CARL SAGAN'S *COSMOS*: THE RHETORICAL CONSTRUCTION OF POPULAR

SCIENCE MYTHOLOGY

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ABSTRACT

Using Carl Sagan's *Cosmos* as a case study, this dissertation explores the intersection of science with popular culture and builds a new framework for rhetorically analyzing popular science programming. The arguments and research focus on the ways in which popularizing scientific information for the masses can create a type of "science fiction" rather than merely being a "transferal" of information. This metamorphosis of fact into fiction occurs as a result of the convergence of three rhetorical concepts, *kairos*, *ethos*, and *aethos*. *Kairos* is the placement of *Cosmos* in time. Historical and political elements (including education and entertainment) contribute to a science program's *kairos*. *Ethos* is the appeal (or credibility) of the narrator. The audience is receptive to the information presented only if the narrator is able to establish this appeal. Personality traits that are popular outside of stereotypically educational or scientific environments are often used in popular science programs to establish *ethos. Aethos* is the "haunt" or the environment created for the program; it lays the groundwork for narrative control. The haunt—which is carefully and purposefully constructed through the use of dramatizations and sensory elements—creates the "viewpoint" from which an audience examines and evaluates the information or arguments presented. A program's *kairos*, *ethos*, and *aethos* intertwine to determine its potential for attracting and retaining a broad audience. However, these elements carry with them an unintentional side effect. In combination, they create a *mythos* that can assist in the popularity and longevity of the program but they also carry with them a fictionalizing effect.

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PREFACE

I watched *Cosmos* as a child and despite many subsequent viewings, I can vividly recall certain scenes, framed from within the context of my early-1980s living room. One of the most striking images emblazoned on my young mind was the Cosmic Calendar and my father's remark about how it put everything into perspective: "It really makes you see how insignificant we are," he said. A man who appreciated common sense, my father was not one to think highly of the esoteric, the overly poetic, or the professional academic who spoke of these things. To him, purpose equaled value and these two things could not be separated. Empty theories or self-aggrandizing concepts were nothing but hot air. Yet, while watching *Cosmos* and being led through the galaxy by Sagan, an academic speaking of traditionally esoteric concepts using poetic language, he opened himself up to the possibilities. And so did I.

Working on parts of this dissertation has been like having a conversation with my father, who has been gone now for over five years. He didn't live to see me enter my post-graduate career, nor to see me hired for a tenure-track position in the Montana Rockies. From those mountains I plan to watch the night sky, like we did when I was a child, camping out by Cow Creek in South Dakota. I plan to surveil the stars and the planets from our own tiny blue dot in the cosmos, to open my imagination and to wonder about them, as my father taught me to do. And I will teach my girls that some dreams have roots in common sense.

TABLE OF CONTENTS

LIST OF FIGURES

KAIROS AND *COSMOS*

Carl Sagan revolutionized the presentation of science to the masses with the Public Television broadcast of *Cosmos* in September of 1980. Concepts of evolution, space travel, and extraterrestrial life were presented to the public in a way that engaged viewers, entertained them, and converted them into science "believers." A simple educational program rarely has the lasting effect of *Cosmos*, a miniseries that has impacted both popular culture and the public perception of science for over thirty years. Sagan's 13-episode opus took viewers on a journey across the universe and through its history. It showed the formation of stars and the history of scientific advances on the earth. It took viewers to ancient Alexandria, to the long-destroyed library there that once held "all the knowledge of in the ancient world" ("Shores"). Sagan repeatedly warned viewers of the dangers of nuclear weapons and encouraged them to grasp the value and uniqueness of human life—even while simultaneously illustrating that Earth is but one tiny speck within an unimaginably massive universe. *Cosmos* became more than an educational program: it became a cultural moment, a narrative of our civilization and of the universe. In a testament to its durability and timelessness, it still airs on-demand on Hulu. The site declares a total viewer estimate (presumably including those from Hulu itself) of "more than a billion people from around the planet" ("Shores"); it has been translated into over 40 languages.

Cosmos was popular from the beginning, and it became the "climax of [Carl Sagan's] ascent to fame" (Davidson 318). Sagan had already published a number of books before *Cosmos*, one even having been awarded the Pulitzer Prize, and he was the regular "house astronomer" on *The Tonight Show* with Johnny Carson (Davidson 262). Clearly, Sagan was not a complete unknown before *Cosmos*, and he had achieved a certain level of renown.

However, he did not achieve "iconic status in North American culture, making his face immediately recognizable to millions of viewers" (Davidson 318) until after this incredibly popular program premiered: "When it first aired, the series catapulted creator and host Carl Sagan to the status of pop culture icon and opened countless minds to the power of science and the possibility of life on other worlds" ("Shores").

Few could have guessed *Cosmos'* durability over the next three decades, even though, as Thomas Lessl reports, its "budget of eight million dollars [made it] the most expensive program in the history of public television" (177). In fact, *Cosmos* still has enough name recognition cache that instead of creating a new science series from scratch, FOX is set to remake it. Seth McFarlane, of *The Family Guy* fame, is set to lead the production of this program, which will air on commercial television in 2013 (Itzkoff). What makes *Cosmos* so special that it has been able to enjoy this type of longevity? Why has the public seemed to embrace it as "something more" than an educational program? Why do people still watch it online or create homages to it on YouTube? If learning about science was their goal, they would more than likely look for a newer source with more updated information and more modern visual effects. What makes *Cosmos* different?

Cosmos was an effort on the part of its creators to reach out to a public during a time of strained incomes and economic inflation. Sagan in particular felt that it was important to show them how science affected their lives and the critical role it plays in improving society. If ordinary people did not see the relevance of scientific exploration in their lives, the history of the ancient Egypt showed that they were likely to reject it ("Who Speaks"). The original *Cosmos* audience of 1980 needed to be convinced that this program (and thus, the program's message) was worth their time before they could be shown the value of the science. Sagan

and his team brilliantly used cultural touchstones, among other rhetorical tools, to appeal to their audience. As those touchstones of contemporary culture (like *Star Wars*) have been held onto and revered by the following generations, so has *Cosmos* remained popular.

Cosmos captured an opportune (or "*kairotic*") moment in time by responding to contemporary political and social factors. Technology had advanced to a point where special effects could be mistaken for photographic reflections rather than artistic renderings of things like supernovas or galaxies. As a result, *Cosmos* was able to create a more realistic experience for its viewers than had ever before been possible. Because of its likeable and unthreatening host, audiences opened themselves to arguments they may have originally rejected out of hand. In effect, this program was able to create an intersection of time (*kairos*), presenter credibility (*ethos*), and sensory appeal (*aethos*) in order to create a *mythos*, or a mythical narrative that reaches beyond the science into a fictionalization closely akin to science fiction. The science fiction-like *mythos* of *Cosmos* helps to account for its impressive longevity. This dissertation will explore the effect of *ethos, aethos*, and *mythos* in subsequent chapters, but this first chapter will concentrate on *kairos* and the ways in which *Cosmos* captured its *kairotic* moment.

The Rhetorical Situation, *Kairos,* and Popular Science

Kairos is the encapsulation of a rhetorically opportune moment: it is the embodiment of perfect timing. Some notable scholars, including James L. Kinneavy and Carolyn Miller, have already explored this concept in-depth, describing the ways in which it is important and how it can be used to further a rhetorical argument. In order to fully explore what *kairos* means in relation to rhetoric, however, the work of Lloyd F. Bitzer and Richard E. Vatz must be considered first. They did not use the term *kairos*, but instead wrote about the "rhetorical

situation." While Bitzer argues that the context of an argument is important, Vatz claims that the rhetor *creates* that context, or the rhetorical situation. While on the surface they seem to disagree, in the end their arguments tie together and lead to the same conclusion.

Bitzer frames the rhetorical situation in this way: "When I ask, What is a rhetorical situation?, I want to know the nature of those contexts in which speakers or writers create rhetorical discourse" (1). For him, a rhetor enters into a situation or context and from that situation creates an argument. Vatz, on the other hand, argues that the rhetor "translates" "information into meaning" and because it is "an interpretive act," the rhetor is creating the situation (157): "The very choice of what facts or events are relevant is a matter of pure arbitration. Once the choice is communicated the event is imbued with *salience*, or what Chaim Perelman calls 'presence'" (Vatz 157). According to Vatz, the determining power of the rhetorical situation is based on the rhetor and his/her decisions.

Bitzer does not negate the role of the rhetor in his arguments, either. However, he does emphasize the timing of the arguments and the importance of audience action and reaction:

> Rhetorical situation may be defined as a complex of persons, events, objects, and relations presenting an actual or potential exigence which can be completely or partially removed if discourse, introduced into the situation, can so constrain human decision or action as to bring about the significant modification of the exigence. (Bitzer 6)

In Bitzer's argument, either a changing of minds or inspiring an action *as a result* of the argument is the factor that determines whether or not a situation is rhetorical. If an audience won't or can't create change, then the situation is not rhetorical. Like Aristotle, Bitzer states

that some constraints are imposed by the rhetor (artistic) and some are created by the situation (inartistic) (8)—so if the inartistic elements cannot be changed, the rhetor has no power or opportunity to inspire action.

In this way, Bitzer figures in the influence of the rhetor; he does not leave the creation of the rhetorical situation to a confluence of events that are completely outside of the rhetor's control: "It is clear that a rhetorical audience must be distinguished from a body of mere hearers or readers: properly speaking, a rhetorical audience consists only of those persons who are capable of being influenced by discourse and of being mediators of change" (Bitzer 8). That said, he gives great credit to the events surrounding the discourse for the importance of the moment:

> [R]hetorical discourse…does obtain its character-as-rhetorical from the situation which generates it. Rhetorical works belong to the class of things which obtain their character from the circumstances of the historic context in which they occur . . . a work is rhetorical because it is a response to a situation of a certain kind. (Bitzer 3)

So, even though the "character" of the moment is derived from occurrences and events outside of the rhetor's direct control, the rhetor's success creates the rhetorical situation.

Bitzer's seven-part definition of rhetoric as situational declared that rhetorical discourse is a response to a situation, which, in turn, gives the rhetorical discourse weight or meaning. But not all situations give rise to rhetorical discourse. To be rhetorical, the discourse must be able to change or alter the situation in some way and it must be an appropriate response to the situation. It's not the rhetor's persuasive intent that is central, but the situation itself (5-6). When the public does not have curiosity regarding (or the desire to

debate about) a topic, no interest is present and so no change can be generated as a result of argumentation. The rhetorical situation is therefore key.

This stance is not as far from Vatz's as perhaps, on the surface, it may seem. Even though he claims that "language is always value-laden" (157) and that the adjectives used by a rhetor "must be a translation . . . not according to the situation's reality, but according to the rhetor's arbitrary choice of characterization" (Vatz 157), Vatz claims that a situation *must* be "named" by the rhetor. While it is true that situations can be emotionally heightened or lessened through creative terminology and event framing, the situation exists in some form before it is described or packaged by the rhetor. This inspiration for the description (or naming) is what Bitzer called the "rhetorical situation."

For example, a dangerous situation is still dangerous whether or not anyone discusses it or calls it such. The changing of opinions about what constitutes danger, or changing the public's opinion about the level (or even the existence) of the danger is the rhetor's goal. Specifically, if a ship is sinking, it will sink whether or not a rhetor tells people about it. The rhetor does not control the danger—s/he may name it and frame it, and that naming and framing may result in a variety of actions, but the rhetor's words do not *create* the original situation. The rhetorical situation—the *kairotic* moment in which a rhetor can help people determine their actions and reactions—cannot happen without the inciting event: a sinking ship. The level of panic or peace that the audience feels after the rhetor has communicated the danger is the result of the speaker's rhetoric—not the situation itself. In this way, Bitzer's notion that action must be the result of rhetoric and Vatz's idea that the rhetor's choice of words inspire audience reaction can co-exist.

The connection between "rhetorical situations" and the Greek term, *kairos*, is made by James L. Kinneavy in "Kairos: A Neglected Concept in Classical Rhetoric." He writes, "The concept of situational context, which is a modern term for *kairos*, is in the forefront of research and thought in many areas" (83). Like Vatz and Bitzer, Kinneavy argued that the events surrounding a rhetorical discourse are vital in determining if an "opportune" moment exists for the rhetor to connect with his/her audience. While Kinneavy puts the term "*kairos*" to Bitzer's "rhetorical situation," Carolyn Miller synthesizes what previous rhetoricians have written and applies this concept of timing to science writing. She says, "[W]e should remember that an opening can be constructed as well as discovered" (Miller 313). According to Miller, *kairos* in science is created by a gap in the knowledge base. This gap is filled with a rhetorical response of some form. The response is rhetorical because it directs future actions of the audience in some way: "Traditionally, science has figured for us not merely as an enterprise that changes over time, but as one that promotes change in a particular direction" (Miller 314). She calls this gap a "problem space" and says that it is the result of a "difference between novelty and tradition" (Miller 320). The importance of information or experimentation that fills the gap of *kairos* moves science into a particular direction of theory and research.

Rhetorical Challenges of Audience in Popular Science

While Miller concentrates on audiences made up of scientists, popular science has dual audiences that affect the way in which rhetors must address the *kairotic* moment. In the same way that "normal" science articles need to persuade the editors of science journals to publish them (Wander 227), so do popularizations have gatekeepers that may block their distribution to their target audience. The avenues of distribution available for popularized

7

science almost always involve some marketing component. While any message must first *have* an audience before it can *persuade* an audience, in popular science, concern about audience attraction and retention is shaped by its need to cater to a secondary audience of "financial supporters." Usually, financial support comes in the shape of advertising dollars and the attached concerns stem wholly from *outside* the rhetor's primary persuasive argument.

As Jeffrey W. Kirsch asserts, television is primarily motivated by ad revenue, so it needs "techniques that hold a viewer's attention sufficiently well to guarantee an audience for the advertisements" (52). Capitalist concerns are at the core for this secondary audience: moral or ethical or intellectual interests are not the deciding factor. The rhetorical message must be shaped to attract not only the audience which the rhetor intends primarily to address, but also to attract and persuade an audience of financiers (gatekeepers) who need to fund the program's production, distribution and/or publication. Being unable to attract not just the *primary* audience but the necessary *secondary* audience could result in the effective erasure of the message. The secondary audience has controlling fiduciary power and determines whether a message exists. Without good cause to believe an advertising message will be delivered as desired to an audience attracted by the program, financial support will not be secured. These concerns about secondary audiences exist even if a program airs on PBS because it receives significant amounts of its funding from the corporate sponsors and from individual contributors. In addition, PBS cannot risk being seen as promoting partisan views for fear it may risk losing federal funding. Controversy may also put at risk pledged donations from "members" who voluntarily contribute to the cost of running PBS.

Because of this link to monetary concerns, popular science may be viewed as being somehow "commodified." The intention to attract an audience can trump the message itself in the creation of popular science. Sensitivity to the "rhetorical situation" is essential in creating popularizations that will reach intended audiences. Rhetors must be acutely aware of each type of "soul," as Plato pointed out, in order to create the most persuasive presentations. This challenge is great when modern television audiences are expected to range in the millions. Therefore, the most popular or permeating aspects in the culture are likely to be referenced in order to capture the interest of the "souls" in question. *Kairos* plays a central role not only in reception of a message, but on the existence of the message. If the science cannot be presented in a way that will meet with the standards or expectations of secondary audiences (the presence of a certain-sized audience, for example), then the message may never be able to be formed. *Cosmos* delivered huge audiences because it addressed its rhetorical situation so well. To understand how, we must explore the public views toward science and trends in entertainment of the 1970s.

Politics and Public Perception of Science

In *The Physicists: The History of a Scientific Community in Modern America,* Daniel Kelves writes that the race to the moon helped to energize the public toward a common "scientific" goal in the 1960s. However, once that goal was met, public interest in science and space exploration hit a decline: "Pollsters found public confidence in scientists rapidly falling, down by 1971 to a 'very favorable' rating of only 37 percent" (Kevles 399). The public was also influenced by works such as Lewis Mumford's *Pentagon of Power*, which "argued . . . that since 1940 a scientific-military-industrial machine had emerged whose purpose was to subordinate human purposes to its own mechanical aims" (Kevles 400). In

general, science was perceived as being run by favoritism and cronyism. It didn't help the public perception that Lyndon Johnson's home state of Texas reaped rewards of science program funding. Kevles writes:

> the leading ten university recipients of federal funds supplied 40 percent of the advisers used by the government to review research proposals . . . Scientific research, the acrid wisecrack went, was the only pork barrel for which the pigs determined who got the pork. (397)

The perception of science as the recipient of government money and not as a contributor to society was damaging. Being equated with politics, political parties, and favoritism painted science not as the "hero" of the space program but as an arm of the Establishment.

Science had become the "other," a more powerful and corrupt entity which was not to be trusted. It did not help that "NASA . . . following the flash fire that killed three astronauts, refused to disclose a pertinent report to congress [because it] might destroy the 'intimate and confidential' nature of NASA relationships with its contractors" (Kevles 401). This refusal added to already negative public perceptions regarding the "scientific elitism" and its confluence with "industry and government" in relation to Vietnam (Kevles 401). The American public viewed science as being in partnership with big business and not as a tool or "helper" of the general public at large. Defense contracts were rich and the American people saw the war in Vietnam as a cash cow for science: in turn, they saw science as increasingly motivated by money and financial opportunity. In short, the "social needs of the nation" (Kevles 404) were not being met. Public opinion held that money, which could have been being used for social programs for the benefit of all, was instead being funneled into programs that benefitted some elite class of scientists in a game of political favoritism.

Through "an arms race which employed nearly half the world's scientists" (Druyan), the public had become used to science as a means of warfare development and a tool of government agenda building.

In addition to these issues of public perception and the prevailing reputation of science, the American educational system (despite its efforts) was not having success with its science curriculum. As a result, adults did not have a level of science literacy that allowed them to understand the complexities of science or space exploration. In 1982, Allan Bromley recognized that this lack of understanding could have serious side effects:

> Over 80 percent of our citizens receive their last exposure, if any, to mathematics and science during their high school years . . . if our public cannot at least appreciate the nature of the issues, quite apart from contributing to their resolution, they inevitably will tend to become alienated from society. (1037)

The separation of the public from a full grasp of the importance of science and its impact on their lives was well underway by the late 70s and early 80s. However, this result was not tied necessarily to funding for science education programs. Reports showed that there was "a significant decline of scientific ability among American students" and at the same time, budgets were suffering from "'a fifteen-year shrining of the U.S. commitment to excellence in science, math, and engineering'" (qtd. in La Follette 35). Money had been invested in order to reverse or avoid this decline in science understanding, but it did not have the desired effect. What was still missing was perhaps public interest, which would not be whetted when the general perception of science was not one of adventure or advancement but instead one of crookedness and the Establishment.

In "Science and Scientists on the TV Screen," a paper which was delivered at the American Association for the Advancement of Science in Toronto in January of 1981, George Gerbner highlights similar fears regarding public interest in and knowledge of science. He states, "The U.S. Department of Education and the National Science Foundation of the White House warned of a 'trend toward virtual scientific and technological illiteracy'" (1). In addition to this trend toward decreased science knowledge, the American public of the 1970s had negative views about science, particularly of physics. As Kevles notes,

> [P]hysics in America, especially pure physics, had undergone an indisputable degree of disestablishment. Polls found that in the mid-1970s a rising faction of Americans once again thought well of science, but what mainly compelled admiration were the contributions of the life sciences to medicine. Applied physics helped set out a menu of technology to suit every taste, including digital watches and pocket electronic calculators; television photos transmitted from spacecraft on Mars; or the remarkable lasers exfoliating with myriad uses. Nonetheless, such marvels did nothing to establish a climate more favorable to basic physical research. (Kevles 423)

Some enterprising television producers, like Jeffrey W. Kirsch, the director of the KPBS science center in 1979, believed that television could find a way to "package" scientific information in a way that would attract viewers (53-54). Popularizers like Sagan believed television could be used to change the public mindset and that "the average viewer would thrill" to scientific content about NASA missions, if that content were presented in an interesting way (Davidson 319).

However, according to Gerbner's "Television Entertainment and Viewers' Conceptions of Science," television did not improve the public perception of science. In fact,

the study declared, "almost all groups of heavy viewers would spend less money on [space exploration]" (28). In other words, the more people watched television, the less likely they were to be in favor of spending public funds on programs like NASA. Like Kevles, Gerbner found, "The science establishment meshed with the industrial and military in the minds of many critics" ("Television" 7). Through the 1970s, "Even the most popular regular science program attract[ed] only 7 to 10 percent of the viewing audience" (Gerbner, "Science" 1). Despite the fact that it ultimately was able to acquire more than eight million dollars in funding, *Cosmos* faced a great challenge in attracting an audience in an entertainment environment that was not receptive to science programs.

