A Religious Dimension Of Technology: Technological Mediation and Voyager 1

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1: Introduction

The sky is filled with half-truths and metaphors. The sun rises; there are "new moons". Orion's belt and the big dipper moved across the firmament which was like ceiling over the Earth. There are shooting stars and there were once eclipses foretelling the end of the world. The sun was once made of blood and the earth stood upon a celestial tortoise. The "heavens" was once meant much more literally than it is today. There is a confusing sensation brought about by peering upwards at the encompassing night sky which seems to induce a kind of grandiose lunacy or sometimes terror at the vacuous blackness. Humans have come up with countless descriptions and explanations for the moving lights of both day and night; many of these have followed along with religious explanations and worldviews. These worldviews truly are *world views*: perspectives on how this thing humans walk on relates to everything else. They are answers to questions of human importance in the universe and have prescriptive elements based upon this ordering. We were once at the center and were the center of attention but as new views of the planet were possible, different relationships between humanity and the cosmos emerged. This thesis is about such a view of the world and about the technology through which this view is mediated. On one hand, this perspective is another step away from an anthropocentric cosmos, however, at the same time, it seeks to orient humanity around a sense of the "human spirit".

Experiences of the divine, of a spiritual realm, of mystical truths have long enamored the minds of religious individuals and scientists alike. When studying religion there are litanies of perspectives from which one can start. Some concentrate on that sense of the divine, others, the reality of human spiritualism, others still on the truth of holy texts. Some instead look at conflicts between religion and science, religion and morality, or the psychological underpinnings through which religious positions are held and propagated. Many of these perspectives have underlying assumptions about what is and is not religion, about what science and

rationality necessitate, and about the purpose or truth these mystical experiences contain. There has been much and heated discussion about how religion fits into our more scientifically inclined modern world however questioning the assumptions through which these investigations take place show the categories and divisions they rely upon to be less clear than they imply. Often, bringing a fresh perspective to discussion can provide new insights about the topics themselves but also about trends previous dialogues have followed. As seen in the natural sciences, new views sometimes require new tools through which the unseen can become seen and what was once occult can be revealed.

Toward this end, I will use the approach of technological mediation to look at how technology is involved in experiences of religion and science. To look at all technologies which have a religious role would be too much for this text, so instead I will mainly look at a single artifact which is especially apt to show how technological mediation brings a new perspective to the study of religion. In this way I hope to answer the following question: How can technological mediation be used to understand the religious dimension of technology? In order to do this, two sub-questions will also be considered: How can technological mediation be used to understand how religion and science relate? How does a technological mediation analysis of a quasi-religious artifact take place?

Technological mediation has been used to look at scientific instruments [Verbeek, pg174] since technology and science have a clear interaction and scientific study often uses technology in an active way in its process. In religion, technology is not often a focal element, instead technology is used to create a context or setting for experience. Despite this, there are some cases where technology takes a more active role. In this paper I will look at a modern technology which is both a scientific instrument and a object intended to mediate a religious experience. Toward this goal, I will first look at a few other examples of technology becoming a focal aspect in a religion. I will then look at a classic text in the philosophical study of religion by William James in which he suggests philosophy should become a “science of religion” while at the same time rejecting science alone as being capable of satisfying individuals’ religious needs. Then, I will turn to a complimentary text by

Carl Sagan in which he reflects on religious aspects of science, associating science with a search for, or worship of, a form of divinity. After comparing these views I will turn to a scientific instrument designed by Sagan to mediate a religious experience of the cosmos: Voyager 1. Through technological mediation I will look how microperctions, marcropreception, lifeworlds, and multistability can be used to understand Voyager 1 as both a religious and scientific object. Finally, I will look at how mediation can be used to shed light on the religious dimension of technology.

A philosophical study of technology with sensitivity to spiritual questions relevant to religion and science and their interaction enables the philosophical study of religion to be expanded. The approach of technological mediation as presented by Peter-Paul Verbeek, based on work by Don Ihde, contains these necessary attributes. Starting from the classical philosophies of technology from Karl Jaspers and Heidegger, mediation has a phenomenological foundation which is augmented by pragmatism and its accompanying empiricism. This postphenomenological approach enables technological artifacts to be analyzed and their relevance to philosophical questions exhumed. In applying mediation to the Voyager 1 space probe, its features will be examined in respect to how they influence perception of the world in a human---technology---world type model. These influences will help elucidate the relationship of religion and science which motivated and is perpetuated by its existence and design. With this goal in mind, I will look at the historical setting in which Voyager 1 is situated, the motivations of its designers (principally Carl Sagan), the rhetoric surrounding the artifact, and psychological factors embedded in its design. These points of study will be used to critique James' study as well as show how technological mediation can be used to further investigate the relationship of science, religion, and technology in general.

Voyager 1

Voyager 1 may seem like a strange object to choose to do a case study about mediation and religion; my reasons for choosing it are four: it seems to be an emerging phenomenon with few examples, the recent popularity of Carl Sagan's work especially with the Cosmos TV series, it poses a particular challenge for pervious research in the philosophical study of religion, and because it straddles a perceived gap between scientific instrument and religious artifact. Voyager 1 embodies an interaction which is still developing between religion and science, as well as between humans and the world.

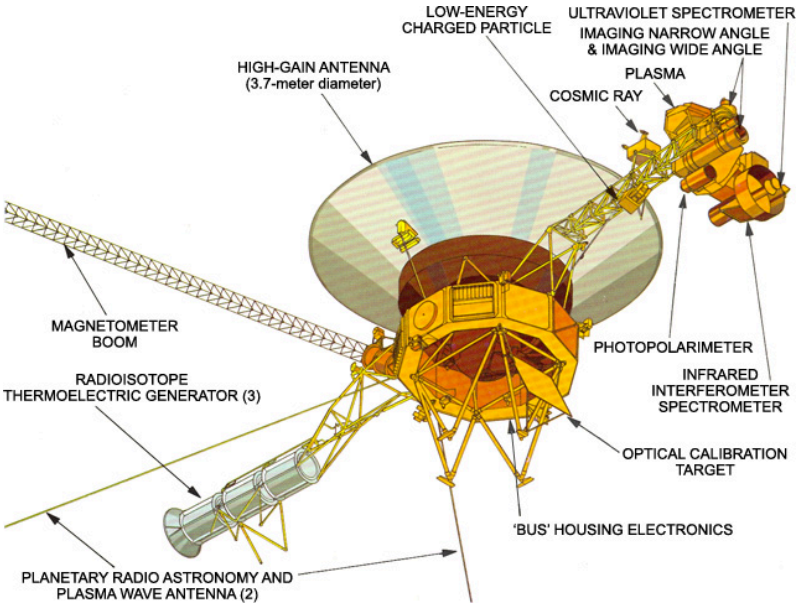


Figure 1: Voyager 1 Diagram

The Voyager 1 space probe is a unique piece of technology at a unique place in the universe. It is the furthest human-made object from planet Earth having been launched in 1977 and only recently entering interstellar space [Jet Propulsion Laboratory, 2014]. Voyager's mission is both scientific and has a religious dimension as shown by its lead designers goals for the craft. Carl Sagan's vision for this object will be discussed in full later in this text but first I would like to point out two connected artifacts which exemplify these goals: The Golden Record and the Pale Blue Dot photograph. On the Voyager 1 space probe there is a gold plated gramophone record titled "The Sounds of Earth." On The Golden Record there are images from Earth depicting a wide varieties of human

activities, music from an array of cultures, and an assortment of greetings in many languages. Designed as a kind of message in a bottle from humanity, it is meant to embody the "human spirit". The Pale Blue Dot photograph is an image of Earth taken by Voyager 1 as it started its journey away from the solar system. It shows the Earth as a tiny, barely visible, speck of light surrounded by the dark sea of space. The image elicits a very different experience of our planet than is normally accessible; one which shows the Earth seemingly humbled and insignificant in the face of the cosmos.

Varieties of Varieties

A foundational text in the philosophical study of religion is *Varieties of Religious Experience* written by William James in 1902. In this text James utilizes his pragmatic approach to understand what religion is in terms of how it functions in the lives of religious individuals. This perspective provided new insights about religion as it showed the beginnings of a scientific study of religion. In addition to the function of religion, James also looked at how religion and science relate to each other. He outlined a stance where a scientific worldview could never satisfy the individuals' religious needs and could never bring the benefits he saw religion as providing for individuals. This will be looked at more closely in the following chapter, however his position can be contrasted with that of the designer of the Voyager 1 space probe and author of *Varieties of Scientific Experience*: Carl Sagan. These differing understandings about the interaction or intermingling of religion and science will be examined in the second chapter, *Varieties of Varieties*, before outlining where the main points of conflict lie. Through this comparison a sharper understanding of science and religion will arise which bring new questions about how they can relate, questions which threaten assumptions made by James and require further

investigation. Philosophy of technology will be introduced as having the ability to extend James' study of religion and address these conflicts.

The Science vs Religion Debate

Much attention has been devoted to conflicts between science and religion. These debates generally follow the form of confronting a person who has a specific religion such as Christianity or Islam against a well-known atheist or agnostic. Four individuals have even been given the bombastic title of " The Four Horsemen of the Apocalypse": Richard Dawkins, Daniel Dennet, Sam Harris, and Christopher Hitchens. Numerous books have been written by these provocateur and reached large numbers of readers, in part through media which feeds on conflicts. But this paper is not about this debate; instead this paper will suggest the polarity of the two positions is an unnecessary assumption. In place of looking at the conflict between science and religion, this paper will seek to understand how they are intermingled by William James and Carl Sagan, and embodied and perpetuated by the Voyager 1 spacecraft. However, I think a brief overview of the conflict thesis for religion and science is necessary since its practitioners have gained public notoriety and may be what most people think of when they imagine science and religion together.

The *conflict thesis*, broadly speaking, states science and religion are in opposition to each other, either in practice or ideologically. To say they are "in practice" in conflict is more of a description of how they have opposed each other throughout history. The stronger definition of the conflict thesis, that religion and science are ideologically opposed, is used to explain the historical conflict [Russel, pg3]. Historian Collin A. Russell looked at the history of this perceived conflict, writing:

> "For nearly a century, the notion of mutual hostility has been routinely employed in popular-science writing, by the media, and in a few older

> histories of science. Deeply embedded in the culture of the West, it has proven extremely hard to dislodge. Only in the last thirty years of the twentieth century did historians of science mount a sustained attack on the thesis, and only gradually has a wider public begun to recognize its deficiencies." [Russel, pg4]

Popularly perpetuated examples of the conflict such as the stories of Galileo and Darwin dominate discourse while contrasting stories found in the history of chemistry (alchemists) and foundations of physics (Newton and Einstein) are forgotten or ignored. At the same time, the examples of conflict which do exist show tension can arise; pragmatic philosophy offers a way to understand these tensions and settle disputes. Upon questioning the assumptions of the conflict thesis, a deeper question of how the two domains dynamically overlap and co-create each other arises which will be one of the main areas of investigation in this thesis.

Along the line of this same conflict is the perception of technology being disconnected or a threat to religiosity. William Fore wrote in his text *Television and Religion*, about three threats: the movement of resources away from religious organizations and goals, the erosion of religious vocabulary, and the growth of religiosity divorced from organized religion [Fore, pg1]. In addition to these three there remains a distrust in religious experiences which come about through the utilization of anything not deemed divine as if these experienced are less authentic and somehow fake. It may be because of these conflicts little has been written about religion and technology in terms of their connectedness. This text will help to fill in this gap. To begin toward this end, the following section will take a look at a few instances where technology is involved in religious experiences.

The Spiritual Sciences

"Any sufficiently advanced technology is indistinguishable from magic."
-Arthur Clarke [*Hazards of Prophecy: The Failure of Imagination,* pg36]

Throughout the history of science there have been many configurations of science, technology, and religion. Voyager 1 is one such instance with a certain place in this history. In this section I will look at other configurations to show how technologies have often been used in religious contexts with religious implications. Doing this will help give a context to Voyager and show how its intended mediating effects are unique but also part of a larger group. The first section on Hierotopy pertain to the more common way technology is utilized by religions as an environment creating tool while the follow two sections on Alchemy and Scientology show how technology can take on a focal role. This section will also help to understand the cultural context of the Voyager 1 space probe to further show how its design was influenced by the point in time it was conceived and how more recent science-technology-religion configurations contrast with Voyager 1. This section will not express the ideologies behind each instance in full but instead the purpose is to briefly show how technology is taking on a mediating role in each religious context.

Hierotopy

The academic field of 'Hierotopy' specifically looks at how sacred spaces such as churches and cathedrals connect the divine and human worlds into different relations. Different qualities of God can be amplified or reduced through the design of places of worship. I use the terms "amplify" and "reduce" since they are the same used by Idhe to describe scientific instruments [Verbeek, pg44]. Gothic Cathedrals embody one ideation of divinity while, for example, Ethiopian Orthodox churches embody a very different sense of divinity. Throughout history technology has even been developed to build these towering gothic arches: the

Figure 2: Cathedrale de Coutances in France. An Example of Gothic Architecture

invention of flying buttresses to enable ever taller walls, techniques in dome building to make the internal space ever more expansive, the use of gold nano-particles to make red stained-glass. In this configuration, technology is used to create experiences for those attending the church, at the same time, these cathedrals were also status symbols of wealth. They were the tallest structures in the world as well as the most expensive. One can only imagine the structures we could see today in city centers had this trend continued. What it means about society that the tallest and most expensive buildings are now offices, hotels and condominiums is a topic for another paper, however, philosopher Albert Borgmann looked at cathedrals in terms of being focal things for communities and compared them to space shuttles, towering achievements of technology and wealth in their own right. Borgmann was very much against this transition, saying this shift has influences on how reality is perceived [Borgmann, pg180]. He calls this shift the device paradigm since the technology or technology-dependent objects are no longer used as a focal thing but instead a means to an end. The space shuttle was only there to move people to space, while a cathedral brings people together. This is a disparity in *engagement*; a cathedral creates a space and way of engagement while a space shuttle does not. In terms of different designs of places of worship, one could critique structures in terms of how well they encourage forms of engagement as opposed to simply being used to disperse sermonic information.

