First of all, my lines are what make the machine feel alive. The silhouette of the form caused by the light sources are curved in the larger picture, but the detailed form consists of sharp, angular lines, like an origami creature.

The second key to harmonizing the play elements is through composition. The piece contains, in a way, two stages: exterior and interior stage. Therefore, the transition from outside to inside is crucial. As the Spectator first sets step inside the gallery, they see the large caterpillar-like Machine. The two red trails of light on the sides of the tunnel guide the way of the Spectator as they crawl inside. The lights also aid in bringing out their innate psychological and physical senses.

When the Spectator finally reaches the dome section of the insect-device, or the "head" of the Machine, the Spectator becomes, quite literally, the "brain", for only they have the imagination that can bring the play come to life.
Further contrast is at play with my choices of color. Even the colors are exaggerations in different segments of the play. *Cool color/hot colors:* most of my puppets are blue and green with dabs of vibrant red or orange. The masks, however, are predominantly hot. They signify alternative life forms coming from somewhere other than the Spectator, or the Earth. *Unnatural colors/natural colors (vibrant colors/dull colors):* the colors seen under UV light appear unnatural and vibrant. The colors coming from the stars, in comparison, are rather dull. I organize these scenic design elements together with acting, costume design, and light and sound engineering in order to meet the Spectator's eyes with the desired effects. Please note that the interpretations of the aesthetics, however, are completely open to the Spectator, as there are various potential sources of visual stimulation to bond with.

I am designing the entire production alone, of course with the aid of my consultation resources—my mentors. Still, there were countless of decisions I could make. Therefore, I needed to consider various things, such as the size and shape of the space in Phyllis Gill Gallery, materials, overall atmosphere, and all other necessities of the scripts.

*Figure 5: The Spectator's perspective, looking upwards from within the planetarium-theatre. The "stage area divides into Upstage Left, Upstage Center, Upstage Right, Stage Left, Center Stage, Stage Right, Downstage Left, Downstage Center, Downstage Right. These stage directions rotate as the Spectator shifts their sitting positions.*
The Spectator is constantly surrounded by motion. Stimulating visuals come from all directions as the Spectator shifts their own point-of-view by looking around, crawling through the tunnel, and switching body positions. Therefore, unless the Spectator stays still (in certain sections of the play), the world around them will not. Unlike traditional museums, where no touch laws dictate the exhibitions, this piece is collaboration between the Spectator and the performers and me. The Spectator gets to be the nucleus of the work, and their physical and mental interactions are in constant demand.

Oiticica believes that it is better to be "out of the box". He warns us against the dangers of cinema, as it can grab hold of you and hypnotize you into passiveness. Cinema creates limitations of the image, constantly framing and obscuring reality, which shuts down creativity. Therefore, I am strict in the presentation of the one-channel video projection near the end of the play. I aim to create something that still involves participation. Near the conclusion of the play, the dome once again opens from the top, and the video projection appears to be starlight, as one would see traveling among galaxies. Meanwhile, the narrator explains the significance of Supernova and Betelgeuse, the shoulder of Orion. Closer speculation will be extremely rewarding, as countless of interpretations may be derived from the details. Therefore, even the video demands the Spectator's contemplation and mental engagement.

As an artist, I am not in complete control. The *Star Maps, Earth Codes* theatre is a Machine, but it is also this organic thing, a caterpillar, and bacteria. It is capable of mutations, shifting attention from inside to outside and inside again. It is a space for growth, like a nucleus, an egg, a bird's nest, channeling an omniscient being outside of
human knowledge. The omniscient bird(s) feeds the Spectator information, and at the same time, it studies their emotions and their reactions.

_The following is the flow of the play, produced by light placements and mechanism:_

- Literal (NIGHT SKY)
- Abstract (UV LIGHT)
- Literal (NIGHT SKY)
- Abstract (UV LIGHT)
- Literal (NIGHT SKY)
- Abstract (UV LIGHT)
- Literal (Projection)
- Abstract + Literal (3D Orion)

_The following is a descriptive chart of two sets of Light Sources:_

<table>
<thead>
<tr>
<th>UV LIGHT</th>
<th>NIGHT SKY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CENTRAL IMAGE = Mask</strong></td>
<td><strong>CENTRAL IMAGE = Orion Constellation</strong></td>
</tr>
<tr>
<td>Intense</td>
<td>Dim</td>
</tr>
<tr>
<td>Vivid</td>
<td>Peace</td>
</tr>
<tr>
<td>Alive</td>
<td>Vast</td>
</tr>
<tr>
<td>Illuminate</td>
<td>Quiet</td>
</tr>
<tr>
<td>Vibrant</td>
<td>Vacuum</td>
</tr>
<tr>
<td>Excite</td>
<td>Desolate</td>
</tr>
<tr>
<td>Madness</td>
<td>Abandoned</td>
</tr>
<tr>
<td>Loud</td>
<td>Detached</td>
</tr>
<tr>
<td>Hot</td>
<td>Cold</td>
</tr>
<tr>
<td>Alert</td>
<td>Monotone</td>
</tr>
<tr>
<td>Focus on details within interior of dome</td>
<td>Focus on unseen exterior of dome</td>
</tr>
<tr>
<td>Nonrealistic</td>
<td>Realistic</td>
</tr>
<tr>
<td>Fantastical</td>
<td>Mysterious</td>
</tr>
<tr>
<td>Mythological</td>
<td>Infinite</td>
</tr>
<tr>
<td>Mysterious</td>
<td>Insignificance</td>
</tr>
<tr>
<td>Otherworldly</td>
<td>Fear</td>
</tr>
<tr>
<td>Energetic</td>
<td>Wholeness</td>
</tr>
<tr>
<td>Instinctual</td>
<td>Stillness</td>
</tr>
<tr>
<td>Animated</td>
<td></td>
</tr>
</tbody>
</table>
Closer inspections would help the Spectator realize that the "stars" are actually city lights viewed from above. The idea of "stars" is simply "projected" inside our minds and it is not actually the stars themselves. These "projections" are then reflected back onto Earth's surface. Recall that the Spectator is viewing from planet Earth's perspective, so one interpretation could be that the "projections" simply reflect the Spectator's own perspective of the Universe.
Lighting in *Star Maps, Earth Codes*, sets the rhythm and atmosphere of the play. The performers manually switch back and forth between ultraviolet light (interior of planetarium) to flashlight (exterior of planetarium). This repetitive shifting helps charge certain elements of the performance and emphasizes the relationships among them, transitioning constantly between literal and expressive elements. In addition, the motions inside the planetarium are faster and more intense than the motions outside, just as how people, in most cases, appear to be calmer on the outside than inside their minds. Once again, I am stylizing the play, adding to the juxtaposition between "natural" and "unnatural" by utilizing contrasting symbolisms of realistic and nonrealistic-lit objects—glowing stars and glowing creatures.

My special effects mainly consist of ultraviolet lights, a purplish-blue light that makes phosphorus glow. The purpose is to light up masks and puppet details. The psychological effect of this light source combining with computerized noises and the electronic music in stereo surround is profound, in my opinion. Working together, these elements can come together and take the mind of the Spectator to a whole new dimension far away. In addition, I was quite thrilled to learn from Asher after the shows that the aesthetics of the piece have shared qualities with Czech black light theatre. With further research, I can see the similarities with the styles and learned a few valuable techniques. The UV black light can intensely transform viewers’ visual perceptions of space and can dramatically metamorphose the theatre’s body. I would love to implement more of this style in the future.