Popular Entertainment and Environmental Concerns of the 1970s

The late 1970s was a time of contention regarding governmental spending on scientific endeavors and perceptions of science, but it was also a time of post-civil rights era social unrest and environmental concern. The first Earth Day, which was in 1970, "signaled a dramatic escalation of public perception about environmentalism and ecology" (Cushing 1). It expressed a growing concern over pollution. In fact, "the late 1960s saw the first public efforts to ban the widely-used [sic] pesticide DDT (Cushing 3). According to William R. Brown and Richard E. Crable, the public at large tended to place culpability on "corporate America for a polluted society" (260). As a result, these companies launched "educational movements" geared toward convincing the public that industry was not, in fact, at fault for pollution and that it was doing its part to control the problem: "in the 1970 issues of *Time*, *Businessweek*, and *Newsweek* alone, there appeared a total of 289 pages of environmental advertising" (Brown and Crable 260-61). Exposure to the topic of pollution and emphasis on environmental awareness was not just in news stories; it was even in the advertisements.

At the same time, rhetoricians were also turning their eyes toward environmental issues: "In our current crisis of the environment we are looking for perspective on man and nature" (J.A. Campbell 442). Public concern was raised regarding pollution and the environment and, according to John Angus Campbell, in the early years of the 70s, "many young people and even noted writers variously claim that either western science or western religion or both advance a view of man's relationship to the environment that is harmful and spiritually bankrupt" (443). The environmental movement had, for some, stirred a desire not just to repair or stop damage to the planet, but to find the sources—whether those sources were corporations or religious beliefs or something else—of environmental damage, perhaps in an effort to effectively address the core issues behind it.

Popular entertainment did not shy away from addressing big political questions and controversial topics such as these and others. According to Kirsten Lentz, television shows of that decade were making a concerted effort to reflect typical "life experiences" and challenges of the time. Shows like *Maude*, *Good Times*, and *All in the Family* were exploring formerly taboo topics like sex, race, and politics. The lead character in *Maude* underwent an abortion. Edith Bunker, the lead female character in *All in the Family*, escaped an attempted sexual assault. In *Good Times*, the Evans family struggled with crime and racism as they raised their family in what they called "the projects" (which was presented as a racial and economic "ghetto"). In the 70s, the considered "quality" of a show depended in part on how—and if—it reflected the grittier parts of reality that had largely been ignored in 1960s programming like *The Brady Bunch*. Norman Lear, MTM Enterprises and others, "[transformed] the situation comedy, making it more complex and more responsive to the social and political changes resulting from the civil rights and black power movements and

the burgeoning feminist movement" (Lentz 46). They pushed the boundaries of programming to reflect a life that was closer to that of some viewers, not idealized or sugar-coated as it had been in the past. As Lentz points out,

> Television programmers themselves started to appeal—implicitly in the 1960s and explicitly in the 1970s—to the cultural logic in terms of which 'relevance' [to social and political problems] gathered significance . . . television executives expected young audiences to respond positively to television programs that adopted the logic of and issues associated to relevance. (60)

As programming executives emphasized "relevance" in their programming, it became not only "tolerated" among viewers, but it could be said that it even became expected.

In addition, the public had experienced a transformational moment in film when *Star Wars* was released in 1977. A character-driven movie filled with action and emotion, a movie about war, adventure and salvation, *Star Wars* echoed some of the "everyday" internal conflicts and desires for adventure that audiences were experiencing in their own lives. For example, the "Force" was so popular that some encouraged George Lucas to create a religion based on it. Audience reception indicated a hunger for adventure and fantasy, not just the life-reflection or contemplation inherent in relevance programming. *Star Wars* was set in another galaxy in which space travel was a common proposition but it spoke to the "soul" of the 1970s American audience. It provided the comfort of classic storytelling within a science fantasy setting. Adding to the fantasy was its opening line, which indicated that all events documented in the film occurred "a long time ago." The implication, of course, is that the movie documented another galaxy's *history*, filled with spaceships and interplanetary travels, while our most notable extra-planetary exploration had involved our own moon. The movie

was fiction wrapped in fantasy, but it provided fodder for reflection about potential societies in other galaxies—societies much more advanced than our own, yet these "ships" would have been to that society "today" the same as the horse and buggy were to Earth. *Star Wars* didn't simply bring audiences a daydream: it presented to them an archetypical good versus evil story presented in unique and intriguing ways.

Incorporating elements of popular television (relevance) with elements of popular cinema (fantasy and adventure) while combatting an overarching negative view of science and scientists presented a great challenge to Sagan and to *Cosmos*. By the 1970s, television had been commonly available long enough to have been researched for audience reception and reaction. These studies helped to guide network executives and program producers in making production decisions, not just for entertainment-centered shows but also for popular science programs. Jeffrey Kirsch's 1979 article, "On a Strategy for Using the Electronic Media to Improve the Public Understanding of Science and Technology," demonstrates the KPBS Science Center Director's confidence:

> This marriage of the sales mentality to the electronic image has led to a form of psychological conditioning of the mass audience. Producers have learned what formats, production techniques, symbols, and personalities are most likely to succeed in the home marketplace. (Kirsch 52)

Kirsch asserts that knowledge about target audiences could be used in order to create popular science programs that capture large audiences. He defines the current challenges facing popular science programs in this way: "Herein lies the dilemma of science communication . . . program material must be packaged in terms and symbols that do evoke resonant responses in the audience" (Kirsch 54). This "packaging" should be done "along formulaic lines" in the

form of characters "based on the stereotypes and shared fantasies of the American public" (Kirsch 53). Kirsch's intent is to tap into the current interests and knowledge of the American viewing public in order to create science programming that interests them. The rhetorical approach is thus not something that is later determined through analysis of the rhetorical object, but it is instead formed *with intention* before the text is created.

Popular Science in the 1970s

The television industry began to make concerted effort in the 1970s to reach audiences through popular science programs despite prevailing negative feelings about science and scientists. It can be argued that because viewers were used to watching television programming that was relevant to them, to their time, to their politics, they would have been primed for a mature, elegant educational program that sought to connect with them. At the same time, they hungered for adventure and fantasy presented with great spectacle. One contemporary popular science series, *NOVA*, aired on commercial-free television and it had already found some success. The creative approach was "entertainment first;" education came second (Klein 365). Of course, Jacob Bronowski's BBC mini-series *The Ascent of Man* had aired several years before *Cosmos* on PBS. It was produced by Adrian Malone who was then, consequently, hired to produce *Cosmos* ("Two Science Series" 263). Still, science on television (other than depictions of science or scientists in fictional programming) was rare.

Lingering negative public opinion made creating a new science program challenging. Writes Frederick Golden in a *Time* cover story about *Cosmos*, science's public image was widely known to be poor: "A decade ago…[science] was unpopular, even in disrepute . . . [It] was being blamed for much that was wrong with the world" (65). Presenting science on television had its challenges, as Judy Klein notes in her 1979 article, "The Medium Gets a

17

Message," but the industry felt ready to take on the task: "Television hasn't proved to be a medium receptive to the depiction of scientific inquiry, but the efforts currently being waged on a number of fronts may soon pay off" (Klein 361). Science was difficult to package and present in an interesting way, but with new technology, "the growing sophistication of production methods" led to viewers responding well to science-centered news segments (Klein 361). Out of this new-found production value came one of commercial television's first "successful" primetime science-focused programming efforts in the form of *Walter Cronkite's Universe*, which executives hoped would "look like *Star Wars* and sound like 'Sixty Minutes' [and which would contain] segments on breaking science news, investigative pieces and theoretical pieces" (Klein 365). This science-news focused program aired first in the summer of 1980, just before *Cosmos* premiered in September. However, it is interesting to note that *Cosmos* was already into production and was being discussed in promotional articles when *Walter Cronkite's Universe* was still an unnamed concept searching for the seed money needed to produce a pilot ("Two Science").

Like *Walter Cronkite's Universe*, *Cosmos* also imitated the amazing special effects of blockbuster movies: "It features special effects rivaling those in *Star Wars:* computer animation, scale models and painted backdrops as dazzling as anything ever attempted on television" (Golden 63). Promotional literature touted:

> Following the lead of many recent science fiction films, 'Cosmos' [sic] uses special effects lavishly. There are more than 70 special effects sequences using such cinematic devices as model animation, band and front projection, chromakey, explosions, tank shootings, mattes and traveling mattes, and new technology effects

18

that use motion control systems for multiple-layer compositing, according to PBS. ("TV Test" 652)

Connecting to the most popular movie franchise in history (up to that point) was key to promoting *Cosmos*. Viewers were likely to have seen *Star Wars,* perhaps multiple times, and to find that they may be able to have a similar adventure in their own homes (in an era before VCRs were commonplace or even available) would certainly have been attractive to them. By throwing in all the buzzwords and technological terms, the marketing materials would have been very persuasive to audiences ready for another such adventure.

In addition to attracting audiences through promoting the use of special effects, *Cosmos* also enjoyed the benefit of the 1970s television trend toward "relevance" programming. Because audiences were already used to having controversial issues discussed in their popular entertainment, they were more receptive to some of the more controversial aspects of *Cosmos*. For example, in episode two, "One Voice in the Cosmic Fugue," Sagan declares, "Evolution is a fact, not a theory. It *really* happened." Audiences were more apt to believe that what was being presented to them was "true" because of the realism present in even situational comedies. In other words, Sagan and *Cosmos* managed to "speak the language" of current television, a language with which audiences were comfortable.

This phenomenon is similar to what Kenneth Burke describes when writing about language acquisition: "When emerging from infancy into linguistic articulacy, a child 'unconsciously learns the rules' of his language's particular grammar and syntax, though the 'rules' may never be systematically formulated" (70). Audiences may not be consciously aware of the "language" of their contemporary entertainment; they may only know what "feels" comfortable and familiar or uncomfortable and foreign. *Cosmos* needed to speak the

19

language of current entertainment because the subject matter was so new to audiences. It needed to attract audiences through appealing to their current interests in science fantasy and special effects. Once the audience tuned in and was both entertained by the spectacle and comforted by the format, the nature of the content could have some leeway to stretch and expand into new areas that they may have otherwise found objectionable. Of course being able to promote this type of approach to presenting science would have looked attractive to funders who supported PBS.

Cosmos Captures its *Kairotic* Moment

As with *NOVA*, *Cosmos'* leading goal was not necessarily "education:" Sagan wanted to change the public perspective on science, to accept it and therefore to fund it. This change in perspective is typical to the "evolution" of science as a field: "Science grows not by mere accumulation of data as does natural history but by changes in perspectives" (Brummett 41). Sagan felt that public understanding of science was critical to its progress. According to Golden, when the American public virtually ignored two different Mars landings, "Sagan decided something had to be done" (68). Sagan knew that television was the key to reaching the public at large. Golden quotes him as saying, "'Television is one of the greatest teaching tools ever invented, particularly for teaching science'" (68). Because of the challenges facing a popular presentation of science on television, Sagan's savvy construction of his *ethos* as a "scientist guide" (which will be explored in the chapter entitled "*Ethos* and the Popular Science *Persona*") was integral in presenting the information in a non-threatening, entertaining, and enjoyable way. To reach the "average" viewer, Sagan had to appear as an "everyman," and not as one of the "scientific elite" who had been associated with cronyism and government spending.

In addition, he had to construct the program in a way that would be digestible within the context of television. As a result, each of the thirteen episodes of *Cosmos* can be viewed independently, together, or in any order. Jason Mittell would call this type of construction "narrative complexity" (29) because some story lines wrapped up in individual episodes but others carried over into subsequent installments. Sagan first mentions the Library of Alexandria and its destruction in episode one, but it isn't until the last episode that he finally reveals what happened to the "martyr" of the library, Hypatia. Mittell argues that this type of construction supports repeated viewings (31) and that these programs often become "the basis for robust fan cultures" (32). This narrative complexity gave *Cosmos* depth and rewarded faithful viewers with a feeling of familiarity with subject matter if they continued along on the journey with Sagan. It also added to the feeling of an "epic journey" which was tied together with a long and winding story thread.

Sagan's appeal to the American public of the late 70s (a public that was used to relevance programming, that wanted special effects and spectacle, and that was frustrated by the elitism of science) begins with a view of space: a black background studded with red, yellow and orange stars, moving through space, accompanied by a few simple notes of music. The program title "*Cosmos*" appears first, quickly followed with "by Carl Sagan." Interestingly, after the host's name disappears from the screen, a surprising third set of words, "A Personal Voyage," appears. Though this phrase is neither part of the series' name nor a part of any episode's name, it is, nonetheless, given this prime real estate at the beginning of the program, even before Sagan, our narrator and guide, has spoken. With these words, Sagan is already building a case that the information about to be presented in the

program concerns each viewer personally. He wants this voyage to matter to each member of the audience individually as well as collectively.

Only after the phrase "A Personal Voyage" does the name of the particular episode appear. In each installment, the music builds, the same familiar notes which will eventually give way to a voiceover, setting the scene for that hour of *Cosmos*. This consistency forms the feeling of a familiar welcoming. Even though an episode may be new, the welcome assures audiences that it has the same, dependable guide they trusted and the same amazing journey that they had already been enjoying. By highlighting the importance of the program for every viewer, Sagan is starting to build a consubstantiality, or "shared substance" with his viewers. Dale Sullivan describes consubstantiality as a partnership between the speaker and the audience: "[T]he audience must think of the rhetor as one of their own, preeminent among them, no doubt, but still one who belongs to them" ("Ethos" 126). Sagan's narrator makes it clear that everyone is starting out on an equal level—we and the cosmos are one— by stating, "We are made of star-stuff. We are a way for the cosmos to know itself.*"* Everything is made of the same materials, so there is nothing that is "more blessed" or valuable than something else.

As the opening sequence closes in each episode and the transition to that hour of programming is made, the dandelion spaceship does a "flyover" from the top of the screen. This flyover closely echoes the opening scene of *Star Wars* in which an Imperial Cruiser comes into view from the top of the screen. This shot was groundbreaking and helped to cement *Star Wars* as a work of master craftsmanship with awe-inspiring special effects. This reference to the opening sequence of *Star Wars* in the opening of *Cosmos* not only makes a connection between the two for viewers, but it also establishes the differences between them.

The large Imperial ship passing overhead in *Star Wars* is intimidating, especially given the size of the much smaller rebel ship. The *Cosmos* dandelion is peaceful and poses no threat. It does not establish hierarchy but merely represents the potential of space exploration and therefore science.

Peripherally, the exterior design of the spacecraft is made to duplicate a "ripe" dandelion, ready to blow in the wind to germinate new life. Once again, it is a visual connection the author uses to unite his audience—and their familiar world—with the cosmos. Entertainment and education "are achieved in rhetoric by the artful mixing of the familiar with the novel" (Sullivan, "Exclusionary" 290). The dandelion is common on earth and spreads its seed on the wind. By portraying a seed as a spaceship, Sagan is giving familiarity to the unfamiliar, comfort to the potentially uncomfortable. The ships in *Star Wars* were equipped for fighting and evasion. Sagan's ship is equipped only for discovery. Sagan is offering an "olive branch" in the form of a dandelion seed. This approach from the perspective of peace sets an "unthreatening" tone for the program from its opening credits.

In the first episode, "The Shores of the Cosmic Ocean," Sagan establishes the immensity and eternity of the cosmos as he sets the stage for the journey to come. He wastes no time establishing his arguments concerning the importance of science and the place of humanity in that vast universe:

> For the first time we have the power to decide the fate of our planet and ourselves. This is a time of great danger. But our species is young and curious and brave; it shows much promise. In the last few millennia we have made the most astonishing and unexpected discoveries about the cosmos and our place within it. I believe our

future depends powerfully on how well we understand this cosmos in which we float

like a mote of dust in the morning sky.

Immediately Sagan justifies the importance of this exploration of science because of what he sees as the looming danger of nuclear war. He provides compelling reason for viewers to stay and he indicates that their efforts to understand the cosmos are key to the survival of the planet. "Science" is relieved of its elitism because the "common" people now have the power over what previously seemed out of their hands. While they may not have embraced science nor fully understood what it could do for them before this program, after *Cosmos*, Sagan hoped, they would adopt a new appreciation for and understanding of the ways in which science benefits humanity as a whole. With a new vision of science in which neither the government nor scientists determine its value—in which the "pigs" no longer determine "who gets the pork"—audiences open themselves to Sagan's arguments because he tells them they have a voice. The decision (whatever that may be) had not already been made for them. They are in control.

Conclusion

The rhetorical construction of the program is so effective that *Cosmos* did not need time to "build" an audience. It enjoyed immediate popularity. The first two episodes attracted "perhaps as many as 10 million [viewers] each" on their initial run (Golden 63). PBS knew right away that it had a hit on its hands. Given the numerous re-runs of the program as well as the availability of program DVDs, and the fact that a *Cosmos* remake is in the works, it is clear that Sagan was able to capture the imagination of his audience. In much the same way that the *Star Wars* franchise has been able to maintain a rabid fan base and shape the entertainment that followed, so has *Cosmos* been able to retain its stature as the apex moment

in popular science television. It embraced the trend toward relevance programming, perhaps even paving the way for iconic cold war drama, specifically for the immensely popular television movie, *The Day After*, a much-anticipated entertainment event which centered on the lives of ordinary Americans and the repercussions of a nuclear war on their lives. Airing first in 1983, this movie "was viewed by half the adult population of the United States, which was the largest audience for a made-for-TV movie up to that time" (Niccum). It tackled the cold war and concerns about nuclear proliferation in a way that both entertained and raised awareness of a serious issue. The network decided to stage a debate immediately after the broadcast. Hosted by Ted Koppel, it featured "Dr. Carl Sagan, Henry Kissinger, Robert McNamara, William F. Buckley and George Schultz" (Niccum). Sagan's renown as "the prince of popularizers" (Golden 64) resulting from his involvement with *Cosmos* and his notoriety as a nuclear weapons activist would have likely made his presence in this debate not only logical, but perhaps even expected: Sagan's agenda regarding preserving the planet and life on it were made clear through *Cosmos*..

While addressing its rhetorical situation was key in attracting and retaining its audience at the time it first aired, programmatic elements that were created as a result of *Cosmos' kairotic* moment can also be credited with its lasting popularity. While the following chapters describe the formation of the popular science *ethos*, the creation of *aethos* (or, the directing of audience point of view to increase their potential for persuasion), and the resulting *mythos,* which creates a hybrid of popular science and science fiction, they all connect back to the rhetorical situation of *Cosmos*. The conscious production decisions made in response to the public opinions about science and scientists, the environment and preservation of the planet, and the prevailing forms of popular entertainment in the late 1970s

determined to program's popularity and impact. Its persuasive power was embedded within its rhetorical construction; that rhetorical construction was shaped by a deft ability to shape *Cosmos'* presentation to the interests and concerns of its contemporary audience.

ETHOS AND THE POPULAR SCIENCE *PERSONA*

Ethos, simply put, is the credibility of the speaker. Writes S. Michael Halloran,
"Aristotle acknowledges *ethos* to be probably the most important [of the three modes of
appeal]" ("Aristotle's Concept" 60). Without it, the audience would not be open to either
logical or emotional arguments from the rhetor. According to George Yoos,

> A speaker has two choices in making *ethos* causally effective. He may distort the
> audience's perception of his own personal qualities, or he may develop rhetorically
> effective personal qualities by being a good person. Aristotle discusses the first
> choice. It is the Isocratean, Ciceronian, and the Quintilian-like emphasis that
> recommends the second choice: *being* [emphasis added] a good man. (44)

Whereas this issue of "credibility" might seem to be tied to the reliability or trustworthiness
of the speaker, Aristotle describes *ethos* as a projection of character, not a reflection of
character: "If Isocratean tradition asserts the speaker's need *to be* good, Aristotelian tradition
asserts the sufficiency of *seeming* good" (Baumlin xv). From an Aristotelian point of view,
the decision regarding the trustworthiness of the speaker is based on the interpretation of a
façade, which may be wholly contrived.

Establishing *ethos* is critical in any endeavor perceived to be educational in nature. In
order to attract and then retain the large audiences needed to justify the millions of dollars
spent on producing *Cosmos*, Carl Sagan had to compose his presentation of the science
strategically. Scientists were seen by the public as tools for the Establishment and they were
described unflatteringly as belonging to a profession in which the "pigs" were in charge of
the "pork" (Kevles 397). In fictional representations on television, "The scientists [were
shown as] . . . relatively less attractive, fair, sociable, warm, tall, young, or peaceful, but very

smart. On weekend children's programs they were also judged to be less rational and stable and much more violent than other characters" (Gerbner 5). The image of the scientist ingrained with the public centered on only one good trait (intelligence) but on many lesser traits that were generally not desirable. Sagan needed to have his "host" display admirable, likeable characteristics in order for the audience to accept him and his message. Projection of elitism or superiority would likely have resulted in audience rejection of the program. In popular science and in *Cosmos* in particular, creation of *persona* is essential to gaining *ethos*—but it also creates friction with orthodox (or "traditional") science.