Figure 3: Ethiopian Orthodox Church in Bermuda - Debre Ganet Immanuel Cathedral Church

Alchemy

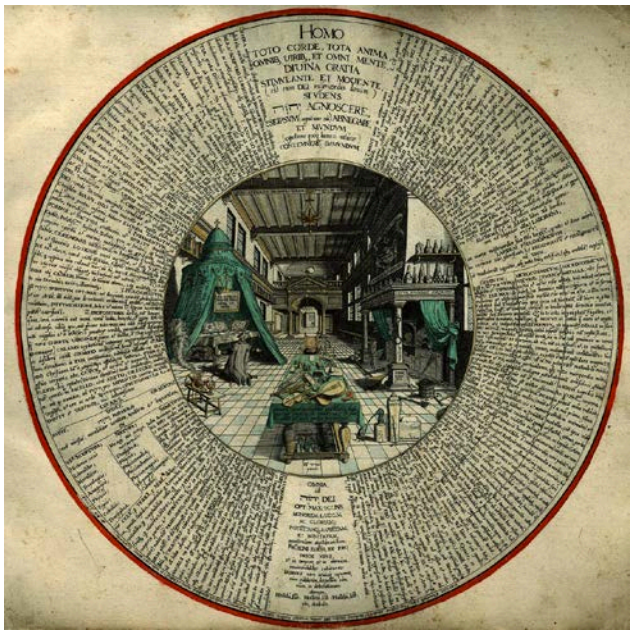


Figure 4: ***Alchemist's Laboratory*** **1595**

There have been many different kinds of alchemists through the middle ages. Some were simply obsessed with gold, others with spiritual purity, others still with knowledge of God. Laying the foundations of chemistry, these alchemists delved into the study of materials and reactions but this pursuit also often had deeply spiritual connotations [Steiner, pg5]. In the picture provided we see a typical alchemists lab from 1595; in it we see a mixture of religious and scientific artifacts. Many alchemists believed their reactions would only work once their soul was pure enough to be allowed a step closer to the philosopher's stone and eternal life [Steiner, pg4]. On the far left, we see an alter in front of which an alchemist is studying spiritual texts and praying to God under a banner which reads "Do not speak of God without Light". On the far right side stands the furnace and calcinator which many alchemists believed only operator properly after years of devotion to both the craft of alchemy, and God. In the forefront, flasks and other glass equipment can be seen while the table is covered with musical instruments and a scale. The lyre on the table is an ode to Hermes (a central figure in alchemy) who is supposed to have invented it and given it to Apollo in return for a scepter representing alchemical dualism.

In this configuration, science and technology earn their significance through relation to religion. The alchemists experiments only work if they are religiously devout and the transformations of the substances to the philosopher's stone represent transformations of the alchemists soul as he/she becomes more

Figure 5: ***The Alchymist, in Search of the Philosopher's Stone Discovers Phosphorus, and prays for the successful Conclusion of his Operation as was the custom of the Ancient Chymical Astrologers*** **by Joseph Wright 1771**

pure. In this example, science and technology are not opposed to religion but useful for learning about the inner workings of God and the self. In the image to the left titled “The Alchymist, in Search of the Philosopher's Stone, Discovers Phosphorus, and prays for the successful Conclusion of his operation, as was the custom of the Ancient Chymical Astrologers” an alchemist regards a flask of white glowing phosphorus with respect as if standing before an alter. Here, the technology-religion mediation comes about through the unique place of technology within the spiritual realm. [Chevalier, pg142]

Scientology

Scientology was established in 1952, 25 years before Voyager 1 was launched. A topic wrought with controversy, scientology embodies a unique and modern configuration of science-religion-technology. One of scientology’s main practices, called auditing, involves an “E-meter” which measures changes in the flow of electricity through a persons body while being asked a series of questions. The technology is similar to those used in lie detector tests but instead of looking for lies, auditors (higher-level scientologist who conduct the question sessions) attribute changes to the presence of “engrams”. These engrams represent negative experiences an individual has collected throughout their life; presence of an engram is seen as the root cause of future suffering and a lack of self-control. Auditors, after discovering an engram, continue to ask questions about the same topic until the individual works through the bad experience, removing the engram (it is important to note, engrams have a more complex spiritual definition involving the souls of dead extraterrestrials but this would require an overly elaborate digression) [Melton, pg29]. Because of this, the e-meter is considered by scientologists to be a “spiritual technology”. Connected to scientology are

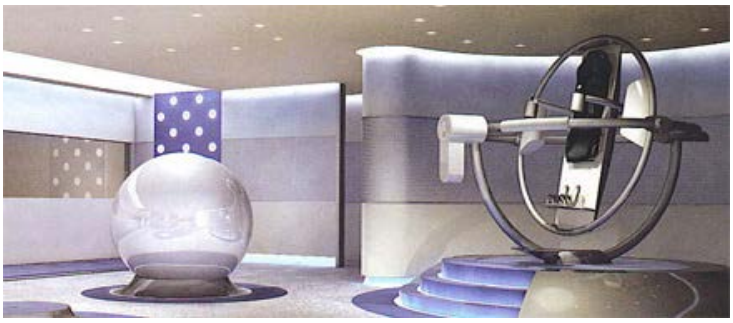


Figure 6: Example of Scientology’s “Advanced technology”

two incorporated non-profit organizations called The Church of Spiritual Technology and Religious Technology Center. These groups own, distribute and sell scientology literature and "advanced technology". Beyond the e-meter, other technologies have been leaked to be part of the church's practices such as anti-gravity simulators, oiliness sensitivity enhancement stations, a "smell wall", and, also in the leaked architectural plans, a type of "time machine". These technologies were developed to enhance adherents' perceptions, of which 57 are listed. All this to move a person closer to what scientologists see as their full potential. [Ortega]

The science-technology-religion configuration in scientology is complex enough for its own thesis. Broadly speaking, the mediation of technology takes place on a couple levels. First off, scientologists actively use technology to increase their sensitivity to certain microperceptions (through the 57 precepts). The macroperception within which these fit into is that of the overall worldview of scientologists which is that humans have a wealth of untouched potential which is impeded by lack of awareness and negative memories. Scientologists' implementation of technology suggests they view technology as a tool to enable superior spiritual and mental well being. At the same time, scientologists reject psychiatry because it does not incorporate their view of the spiritual nature of humans [scientology.org]. So there is a selection going on about which technologies (e-meter and auditing as opposed to counseling and medications) work and do not work. It is only after a person is an adherent to scientology and has begun to develop a scientologist lifeworld are they allowed to use these technologies, therefore the microperceptions occur within this framework which already supports certain macroperceptions about them. In the case of the Voyager 1, it would be as if one had to be a scientist at NASA before learning about The Golden Record.

These examples of how religion and technology overlap are an introduction the line of thinking that religion and technology are not disconnected but are in fact highly involved on a number of layers. From hierotopy we can see how technology is used to created a desired setting through which a certain religious experience is

encouraged. From alchemy, technology is shown to have the potential to become a focal aspect of religious experience. Finally in scientology technology takes on an active role in bringing a person closer to their religious goals. But these are all complex relations in their own right, in the following section I will first introduce some of the challenges of discussing how religion and technology overlap before laying out some of the important concepts I will use for this challenging analysis.

Central Concepts: Suspicions On The Hidden Realities of Air

William James approached the conceptualization of terms in his work as highly suspicious. James only defines religion after pages of caveats and softening of the conclusiveness or effectiveness of his defining such a term. [James, pg4-37] Such caution or outright rejection in defining the terms being used to make a description is something to be noted since it encourages the sensation of open discussion, of genuine, self-aware uncertainty, or even that the nature of the things being discussed are, in a way, unsayable. This is not surprising when one looks more closely at the topics James discussed: transcendence, religious experiences and faith. Because of this perceived incommunicability experienced in these different cases, the author calls upon readers to draw from their own similar experiences. The reader may or may not have previously reflected on these experiences, but James seems convinced they are common enough for individuals to use their own insight.

The subheading for this section is “Suspicions On The Hidden-Realties of Air” which is a reference to an alchemical text written by Robert Boyle. The topic of that text was something which previously had incurred little interest: the air which compasses and envelops us [Boyle]. I think James encourages a similar reflection with a similar amount of hesitance. He is attempting to give descriptions of what is taken for granted and occurs anyway in lives (both religious and non-religious), but these are only suspicions. For James, religion is a question of healthy human orientation such that all humans are always oriented in some direction whether this is called a religion or not. Like describing air as a combinations of nitrogen oxygen

and carbon dioxide, these conceptualizations of the important pieces going into an individual's "worldview", are non-obvious and can even come across as counter-intuitive.

In Foucault's Order of Discourse, we see a similar cautiousness but in this case toward discourse in general [Foucault, pg48]. He discusses taboos around which discourse becomes especially rigid, where there are unspoken rules about what can and cannot be said if one is to be considered either reasonable or mad. The two taboos he names as most dubious are sexuality and politics but I see a similar difficulty arises in discussing topics related to religion. Foucault attributes the existence of these taboos to their relation to desires and power, a relation which religion similarly partakes in. I only mention this with the hope of quelling any unease that might come about when reading a term such as "religious", "quasi-religious", or "spiritual" which I will now define as they will be used in this paper.

The terms religiousness and spirituality will play an important role in this text. Though they are not synonyms they tend be to used to describe similar things. A study done about the words themselves from *Journal for the Scientific Study of Religion* showed many people describe themselves as spiritual as opposed to religious when forced to choose only one. 41.7% of respondents said 'religiousness and spirituality overlap but they are not the same concept' while 38.8% said 'spirituality is a broader concept than religiousness and includes religiousness'. Only 6.7% said 'religiousness and spirituality are different and do not overlap' [Zinnbauer ,pg554]. In this text the difference between the terms is not the subject of study, they will be used mostly interchangeably since this paper is about areas where they seem to overlap. Similar to religion and spirituality, an overlapping of religion and science is a focus of this text as has already been shown in the technologically infused religions discussed in this introduction. The term religious-scientific will be used to denote instances of this form of overlap. Lastly, "quasi-religious" describes something which fits some criteria for religion or spirituality but does not fully qualify; "quasi-religious" can be thought of as describing something on the edge of religion, neither clearly non-religious nor religious.

2: Varieties of Varieties

William James

In this chapter I will introduce the framework, methodology, and concepts William James uses in his study of religions. I will start by explaining his pragmatic approach and pragmatism in general, as he is known as one of its "founding fathers". After this I will look more closely at the text "Varieties of Religious Experience" and elucidate his stance on mystical experience, religious experience, and religion as a whole. Lastly, I will discuss James' views on science and technology in relation to religion.

Before going into James' philosophy, I would like to reflect on the question: why William James? Why use the theories of a physician and psychologist turned philosopher to understand an interstellar spacecraft? I can think of several motivating factors. To begin with, James' *Varieties of Religious Experience* represents a paradigm shift in the study of religion toward empirical research, turning religious studies into a more scientific endeavor. This opened up the possibility of religion to be understood on new grounds; definitions for religiously relevant words could come from a place outside of the religions themselves. The foundation for James' understanding of religion comes not from internal reflection of what religion is to him but instead from the experiences others have with religion and how it functions in their lives. He began with varying individuals with radically different stories and attempts to ascertain the meaning and role of religion in people's lives from these disparate positions. This concentration on religious experiences, their character and function, will provide a starting point for thinking about how Voyager 1 is involved in similar experiences. Since pragmatism is an approach which concentrates on empiricism and experiences, it will help to form a conceptual basis for the mediation analysis of Voyager 1 through providing a perspective on religion based on

experience. In addition, James idea of philosophy becoming a "science of religion" shows a science-technology-religion configuration to be compared to that held by Sagan in his complimentary text *Varieties of Scientific Experience*.

Pragmatism

In this paper I will use pragmatism in a couple different ways. First, in the following section, I would like to highlight its use in studying religions by William James. Secondly, I will use it to support a description of the Voyager space probe as a quasi-religious object based up the functions it was designed to have. But first, I must give a response to the following: what is pragmatism? How is it different from other philosophical methodologies? What makes it distinct and unique?

A good place to begin would be with one of James' own lectures titled "What Pragmatism Means". In this lecture he outlines the basics of pragmatic philosophy, doing so in a, for lack of a better word, pragmatic way, giving examples of situations where a pragmatic outlook provides conclusions which are functional. The hope is that when people see how pragmatism behaves when confronted with questions others will be able to employ it themselves. What is interesting is how this methodology for teaching about pragmatism embodies several qualities which are important for pragmatism: the primacy of the consequences and functionality as opposed to reaching abstract categorizations, importance of empirical information, and nearly illimitable openness to hypotheses. Each of these facets will be examined closer in the following section before I bring them together again to discuss James' work in religious studies.

Since moving to the Netherlands I have been told on many occasions "The Dutch tend to be very pragmatic" generally this is said with pride, with the exceptions of when describing decisions made by Royal Dutch Shell Corporation. Whether The Netherlands is a pragmatic nation or not is another question for another paper however I think it is interesting to note the pragmatic quality which is often being referred to is this preference for something which works as opposed

to something which fits perfectly into previous definitions, categories, or laws. In the pragmatic tradition there is an impulse to put this functionality as the foundation from which other things can be built. In What Pragmatism Means, James shows how this can be juxtaposed with rationalism where ideas about truth comes from more abstract foundations in logic. James argues that such abstractions do not represent a way of thinking which is usable in people's lives, instead the idea of truth is approached with the individual in mind: how does truth, or what we call truth, function in our lives? What are the consequences for the human being if this or that definition of truth is employed? If there is no difference in the consequences, the definitions are affectively the same regardless of how they are described. Discovering differences in consequences becomes a high priority in pragmatism; this is done using an empirical methodology. (James, *What Pragmatism Means*)

William James was also one of the founders of American psychology; from this scientific background he saw the value empirical data can have in making reliable predictions about the world and individuals. Empiricism in pragmatism helps provide a foundation for devising a new way of categorizing beliefs and actions based upon empirical differences. In *Varieties of Religious Experience*, James outlines different relationships people can have toward a religion and how these different relationships affect a persons experiences and life regardless of what the specific religion is. This empiricism is tied to the falliblism inherent in pragmatism. Empirical work is necessary to overturn previously held conceptions, a happening which pragmatism sees occurring continuously. Empiricism and falliblism enable an openness and pathway to doubt established paradigms, while pragmatism's concentration on functional differences enable a new way for lines to be drawn, albeit, these lines are seen as likely temporary until new empirical information is available. The qualities discussed above enable a wide range of hypotheses to be open for investigation. Concern about whether something fits into an established framework is no longer the goal, but empirically discovering functionalities. This concentration on functionality and consequence comes directly from Charles Sanders Peirce's philosophy: " If there were any part of a thought that made no

difference in the thought's practical consequences, then that part would be no proper element of the thought's significance." (Pierce, pg286)

Varieties of Religious Experience

Twenty lectures given in Edinburgh during 1901 and 1902, transcribed into the book *Varieties of Religious Experience* embody the pragmatist tradition applied to the study of religion. In this book William James looks at how religion functions in different individuals using empirical observations of religious individuals, calling it a study of human nature. In this study, he makes several distinctions which will be useful for the later analysis of the Voyager 1 space probe. He first discusses the difficulty in defining religion however puts a definition forward to be used in the text. Following this I will look at two lectures, one where James describes mystical experiences and one where he outlines the role of philosophy in a religion. Next, I will look at his concept of healthy-mindedness and the correspondence he sees it has with religion.