It should be clear by now that light design and sound engineering go hand-in-hand in constructing the play's atmosphere and rhythm. My methods for sound engineering
came from experimenting with sound effects on the KORG board and compositing on music editing programs. The narration recording comes from a professional voice actor. The recorded sounds are the result of combining both human voices and KORG board experimentations, creating a futuristic, electronic vibe after I edited all the elements together in music software. The electronic music, as all other elements of the play, is formed with the following contrasts in mind: psychological/physical, organic/artificial, nonrealistic/realistic, reality/perception of reality, fear/desire, known/unknown, interior/exterior, assertiveness/passiveness, nonverbal/verbal, world inside (imagination)/world outside (Universe), past/present, imagination/calculation, and last but not least, limitations/infinity. The sound switches between nonverbal and verbal, creating literal images and abstract concepts while aiding the visuals in emphasizing the switch. Those two becomes inseparable; therefore, the importance of performer to be on cue is stressed. Nonverbal and verbal audio tracks are the essential elements in the creation of mood and flow of the play.

As for the narration, I asked my voice actor to vary the roles using distinguished tones of voice. The three characters include: the narrator, the researcher, and the student. I envisioned the narrator's voice to be an overpowering deep voice, while the researcher, a voice of an elderly man, someone who is wiser in comparison to a young student. The cliché is intended in order to familiarize the Spectator with the verbal aspects of the play from the very beginning by making them feel light-hearted and at ease. The dramatic ups and downs in tone also help keep the Spectator stray from boredom. After all, one of this project's three main objectives is to provide information. Thus, an entertaining delivery is
necessary. I chose to do a second take after coming to the decision that the researcher's voice does not pair well with the British accent.

The tone and style of the play are also established through the character and puppet design, and the costume is consistent with the construction of the set. For instance, the dress of the masked puppeteer is black, but it glimmers by reflection in the same quality the stars glimmer within the planetarium. There is a sense of displacement between the head and the body. The head is vivid and transforming while the body is dark and hidden, with the exception of small occasional sparks.

The masks, on the other hand, are designed to accompany the abstract puppet creatures as they share the same color palette and reflect with ultraviolet light. Masks go way back in the history of drama, traditionally used by primitive tribes from all over the world, then by the ancient Greeks, father of our western constellations. In this case, utilizing masks seems highly appropriate, given that I am communicating the past and present astronomical perceptions of humanity. Moreover, masks are a constant reminder of theatre, a crucial symbolic element. The false face is exaggerated in its features and is an extension of the performer's stage presence. The head suggests a creature of fantasy, emphasizing the nonrealistic qualities of the play; yet, the body is rather human-like, adding to the realistic elements of the play.

The nature of the individual is vague, curious, but controlling. The mythical creature seems to contain a certain eternal force that connects to everything. It runs the Universe-Machine. The actions are bird-like, with unpredictable jerking movements. In contrast with the puppet creatures under its control, the bird appears to be a higher being. It is constantly in power as it holds the mystery high above the Spectator's head, and that
is the only form of communication between them since the bird does not speak. The being appears to exist in a world beyond human knowledge, maybe in a world of make-believe, full of hyperboles, and allegory. Still, the Spectator can make out pieces of human characteristics: a glimpse of a hand, a mouth, a human silhouette. The fabric construction of the dress at around the shoulders helps obscure the face, which further builds up the nonhuman qualities and overarching sense of wonder. Overall, the being may be an intersection of folkloric traditions and experiments, art and science.
The time and location suggested by the costume would further disorient the Spectator: the setting is in the future, perhaps, in some distant land, but perhaps also is from the past. Is the creature a bird? Crow? An alien? A God? A Death God? Does it have a doppelgänger? Or is there just one? Does the head marking symbolize DNA? Does it have ritualistic or scientific connotations? Or both?
The puppets, like the masks, are extensions of the performer, yet they appear to have lives of their own. While the body is treated as a sculpture, these puppets are treated as language, the main source of communication with the Spectator. They are the symbols, both the signifiers and the signified. In order to persuade the Spectator of the puppets' independent movements, I studied techniques of puppet making and manipulating from YouTube channels and a Halloween show at Bob Baker Marionette Theatre. The live show gave me an idea of the ranging auras the puppets' appearances and movements can emit into the theatre. I aimed to detach the appearances of these puppets from any particular cultures. They are independent, surreal beings, organic and artificial at the same time. Utilizing colors, which do not part from structures, I assembled geometric shapes with clashing flexible lines and gestures. This factor further adds to the overall style of the play.

As for the choreography, improvisation is the key as the performers transform space with these physical objects throughout the given time frames. This fact is what sets apart live performance from cinema. Cinema may be heavily manipulated to fit any interpretations, while a live performance is an event; what the Spectator sees is reality occurring in real time, even if tricks were planted to skew their visual perception. The truth stays that a performer cannot manipulate time. The movement of the puppets, on the other hand, can be manipulated, so what I choreograph in that given time may alter one’s perception of time. Therefore, although time itself stays the same, the illusion of time can be manipulated. The puppets’ movements in space may suggest complex interrelationships between the characters and their surroundings, yet at the same time, those manipulations are still prone to human mistakes. Out of the thirty shows, not a
single performance is ideal, but each attempt in achieving the ideal emphasizes the humanness of that pursuit. In the end, imagination and active thinking of the Spectator are the final elements necessary in order to piece everything together into a unified whole, so whether or not they finally receive the humanness of the performance is beyond my control. That is also one of many charms of live performance.

**Observations and Insights:**

In my attempt to find cross-cultural references, one article supplied by Dr. De-Leo Winkler’s was written by Robert S. McIvor (2000), which caught my attention. McIvor describes how various cultures pictured the three stars of Aquila the Eagle, while analyzing how cultures share similar customs when forming constellations.

In China, Beta, Alpha, and Gamma Aquilae form an asterism called Hoku, which is pictured as a herdsboy… [while] in India the three stars were imagined to be footprints of the Hindu god Vishnu, the Preserver of the World, made as he strode across the heavens (p. 58).

The three stars of Aquila caught the attention of many other cultures as well, such as, but not limited to, “Mesoamerica, Peru, Arabia, Turkey, and Persia,” who all set the three stars in a line apart from their neighboring celestial objects. McIvor (2000) further notes that in comparison to these cultures, modern astronomy diverges by included a total of nine stars with the three Aquila stars to illustrate a flying eagle (p.58). I grew devoted to discovering other cases of similar cultural visions of the same stellar objects.

The Orion constellation came to mind as the best choice of reference, since the three stars of Orion’s belt are such a prominent image in the sky due to their similar
spacing and magnitudes. I wondered how cultures’ perceptions of the universal constellation relate to one another, and how they compare to modern astronomy.

As I researched more and more into the past, I found myself stuck with a new basic, but troubling question: How can I better understand our modern stance with Orion? In modern times, more knowledge and instruments are available for us to see the constellation and its details, so how have our perceptions changed towards this largely studied constellation? We now know more about Betelgeuse and the Orion nebula than ever before, along with the rest of the celestial objects in the sky. Furthermore, we can easily accumulate a visual representation of the Orion constellation with actual spatial relationships between the stars with three-dimensional modeling. Therefore, what can these things tell us? Do they suggest that the ancient knowledge of the sky is only a manifestation of their imagination? Or do they hint that the ancients only appropriated the observed movements of the stars to suit their needs in society? It finally hit me, after I had built the 3-D Orion structure, that if the spatial relationships of the stars in the asterism were to vary only slightly, then the cultures may have noticed Orion in a completely different fashion, and I could be writing about a whole other constellation this very second.