Formation of *Ethos*

The audience must perceive a speaker as trustworthy or appealing before they will open themselves to any argument: "The factors defining *ethos* . . . [are] in the audience's perception of or response to the speaker" (Yoos 47). By agreeing to hear an argument, the audience is thereby conferring power to the speaker. The speaker cannot create *ethos*—it must be given by the audience. In order to earn *ethos* and thereby gain this power, the speaker must "manifest the virtues most valued by the culture to and for which one speaks" (Halloran, "Aristotle's Concept" 60). To show that the speaker shares the values of the culture, s/he must address the audience in a way that takes into account the historical (or *kairotic*) situation. In addition to the educational background or knowledge-level of the audience, the speaker must take into account the political and socioeconomic climate that produces interests, attitudes, and concerns in the audience. In other words, "in [*ethos*] we find a culture speaking about itself to itself" (Lessl 186). *Ethos* is conferred after the audience assesses the rhetor's place of belonging.

Once the rhetor has gained trust by demonstrating or acknowledging an allegiance to the values of the audience, the audience will confer onto the speaker the opportunity to address them with his/her message: "More than an affirmation of common cultural values, *ethos* describes an audience's projection of authority and trustworthiness onto the speaker, a projection that is triggered or elicited by the speaker but otherwise supplied by the audience" (Baumlin and Baumlin 99). Referencing the important touchstones of an audience triggers their willingness to receive a speaker and therefore the argument being presented: "Psychoanalytic theory suggests that *ethos* can never be more than appearance because it involves . . . the audience's projection of its own internalized images of authority on the speaker" (Baumlin and Baumlin 99). If the speaker appears trustworthy, knowledgeable, and interesting enough to earn their attention, then the audience will respond positively to the speaker, opening themselves to the persuasion which will inevitably be embedded in the message the speaker will deliver. When these cultural references are made in the most effective way, the speaker can be said to "capture" the *kairotic* moment, the ideal moment in time for a rhetorical text to be presented.

Although Aristotle argued that *ethos* was established independently for each speech act (or, as interpreted here, for each act of communication), many more modern rhetoricians argue that *ethos* can be earned through a cumulative process. Francis Bacon, for one, argued that *ethos* could be acquired because of established reputation. He felt the speaker "in effect constructs his own reputation through cumulative utterance" (Wallace 123). According to Bacon, then, reputation, which is built over time, influences the audience's perception of the rhetor's performance: "[E]thical proof is not confined to the impression of good character that a speaker may convey in a single speech before a given audience . . . his popular

29

reputation is always an important factor in the audience's estimation of his character" (Wallace 123). Unless they are wholly unknown to the audience, speakers do not start with a clean slate for each presentation. Reputation-based *ethos* can either benefit or harm a rhetor. An individual with an established, positive reputation will face less of a challenge in convincing the audience to listen to the message delivered. An individual with a poor reputation, however, will have additional challenges in persuading an audience.

In addition, speakers may also tap into a cumulative *ethos* through association with a group that is already known to the public. These groups could focus on any issue or set of issues, be they political, social, economic, or intellectual; by claiming an association with one of these groups, the speaker is pulling on a mantle of the values and actions of that group. For Halloran, the scientific *ethos* is collective, shared by all scientists ("Aristotle's Concept" 62) and not the result of individual reputations. The invocation "Science" endows speakers with great inherent power because the audience may have "been socialized in the belief that science . . . was also a measure of intelligence" (Wander and Jaehne 214). Every contact with a scientist could result in some type of persuasion: "Whenever the scientist communicates, even the most mundane and seemingly innocuous descriptions, he is persuading his audience, literally commanding them, to adopt his point of view" (Weimer 14). Beginning from a place of great power lends great responsibility—and great culpability—to those who enjoy that advantage. In order to preserve it, science has set up mechanisms within the field to protect the positive aspects of Science's cumulative reputation.

Scientists protect this rhetorical advantage through creating what Wander would call "gatekeeping mechanisms." Michael A. Overington reports that scientists are trained to conform their communication practices with those of their field in order to be accepted as a

member of the scientific community. This training teaches them how to convince each other—for example, peer reviewers or journal editors—that their work is important and that it has been done correctly. When scientists demonstrate persuasion among their peers, their work may be published in journals to a wider audience, for example. Overington charges that scientists who do not follow the communication process into which they are apprenticed can be ostracized or even discredited within their profession. In addition to this potential for blacklisting or snubbing, Merton argues that scientists also have "ranks" *within* the field, and individual scientists' reputations are based, at least in part, on the ability or willingness to conform to standards. Even if field standards are applied, if they are applied with something less than success, professional interaction with and reputation among other scientists will be affected.

Therefore, refusal or the inability to comply with these norms in communication may result in a damaged career: "Scientists may assimilate caste-standards and close their ranks to those of inferior status, irrespective of capacity or achievement. . . . Caste-inferiors must be shown to be inherently incapable of scientific work, or, at the very least, their contributions must be systematically devalued" (Merton 227). The reason for the severity of this consequence could be that science builds on previous research. If scientists are proven not to follow standard systems, then perhaps it is easy to imagine that their scientific work might also be compromised. Because the field needs to build on the work of others, this potential can be enough to throw an entire reputation into doubt: "Polanyi argued that sciences are knowledge making cooperatives whose success depends crucially on their integrity as discourse communities" (Harris 283). If this discourse community has established standards and a member disregards them or is unable to apply them, then the "collective" may see that

31

rejection as a threat to the accumulated reputation (or credibility) that they rely on in order to build on the previous work of others—and to have their work accepted by non-scientists. Scientists who threaten this "currency" of the field must then be ostracized from the group. While ostracized individuals may still claim allegiance, the group will have disavowed those scientists and, therefore, their work.

Formation of *Persona*

Popularizations do not follow the standards of communication as established by the scientific community because the rhetorical situation of a scientific popularization is very different from that of traditional science. According to Merton, physicians and lawyers have a clientele that may shape what they produce, but a scientist has no such limitations. For Merton, science is "pure" and explores for knowledge's own sake. However, as discussed in the first chapter, "*Kairos* and *Cosmos*," popular science does have a clientele, customers that it has to please. As a result, content must be presented in a way that attracts a broad and sizable audience and inspires financiers to support the production. Popular science has to adapt its messages both to an "intended" audience and to an audience of financial backers. As a result, those who control the program funding must be persuaded that the topic and its presentation will produce a certain number of viewers, for example, before the message can even be created. Audience demands on the speaker results in "the dilemma of science communication . . . program material must be packaged in terms and symbols that do evoke resonant responses in the audience" (Kirsch 54). Information can't be relayed according to a static pattern. Information about the interests and concerns of the contemporary audience force popular science as a genre to form appeals and characteristics that speak to the audience of the time. In addition, an element of drama is necessary to attract and keep an

audience who is less likely to spend time with a "school lesson" than they are to watch an entertaining, interesting program from which they also learn some science.

To help in the endeavor of adding drama and interest to science as well as to show a connection with the concerns and interests of the contemporary audience, most television popular science enlists a narrator or host to guide the audience through the program. While this person may be a scientist and benefit from some of the inherent *ethos* resulting from belonging to that collective, the speaker also must appeal to the audience on a personal level. Therefore, the formation of a "character" is necessary. Paul Newell Campbell calls this type of character a *persona* and defines it as an "implied author or speaker" (394). This *persona* follows the Aristotelian notion that projection and not reflection is what is necessary in establishing *ethos*: *persona* may be "an imaginary being implied by the work, but a being who has no necessary resemblance to the author" (P.N. Campbell 394). Whereas this type of *persona* is vital in popular science presentations, it is a rarity in traditional science. Weimer views the "persona of ideal science" as a drawback because it often is seen as "coldly marching toward proven truth in an amodal, value-free, and logical fashion" (Weimer 22). In popular science, cold, emotionless detachment will lose an audience very quickly. Personality and personal appeal are critically important. While Aristotelian rhetoric acknowledges that *persona* is a projection and not a truthful reflection of the speaker's character, in science, this dissembling contrasts with the discipline's need to be accurate, honest, and descriptively exhaustive.

However, *persona* in scientific works, can be very effective in securing an audience. Watson and Crick's announcement of the structure of DNA was written in a "consciously contrived style." (Halloran, "Birth" 74). Halloran also argues, "the genteel style of Watson

and Crick's first published paper reflects a rhetorical persona . . . in the flesh, they were obstreperous and irreverent" ("Birth" 74). They created an *ethos* not just for other scientists, but for the journalists who would read their short announcement and report on it. Their fabricated rhetorical *persona* helped them to extend the reach of their science beyond the limits of their field—something Oswald Avery (whose findings were arguably as significant, if not more so) had not done—in order to seize a *kairotic* moment and further the field and public understanding of it. This formation of *persona* is not in itself rare, but the creation of such an expertly crafted *persona* within the bounds of orthodox science communication is. This *persona* changed the way the science was received by the press and it rewarded the scientists behind the *persona* with more public notoriety than they otherwise would have had. In turn, this notoriety for Watson and Crick effectively eclipsed the contributions of the Wilkins, Stokes, and Wilson as well as of Franklin and Gosling, the scientists who wrote the two papers that accompanied the original publication of "A Structure for Doxyribose Nucleic Acid." These other two articles were not written using the same attractive *persona* and were thus easily overshadowed by the Watson and Crick article.

While the projection of persona made Watson and Crick more likeable to the press, which was sure to pick up the story, *persona* in popular science does more than simply make the speaker likeable. A consistent and amiable *persona* may comfort audiences and dull their critical observations. George Yoos argues that *ethos* can lead to predictability, so people don't feel that they have to listen closely to the speaker because they feel they know the speaker well enough to predict what will be said (55). Yoos is critical of this dimension of *ethos* and claims that an "ethical appeal," or, a display of the speaker's "disposition, character, . . . or bearing" (41), is then necessary to hold the audience's full attention. I

34

acknowledge the value of ethical appeal and will explore and reframe that concept in the chapter entitled "*Aethos* and the Universe." However, the lulling and leading that can be produced through a projection of *persona* can also break down the audience's natural barriers or tendency to be critical, just as *ethos* does. This projected persona can allow the speaker to present the audience with information they may otherwise resist or reject because they are wrapped up in the "character" who displays traits they find interesting and appealing.

Within the context of popular science, *ethos* provides the professional credibility of the rhetor, but *persona* attracts and maintains audience. Because it can be difficult to separate a professional "face" from a private one, *persona* also creates the public image of the scientist as an individual within the collective. As Sagan demonstrated, a broad enough popularity or public appeal as an individual within the collective means the science popularizer may no longer need the "avowal" of the collective in order to maintain the benefit of its cumulative scientific *ethos* with the public at large—which the cumulative perhaps may find to be a challenge to its power and authority to guide the communication or even research practices of its members.

Persona in *Cosmos*

The presence of *persona* in popular science is critical to the retention of an audience, and so the first episode of *Cosmos* had to do more than simply introduce the program and its content: it had to introduce the program's host. It was crucial that Sagan establish his *persona* or "character" in the first episode, "Shores of the Cosmic Ocean," in a way that would give him the trust and capture the interest of his audience. This *persona* is key to *Cosmos* because Sagan would become the "pied piper" who entices the audience to follow along on a cosmic journey, even when it ventures into unknown or controversial territory. More than just

following along, the audience also needs to commit to the program and its lessons without wavering into disbelief or doubt. In short, the audience has to trust their host, and, to accomplish that, the host's *persona* has to be perceived as likeably, friendly, knowledgeable, and trustworthy. In the end, like Watson and Crick, the man who guides the program's cosmic journey is a carefully crafted creation, not fully reflective of Carl Sagan's own personality.

Sagan presents himself as an "everyman" with the ability to share wondrous information with others. However, according to biographer Keay Davidson, Sagan's own personality was reportedly abrasive, insensitive, and belittling (323), as well as "brash" and "aggressive" (190). During the filming of *Cosmos*, "Sagan seemed to lose his sense of humor and became increasingly brusque, even petulant at times" (Davidson 323). He clashed with director Adrian Malone and was dealing both with a contentious divorce and the failing health of his father. On his shoulders he carried concern for his mother, who would be lost without his father, and in his heart he fostered a new, deep, and encompassing love for series co-writer Ann Druyan. Halfway into production, the "stresses on the production [of *Cosmos*] . . . were driving it close to collapse" (Davidson 325).

Nowhere in Sagan's depiction of his amiable scientist guide is any of this stress apparent to average viewers. His tone of voice and patterns of speech remain consistently gentle, patient, and kind with his signature pronunciations and emphases. To his credit, Sagan was always a talented and generous teacher: "he almost always displayed patience and good humor when addressing lay people" (Davidson 52). While his colleagues may have found the representation of Sagan on the screen difficult to watch (likely because it conflicted with the personality they knew), the public responded very well. The show became what

Davidson described as a "cultural triumph" with "textual clarity and visual dazzle. It was to television science documentaries what *2001: A Space Odyssey* had been to science-fiction (sic) cinema: a new standard to shoot for" (Davidson 333). While his "persona troubles some viewers" (Davidson 332), this success would have been unlikely (if not impossible) if the majority of viewers did not find the *persona* of the program's host to be pleasant, appealing, and trustworthy.

Sagan's thorough classical education made him capable of creating a nearly omniscient but certainly intellectually dexterous guide. He attended the University of Chicago, "The Athens of the Midwest," which boasted the "Hutchins program." This educational approach was "classically oriented" and "an intellectual feast [that] transformed many students' lives" (Davidson 35). The students

> could not pick and choose classes as they pleased. . . . Rather, they were required to
> study a fourteen-part curriculum built around classical works. The teaching was
> implicitly historical. If one was to study, say, Newtonian physics, then one began by
> reading Newton's original writings. Science was presented not as a separate discipline
> . . . but as part of the larger culture. (Davidson 35)

Students studied not just scientific figures, but Sagan reported that it would have been "'unthinkable for an aspiring [Chicago] physicist not to know Plato, Aristotle, Bach, Shakespeare, Gibbon, Malinowski, and Freud—among others'" (Davidson 36). So when Sagan created *Cosmos*, he did it with this broad base of knowledge, fully aware of the intricate webs that connect disciplines, discoveries, and advances. His education helped him to know what would be appealing to his audience.

In addition, as a credentialed scientist, Sagan was able to take advantage of the collective *ethos* of Science, but he also had to avoid being grouped with orthodox scientists as one of the "elite." He had several late-night TV appearances with host (Johnny Carson) that gave him some cultural cache as someone worth watching. Still, Sagan could not rely on these initial impressions to sustain the audience through the entire thirteen-episode program. He needed the audience to connect with the program's host so they would connect with the subject matter. He needed to present the information in an interesting way to depart from school lessons and make it an adventure. He accomplished this feat through the environment in which he first introduced his "himself," or, his *persona,* as someone who is powerful yet unthreatening, knowledgeable, likeable, and trustworthy.

"The Shores of the Cosmic Ocean"

The opening ten minutes of *Cosmos'* first episode establishes Sagan's appeal for the audience and illustrates his vast but unthreatening power as well as his intellectual prowess, likeablility, and trustworthiness. Although the entire episode is geared toward setting the stage for the twelve episodes which follow, these key initial minutes establish the audience's willingness to confer ethos to their guide, largely because of his presentation of *persona.* I will first describe these minutes in detail and then I will break them down and describe how they work rhetorically. It should be noted that Hulu, the website from which text selections were transcribed from captions, airs the 2000 reissue of *Cosmos,* which includes a two-minute introduction by Ann Druyan. Druyan, a *Cosmos* co-writer, indicates the importance and longevity of *Cosmos*, reaffirms the science, and compliments the program as prophetic. This introduction would, of course, not have appeared during the original airing in 1980, but it is notable to mention because all minute markers in these scene descriptions include this

additional two minutes. To have an absolutely accurate understanding of how quickly Sagan establishes his *persona*, one must subtract two minutes from the times noted in order to get a full view of what the original audience experienced in 1980.

After the Druyan introduction, as the first episode of *Cosmos* begins, the musical refrain, which will soon become familiar throughout the entire miniseries, plays orderly, almost maudlin notes. Reddish-hued stars and galaxies of different shapes are presented on a black background. Then "Cosmos" appears on the screen, which is soon replaced with "by Carl Sagan." Afterward, appearing alone on the screen are the words, "A Personal Voyage." Quickly, what the audience soon will know to be a spaceship, shaped in the form of a dandelion seed, flies over head. Then, the name of the episode is presented: "The Shores of the Cosmic Ocean."

This opening montage (which is repeated for each episode) then transforms to an image of waves curving, crashing to shore. We hear Sagan's voice (speaking in a calming tone that is well paired with the peaceful music) before we notice him in a long shot at 3:04, walking, barely perceptible, toward the cliff. He is walking from the left of the screen toward the center, and as he turns toward the camera, it zooms in slowly while maintaining a still-significant distance. He is clearly speaking, his hands moving with his words, but he has no recognizable facial features or facial expressions. At 3:12, he speaks using dreamy, poetic language:

> The cosmos is all that is or ever was or ever will be. Our contemplations of the cosmos stir us. There's tingling in the spine, a catch in the voice, a faint sensation as if a distant memory of falling from a great height. ("Shores")

Again, the waves appear as Sagan notes, "We know we are approaching the grandest of mysteries" ("Shores").

The wave background again changes, this time to an ocean backdrop, focusing on calmer water, farther out from shore, and Sagan steps in front of the camera from the left. In a single glance, he projects the image of an amiable, educated person—perhaps even a professor. Nothing indicates his work as a Scientist—he dons no white laboratory coat, nor does he mention his name or professional credentials. As shown in Fig. 1, he is wearing what we'd define now as "business casual" clothing: white shirt, tan tie, tan blazer, and khaki pants under a muted orange-hued jacket. His hair—which is cut short enough so that it does not reach his shirt collar—is long enough so that it whips imperfectly in the wind.

Fig. 1. A friendly, welcoming smile greets viewers of "The Shores of the Cosmic Ocean."

He continues at 3:43,

The size and age of the cosmos are beyond ordinary human understanding. Lost somewhere between immensity and eternity is our tiny planetary home, the Earth. For the first time we have the power to decide the fate of our planet and of ourselves. ("Shores")

At this point the background music stops and we are left with only Sagan's voice and the sounds of nature.

The scene appears very natural and unstaged. Sagan is smiling and he's even squinting from the sun. He is not hiding under a great deal of stage makeup or hairstyling. He does not shy from showing an unflattering angle. His words are lulling but his eyes are expressive:

For the first time, we have the power to decide the fate of our planet and ourselves. This is a time of great danger. But our species is young and curious and brave. It shows much promise. In the last few millennia, we have made the most astonishing and unexpected discoveries about the cosmos and our place within it [scene fades to seagull]. I believe our future depends powerfully on how well we understand this cosmos in which we float like a mote of dust in the morning sky. ("Shores")

When the scene shifts from the seagull back to Sagan at 4:35, he is standing on the edge of the cliff, his back to the camera (Fig. 2).

Fig. 2. Sagan stands on the edge of a cliff before turning to face the audience, from "The Shores of the Cosmic Ocean."

He turns with a smile, and walks to join us. As he continues walking there is a sensation that we are walking together, away from the cliff's edge and the danger it implies. As he walks, he says,

> We're about to begin a journey through the cosmos. We'll encounter galaxies and suns and planets, life and consciousness coming into being, evolving, and perishing. Worlds of ice and stars of diamond. Atoms as massive as suns and universes smaller than atoms. But it's also a story of our own planet and the plants and animals that share it with us. And it's a story about us: How we achieved our present understanding of the cosmos, how the cosmos has shaped our evolution and our culture, and what our fate may be." ("Shores")

As Sagan walks, he occasionally looks down, presumably to check his footing. The movement is natural, uncontrived. Again, the image of Sagan is faded out to one of waves crashing, and our narrator/guide indicates that our journey will focus on the "pursuit of truth." The waves are quickly replaced with sky and the camera moves downward as the narration continues to focus on the shore. It is easy to miss Sagan in the distance as he enters from the left, this time walking on the craggy beach, once again not toward the camera, but toward the shore. The image is that of a lone man on a walk, independent and unaccompanied.

At 5:50, he stops to rest and the camera focuses on him from the waist up, now leaning on a rocky protrusion, his elbow resting on the rock, his hands clasped. He appears even to be slightly slouched (Fig. 3) as he continues to describe our coming journey. After 15 seconds, his face appears in close-up and he says,

Some part of our being knows this is where we came from. We long to return. And

we can. Because the cosmos is also within us. We're made of star-stuff. We are a way

for the cosmos to know itself [a lone note of music]. The journey for each of us

begins here [Sagan taps his temple and the backdrop of music begins again]."

("Shores").

 Our host tells us that we will take our journey on a "ship of the imagination" and that we

will be "unfettered by ordinary limits on speed and size" ("Shores"). He promises that we

will be able to go "anywhere in space and time" ("Shores").

Fig. 3. Casually leaning on a rock, Sagan tells of the journey to come, from "The Shores of
the Cosmic Ocean."

When the scene changes to a view of Sagan, again from the waist up, leaning as

before on the rock, he says,

Perfect as a snowflake, organic as a dandelion seed [pulls a dandelion seed out from

between rocks as camera zooms in on it], it will carry us to worlds of dreams and

worlds of facts" ("Shores").

We see the dandelion's white spindly fibers swaying in the wind as Sagan grips it between

his left thumb and forefinger before transferring it to his right hand. The camera returns to

43

the image of the leaning Sagan, dandelion seed in hand, inviting us to experience the journey

with him: "Come with me." He raises the seed (again shown in close-up, Fig. 4), and he lets

go. Sagan looks up into the sky, appearing to follow the now-blowing seed with his gaze.