In defining religion, William James navigates through religious lexicon to first pick out what his definition is not. The first thing his definition is not is an attempt at demarking religion's essence; such a description would undermine James' pragmatic and falliblistic ideals. In addition to this, James wants to avoid giving an explanation of the origin of something called "religious sentiment" since, in his view, there are many religious sentiments which are manifested differently. Also intentionally absent from his definition is the necessity for the religion to be part of an institutional or organized body of other similarly mind individuals; instead he concentrates on personal religion defined as "the feelings, acts, and experiences of individual men [sic] in their solitude, so far as they apprehend themselves to stand in relation to whatever they may consider divine." (James, *Varieties*, pg38) In addition to this he describes how religiousness can be found in a multitude of settings and toward no defined set of objects, such that "religious emotion" can come about from awe toward "a forest at twilight or in a mountain gorge" if a

connection is made between the experience and the divine. [James, *Varieties,* pg35] However, this description requires further clarification about what is meant by the "divine". I will now look at how William James considered mysticism and philosophy in religion, as this will further illuminate James' "divine". From this definition of religion and through his study of religious people, James finds five commonalities in the "religious lives" of these individuals:

1: "that the visible world is part of a more spiritual universe which it draws its chief significance"
2: "That union or harmonious relation with that higher universe is our true end;
3: "That prayer or inner communion with the spirit thereof – be that spirit "God" or "law" – is a process wherein work is really done, and spiritual energy flows in and produces effects, psychological or material, within the phenomenal world"
4: "A new zest which adds itself like a gift to life, and takes the form either of lyrical enchantment or of appeal to earnestness and heroism."
5: "An assurance of safety and a temper of peace, and, in relation to others, a preponderance of loving affections." [James, *Varieties,* pg467]

Mystical states of consciousness form one marker of personal religion for James. He identifies this state in four ways: ineffability, noetic quality, transiency and passivity. That a mystical state of consciousness is ineffable means an accurate explanation of the experience does not feel as if it can be captured by words; the state transcends human lexicons. The noetic quality refers to the sensation of this state giving one access to a special insight and knowledge. James writes, "They are illuminations, revelations, full of significance and importance, all inarticulate though they remain; and as a rule they carry with them a curious sense of authority for after-time."[James, *Varieties,* pg367] Thirdly, mystical states are transient in that they come and go instead of being reached and then sustained. Because of their ineffability, memory of the state feels imperfect. Finally, mystical states come only to a passive recipient. James notes that several things can make a mystical state more

likely to occur. Passivity also refers to the sensation of being under the control of a "superior power" during a mystical state.

I would like to contrast this description of mystical states with James' view of philosophy in religion which starts with the question "Is the sense of divine presence a sense of anything objectively true?" [James, *Varieties*, pg416] In James' opinion the answer to this question is hidden, what is more interesting is how religious or non-religious people react to evidence one way or the other. He uses the example of arguments "proving" the existence of god. He points out that these arguments have existed for centuries but have failed to convert the world so the proof must not be as clear as some people might perceive. Instead, they only seem to reaffirm the beliefs we already hold. An argument proving the existence of god to an atheist instead convinces the atheist that religious people cannot do philosophy very well; while theists accept the argument as confirmation of god's existence. James wrote "They only corroborate our preexistent partialities." [James, *Varieties,* pg423]

Psychical Research

On the fringe of scientific inquiry during the nineteenth century was research into parapsychological phenomenon. William James was a part of this movement and was one of the founding members of the Society for Psychical Research which would go on to include many intellectuals, and even Nobel Laureates. [Junior, pg 65] James felt an empirical investigation of parapsychological phenomenon would open up new ways to heal illnesses. One study called "Consensus of Hallucination" amassed over 2000 reports of apparitions of dead individuals by families or friends. After adding strict criteria to filter out the hallucinations least likely to require supernatural explanation, the authors had 32 cases where apparitions of deceased individuals were seen within 12 hours of death by family or friends who did not know the person had died. James calculated the prevalence of such hallucination to be greater than would be expected if they were cause by mere chance. James would continued to attempt to understand what caused these hallucinations, as well as trances and behaviors of mediums, throughout the rest of his life. Disagreeing with

some of his contemporaries, he saw these hallucination and trances as positive psychological experiences, even bringing to light knowledge inaccessible to the normal mind. This brought him in conflict with other scientists of his day, but he generally had a negative view of the scientific climate, calling it: "agnostic positivism, radical materialism, mechanical rationalism, a vicious intellectualism". Instead, James argued for a radical empiricism based on experiences. James wrote "Everything real must be experienceable somewhere, and every kind of thing experienced must somewhere be real." [James, *Essays in Radical Empiricism,* pg81] So it was never a question of where parapsychological phenomenon were real, but rather, what is the experience of them? For James, the answer seemed to lie outside known natural sciences. This was not a call to supernaturalism, on the contrary, the lack of explanation meant more empirical research was needed to bring it into focus within natural theories.

Religion and Science

At times, James' philosophy is unpredictable. On the one hand, he seeks to make philosophy a science of religion, however, at the same time, rejects ideas of scientism. In *Varieties* he wrote about the increasing common view the laws of nature should be regarded as the only source of objective truth, and scientific methodology itself ought be "revered". Instead, James saw such a rationalization unable to illuminate relevant truths about life, only aiding in knowledge of relatively superficial aspects of existence. [James, *Varieties,* pg468] His dismissal scientism is softened, however, in saying the conclusion that science can replace religion is at the very least, premature. Instead, James suggests a combination of religion and science gives an individual the best chance for "good health" in the sense science helps with physical sickness, religion encourages healthy-mindedness. [James, *Varieties,* pg470] Furthermore, James quotes Tolstoy as saying the problem he put forward to science could never be answered by it: "the meaningless absurdity of life." [James, *Varieties,* pg155] It is in these deep crevasses where existential questions emerge which James felt science inherently fails to give a satisfactory answer. In his quest to

develop philosophy as a science of religions, he explains how science can interact with the problems of Tolstoy without replacing the religion within: "Yet as the science of optics has to be fed in the first instance, and continually verified later, by facts experienced by seeing persons; so the science of religions would depend for its original material on facts of personal experience, and would have to square itself with personal experience through all its critical reconstructions." [James, *Varieties,* pg441]

James was also aware of the influence science has had on the religions of his time. He discussed how developments in science (among other developments) created a need for a different kind of God than had previously been conceived. There were new questions and conflicts, moral uncertainties and social contexts. In addition he claimed science could help reject religions which include absurd or incredulous claims, however, science itself could not replace these religions for the reasons stated above and restated here: science's inability to address personal questions of existential nature, and its seemingly endless incompleteness. One final passage in particular explains this inadequacy in verbose terms and connects us back to the cosmic theatre in which Voyager 1 is now an actor:

"Our solar system, with its harmonies, is seen now as but one passing case of a certain sort of moving equilibrium in the heavens, realized by a local accident in an appalling wilderness of worlds where no life can exist. In a span of time which as a cosmic interval will count but as an hour, it will have ceased to be. …. It is impossible, in the present temper of the scientific imagination, to find the driftings of the cosmic atoms, whether they work on the universal or on the particular scale, anything but a kind of aimless weather, doing and undoing, achieving no proper history, and leaving no result. Nature has no one distinguishable ultimate tendency with which it is possible to feel a sympathy…. The bubbles on the foam which coasts on a stormy sea are floating episodes, made and unmade by the forces of the wind and water. Our private selves are like those bubbles—epiphenomena; their destinies weigh nothing and determine nothing in the world's irremediable currents of events." [James, *Varieties,* pg472]

In this chapter, I gave an overview of James' philosophy and concentrated on his study of religion. In terms of philosophy, his pragmatic method has similarities to the technological mediation method I will be using later to analyze Voyager 1. Commonalities include a concentration on experiences, utilization of empirical evidence when present, and usefulness at semantic dispute evaluation. His findings about religion, such as description of religious experience and mystical experience, will be contrasted with Carl Sagan's view of science in the follow chapter and picked up again for application to experiences with Voyager 1.

Carl Sagan

"We are star stuff."

- Carl Sagan

Voyager 1 required extensive amounts of planning and design; many of its features and mission would have turned out different if it had not been for the program director: Carl Sagan. Though he was not a philosopher, strictly speaking, he brought a unique approach to the mission and sought to include some non-scientific objectives. Since his name is not a common one in philosophical journals I will give a brief summary of his achievements and life for the sake of understanding part of what motivated him to steer the Voyager program in a way not solely based on scientific motivations. In this short biographical section I hope to convey a sense of his overarching worldview since it helps show how and why he saw the voyager program as having implications beyond scientific academia. Later in this text, I will extensively describe the Voyager 1 space probe and Voyager mission in general. This section will provide a basis to understand Sagan's ideation of religion when designing Voyager 1 and his intentions in designing it to have spiritual significance.

Born 1934 in Brooklyn, New York, Carl Sagan quickly developed an interest in science, however through a scholarship he first studied at University of Chicago in

a “Great Books” program. By 1960, Sagan had earned a doctorate in astronomy but his interest in broad topics with deep human implications continued. A biographer noted that Sagan struggled with “grand dichotomies—between reason and irrationalism, between wonder and skepticism…He yearned to believe in marvelous things (UFOs, alien civilizations, life on Mars), yet reason usually brought him back to Earth” (Davidson). Existing on this fringe between the fantastic and scientific led Sagan, who also had an interest in biology, to study things not necessarily encouraged by mainstream science. Exobiology (the study of life on other planets) was an emerging field at this time, eyed by many astronomers as overly pseudo-scientific. In postdoctoral work he studied biology and wrote on topics within the field of exobiology and planetary science. After moving to Harvard and then to Cornel, Sagan joined the science team behind NASA’s missions to Mars.

Sagan was more than just a scientist; he also excelled at educating the public about science. He organized and presented at several symposia where fringe scientific ideas could be debated. His ability to connect to a lay-audience and articulate yet witty demeanor let to further educational opportunities such as writing science books for the general population and appearances on popular television programs. The public became further interested when plaques commissioned by Sagan went on four NASA space probes and he won a Pulitzer Prize in non-fiction. He truly became a household name when, in 1980, millions of people worldwide watched him as presenter of the *Cosmos* television series (recently remade with Neil Degrasse Tyson at the helm). *Cosmos,* with the subtitle *A Personal Voyage,* won him both an Emmy and Peabody award. Increasingly he spent his efforts on public education, writing books and combatting pseudoscience. [Davidson]

The combination of spiritual and scientific ideas and language was Sagan’s modus operandi throughout his television and writing career. Sagan paid homage to William James by writing a book titled *Varieties of Scientific Experience – A Personal View of the Search for God* (like James’ *Varieties*, this book was based on his Gifford lectures) in which he praised James definition of religion as “feeling at home in the universe”; however, I could not find anywhere James used this exact phraseology. In

Varieties of Scientific Experience, Sagan took on several topics: humanity's place in the universe given the current cosmology given by science, the idea of extra-terrestrials, natural theology, and religious experiences. He discusses old cosmologies involving crystal ceilings and creation myths, as well as evolution and, of course, exobiology. All the while, he examined the process through which relevant discoveries were made, and new cosmologies or histories were disseminated. He paints a picture of how science has slowly eroded previously held visions of our "home in the universe"; at the same time his explanations of more modern cosmologies seek to imbrue them with a more personal and spiritual significance.

Varieties of Scientific Experience

In this section, I will look specifically at Sagan's *Varieties of Scientific Experience* as it relates directly to James' similarly titled text. Here we see commonalities and differences in how each approach religion and science. Later in my thesis I will contrast the two to show how they conflict in a number of ways, but this section will function more as a summary of the relevant ideas.

Varieties of Scientific Experience, which was published post-humorously, begins with an editor's note written by Sagan's widowed wife (who was also an integral member of Voyager's design team) Ann Druyan. In it she talks about Sagan's spiritual life, he's view of science as "informed worship" and about how learning about nature was, in his view, learning about God. She noted that he read sacred texts from many religions and quoted them in debates with religious leaders. He took the question of God so seriously that any means of questioning which might shed light on the issue had to be utilized:

"He never understood why anyone would want to separate science, which is just a way of searching for what is true, from what we hold sacred, which are those truths that inspire love and awe. His argument was not with God but with those who believed that our understanding of the sacred had been completed." [Sagan, pg7]

The book begins with a brief discussion about superstition which Sagan defines simply as belief without evidence. Sagan turns to the etymology of religion to give it a definition: to bind together. From these ideas, he begins the real matter of the essay: natural theology through newly discovered knowledge about the universe. Here, Sagan juxtaposes a western conception of God with a cosmos which is mostly filled with darkness and empty space, where entire worlds take eons to form then are destroyed in supernovas, where the distances between points of light are immense, and where questions about how it functions are still mysterious and unknown. He writes "A general problem with much of Western theology in my view is that the God portray is too small…It is a god of one small world." [Sagan, pg21] According to Sagan the domains which science and religion attempt to confront are extremely similar, but the method for seeking answers to the questions therein are different. Religion has largely tended toward a binding together through superstition while science seeks to do the same thing through evidence. This difference in methodology is not a rule, however, religion and superstition are not synonymous in the same way that science and evidence are synonymous, he writes. An example of how religion and science work together is given through a quote from Albert Einstein: "I maintain that the cosmic religious feeling is the strongest and noblest motive for scientific research." This leads Sagan to ask the question of whether a creator god would prefer an individual who, unthinking, worships, or someone who seeks to understand the cosmos in all its glory. [Sagan, pg11] Addressing western religions he says this seeking for answers enables a person to be in a state of love which is informed by truth instead of superstition. He concludes the chapter my stating his own beliefs:

"My deeply held belief is that if a god of anything like the traditional sort exists, then our curiosity and intelligence are provided by such a god. We would be unappreciative of those gifts if we suppressed our passion to explore the universe and ourselves. On the other hand, if such a traditional god does not exist, then our curiosity and our intelligence are the essential tools for managing our survival in an extremely dangerous time. In either case the enterprise of knowledge is consistent

surely with science; it should be with religion, and it is essential for the welfare of the human species." [Sagan, 22pg]

Sagan looks at the anthropomorphic principle which states that any view of the cosmos will include an explanation of why humans exist. In the past, this question did not require much consideration since humans were center stage in the universe, literally the center of the universe. In this way, the universe existed for humans, our importance was clear. Since the Copernican revolution, this view has become more and more difficult to hold since this was only the first "demotion", as Sagan called it, of the Earth [Sagan, pg23]. The Sun turned out not to be "The" Sun but simply "a" sun and the solar system, likewise. Our galaxy turned out to be one of billions. Not only are there many more suns, solar systems and "earths" our there, but we are not the center of it all:

"So those who wished for some central cosmic purpose for us, or at least our world, or at least our solar system, or at least our galaxy, have been disappointed, progressively disappointed." [Sagan, pg24]

Other scientific discoveries have also eroded the traditional view of human identity; after these cosmological models, Sagan looks at evolution and the age of the Earth. He notes how this "battle" between religion and science continues to this day; Sagan sees this as understandable because of what evolution does to human identity. Before evolution, humans could be seen as separate from the rest of the natural world, as having an element of something beyond. Yet again, we are special; anthropocentrism persists and we can trust our rational minds as something more than animal and our destiny as greater than the ants. An evolutionary understanding of humanity, along with the other changes in cosmology, led to another threat, this time more hypothetical: extra-terrestrials. Could it be there are other creatures in the universe which are equal to or superior to us in terms of rationality or creativity? Sagan leaves the question open but suggests this could be another threat to the belief that humans are in some way special. With this as an

introduction, Sagan's next few chapters look at the solar system and its capacity to harbor life by examining evidence brought by the Voyager mission. He discusses organic molecules and the speed of chemical reactions and the path to intelligent life; all this to bolster the idea that life may be prevalent throughout the universe but developed technologically advanced civilizations are likely far far rarer.