This concept again emphasizes how subjective human knowledge really is. Science attempts to be as objective as possible when revealing the truth; however, the absolute truth still stands that science will never be the truth. Our knowledge, as philosopher Thomas Kuhn (1962) claims, is still our perceptions, influenced by culture, technology, and motives. That said, our encyclopedia entries are simply close descriptions of truth, but they will never be truth itself. This is not actually a depressing
fact because by using the scientific method, we still have the ability to indicate which facts are truer than others, even if our understandings will never reach reality.

Keeping this in mind, I studied cross-cultural perceptions of the Universe by exploring common themes using interdisciplinary methods. I sometimes questioned whether it is naïve of me for wanting to find a cross-cultural perspective of the Universe. It could be, but in the end, the process of my quest is authentically translated into the final work, and through the process, I learned that this is my own projection of wanting to understand ontology through analyzing astronomical motifs. Therefore, it seems appropriate for me to link cultural ideologies with various methods of learning, using Orion as my point of reference.

One motif I noticed regarding the Universe itself is a *dome-shaped Universe*. I first noticed similarities between my planetarium design and the description of a widespread concept of the sky among tribes of the African continent. The concept, to reinstate, describes the sky as a blue dome, made of solid rocks with holes in them. The sun passes through the inside of the dome throughout the day and light up the stars from outside during the night. In the case of the Egyptians, the earth is also segregated from the unknown. However, instead of being made out of rocks, the sky is a goddess called Nut, who protects her people against the unknown with her blue and starry physiques. The sun and stars come in through her mouth and body daily as she gives birth to the Sun every morning and the stars every evening (Redford, 2001). Although the goddess described in the tale is not exactly a half-sphere, we can observe from the illustration, as seen in *Figure 6*, that the Egyptians’ sky concept shared similar visual characteristics with the rest of the sky concepts I mentioned earlier. Moreover, the illustration
harmonizes with my own initial drawings of the theatre, such as the mystical beings interacting with humans from the inside and outside of the protective layer.

Figure 6: Photographed by the British Museum, art is from the Greenfield Papyrus depicting "the air god Shu, assisted by the ram-headed Heh deities, supporting the sky goddess Nut as the earth god Geb reclines beneath." Credit: Wikipedia.12

While to the Egyptians, a goddess forms the dome, the Hindu, in India, commonly describe a Brahmanda Universe, also known as Cosmic Egg. The creation tale follows a god named Brahma who created the Universe from a golden egg. He created water first and places a seed in it. The seed then grew into an egg, which then Brahma split in half. From the golden half came the heavens, from the silver half, Earth. All creations, including all cosmic objects, came from this egg and are oscillating "infinitely between

expansion and total collapse."¹³ This oscillation is a crucial element of India’s theory of the world’s birth.

Like the previous concepts, one of the most prominent stories of creation from China also involves the *Cosmic Egg*. The tale describes a giant named P’an Ku who hatched from an egg. The half shell above him grows to be the sky, while the other half becomes Earth. P’an Ku grew and grew for thousands of years, steadily gapping the sky and earth with his body, until finally he could not grow anymore. He fell into pieces, and "His limbs [are] the mountains, his blood the rivers, his breath the wind and his voice the thunder. His two eyes are the sun and the moon. The parasites on his body are mankind (*Creation Stories*, n.d.). China borrowed many cultural influences from India, so it does not surprise me that the story of how the world originated from an egg is shared between them as well.

Of course, the world egg or cosmic egg is a well-known element, which reoccurs in cultures not limited to the ones I have just mentioned in creation mythology. These stories paint colorful pictures, but the most fascinating part is how I was not aware of most of these tales until post-production, yet even my own concept of the Universe matched the basic structure of these creation lore. Therefore, I sense that this is not simply the result of my fabrications. The vastness of the human imagination seems at time comparable to that of the Universe itself, yet there are so many coincidences aligning with universal consciousness, which makes me consider the fact that they may not be coincidences after all.

My investigation of whether or not I am able to use archaeoastronomical data to create a viable, wondrous, and educational artwork for the modern spectator to connect

with came together as I was reading Joseph Cornell’s monograph by Diane Waldman (2002). As an artist and a dreamer, Cornell is curious about everything—birds, the female species, and, of course, the Cosmos. He is one of the first artists to create collages, piecing together visual and textual information to form new, connecting dots like various cultures did with their stars groups. It is how we humans make sense of things—by finding patterns and connections. One may be wondering why I choose to reconstruct the common subjects in sky lore through art. Well, “reconstruction is the mode of thought most appropriate for its study”, because it “posits completion”. Reconstructing the sky lore into a new, unified visual experience removes the “inconsistencies and gaps” which exist in various cultures (Ammarell, 2014, p. 2207). The most interesting aspect of this activity is that just when I thought I have found a key to the secrets codes of the sky lore, the Universe surprises me with more inexplicable puzzles, again reclaiming its authority over humanity.

Other than the dome conception of the world is another cross-cultural subject: "birds". Truthfully speaking, the bird-like features in my character design of the puppeteer were absolutely intentional. From my research, several of the readings demonstrate references to birds being the curious observers and from whom we gain knowledge. Emlen's indigo bunting, for example, exhibited innate ability to self-orient in the planetarium lab. Plenty of Cornell's artworks illustrate the innate behaviors of birds in sync with the Universe. William B. Gibbon (1972) quoted14 that “many peoples throughout recorded history have equated the souls of the departed with birds and stars.” This insight may be easily understandable, since the connotations of souls and heaven can

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14 Gibbon (1972) found the quote in Bernt von Arnim’s unpublished notes from the University of Graz, Austria.
be easily traced to birds and stars. Further mentioning of birds by Gibbon (1972) appeared in the same article, in an Algonquian Indian “Song of the Stars”:

We are The Stars which sing, 
   We sing with our light; 
We are the birds of fire, 
   We fly over the sky. 
Our light is a voice; 
We make a road for spirits, 
For the spirits to pass over.\(^\text{15}\)

Yet another mentioning of relating birds to stars appeared in Trevor M. Leaman and Duane W. Hamacher’s (2014) article regarding South Australia astronomical traditions, where Daisy Bates, the anthropologist-astronomer translates, "Jurr-Jurr, a species of night owl, whose hoarse cry is thus rendered by the natives, has a distinction of being translated into a star, and is now Canopus, watching over ming-arri…, now the Pleiades" (Leaman, p. 183). The Aboriginal bird figure is one that is observant and protective. It appears to be just as wise and powerful as the ancestral-birds, described in the former “Song of the Stars”. From these rich verses, I gathered the idea of a universal bird figure, which speaks the language of the Universe and communicates its wisdom through gestures, poetry in forms of puppetry. Although the bird characteristics from costume design to choreography are subtly referenced, they are there for those who choose to look for them.

A motif I observed from the sky lore surrounding the Orion’s belt is quite mundane. Usually, the subjects surround daily tools, or targeted animals. Furthermore, the larger celestial canvas of the Orion constellation, including Betelgeuse and Rigel,

\(^{15}\) Barnes, N., (1925) American Indian Love Lyrics and other Verse, New York, 92.
usually gets personified into a warrior or huntsman, who is often seen with a weapon as he chases after other constellations (*See Table 1 below*).

Similarly, the Pleiades were often portrayed as a group of females by ancient cultures, according to Gibbon (1972). For instance, Gibbons speculates that “the Chinese worshipped them as the seven sisters of industry…the Ossetes saw seven sisters, [while] the Italians saw seven girls…” In Western Australia, tribes describe “a group of women being pursued by the moon.” The Hindu illustrated “six nurses”, and the Greeks recorded the “seven virgins”, or Atlas’s daughters. East and West Slavs, and many Germanic tribes also aligned with the motif of female Pleiades. North American tribes, however, frequently represented the Pleiades as children who “dance” due to punished starvation (Gibbon, p. 242). These parallels with the Orion constellation and the Pleiades do seem to be greatly coincidental. It is quite possible that many of these cultures interact with one another in some forms, if not linguistically, but these reoccurring descriptions of the exact star groups may be demonstrating a collective, humanistic mentality of the ancient stargazers. The idea of universal consciousness keeps reappearing in my mind, which is quite possible in this case, as the similar imageries appear to be simultaneously forming from all over the world.