Seven minutes into the program, the ocean setting is replaced by black space, filled not just

with stars, but brilliant galaxies as well as our shining "spaceship of the imagination," formed

in the image of the dandelion seed (Fig. 4). The galaxies in the background indicate our

forward movement as they appear to be coming nearer to us; Sagan's narration continues.

Fig. 4. The dandelion seed (left), an unthreatening vehicle of life, becomes the inspiration for
Sagan's "spaceship of the imagination" (right), from "The Shores of the Cosmic Ocean."

After nearly a minute, Sagan notes that we are now "halfway to the edge of the

known universe" ("Shores") and the inside of our ship is revealed. Sagan is sitting at what

appears to be a control panel set in front of a window out into space (Fig. 5). The ship's

interior is monochromatically white with a "pointed" or sharply pitched roof that is almost

church-like. Sagan occupies the only chair, his back to the camera. As the camera pulls away

from him, we see that the ship is long and narrow. At the opposite end, nearer to the camera,

is a pentagonal "space map" showing galaxies, which becomes clear to us at 8:30. The

camera slowly moves forward, then the scene changes to colorful, awe-inspiring galaxies

close-up. Sagan then turns, gestures with both hands (palms up) toward the floor). Music

plays and the floor of the ship appears to open—another window with a shape reminiscent of a keyhole. Sagan crosses his legs and leans on the arm of the chair as he continues his narration. Then, at 9:15, he turns again toward the front of the ship, clearly in control, with a map on board but no need to reference it. At 10:00, the lessons begin with an explanation of a light year, its definition and its function. Our journey has begun.

Fig. 5. The ship's interior and cathedral-like ceiling, from "The Shores of the Cosmic Ocean."

Narration

The narration is reminiscent of a bedtime story, which makes the introductory voiceovers both comforting and nonthreatening in tone or content. The language that Sagan uses is not standard scientific jargon. In fact, it isn't even language common to educational endeavors. It is dreamy and meandering, at times seeming a bit unclear. When Sagan, leaning on the rock, says, "Perfect as a snowflake, organic as a dandelion seed" ("Shores") in regard to our imagined spaceship, the description seems to come from nowhere. There had been no previous reference to the perfection of space travel or in what way our travel would be "perfect." While one can eventually surmise that he is saying that traveling using our imagination (which knows no boundaries or limitations) is problem-free, this connection

45

might not be immediately clear to the average viewer. The language itself is pretty and soothing, and so the audience, wrapped up in the larger concepts that Sagan describes and lulled by the quiet delivery of his narration, may not notice such slight issues of clarity.

Much like Charles Darwin did in *The Origin of the Species,* Sagan creates descriptions that pushed beyond mere scientific reflection into poetic consideration: "[T]he attitude toward nature expressed in *The Origin of the Species* is . . . a moral and humane response to the competition and violence in nature. Darwin does not describe nature in neutral, dispassionate language—he marvels at it" (J.A. Campbell 444). Far from the dry and neutral language of a scientific article, it expresses awe and reverence similar to the way that Darwin spoke about nature. Sagan does not express himself dispassionately as a "scientist;" his inflections and distinctive habits of emphasis are signatures unique to him. His words are formed almost as a devotional to the cosmos as a deity. When he says, "The cosmos is all that is or ever was or ever will be" ("Shores"), a reference to a god-like entity—an all-powerful being without beginning or end—is made. These first words of the program introduce audiences to the concepts that will be covered, but they also lay the foundational definition of the word "cosmos" (which literally means "order"). This "cosmos" becomes something more directly connected with the spiritual than with the scientific.

Sagan pushes this spiritual connection toward the literary or even poetic when he notes, in a dreamy tone, "There's tingling in the spine, a catch in the voice, a faint sensation as if a distant memory of falling from a great height. We know we are approaching the grandest of mysteries" ("Shores"). These lines could easily be written in stanzas rather than in prose. Again, the meaning or relationship of these lines to the program's purpose is not clear. Yet, the combination of tone and artistry are inviting, indicating that this program will

be more than simply "educational." They also indicate that this person, the program's host, is smart and sensitive. He is not challenging the audience with scientific language they may not understand. He is not delivering a boring introduction that simply tells them who he is or what he's going to tell them. He touches on something more deeply human, something more interesting than a string of facts delivered with great spectacle via television. He promises the audience something not normally associated with science: beauty.

The imagery evoked through the narrator's words is meant to inspire and draw audiences into the artistic, literary qualities of *Cosmos*, much in the way a Homeric epic would. These epics "carry the unfettered reader aloft on wings sublime" (Bassett 393). *Cosmos* does the same for the television viewer. The language and the visual depictions of this amazing journey, which stretches beyond the limits of the galaxy to the ends of the universe, carry the audience "aloft," as though they are on a journey with an epic hero like Odysseus. And, just as Homer's work "served as a storehouse of knowledge" (Bassett 395-96), so does *Cosmos* store and share the information of its contemporary scientific disciplines. Through his use of language, Sagan presents the cosmos as powerful and awe-inspiring, yet controlled by universal laws of physics. At the same time he links his program with classical archetypes and story structures which have stayed in the ken of humanity through millennia.

Sagan makes clear that this program is not "only" about science or the universe; it's not a story belonging to some "Other." It is the audience's story: "But it's also a story of our own planet and . . . it's a story about us . . . and what our fate may be" ("Shores"). He becomes a fortuneteller, able to tell potential fates so we can choose our path more carefully. He evokes interest from the audience while at the same time establishing his power. He is not

establishing his power *over* the audience, but instead he is establishing his power to *help* the audience. He reiterates this message later in the introduction, making a connection not just between the audience and the story, but between the audience and the cosmos itself, which now is described as part of our very essence: "Some part of our being knows this is where we came from. We long to return. And we can. Because the cosmos is also within us. We're made of star-stuff" ("Shores"). The message again invokes spirituality. Sagan is actually describing the physical components of our being—our material make-up of matter, a grouping of atoms, recycled from the universe. However, his words indicate something more. What he describes seems to have no limitation of physicality; yet it is something with consciousness: "we are a way for the cosmos to know itself" ("Shores"). We become, not just part of this godlike thing, but we become its consciousness, a key part of its structure. What Sagan describes is something more closely akin to a soul rather than animate groupings of matter. This *persona* is not challenging religious beliefs, as a Scientist would; he is expanding Science with a vision of spirituality.

Last, Sagan's use of first-person plural makes his words seem to come not from someone inaccessible and "above" (like a lofty academic), but instead from someone who is on the same level as the audience. He uses language to create a valuable partnership with the audience: by continually using the first person plural, he puts himself together with his audience. Throughout the entire miniseries, Sagan only rarely separates his *persona* from the audience by saying "I." He frequently uses the terms "human species" or "we" in order to bring his audience closer to his message and closer to him. By saying "we," the message transforms; it is not just scientists who have explored and learned and discovered (Lessl 191).

It is the human species who has done these remarkable things: the human species, of which we are all a part. He gains credibility and further advances his image as an Everyman.

<u>Movement</u>

The audience's first view of Sagan is shot from a distance. He is walking, not toward the camera but instead toward the water. When he turns to face the audience, the camera is still zoomed out, so no facial features or expressions are discernable. In fact, this man could be anyone on Earth. In effect, between this first shot of him and Sagan's omission of a self-introduction through words, our host erases his ego. He is important to the journey because he will be our guide, and the lack of ego indicates a lack of ulterior motives. Because of his movement toward a neutral position, Sagan is unintimidating. The audience, via the camera's perspective, joins him and enters his space: he does not invade ours. Kirsten Lentz argues that characters who move forcefully come to be seen as "commanding" (71), abrasive, or aggressive. Sagan's calm walking toward the cliff and then toward the water eliminates this potential interpretation of his *persona* as being threatening.

When Sagan stands at the edge of the cliff, his back to the camera, he turns around so he can talk to the audience. As he turns, he smiles, as if greeting someone familiar to him. He does not turn quickly, with anticipation: he turns slowly, with no indication of feeling threatened or uncomfortable. Then, as he walks toward the camera, the camera begins moving with him. Sagan's face is shown more closely, but the camera is pulling backward as he moves. The sensation is that the audience is now walking *with* him, a companion. Because Sagan must look down and check his footing (as noted earlier), a sense of realism is brought to the scene. It is a natural (and intelligent) movement for someone walking on a rocky cliff, conversing with a friend, to watch where he is stepping. He is not staring into the camera

from a short distance; he releases his "eye contact" with the camera, increasing the realism of the scene. The audience has entered his space, and we have joined his walk. This joining indicates the audience's power to choose whether or not to go along on his journey.

Setting

The crashing waves which open the program demonstrate the power of nature. Of course, the natural beauty of the location would have interest for the audience, but it is also well chosen for our host to demonstrate his own willingness to be vulnerable and to emphasize that this journey is offered via invitation, not decree. The often and quickly shifting images on screen contrast with the slowly delivered monologue, adding interest. When Sagan is shown in his first close-up with his hair whipping in the wind, he doesn't fuss with it. He doesn't wear a hat and he clearly doesn't have a crew off-camera blocking the wind. He shows that he is no prima donna by allowing himself to be filmed in somewhat unflattering conditions. Because he must check his footing while he walks, the audience is assured that he really is walking on this uneven terrain: there is no hidden "sidewalk" which he enjoys but which is unseen by them. Sagan is presenting himself as naturally as possible: just a person out by the ocean. His lack of fussiness about his appearance, his willingness to squint his eyes rather than hiding them behind sunglasses is an exposure of his "true" self. A demonstration of his sincerity and trustworthiness, he does not appear to hide behind makeup or other falsifications of television.

When the camera comes for the first time from behind Sagan, he is standing on the edge of the cliff. The body language places him in a vulnerable position. He does not need to be in control of the audience's actions and he trusts the audience with his own safety. This vulnerability indicates the *persona* of a host who will confer onto audiences the same thing

that he asks of them: trust. He needs them to believe what he has to say, to accept it without a lot of doubt or hesitation. The territory into which he intends to travel is controversial at times, but he must have the chance to explain his stance on those issues before other prejudices or preconceptions interfere. He wants the audience to trust him enough that they will stand at the edge of the cosmos' cliff and learn what they may have perceived to be "dangerous" to their beliefs or identities.

The choice of a dandelion to represent a spaceship is also an interesting and unusual one. Normally, spaceships are depicted with many mechanisms for defense or attack. But not Sagan's. His dandelion is innocuous, beautiful, and functional. While any ship that can travel through space must be equipped with impressive technology to power it and to preserve the life inside of it, this ship is related to the common. Although powerful by necessity, the ship's lack of preparation for attack or defense signals an unthreatening agenda. Therefore, the "captain" of this ship, our host, must also be unthreatening in his motives. In addition, a ripe dandelion seed spreads life everywhere. Rather than being a symbol of threatening life, this ship is being associated with spreading it.

The spaceship's stark white and church-like interior is again reminiscent of something religious. Because Sagan has told us that we are "star-stuff," we already know that we are woven into the fabric of the cosmos. The lack of color within the ship may be reminiscent of popular images of "heaven," but it is also a nod to the "colorlessness" of a black and white universe. The map at the back of the ship, far behind the location from which, presumably, the ship would be steered, provides a visual anchor to the scene. Sagan clearly knows this map well enough that it can be located three or four meters behind the control panel without issue. His knowledge of that map is so thorough and reliable that he

51

has little need to reference it, nor does he need a co-pilot. Only one seat is available, and he is in it. He is clearly in control of steering the ship, of guiding us anywhere in space or time.

Sagan himself is not presented in white nor in a laboratory coat. Such a depiction would at least differentiate him, and potentially elevate him, "above" his audience. It may also threaten the perception he has been fostering of the audience's own control over whether they join this journey. Sagan would want to present his host's *persona* as an ordinary person—one who is very knowledgeable, of course, but one who belongs with the Everyman. He wears a tie, which does distinguish him somewhat from other people as a signal of authority. However, it is a textured tie rather than a smooth or expensive silk tie. His corduroy blazer also adds texture to his dress, eliminating the possibility of appearing too polished. In fact, this blazer is almost a prototypical "professor" blazer. So, even though Sagan does not present his credentials nor even say his own name, he creates through his dress an amiable professor *persona,* distancing himself from an identity as a Scientist. The *persona* presented is a reliable guide, peaceful, curious, inviting, smart, calm, and friendly. Through him, the audience will find the great sights and astonishing truths he has promised earlier in the introduction.

Scientific *Ethos* and the Science Popularizer

As explored by Overington and Merton, professional standing within the scientific community relies on conforming to the communication standards it has set, standards that (presumably) help protect its collective *ethos*. These mechanisms establish communication norms within science and between scientists. However, popular science cannot share the same gatekeeping mechanisms with orthodox Science. Whether accommodations, as Jeanne Fahnestock would call popularizations, are in the form of scientific articles in the mainstream

press or in television programs, they are destined for a broader audience than any academic article, regardless of importance. These accommodations sometimes are written by journalists; other times they are written by scientists. However, those who "translate" or popularize scientific information subject themselves to potential criticism from both lay audiences (criticisms regarding lack of clarity or interest) and by scientists (claims of inaccuracy or oversimplification). While Merton writes about the "the institutional structure of science" (269), it should be acknowledged that popular science's "institutional structure" should lie, to some degree, with the medium through which it is distributed, or perhaps even with education rather than with Science.

Because the institutional structure for popular science does not match that of orthodox Science, Sagan has been subject for years to the burden of being a part of the "science collective" (and thus being able to tap into its accumulated *ethos*) while also being a science popularizier, communicating outside of the field's established channels. A boundary-breaker and bar-setter for science popularizations, he is at times disparaged and disrespected within his own profession. His *ethos* as a scientist is questioned—and it was even dismissed when he was refused entry to the National Academy of Sciences. Deliberations were held confidential, but debate was reportedly vigorous. That year (1992), only 59 instead of the usual 60 scientists were admitted for membership in this elite group. Denying Sagan entry indicated that fellow scientists didn't deem Sagan "worthy" of it. They questioned his contribution to the field of science, despite the fact that his enormous public appeal resulted in conference talks about science that would need to be booked in stadiums, not classrooms or even auditoriums (Steel 248). Even though he received the NAS' Public Welfare Medal, the message they sent was clear: he was being denied the achievement and honor of being

53

counted among the membership of elite scientists. He was effectively ostracized, a caste inferior in the field.

The main criteria for rejecting him was that his research and discoveries were not significant enough—and that, according to Faye Flam, admitting Sagan would "open a floodgate to people whose science isn't spectacular but [who] have other credentials" (960). These "other credentials" could indicate that the academy thought Sagan had blurred the line between science and popular science, so his work as a whole could not be easily categorized. It is hard to say if their objections were directly related to the creation of "*persona*," an illusion, when science is based on facts, or whether it was based on Sagan's inability or unwillingness to follow the established "rules" of scientific communication (an impossible feat when one wants to popularize). They may also be related to the power a great popularizer can wield and how that popularizer, in some ways, receives "ownership" of the science in the public's eye. Regardless of the reason for the field closing ranks against him in exactly the ways indicated by Overington and Merton, it is clear that it was not Sagan's lack of contribution or "inability" as a scientist that led to his rejection. In fact, Sagan possessed a Ph.D. in astronomy and astrophysics, had a *vitae* that was 265 pages long, worked with NASA on Mars missions and the Voyager probe, and published an average of one "scientific peer-reviewed paper per month" (Shermer 493) from the start of his career in 1957 until his early death in 1996. He may have published more popular science articles after *Cosmos* than he did beforehand, but his rate of scholarly paper publication did not decrease (Shermer 493). He maintained his connection to orthodox science and discovery even as he expanded public knowledge of, interest in, and funding for science. His contribution to science was different from that of other scientists, but just as valuable (if not more so) than most. In his case, the

ability to tap into a cumulative *ethos* of a group helped him to have credibility with audiences but ended in a professional humiliation inflicted because of a lack of understanding or acceptance of his methods—even though they were enormously successful—because they did not follow with what is traditionally expected of a Scientist.

Conclusion

Sagan's unimposing *persona* as a host and guide, who is at once able to communicate unflagging expertise and knowledge while portraying an unintimidating Everyman, helped to bring the public of 1980 into the complex and sometimes intimidating world of science. By introducing spiritual and artistic elements along with the science, Sagan creates a definitive *persona* that helps his subject matter reach a broader audience who is receptive to his message. This *persona* was not reflective of his own personality, which was often described as arrogant. Sagan was savvy enough to create a likeable host who would not intimidate the audience with his pedigree as a scientist. Instead, he illustrated great knowledge through his poetic words and references.

The host's *persona* communicated a lack of ego, and interest only in sharing this vast storehouse of knowledge and the awesome journey he was about to take. Through his movement, Sagan invited the audience to join him on a walk, which would eventually become this journey through the cosmos. His ship was powerful, but it contained no sign of weaponry, indicating that even if the audience gave him power over themselves, he would be no threat. In fact, he gave the audience power over himself by showing his own vulnerability, by standing on the edge of the cliff and by showing himself in an imperfect manner, wind whipping his hair, shadows on his face, eyes squinting. He revealed the importance of the audience as the "consciousness" of the cosmos and did not deny any spirituality or religious

beliefs—beliefs that might put up barriers to their acceptance of his messages. Instead, he expanded the notion of spirituality to include the vast universe at large, with humanity woven into its fabric as its soul. This *persona* was able to at once be a guide and a friend who is powerful yet unthreatening, smart, likeable, and trustworthy.

As a member of the scientific orthodoxy, Sagan suffered the consequences of his *unorthodox* manner of communicating science, yet his ability to popularize science for millions of people stretches across decades of time. The audience's trust of him and their interest in the subject matter depends on his representation of *persona*. This *persona* allows Sagan to gain *ethos* with a broad audience who in 1980 (as explored in the chapter entitled "*Kairos* and *Cosmos*") was wary of science and associated it with "pork," weapons of war, and elitism. Unlike orthodox science, which can itself benefit from the formation of *persona* in its communications, popular science must present a host who can break through a vast array of potential barriers that are not always connected with the subject matter at hand. Sagan works around barriers of belief, varying education levels, geographic and cultural identities, and distrust of his field. Without his host's *persona*, *Cosmos* would have seemed to be a lecture and not an adventure which people eagerly took: an adventure that people are still taking more than thirty years later.

AETHOS AND THE UNIVERSE

In George Yoos' 1979 article, "A Revision of the Concept of Ethical Appeal," the author explains that the meaning of the Greek word ήθος has been fractured over time, resulting in only partial understanding of Aristotle's rhetorical use for the term. The definition has been split in two: "credibility of the speaker" and "haunt" or "dwelling place." While both meanings can be understood in the original Greek, the usual English transliteration of ήθος, *ethos,* has traditionally emphasized traits of the speaker over those of place, and, as a result, the second important aspect of the term has been mostly abandoned or forgotten. However, as Charles Chamberlain, S. Michael Halloran, and Dale Sullivan have pointed out, the concept of a haunt or dwelling place is an important rhetorical tool. Because these authors all use different terminology to describe the creation of a haunt or dwelling in rhetoric, I will unify and expand upon their definitions by fitting them under the single transliterated umbrella of *aethos*. While the chapter "*Ethos* and the Scientific Persona" discusses *ethos* and its importance and usage in televised popular science, this chapter will concentrate on *aethos*. It will reconstruct the "lost" meaning of *aethos*, contextualize it within the work of modern rhetoricians who have recognized its importance, and discuss the ways this rhetorical appeal is used to persuade in popular science television. Carl Sagan's *Cosmos* will again provide the case evidence for this argument.

The Rhetorical Function of *Aethos*

In a nutshell, *aethos* increases persuasion by using sensory elements to create a new framework through which an audience receives the information or arguments presented by a speaker. It unifies the audience as a whole and creates the singular identity of "audience" for what is, in truth, a group of individual viewers who are separated by space and even time.

Aethos is about vision and interpretation; it connects the audience emotionally to the speaker's argument and provides enthymemic clues for the "appropriate" audience reactions. The haunt or dwelling created by the speaker is "entered into" by the audience, and it is from this space that the audience experiences the speaker's point of view. When the audience enters the speaker-created haunt, it is thereby conferring great power to the speaker, who can then, in effect, control the viewpoint from which the audience examines the information presented. Because the audience does not view the information presented through their own "frames" but instead through the frame created by the speaker, the resultant persuasion can be highly effective. Within the context of television, the haunt involves the intertwining of sound and imagery which manipulate—and, in the case of *Cosmos*, emotionally manipulate—the audience.