The next chapter I will be examining is titled "Extraterrestrial Folklore: Implications for the evolution of Religion". Sagan begins the chapter by saying the hypothetical existence of aliens deserves philosophical reflection [Sagan, pg57]. He first looks at the text *Chariots of the Gods* which puts forward an extraterrestrial hypothesis for the construction of pyramids and other ancient man-made wonders. Sagan dismisses the hypothesis but is instead interested in the widespread appeal of book. He suggested it was because it positioned extraterrestrials as possible saviors of the Earth; gods watching from on high, intervening when necessary using their advanced technology and science [Sagan, pg58]. Sagan references Hume's *An Inquiry Concerning Human Understanding* to compare evaluation evidence of extraterrestrials to evidence of miracles. In either case, it is more interesting and even exhilarating for the explanation for an event to be aliens or gods but this desire can cloud judgment and prevent a person from realizing they merely saw an airplane or snake-oil salesman with a penchant for parlor tricks. Suggesting a miracle has a non-miraculous origin is even where the term "devil's advocate" comes from as the Catholic Church would always designate a bishop to argue against the divinity of a happening [Sagan, pg61]. Sagan concludes the chapter by suggesting skeptical inquiry should especially be applied to topics which we have a strong emotions involved:

"Well, it seems to me that there is only one conceivable approach to these matters. If we have such an emotional stake in the answers, if we want badly to believe, and if it is important to know the truth, then nothing other than a committed, skeptical scrutiny is required. It is not very different from buying a used car. When you buy a used car, it is insufficient to remember that you badly need a car. After all, it has to

work. It is insufficient to say that the used-car salesman is a friendly fellow. What you generally do is you kick the tires, you look at the odometer, you open up the hood. If you do not feel yourself expert in automobile engines, you bring a friend who is. And you do this for something as unimportant as an automobile. But on issues of the transcendent, of ethics and morals, of the origin of the world, of the nature of human beings, on those issues should we not insist upon at least equally skeptical scrutiny?" [Sagan, pg63]

Faced with a difficulty similar to James in defining religion, Sagan discusses defining "God" from the standpoint of his natural theology. He compares gods throughout time, both how they have been conceptualized by individual believers and how the gods of other religions were seen, for example: "The Romans called the Christians atheists." When comparing the differences of Olympian gods to the God of the bible it's startling the same word was used to describe both. He outlines a western conception of God shared by Christianity, Judaism and Islam: "omnipotent, omniscient, compassionate, who created the universe, is responsive to prayer, intervenes in human affairs, and so on." [Sagan, pg64] Then he asks whether a being who created the earth but was not compassionate would still be God and points out how at least one well-known theologian, Paul Tillich, denies the supernaturalism of God. Sagan speaks about how Einstein had an idea of God as the sum total of physical laws which would put atheism in a strange position. Because of this great variety, Sagan chooses to reflect on specific conceptualizations of gods instead of choose a set definition which would likely leave out large swaths of people who consider themselves "believers".

In the following chapter Carl Sagan looks specifically at religious experience. He begins by looking into the history of religion and even the history of the study of religion with a quote from Democritus who, in the fifth century BC, stated: "The ancients seeing what happens in the sky, for example, thunder and lightning and thunderbolts and conjunctions of the stars and eclipses of the sun and moon were afraid, believing gods to be the cause of these." So, as a starting point, Sagan looks at animism which includes experiencing the supernatural in natural objects and

happenings. From here he moves on to the belief that human can influence the supernatural forces by doing rituals or saying prayers. Lastly, he discussions some more Freudian understanding of religion and, in connection, quotes Fyodor Dostoyevsky: "So long as man remains free he strives for nothing so incessantly and so painfully as to find someone to worship." These three formulations (religion for explaining natural happenings, religion for gaining agency against natural forces, and religion as the product of psychological and sociological forces) form the foundation for the second half of the chapter on how this relates to a scientific worldview. He starts with brain chemistry, relating changes in behavior and experience to the chemicals present in the brain at a given point in time. He discusses how different states are possible if one is under stress, has consumed a substance such as alcohol, or through deprivation such as fasting. He suggests a term for a chemical which produces religious experiences, either through deprivation or consumption of another substance: theophorin. One common aspect of religious experience which Sagan says is almost always present is the a combination of "awe and humility before a power vastly greater than ourselves"[Sagan, pg77]. At this point, Sagan asks what would be advantageous about having such a chemical in the mammalian brain of humans except to promote social stability and morality through group submission to whatever this vast thing being experienced is. This suggests the cosmological aspects of any religion are, in some way, extra, the real important aspect of religion is its ability to promote a safe and healthy society.

The final chapter in *Varieties of Scientific Experience* is titled "The Search" which implies a continuous process of discovery. This chapter best embodies Sagan's approach to both religion and science. Here we see similarities with pragmatic philosophy as Sagan suggests we are constantly trying to incorporate new knowledge and ideas; he goes further and suggests this search is the fabric of religion and science and that it is unlikely *the search* will ever truly end. Sagan discusses our time as an era of competing ideologies, sometimes culminating in fighting and death. Though this has been a continuous process, according to Sagan our age is of special importance as we now have the ability to destroy the planet as a

whole (whether through nuclear weapons or destruction of the biosphere). Sagan suggests science, by providing a view of Earth from the outside can provide a perspective that discourages seeing one's own ideology as the end-all-be-all. He goes on to outline several qualities to further aid in this conflict of ideologies: skills of explication, dialogue, and compassion. Why is there not a commandment "Thou shalt understand the world" he asks before summarizing the challenge we currently face:

"And we have grown up on this planet, trapped, in a certain sense, on it, not knowing of the existence of anything else beyond our immediate surroundings, having to figure the world out for ourselves. What a courageous and difficult enterprise, building, generation after generation, on what has been learned in the past; questioning the conventional wisdom; being willing, sometimes at great personal risk, to challenge the prevailing wisdom and gradually, slowly emerging from this torment, a well-based, in many senses predictive, quantitative understanding of the nature of the world around us. Not, by any means, understanding every aspect of that world but gradually, through successive approximations, understanding more and more. We face a difficult and uncertain future, and it seems to me it requires all of those talents that have been honed by our evolution and our history, if we are to survive… I think if we ever reach the point where we think we thoroughly understand who we are and where we came from, we will have failed. I think this search does not lead to a complacent satisfaction that we know the answer, not an arrogant sense that the answer is before us and we need do only one more experiment to find it out. It goes with a courageous intent to greet the universe as it really is, not to foist our emotional predispositions on it but to courageously accept what our explorations tell us." [Sagan, pg90]

This section on *Varieties of Scientific Experience*, along with the previous piece on James, give a basis for understanding relations between religion and science. In addition, it provides ways to characterize spiritual experiences both within traditional religious contexts as well as scientific contexts. Toward answering

the question of this thesis, these *Varieties* show different ways religiosity presents itself through variant experiences. In the following section, these differing perspectives will be compared and contrasted to further show how religion and science relate with the purpose of integrating how technology, something normally only associated more with scientific contexts, can have a religious dimension.

Varieties of Varieties

I can only wonder at how the conversation would go if Carl Sagan and William James met for a drink at the Bolwerk. It would have been a great resource for the writing of this thesis. But, alas, separated by almost 100 years, the majority of the 20th century, these two individuals could not meet. If they had, what might they have clinked their glasses in agreement about; what might have lead to shouting? In this section, I will juxtapose the two *Varieties* to discover commonalities and conflicts found in their differing approaches and views about how science and religion interact and interrelate. I will first look at broad differences and similarities between the two books such as their main subject of study, methodology, scope, and style. Following this I will look more closely at several points of overlap such of religious experience, mystical states, and, lastly, how scientific knowledge about the cosmos interacts with religious experience. The purpose of this section is to show how different conceptions of what counts as religious result in different perspectives on its potential. Since James and Sagan come to conflicting conclusions about how science and technology can be involved in religious experience, this section will aim to understand how this conflict emerges and how this can provide a way to better analyze the religious dimension of Voyager 1.

Showing a variety of experiences marks the first core similarity between the two texts. Each author sought to display differences in how their chosen focus is embodied and perpetuated by individuals of varying degrees of familiarity and understanding of the given subject. For example, James looks both at individuals

who have reflected little on their particular religious situation as well as individuals who have gone through conversions following active reflection. Sagan looks both at strict scientists as well as those who operate on the fringe. Each author attempts to show the wide array of conceptualizations found in their chosen domain. This approach, to look for examples and evidence of different ways an idea is realized, can be understood as being a part of the pragmatic method James explicitly employs and Sagan less explicitly utilizes. This method of looking out into the world for different constructions of either religion or science leads them both to difficulty in defining terms since any definition risks excluding exotic or fringe constructions. The benefit both authors enjoy from this process is they can better grasp actualities about religion or science and since they are both concern with how these things function in individual's lives they end up with texts which are more widely relatable by the general public.

Each text is concerned with a topic whose existence and development spans millennia, but the mere eighty years between the two lead to vastly different historical settings. Technology is one of the main causes of this disparity. Sagan lived in an age when space seemed like the new Wild West, the new America; we had traversed the ocean of the atmosphere and discovered a new world. James still lived in an era when a ship capable of reaching such height, much less the navigation equipment necessary for a safe return, were either dreams or not even. In addition, the newest scientific threat to religious authority in James' time was evolution, a scientific discovery nearly devoid of technology. The older threat and conflict, pertaining to the movements of celestial bodies, had had a technology, namely telescopes, as a focal point. In this new game, technology played a lessor role. James also lived during the industrial era, when technology was more about economic expansion than advancement of scientific knowledge. Further still, if the main effect of new technology is seen as occurring predominately at one's job or during travel, the idea that technology could be involved in religion in an integral way becomes even more distant. Since James keeps science and religion separate, concentrating on applying one to the other, technology's role would be confined to developing tools to investigate the fabric of religion instead of becoming somehow involved in

the experience itself; not so, for Sagan. In Sagan's time technology was expanding the minds of the public, both indirectly through images from space and directly through the administering of LSD.

Both James and Sagan were concerned with the expansion of their fields into new domains and so, took up topics on the fringe. For James this meant the empirical study of psychic phenomenon, for Sagan – exobiology. Both saw deep implications if their search came up with results. Parapsychology would place the human mind in a wider, spiritual universe where souls of the dead could speak from the underworld or telepathy could be honed and practiced. Discovery of extraterrestrials would show humans as part of a grander story of life spanning light-years and millennia; we would be one strange instance of a phenomenon ubiquitous throughout the cosmos. Both looked to science and empiricism to help discover these new realms, driven, similarly, by the question of 'what are we?' James thought, maybe, spiritual creatures in a spiritual world; Sagan thought, maybe, just one example of life among many. But there is another similarity between psychic research and exobiology: each has a class of "believers" considered, more or less, "crazy". To combat this image, both Sagan and James had to apply the strictest criteria and empiricism in order to defend against this label. It is interesting to note neither search was conclusive, instead, it seems, each person developed a belief of some kind that their investigations were merely the initial inkling of human beings being a part of a larger web of existence.

If you read between the lines of James, you find an attempt to keep humans as something beyond the animal, or at least, that this belief is necessary for a healthy mind. Sagan, living eighty years later, could look back at history and see this systematic erosion of anthropocentrism; instead of fighting it and discovering a new way to put humanity in a special place, he sought to embrace the humility, make the universe so unimaginably vast and full of awe that it becomes a spiritual humility. James surely was not against humility but maybe humility before God (instead of Cosmos) found in gothic cathedrals or amongst a towering canopy of trees satisfied the personal aspect James saw as integral in religion.

Another major difference between the two *Varieties* is James' devotion to pragmatism; since he was a philosopher and psychologist, he was somewhat restricted to writing a text which follows a form understandable and acceptable in academic discourse. Sagan, on the other hand, was much freer, more concerned with public education and inspiration. Though they both have a knack for colorful descriptions and illuminating analogies, James had a different audience in mind than Sagan. Because of this, comparison becomes more difficult. Though Sagan often uses reason which takes on a pragmatic appearance such as his approach to superstition, he does not explicitly claim to be a part of any philosophical school.

Though they both look for varieties, they look for varieties under different headings: religion and science; however, these terms become intertwined at different moment's in each work. Both authors show how science provides a certain type of information not found in religions. James wants science to inform us about religions, understanding them from an empirical point of view. Sagan's perspective, instead, shows science and religion as working in parallel, or even, continuously cooperating to ask and answer questions. It appears James wishes to keep science and religion separate, letting science enable us to understand religion while Sagan sees potential for a more reciprocal relationship: science informing religious standpoints as well as how understanding how religion functions, and conversely, religion informing and framing science. This conflict could be the product of lingering anthropocentrism in James' work since he suggested a purely scientific account of the universe would be, though full of awe and harmonies, too impersonal and abstract to bring about the benefits he saw religion as providing. In religion, James thinks humans need purpose, specifically, divine purpose. Sagan instead sees the scientific account as encouraging a healthy humility. It is as if they agree that a scientific understanding leaves little left in the sense of purpose for humans but James does no conceive of this as having a productive place in religion.