Gathering all of this information, I decided to analyze the data by reviving sky lore imageries in a collective formation. In order to achieve this, I first deconstruct common descriptions in these motifs into abstract shapes and forms by reassembling details of the scenarios. The end results are my puppets, which are the main instruments in communicating these Orion related references of the studied cultures (*See Table 1*).

*Table 1. The following are basic breakdown of the puppets and references in sky lore.*
<table>
<thead>
<tr>
<th>Puppet Name</th>
<th>Greek Name</th>
<th>Cultural References</th>
<th>Materials</th>
<th>Descriptions</th>
</tr>
</thead>
</table>
| “The Warrior”    | Orion: Betelgeuse, Rigel, Bellatrix, Mintaka, Alnilam, Saiph | - Aborigines: *Nyeeruna*, the Huntsman who wants the seven ming-arri sisters desperately for his wives and chased them into the heavens. *Nyeeruna’s* right arm, Betelgeuse, contains “fire magic”  
-Yuman tribes of Gila River: a hunter, or “mountain sheep pursuer” (Gibbon, 243) | Found bird feather, clay, wires, wood chip, leftover plastic, dark paint | - The character sounds like an instrument when in motion and seems to be dancing, courting the females.  
- Overall shape is based on Orion constellation, and I kept the basic physiques of a warrior/huntsman.  
- Orion constellation is cross-culturally perceived as a man. |
| “The Eldest”     | Hyades: Aldebaran | - Aborigines: *Kambugudha*, the eldest of the seven ming-arri sisters who spreads her leg to a V-shape in order to taunt *Nyeeruna*. Her firey left foot, Aldebaran, puts *Nyeeruna* to shame, and in reaction, he quenches his fire arm, Betelgeuse.  
-Gana Bushmen: pigs  
-Ju/Wasi Bushmen: Daughter’s husband, Aldebaran, who failed at hunting zebras and was too shameful to return to his wives.  
-Indonesian tribe, Meratus: “pig’s jaw” (Ra’ang Bayi). V-shaped lower jaws of wild pigs are hung on walls of Meratus houses as hunting trophies (Ammarell and Tsing, 2210) | Wires, natural clay, dark paint | - V-shaped to represent Hydra’s legs as she battles Orion. One of the legs is painted red as Aldebaran fills with “fire magic”.  
- The same puppet was used with “The Pig” as its jaw, which dropped out of the pig. |
| “The Sisters”    | Pleiades: M45 | Aborigines: *Yugarillya*, six ming-arri sisters, not including Hyades  
-/Xam Bushmen: “summer’s things” which forecast start of rainy season.  
-Gana Bushmen: wives of Canopus and Sirius.  
-Ibibio of Nigeria: Aldebaran and Pleiades are “Mother Hen and her Chicks”  
-Namgua Khoikhoi: “Stars of Spring”, Khunuseti: daughters of Tsui  
-Ju/Wasi Bushmen: Daughter’s husband, Aldebaran goes to hunt zebras (Orion’s belt) only had one spine bone of a horse, mud, natural clay, pinecone, wires, dark paint | Found spine bone of a horse, mud, natural clay, pinecone, wires, dark paint | - The character appears quite slim, beautiful, with spikes. Six or seven spikes for six to seven sisters.. I made the number of spikes ambiguous by joining two of the seven spikes together. Hence, the true number of spikes/stars is not to be easily identified.  
-Web, attracting and destroying  
-Harmful spikes coming out of the blossoming center |
<table>
<thead>
<tr>
<th><strong>The Prey</strong></th>
<th><strong>The Chased</strong></th>
<th><strong>The Chaser</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Orion</strong>: Betelgeuse, Rigel, Bellatrix, Mintaka, Alnilam, Saiph</td>
<td><strong>Orion’s Belt</strong>: Mintaka, Alnilam, and Alnitak</td>
<td><strong>Orion’s Sword</strong>: Aborigines: Babba, the Dingo’s Father, also representing Dingos, (or Orion’s shield) the arc of star between Beta Tauri and Achermer as a whole, protectors of the Mingarri sisters.</td>
</tr>
<tr>
<td>-Indonesian Tribe (Meratus): Spring Trap, referring to bamboo-speared traps that are set for forest games to hunt wild boars. -Pig reoccurrence in African tribes, Sotho (Makolobe), Twana (Dikolobe), Karanga of Zimbabwe (Nguruve). These tribes saw the belt stars as pigs or wild boars. -Hindu: Mriga, meaning “the stag”, held to the sky by an arrow (the belt stars)</td>
<td>-African tribe, Sotho (Makolobe), Twana (Dikolobe), Karanga of Zimbabwe (Nguruve): three pigs -African tribe, /Xam Bushmen: three male tortoises hung on a stick. -African tribe, Nyae Nyae!Kung Bushmen: zebras -African tribe, Masai: three old men pursued by lonesome widows -Aborigines tribe, Njiru, Orion -Yuman tribes of Gila River: a deer, a mountain sheep, and an antelope -Indonesian tribe, the Javanese: Weluku, the Plow (Ammarell and Tsing, 2210) -Indonesian tribe, Banjar: pointers to Kiblat (Qiblah):</td>
<td>-Aborigines: Babba, the Dingo’s Father, also representing Dingos, (or Orion’s shield) the arc of star between Beta Tauri and Achermer as a whole, protectors of the Mingarri sisters. -Mongols, Buryat of the Balagan</td>
</tr>
</tbody>
</table>
A hunter began to stalk three deer, but they ascended to the sky, so the hunter shot the arrow after them. Orion sword is the hunter’s arrow, while the belt stars are the deer (Gibbon, p.244). Indonesian tribe, Banjar: the Corpse Stars, help custom of orienting the dead north-south with head facing Mecca (Ammarell and Tsing, 2210).

### 3-D Orion

<table>
<thead>
<tr>
<th>Orion: Betelgeuse, Rigel, Bellatrix, Mintaka, Alnilam, Saiph</th>
<th>Modern three-dimensional rendering of the asterism with precise spatial relationships between stars.</th>
<th>Wooden sticks, wires, strings, miniature light bulbs, black acrylic paint</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>District:</strong></td>
<td>embedded hair</td>
<td>constant rapid movements.</td>
</tr>
<tr>
<td><strong>The legs are controlled by strings, so the motions are very flexible and natural, made possible by the stray hair and other free-flowing elements.</strong></td>
<td><strong>In conclusion of the show, the performer shifts the 3-D Orion constellation around at the opening of the geodesic dome in attempt to merge real and projected forms.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>-After the play, I usually match the names of the stars to each of the referencing light bulbs.</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

One of my aesthetic influences includes James Turrell's works, especially his *Skyspace* series (Turrell, n.d.). The main topics my project share with Turrell’s works include light, space, and visual perceptions. The *Skyspace* series consists of architecture designs with a cropped opening on top, which comes in various shapes with different designs. He calls the opening “oculus”. Several *Skyspace* landmarks are open to public, where visitors are invited to come experience the changing natural light reflected within the architecture. I also share the desire to create "an experience of wordless thought" (Turrell, 2016). My planetarium-theatre is similar in aesthetics in the way the cropped hole frames the Spectator's vision and invites lights of various qualities to reflect within the space. However, my piece oscillates between both literal and abstract thinking. In other words, the methods of delivering information shift between means of both verbal and nonverbal communication.
I kept these ideas in check as I developed the design concept and created the environment for the performers to help set the tone and style of production in a way that distinguishes both realistic and non-realistic theatre. By appropriating the metaphors of the production, I was able to make sure that the scenery is in sync with the other production elements. Turrell’s works guided my visions in creating the right atmosphere for the intended Spectator experience. Other aesthetic influences include, but are not limited to, Joseph Cornell's assemblages, Stan Brakhage's films, especially *Mothlight* and *Dog Star Man*, African Stellar Arts' *Sound of Stars* series, and various architectural designs and landmarks. I was constantly experimenting and desired to keep the piece as raw and open to interpretations as possible, insisting on not dictating the Spectator's experience.