The inherent unknowability of the viewpoints from which people perceive the world around them creates a great challenge to persuasion. These arenas, which would have been referred to as "frameworks" by Polanyi or "terministic screens" by Burke, determine the audience's perception of "truth." Fully understanding a single audience member's particular framework would be highly improbable, so addressing the multiple viewpoints of individual members of an audience would be impossible. Rather than adapting the message to their existing perspective, *aethos'* function, then, is to *direct* or *manipulate* audience members' perspective. In this regard, *aethos* is reminiscent of Barry Brummet's "advocacy of realities," in which the rhetor invites an audience to experience a different worldview. Brummet argues, "The central tenet of intersubjectivity, or process, is ambiguity: the idea that there is no objective reality . . . There is no one standard against which to compare experience" (28). He goes on to claim, "that reality is shared and that it can be changed" (31). By "advocating" a

58

certain reality, a rhetor can change the common perception of reality (intersubjectivity) since a singular truth does not exist. What Brummet does not argue is the connection of his concept with the original meaning of *ήθος*.

The literal translation of *aethos* has been described by S. Michael Halloran as being a physical space. He writes,

> The most concrete meaning given for the term in the Greek lexicon is 'a habitual gathering place,' and I suspect that it is upon this image of people gathering together in a public place, sharing experiences and ideas, that its meaning as character rests. (60).

This idea of "sharing space" is reinforced by Dale Sullivan when he describes a unification of the audience, transforming from individuals to parts of a whole: "…those who share a common mental or spiritual space also share a common substance, we begin to experience *ethos* as consubstantiality" (127). "Space" and "sharing" are the stabilizing spokes of *aethos*. This space, however, does not need to be a physical location and consubstantiality does not have to be manifest synchronously. According to Sullivan, mental or spiritual spaces still have "substance." I argue that the freeing of "space" from a physical location allows television popular science to create *aethos* as a critical underpinning for its persuasion. It creates the opportunity for the "speaker" to persuade the audience to action.

While Sullivan's definition provides some fitting imagery for imagining the role that *aethos* plays in persuasion, Charles Chamberlain's work will illuminate my definition of the term most clearly. He explains that Homer defined the space of *aethos* (which Chamberlain writes as "*ēthos*") not as a location where people "habitually meet," but rather as a space that is used to habituate creatures to new routines. He uses the example of stabling horses to

illustrate his meaning: "The point of the manger is that the humans hope to change the horse's habits by using hunger to make it regard the manger as home" (98). Often, he points out, the pull of the pasture is too strong and the horse, which has long been habituated to the open spaces, cannot overcome its pull. Because of the difficulty in "re-habitualizing" a creature, a correlation is drawn with persuasion: "The simile is concerned therefore with the power of habituation . . . .These habits are difficult, though perhaps not impossible to change" (Chamberlain 98). Using a physical space to change an inward belief or reaction is the connection Chamberlain is making, but he does not imply that the space where this change occurs must be physical. Herein lies the power of *aethos*: the difference between a physical space for *meeting* and a place for creating mental change is enormous. If the space were "merely" physical, the rhetorical usefulness might be viewed as being limited. But, because this space can also be mental or even emotional, the rhetor can effectively shape the psyche and perceptions of the audience to elicit the response desired.

Since *aethos* does not need to involve a *physical* location, a "rehabituation" (or mental change) can be achieved through perception. This mental change is what makes *aethos* a rhetorical construct: *aethos* is the arena (or a frame) through which the audience will view or experience the information a speaker presents. Because this arena is not a physical space, it is constructed and fully controlled by the speaker. The audience enters into this arena only if the speaker has *ethos*. Once "inside" this space, the audience will experience consubstantiality with the speaker and with other audience members. They will have a shared experience that binds them together and allows the speaker an opportunity for persuasion.

Aethos can also provide a frame of excitement for subject matter that might otherwise seem dull. Judi Klein's 1979 article, "The Medium Gets a Message," states that an element of

visual attractiveness was key in television because audiences were already associating "importance" with "visual excitement:" "Another problem is that the importance of stories is often judged on the basis of how visually exciting they were" (361). She goes on to explain how science didn't appear often on the evening news because it "could not readily be summed up in a matter of seconds and . . . did not lend itself to the TV camera" (Klein 361). Building a consistent façade of excitement surrounding scientific theories, laws, and history was critical to *Cosmos* being able to garner coverage in the press.

Sagan and the creators of *Cosmos* understood the great challenge in front of them: keeping the attention of a broad audience while presenting thirteen hours of science programming over a half-season of television. In order to further his agenda of encouraging adult viewers (voters) to embrace science and space program funding (motivation which the chapter entitled "*Kairos* and *Cosmos*" explores in-depth), Sagan needed to create a friendly, unthreatening view of space and of science. This "view" was created through the program's *aethos*. Sagan and the producers *Cosmos* used contemporary images and references which would most interest or appeal to viewers. Their intentional use of aesthetic qualities to capture and retain audience interest is made clear in a short promotional blurb published before the program ran: "The intent of 'Cosmos' [sic] is to examine [scientific] questions in a style that is both intellectually stimulating and visually attractive" (TV Test Tube 652). By manufacturing a tone of excitement for every concept covered (even of the googol or of the tesseract), Sagan and *Cosmos* could gain the attention and the publicity needed to further his rhetorical objective.

Evidence of this "tone of excitement" is clear from comments Sagan made to Klein in an effort to promote the show:

61

Still another approach will be offered by Carl Sagan in his series 'Cosmos,'

premiering in 1980. According to Sagan, the aim of the show is 'to explore the

deepest connections of human beings with a vast and awesome universe in which we

float like a grain of sand in the cosmic ocean.' The proposed scope of the show takes

in virtually all scientific disciplines and will employ the use of lavish special effects

to heighten the wonder of science as it influences life. (Klein 365)

The "heightening of wonder" echoes Jeanne Fahnestock's assertion in "Accommodating

Science: The Rhetorical Life of Science Facts" that popular science has two basic appeals:

the appeal of application (or usefulness) of the information and the appeal of wonder which

attaches it "to a category which has a recognized value for an audience" (279). This

recasting in wonder, at least in the case of *Cosmos*, created *aethos* within the program so the

"speaker" could direct the viewers' gaze, could create a new framework from which the

audience would view the information presented. The wonder attracts audiences, but it also

provides the speaker with a tool for persuasion.

The Creation of *Aethos*

Aethos is created most easily through mediums capable of sensory exchange. Skilled

rhetoricians can create such a space by words alone, but it is much more challenging to do so.

Nostalgic references to a time or a place that will be of importance to an audience may create

a type of *aethos*. For example, Dr. Martin Luther King, Jr.'s "I Have a Dream" speech called

on forward-looking, idealized references to the future. Now, the speech itself is invoked to

elicit nostalgic references to the past. Hearing these words can transport an audience to a

place where their emotions are exposed and they show vulnerability. Within this

vulnerability, speakers find opportunity to persuade the audience toward whatever goal the speaker has set for the exchange. This type of invocation can be very useful.

However, simply speaking about these places is not enough to maximize the rhetorical appeal, or the persuasion of the audience. Writes Karl R. Wallace in his book, *Francis Bacon on the Nature of Man*, "Reason and imagination together created a credible object or argument, and the effect was insinuative" (80). The "insinuation" created by the mixture of projected image and audience imagination is what creates the frame or arena. While references to places of significance might have rhetorical value (as in the example above), it is the *presence* that is what is most moving or valuable to the audience. Danielle Endres and Samantha Senda-Cook assert that "places themselves—not discourse about places—are rhetorical tactics in movements toward social change" (259). Simply speaking about the place will not move the audience to action (although reference to a physical location may invoke a type of *aethos*). The frames or arenas framed by the creation of virtual place are necessary to further the rhetor's argument.

Usually, *aethos* needs the help of visual and auditory elements in order to create an "arena" where the speaker can lead the audience's attention toward a distinct target for a clear purpose. The broader and larger the audience, the more necessary these additional elements are in creating a common framework through which all will examine the information that is presented to them. A television program can create a unique environment like none the audience has ever seen, or it can recreate a scene that is common to some or most of them. Whatever the speaker chooses to display, the illusion creates a power differential that sides with the speaker.

When the audience sees the speaker-created display, those images become the "norm" for the framework through which the rest of the presentation will be viewed. With current technology, creating a new "manger" for an audience is fairly simple for those with the technical know-how. Television provides excellent opportunities for *aethos*-building because it is able to portray a non-physical space that "feels" real to viewers who willingly suspend their disbelief. Through imagery and sound, music and pictures, speed and repetition, people can become quickly "habituated" to the new environment created through entertainment. An "arena" can be built from which they will view the information that the speaker presents— and therefore they are more open to persuasion because their individual frames are not being applied to what they are seeing.

In order to capture the most "belief" and cooperation from the audience, the generous use of imagery is helpful. As J. Anthony Blair points out, the images shown even in nightly news programs are a selection of reality, manipulated to fit within a newscast and broken by voice overs. Yet, because of "the sense of realism that the visual conveys . . . [his] students are under the impression that the visual gives them direct access to what is visually portrayed in a way that print does not, and their impressions are what matters so far as the power of the visual is concerned" (51). The images depicted on news programs are hardly the same as "being there," so although the filter is different between print and film, a filter still exists. However, audience awareness of the filter's presence is greatly lessened in visual media.

This lessening of awareness results in an audience predisposition to believe that the entire "picture" of an event or place is being presented, when, in fact, it will still only be a limited moment in time from a particular angle or collection of angles. It will also be edited to fit into a narrative and into a time slot. By showing an image, the speaker is creating

aethos while at the same time triggering a "pre-existing" tendency to believe what is seen. Wallace reports that Francis Bacon believed, "A thought occurred, an image followed upon it. Imagery was in this sense a re-presenting of thought" (70). If an image is a "re-presenting of thought," then the thought is being created from outside the audience and subsequently delivered to it through the image—through *aethos*.

The images which trigger a reaction in the audience are affecting them on a psychological level. For example, if one person sees another biting into a sour pickle, the observer's salivary glands may be activated. This kind of reaction, which results from one person watching the actions of another and then manifesting some kind of "mirroring" response, can also be called the "mirror effect." Physical response indicates that a neurological connection between the *observed* and the *experienced* is made real. Daniel Levitin remarks in the book *Science is Culture*, "[M]irror neurons [are] neurons that mirror the activity of others" (Levitin and Byrne 152). These mirror neutrons are what make people become joyful when a favorite athlete in the Olympics earns a gold medal or cry when their children are suffering. Their neurons are focused on a particular action and reaction, and as a result, their own emotions react as though they were experiencing the same event. So, when people are led through the same haunt or arena, when they are shown a sorrowful event— even if they wouldn't have remarked on the event otherwise—their beliefs are affected and their emotions react. The goal of the rhetorician is to have these reactions carry-over into the time when the audience is no longer within the controlled arena. The goal is to have the mental change take place so that the reaction is elicited without the mirroring being present.

Television is in the enviable position of being able to quickly change locations and to display imagery with multifarious and diverse associations. Television can reference events

or entertainment outside of its own generic medium—and it is able to trigger psychological or emotional connections quite easily. For example, *Cosmos* references *Star Wars* with its effects and music. A *Time* cover story which was published during *Cosmos'* first run on television, declared, "It features special effects rivaling those in *Star Wars*: computer animation, scale models and painted backdrops as dazzling as anything ever attempted on television" (Golden 63). At this time, only two parts of the original *Star Wars* trilogy had been released. The series' storylines and characters had captured the attention of audiences across the entertainment universe. Fans were looking back to the first two movies and looking forward to the third which would be released in three more years. It was the "golden age" of the *Star Wars* phenomenon, when George Lucas was idolized as an entertainment god, and any references to that franchise were likely to garner attention, even from people who were not normally interested the subject matter beyond the popular culture reference. *Star Wars* encouraged interest in space, space travel, and other civilizations—and these things are what *Cosmos* could offer in abundance. *Cosmos* could take its viewers on voyages across galaxies as well—and it could do it through *aethos*.

This type of cultural reference in entertainment to heighten audience interest or buy-in is not uncommon on television. For example, Faye Woods studied the television program *American Dreams* and wrote about how, "Through the application of film music theory to a television . . . the recreation of and appropriation of original broadcast footage in *American Dreams* is intricately interwoven with its dramatic action" (28). This recreation based on archival footage resulted in a heightening of dramatic tension. It also served to connect the fictional characters more closely with the events depicted on the television show. Because of these connections to the past through a "modern" lens, the emotional reaction of the audience

66

was greater because they were more emotionally invested through the fictional family and characters. In the same way that *Cosmos* referenced *Star Wars*, so *American Dreams* referenced 1960s American culture.

One of the most impressive visual elements created for *Cosmos* was the Library of Alexandria. The visual effect was so well done that it may not be immediately obvious, even to modern-day viewers, that it is a "special effect" and not a location shoot or set piece. While it is referenced in more than one episode, the final episode, "Who Speaks for the Earth," is where the recreation is most detailed. Because this was the final hour of the series, Sagan is more direct with his arguments. His audience has dwelled within the haunt (*aethos*) created for them for the twelve previous episodes. The detail of this final recreation of the Library fits both with the previous episodes and with the importance of the message Sagan delivers in the segment.

The illusion of "place" as a physically distinct location is strong in this scene, even though it is an artist's depiction. According to Perelman and Olbrechts-Tyteca, ". . . an illustration designed to create presence will sometimes have to be developed with a wealth of concrete and vivid detail . . ." (358). In this instance, not only are the computer renderings impressive in their detail, but when Sagan walks across the library to meet "us," a shadow falls across his face. The shadow is not present when he speaks of the Library's great achievements, but when Sagan delivers the lines that could be most closely applied to the politics of *Cosmos'* time, the shadow appears. He stops on his mark in just the right-sized piece of light so that his face is well-lit, even though shadows still show across his body and when he moves.

As I've already argued in the chapter entitled "*Kairos* and *Cosmos*," Sagan believed that in order to increase funding for the space program and for science in general that the public had to understand how science was important and the ways it impacted their lives for the better. He also deplored the fact that "nearly half the world's scientists" (Druyan) were employed in the weapons industry. Garnering public support for non-weapons-related scientific endeavors could only be achieved, he believed, through popularization and public outreach. His attempts at popularization also ended in his own near-excommunication from the scientific community—ironically, like a ancient figure Hypatia (only far less violent), whose horrible fate he described directly after he delivered the speech above.

The Creation of Place

Aethos is created through visual and auditory elements which work together to create the rhetorical "haunt" or "arena." Sonja K. Foss indicates that speakers can anticipate what meaning they suppose an audience may take from an image when she writes, "Analysis of the presented and suggested elements engenders an understanding of the primary communicative elements of an image and, consequently, of the meanings an image is likely to have for audiences" (307). So, even though Yoos saw the psychological aspect of interpreting *aethos* as problematic, Foss's statements make clear that determining "likely" reaction is possible.

A virtual "place" created by television can have the same rhetorical benefits Endres and Senda-Cook discuss in "Location Matters: The Rhetoric of Place in Protest:"

Rhetorical scholars have begun to consider place as rhetorical, a move we support. Considering place in protest as a rhetorical artifact calls for more attention to how place can act as a node for understanding how locations, bodies, words, visual

symbols, experiences, memories, and dominant meanings all interact to make and

remake place. (277)

They go on to say that these places are in "constant negotiation" (277) and they describe

three ways in which places act rhetorically. These ways include the ability to "*build on a pre-*

existing meaning of a place to help make their point….*temporarily reconstruct the*

meaning…of a particular place…Third, *repeated reconstructions over time*…." (Endres and

Senda-Cook 259, emphasis in the original). Television is in the unique position of being able

to act rhetorically in all three of these ways.

First, television can easily build a "pre-existing memory of place" by displaying

images that are likely to trigger memories for the expected (or desired) audience. The earlier

example of *Star Wars* imagery being used in *Cosmos* can also serve as an example here. The

familiarity of a beloved environment can increase audience comfort. Without these

referential touchstones, space may have seemed foreign, cold, or uninteresting to

contemporary audiences. According to Marcel Chotkowski La Follette, at least until *Cosmos*

first aired (September 28, 1980), presentations of science on television emphasized the

"scarier" or more sensationalist possibilities of the field. In a 1981 article, he writes: "All

strange locations in space and/or time account for about 1/3 of the science-related programs,

suggesting the exotic and dangerous aspects of the dramatic image of science" (La Follette

33). In other words, television sometimes supported or even at times emphasized a vision of

space as being an exotic and dangerous location. So, it was logical for *Cosmos* to make overt

connections not with previous science programs on television, but with previous science

fantasy entertainment like *Star Wars* to "recast" its image.

Second, television reconstructs a "temporary" meaning or a temporary place if one wants to say that a program is 30 minutes long and afterward the viewer will step away and perhaps never return. However, when programs go into syndication or when they are released on video, they remain essentially unchanged from the original. Additional elements may be packaged in a "bundle" if purchased (DVD extras), but the episodes are normally left, even with their flaws, forever as a historical document. Theatrical releases may not be as unchanging (restoration, colorization, application of new effects like 3-D, revision for ideological reasons). However, to my knowledge, no television programs—and popular science programs in particular—have been edited at this level and then re-released to the public. These locations remain dependably the same but the audience only visits them temporarily.

Besides providing a non-physical space that can be shaped for persuasion, *aethos* allows the speaker to kindle consubstantiality between the speaker and the audience. The essence of this consubstantiality is explained when Dale Sullivan asserts his interpretation of the term ήθος: "*Ethos* is not primarily an attribute of the speaker, nor even an audience perception: It is, instead, the common dwelling place of both, the timeless, consubstantial space that enfolds participants in epideictic exchange" (Sullivan 127). The image of "enfolding" is particularly apt because *aethos,* which is both controlled and created by the speaker, permeates the perceptions of the audience. It is perceived through both the visual and auditory senses, and as a result, it affects the feelings of the audience. Through it, the speaker creates a framework through which the audience will receive and perceive the argument presented. The speaker can use this frame to depict elements as being praise-worthy or blame-worthy, which shows its relationship to the epideictic. The speaker can also

use this frame to signal the action required of the audience in order to avoid the difficulties that will surely happen if no action (or opposite action) is taken.

In some ways, the "timelessness" of this space (as Sullivan describes it), creates an additional trust between the speaker and the audience. As discussed earlier in regard to the rhetoric of location as described by Endres and Senda-Cook, the space of the exchange cannot change. In the case of television popular science, the arena will stay the same even if audiences revisit it in 20 or 30 years. The space created for the shared learning or experience is held as sacred, inviolable. This sense of the sacred is why, when attempts are made to change the space, audiences cry out in protest. For example, the updates that George Lucas made to the original *Star Wars* trilogy have spawned much debate and even "fan" hatred. He committed the sin of violating the shared space, the *aethos*, of those films, thereby nullifying the consubstantiality and breaking the "enfolding" aspect of the exchange. In the case of the *Cosmos* "remake" set for 2013, I anticipate a great deal of backlash from those who are admirers of the original. However, in fairness, the haunt created will likely reference the original without attempting to replicate it. Despite that fact, the audience who found comfort and enlightenment in the *aethos* created by the original may still experience disappointment and be vocal of their disapproval. Some will undoubtedly feel that the contract of consubstantiality has been broken.

That said, the fact that the remake will air on commercial television will create additional challenges for the producers. According to Judi Klein's 1979 article, experts were recognizing that, "Commercial television, by its very nature, provides more of an obstacle to those who attempt to present science programs than does commercial-free TV" (361). Commercial breaks may invoke any subject or tone in the middle of an attempt to build

aethos. No matter how serious the subject matter or what emotion is being sought through the presentation of images and sounds, a commercial for any number of personal care products, sales, or websites could interrupt, breaking the spell. In some ways, these interruption break the contract of consubstantiality as well. But, since they occur during the original viewing experience, *aethos* has not been fully established and so cannot be as missed by an audience who never was able to fully experience vision from that haunt. Sagan was able to create a haunt without the interruptions of commercials because *Cosmos* aired on PBS.

And last, the third way in which television can act rhetorically by creating "place" (*aethos*) is by being able to repeat the environment over time. *Cosmos* ran over a thirteen-week period, one hour per week. The audiences that came back and watched the entire series through saw the repeated framework. While the "locations" depicted may not have been the same every night, the approach to building them and introducing them/portraying them stayed consistent throughout the entire series run. Also, repetition is particularly present in syndication and sales of the program on video or DVD formats. This consistency helps build consubstantiality among fans. They learn the environment and can communicate about it outside of the presence of the frame. Fan homages to Sagan and *Cosmos* on YouTube testify to the tangibility and importance of this space to viewers who have repeatedly visited it.

The *Cosmos* Haunt

The haunt or arena needs to be a familiar place in order to serve its function. Within *Cosmos*, more than one haunt exists, and each haunt serves to create the frame for a particular angle of examination. One of these haunts is the cathedral-like spaceship. Although Sagan reportedly did not like the design of the ship (credit for design goes to Adrian Malone, the show's producer and director), it served the same function of habituating the audience to

72

a particular view of space and space exploration. The exterior of this ship appears in all the episodes during the roll of opening credits. The interior appears in at least nine of the thirteen episodes. When it is present, Sagan discusses topics like "the stuff of life" or the birth of stars ("Shores," "One Voice" and "Lives"); compares Earth's environment and possible destruction with that of other planets and civilizations ("Harmony" and "Encyclopedia Galactica"); invites viewers to examine earth from the outside, as aliens ("Blues"); explores the potential for future space travel and the boundaries of the universe ("Traveller's Tales" and "Edge"); and makes connections between the modern audience and the astronomers of our ancient past ("Who Speaks"). By maintaining a similar frame for examination for similar threads of argument, *Cosmos* removes some of the alien or uncomfortable elements which may bring the audience out of the program—or break the spell of the haunt—and allows the audience to examine new or controversial ideas from a comfortable and familiar location.