Religious experience takes on a different form and function in each text. To clarify, religious experience in *Varieties of Religious Experience* demarcated individual's religious lives, that is to say, personal religion in a broad sense. In *Varieties of Scientific Experience*, Sagan uses "religious experience" to describe what

James called “mystical experiences”; this will be the subject of a later section. Here I will be looking at religious experience as defined by James but this subtle change in phraseology deserves noting and examination. Why the shift? It may merely be a matter of rhetoric; mysticism has a stronger connotation of superstition than simply religion so Sagan may have chosen to use a word less likely to incur negative sentiment. In addition, James’ broader definition of religious experience may have conflicted with Sagan own conception of how worldviews should be denoted. Sagan never calls his own view “religious” yet it still incorporates religious concerns. At the same time he never calls his view strictly scientific; in the first chapter he even describes godlessness as something to be avoided but superstition to be equally dubious.

Sagan saw James’ philosophy of religion as leading to a definition for the function of religion: feeling at home in the universe (a maxim repeated in reference to James’ *Varieties* but may be a misquotation). *Varieties of Scientific Experience* seeks to provide a similar account of science, or at least, show how science can help one “feel at home in the universe”. However, this task at least partially conflicts with James’ understanding of religion and science since he sees science as too impersonal. The disagreement seems to stem from different understandings of what is adequately personal to bring about the health benefits James is concerned with or from disregard on Sagan’s part of this need for a personal place in the cosmic and/or divine storyline. It could also be that James would not call Sagan’s worldview as purely scientific, but science plus a religious element. It could even be that James would consider the task of making a scientific worldview fit with personal needs a religious endeavor: an experiment in his science of religions which is his desired conceptualization of philosophy. These uncertainties culminate into a single question: would James consider Sagan’s approach religious experience. If yes, then James hesitance toward a religion whose content is science is ungrounded. If not, the question will be what is missing from Sagan’s experience? And, is what is missing necessary for the benefits James sees religion as bringing? As a pragmatist, such evidence would trigger a re-conceptualization of religion as either not being the only source for the benefits he outlined or there is a need to broaden his

religious experience criteria to include something as steeped in science as Sagan's worldview.

Mystical states (Sagan's "religious experiences") were denoted by four qualities by James: ineffability, noetic quality, transiency and passivity. These qualities fit well with Sagan's theoretical theophorin; however, mystical states also come in a number of "modes" in Sagan's writing. There is a nature mode, a ritual mode, and a substance mode. These modes are derived from Sagan's brief history of religion regarding religious experiences. The nature mode could be brought on by observing natural phenomenon and suggesting a supernatural connectedness to explain its happening. The ritual mode pertains to states brought on by performing systematic actions such as chants or sacrifices with the goal of coaxing a supernatural entity to behave in a certain way. Lastly, the substance mode is brought on by consumption of certain psychoactive substances for the purpose of experiencing the spiritual significance of everyday things. James acknowledges mystical state could follow from many different causes; instead of inspecting and accepting or rejecting causes, he questions them on the grounds of their function. If a mystical state functions to strengthen a person's religion and promote healthy mindedness, then it is a valid form of religious experience. At the same time, these mystical states are never to be considered useful means for settling argumentation, as James noted. Sagan had an even more ambivalent stance to mystical states. With his neurochemical explanation he delved into implications of both revelation but also manipulation. In Sagan you find a much more tool oriented approach to mystical states along with James' conceptualization. In addition to this, Sagan highlights a strong correlation between mystical states with humility and awe instead of finding criteria to categorize an experience as mystical or not. With humility and awe Sagan suggests implications for morality and a stable society; James sees these as more associated with his religious experience, instead of the mystical states. To summarize this conflict, mystical states carry value for James in the sense they can fit into a wider religion; Sagan's stance instead places mystical experiences as something which is able to be predictably activated in people and can lead directly to humility and awe, absent from a clear worldview.

Finally, we reach the zone of the most crucial conflict. How do these two authors see scientific knowledge and religious experience as interacting? James suggests scientific conceptualization can detract from the effectiveness of religious experience at bringing about a healthy-mind. Sagan on the other hand, finds markers of religious experience in his scientific experiences and makes a broader claim that religions which ignore scientific knowledge do so from the basis of superstitions. These disagreements stem from differences in how personal they see science, and scientific knowledge; but whether science can give a personal account is only half of it, as James said there must be a harmony, in the sense of purpose giving. To put it succinctly, science lacks divine purpose and divinity is necessary for religion. James reached this conclusion through a pragmatic approach to religion, by looking at its function. His assessment about the necessity of divinity is tied to the ability a religion has to function as a healthy-mind producing worldview or way of life. Sagan's approach shows similar concerns but does not confine these benefits to what James considers religion.

This conflict, along with the previously described conflicts, are left unresolved at this point. It remains unclear whether Sagan's worldview is purely scientific or partially religious. In addition, inconsistencies regarding the handling of mystical states are shown but an explanation for this difference remains elusive. How has the place of science in religion changed since James began applying science to religion itself? These questions require further investigation and a broadening of involved elements since one could ask, what is the consequence of James and Sagan's view? To address these issues, I will use technological mediation to analyze the Voyager 1 spacecraft, and the context in which it was designed and built; in doing so some resolutions to these conflicts will reveal themselves.

3: Technological Mediation

Technological mediation seeks to understand how humans and technology change each other through time. It opposes itself to pervious approaches to the relationship of human beings and technology such as those proposed by Karl

Jaspers and Martin Heidegger. These previous approaches were marked by a general negative assessment of technology as a whole as a kind of danger to be avoided. Mediation also opposes itself to both instrumentalist and deterministic perspectives of technology, discovering itself as a kind of middle ground between these two. It borrows elements from both phenomenology and pragmatism toward a postphenomenological framework which finds value in phenomenology's blurring of the line between the internal and the external but applies empirical methodologies to understand where relevant interactions or influences are taking place. As technologies develop, so does the broad relationship between human beings and technology, but this is too large a scope for empirical methodologies, instead the development of particular technologies and the particular areas of human life which they mediate are what is to be investigated.

Though these classical philosophy of technology texts had a largely negative view of technology, they still uncovered hidden affects of technology. Karl Jaspers' concentrated on how human existential concerns are played out with technology. In his view, technology got in the way of authentic human existence, becoming a type of obfuscating structure between humanity and reality. His overarching philosophy which he applies to technology includes three layer: Daesin, existence and transcendence. As Peter-Paul Verbeek points out in *What Thing Do,* Jaspers analyzes technology through Daesin and existence but leaves transcendence out [Verbeek, pg45]. His reasoning for this is difficult to know but since transcendence is relevant for this study, I will briefly address his philosophy of transcendence for use in the following analysis section.

Jaspers' transcendence is of particular interest because it brands itself as a distinctly non-religious transcendence. Despite this, it shares some qualities of James' mystical experiences such as noetic qualities, ineffability and transience, however passivity is excluded [Jaspers, pg10,11]. Even more thoroughly than James, Jaspers rejects the idea of a sharp definition but connects transcendence with a revelatory perspective, almost overhead but at the same time embodied, a perspective which shows the person as they authentically exist in relation to

Encompassing. So what exactly is Encompassing? Again, Jaspers rejects the notion of strict definitions:

> "Encompassing, not a word with fixed knowable connotation, but a moving signifier of the ultimate being that is the foundation of our concepts. Designates something within humans which…conception makes but we cannot conceive except in moments of transcendence. World is an encompassing, man is also an encompassing. Man is always more than he can know himself to be." [Jaspers, pg10]

So we find in Jaspers a philosophy of transcendence, which, though devoid of religion, has similarities to mystical states. The main difference between Jaspers' transcendence and James' is a difference in divinity. For James, a connection to the divine is necessary for the mystical state, for Jaspers, ideas about divinity can even make the task of transcendence more difficult and unlikely.

Martin Heidegger also provided concepts expanded upon in the theory of technological mediation. Heidegger uses the ideas of revealing and enframing to help understand how technology influences how humans perceive and understand the world. Revealing pertains to how technology shows the world to have a certain existence. In Heidegger's phenomenology, technology reveals the world as "standing reserve", that is, material to be controlled, incorporated or used. Enframing relates to how a technology implies this revelation. If a river is considered without a hydroelectric dam, the river is not enframed to be revealed as standing reserve. Other objects, such as artworks, reveal differently than technology however in Heidegger's philosophy, technology always reveals nature as standing reserve.

Verbeek critiques Heidegger's position from several different angles. Using Andrew Feenberg, the ideas of enframing and revealing are shown to be useful but Heidegger's employment of them is overly restrictive [Verbeek, pg62]. A hydroelectric dam might reveal the river as standing reserve but a car could reveal the world in a different way. Verbeek writes, "a philosophical analysis of the role of technology in the modern world cannot rest with reducing technology to forms of

interpretation, but need to devote its attention as well to the ways in which specific technologies and artifacts help to shape specific forms of praxis and interpretation." [Verbeek, pg67] A second criticism is that of nostalgia. Heidegger saw certain technologies such as windmills or bridges as acceptable despite their similarity to more modern technologies. Don Ihde, characterized Heidegger's nostalgia as a "romantic thesis" [Verbeek, pg68] and says Heideggers cherry-picks both modern and traditional technologies which fit his thesis while ignoring counter-examples.

Technological mediation seeks to go beyond these foundations and become a postphenomenological approach that does not retain the sense of alienation these classical philosophies perpetuated. The model portrayed by technological mediation is as follows: human --- technology --- world. Postphenomenology includes empirical methods to understand exactly have mediation is occurring. The methods I will be including in this analysis are rhetoric, a survey of relevant psychological studies, and a historical analysis. The psychological studies will provide a description of experiences, the historical analysis will give a cultural context, while the rhetorical analysis will help provide a picture of the designers intentions. The goal of this process will be to understand how the technology mediates experience of the world. Don Ihde writes, "A phenomenological account… always takes as its primitive the relationality of the human experiencer to the field of experience." [Verbeek, pg122] Ihde breaks these experiences into two categories: microperception and macroperception. Microperception pertains to individual sensory experiences while macroperception is how the individual experiences fit within a person's larger experiential framework called a "lifeworld".

The concept of a technological lifeworld will be an important tool in the coming analysis so it requires further elaboration. An individual's lifeworld refers to a specific cultural context through which reality is understood. Ihde describes our current lifeworld as pluricultural [Verbeek, pg137] since we are aware of many cultural contexts through which meanings can arise. In terms of macroperception, it means the ability to imagine others' macroperceptions and understand behavior within these disparate views. But a lifeworld also refers to something which changes within each individual as new relevant experiences are internalized. These are

effectively perceptual changes of relations within a person's worldview. As an example, Ihde refers to science and the way scientific instruments enable new microperceptions, influencing macroperceptions and ultimately fitting into a lifeworld. However if an individual is not a scientist, these new microperceptions will not interact with a lifeworld in the same way. Philosopher J. H. Van den Berg looked even more closely at scientific instruments and their role in experiences which seem to access *reality*. Scientific artifacts have a special place in many lifeworlds because of its perceived relation to what things really exist and what they really mean. Verbeek criticizes Van den Berg's placement of mediation through scientific instruments in an entirely separate category to other technologies on the grounds that the artifacts themselves do not have this relation to reality but instead an individual's lifeworld may add this attribution. An individual whose lifeworld is void of scientific understanding would not have their experience mediated in the same way.

Ihde also analyzed scientific instruments within the scientific context to further elucidate how perception is mediated by technologies . Amplification and reduction denote the two ways perception is transformed by scientific instruments. For example, a telescope amplifies a person's ability to see distant objects, but reduces the field of vision. Experiences mediated through scientific instruments, as described by Van den Berg, depend upon the individual's lifeworld. To say the experience brought by scientific instruments are simply dependent on an individual's life world fails to address a deeper complexity. Ihde uses the term "instrumental realism" to describe how the instrumentation is also embedded within the experience and lifeworld of scientists (Verbeek, pg141). Thus, instruments have a special place as they disclose reality but also transform reality into a new form which is possible to be experienced. This transformation or translation is dependent upon the technological object which takes on a new existence when it is understood to present a special access to reality. As Ihde puts it, he "views instruments as actually constituting the objects studied by the sciences and therefore as codetermining the content of scientific knowledge." His idea is that

instruments “give a voice” to the subject of study, but in giving such a voice the instruments themselves influence how the voice is heard.

Another important concept brought to the discussion by Idhe is *multistablity* [Verbeek pg136]. This refers to how a technology can mediate a different experience depending on who is using it and the expectations that person has. For example a car might simply be a means of transportation for one person, but to a car enthusiast it may be conceived as a work of art, or symbol of how one wishes to be perceived, or an example showing aesthetics from a specific time and place in the history of automobiles. Another, more striking example can be found on the island of Tanna where members of a local tribal group clear forests to make mock landing strips. The religion of the tribe, called a “cargo cult”, derives from the building of a small military base and the dropping of cargo by outsiders which the islanders perceived as gifts from God. [Tabani].

This sketch of technological mediation sought to bring forward the main concepts to be used in my analysis of the Voyager 1 space probe. These tools will be employed to understand the various modules and functions constituting the artifact. Mediation is an effective approach to address this particular artifact because it enables the concerns of William James to be retained, such as his concern for the functioning of religious lives through empirical study. It both expands on the empiricism and adds sensitivity to phenomenological aspects of religion, however using different terminology. Before application of this approach, a more precise description of the artifact itself is required. In the next chapter, Voyager 1 will be fully explained in terms of its construction, content, position, and use since all aspects contribute to how a human---technology---world relation comes about.

Voyager 1

“Its real function is to appeal to and expand the human spirit.”

-Carl Sagan

This quote from Carl Sagan was in reference to the golden record on the Voyager 1 space probe as the justification for its presence; it is unusual considering the cost of sending objects into space and differs from the usual scientific justifications. This helps to illustration the complex mission of Voyager 1 which was partially scientific but also something else. In this section I will describe Voyager 1, its path through space, and some particularly interesting decisions made during its mission, specifically the choice to turn the craft around for a last picture of earth: The Pale Blue Dot photograph. In addition I will pay special attention to the famous Golden Record, its contents and construction.