**Potential Implications:**

Once again, I intended to invite attendees to raise their own curiosities about certain topics, such as their assumptions about what defines art and theatre, how we differentiate art and science, and how do we know what we know. Plays are, of course, ephemeral, so every moment of experience is a fleeting one. Therefore, the Spectator's only souvenirs are the leftover feelings, accumulated information, and discussions following the play. With this factor at hand, I can utilize the play setting as a place of experimentation for alternative ways people receive new data. Instead of being in a traditional lecture setting, the Spectator is in an enveloped space where all of their senses are actively learning. Studying how well the Spectator receives new information regarding ancient sky watchers' perception of Orion in this kind of setting may be worthwhile. The location of
the play also alters people's impression of art. One person thought the gallery would contain paintings, like in most museums. This work, on the other hand, is deeply invested in atmosphere, gestures, motion, narrative content, and the Spectator's active presence. Spectator is the structural nucleus of the work, the center of the piece, and their physical and mental involvements are necessary for bringing the work up to its full potential. This factor also allows the Spectator to regain confidence in their own intuition.

The Spectator has the potential to be physically, emotionally, and intellectually engaged with the piece on various levels. Conversations I had with the individuals who experienced the show ranged from being about Orion, to about astronomy, to the artistic experience, and to the intersections of fields. An interesting by-product of this interdisciplinary experiment is the population of the audience the event had gathered. The event attracted peoples from fields in both the arts and the sciences, so our conversations after the showings came from various point-of-views.

Moreover, this piece opened up conversations with the public about a few negative characteristics modern people possess, such as impatience, suppressed imagination, and apathy. When UC Riverside’s Department of Astronomy and Physics brought the huge telescope out for the students to witness Venus passing the Sun, most people were not bothered to snatch the opportunity of a lifetime. The Universe is life’s infinite jigsaw puzzle, yet many of us do not have the attention span longer than a six-second Vine to question all that is out there. Several members found these issues worth discussing, given that technology is evolving faster than ever.
Statistical Analysis:

The success of the piece is also measured statistically by the reactions of the individual attendees. At the end of the performances, the house manager hands each attendee a survey, to extract from my audience members, their perception of the Orion constellation, after experiencing my reimagined version of the sky lore. Moreover, I want to see what the Spectator could reconstruct from my images and sounds and what their reimagining of the stories is like. The assessment questions are on a scoring spectrum of 1 to 5, for instance:

Survey Questions:

(1) I am interested in phenomena in the sky  
(2) I would like to learn more about phenomena in the sky

(1) I am interested in artistic expressions  
(2) I am interested in seeing more artistic expressions like this

(1) I think art and science can find common ground  
(2) I think art and science can find common ground

(1) I keep up with astronomical news  
(1) I go see art shows often (2+ a year)

(2) I find that art is a great way of communicating science  
(2) After the play, I know more of the Orion constellation

(1) Comments: ____________________________________________
(2) Comments: ____________________________________________

*note: (1)’s are preshow questions, (2)’s are post-show questions
1. Did Spectators Know More about the Orion Constellation after the Play?

My hypothesis is: “I am able to use archaeoastronomical data to create a viable, wondrous artwork for the modern day person to connect with, while conveying information at the same time.” Therefore, I used statistics to find out whether or not the interdisciplinary show was successful in providing an educational experience. The first test was conducted on whether or not the attendees believe that they acquired more information on the Orion constellation after experiencing the show. I used the 34 anonymous responses for the post-show question, “After the play, I know more of the Orion constellation”. The outputs are as follows:

One Sample t-test

data:  edu
t = 29.281, df = 33, p-value < 2.2e-16
alternative hypothesis: true mean is not equal to 0
96 percent confidence interval:
4.171401 4.828599
sample estimates:
mean of x
4.5

Confidence Interval: (4.171401, 4.828599)

Interpretation: We are 96% confident that the true mean spectator score, from a scale of 1 to 5 agreed that they knew more of the Orion constellation after the play is between the intervals 4.2 and 4.8. The confidence interval is in higher range of the scoring spectrum of 1 to 5. Therefore, I conclude that significant attendees found the play to be quite educational, satisfying the latter part of my project hypothesis.
II. Did Spectators Shift in Stance? Pre-show versus Post-Show Responses

I want to find out whether or not the play altered the stance of the attendees on the statement, “I think art and science can find common ground”. 27 pairs of pre-show and post-show responses were used in the test. The responses ranged from a scale of 1 to 5, and the results are as follows:

Test of Significant Difference
Paired t-test

data: F1 and F2
t = -1.1538, df = 27, p-value = 0.2587
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
-0.4961166  0.1389738
sample estimates:
mean of the differences
-0.1785714

1. Ho: μ1 - μ2 = 0; There is no significant difference between pre-show and post-show mean scores on whether or not art and science can find common ground.

2. Ha: μ1 - μ2 ≠ 0; There is a significant difference between pre-show and post-show mean scores on whether or not art and science can find common ground.

3. t = -1.1538; p-value = 0.2587

4. RR: Reject Ho if p-value < α = 0.05

5. Conclusion: Since p-value = 0.2587 > α = 0.05 -> reject Ho

Interpretation: We cannot conclude that there is a significant difference between pre-show and post-show mean score. This suggests that the Spectators’ stance on whether or not they believe art and science can find common ground stayed the same on average, before and after the show. The pre-show mean is 4.6 while the post-show mean score is
4.8. Although there is an increase on the degree of agreement with the statement, the change is not enough to be significant.

Results:

To understand how this work fits in the world of art today, I tried to decipher where art is moving towards in the 21st century. Before 15th century, western art and science both existed to serve the church. After the Scientific Revolution and the invention of photography, art and science diverged from one another. Realism became Modernism, which then became Postmodernism. Now, the shocking and ironic factors of Postmodernism seem to be getting stale. Contemporary art has been breaking away from traditional gallery, using all possible materials (or lack of materials) as its medium as it merges deeper into everyday life. My work is constructed on the history of both art and astronomy. It is such an experimental hybrid that I find it hard to cram into a single genre of studies. I do, however, agree with Keith Martin-Smith (2008), the writer for the Integral Institute, that my creative work should be considered in the following contexts:

1. The artist herself and what she thinks the work is
2. The cultural position of the artwork
3. The artwork itself
4. The viewer's response

My objective for *Star Maps, Earth Codes*, to reinstate, is to formulate an experimental play that intersects fields of astronomy and art. I intended to bring those with an open
mind: 1. *Sense of Wonder* (emotional impact) 2. *Opportunity for Involvement* (physical impact) and 3. *Information* (intellectual impact). The main inquiry is whether or not I am able to appropriate archaeoastronomical data to create a viable, wondrous artwork for the modern day person to connect with, while being educational at the same time. The end result is the planetarium-theatre, which connects the singular Spectator with the interpretations of the Orion constellation by different cultures. The stories and scenarios are brought to life by digital contents, puppetry, and a narrative, and the final exhibition was open to public by reservation at UC Riverside's Phyllis Gill Gallery from December 5th to December 9th of 2015.