In a similar way, *Cosmos* tends to use the ocean as a frame whenever it addresses the beginning or evolution of life. The seaside setting in Monterey, California, with its picturesque cliffs, whipping wind, and crashing waves, bookends the program. We first meet Sagan in this place, and it is here where we leave him at the end of the program. While the final image of the program is of the interior of his ship, Sagan is not present. The last place he appears is near the water—the place he uses as a metaphor life. From these shores, he discusses the evolution of life on Earth and the exploration of this planet by seafarers of centuries past.

The metaphor between exploring Earth's oceans and the grand expanse of space is not subtle; in "Traveller's Tales" Sagan discusses the benefits of Holland's investment in exploratory seafaring missions: "never before or since has Holland boasted such a *galaxy* of

scientists, mathematicians, philosophers, and artists." Later he reveals that these ships were called "flying boats" and then he declares that the "Voyageur spacecraft are their descendants." By framing the information from this familiar shore, which serves as the edge of "the cosmic ocean" ("Shores"), he signals to his audience the direction of discussion. He uses the shore as a "home base" of familiarity to lessen the potential fear people may have for venturing beyond the Earth and what they know.

The ocean also lends beauty and an element of awe, perhaps even reverence for the beauty of Earth, to his arguments regarding evolution. It creates an anchor to home and the familiar, and from here he launches an adventure based in the realm of "imagination." The trepidation and pause that the audience may have regarding extending themselves beyond their comfort zones—either comfort zones based in belief and ideology or comfort zones based in willingness to venture beyond the known or the sure—would be lessened because of this frame of the familiar. Sagan depicts the unfamiliar and the potentially objectionable through this frame, created to direct the vision of the audience and to provide a "tone" for their reception of the information.

For example, episode five, "Blues for a Red Planet," provides the frame of both the spaceship and the seaside. About minute 22, Sagan uses the spaceship to stage an exercise in which the audience is asked to view Earth from the outside as "aliens." He directs,

Now, imagine yourself a visitor from some other and quite alien planet. You approach the earth with no preconceptions. Is the place inhabited? At what point can you decide? When we look at the whole Earth, there are no signs of life. We must examine it more closely.

While he is speaking, a picture of the Earth, round and blue, is displayed outside the ship's

window. As the picture shifts to show the Earth from "a few kilometers" away, Sagan

declares that Earth still appears to be "utterly lifeless." It is not until he has brought the ship

in closer still, to the point where details "as small as 100 meters across" appear, that we can

begin to see the telltale patterns of intentional design. The point is clear: life is hard to see

from too far away. In order to determine visually whether intelligent life exists on other

planets, we will have to get much closer to those planets.

This scene changes at about minute 26 to an examination of the surface of Mars from

our ship. The pictures of the surface of Mars appear to be actual photographs, most likely

taken by NASA, but around minute 28, the images are again displayed as though through the

front window of our ship. They are tinted reddish and they depict the surface from a much

closer range. These pictures must be computer-created renderings of what scientists believe

the Martian surface looks like up close. The ship "glides" across the surface and close up to

the Mariner Valley. At 29:30, Sagan is standing in front of the ship's window and it appears

that the ship is traveling swiftly through the valley. The red glow from the planet is cast over

everything in the ship. After a minute of this virtual experience, Sagan states, "To skim over

the sand dunes of Mars is, as yet, only a dream." Yet, because of the transition from actual

photograph to rendering, and being able to view the surface of Mars "close up" from the

safety of our familiar ship, the impression of knowing what the planet looks like from this

distance is still firmly planted with the audience.

After discussing the very real Viking mission to Mars, showing a map and telling

where the craft were landed, the scene shifts again at about minute 32 to show what appears

to be a volcanic eruption. He says, "So, after a voyage of 100 million kilometers, on July

20,1976, Viking 1 landed right on target in the Chryse Plain." The image shown looks like a view from the Viking as it was landing, although this would be impossible. Stones are blown out of the way from the exhaust as the probe lands. As the image shifts to show the outside of the vehicle as it "awakens," Sagan tells what the Viking did upon reaching the planet's surface. The mixture of factual narrative of a real, documented event alongside constructed imagery blurs the line between what *really* happened and what we can *imagine* happened or *imagine* it looked like. These images are all bathed in the reddish hue so stereotypically associated with Mars. At 33:40, we're shown an actual image taken by Viking of its own "foot," the first image—a real photograph—sent from the planet's surface. The intermixing of photograph with conceptual rendering blurs the line between the two. An audience, safely inside their familiar spaceship, being instructed by their trusted guide, is unlikely to attempt differentiating between the two. To them, one image follows another and none appear less "real" than the others. The frame creates trust and focus, removing doubt and encouraging belief.

Aethos and Enthymeme

Aethos embraces the enthymeme because it draws from the audience their own input in completing a "partial" argument presented by the speaker. The speaker provides evidence in multiple ways but in the end leaves the conclusions to the audience. In *Cosmos*, what is being argued is largely unsaid. The *aethos* creates a framework from which the audience can see the beauty and the fragility of life. When these images are contrasted with a nuclear blast's signature mushroom cloud, the conclusion is obvious to the audience (yet left unstated by the speaker): nuclear weapons have the power to destroy what is beautiful and fragile on

this planet; they pose a danger and should not be used because of the destruction they will wreak.

An enthymeme gets its power by inviting (or perhaps "requiring") the audience to provide part of the argument on its own:

> An Aristotelian enthymeme is an argument in which the arguer deliberately leaves unstated a premise that is essential to its reasoning. Doing so has the effect of drawing the audience to participate in its own persuasion by filling in that unexpressed premise. This connecting of the audience to the argument is what makes the enthymeme a rhetorical form of argument. (Blair 41)

The sensory elements inherent in *aethos* drive audience reaction: whether it is the hopeful music or the dreamy imagery or the fright of watching the world die. Implicit in the emotional response is the remaining, unstated portion of the argument: the value judgment on what has just been depicted. Is the event that just occurred a good thing or a bad thing? The intensity of emotional response determines how "good" or how "bad" an event is. Sagan doesn't always tell his audience to stop nuclear proliferation, but the intensity of his argument, the number of times he creates a frame that displays the "badness" of nuclear weapons, repeatedly has a chance to break down whatever resistance may be within the audience. He uses *aethos* to get them to experience the subject matter from his point of view.

The enthymeme's rhetorical power is within *aethos* when it establishes context for an argument that may be contrary to the views previously held by the audience. *Aethos* convinces the audience of the importance of the topic because of the shift in frame. The images convince viewers of truth without using an obviously persuasive argument. Perelman and Olbrechts-Tyteca assert that "to someone concerned with the rational character of

adherence to an argument, convincing is more crucial than persuading" (27). The authors

explain that persuading encourages action whereas convincing is more about changing belief:

"conviction is merely the first stage in progression toward action" (27). Therefore,

"convincing" changes an audience's outlook to accept that whatever viewpoint is being

advanced by the rhetor and to see that viewpoint as universal or "true." It guides the audience

to believe that "every rational being" (Olbrechts-Tyteca 28) would adhere to the same point

of view.

Perelman and Olbrechts-Tyteca go on to explain that persuasion is not about universal

truths; it is for particular audiences, to encourage them to action because of some motivating

factor that makes the action particularly relevant or expeditious for their attention. Because

convincing is about "truth" and not about action, viewers are lulled into accepting the

framework created for them. It is only after they have accepted this frame (or entered the

haunt/arena) that the persuasive argument will be presented. If the evidence for the argument

is already accepted as being true, then the use of enthymeme is an ideal approach to

persuading the audience of action that should or should not be taken. *Aethos* convinces the

audience of their place in within the argument/concept, so it is easier then to persuade them

as a person affected, as one who cares.

In episode 13, "Who Speaks for the Earth," Sagan poses as a space traveler who

comes upon a world that was "clearly inhabited, a world I had visited before." This world

had all the signs of an advanced civilization, but while he's watching it, he says, "suddenly,

darkness. Total and absolute." His computer helps him to determine what happened. It

flashes pictures of a variety of planets (including earth-like blue planets) and then settles on

the half-lit, then suddenly dark world he had earlier referenced. This picture is reminiscent of

the earth at night. As Sagan reads through the planet's statistics, he says, "Their biology was different from ours. High technology…They must have known they were in trouble." He begins to feel homesick for Earth, so, he begins to listen to television broadcasts from "home." These broadcasts feature quickly changing news announcements that indicate some type of trouble when they are quickly cut off. No sound replaces them until Sagan again says: "Then suddenly silence. Total and absolute."

He does not tell the audience to equate the alien world with earth. He also does not tell the audience what happened, although he makes clear that destruction would have been "at our hands." He provides a list of ways that the earth "could have been" destroyed, including the "ravaged land," "poisoned air," "changed climate," plague and nuclear war. He pulls up information on the computer, which is presented visually with pictures, statistics, and numerical identification, just as the alien planet had been. The age of the Earth is even the same as the alien world. In the end, Sagan determines that it was nuclear war that destroyed the earth. He uses emotionally triggering words, describing the death of humanity as meaning "never again a love, or a child…no more songs from the earth." Then the camera focuses on his profile, and he bows his head in mourning. After he ponders the weaknesses of human life (and "the reptilian voice within us"), he asserts that, "We accepted the products of science; we rejected its methods." At the end of the monologue, he laments that there would "never be another human, not on a billion worlds." The image of Sagan's back while gazing out the front window of his spaceship at the Earth is soon combined with the image of a mushroom cloud. Sagan's image fades as additional explosions and clouds are presented.

This short scene is woven within a larger series of similar presentations of information that are equally as pressing as arguments for scientific guidance and against

nuclear weapons. Because this was the last episode of the thirteen, being less "covert" in the

argumentation would have been deemed acceptable. The audience would already have

experienced twelve hours of the speaker-constructed "haunt" and so would be less resistant

to this point of view. The juxtaposition of the two planets, both destroyed, helps to further the

enthymemic argument against nuclear war. Equating the value of life, the preciousness of

life's experience (love, children, music) as the cost of nuclear proliferation leads the audience

to the conclusion that nuclear weapons are not for defense, but instead, they are for

destruction. The intent is to motivate more than opinion against them: the intent is to

motivate the audience to no longer accept or support nuclear weapon production. Sagan does

not tell the audience to resist nuclear weapons; he gives them the evidence of his argument

and lets them draw the conclusions.

Conclusion

The creation of a haunt in television popular science programs allows a speaker to

direct the gaze of the audience, to change the "angle" from which they would normally view

subject matter. When entering into this digital space, the audience is conferring onto the

speaker great power. Because of this fact, *ethos* must first be established. The speaker can

use sound and imagery to create a consubstantial space which binds audience members and

the speaker in a shared, "unchanging" space. The images are likely to elicit belief from the

audience that the facts and information given to them are complete. They are "convinced" of

the truth of the program's content and so they can more easily be persuaded to its

motivational point of view. Emotional manipulation and the mirror effect can further create

belief in the experience and program content—even that which is purely imaginary—created

through *aethos*. *Aethos* in popular science television leads to the creation of a science-

fiction-like *mythos*, which will be explored in the next chapter, "*Cosmos* and the Creation of

a Science Fiction *Mythos*."

COSMOS AND THE CREATION OF A SCIENCE FICTION *MYTHOS*

Mythos can be described as an expansive fictional narrative that depicts or explores archetypical storylines, characters or other elements, which would be familiar or recognizable, in some way, to the audience. In modern times, the word "myth" is associated with something that is known to be untrue but that (at one time) was held as a common belief. In fact, Greek mythology centers on religious imaginings of gods and their complex relationships with each other and with humans in order to explain how the world and humanity were created. In his article "*Mythos* and *Logos*," Spyros D. Orfanos explains, "To the Greeks, myth was a sacred narrative explaining how the world and man came to be in their present form" (483). Further, he explains, "Myths for the Greeks were odes that illustrated their cultural legacy. The anecdotes were passed down in oral poetic tradition as interrelated tales over the centuries and cumulated in what may be the greatest Greek achievement: the theatrical drama" (484). These myths served to document the values of Greek society; they were not intended to be seen as "fiction," created for entertainment purposes only.

For the Greeks, these tales were a way of educating people about creation and natural history. In order to entice people to listen, these stories had to be made interesting enough to attract attention and clear enough so their points would be understood. As a result, story patterns, or archetypes, were formed. These archetypes contained recognizable patterns of action, locations, characters, or plot themes. Even today, moviegoers can easily recognize the archetypical story structure of modern romantic comedies: a couple dislikes each other; becomes friends because of some common interest or hardship; faces a challenge that seems to "destroy" the newfound friendship; and reunites after a revelation of some type. In terms

of Greek drama, these recurring themes became "stock epic machinery" that were useful to poets "when dealing with subjects of the same class" (Crooke 77). In other words, these archetypical structures became shortcuts to establishing a narrative rhythm that is familiar to (and easily accepted by) the audience. Archetypes and myths build a recognizable scaffolding on which arguments can be built. The familiarity of the structure provides comfort for the audience who may be challenged already by the arguments (or directives) embedded within the story. Because it "requires emotional participation and ritualized reflection" (Orfanos 484), incorporation of myth works well with modern cinema and television.

In his article, "Science and the Sacred Cosmos: The Ideological Rhetoric of Carl Sagan," Thomas M. Lessl identifies a "mythical framework" within *Cosmos*, but he does not explore how this framework is built, or what impact it may have on the program or the science it presents. He notes, "*Cosmos* is a hybrid generic form; it sets the instructional elements of the series within the larger mythical framework reminiscent of numerous works of science fiction" (175). While he takes notice of the science fiction-like elements of *Cosmos*, Lessl does not venture beyond merely observing them. This chapter will explore the formation of this framework and the impact of it on audience perception of the science. It will expand the initial observations of Lessl and argue that, when used in combination and to their fullest potential, *kairos*, *ethos*, and *aethos* form a *mythos*, or a mythopoetic element of fantasy, which creates hybrid of science education and science fiction. By adapting timeless archetypal images and storylines to the contemporary culture of its time, *Cosmos* merges the timeless with the current, the scientific with story, and the imagination with drama to create myth. While *Cosmos* will again provide case evidence for these arguments, the arguments

themselves will be generalizable and applicable to other popular science programs that harness this rhetorical power.

Rhetorical Construction of *Mythos*

According to Philip Rose, *mythos* is a "mythical dramatization of the world" (632). Embedded in dramatization, *mythos* can serve as a powerful rhetorical tool alongside the other rhetorical proofs of *ethos, logos,* and *pathos*. According to Baumlin and Baumlin, whereas the other rhetorical proofs tend to persuade audiences toward a single "truth" through analysis and division, "The mythic seeks instead to unite, to synthesize, to assert wholeness in multiple or contrasting choices and interpretations" (106). The audience is encouraged through *mythos* to regard the rhetorical act as an entire experience—rather than analyzing and breaking down its parts. In addition, Baumlin and Baumlin note, "In the *Poetica*, *mythos* deals specifically with those classical language-arts that, in performance, transcend the logical-referential realms of discourse to reverberate in a higher, symbolic realm, a realm of moving and divine revelation" (106). *Mythos* connects audiences to subject matter on an emotional or imagination-triggering level rather than an intellectual one; it emphasizes the spiritual and invokes symbols that will resonate with the audience. *Mythos* is present in the structure of the story, the way the narrative is put together and delivered. It relies on archetype to provide the thread that ties it with the great epics of the past.

The familiarity and accessibility of the story patterns or archetypes are very useful to storytellers. They allow examination of subject matter in terms of "myth" rather than through current political or social framing that may alienate an audience before the "point" is made. According to Roland Barthes, myth "hides nothing and flaunts nothing: it distorts; myth is neither a lie nor a confession; it is an inflexion" (128). These "inflexions" of truth were

passed through Greek epics in the form of narratives in which adventure met morality, understanding, and codes of behavior. In the case of popular science (and *Cosmos* in particular), *kairos*, *ethos*, and *aethos* combine to form a mythopoetic "voice." By addressing each of these rhetorical elements successfully, a rhetor lends a slant of fictionalization to a program.

While this slant may not seem to be particularly notable beyond the fact that it is the instrument through which an audience is attracted and retained, in science education, fictionalization of information can have repercussions on the perception and understanding of the program's content. The program's objective may be ostensibly to educate, but when information is inaccurate (or fictionalized), the purpose behind the program is revealed to be something other than transfer of information. In the case of *Cosmos*, the motivation behind the program, as discussed in the first chapter of this dissertation, was to increase interest in and funding for the space program. While Carl Sagan wanted audiences to understand how science affected their lives, he did not aim to "teach" a particular set of facts or have the audience come away with some pre-determined level of scientific knowledge. His goal was to convince the audience of the importance and applicability of science to their daily lives.

Mythos in popular science television could be defined as the fictionalization of truth via the means of audience attraction and persuasion. *Kairos* makes the time ripe for the argument, *ethos* helps the speaker open the door for audience acceptance of the speaker, and *aethos* builds an environment in which the speaker can be the most persuasive; these three elements and the efforts made to capture them converge in an unavoidable fictionalization of the information presented: *mythos*. Because of the phenomenon of *mythos*, popular science walks a line between orthodox science and science fiction: it is a representation of truth but

in a way that fictionalizes it. Assumption, theory and belief are communicated as truth because "representation" is communicated as reflection. Connecting the content of an educational program with the dramatic structure and archetypical storylines or tropes of fiction creates this *mythos* and results in at least a *degree* of fictionalization.

Dramatic Structure of *Cosmos*

While Greek myth was passed along in the form of drama and the elements of these myths became archetypal, the structure of the stories also forms a recognizable pattern. Kenneth Burke explains this pattern through his "pentad," which is made up of Act, Scene, Agent, Agency, and Purpose. The Act is what is going on in the story. He uses the example of a shipwreck to represent the Act as that which initiates and drives the storyline. The Scene is the setting (for example, a desert island). The Agent (or Actor) is the main character, or the person "doing" the action. The story revolves around how this character reacts to the situation or the Act (the shipwreck). Agency is how it all came to pass (how the ship happened to wreck). Last is Purpose, or the "meaning" behind the story. In rhetorical terms, it would be the argument that is embedded in the story.

Burke created his pentad as a way "to help a critic perceive what was going on in a text that was already written" ("Questions and Answers" 332). Writers could use this common structure, he said, as a way of asking the audience questions. Through the Agent's reactions to the Act within a particular scene, the audience can be asked to evaluate whether the Agent acted appropriately or morally. The audience can be encouraged to evaluate what their own actions would be, were they placed in the same situation. The author can also advise the audience to act in the same (or a different) way. Although it is not presented as a traditional drama, *Cosmos* shares this dramatic structure. It can therefore take advantage of

86

the recognizability of form to keep audiences comfortable and interested, even as the Agency of the story may challenge their beliefs and even as the Act is completely foreign to them.

The journey itself in *Cosmos* begins in the first ten minutes of the first episode, and serves as the Act. Everything that occurs in the series is the result of this trip, even when the focus is not on the trip itself but rather on the "mini-lessons" of science or history. The Scene is the cosmos, from its creation until the present day and from its far reaches all the way back to earth across its entire expanse. Sagan promises that the audience will encounter no limits on the journey and that even time cannot produce a limitation on the adventure. Of course, Sagan in combination with the audience is the Agent. The audience requires Sagan's guidance, but Sagan emphasizes the audience's own power and control over the journey—in a spaceship created in their imagination. He also emphasizes the audience's power to choose how they will react and what they will do with the information he is presenting to them. Throughout the program, Sagan presents "subagents" in the form of historical figures and scientists, but the audience is the central figure and our journey and discovery the focus of the story.

The Agency for *Cosmos* is the reason for the journey: the looming threat of destruction. From the first episode to the last, Sagan makes clear that humanity's destiny is by no means assured and that, once destroyed, there were be no "salvation" or reincarnation of our species, even if the planet itself were to survive an apocalyptic event like nuclear war. He warns us that it is a "time of great danger," and so we must be wary. He warns, "I believe our future depends powerfully on how well we understand this cosmos in which we float like a mote of dust in the morning sky" ("Shores"). This "understanding" provides the Agency, or, the motivation for the story.

Closely connected to Agency is Purpose. In the case of *Cosmos*, that purpose is the preservation of Earth and the inhabitants of this planet, but it is also about expanding our knowledge as a species and exploring the universe beyond our own planet. Beyond that, Sagan wants the audience to understand their "connection" to the universe and the intrinsic value of life. He wants viewers to understand that science produces important and valuable information that benefits all of humanity. And, he wants the audience to know that the responsibility for preserving the planet and themselves goes beyond a "personal" value, to a responsibility to the universe at large. Because we are a way for the "cosmos to know itself" ("Shores"), we would in effect eliminate the consciousness of the universe if we were to become instinct. Doing so through our own actions, as Sagan implies, would be an act of futility and catastrophe affecting more than just ourselves. Humanity's destiny is interwoven with that of the universe and so our mandate for learning about it and preserving life, human life, is clear.