On the way to becoming the first human-made object to enter interstellar space, Voyager 1 had several other mission objectives. Launched September 5, 1977, its first destination was Jupiter and took 18,000 photographs and other measurement, giving images clearer than any before of the distant giant. The purpose of such images and measurements was three fold and applied to all celestial bodies Voyager encountered: investigate atmosphere content and movement, study the satellites around the planets (rings, moons and smaller bodies), and examine the planets' magnetic fields. Powered by nuclear material and using a tape record as a storage device, at the time, Voyager was a technological powerhouse, capable of taking precise measurements and operating mostly autonomously because of a large delay time for data to travel to Earth and back. Next on its mission which was considered a "Grand Tour" of the solar system was Saturn taking an additional 16,000 images. These planetary measurement and images were not Voyager's main mission, however; it was to study what lay beyond them.

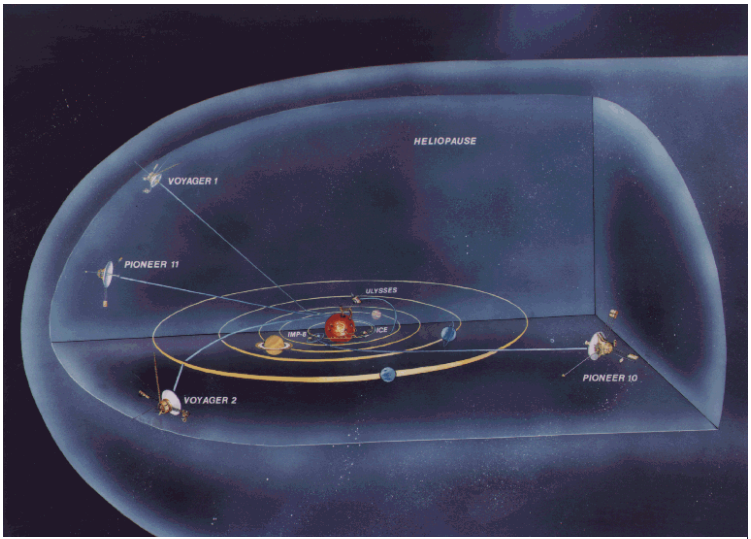


Figure 7: Boundary between Solar Winds and Interstellar Medium

Interstellar Mission

What is interstellar space? The definition has changed

throughout Voyager's journey. Generally speaking, interstellar space refers what lay between the stars; in Earth's case this means exiting our solar system. This change in the type of space is not simply a matter of position, but influence. Different thresholds have been proposed at the point where interstellar space begins: when gravitation influence from the sun wanes, when cosmic radiation is greater than solar radiation, or at the beginning of a bow-shock formed by the solar winds colliding with interstellar medium. The first threshold crossed by Voyager was the terminal shock which is the point where solar radiation no longer moves at supersonic speeds. The horizon marks the beginning of the heliosheath which, along with the heliopause, can be thought of as a kind of atmosphere forming the boundary between the solar system and interstellar space much like Earth's atmosphere forms the boundary between the planet and space. However, unlike Earth's atmosphere, which is largely spherical, the solar system's heliosheath in shaped more like an arrow. A rounded front faces in the direction the solar system moves relative to the center of the galaxy (since the solar system revolves around the central supermassive black hole). Voyager is exiting the solar system at roughly the Solar Apex or the tip of the arrow. [JPL]. Also crossed by Voyager was the boundary between the heliosheath and the heliopause. Some consider the entrance into the heliopause to be the beginning of interstellar space but since the heliopause is of unknown thickness, there remains some debate within the scientific community, however NASE officially announced Voyager 1 had left our solar system on August 25, 2012.

Pale Blue Dot

"Once of photograph of the Earth, taken from the outside, is available… a new idea as powerful as any in history will be let loose." – Fred Hoyle, 1948

Before heading off into interstellar space Voyager turned around for one last photographic series much to the dismay of most scientists on the project since it was "not scientific". [Greenfieldboyce] This series was a family portrait of our solar system composed of several photos of each planet. One planet was of particular interest, the pale blue dot, that is, our planet and home, Earth. The decision to take the photo was partially inspired by the photo taken by Apollo 17 known as "The Blue Marble". Pale Blue Dot is also the name of a book written by Sagan whose first chapter begins with a quote from

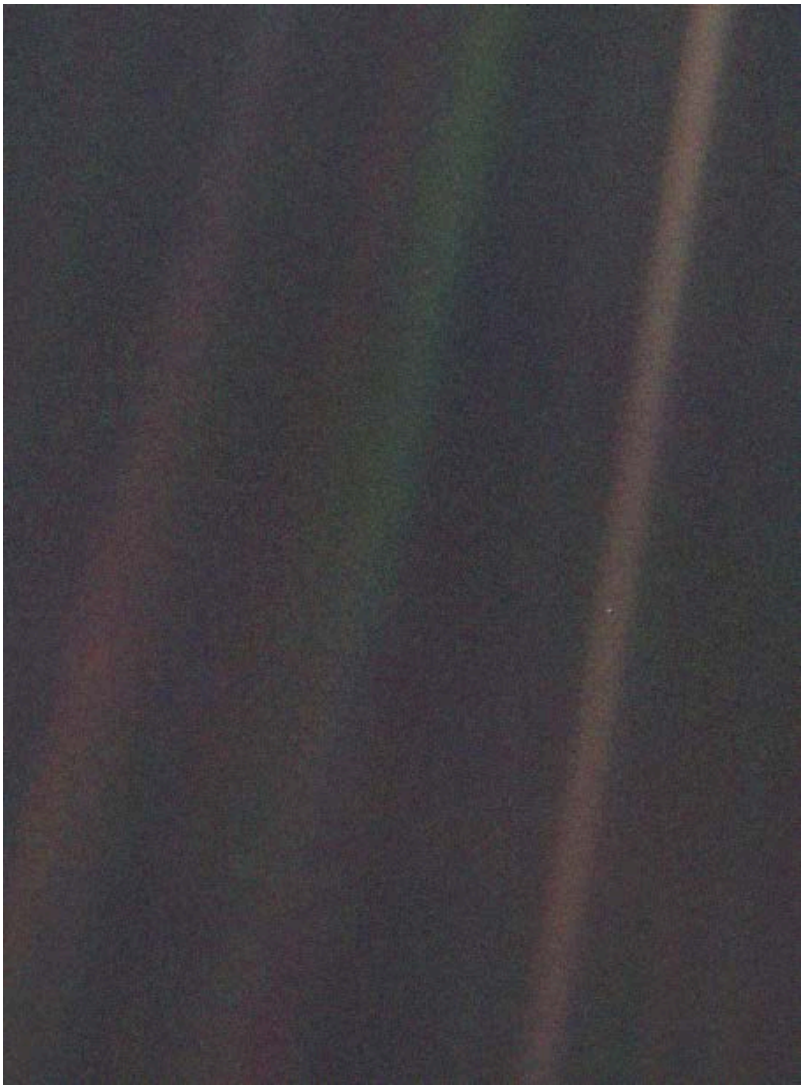


Figure 8: Pale Blue Dot Photograph

Marcus Aurelius: “The entire Earth is but a point, and the place of our own habitation but a minute corner of it.” [Sagan, Pale Blue Dot, pg1] This is the Earth Sagan hoped to show in the photograph, something small, maybe insignificant, but of tremendous value, at least, to humans. It is meant to make us question our uniqueness and prevent us from thinking there are not still oceans across which new lands may exist. In this case, the ocean is much larger, but the oceans were also immense until crafts were developed to transverse them. The question the photograph brings to mind is what humans are in relation to the darkness and other points of light which encompass us in all directions.

Since Voyager 1’s last photograph of Earth it has travelled billions of kilometers. As of my writing this it is currently at 19,189,430,794 kilometers from Earth and traveling at roughly 1,000 kilometers per minute. It still transmits and receives data from Earth and will continue to do so at least until 2025; there are components on the craft which will last considerably longer, on the order of hundreds of millions of years. [Jet Propulsion Lab]

The Golden Record

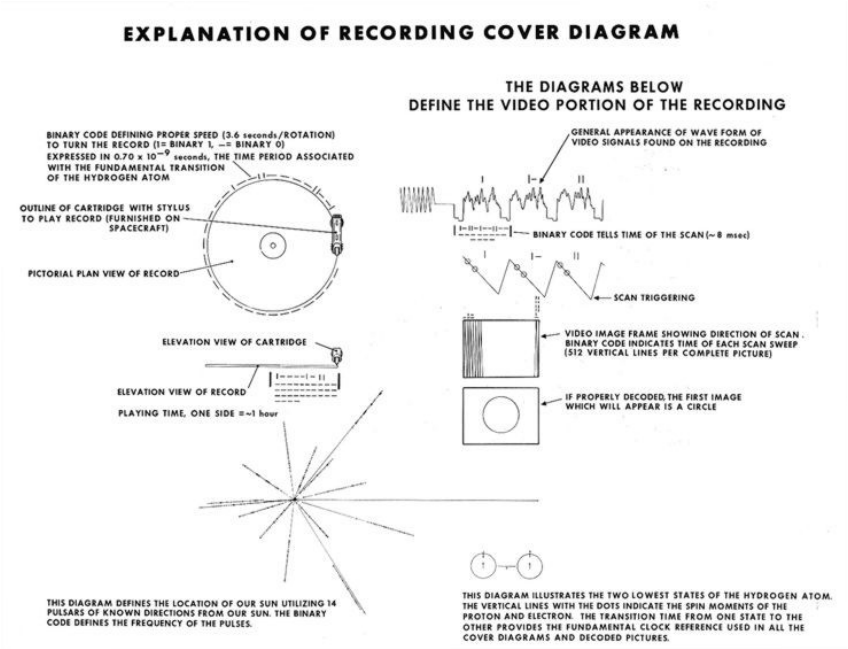
"To the makers of music – all worlds, all times"

-Inscription on the Golden Record

Designed by a committee at NASA which was chaired by Carl Sagan, the Golden Record is the product of many experts’ opinions and hopes. Sagan wrote about the record:

"The spacecraft will be encountered and the record played only if there are advanced spacefaring civilizations in interstellar space. But the launching of this bottle into the cosmic ocean says something very hopeful about life on this planet." [Jet Propulsion Lab]

Figure 9: The Sounds of Earth Golden Record



These two concerns (ability to access the embedded information and embodiment of human civilization) steered much of the record's design. It had to survive long enough, be simple enough to operate, and have useful information in order for it to be any use for extraterrestrials. However, as an 'extension of the human spirit' it had to contain a plethora of qualities vast in scope but also deep, so as to reflect, somehow, the human spirit. This momentous task required organization of, not only, scientists from NASA but also co-operation from sources across the globe.

Made of gold, encased in aluminum then electroplated with uranium-238, which has a half-life of 4.5 billion years, the Golden Record is a time capsule capable

of outliving its creators. In about 40,000 years, it will be within 2 light-years of another star but this does not mean Sagan was optimistic about its being found by extraterrestrials, describing the odds as “infinitesimal”. In a discussion with Stephen Hawking, Arthur Clarke, and Carl Sagan, Clarke suggested, in jest, it is more likely the Golden Record will be retrieved and placed in the Smithsonian. These are only speculations and do not show the true purpose of placing a golden record on the first craft to reach interstellar space. As quoted previously, Sagan saw a spiritual significance in the record’s trip to the stars. This idea will be dealt with directly later in the paper, first I must describe what exactly is on the record.

The golden record consists of images and music and, even, a recording of brain activity. Some of the images had already appeared on previous space probes but these were elaborated upon for the voyager mission. There are greetings from people around the world in fifty-four languages, a greeting from the UN, from the president of the United States, and whale greetings. There are also sounds from Earth like the crashing of waves and a kiss from a mother to her child, crickets and a train passing by, a heartbeat and laughter. As well, there is music of many different styles and genres such as blues, classical, rock and roll, opera, bagpipes, jazz, and folk music from several different countries. Images included depictions of things such as a sunset, people cooking, airplanes and space shuttles taking off, school rooms, crocodiles, trees, snowflakes, the structure of DNA, and images of the other planets in our solar system. The recording of brain activity is particularly interesting as it was recorded from Ann Duryan and included an hour long message about the history of Earth, and concluded with a personal message about what it feels like to fall in love.

The construction of the golden record included the design criteria of ease of translation. Some images on its surface were designed as instructions on how to access the information stored. In the image we see basic instructions about the functioning of a record player as well as how images were stored on the record. In addition, the time of launch of the record could be calculated because of the radioactivity of the U-238 electroplating; this, along with the image of a coordinate

system based upon pulsars near earth, would enable, at the least, an estimation of the disks spatial and temporal origin even if the rest of the contents could not be accessed or interpreted.

Discoveries

Several scientific findings can be attributed to the Voyager 1 space mission. One discovery was the presence of stable liquid oceans under Europa's icy surface. This has made it a prime candidate for future searches for life within our solar system. Jupiter's turbulent atmosphere was discovered to be the product of many interacting hurricane-like systems, finally giving an explanation for its large red dot. Also during its pass of Jupiter, Voyager discovered 2 new moons (Thebe and Metis) while the already known moon, Lo, was found to be the most geologically active object in the solar system with numerous large volcanoes. It also discovered Uranus' axis of rotation to be tilted unlike any other planet in the solar system. This causes its magnetosphere to be twisted in a corkscrew-like fashion, also unique to the planet. As voyager reached interstellar space, it discovered, instead of a smooth transition between solar winds and cosmic radiation, spinning bubbles of magnetically charged particles. [Jet Propulsion Lab]

This description of Voyager 1 is an overview of its qualities, some of which have direct relevance to religious experiences, some of which only form a background relation. The main aspects to remember going forward are the Golden Record and its content, the Pale Blue Dot photograph, its position in space, its longevity, and the goals which motivated its design. These qualities of the artifact give it attributes which are more than purely scientific, though it remains a scientific instrument. In the following chapter I will show how these attributes are neither conflicting nor completely removed from each other.

Technological Mediation Analysis of Voyager 1

"I affirm that next to the soul the most beautiful object in the galaxy is a spaceship!"

- Alejandro Jodorowsky [duneinfo.com]

Now that I have presented technological mediation theory as well as the Voyager 1 space probe, I am ready to apply the theory to the artifact.
The goal of this analysis is to understand how the religious and scientific aspects of the technology relate to humans such that a specific human---technology---world relationship is discovered. How does this artifact mediate experience? Following this, I will return to the conflicts between William James and Carl Sagan and their *Varieties* to investigate how the empirical study of religion and science can be improved through application of the technological mediation approach. Ultimately this analysis will provide insight into the religious dimension of Voyager 1 and show how technological mediation can be applied toward such an end.