After the completion of the project, I feel more confident in the ability of interdisciplinary methods to amplify learning. I also feel confident in being able to deliver emotional, physical, and intellectual impact to the modern spectator through the work.

In terms of measuring the play’s educational value, I conducted a survey, which results demonstrated that I am 96% confident that the true mean score, from a scale of 1 to 5 agreed that they knew more of the Orion constellation after the play is between the intervals 4.2 and 4.8. The confidence interval is in higher range of the scoring spectrum of 1 to 5. Therefore, I conclude that significant attendees found the play to be quite educational, satisfying the latter part of my project hypothesis.

In a different test, I was not able to conclude that there is a significant difference between pre-show and post-show mean score on attendees’ interdisciplinary views. In other words, this result suggests that the attendees’ stance on whether or not they believe art and science can find common ground stayed the same on average, before and after the
show. The pre-show mean is 4.6 while the post-show mean score is 4.8. Although there is an increase on the degree of agreement with the statement, the change is not enough to be significant.

A major realization after the play construction is that the spatial relationships among the stars of Orion may suggest that the ancient civilization’s perceptual reality of the Universe can change just as easily as me shifting the 3-D constellation structure around. This realization is astounding due to how much stories evolved around Orion due to its qualities of being easily spotted: three stars in a straight line. This realization also further emphasizes how fragilely our knowledge rests in subjectivity. All branches of knowledge are gained through perceptions. Science is no exception. Therefore, I push future research and creative activities to use more interdisciplinary methods, so that our dedications can achieve more wondrous things than ever before.

Before the project, I was fixed on a method that is primarily intuitive—I now learned that this is a bit of an outdated take in art practice. Furthermore, it unwinds the Scientific Revolution. After further research, I grew a new perspective on the relationship between artists and astronomers, and it led me to archaeoastronomy, a discipline I have not heard of before this project. As the foundations were set, I gradually learned to let go of previous fixations and let everything breathe and transform.

In my opinion, this piece has certainly taken a life of its own. My mentors have aided me in setting the foundations for the work, but the theatre-machine has absolutely carried my own sense of wonder to an alternative dimension I had not yet dreamed of before its constructions. The space holds a certain amount of magic and life that is simultaneously organic and calculated. It is ritualistic and scientific, and all the while, it
is educational. The piece reinforces the concept that nothing is absolute and that there is not a single subject in science and in art we can claim we know everything about.

The audience members are a valuable resource as they made the piece come to life in the end and helped me realize that I can indeed make an interdisciplinary creative activity that is both wondrous and educational. I learned that people in the University setting are quite open to interdisciplinary research to begin with. Therefore, if I could do the performance again, I would love to test out the installation in locations where art and science are more segregated and see if the piece can have a significant shift in people’s perspective on interdisciplinarity. Potentially in my future works, I want to further investigate ways to implement valid research methods in subjects that are difficult to measure by numbers. Of course, I wish to continue making works that are educational in intent. The quest to make wonder in context of existing works by scientist-artists and vice versa is a fruitful one, yet in the end I led myself to more questions than answers. This is not an unusual result, since research, after all, is an endless process to abandon ignorance and advance in knowledge in all areas of interests.
Post-Show Anonymous Commentaries:

- Loved the element of physical experience.
- I think this was heading in the right direction, but I think more is necessary in order to properly teach. I am not an auditory learner, so I wasn't able to retain much of the information given to me. I was hoping for more visual signs or illustrations of the constellations to actually view the constellations. The idea of the dome was a very creative idea, but because of the abstractness of the "alien" and video interactions we watched it was a little difficult to understand the point of each of the actions. Also, while we were in the dome the video was directed to the side of the opening, so we could only see an edge of the video.
- I really enjoyed this, I think you had me at the tunnel with lights :-). If there was one suggestion I had it would be that maybe you should tell people how to sit inside so they would see the most. We sat next to the chair since there were two of us but I think we missed a couple of bits. I really loved how it seemed original and very well thought out, I would be happy to go to future things like this, or hear more about your work. Peter
- Best show I've seen in my entire life. Amazing, your show was fantastic you beautiful, strong creative woman!
- Awesome show! Great installation :) 
- Great! Keep doing art <3
- Excellent show 
- Very impressive 
- A wonderful experience, things like this should be available to school kids! Thank you.
- The show was great. It felt like a small observatory or a theater – it made me feel like a child again that was listening to a thesis/science show. Thx for this experience.
- Love it! The space felt so unreal which made it a little frightening, but brought me great comfort at the same time. I learned too. Also enjoyed the tunnel, like walking into another dimension.
- Very mind expanding, scary, and trippy. Overall very interesting. :) 
- Awesome!
- Very informative, adding your own accents to the recording was a nice little distraction. You can turn the volume down just a bit to remove the speaker cracking.
- Great work! Hope you will continue to produce more work like this! It is great you are combining art with solid science.
- I really liked the dome and looking up during the show. Just like looking up at the sky!
- I loved this! More of this please! The way the play was set up was awesome too. Thank you again :) 
- Really interesting! Loved the way it was set up. Never had to crawl to see a play :) 
- AWESOME, Thanks!
- Very awesome performance!
Production Notes

body.wav
play.mp3 (after bell)
Narration
flashlights point around the domes
at end of commentary, turn on black lights (2x)
go on stairs

Act 1:
1) pig+jaw
2) zebra
Commentary:
flashlights point around the domes
at end of commentary, turn on black lights (2x)
go on stairs

Act 2:
1) zebras
2) orion, lion
Commentary:
flashlights point around the domes
at end of commentary, turn on black lights (2x)
go on stairs

Act 3:
1) lion, jaw
2) orion, ming-arri
Commentary:
flashlights point around the domes
at end of commentary, turn on black lights (2x)
go on stairs
Closing:
turn on projector, press play
twist lights on orion constellation
announce end of show, ask audience to exit through their right side.
STAR MAPS, EARTH CODES
An experimental play by Danni Wei

Bridging Astronomy and Art, facts and imagination, allow us to bring the Universe closer to mundane life on Earth.

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by appointment only - limited 30 spots

*RSVP e:  http://tinyurl.com/starmapsearthcodes

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Arts Building - ROOM 245
Free & open to the public
Suggested Parking in Lot 24
Information: danni.wei.artspace@gmail.com

made possible by Department of Art, Department of Physics and Astronomy and NSF funding
Performance Information, Outline, and Script:

Dec 5, 6, 7, 8, 9
5-8 p.m.
Each performance will run for 30 minutes each (25 minutes show, 5 min transition between shows), 9-15 people per day, 3 hours for 5 days
Total number of people walking through = 45

OUTLINE
5 mins - PRESHOW
- 3 mins - EXPLORATION
2 mins - OPENING
5 mins - ACT ONE: INDONESIA and COMMENTARY
5 mins - ACT TWO: AFRICA and COMMENTARY
5 mins - ACT THREE: SOURTH AUSTRALIA and COMMENTARY
5 mins - CLOSING and EXIT

SCRIPT
I. PRESHOW
5 mins - [Spectator meets doorman, sign in, asked to be careful as they crawl through the tunnel. The Spectator is kindly asked to remain seated and remain silent, but are allowed to use chimes inside the spaceship to communicate.]