By presenting *Cosmos* using a dramatic structure that is recognizable, Sagan is tempering some of the "unfamiliarity" of the subject matter and some of the challenges presented by the scientific assertions that he makes. The structure adds interest for the audience and motivation for them to return to a program broken into thirteen parts. *Cosmos* is shaped by what Jason Mittell would call "narrative complexity" (29), manifesting in *episodic* story lines being wrapped up in individual episodes and *programmatic* storylines being wrapped up only at the end of the series. For example, Sagan first mentions the Library of Alexandria and its destruction in episode one, but it isn't until the last episode that he finally reveals what happened to the "martyr" of the library, Hypatia. This narrative complexity provides depth and elicits sustained viewer interest in the program. Mittell writes, "…these

shows ask us to trust in the payoff that we will eventual [sic] arrive at a moment of complex but coherent comprehension, not the ambiguity and questions causality" (Mittell 37). For those who remained faithful throughout all thirteen hours, the "answers" to some of the most persistent or intriguing questions would be presented. While science is an ongoing "mission" of discovery, the dramatic structure of *Cosmos* indicates that closure and a "final answer" are possible.

Mythic Narrative in *Cosmos*

Cosmos' mythic narrative is an origin story, meant to explain where we come from and who we are. It is reminiscent of a Homeric epic, as described by Vivante: "An extensive and essential setting wherein man and nature, animate and inanimate objects bear the mark of a common origin—this is a singular achievement of the Homeric tradition" (Vivante 6). While the program as a whole contains a dramatic structure, the story of our origin and evolution provides the program's "divine revelation," as Baumlin and Baumlin put it, which is meant to resonate with audiences beyond their immediate interaction with the story. This resonance, saturated with *mythos*, is a result of the narrative. Philip Rose describes *mythos* as analogous to "the feeling of connectedness that is characteristic of aesthetic experience . . . The sense of fit with the world is generated within mythos" (639). This idea of *mythos* as an element that connects the audience with the story is critical to understanding the way the narrative of evolution is constructed in *Cosmos*.

Beginning from the first episode, Sagan proclaims that "we are made of star-stuff," a statement he repeats in the eighth episode, "Travels in Space and Time," as well as in the final episode, "Who Speaks for the Earth." It is our introduction to the exigence of the story and it is not allowed to fade from our conscious. Our "oneness" with the universe is tied to

our evolution, from "star-stuff" to the humans we are today and to the explorers we may someday become. However, this narrative is not presented in a purely chronological manner, as a narrative about evolution quite often would be. Some elements are repeated (likely for emphasis) and the story as a whole seems almost cyclical or circular. We begin as elements, born out of the death of a star, evolve as an ever-improving form of life (full of potential), become a consciousness which learns about the universe as we learn about ourselves, and eventually go back out into the cosmos as part of the universe that permeates everything.

As Sagan describes in episode nine, "The Lives of the Stars," stars "sparked the origin of life." Elements are pushed out into the universe and they eventually form other things, sometimes living things. Some elements eventually became us. To emphasize our importance within the universe, Sagan proclaims in the first episode, "Shores of the Cosmic Ocean," "We are a way for the universe to know itself." Again, this statement is repeated in the eighth episode and at the end of the series. Sagan distinguishes the audience as the consciousness of the cosmos and therefore an integral part of all that is. This sentiment is also present in spirit in episode seven, "The Backbone of Night," when he declares that exploration of the universe is a mission of self-discovery. He tells a school child, "You're part of the Milky Way."

In the second episode, "One Voice in the Cosmic Fugue," Sagan illustrates how humans can guide evolution by telling the story of Japanese crabs whose shells bear markings very similar to that of a human face. A myth had grown around these crabs, that the faces were those of Heike warriors, and so fisherman would throw the crabs back to the sea when they found them in their nets. Sagan points out that humans directed this evolution— they chose to preserve the lives of these crabs and take the lives of others. In the same way,

the narrative implies, humans can choose our own destiny and direct our own evolution, just as we did with the crabs.

Because of the power it gives us, Sagan presents evolution as positive, even "uplifting" ("Blues"). He describes it as an opportunity to choose our actions as a species, as inhabitants of this planet and as part of the cosmos that surrounds us. Of course, he points out that evolution has drawbacks as well, such as a still-present human (primitive) penchant for violence ("Who Speaks") that stems from our thus-far un-evolved "reptilian brain" ("Persistence"). He reveals in episode four, "Heaven and Hell," that humans could very well "force the hand of nature," and destroy not just human life, but all life on Earth. He repeats the introductory phrase, "If we do not destroy ourselves" ("Backbone" and "Travels") to point out that our still-evolving weakness could result in catastrophic destruction if we do not take control of it. Last, Sagan also presents human travel beyond the limits of our small planet as a natural progression from seafaring voyages—an evolution of investigation and an evolution of our species.

One of the main thrusts of *Cosmos'* mythic narrative of evolution is the miracle and randomness of life: "There was a particular sequence of environmental accidents and random mutations in the hereditary material" which formed us ("Travels"). This information, "from the point of view of a star," illustrates that our construction was not purposeful, nor did it come from "outside" us. While we can control what happens with life once it is formed, the creation of life itself is arbitrary. Therefore, according to Sagan, there is no god to save us from a fall, whether that fall comes from another set of random accidents or from our own irresponsibility, carelessness, or selfishness in regard to our planet. When Sagan shows the line drawings illustrating human evolution, beginning with single-celled organisms (second,

91

eighth, and thirteenth episodes), he stops with the present human form. However, the implication throughout the series is that we are, as yet, not yet fully evolved as a species. His reference to the "reptilian brain" ("Persistence") makes that clear. Sagan shows that even the constellations change and evolve (episode 10, "The Edge of Forever"), so humans would be no different. We are made of star-stuff. Our origin story starts and ends with the stars.

Science Fiction's Influence on *Cosmos*

From the beginning of his career, Sagan's science often was influenced by his interest in science fiction. He was a dreamer and his imagination was greatly influenced by the science fiction of his youth. According to biographer Keay Davidson, Sagan grew up reading science fiction, enthralled by the works of Burroughs (who also, incidentally, influenced *Star Wars'* George Lucas). Davidson even states that Sagan's serious proposals about "terraforming" Venus reflected this science fiction background because Jack Williamson originated the term, but the concept came from science fiction writer Olaf Stapledon who "suggested electrolyzing Venus's supposed oceans to generate oxygen for its atmosphere" (116-17). Friends reported of Sagan, "He was presenting [his ideas about extraterrestrial life] as science but to me, this was science *fiction*" (Davidson 112). So, it should be no surprise that the similarity of *Cosmos* to science fiction (in format) is not a new one. In 1981, Martin Green wrote, "Sagan is likely to arouse the same reactions in a man of letters as Wells and his followers have aroused" (570). Elements of the story and its structure are clearly reminiscent of (and referential to) science fiction.

Cosmos references science fiction through story, structure, and visual depiction in order to connect with audiences. An extended dramatic depiction of H.G. Wells' *War of the Worlds* begins approximately two minutes into the fifth episode, "Blues for a Red Planet." It

features "Avant Garde" imagery, including what may be the mechanisms in a clock and an eyeball (which is certainly not human). It attempts to reproduce the "innocence" of an earthly civilization continuing on, unaware it is being watched by aliens who have an "envious eye" for our planet. Eventually, Sagan breaks into the story to briefly discuss the story itself and the famous radio depiction that caused a panic among listeners some forty years after the original was written.

Before moving on to talk about Edgar Rice Burroughs' John Carter novels and Carter's adventures on Barsoom (Mars), Sagan presents information about astronomer Percival Lowell. Sandwiching historical information about a scientist investigating the real possibility of life on Mars between fictional representations of it creates a fuzzy demarcation between the two. Lowell thought life on Mars was real—and that he saw water being directed, through canals, to civilizations in warmer, drier regions. The audience is not asked—nor is it motivated to—keep straight what is science fiction, what is science fiction reference, and what is authentic scientific investigation (even if it proved to be incorrect). The background of science fiction provides interest and drama to the historical scientific information presented.

Just as Burke's pentad can be used as a tool to analyze the dramatic structure of *Cosmos*, so can the identification of common science fiction themes link the program to fiction. Interstellar travel and time travel, two science fiction tropes identified by Alasdair Wilkins, are synonymous with the content of *Cosmos* and occur throughout the series. In the first episode, Sagan travels to the edge of the universe with his audience in his "spaceship of the imagination." This ship reappears throughout the series, as does the theme of travel through space. Sometimes this travel is not just through space, but through time as well. In

episodes eight and ten, "Travels in Space and Time" and "The Edge of Forever," Sagan

shows viewers the connection between the two. In "Travels in Space and Time," Sagan

travels to Italy and illustrates time dilation at the speed of light by showing the story of two

brothers, Vincenzo and Paolo, one who rides a motor scooter for a short time at the speed of

light, and the other who stays behind. When the traveler returns, he finds his brother an old

man. The concept of traveling at the "speed of light" is common in science fiction; in this

instance, *Cosmos* uses this reference to show what would "really happen" (as Sagan puts it) if

people were to travel at that speed. However, the side effects of such travel have not been

fully confirmed; rather than reflecting reality and admitting to a lack of confirmation, Sagan

is representing something science *believes*—but cannot verify—as truth. The space between

truth and a scientific belief or theory is where *mythos* is created. This topic influences the

audience both because of the subject matter and because of the "truth" that it reveals—truth

regarding subject matter that is ordinarily depicted within science fiction but that is now

being presented with the *ethos* of science supporting its claims.

While these dramatic vignettes provide short illustrations of information within the

more complex narrative structure, *Cosmos* as a whole appears to be modeled upon one of the

most common themes within science fiction. As explored previously in this dissertation, the

first episode, "Shores of the Cosmic Ocean," takes viewers on a voyage "across the known

universe," from the edge of space to the "local group" and the Milky Way. This voyage

mirrors the one in Olaf Stapledon's *Star Maker*. While the Stapledon's journey starts from

earth and heads outward and Sagan's trip starts from the edge of the universe and travels

toward earth, the comparison is striking. *Star Maker* is a meandering journey that has a loose

plot, binding together shorter stories about the narrator's adventures through space and many

"epochs" (a word Sagan also uses) of time. It has a strong message against war and the senseless destruction it causes—but also about the almost unavoidability of it.

In the story, life itself is the most important thing. Even when destroyed, another civilization will rise to take its place, one that is perhaps superior and able to avoid the destruction that claimed the first. Stapledon makes clear in his novel that that science can save and enhance life but it must be balanced and beings must work together in order to really succeed (120-21). While the author indicates that religious zealotry is dangerous, he imbues his book in the spirituality of a quest for the "Star Maker," a godlike creator. When the narrator starts the journey, he cannot see the value or beauty of the "domestic," but he learns the cycles of creation and destruction. In "A Note on Magnitude," which appears after "Epilogue: Back to Earth," Stapledon makes clear the value of life: "A living man is worth more than a lifeless galaxy" (255). In the end, "we" become one with the universe, the Star Maker, similar to the way Sagan presents us as a "way for the cosmos to know itself" ("Shores"). In both works, humanity and the universe are interconnected; awareness and life are the most important things.

Sagan's journey through *Cosmos* shares the same type of meandering structure as *Star Maker*. It does not concentrate on a chronological sequence or on tying together a featured scientist with ones previous discussed in the program. Sagan emphasizes that human life is a valuable thing and, once destroyed, it can never be recreated. He promotes science as having "communal" value for everyone on the planet: working together toward a "greater good" could advance the civilization in positive ways that working independently as nations (focusing science on weapons technology, for example) will never be able to achieve. Sagan decries the "reptilian brain" and adherence to "pseudoscience" and unprovable claims. He

95

asserts that "evolution is a fact, not a theory" ("One Voice"), effectively rejecting the claims of creationists. Yet, *Cosmos* also incorporates elements of spirituality, claiming that human life (specifically, the audience) is a way for the universe to be conscious or self-aware. The unity of all of creation is presented in a cosmos that is "all that is or ever was or ever will be" ("Shores")—eternal, like a god.

Again using Burke's pentad as a tool for analysis, we can discover that *Star Maker*'s interstellar journey across the universe is again the Act. The Scene is the cosmos, with sub-scenes, not of vignettes, but of the narrator's experiences with an array of other civilizations he encounters. The Agent is a narrator, a singular voice that speaks to and for "all" of humanity. Agency is the danger of civilization and the potential for self-destruction or annihilation. The Purpose is a message of unity between all things, including between humanity and the universe. At the end, our narrator is the Star Maker and we understand that creation occurs in a cycle. A message of cooperation and preservation is clear, as is a message about the senseless destruction caused by war. When placed side-by-side, *Cosmos* and *Star Maker* are different artifacts with the same messages, structured using the same values. Even if viewers are not familiar with Stapledon or his work, the structure and content of the story would be familiar because elements of it have become archetypical to science fiction (Kubrick's movie *2001: A Space Odyssey* and Roddenberry's television series *Star Trek*, for example). The *mythos* created in *Cosmos* because of its similarity in structure, content, and presentation to a landmark work of science fiction is an element of strength (garnering popularity) but it is also an element of fictionalization, which calls into question the depictions of science occurring in the "educational" portions of the program.

Mythos: Representation Versus Reflection

Just as lengthy, rich textual descriptions of civilizations and other planets enhance a science fiction novel like *Star Maker,* so visual depictions are necessary for a television audience to connect with a program that explores complex scientific information. Some of these explanatory depictions in *Cosmos* are pictures, but most are computer renderings. Because they are *representations* rather than *reflections* of places or things, an element of fictionalization is interwoven with the science. Roland Barthes argues that, "the 'ethic' of the drawing is not the same as that of the photograph" (43). Because the visuals aren't necessarily a *reflection* of an event or a place but instead an "imagining" of what these things *might* look like, the truth of the depiction can be called into question. To place this assertion in context: a drawing of the Loch Ness monster would not be considered convincing "evidence" regarding its existence; a verifiable photograph might be. A high-quality, real-to-life computer animation could also be convincing—even though it is simply another form of "drawing"—if it were presented by a trusted host who explains how scientists think it lives (without clarifying that they can't prove it even exists). This type of presentation might be mistaken for *evidence* of Nessy's existence rather than as an *illustration* regarding the *belief* or *theory* that it exists and how it lives (if it does).

Although this analogy is a bit extreme, *Cosmos* and other popular science programs approach subject matter in just this way quite commonly. Programs about dinosaurs often follow this pattern, for example. Writes J. Anthony Blair, "What the visual element adds to film or video . . . is that . . . we don't just imagine the narrative, we 'see' it unfolding before our eyes. Seeing is believing, even if what we are watching is invented, exaggerated, half-truths or lies" (56). Because *Cosmos* shows many artist/computer renderings in a way that

97

passes for photographs (or reflections rather than representations), the audience is likely to accept them as real and not question the verifiability of the image depicted. In fact, these visuals are necessary in a medium like television. The genre of popular science programs—out of necessity—must fictionalize content in this way, to attract and to keep an audience.

These visual elements, discussed previously in this dissertation as *aethos,* impose a framework from which a rhetor gains greater persuasive power. Polanyi and Burke both argue that frameworks (or "terministic screens") place a direction of perception that creates a particular "truth" which does not necessarily prove to be universal. Truths can be altered depending on the angle or construction of the frame. In the case of *Cosmos*, the use of visual elements depicts the birth of galaxies, the way in which DNA first replicated itself, and the grandeur and beauty of the library of Alexandria. Just as interweaving photographs from the Viking mission with computer renderings would likely not have been differentiated by the audience (as explored in the chapter entitled "*Aethos* and the Universe"), so would other illustrations likely pass the audience unquestioned when presented through a similarly constructed framework. Because clarification is not made regarding the assumptions that had to be made in order to create images that depicted these things, the audience is led to believe that these pictures are *reflections*—not imagined *representations*. Because Sagan established a strong trustworthiness (*ethos*) and because the visuals are presented in a way that resonated with the audience of 1980 (*kairos*), these visual frames (*aethos*) provide a critical element of interest in the program's narrative storyline and present a fictionalization (*mythos*) rather than a recitation of fact.

Of course, stating a disclaimer as each image is shown would break the spell of the haunt, and therefore greatly affect the rhetorical approach's effectiveness. The combination

of *kairos*, *ethos* and *aethos* builds an arena for perspective and argumentation, directing the attention of the audience. By breaking in with information from "outside" the carefully constructed arena, Sagan would be fracturing the attention of his audience and incorporating doubt into his own argument—which would lessen his *ethos*. The audience, if given time or desire to examine what they are seeing, would likely realize on its own that the visuals are constructed and not captured. However, when their attention is directed uninterrupted through the story structure and sensory presentation, they are more likely to get caught up in the fictionalization (*mythos*) and less likely to critically examine the particulars. The audience is willingly and readily immersing themselves in the "dream" that the Sagan is presenting—and at the same time taking his argument from a perspective he has created.

Some may argue that since these visual depictions reflect scientific data that they are therefore accurate. In truth, these visuals are not even reflections of data—they are *translations* of it. As Burke points out, translations may come close to the original, but they are not necessarily fully reflective of it: "Yet, as regards 'symbolic action' in general, there are such 'displacements' as when a mathematician substitutes a symbol for an equation, or when a translator substitutes terms in one language for terms in another . . . 'mother and father' to parents" (Burke, "Language" 66). These translations create displacements within the text. To say "parents" instead of "mother and father" can reflect a meaning that differs from the original. "Parents" denotes the people who raise a child, which may be mother and father (sometimes including stepparents), two mothers or two fathers. On the other hand, "mother and father" usually denotes the biological or legal relationship of two adults to a child. While this translation does not change the intended meaning in big ways, it *does* change the meaning.

This type of translation of scientific data occurs when colors are used in visual depictions of space. In these instances, the colors are merely "representative colors [which] translate information in invisible light into a picture we can understand, much as text can be translated from one language to another, or symbols might be used in a cryptogram" (Wolf-Chase 5). These colors determine the area of focus for viewers and they also frame the event or object as one of "beauty." If the light—represented via color—is actually part of an *invisible* spectrum, then can these phenomena be "truly" beautiful to the human eye? The addition of an element that heightens the sensory appeal also adds *value* to the element depicted, altering it true nature. The audience will then believe that they know what something looks like because they will have perceived the visuals as "fact" or "reflection" rather than "translation" or "representation." In sum, any constructed visual representation of an event or object is actually a translation of data and it will change that event or object, however unintentionally, by changing the frame through which it is viewed. It creates a fiction.

Mythos and the Lasting Popularity of _Cosmos_

An examination of *The Body in Question*, another popular science program that aired during the same weeks as the first run of *Cosmos,* serves as a case-in-point for understanding how *Cosmos' mythos* played a part in its success. *The Body in Question* boasted a talented and intelligent host named Jonathan Miller, a "noted British physician, writer, actor, lecturer and theatre director" (*Science* 115). While the pedigrees of both Sagan and Miller seem equally impressive, a key difference between the two programs is that Miller's program promised education rather than exploration. For example, the first episode of *The Body in Question* is called "Naming of Parts." According to a promotional blurb in *Science,* the

program "postulates that our ignorance of basic physiology leads to unusual attitudes toward our own insides. Using a variety of media, Miller explains what happens when we fall ill" (115). In contrast, on the same page in the same issue, *Science* describes *Cosmos* in this way: "Sagan employs a 'spaceship of the imagination' to take viewers on a simulated, scientifically accurate journey from the edge of the known universe 8 billion light years away" (115). Even though both programs seek to educate the public about science, their promotional blurbs indicate that their approach is very different. *Cosmos* is saturated with *mythos*—a dramatic adventure, like that, perhaps, of Odysseus. *The Body in Question* promises to look at "our own insides . . . when we fall ill"—promising a look at mucus formation and perhaps stomach viruses. The connection is with physicality, not with epic adventure.

In addition, while the *Cosmos* blurb emphasizes journey and discovery through simple yet poetic language, the blurb for Miller's program references the "ignorance" of its audience and it uses academic terminology. While *Cosmos* is described like a program focused on entertainment, *The Body in Question* is described like a program focused on education. While *Cosmos*'s description evokes images of space that are reminiscent of the contemporary entertainment juggernaut *Star Wars* and its then soon-to-be-released sequel, *The Empire Strikes Back*, *The Body in Question* makes no such references either through use of language or through subject matter. Illness is its focus, not a story of excitement and exploration. Only one of these two programs was destined to capture the imagination of millions of viewers. *Cosmos* is the one that captured the imagination of contemporary audiences through references to popular culture (*kairos*); that presented a narrator who did not declare the audience's "ignorance" or talk down to them (*ethos*); that promised an

101

opportunity to take part in a great adventure, presented with dazzling special effects (*aethos*); and that planted the seeds of *mythos* by using "imagination" and "scientifically accurate" in the same sentence.