Why Voyager 1 is a Special Case

Voyager 1 presents a unique challenge to technological mediation, many of the terms normally applied to ubiquitous artifacts become strange or somewhat awkward in this application. For example, Verbeek writes "Technology mediates our behavior and our perception, and thereby actively shapes subjectivity and objectivity: the ways in which we are present in our world and the world is present to us." (Verbeek, pg203) The word "world" in this case refers more closely to Ihde's lifeworld, which will be important for this analysis, however, since Voyager directly mediates experience of the world, as in the relation of Earth and the cosmos, "world" could also reference a more constrictive, almost scientific, definition. These two "worlds", our lifeworld and the cosmos, surely have a relationship but they are not synonymous.

Generally mediation is applied to mass produced artifacts; in this case I will be looking at a single artifact which was produce by a large body of people and has

been contemplated by a large body of people. In this way, Voyager 1 lives just as much in the words and stories about it as in the artifact itself. An idea about a technology can have influence the same as the actual object. The mediation process does not start with the artifact, but with its first ideation. The war machines from Terminator do not yet exist, but the idea of them has been enough to bring into question and influence human beings understanding of themselves and technology. But where mediation begins is not of issue here, simply that direct interaction with an artifact is not required for the artifact to mediate. However this brings up an interesting point about artificial artifacts and their ability to also mediate.

A third difficulty presents itself in the frankensteinian qualities of Voyager. It is a scientific instrument, a greeting to extraterrestrials, and designed to both embody the spirit of humanity and, at the same time, influence it. For these reasons I began with presentation of James' *Varieties of Religious Experience*, to outline an empirical study of religion before moving to Sagan's *Varieites of Scientific Experience* to contrast it. These two artificial poles, the scientific and the religious, were shown by both to be connected in dynamic ways. Voyager, incorporating elements of both, can be better understood by having both perspectives in mind at the same time. A purely scientific explanation would miss the spiritual aspects while a purely religious analysis would miss its scientific nature. One could have designated pieces of the craft to the religious paradigm and other parts to the scientific paradigm, however, as described by Sagan, these physical elements are intertwined similarly to how religion and science are intertwined in both James and Sagan. The concept of "multistablity" will be used to help illuminate how these contrasting qualities can be found in the same artifact.

Focused empirical research on how Voyager fits into or influences worldviews or human—world understanding has not been carried out. There has not been a study on how the Pale Blue Dot photograph might produce humility or how much people identify with the contents of the Golden Record and see it as an embodiment or message from humanity as a whole. No one has asked whether they feel the human spirit has been extended into the cosmos as Sagan intended. It is unlikely these studies will be done; instead, what is present to be analyzed are the

artifacts, those intentions explicated by Sagan, and the similarities Voyager 1 has with other technologies which mediates religion. Because of this, the empirical data will come from analysis of the cultural context, mystical experiences from related sources, and a look at the Sagan's rhetoric.

Voyager Lifeworld

"That's one small step for [a] man, one giant leap for mankind"

-Neil Armstrong

Voyager 1's own historical and cultural context shows how space already had a mythic atmosphere for its designers. The idea for a "grand tour" of the planets came in the 1960s when it was discovered the planets would be in a beneficial alignment for such a mission. This was before the moon landing and the words of Neil Armstrong, around the time 2001: A Space Odyssey was released. The mission profile fit nicely into other missions planned in the midst of the space race. The idea of sending a message to extraterrestrials already existed, in fact, Sagan had helped design and send the Arecibo message with Frank Drake (most famous for developing an equation to calculate the number of intelligent life forms in the universe). Well-known and extremely popular space opera series *Star Wars* first came out the same year Voyager 1 was launched. *Star Wars*, which used Joseph Campbell's studies of myth to create a hero's journey (an archetypical myth form) in a distant galaxy teeming with extraterrestrial life forms. Sagan seems to have been aware of an opening for a religion based on these new sources of awe opened up by science:

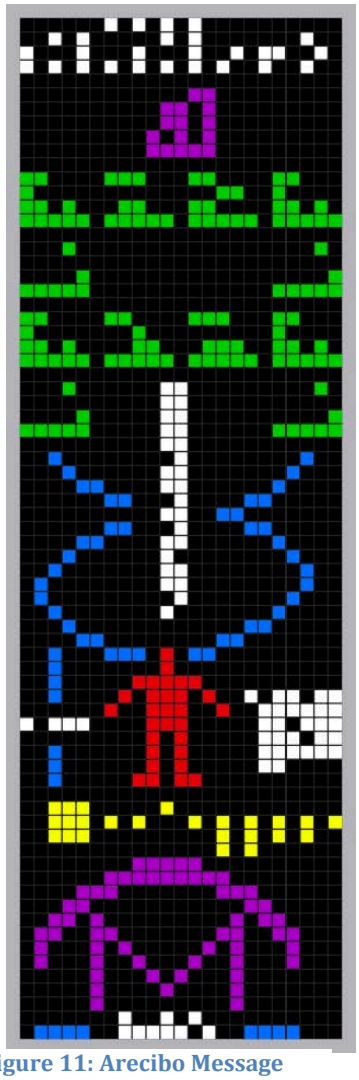


Figure 11: Arecibo Message

"A religion old or new, that stressed the magnificence of the universe as revealed by modern science, might be able to draw forth reserves of reverence and awe hardly tapped by the conventional faiths. Sooner or later, such a religion will emerge." [Sagan, *Pale Blue Dot,* pg38]

During the beginning of the Golden Record's design process America was at the end of a unique time in its cultural history. The hippie movement incorporated free love, world peace, psychedelics, environmental concerns, alternative lifestyles, new forms of spiritualism and music to create a zeitgeist unlike any America had seen before. Voyager 1 was not launched until the movement had all but ended however its ethos still influenced Sagan since he empathized with many of its ideals such as world unity, environmentalism, and, it was revealed after his death, a fondness for marijuana. When reflecting on Voyager's historical setting it comes as no surprise that music played an integral role for something meant to represent the human spirit since it comes from a time when music helped drive a cultural movement.

The multistability of the Voyager 1 spacecraft enables it to have one function within this cultural context and other in the scientific context. In a non-scientific setting, its golden record, pale blue dot, and time capsule or message like qualities become focal design features. While a scientific context brings forward its position in interstellar space, first-ever data on distant planets, and measurements on the edge of the solar system. In this way, Voyager 1 exhibit multistability in a quasi-religious context as a "spiritual extension of humanity" and in a scientific context as the first interstellar space probe. [Love]

How voyager fits into individuals' lifeworlds is dependent up the collective macroperceptions it elicits. Sagan helped steer Voyager's design and mission to incorporate elements (the sources of microperceptions) which have intended macroperceptional effects. Ultimately though, Sagan had in mind a specific lifeworld which could follow from these macroperceptions. The Pale Blue Dot, simply a photograph of a planet at the micropreceptual level, is a photograph of "home" at

the macroperceptual level and Sagan asserts is reason for humility and environmental concern at the lifeworld level by saying:

"It has been said that astronomy is a humbling and character-building experience. There is perhaps no better demonstration of the folly of human conceits than this distant image of our tiny world. To me, it underscores our responsibility to deal more kindly with one another, and to preserve and cherish the pale blue dot, the only home we've ever known." – Carl Sagan [Pale Blue Dot, pg13]

The Golden Record, full of material for microperceptions such of images and music, at the macroperceptual level is intended to represent humanity, at the lifeworld level a message in a bottle to extraterrestrials. Voyager itself at the microperceptual level, a mere space probe, at the macroperceptual level the beginning of interstellar space exploration, at the lifeworld level, the intended consequence is the sensation of "an extension of the human spirit". Though Sagan sought to provide these links himself, he also saw them as there to be perceived without his showing them.

But there is more to the intended lifeworld than just these macroperceptions. In order for Voyager 1 to truly be seen as an extension of the human spirit, a lifeworld must also include a certain configuration of science-technology-religion. In terms of science and religion, the interaction between the two outlined in *Varieties of Scientific Experience*, or one similar, is necessary for such a grandiose understanding of Voyager 1 to take hold; otherwise mediation takes a different course and the human---technology---world interaction is not as expansive as Sagan intended. Voyager could become a symbol of excessive government spending, or the Golden Record could become another example of western culture extrapolating itself as human culture or the Pale Blue Dot photo evidence of cosmic lonesomeness, Sagan's rhetoric could be the product of the hippie era love movement, just another picket sign calling for world peace. How exactly Voyager 1 mediates the human—world relation is dependent upon the underlying lifeworld of an individual; at the same time, because it shows the Earth itself, contains music from distant cultures, and exists beyond the edge of our solar system, Sagan intended it to bring to mind

that very relation of human—world which for many other technological artifacts, exists in the background.

A Sacred and Cosmic Rhetoric

One empirical tool useful for understanding the perceptions mediation analyzes is a study of the words surrounding a given artifact. Such rhetorical information gives an idea of how an artifact is perceived and the experience of the world it mediates. In the case of Voyager we have descriptions from its designers as well as examples from media throughout the last four decades. In this section I will use Thomas Lessl's rhetorical analysis of Carl Sagan's *Cosmos* television series since many passages from it pertain directly to Voyager and are actually repeated from Sagan's books *Murmurs of Earth* and *Pale Blue Dot*.

Lessl begins with Kenneth Burke's four characteristics of rhetoric: shared substance, the product of conflict at several levels, symbols of identification, and common experiences which unite [Lessl, pg175]. These characteristics were based on Burke's long research into how our narration of an event or action can inform understanding of the thought processes lying behind them. His formative *Rhetoric of Motives* looks at how words can be used as strategies for influence. With Voyager, we see this both in the words used to describe it, but also the design of the artifact. Using this rhetorical analysis, I will be further able to connect Voyager's attributes to specific micro and macroperceptions.

Because of a desire to find and perpetuate a rhetoric of shared substance, Lessl writes, "One should not be surprised to find the popularizer of science regarded by his professional peers as an outcast or heretic." [Lessl, pg176] The prime example is that of the Pale Blue Dot photograph when scientists on the Voyager team attempted to prevent it from happening on grounds of it being 'unscientific'. Despite this, rhetoric about the photograph shows shared substance as one of the main motivators of its creation:

> "From this distant vantage point, the Earth might not seem of any particular interest. But for us, it's different. Consider again that dot. That's here. That's home. That's us. On it everyone you love, everyone you know, everyone you ever heard of, every human being who ever was, lived out their lives. The aggregate of our joy and suffering, thousands of confident religions, ideologies, and economic doctrines, every hunter and forager, every hero and coward, every creator and destroyer of civilization, every king and peasant, every young couple in love, every mother and father, hopeful child, inventor and explorer, every teacher of morals, every corrupt politician, every "superstar," every "supreme leader," every saint and sinner in the history of our species lived there – on a mote of dust suspended in a sunbeam." [Pale Blue Dot, 13pg]

In the case of Voyager 1, this idea of shared substance goes to another level, as Sagan looked to help create shared substance through the craft itself. Shared substance is embedded in Voyager 1 through its attempt to capture the spirit of humanity: music from around the world, images of common experiences such as eating ice cream and raking leaves, a trip to the grocery store and the commute to work. Having these images and sounds on Voyager enables discussion about how it applies to and represents humanity as a whole. U.S. President Jimmy Carter recorded a short speech included on the Golden Record in which he says: "This is a present from a small, distant world, a token of our sounds, our science, our images, our music, our thoughts and our feelings." [*Pale Blue Dot*, pg109] Which is an explicit description of how Voyager 1 embodies a shared substance.

Lessl goes on to describe the conflicts Sagan's rhetoric seeks to resolve, mainly, a religious-scientific divide. The content from *Varieties of Scientific Experience* specifically targets this divide positing science as a form of natural theology. Sagan wrote, "If a Creator God exists, would He or She or It or whatever the appropriate pronoun is, prefer a kind of sodden blockhead who worships while understanding nothing? Or would He prefer His votaries to admire the real universe in all its intricacy? I would suggest that science is, at least in part, informed

worship." And further bridges this gap through quoting Einstein: "I maintain that the cosmic religious feeling is the strongest and noblest motive for scientific research." Relevant rhetoric about Voyager includes the mission statement Sagan gave about the Voyager 1 craft "an extension of the human spirit". So, in Sagan's eyes this is a scientific instrument with spiritual significance. In saying this, Sagan straddles the religious-scientific divide, forming a position in the middle as a type of resolution.

Symbols of identification are the means through which these conflicts can be resolved. Lessl regards such symbols as helping to unify reality and actions: "Science seems to be more successful with the general public when it uses its own natural objects of inquiry (stars, planets, galaxies, living organisms) as its symbols. Unlike technological artifacts, the natural objects of scientific inquiry already have a sacred quality for the public at large and can act as common symbols uniting science and society." [Lessl, pg174] On the Golden Record there are symbols such as images of Earth as our collective home as well as the images of Man and Woman, of birth and death, the Sun and Moon, all contributing to influence the perception of Voyager 1(a strange looking scientific instrument) as somehow representing humanity.

Experiences which unite is the final criteria outlined by Burke in his analysis of rhetoric. Lessl wrote this united experience is first brought about by inducing a shared science-type human identity by employing the above mentioned symbols. In doing so, the relevance of science to humanity becomes, at the least, easier to imagine so when Sagan describes Voyager as a message in a bottle, a person is more likely to imagine that message as being from "Us" rather than a design team at NASA. Lessl suggests *Cosmos* creates shared experience to the degree it can unite non-scientists to this cosmic view such that it satisfies needs normally considered purely religious: "This presentation of science, I believe, creates a mythic understanding of science which serves for television audiences the same needs that religious discourse has traditionally satisfied for churchgoers. " (Lessl, pg175)

Lessl goes on to discuss Sagan's cosmic-mythic depiction of humanity which can be seen as constituting a major aspect of Sagan's lifeworld. This worldview incorporates cosmic evolution as an overarching storyline through which humanity

derives identity. This ideology was previously examined in the *Varieties of Scientific Experience*; Lessl shows how this cosmic-mythic perspective is used as a rhetorical device by Sagan to give an alternative to more religious worldviews while maintaining a level of "sacredness" and purpose. Lessl remarks, "Just as in countless religions where human activities and experiences have divine archetypes in the eternal realm, so also in scientific messages such as *Cosmos* we find that the activities and experiences of the scientist have an eternal paradigm, in this instance, cosmic evolution." (Lessl, pg177) Further still, Sagan translates scientific concepts into language meant to evoke the same mysteriousness and mysticism normally reserved to holy books: "Through the subtle suggestiveness of metaphor, Sagan breathes life into the formerly dead machine universe, transforming it into a self-determining, purposive cosmos. The fact that this vitalism is given to nature through deliberate metaphor is important. The ambiguity of figurative speech allows Sagan the capacity to transgress the more rigid norms of scientific description." (Lessl, pg181)

Technologically Mediated Mystical Experiences

Can a technology evoke a mystical experience? In James and Sagan we see similar schemas for identifying a mystical experiences including senses of ineffability, a connection between a vast world and an individual, transience, and the sense that something of importance has been experienced. In psychological research, many of these qualities coincide with experiences of awe. Awe is defined by Dacher Keltner and Jonathon Haidt as having two main components: vastness and need for accommodation [Keltner, pg303]. They also include several other parameters which modulate the affect of awe into "flavors": beauty, threat, ability, virtue, supernatural. Despite these similarities, James asserted that a relation with divinity was necessary for the mystical experience to be genuine and useful. This remains to be a popular intuition about mystical experiences, that they are somehow fake if they happen through non-divine sources. Sagan's stance fits more closely with the psychological definition of awe however his theorized theophorin

remains unknown. The research by Keltner and Haidt suggest there are different ways of eliciting an experience of Awe such as nature, art, and music; two of which are incorporated into Voyager 1 and its mission. Music in particular plays an important role in the Voyager spacecraft with music from around the world. But there is another subgroup within awe that is of particular interest when considering how Voyager might mediate an experience of awe: the overview effect.

When astronauts go into space they report much of their free time is used staring out the window at the Earth [The Overview Effect Video]. This experience produces many of the effects of awe previously discussed and their self-reports reflect some of the cosmic-mythic rhetoric previously discussed. The experience of astronaut Edgar Mitchell of Apollo 14 was so profound it motivated him to create the Institute of Noetic Sciences. Interestingly, "noetic" is one of the four terms James used to describe mystical experiences:

Nicole Stott, ISS Astronaut: "Awe is one of those words you have a better understanding of once you see it, using the word awesome was totally appropriate when describe what the planet looks like."

Edgar Mitchell, Apollo 14 Astronaut: "After I came back and tried to understand what this experience was all about I could find nothing in the scientific literature about it, and nothing in the religious literature, so I turned to the local university to help me with what I saw… they came back to me and a few weeks later and said in the ancient literature they found a description called 'salva corpus amanti' they said that means you see things as you see them with your eyes but you experience them emotionally and viscerally with ecstasy, and a sense of total unity and oneness… it was clear to me as I studied this it wasn't anything new but something important to how humans are put together."

Philosophers David Loy, David Beaver, and writer on the overview effect Frank White analyzed these experiences:

"The focus had been 'we're going to the stars; we're going to the other planets' and suddenly we looked back at ourselves and it seems to imply a new kind of self-awareness….To have that experience of awe is to, for the moment, let go of yourself and to transcend the sense of separation. So its not just that [the astronauts] were experiencing something other than them but at some deep level they were integrating and realizing their interconnectedness with that beautiful blue-green ball."- David Loy

"We've been evolving from the beginning of civilization to a larger and larger perspective of life on earth but the next natural evolution is understanding the life in space. That is the fact the earth… is spaceship earth… the overview effect is the sudden recognition we live on a planet and all the implications that bring to life on earth." - David Beaver

"You see the sun as a star, we see the sun in a blue sky, up there you see it in a black sky so you see it in a cosmic perspective." – Frank White

It seems Sagan sought to elicit a similar emotion through his Pale Blue Dot photograph. In mediation terms, the photograph itself acts as a microperception, but because it is of the Earth it also has a direct connection to the macro-perceptual concepts. However, conversely to the overview effect which is produced by an amazement at the vastness and complexity of Earth, the Pale Blue Dot could elicit something closer to horror at our own insignificance. That vast, undulating, deep blue lined by gold and ochre beaches, abstract and organized patches of a rich greens and floating stripes of pearlescent clouds above land speckled by orange glowing cities from the thousands of streetlamps which bring astronauts awe, is shown to be tiny, a dot in a larger ocean that is the Universe. This macroperceptual shift, according to Sagan, has spiritual implications which can inform how humanity relates to the cosmos. "Humility" he says, again fighting anthropocenterism, is what the Pale Blue Dot encourages.

Jaspers' philosophy of transcendence can be applied to this experience. His transcendence, much like mystical experiences, enables a person to understand themselves anew, as having a certain place within an encompassing. In mediation terms, Encompassing can be seen as a macroperceptive shift to a larger, marcroperception such that the previous lifeworld is contained within the new one. This shift is the experience of transcendence. Jaspers' transcendence, like Sagan's mystical experiences, is void of a connection to a divinity which is also missing in the overview effect. Philosopher David Beaver said about the overview effect: "Its no wonder people have likened the overview effect to a spiritual or meditative experience, although its not exactly that, its a cognitive shift that can produce of meditative for spiritual experience." Here we see a distinction between the micropercetion of the overview effect, and the macroperceptive change which comes with transcendence or mystical experiences.

Figure 12: The Blue Marble Photograph

An alternative microperception consisting of a picture of the Earth exists: The Blue Marble. This image, from 1972, does not evoke the same level of humility as the Pale Blue Dot. Here, Earth takes up the whole image. Though this can also elicit similar overview effect type sensations, it is distinctly anthropocentric and does not show a cosmic position.

This analysis of Voyager 1 using technological mediation has uncovered a range of specific and intentional microperceptions (most notably in the golden record and pale blue dot photograph) which connect to spiritual macroperceptions and lifeworlds. In addition it has shown how Voyager 1 can be both a scientific instrument and a religious artifact through understanding its multistability. What

this all means for the relationship of science, religion, and technology will be discussed in the following concluding chapter.

4: Conclusion

Although this voyage is coming to an end, it is equally just beginning. There have been many strange stops along the way which, I hope, shed light on the core questions I sought to pursue an answer for: How can technological mediation be used to understand the religious dimension of technology? This question, too large for a master thesis in part because it has been discussed very little in academic literature, acted as the point of departure but quickly became more focused to a single case study meant to illuminate the way for future study. I began with an examination of an empirical and pragmatic investigation into the nature of religion through William James and his classic *Varieties of Religious Experience* because I would end up, similarly, with an empirical approach but through technological mediation. In doing so, I discovered an elephant in the room which is the relation of science and religion. I would have been avoiding an obvious point of contention had I ignored the fact I was using science to study religion so instead of tip-toing around these conflicts I chose a technology which would enable me to address it head on. So enters Voyager 1, a scientific instrument with purposefully embedded spiritual connotations. Further still, the artifact's lead designer wrote a text which was a mirror reflection of James classic text, Sagan's *Varieties of Scientific Experience.* These varieties of *Varieties* acted as the basis for thought about worldviews in between the religion and science poles since James used science to understand religion while Sagan used religion to understand science. The philosophical approach of technological mediation, void of loyalty to either domain, yet sharing James' empiricism and concentration on experience enabled Voyager 1 and Sagan's intentions to be put under a conceptual microscope. Small decisions and elements could be examined in terms of their macroscopic implications. Further still, mediation enabled Voyager 1 to be looked at in terms of processes: How does it change perspectives? How does it represent a certain place in the history of religion

and science? This is especially useful for an artifact like Voyager 1 since the thing itself moves: it was not always the first human-made object in interstellar space, the artifact would not be so much of what it is if it was not for the Pale Blue Dot photograph. At this point, one should ask, what exactly was discovered in this philosophical investigation?

First, I will discuss broad conclusions about the study of religion and technology then specifics about voyager. Defining religion is no easy task and efforts to do so are still in development. Instead of looking at cohesive worldviews or established institutional religions, the study of religion and technology benefits from looking at specific emanations of religious-like thinking and experiences such as the ideology of Sagan or mystical experiences. Focusing on these piecemeal examples gives technological mediation the necessary material (specific artifact and experiences) through which microperceptions can be observed. This investigation also showed openings for nuance beyond what James had started through addition of empirical research about technology. Following with this, another important definition is what counts as technology. The more obvious an artifact is a technology, the more likely the worldview behind its employment will include an expressed scientific position. Technological mediation as a framework for understanding how perceptions of the human---world kind are changed through technology was put the test in this analysis since religion and science can be seen as the most encompassing examples of explicit conceptualization of this relation. Overall, it provided useful tools through connecting microperceptions to macroperceptions to lifeworlds, magnifying the process from artifacts to worldviews. Configurations of science-technology-religion were shown to be a useful way to juxtapose ideologies which include elements of the three in varying degrees and avoided the difficulty of defining any given worldview as “religion” or “science” or the mere employment of a technology as a tool.

This analysis of Voyager 1 showed several specific phenomenon which have previously been unexamined. Referring back James’ study of religion, Voyager 1 should not be able to have any religious implications at all. James wrote about the inability of science to fulfill religious needs, and further, how divinity is necessary

for religious experience. Sagan's account of science and his rhetoric surrounding Voyager 1 show this conclusion has little grounding. Through James' own pragmatic methodology, Voyager 1, and the worldview implied with it, functions in a religiously relevant way. It is possible that it makes sense to assign new terminology such as "quasi-religious" to how Voyager 1 function within a lifeworld however this merely avoids the conflict. Instead, I see this as evidence that James' empirical study came to faulty conclusions about the potential of science and technology and the necessity of divinity. *Varieties of Scientific Experience* shows a worldview which is neither purely scientific nor religious and supports the idea an approach such as James', which separates the two, will miss certain facets of religious experience. Technological mediation was applied to help coax out some of these facets and showed mediations adaptive qualities when addressing worldviews which do not fit neatly into previously pervasive categories such as those necessary for the religion vs science conflict theory. Voyager 1 as a case study was shown to be useful for dismantling this dualism as well as showing the microperception—macroperception—lifeworld relations. The Pale Blue Dot photograph mediates a human---world relation which shows humans in a place a humility and gives reason to take care of our "fragile home". The Golden Record mediates a human---world relation which shows human being as unique, filled with a range of complexities which are at the same time cultural, emotional, religious, and scientific. Voyager 1 as a scientific instrument mediates a sense of beginning for the whole of human---world relations; we have only just started to scratch the surface of interstellar space. Voyager 1 is a system of engineered microperceptions meant to elicit an experience of awe by laying bare humanity, in all its wonder and complexity, in relation to a vast unexplored cosmos and there by induce and strengthen an intended macroperception in a lifeworld which is both religious and scientific. This is the double-edged purpose of the design and mission as an "extension of the human spirit."

Further Research

As stated in the Conclusion of this thesis, this is only the beginning of a larger attempt to use philosophy of technology as a means to understand religions in general. In my thesis, I showed how Voyager 1, along with perspectives from the historical analysis section on Alchemy, Hierotopy, and Scientology, do not exist in a strictly religious space but have science and technology weaving into their respective lifeworlds. Because of this, I think a more nuanced schematization of worldviews is implied by this analysis; it is not enough to simply categorize certain groups or views as religious then ask how technology is involved in their lifeworld. Instead it makes more sense to begin from the technology itself and ask how they mediate human—world relations in a way which connects to, normally, religious concerns even if this occurs within a group or view not commonly viewed as "religious". Further research is necessary for a scheme to be uncovered but I will briefly speculate about pathways toward this end.

Technological mediation purports to show human---world relations and works well at showing how technology fits within this relation which is in a constant process of renewal. However, all analysis of a particular human---world relation is generally done in connection with a highly specific domain. As in Verbeek's *The Technological Mediation of Morality*, ultrasound technology is shown to bring new moral questions which human lifeworlds will have to encompass a way of answering [Verbeek, pg4]. The answer to these questions can show certain texture within a specific lifeworld, but to what extent can these things be predicted based up previous knowledge about an individual's lifeworld. In order to show widespread mediation processes, that is changes in technology and lifeworlds, a way of categorizing lifeworlds would be highly beneficial for technological mediation in general but maybe necessary for using technological mediation to understand the religious dimension of technology. Such a categorization would enable questions such as, how would technology x affect lifeworld y? As an example, one could consider a theoretical situation: how would the catholic church react if full-body cryonic technology was proven effective? This would be an interesting case since

cryonic technology has a strong connection to death, a topic relevant to most religions. In fact, this topic has been discussed before:

"A priest told me about a common argument among Catholics: If a person was in the hospital and surgery would probably save the person's life (and NOT to have the surgery would mean certain death), then choosing not to have the surgery would be choosing to die. Willful death is suicide. (If God had wanted you to die, he wouldn't have invented surgeons that could fix your problem.)

By the same logic, if it could be proven that cryonic suspension would preserve a person's life, then NOT to choose suspension when in a terminal condition would ALSO be willful death. Under those future circumstances, this priest would argue that NOT to choose cryonic suspension would be the mortal sin of suicide."

-Steve Bridges of Cryonet

Technological mediation would also ask whether the catholic position on what death and suicide are would change because of this technological development, but there is no clear way to make such a prediction or even hazard a guess. Rather, it would depend less on the Catholic Church, but rather on the a kind of "catholic lifeworld" which is a considerably more complex entity. And even within the Catholic Church itself there in a diverse array of lifeworlds found in its adherents. Terms such as "religious", "scientific" and "catholic" do not have enough precision to be useful for answering questions of this sort. Instead, if one is concerned with prediction, an array of science-technology-religion configurations could be used in which different individuals fit regardless of how they self-identify. Such a schematization would amount to a series of lifeworld-archetypes which would aid in understanding the religious dimension of technology as well as religion or worldviews in general.

Another point of further research would open up if religious texts, parables, and interpretations of them were considered technologies. This would show a whole other technology-religion relation, not so much about the religious dimension of technology, but commonality between technology and religion: the technological dimension of religion. It seems technological mediation would still be an effective tool for understanding this relation since microperceptions, macroperceptions, and lifeworlds could still be applied to religious texts in a similar way.

Lastly, this thesis has showed there is an opening for a new "Varieties": *Varieties of Religious Technology*. Such a text could extend many of the lines of thinking begun in this text but be expanded to many more technologies: robotics, life-extension technology, neuro-implants, AI, the Internet, space travel and colonization, and post-humanism in general. Such as text could show how technologies frequently interact with religiously relevant domains such as the definitions of life, death and human as well as the morally relevant domains connected to them such as purposes and values.

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