II. EXPLORATION
3 mins - [Spectator crawling through tunnel, exploring spaceship.]
[Sound = vacuum, bodily sounds: breathing, heartbeat]
[Visuals = Red LED light along the middle of the tunnel to lead the way to the spaceship entrance. Cushions and blankets on bottom of tunnel]
[Visual of spaceship interior is also glow, but not overwhelmingly like the tunnel. The little stage curtains will be located at the entrance, between the tunnel and the spaceship. There will be some symbols on the wall, hinting elements of the story. There will be chimes along the ceiling of the spaceship (not the dome).]

III. OPENING 2 mins
[Sound = At first sound of chimes played by the Spectator, the sound of theatre will come on of an orchestra warming up instruments]
[Visual = The lighting transitions from complete darkness to lit stars, to lit bird masks of ACTORS 1 and 2]
IV. ACT ONE: ANCIENT INDONESIAN SKYLORE
2 mins
[Sound = sound of planting, dirt, water, pig oinks, yelling gibberish, murmurs] [Visual = "Plow", cultivating plantation, turn into "Spring Trap", "Pig" chased by "Hunter", "Pig" turns into "Pig Jaw" hanging by the "Hunter"]
.5 min - TRANSITION
2.5 min - COMMENTARY
[Sound = 2 astronomers commenting with computers running in background] [Visual = Light dims to darkness, take puppets, backdrop out, leaving only Orion Constellation lit]

V. ACT TWO: ANCIENT AFRICAN SKYLORE
2 min
[Sound = sound of "Dogs" chasing "Pigs", man, dog, buck, old man chased by widows] [Visual = "Husband" goes from home and his "Wives" to hunt three "Zebras". only has one arrow. Missed arrow, cannot get back because of "Lion". Cannot return to face "Wives".]
.5 min - TRANSITION
2.5 min - COMMENTARY
[Sound = 2 astronomers commenting with computers running in background] [Visual = Light dims to darkness, take puppets, backdrop out, leaving only Orion Constellation lit]

VI. ACT THREE: ABORIGINAL SKYLORE
2 mins
[Sound = laughing, grunts, dogs barking] [Visual = "Man" with firey arm chases "Sisters". "Dogs" help protect the "Sisters. "Eldest Sister" feet glows firey and "Man" is mocked while an owl, a spider and the moon laugh at him.]
.5 min - TRANSITION
2.5 mins - COMMENTARY
[Sound = 2 astronomers commenting with computers running in background] [Visual = Light dims to darkness, take puppets, backdrop out, leaving only Orion Constellation lit]

VIII. CLOSING
5 min - Projection onto Orion 3D Constellation Model (dancer)
EXIT sign appears, and the Spectator will be shown out.
INTRODUCTION

Narrator: On cloudless nights, throughout winter from where we stand, one can observe the brilliant constellation of Orion, the huntsman of Greek mythology, with Taurus the bull on one side, and bright Sirius on the other, gracing the night skies. Orion is instantly recognizable by its three bright stars in a short line—Orion’s belt—and the brilliant giant red star, Betelgeuse. Bellatrix is the right shoulder of Orion, and Rigel is the other bright star. Roughly between Rigel and the Belt lies Orion’s Sword, which appears as 3 fuzzy stars. The Orion Nebula—where new stars were born—is the middle “star”, hanging off of Orion’s belt.

These stars are linked to the daily lives of people from various cultures. They make myths from Orion, many myths, which help them conduct their daily lives, using stars for their existence. We are studying this relationship through the compound of anthropology and astronomy, "archaeoastronomy", the study of how people evolve with their understanding of phenomena in the sky. Let us take snippets of some studies conducted on their traditions, thoughts, and understandings of Orion, and examine how their knowledge reflects their relationships with the world around them. Perhaps, that knowledge might reveal something about where our own society stands... in the Universe.

ACT ONE: Indonesian cultures: Javanese, Banjar, and Meratus - Ammarell (1.5min puppets, .5min transition, 1min dialogue)

[Sound = Electronic]
[Visual = “Plow”, cultivating plantation, replaced by/dancing with "Spring Trap", "Spring Trap" attempts to catch "Pig", "Pig" gets away, but chased by "Hunter", "Pig" replaced by "Pig Jaw" hanging by the "Hunter", who dies and corpse facing north-south to Mecca]
[a sharp ended tool rising and setting: reminding farmers to sow and harvest]

TRANSITION (.5min)
[Light pans from puppets to two Puppeteers (Wearing Bird Masks), drawing away their puppets] [Light Dims-10secs] [Closes the Ceiling Lid, Light source shines from outside onto a section of the dome, through its holes, revealing the constellation group from the story, (showing: Bellatrix, Betelgeuse, Rigel, Saiph, and Orion Belt]
COMMENTARY:

[Sound = Ambient] [Visual = Light dims to darkness, take puppets, backdrop out, leaving only Bellatrix, Betelgeuse, Rigel, Saiph, and Orion Belt lit]

A: It never fails to intrigue me how aware the Javanese were of the stellar movements. They watch the rising of the Pleiades and Orion at dawn in June, marking the end of one agricultural cycle and beginning of a new one... they know exactly when to start sowing and when to finish harvesting.

B: They use the Solar Stellar Calendar, don't they?

A: Correct. And in the 19th century, every ordinary Javanese farmer had access to the complex and complete agricultural system of what they called the Pranatamangsa calendar to tell the natural order in which stellar observations were embedded. A whole guide for them, right there in the sky.

B: That's extraordinary. I don't even know when its tomato season, but the Javanese can tell you by just looking up!

A: The Meratus, on the other hand, were marginal users. They're cultivators and hunters, so their concept of weeks and months only exists within the 4-month farming period. They know they should start harvesting when Orion comes out at dawn, but, after that, they are just waiting for it all to happen again.

B: Wow, different concept of time, huh?

A: Yes, it is so different from our own. Our nervous system can't even handle our society's time demands. It's crazy! Every microsecond matters, like our stock market!

Indonesian tribes use these stars for more than just farming and hunting. They also use it for religious reasons. Another tribe of Indonesia, the Banjar, who are mostly Muslims, for example, use Orion's belt to properly bury their dead.

B: Did the Meratus and the Banjar interact much?

A: Yes they did. Geographically speaking, they're very close, so they share similar linguistics and economic systems; but, culturally, they're different. The Meratus saw the Orion's belt as a "Spring Trap", a reference to the luring of wild pigs into their hunting traps during springtime. On the other hand, the Banjar translates the belt into pointers to the Kaaba in Mecca, the place of pilgrimage. The three stars, making the Orion sword, are called "Corpse Stars" - oriented north to south. They aid the ritual of laying the deceased on its right side with head facing north—to Mecca.

B: The Indonesian cultures have such varied reasons for skywatching.
A: Yes, agriculture, foraging, and religion... Their knowledge of Orion reflect their social structures and cultural interactions. Their skylores give us incredible detail on their perspective of their Universe.