   Mythos in *Cosmos* has resulted in enormous and enduring popularity. It gives the program longevity beyond what would normally be expected for an "educational" program and it provides an invitation to return—not to learn, but to enjoy. *Mythos* allows a program from 1980 to maintain enough relevance to still be ripe for parody in 2010. In Darwin Deez's official music video for his song "Constellations," the singer is dressed in a Sagan-signature brown blazer with a turtleneck. While the song itself has little relevance to *Cosmos* (beyond mentioning stars and constellations), the Sagan reference is clear. The song was part of an album released in 2009, but this video was uploaded to YouTube on Sept 14, 2010. Fewer than two weeks after "Constellations" was uploaded to YouTube, El Guincho released an official video for the song "Bombay." The introduction features the singer speaking lines from the first episode of *Cosmos*, "Shores of the Cosmic Ocean," (in Spanish with English subtitles). The lines are some of the most famous from Sagan's introduction and include a reference to the famous dandelion-seed "spaceship of the imagination." While neither the rest of the video nor the song seems related to *Cosmos*, this introduction clearly references the thirty-year-old program. The coincidence of both videos being produced and released so close together, thirty years after *Cosmos'* premiere, illustrates the program's lasting effect on popular entertainment culture. Without the power of *mythos*, the "lessons learned" in *Cosmos* would have eventually faded or been incorporated into common knowledge, their source of popularization forgotten. Now, the program is continually eulogized anew in modern media like YouTube.

Conclusion

"Inaccuracies" in popular science programs, while inherent because of the fundamental differences between reflections and representations, are not based on scientific "error." They are the result of the *mythos* created through the dramatic structure, the visual representations, and the commonality of the content with science fiction. The fictionalization of *mythos* creation is valuable and is not a detriment to the program—in fact, it is essential to *Cosmos*. In "Philosophy, Myth, and the 'Significance' of Speculative Thought," Philip Rose argues, "the principal function of mythos is to generate significance [for ancient myths] in this dramatic, theatrical way" (642). The mythopoetic presentation of *Cosmos* generated significance for the program, resulting in long-lasting popularity. Even though *Cosmos* teaches science, the presence of *mythos* generates significance by making the science more interesting for (or palatable to) a lay audience. Sagan's audience demanded a program that was friendly, accessible, full of hope and tinged with dream, and that is what he delivered. *Mythos* provided an element of "magic" in the science to capture the audience's imagination. In short, the *mythos* created by *kairos*, *ethos*, and *aethos* persuaded the audience that *Cosmos* was valuable both as a program and as a place.

IMPLICATIONS FOR SCIENCE, ARGUMENTATION, AND THE FUTURE

Despite extended research and commentary on popular science television and the ways in which *kairos*, *ethos*, and *aethos* work together to form a *mythos*, many questions have still to be answered. For example, can a program be classified as purely "educational" when political motives are at play in its creation and presentation? While these questions for further research are certainly too large to cover adequately in a concluding chapter, I would like to provide a short preliminary examination of one current assumption about popular science as it pertains to the rhetoric of *Cosmos*. The rhetoric of popular science is generally considered to be epideictic in nature, but I argue that Sagan's rhetorical intention for *Cosmos* was distinctively deliberative. My arguments will center on Sagan's "intent" and values, and as a result will rely heavily upon Keay Davidson's noteworthy biography of him to establish these. This biography should be considered exhaustive because of the depth of the author's extensive research into his subject and his many interviews with Sagan's friends and colleagues, as well as (with the help of Ann Druyan, Sagan's widow) interviews of Sagan family members.

Rhetorical Lenses and Scientific Rhetoric

In "Accommodating Science: The Rhetorical Life of Science Facts," Jeanne Fahnestock writes that "normal" science, or science written by and for scientific audiences, is forensic because it makes an argument about research that has already been conducted. Scientific articles describe what research, investigation, or experimentation has been done, how it was done, and what results were found. Ultimately, science writing then argues what those finding may mean or what they may imply. The focus is on examining the past. However, when scientific articles are "accommodated" for lay audiences, the text goes

through a genre shift wherein the purpose (and thus the type of rhetoric) changes. Fahnestock asserts that accommodations (or popularizations) don't simply "report" the same findings in different language: they "celebrate" rather than "validate" the findings (Fahnestock, "Accommodating" 279). When the text is transformed in this way, its rhetorical nature changes as well. Instead of being forensic in nature, the "scientific accommodations are overwhelmingly epideictic" (Fahnestock, "Accommodating" 278-79). Whereas the science written for experts must prove the validity of a conclusion, accommodations, she writes, function only to celebrate the presence of a finding.

Fahnestock does not claim that *all* accommodations are epideictic, nor does she examine popular science television. However, as a pioneering academic in the rhetoric of science, Fahnestock has established arguments that ought to be addressed in new studies involving translations of science for non-expert audiences. For the purposes of this investigation, I will use "accommodation" and "popularization" interchangeably. Both terms identify scientific information presented in accessible language and format to lay audiences. Both accommodations and popularizations have concerns that orthodox science does not. For example, articles containing accommodations of science may have limitations of presentation (for example, space limitations) that would be different from the limitations of a scientific article. In addition, popularizations need to find an audience appeal outside of the facts and findings themselves; the interest of the lay audience is more closely related to a desire for entertainment than would be the interest of a specialized audience. For these reasons, the presentation is understandably different between the "original" work and the accommodation or popularization, regardless of whether the accommodation is text-based or television-based. Therefore, these terms can be defined in such as way that they can be used synonymously.

I contend that Fahnestock correctly asserts that the changes necessary to create accommodations are important enough that they result in a shift away from forensic rhetoric. However, I argue that while Fahnestock is correct in her assertion that accommodations are often epideictic in nature, the speaker may be using "praise" of the information presented to seek a change or action which is actually deliberative in nature; therefore, the speaker is using a "borderline" rhetoric that seeks to inculcate values (epideictic rhetoric) with the motive of inspiring action (deliberative rhetoric). This rhetoric may "shift" values, which is different from the "preservation" of values.

The epideictic speaker, as described by Perelman and Obrechts-Tyteca, enjoys a type of "unchallenged" podium: "Being in no fear of contradiction, the speaker readily converts into universal values, if not eternal truths, that which has acquired a certain standing through social unanimity" (51). The rhetorical arguments made by an epideictic speaker, according to Dale Sullivan, "validate the orthodoxy" and maintain cultural values ("Epideictic" 233). In his article "The Ethos of the Epideictic Encounter," Sullivan continues his argument: "Theoretically, the orator's praising virtuous acts and blaming vicious acts moves the audience to admiration; feeling emulation, they then imitate these praiseworthy characteristics and the value system of one generation is passed on to the next" (115). Sullivan also notes other functions of epideictic rhetoric as including, "the celebratory and the literary" ("Ethos" 115). The celebratory function is normally observed during ceremonies or special occasions. The literary function centers on passive enjoyment: "the epideictic audience act as observers or spectators" (Sullivan, "Ethos" 116). The epideictic is used for "preservation, education, celebration, and aesthetic creation" (Sullivan, "Ethos" 116). The key here is that all of these functions and occasions seem to involve the passive acceptance of

arguments about maintaining the status quo; therefore, epideictic rhetoric generally can be seen to inspire audiences to imitation, in effect reinforcing *existing* values. Any external actions inspired by the rhetoric are thus the reflection of existing personal or current societal values.

It is through persuading individuals to adopt established ethical or moral codes that epideictic rhetoric serves its function of preserving the values of a society. A presentation is deliberative when it seeks to change values away from the status quo or requires an external action signaling change. Epideictic can inspire action, but only if the action is indicative of already held values—even if they had not previously been acted upon. While one neighbor may shovel another's walk because of values reinforced by a Sunday sermon, the action itself stems from an established value system, even if that system had not previously moved the person to action. Acting in compliance with a value system and possessing a value system can be very different things. According to Perelman and Olbrechts-Tyteca,

> . . . the argumentation in epidictic discourse sets out to increase the intensity of adherence to certain values, which might not be contested when considered on their own but may nevertheless not prevail against other values that might come into conflict with them. (51)

Even though a value or ideal might logically seem, on the surface at least, something that most people would support, when placed up against values which are equally logical yet conflicting, only one of the two will be able to prevail.

Such might be the case in valuing traditional marriage structures and also valuing the right for all to choose non-threatening lifestyles without government interference or discrimination. One of these values preserves the past (or tradition) while the other signals a

107

shift requiring action. The function of preservation in epideictic rhetoric emphasizes the embracing of existing cultural and value-based norms. When the rhetoric encourages *change* (through legislative action, for example) the rhetoric is deliberative. In short, epideictic rhetoric focuses on the primary or pervasive societal values of the past and seeks to preserve them in the present. Whereas the epideictic preserves tradition, deliberative moves audiences toward different values. A deliberative appeal *requires* external action in order to achieve the rhetorical goal.

Deliberative Rhetoric and *Cosmos*

When science accommodations contain information rhetorically presented with the goal of persuading an audience toward *changing* their values and even toward external action, these accommodations can pass a hazy borderline from epideictic toward deliberative rhetoric. In creating and presenting *Cosmos*, Carl Sagan hoped to persuade the public to value science in order to inspire *deliberative* action in regard to funding: "To spare NASA's future Mars missions from the congressional budget ax [sic], space scientists needed to sell Mars to the public. In particular, they needed to exploit the ultimate propaganda tool: television" (Davidson 180). Like Wernher von Braun who "had gone on Walt Disney's television show to talk about the future age of solar system exploration" in the 1950s, Sagan went on television in the 1960s and, rather than concentrate on *how* research on Mars would be conducted (as did another guest), Sagan "waxed philosophic" and explained *why* such research was important (Davidson 181). According to Sagan's biographer, the message received by the public was clear: viewers that night likely discussed the man "who had explained so charmingly and convincingly why taxpayers should send string-squirting robots to Mars" (Davidson 181). His presentation of science wasn't aimed at public understanding

or complacent valuation, even though, on the surface, it may have seemed an educational endeavor: he wanted them to financially support a program that was threatened by cuts.

Sagan's goals were not purely epideictic. He wanted to change public values toward appreciation of (and steady interest in) the American space program and away from paranormal pseudoscience and "irrational belief systems" (religion being a potential target). Both Sagan and his business partner, Gentry Lee, were "flummoxed by the vacillating reaction of the public and the press to the [Viking Mars] missions" (Davidson 318), because public interest in these missions was not strong. So, even though Sagan was "scornful" of television, he "knew that television was essential to persuade the masses of the value of scientific exploration" (Davidson 319). In addition, "Sagan also believed that television coverage of science could lure the public away from its unhealthy fascination with pseudoscience and irrational belief systems" (Davidson 319)—an existing societal interest and value that frustrated him. Sagan believed that the key to maintaining and building civilization was for the public to understand the ways in which science affected and benefited their lives.

Sagan held firmly to the idea that falling into irrational belief systems threatened the public's ability to appreciate orthodox science and its process. Even his pre-*Cosmos* book *The Planets* did more than simply promote a value of science exploration; it "explained why [the solar system] was worth visiting" (Davidson 182). As time went on, Sagan's deliberative arguments grew more conspicuous. In an article published in *National Geographic*, Sagan "advocated space exploration as an alternative to war . . . [claiming] spaceflight might ease the worsening tensions of modern life" (Davidson 183). In fact, Sagan believed that "space exploration might be 'a prerequisite for our continued survival as a species'" (Davidson 182).

In this article, Sagan's rhetoric fully crosses the border between epideictic and deliberative rhetoric. While he still wants the public to value science, here he advances science as a savior of the human race and a preferable alternative to war. These arguments are presented overtly, years before *Cosmos*. However, they are indicative of Sagan's professional intent and personal values, which colored the work he produced.

Sagan wasn't alone in his view that popularization could encourage the public to support science programs. As his popularity grew, Sagan received repeated requests to lobby congress on behalf of the American space program. In fact, "NASA continued to face repeated assaults on its budget for robotic space missions, and the agency saw Sagan, the nation's best-known space scientist, as its savior" (Davidson 327). His celebrity status and access to the public allowed him the opportunity to shape attitudes in a way created political reaction. It wasn't only on Capitol Hill that Sagan inspired action through his gospel of science. Davidson quotes a NASA scientist (Jeff Moersch) as saying, "in his generation, 'people that are just starting out with their Ph.D.'s right now, all of them were inspired by that show'" (Davidson 331). The promotion of science as a thing to value and foster resulted in "disciples" devoted enough to answer a calling to the field.

This accomplishment is impressive, given that public perception of science and scientists at the time was very negative. In the introduction to the year 2000 reissue of *Cosmos*, co-writer Ann Druyan describes the late 1970s, the time during which *Cosmos* was created, this way:

> Back then, the United States and the Soviet Union held the whole planet in a
> perpetual hostage crisis called the Cold War. The wealth and scientific ingenuity of

our civilization was being squandered on a runaway arms race that employed more

than half the world's scientists and infested the earth with 50,000 nuclear weapons.

Through *Cosmos,* Sagan explains the ways in which science improves (instead of threatens)

life for all. The program seeks to change public opinion away from viewing science as the

means of destruction and devastation and toward one in which innovation, adventure, and

discovery is emphasized. In this way, Sagan isn't merely "validating" information for the

public in *Cosmos*—he is shaping attitudes toward it.

His aims may have been motivated in part by what Thomas Lessl calls the public's

"growing moral distrust of science" (184). Lessl notes that *Cosmos* addresses a "fundamental

difficulty" with which science was struggling at the time, namely a lack of understanding of

science being weighed against support for funding—resulting in science losing out:

> The increasing sophistication of scientific research places greater pressure on
>
> scientists to justify their demands for the funding of work that . . . is also increasingly
>
> difficult for the nonscientific public to understand and therefore appreciate. (184)

In short, Lessl maintains that public understanding of the importance of science would then

encourage people to be more supportive of the great expenditures that go into

experimentation and research. If average people could be convinced of the importance of

science in their own lives, then they would support scientific endeavors financially. *Cosmos*

became a window to science for the public; it became the public link between them and the

expenditures, between them and the science that they may have heard about but didn't

necessarily understand.

Sagan's ideology regarding the importance of science to society is clear throughout

Cosmos. From the first episode, Sagan promotes the notion that destruction of the planet and

all of human life is a real possibility. He repeatedly mentions the "meaningless" self-destruction that looms. Toward the end of the fourth episode, he warns viewers not to "force the hand of nature." He tells them it is critical to begin respecting ecosystems (shifting values toward conservation). To emphasize the necessity of ending the current state of "indiscriminate destruction" of the planet, he shows the "ravages" of the earth from such destruction. He tells about the potential repercussions of maintaining the status quo: "Beyond some critical threshold . . . the damage becomes irreversible." At the same time he shows a struggling bird trying to fly away from an oil-slicked beach. Sagan declares, "If we ruin the Earth, there is no place else to go. This is not a disposable world. And we are not yet able to reengineer other planets" ("Heaven and Hell"). The warning is clear: without change to the way the public values (and therefore treats) the planet, destruction is nearly inevitable.

Besides encouraging eco-responsibility as a value to embrace, in several episodes Sagan equates space exploration with the exploratory ocean voyages of centuries past. The effect is to draw a connecting line between the benefits of those missions and the potential benefits of modern day space missions. By connecting the two, he also implies all that would have been lost had those ocean voyages not been funded. In "Traveller's Tales," he even asserts that space travel in modern times is less of an investment—cheaper—"in comparison to the resources of the society" than sea exploration was then. To draw a clear link between the sailing voyages and space exploration, Sagan compares the length of time it took seafarers to go from one port to the next and equates those as being the same as it now takes to travel from the earth to the moon or from the earth to the other planets, like Jupiter. He also illustrates that exploration has more benefits that simply "finding" things: "Becoming an exploratory power made Holland a vital intellectual and cultural center as well. The

improvement of sailing technology spurred technology in general" ("Traveller's"). He wants the audience to equate the betterment of life in general with the exploration of space. If they value the first thing, the argument implies, then they should support and value the second.

Another way that *Cosmos* encourages its audience to embrace particular values is by painting evolution as the proof of a teleological destiny for humanity. In the second episode, Sagan emphatically asserts, "Evolution is a fact, not a theory. It *really* happened" ("One Voice"). In order for the audience to latch onto his assertion that humanity has a teleological destiny, heading toward some grand future, he must get the audience to acknowledge that it is not the will of some Other, but the hard work and investment of the people living on the planet, now and in the future, to *purposely move toward* that destiny. Because he has laid this groundwork, his promise of "venturing" to outerspace in the seventh and eighth episodes are placed in context: these benefits won't be achieved without effort. Many hurdles have to be crossed, hurdles which include the avoidance of global destruction and the intentional investment in exploration and science. Sagan continually reinforces this change as the destiny of an "evolved" species, by decrying the "reptilian brain" which is the storehouse of the baser human emotions ("Persistence"). Evolution, he asserts, can help us get past a base tendency toward war.

The final episode brings all his arguments together. In the first episode, "Shores of the Cosmic Ocean," he tells of Hypatia and the library of Alexandria, but he does not tell what happened to her or to the library. Finally, in the thirteenth and final episode, "Who Speaks for the Earth?," Sagan reveals the rest of the story. He paints the picture of ancient Alexandria as a place of great thinking and discovery, but one in which political, economic and religious ideas were not questioned. Because the knowledge of science and its benefits

was kept by only a "privileged few," the average people did not understand how it helped to improve civilization for all:

> The new findings were not explained or popularized. [Any progress] benefitted them little. Science was not part of their lives. [Innovations] mainly were applied to the perfection of weapons, to the encouragement of superstition, to the amusement of kings. . . . The great intellectual achievements of antiquity had few practical applications. ("Who Speaks")

As a result, "There was no counterbalance to stagnation, to pessimism, to the most abject surrender to mysticism" ("Who Speaks"). Because of this lack of understanding, no one stopped the religious zealot Cyril, later made a saint, who led the destruction of the great library. And no one stopped the slaughter of Hypatia, the library's caretaker, a woman of great intelligence who had risen to a place of prominence and authority so many centuries ago. The loss of this library Sagan describes as "incalculable" ("Who Speaks").

The connection between Sagan's tale of ancient Egypt and the situation in late-twentieth century America is clear. For Sagan, the modern public of 1980 also embraced mysticism and pseudoscience. The modern public also was unaware of the connection between science and their daily lives. The modern public also associated science with weapons production and technology. The crux of Sagan's argument, built throughout *Cosmos*, is that the modern public will also "tear down" a figurative library of incalculable worth if it does not understand or value science. Sagan wants the public to see the benefit of science in their lives and to their world. He wants them understand the repercussions of turning a societal back on science, as happened in Alexandria. He wants them to *value* science enough to fund it, to change their current concern with expenditures and support

114

scientific exploration. He paints a new picture of science, through this expansive "accommodation," that does more than teach about science: it argues for a change in perspective and a change in values that will ultimately result (if he's successful) in a change in action. His argument is deliberative, moving the public away from their current state of distrusting scientists and equating science with weapons and destruction.

Questions and the Future of *Cosmos*

Perhaps the greatest tribute to *Cosmos'* lasting influence is its upcoming remake. How will this program be adjusted to suit a new *kairotic* moment? With Sagan gone, how will Neil DeGrasse Tyson approach his new role as the Guide? Will he emulate Sagan's approach, or will new times and new topics dictate a new approach? For now, the program is set to air in 2013 on FOX and it will have *The Family Guy*'s Seth McFarlane at the helm. Because it will air in primetime on commercial television, will the interruptions in *aethos* create a greater disconnect with the audience? Will commercials interfere with the "adventure?"

Since the original *Cosmos* had the benefit of airing on PBS, a channel that carries a reputation for both education and for quality entertainment, audiences in 1980 were likely confident that the program would be interesting and entertaining. Will the change in channel to a commercial network result in a change of public perception? Will it change who tunes in? Or how many tune in? Will some people assume that the program will have a conservative agenda (because it is airing on FOX), rather than the liberal leanings of the original? Will political agendas come into play and affect content? For example, will evolution again be declared a fact and not a theory, or will FOX shy away from such pronouncements for fear of public backlash? Will the programmatic goals change from the

original? If the precarious nature of life still plays a central role in the program, what will take the place of nuclear war as humanity's biggest threat? Our own culpability and irresponsibility in fostering our destruction could again be featured, regardless of "villainous" mechanism that would facilitate it. But, then again, it might not.

All these questions are worthy of further investigation, and I wait for 2013 with a sense of anticipation and of dread. The producers and writers have a much bigger challenge this time around than they did in 1980. Then, they were breaking new ground. Now, they are planting in long-cultivated earth. Somehow, they need to make a program that fulfills all the promises of the *Cosmos* brand. It must create its own *mythos*, yet it cannot stray too far from the original lest it elicit cries of "heresy" from the public. Audiences are much more used to visual effects; how will the remake elicit the same wonder as the original did in 1980? When an audience can Google every fact and, within seconds, post or tweet about the slightest inaccuracy on social networking sites, how will the "hedging" of scientific information be approached? What role will the current fan base play in the remake's success or lack thereof? What role will modern technology play in its reception or rejection? Studying the original *Cosmos* will hopefully provide some benchmarks by which the remake can be compared. The rhetorical constraints of its format, creators, and reputation is sure to produce interesting and research-worthy results.

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