ACT TWO - African (1.5min puppets, .5min transition, 1min dialogue)
[Sound = sound of "Dogs" chasing "Pigs", Ocean and shuffling of sand, old men, old widows in chase]
[Visual = "Husband" goes from home and his "Wives" to hunt three "Zebras." Only has one arrow. Missed arrow, cannot get back because of "Lion." Cannot return to face "Wives." Three "male tortoises" hung on stick, chasing three "female tortoises" hung on stick]
TRANSITION (.5min)
[Light pans from puppets to two Puppeteers(Wearing Bird Masks), drawing away their puppets]
[Light Dims-10secs]
[Closes the Ceiling Lid, Light source shines from outside onto a section of the dome, through its holes, revealing the constellation group from the story, (showing: Bellatrix, Betelgeuse, Rigel, Saiph, and Orion Belt]
COMMENTARY (<1min)
[Sound = Ambient] [Visual = Light dims to darkness, take puppets, backdrop out, leaving only Rigel Betelgeuse, Orion belt and sword lit]
A: There is an extremely rich oral tradition in sub-Saharan Africa, but there are very few, if any, astronomical artifacts. With the urbanization and industrialization, many of the stories are not being told anymore. A widespread African concept is that the sky is a solid dome, perhaps made of blue rock, resting on the Earth, upon which the Sun moves. The traditional Tswana idea is that stars are holes in the rocky vault that is the sky. The Nyae Nyae !Kung Bushmen saw the sky as the dwelling place of all the divine beings and spirits of the dead.
B: I see... What about the Orion constellation? It's very important to the Indonesian tribes, so how did some cultures in the African continent see Orion?
A: Several cultures identify the Orion Belt stars as animals ... Batswana from Moruleng, a town in North West province of South Africa, saw the stars of Orion's belt rise at sunset near mid-November, the hunting period for bush pigs and warthog. They are seen as 3 pigs also by the Sotho, Tswana, and the Karanga of Zimbabwe. The Masai, on
the other hand, refers to the Belt Stars as "Three Old Men Pursued by Lonesome Widows".
B: That is quite charming. They are such resourceful and observant poets with magnificent imagination of the Universe! It's a pity that these stories are vanishing as we speak.

ACT THREE (1.5min puppets, .5min transition, 1min dialogue): based on The Orion Story from Wandunya (pg8 in Aborigines article)
[Sound = laughing, grunts, dogs barking]
[Visual = "Man" with firey arms chases "Sisters". "Dogs" help protect the "Sisters. "Eldest Sister" feet glows firey and "Man" is mocked while an owl, a spider and the moon laugh at him.]
[Dark to Light] [the universe is shown, 6 female-looking (2 puppets) descends from the heavens communicating with one another, laugher is heard]
[some unknown mammals small in size running around the females]
[mammals play-fighting, one knocks down other, females snickering, pets the mammal, mammal makes sounds similar to a purr/chirp(happy)]
[flames sounds, thumping footsteps---gone]
[women panics, but settle down. walks on and finds food]
[eat food, a Man drops down from heavens, startled then running away (around the Spectator 1 cycle, Man chases women around Spectator 1 cycle]
[mammals makes horrifying sounds back at Man to keep him away]
[one Alpha Female (devilish) descends and spread something..to Vshape]
[Man backs off and lights arm of “fire magic” but dimmed due to one of the Alpha Female’s end of Vshape’s glazing end]
[Man looks shaken] {meanwhile, the Alpha Female lets the mammals to be their shield}
[Man’s anger makes arm fierce again]
[Alpha Mammal with sharp head-drills drops down and attacks Man, swinging east and west] {meanwhile, Alpha female laughs, while other females get lifted, and the Alpha Mammal returns, and the females returns a dark bird-like creature and moon and a 6 legged creature laughs harder}
[Man weakens firearm and looks shaken - humiliated again] TRANSITION (.5min)
[Light pans from puppets to two Puppeteers (Wearing Bird Masks), drawing away their puppets]
[Light Dims-10secs]
[Closes the Ceiling Lid, Light source shines from outside onto a section of the dome, through its holes, revealing the constellation group from the story, (showing: Jupiter at the bottom below Hyades, Canopus, Moon, Rigel, Pleiades, (legs) Hyades, (foot) Aldebaran, Babba—what modern star is it?, dingo puppies—unclear, and Orion)]

COMMENTARY:
[Sound = Ambient]
[Visual = Light dims to darkness, take puppets, backdrop out, leaving only Orion Constellation lit]
A: The Aboriginal astronomical traditions from Ooldea, South Australia are just as poetic and beautiful as the Greeks', the Indonesians', and the Africans'. In their version of Orion, “...Jurr-jurr, a species of night owl, has a distinction of being translated into the star Canopus, watching over Ming-arri, who were women in long ago times who never wished to mate with men. Ming-arri, the Aborigines' Pleiades, is being pursued by Nyiruna, the Aborigines' Orion, 'round and round the sky'. The sisters occupy a unique position in native legend. They lived by themselves and kept a tribe of dingoes to keep all men away, the dogs killing and eating all the men they caught. Ming-arri brought forth and reared their babies, but laid the injunction on each one as it grew up that “it must never talk or whistle” or the men would catch it. Nyiruna was a great hunter in those days, and he wanted Ming-arri badly for his wives, and left them food to catch them, but the dingoes ate the food and chased Nyiruna away, and when Ming-arri went into the sky, Nyiruna followed them. There he is, still chasing them, while the dogs continue to keep him away. Because their mothers never let them speak in the old days, Ming-arri have now no voice at all.” Nyiruna is prevented by Kambugudha, their eldest sister, or the Hyades, who guards her younger sisters. Kambugudha taunts Nyiruna by standing before him with her V-shaped legs of bright stars, the “head” of Taurus. The club in Nyiruna's right hand, Betelgeuse, fills with “fire magic” ready to throw at Kambugudha. However, she defensively lifts her left foot, Aldebaran, the eye of Taurus, which is also filled with “fire magic”. This causes Nyiruna great humiliation and he puts out his own fire magic. In her contempt of his vanity, Kambugudha places a line of dingo
puppies between her and Nyiruna, represented by an arc of stars between Orion and the Hyades.
B: This remarkable oral tradition concerning Orion and the Pleiades belongs to the Mingarri totem, widely known in Central Australia from an Aboriginal community near Wandunya. Although the tale has no usage in terms of survival, the oral tradition plays an active role in keeping the community together.
A: Right, its their way of continuing their bonding, while passing on their knowledge about the phenomena in the sky throughout the generations.

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**CLOSING** (5min: Narration + projection + 3D Orion) projection fading into ACTOR3
projection content: Flickering of light making the 3D Orion structure. What appears to be stars are actually city lights filmed from an airplane -- bringing Spectators back to our familiar civilization.
[Sound: Same grand music as introduction]
[Visual: Ceiling lid opens up, shows one-channel video projection onto ceiling]

**Narrator:** Low mass stars end their lives in a peaceful way. They just blow their gases and material into the outer-space. A Supernova is the death of a massive star, such as Betelgeuse.
The Betelgeuse, also known as Alpha Orionis, is a giant red star, the shoulder of Orion. It is a monster in comparison to our very own sun—950 times greater in diameter. Its pulsation indicates its upcoming death. This happens for thousands of years—that's why it varies in brightness. It's going to blow up anytime soon—maybe 2 hours or a thousand years. It varies for a period of 400 days, so Betelgeuse would need to be observed over many cycles spanning several years for its variable nature to be noticed.

When it finally blows up, we will see a brightness in the night sky that will even be visible during the day. We don't know how bright it will get, but we will see something, which will be leaving behind a neutron star. So that's... a Supernova exploding.

Now the question is... What would the death of Orion's shoulder mean to these ancient cultures?
ACTOR3 (holding the 3D Orion structure) slowly raises up to the projection, rotates the 3D Orion structure to show all dimensions, in synch with the music. Bring down the middle light/star of Orion belt to inner clear dome, make float down like a snowflake.
Head: Thank you for your attention. Please follow the exit sign and watch your steps. It has been a delight having you here with us.
(curtain will be lifted by him, guided by the light from 3D Orion structure. He will briefly exchange conversation regarding the 3D Orion structure and the show itself)

*NOTE: Nyeuna link to Orion

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References:


In Search Of The Dark Star the Dogon African Tribe Sirius Planet Star X. (2012).
Retrieved January 14, 2016, from
https://www.youtube.com/watch?v=g0oiYB5JQAg


N. Abrams, 104-119.


Star Maps, Earth Codes Project Documentation: