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Framing NASA: An Analysis of How the Space Agency is Portrayed in Popular Media

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**Framing NASA:
An Analysis of How the Space Agency is Portrayed
in Popular Media**

A Major Qualifying Project

Submitted to the Faculty

of

WORCESTER POLYTECHNIC INSTITUTE

in partial fulfillment of the requirements for the

Degree of Bachelor of Science

in Professional Writing

by

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Abstract

As a U.S. government agency, the National Aeronautics and Space Administration's (NASA) funding has a complex relationship with the government and popular opinion. My purpose was to determine how the depiction of NASA programs in the media is related to the public support that the agency receives and to discover which portrayals are successful by using frame theory to analyze media samples. I identified frames in nine samples and then compared the results to the culture at the time as well as NASA's programs and funding. I also studied media portrayals in another field, physics, by analyzing thirty articles in order to determine a currently relevant frame, which I then used to depict a NASA program in an editorial. My final project demonstrated links between media framing and NASA support.

Table of Contents

Abstract	ii
Table of Contents	iii
List of Figures	iv
List of Tables	v
1. NASA in the Public Imagination	1
2. How Depictions of Science by Journalists Impact Funding	5
2.1 Journalism and NASA’s Relationship	5
2.2 The Impact of Media Coverage on Scientific Funding.....	8
2.3 The Impact of Public Opinion on NASA Funding in the Past.....	12
2.4 Historical Media Samples	14
3. Frame Theory as a Method for Analyzing Journalistic Depictions of NASA.....	24
3.1 The Creation of Frames	27
3.2 The Persuasiveness of Frames	30
3.3 Audience Interaction with Frames	32
3.4 Frame Identification and Analysis	34
3.5 Applying Content Analysis to Selected Materials	38
4. Determination of the Success of NASA Depictions by the Media through Application of Frame Theory	41
4.1 Frames Identified from 1958 to 1970	42
4.2 Frames Identified from 1970 to 1986	50
4.3 Frames Identified from 1986 to 2010	57
4.4 Summary of Results	63
5. Analysis and NASA Application of a Frame with Popular Appeal.....	68
5.1 Method for Applying a New Frame to NASA.....	69
5.2 Physics Frame Analysis	71
5.3 Editorial Applying Investigative Frame to NASA.....	75
5.4 Intended Frames and Reactions to Editorial	78
6. Conclusion	81
References.....	83

List of Figures

Figure 1 – Biomechanics Funding by the National Science Foundation (2005-2011).....	10
Figure 2 – Nanotechnology Funding by National Science Foundation (2003-2008).....	11
Figure 3 – Simplified Diagram of Factors Affecting NASA Funding.....	13
Figure 4 – Periods of NASA History	15
Figure 4 – Diagram Relating Stakeholders in Frame Theory Communication	26
Figure 6 – Gerhards and Rucht’s Graphical Presentation of the Argumentative Structure	37
Figure 7 – Interrelationship of Frames (1958-1970).....	42
Figure 8 - Charles Bonestell’s <i>The Conquest of Space</i>	46
Figure 9 – Interrelationship of Frames (1970-1986).....	51
Figure 10 – Lack of Relationship between Frames (1986-2012)	58

List of Tables

Table 1 – Five Most Commonly Used Frames Broken Down by Era 64
Table 2 – Most Commonly Applied Physics Frames 72

1. NASA in the Public Imagination

Over forty years ago, NASA landed a man on the moon with the backing of billions of dollars of government-funded money, but, today, NASA programs are being canceled at an alarming rate as funding falters. In 2011, the space shuttles were permanently retired, ending over 25 years of missions to space. In early 2012, John Travis of *Science Insider* reported that NASA bowed out of a joint interplanetary mission with the European Space Agency (ESA) due to its limited budget. The space agency is not funded as it once was.

Although there are many factors that impact NASA funding, decreasing public support could be related to decreasing funding. The agency's budget is determined by the U.S. government, which is comprised of elected officials. These officials often make decisions according to public opinion in hopes that they are re-elected by the public. Since the people who decide NASA's budget are influenced by public opinion, there is a correlation between NASA funding and public support. NASA's decreasing budget is then indicative of less popular support.

The media has an influence on the public opinion of NASA, so how the space agency has been portrayed in the media could be linked to its current funding crisis. According to Gamson, a rhetoric scholar, the media utilizes frames, persuasive rhetorical devices, to contextualize stories for their readers (157). These frames not only contextualize the story but attempt to influence the audience. For example, Cornelia Dean applied a recklessness frame to NASA spaceflight programs in order to decrease public support. Depicting the spaceflight programs as "thrill-seeking" and without scientific

merit was intended to persuade readers not to support spaceflight programs. Through persuasive portrayals of NASA like Dean's, journalists can attempt to sway readers to support or not support the space agency. Although they may not influence everyone, journalists' depictions of NASA reflect how the public feels about the agency.

Analyzing the application of these frames and comparing them to NASA's funding could demonstrate which media portrayals of NASA were successful at garnering funding in the past and also indicate if current portrayals of the space agency are linked to NASA's decreased funding. In the following report, I investigate, using frame theory, how journalists have portrayed NASA over its fifty year history. The purpose of my project was twofold: to identify what frames were successful at garnering public support and funding for NASA in the past, and to recommend frames that could be successful for the space agency to use in the future.

In Chapter 2, I explore how journalists' depictions of scientific institutions, like NASA, typically impact the science's funding. To understand how media attention impacts scientific funding, I examine the fields of nanotechnology and biomechanics. By comparing the funding granted to each discipline by the National Science Foundation and media attention, I suggest that positive media attention reflects increased funding. The purpose of this chapter was to demonstrate that the media portrayal of the space agency is likely one of the myriad factors that is involved in determining NASA funding.

To determine how the media depicts NASA, I discuss frame theory as a rhetorical method in Chapter 3. First, I define frame theory and explain how it is intended to persuade the audience. Then, I examine how frame theory is applied in journalism and how to identify which frames are being applied. This is the foundation for my analysis in

Chapter 4. Finally, I note what aspects of a frame make it successful. These are central to my analysis in Chapter 4 because I use these aspects to evaluate how successful the frames used to depict NASA are.

In Chapter 4, I examine nine samples in order to determine which are successful at garnering funding. The sections are broken down into three periods of NASA history: Golden Era (1958-1969), Pre-Challenger (1970-1986), and Post-Challenger (1986-present). I analyze the cultural milieu in each era and compare it to the frames applied in order to gauge the frame's relevance, which is a critical aspect of success. An additional element of success that I note in Chapter 4 is repetition of frames, which research in Chapter 3 indicates is another qualifier of success. Then I compare the results across all three periods in order to determine how shifting frames impacted NASA.

Once I have qualified what makes NASA frames successful in Chapter 4, I apply a theoretically more successful frame to depict NASA in Chapter 5. In this chapter, I analyze the frames used in depicting physics, which is a similar discipline, but currently receives more funding from NSF and has more popular appeal. Through this analysis, I suggest that one frame, the investigative frame, is both relevant and consistently applied, indicating that it may be successful. Using this frame, I develop an editorial about a NASA program and explain how it could appeal to audiences.

NASA's current funding woes could be reflective of the current depictions of the space agency in the media. I analyze how these media portrayals attempted to impact public opinion of NASA in the past in order to determine how they will affect NASA's public image in the future. With my findings, I put forward a new way for NASA to be

depicted in the media that could increase the space agency's popular support and potentially impact the agency's current funding crisis.

2. How Depictions of Science by Journalists Impact Funding

The purpose of this chapter is to characterize the relationship between journalism, NASA and public opinion in order to demonstrate that the media portrayals are reflective of shifting public opinion and even funding determination. The first section, 2.1, is my examination of how NASA programs are transmitted to the public through the media and how NASA and the media have interacted in the past. In 2.2, I analyze how media attention is linked to funding in other scientific fields. With this section, I suggest that the media depictions of NASA are reflective of shifting public opinion and changing funding. Finally, in 2.3, I demonstrated how public opinion has impacted NASA funding in the past. Together, these sections attempt to illuminate the complex relationships between NASA, journalism and public opinion.

2.1 Journalism and NASA's Relationship

Understanding how NASA has communicated with the media in the past is vital to my project. The interrelationship between the space agency and the media is a key component. Although NASA does control much of what information is passed down to the press, the media decides how to contextualize the information for the public. Getting a positive public reaction to NASA news is a product of both NASA and the media's effort. By analyzing past interactions between NASA and the media, I can determine how the two elements work together to create a story and influence public opinion.

Before the Challenger disaster, journalists used a particular model of communication to depict science programs. In this old model, or relationship, information flowed from the scientists, through the journalists, to the public. Many scholars, including Nelkin, Gross, Grabill, and Weingart, have defined this relationship as the one-way

communication model, where scientists are the sole source of information and the public simply receives the news. Scientists find the truth and journalists, as translators, simply pass it along to the public. In this model, Gross and Grabill both define the public as receptive and uninvolved in the decision-making process. Grabill suggests that, in this model, the audience or public is a consumer of information after the decision is made (424). The audience doesn't interact with the information. Weingart explains that the scientists produce "true knowledge" (869) to be transferred to the masses.

The Challenger disaster highlighted the flaws of the old communication model, providing a catalyst for developing a new model. The disaster, when seven astronauts were killed 74 seconds after the shuttle launch, clearly demonstrated that the shuttles were not 100% safe. This was directly contradictory to what NASA had led Americans to believe. The nation felt dismayed and the press was irate about the lack of information available after the event. Following the old communication model, journalists needed NASA to provide information so that it could flow down to the public, but NASA was secretive about the ongoing investigation. Martin and Boynton explain that journalists viewed NASA as "disrupting the flow of information between the agency and media" because they would not allow high-ranking officials to be questioned by the press (256). When NASA did not provide the information to the press, the entire one-way communication model broke down. The press had no information to pass on. This breakdown highlighted the limitations of the old communication model.

This newer communication model was visible during the next space shuttle disaster, the Columbia explosion. In contrast to the Challenger disaster, NASA held twice-daily press conferences after the Columbia explosion, sparking stories about the

space agency's openness and honesty (Martin and Boynton, 259). NASA did not seclude itself from the socio-political atmosphere, as science had typically done in the past. Instead of a one-way information transfer, the new model promotes communication as a two-way flow between science and the public (Gross 6). Once the flow is two-way, the public is no longer a "consumer of information" but an active participant in the decision-making process (Grabill 424). With this system, the press would have NASA-provided information by which to evaluate ethical and political ramifications. However, the space agency was aware that it would be evaluated from a social standpoint in this new communication model. According to this model, Grabill claims that scientific norms are bound by cultural values (422) and Gross adds that scientists must demonstrate ethics and trustworthiness before the public accepts the new knowledge (18). In this model, journalists, scientists and the public are engaged in "an interactive process of exchanging information" (Grabill 425). During the Columbia explosion, this model of communication was demonstrated by NASA constantly updating its reports on the Columbia and answering questions from the press.

This interactive process is complex and, in the past, NASA has not always worked well with journalists to depict its programs in positive light. For example, NASA's Hubble program was depicted negatively because the capabilities of the telescope were oversimplified. Oversimplification is a common complaint by scientists about journalists' depictions of their programs (Gross 6). As Kauffman explains, the media focused the public's attention on the clarity of Hubble's photographs, bypassing the other functions of the telescope. Journalists began hyping up the pictures and asking NASA to provide coverage of the first pictures. However, the date of the first picture was

continuously pushed back as NASA discovered an error in the construction of the telescope. Kauffman discusses how the media started reporting Hubble as “failed program,” since it failed to take pictures as it promised (5). Negative stories filled the press since NASA couldn’t demonstrate that the telescope was working by providing pictures, according to Kauffman. The negative press was inaccurate because Hubble still had many functioning capabilities, even though the optical lens needed for photos was deformed.

Negative views of science in reporting are often the fault of both the scientific institution and the media, and they can have drastic impacts on public perceptions of programs. In the case of the Hubble Telescope, NASA contributed to the oversimplification of the program as much as the media did. As Kauffman explains, NASA mistakenly focused the public’s attention on the clarity of Hubble’s photographs. NASA administrators wanted to flaunt Hubble’s amazing photos and gain public attention. Most science institutions, like NASA, are certainly aware that touting their projects can result in more funding. Often, scientists race to publish first, sometimes overlooking their own peer review system (Nelkin 173). In NASA’s case, when no pictures were provided and NASA dallied, the media began to fill in the “vacuum” with negative press, according to Kauffman. This communication breakdown demonstrates some of the complexities involved in communicating NASA programs to the public through the media.

2.2 The Impact of Media Coverage on Scientific Funding

Through this section, I suggest that media attention is one of the many factors that impacts scientific funding. To demonstrate this link, I analyze the funding that a science

discipline receives and compare to the depictions of the topic in the media. One way to assess whether science is being funded through public support is by studying National Science Foundation (NSF) records. The NSF is a federally funded agency that gives grants to different scientific disciplines. I analyzed two technologies funded by the NSF since 2002, biomechanics and nanotechnology, in order to compare the NSF funding trends to the type of media attention in The New York Times. Negative press and decreased funding in similar years would suggest that media attention is reflective of funding fluctuations.

Biomechanics has followed a typical funding trend, garnering more funding as the media publishes more articles about the topic, which brings the public's attention to biomechanics. The NSF has consistently funded biomechanics since 2005 (see Figure 1 on the following page). Each year, biomechanics gets a bit more money, creeping upward from \$66,214 in 2002 to \$110,000 in 2011 (NSF). The first noticeable connection between biomechanics funding and the media occurred in 2004, the year before the NSF started funding biomechanics. As reported by Glier and others, the New York Mets baseball team started using biomechanics to hone their pitching skills. The next year, biomechanics received funding for the first time.

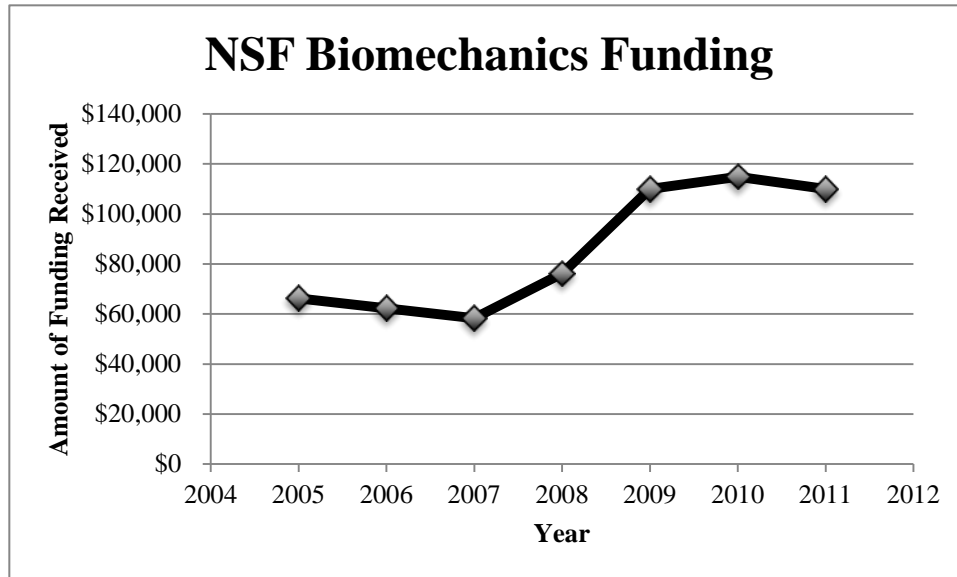


Figure 1 – Biomechanics Funding by the National Science Foundation (2005-2011)

The coverage of biomechanics in the media does seem to correlate with the amount of NSF funding granted during this time period. Biomechanics doesn't get an increase in funding for a few years as the media focuses on biomechanics as a technology for professional athletes. However, journalists began showing how biomechanics applies to everyday life starting in 2007, with the development of a weighted vest for exercise (Shea) and a depiction of runners shirking shoes for better biomechanics in 2009 (Cotese). During the same time period, NSF funding jumped from \$76,246 in 2008 to \$110,000 in 2009. This correlation demonstrates that media attention is reflective of funding. This link between media attention and funding is important to my project because I compare media depictions to funding in Chapter 4.

To further demonstrate that media depictions can be related to funding in my comparative analysis, nanotechnology provides a more exaggerated example. Unlike biomechanics, where the public was slowly introduced to the scene, nanotechnology exploded. The first year that NSF funded nanotechnology (2003), the discipline received

over 4 million dollars. The media coverage in 2002 implies that the public was also embracing nanotechnology. Articles touted nanotechnology's ability to shrink computer components (Chang), keep our clothes cleaner and our cars unblemished (Feder). Although there was criticism of nanotechnology rapid development, it was often described as taking "concerns of others out of context" (Feder). These were the headlines in 2002, the year that the NSF decided to fund over \$4 million to nanotechnology (Figure 2).

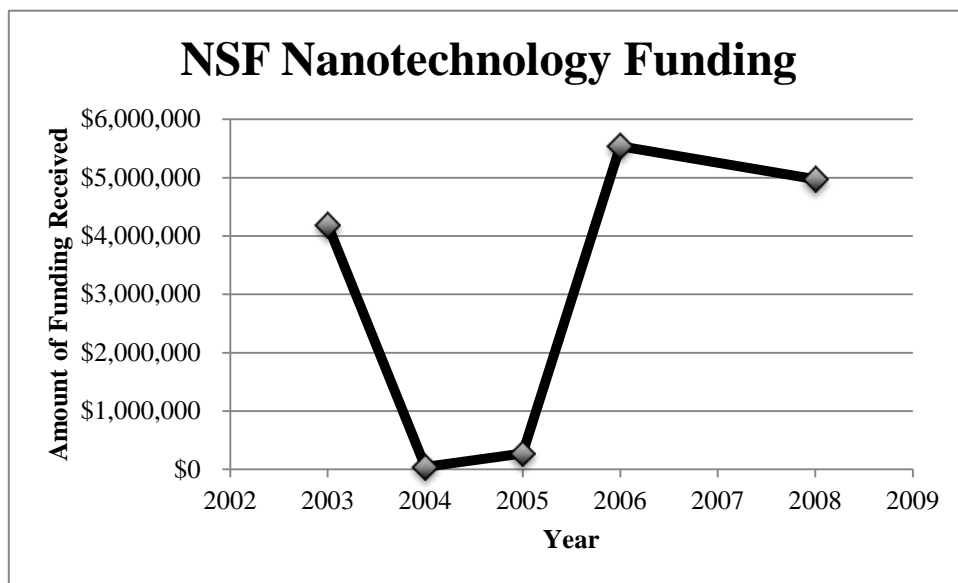


Figure 2 – Nanotechnology Funding by National Science Foundation (2003-2008)

In 2003, media articles became more critical of nanotechnology and NSF funding plummeted the following, reflecting the link between media depictions and funding. Suddenly the same group that previously took things "out of context" had become "cautiously earnest" (Feder). These groups were so successful during 2003 that nanotechnology group was formed in order to address the concerns (Feder). NSF funding in 2004 was one percent of the funding allocated in 2003. This shows a sharp correlation between public opinion/media attention and scientific funding, demonstrating that when

the media reflects negative public opinion through its stories, funding also decreases. However, the converse is also true. As nanotechnology started being applied to health and medical concerns in journalists' portrayals of nanotechnology, public opinion shifted. Then NSF funding reached the millions of dollars mark once more in 2006. Nanotechnology has not had consistent funding from NSF and the unusual funding trends do seem to correlate with media attention and public opinion.

Through the examples of biomechanics and nanotechnology, I suggest that the media depictions of sciences are reflective of shifts in scientific funding. This pattern should also hold true for NASA. Since I am evaluating media samples and gauging their success regarding funding in my analysis, it is necessary to provide examples that demonstrate that media attention is indicative of funding fluctuations.

2.3 The Impact of Public Opinion on NASA Funding in the Past

Although public opinion does impact NASA, previous research demonstrates that an increase in NASA funding is not directly related to increased public support because the government agenda plays an important role. Recent scholars, Launius, have theorized that public support of NASA was not stronger during 1960's, even though federal money was being poured into the NASA budget. Launius's article "Public Polls and Perceptions of Human Spaceflight" focused on the Apollo project and demonstrated that high level of funding did not necessarily correlate with favorable public opinion. Instead, many scholars have concluded that the space program is often used as a political tool. Steinberg, who published his article in *Space Policy*, specifically studied how space funding is responsive to public opinion. He concluded that sometimes space policy funding is related to public opinion and sometimes it is presidentially driven. He

demonstrated how President Reagan pushed the space station program forward to promote international cooperation. Another excellent example of a president driving a NASA program is when President Clinton continued the Shuttle-Soyuz project (visiting the Russian space station Mir) with the Russians as a form of foreign aid. In his book, *Leaving Earth*, Zimmerman cites this example of presidentially driven programs, discussing how the program was continued despite real safety hazards.

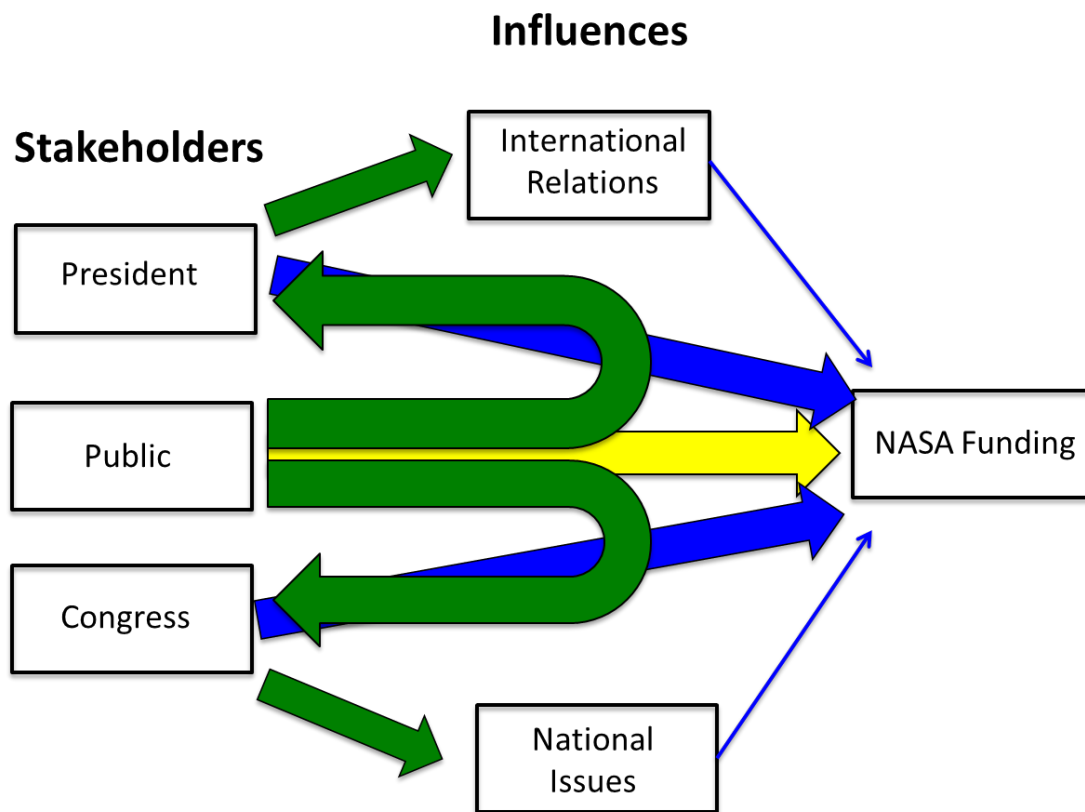


Figure 3 – Simplified Diagram of Factors Affecting NASA Funding

Although presidential support is certainly a large factor, public opinion does have an impact. In Figure 3, I demonstrate how the president, Congress and the public are related and how they influence NASA funding. Blue arrows indicate direct connections. Presidential mandates and Congress votes directly affect NASA funding. Green arrows

indicate influences on the stakeholders, such as international relations and public opinion for the president. According to Steinberg, President Bush pushed a presidential initiative for space. However, this was in response to increased public support for NASA.

Steinberg also argues that “Congress cater(s) to both sides of the issue, providing what the people want in regards to reducing funding for NASA as a percentage of the budget while responding to supporters of the space program though increasing funding in real dollars.” These examples demonstrate that the president and Congress are influenced by public opinion, as shown by the green arrows. This implies that public opinion affects funding for NASA, if indirectly, as depicted by the yellow arrow in Figure 3.

2.4 Historical Media Samples

I examine the public responsiveness to media framing of NASA projects in Chapter 4 through an analysis of historical media samples selected in this section. For my analysis, I have broken down NASA’s history into three major time periods (see Figure 3). The first spans the era of satellite development and moon exploration. It ends with Apollo 11 landing on the moon, which I initially suspected would be a catalyst for changing depictions of the space agency in journalism. The second era that I have categorized is the space shuttle and Skylab era. Although the shuttles continued long after the Challenger disaster, the second period ends in 1986. I chose this as a breaking point because the Challenger disaster was a catalyst for the new communication model (described in the previous section of this report). After 1986, journalists seemed to dramatically alter the way that they talk about NASA programs. The final era that I have analyzed is from 1986 onward. Chosen from a rhetorical viewpoint, these are three

distinct periods of NASA history, separated by NASA’s watershed events (red lines in Figure 4).

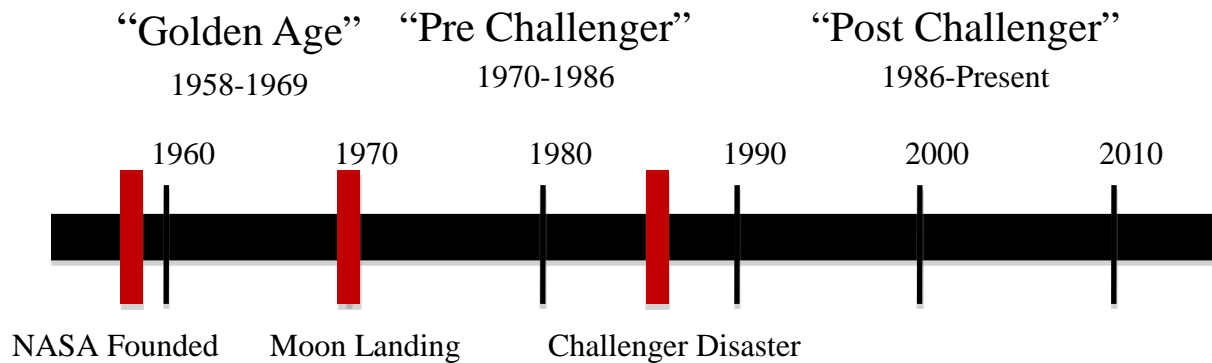


Figure 4 – Periods of NASA History

Although I chose these events as three distinct periods, the true break between periods was Challenger. The moon landing did not change how journalists portrayed the space agency. My analysis shows that many of the same frames were applied through the first two eras. Upon completion of the analysis, I determined that Challenger was the only event where media portrayals of NASA distinctly changed.

To analyze the media impact on NASA programs, I sampled both newspaper articles and informational videos in order to obtain a variety of media types. I chose to use newspaper articles because they are a common way for news about NASA to be transmitted to the public. Most people will learn about NASA programs from newspapers, rather than scholarly journals, which makes newspapers a good indicator of public knowledge. However, I have also included videos. While these may not be as popular as newspaper articles, they still have merit in this study. These are particularly important to my study because these specials tend to focus on a specific program. With videos, I can get more in-depth knowledge on journalists’ framing of specific programs.

Two articles and one video were selected for each time period noted above. All

the articles were retrieved from the New York Times Archive. As a well-respected journal with many awards and a readership over one million, the Times was a logical choice. Each article was carefully selected, according to criteria that I developed: the article should discuss at least one NASA scientific program (future or current) and mention the advantages and disadvantages of such a program. I applied these criteria to choose six articles, which are detailed below, along with the explanation of why I chose that specific article.

“NASA to Restudy Ramjet Engines” by Evert Clark (1964)

In his New York Times article, Clark asserts that ramjet technology developed by NASA will reap benefits in the near future. He supports the ramjet project by listing potential aviation benefits (such as supersonic passenger jets and spaceships that launch from runways), explaining how a ramjet works, and demonstrating how ramjets can be tested using current technology, such as the X-15 rocket plane. His purpose is to excite the public with the possibilities of ramjet research.

The primary reason that I chose this article was its detailed explanation of a specific NASA project, ramjet technology. Clark’s article is a prime example of explaining a complex scientific project to the public. He even tries to explain how ramjets themselves work. This is important to me because how projects are explained is a cornerstone of my study. Additionally, Clark meticulously details the benefits of a ramjet program to the public. Mentioning advantages and disadvantages of a NASA program fulfills one of my listed criteria. Clark’s article about ramjet technology was a fit for my study because described a complex NASA program to the public in a persuasive way.

“Space Technology Providing Benefits” by Walker Tomaswezki (1969)

In his article, “Space Technology Providing Benefits,” New York Times reporter Walker Tomaswezki argues that that large cost of the spaceflight program is worthwhile due to the new products being introduced to the economy. Tomaswezki details NASA-inspired innovations in multiple research areas to demonstrate the benefits of the American spaceflight programs. He writes compellingly of the advantages of space programs, but also cites the public’s concern about the cost.

Although this article does not talk about a specific NASA program in detail, it is an appropriate article for my study because it enumerates the costs and benefits of the spaceflight programs. Tomaswezki does pay more attention to the benefits than the cost, but he also cites the huge monetary cost of spaceflight as a disadvantage. This article is also appropriate because it discusses the programs themselves, as well as the science that came from them. I chose this article over more “scientific” descriptions because it captures public opinion (high monetary cost) about NASA programs.

“Satellites Cameras Scanning Coast” by Joseph Deitch (1972)

Joseph Deitch, in a special report to the New York Times, asserts that the NASA E.R.T.S.-1 project is fulfilling a need for environmental photos. In his article, Deitch explains how a NASA satellite can photograph large areas in a shorter time than typical aerial photos and how these photos can be used by environmental agencies, such as the New Jersey Department of Environmental Protection. He argues that the large cost of the satellite (\$174 million) could be offset by the useful information that it sends back to Earth.

Not only does this article give an explanation of a NASA program, it enumerates the costs and benefits, which makes it perfect for my study. Deitch gives a short explanation of the program itself, but expands upon the effects of the program. The fact that Deitch explains the results of the program is particularly important to me because it demonstrates a new way of writing about programs. In this article, the program isn't explained for technology's sake, but expounds upon the environmental results. I chose to include this article because it talks about NASA programs much differently than the first two, even though it's discussing a similar topic.

“Military’s Role in Space” by Wayne Biddle (1984)

In a special article to the New York Times, “Military’s Role in Space,” Wayne Biddle asserts that the growing link between NASA programs and the military is reallocating a large portion of NASA funding to military missions. Biddle defends his argument by charting how NASA and the Pentagon have worked together more closely since the Apollo missions; Biddle continues to point out that, though the two agencies are “working together” on a Space Shuttle launch, the Pentagon’s space budget is far greater than NASA’s, even though NASA supplies the primary funds for the space shuttle. His purpose is to demonstrate that the military is distracting NASA from the agency’s mission, to be “on the cutting edge of science and engineering.”

Although this article does not describe a specific program, it provides an overview of NASA programs from Apollo to the space shuttle, which makes the article appropriate for my study. The article’s greatest strength is that it traces the changing relationship between NASA and the military. Biddle’s chronology of NASA and the Pentagon’s relationship gives insight into how NASA wants its programs to be viewed, as

either civil or military. The goal of my analysis is to determine how NASA portrays its programs, and this article unveils when NASA is viewed as a more civil or more military agency.

“Robot Named Dante to Explore Inferno of Antarctic Volcano” by Warren E. Leary (1992)

Warren Leary, in his article “Robot Named Dante to Explore Inferno of Antarctic Volcano,” argues that the robot developed by NASA will not only provide needed information about Mount Erebus, but also pave the way for robots on Mars. The author gives detailed information about the robot’s capabilities and disadvantages in order to demonstrate how what was learned in its construction and deployment. Leary continues to explain how the lessons learned from Dante can be applied to a Mars robot. For example, he explains how the delay from Antarctica to the control center mimics the lag time between the moon and Earth. Leary introduces Dante as a trial run for more advanced Mars-bound robots.

Leary’s article both discusses a NASA program and extensively details the costs and benefits of the program, which fits the criteria that I developed for my study. The article is particularly useful because it shows both successes and failures of the project. For example, it mentions that the robot broke during the test run, but was repaired quickly. I also chose this article over others because it connects to future NASA programs, such as a robotic Mars mission. Seeing how NASA portrays an upcoming mission would be helpful for my study.

“At NASA These Days, Clouds Are Just What You Zoom Through on the Way to Mars” by Cornelia Dean (2005)

In “At NASA These Days, Clouds Are Just What You Zoom Through on the Way to Mars,” Cornelia Dean argues that political agenda of traveling to the moon and Mars could take NASA funding away from scientific projects. She underscores this point by examining a climate change project that was cancelled after budgeting changes at NASA. Dean also cites how scientific expectations of the next decade of NASA projects deviate from the new political agenda. Her purpose is to demonstrate how executive-led spaceflight programs could decrease the funding available for scientific pursuits.

I chose Dean’s article because it not only discusses multiple NASA programs but also compares them. She outlines the costs and benefits of multiple programs, including the Hubble Telescope and the climate change project. From a rhetorical analysis viewpoint, it will be enlightening to analyze which programs the author defends or rejects. Dean’s article will illuminate how NASA portrays both its programs and overall agenda.

These six articles are a small sample of many articles about NASA programs over the last fifty years. However, they were carefully chosen for relevancy to my specific study. Having such a small sample size guaranteed that I used the most relevant articles available. I also augmented this small sample with the informational videos that I chose to analyze.

Using criteria similar to those used to choose the articles, I selected one informational video from each time period. In addition to explaining NASA programs and their costs and benefits, videos had to focus on current programs. I added this

criterion to avoid the later videos that detailed the halcyon days of Apollo. These videos were not useful to me because I'm interested in how NASA garners public support for current programs. Romanticizing older programs is an interesting rhetorical choice for NASA, but it's not a topic I have chosen to analyze in my study. Instead, I chose videos that analyzed on-going programs. The videos I selected, along with the explanation of why they were selected, are enumerated below.

“Within this Decade: America in Space” (1969)

NASA, in “Within this Decade: America in Space,” argues that reaching the moon is an incredible achievement realized by ten years of space research. This argument is supported by the detailed chronology of American space projects, from basic satellites through the Gemini and Apollo programs, which demonstrates how each program is built on top of the previous work's achievements. The video also describes how Apollo 8, Apollo 9 and Apollo 10 paved the way for the lunar landing mission (Apollo 11). Through this movie, the lunar landing in Apollo 11 is shown as the inevitable achievement of long years of research.

Created just prior to the Apollo 11 lunar mission, this video fulfills my criterion of analyzing an ongoing NASA program. I also chose this video because NASA created it. My project explores how NASA explains its programs to the public. Sometimes this is done through journalists, as with the articles above. However, this video shows directly how NASA wants the public to perceive its programs. NASA's documentary fits my study parameters because it demonstrates NASA's intended public perception of spaceflight programs through the 1960's.

“Pioneer 10: Jupiter Odyssey” (1974)

In the NASA-created video “Pioneer 10: Jupiter Odyssey,” the Van Valkenburg of NASA argues that the Pioneer 10 spacecraft will send back knowledge that scientists could never receive using earth-bound laboratories. This argument is supported by the comparison of the photos from the Earth’s largest telescope to the photos that Pioneer 10 retrieved. The video also details exactly what kind of knowledge that the spacecraft can retrieve by explaining the instruments and the type of data the spacecraft can send to Earth. With poetic descriptions of the planets and the universe, the video also shows a romantic view of the Pioneer 10’s scientific mission.

I chose “Pioneer 10: Jupiter Odyssey” to analyze because it explains one specific program in detail and explains the advantages and disadvantages, which fulfills my most important criteria. This video was also appropriate because it discussed a recent program; the Pioneer 10 was still active when the video was released. Additionally, it was a NASA-created documentary, so it can give me insight into how NASA wants the public to view its programs. With a multitude of videos to choose from in the 1980’s, it was hard to pick one. However, “Pioneer 10” proved to have a great deal of information about the program itself (not just the science it uncovered). This makes it a better fit for my project than the other videos that I viewed.

“Five Years on Mars.” (2008)

National Geographic portrays the Mars rovers as explorers that have faced trials and overcome them in “Five Years on Mars.” The video traces the routes of the Mars rovers, Spirit and Opportunity, from impact on Mars to their current location. These routes include many problems and lucky breaks, from getting stuck in quicksand to a

much-needed gust of wind. National Geographic uses the rovers to show how, with enough effort and resources, hurdles can be overcome.

This video was my first choice for analysis because it carefully traced an ongoing NASA program, including the costs and benefits of the program. Unlike the other videos, it shows many of the trials that the program had to face and overcome and it cites the time associated with those costs. I also chose a video that wasn't created by NASA because it reflected a trend in the videos that I researched. In this time period, other entities, such as National Geographic and Discovery Channel, started featuring NASA programs, while the space agency itself seemed to create fewer and shorter videos. Although different from the other two chosen videos, it is an appropriate choice for my project because it portrays a NASA program, the Mars rovers, using a rhetorical frame.

These videos, coupled with the six chosen articles, will comprise the materials that I will evaluate according to the methodology that follows in Chapter 3.

3. Frame Theory as a Method for Analyzing Journalistic Depictions of NASA

To analyze media depictions of NASA in Chapter 4, I use the frame theory method, which is discussed in this chapter. First, I introduce the concept of frame analysis in order to demonstrate how it works as a method for my analysis. Then, in 3.2, I demonstrate how frame theory is used as a means of persuasion, an element that I analyze in Chapter 4. Section 3.3 examines how audiences interact with a frame, which helps me define the public impact of the media depictions of NASA. Finally, in sections 3.4 and 3.5, I discuss the application of frame theory as it will be used in my study.

Often, to contextualize scientific developments for the public, journalists utilize frames. The name “frame” is derived from the physical frame that encircles a picture. As physical frames outline pictures, theoretical frames bind stories. Framing is an organizational structure that people use to perceive and organize the information they receive. According to Lakoff, frames allow people to “acquire, understand and communicate knowledge (qtd. in Park 15).” Journalists use frames to communicate scientific knowledge to the public. With frames, journalists can take discrete events and assemble them into a meaningful storyline (Park 23; Gamson 157). For example, a war in Uzbekistan would be a discrete event. However, in order to gain people attention, American journalists could use a frame to connect this war to American cultural notions. In the United States, there is a strong cultural perception of freedom. If the journalist writes about the war as a fight for freedom, it will resonate, or connect, with American

readers. By using frames such as this, journalists construct the scaffolding in which to build their story, a structure that I must identify in my study.

As a persuasive tool, framing can be used to sway public opinion of NASA by depicting programs in a certain way. Continuing the example above, the public might be more willing to be involved in the war in Uzbekistan if they perceive it as a fight for freedom. Strong perceptions generated by frames can persuade people, which could lead to actions. From a rhetorical perspective, framing an issue serves three purposes: to define a problem, diagnose causes of the problem, evaluate actions and prescribe solutions (Entman 52; Tucker 145). In the case of the war in Uzbekistan, the frame of freedom defines lack of freedom as a problem, diagnoses oppressive government as a cause, and prescribes U.S. intervention. In the case of NASA, if the journalist frames a story in a way that reflects negatively upon the space agency, NASA could become a problem, too much funding a cause and eliminating funding an appropriate action. How frames lead people to take actions like decreasing funding for NASA is a topic important to my study.

Although journalistic framing has the intention of persuasion, readers use frames to shape their understanding of the story, and the applied frames can be different from the received frames. According to Entman, a professor of communication, frames are present in every level of news communication: the communicator or journalist, the text itself, the person receiving the news and the culture (52). For example, in “Rapid Weight Gain,” Shea, the journalist, discusses a weighted vest in the frame of being healthy. However, the text itself might not contain this exact frame, since it only talks about the health frame in terms of burning calories and increasing exercise intensity. The person receiving the

news may make the same connections as the journalist, such as burning calories leads to greater health. However, the reader could understand burning calories in a different way than as related to health. Finally, the culture in America tends to connect burning calories to maintaining health, but another culture could understand the text differently. In an impoverished country, burning calories could be connected to a frame of an unhealthy lifestyle. I have summarized Entman’s four levels of news communication with the example of “Rapid Weight Gain” in Figure 4.

Four Levels of News Communication

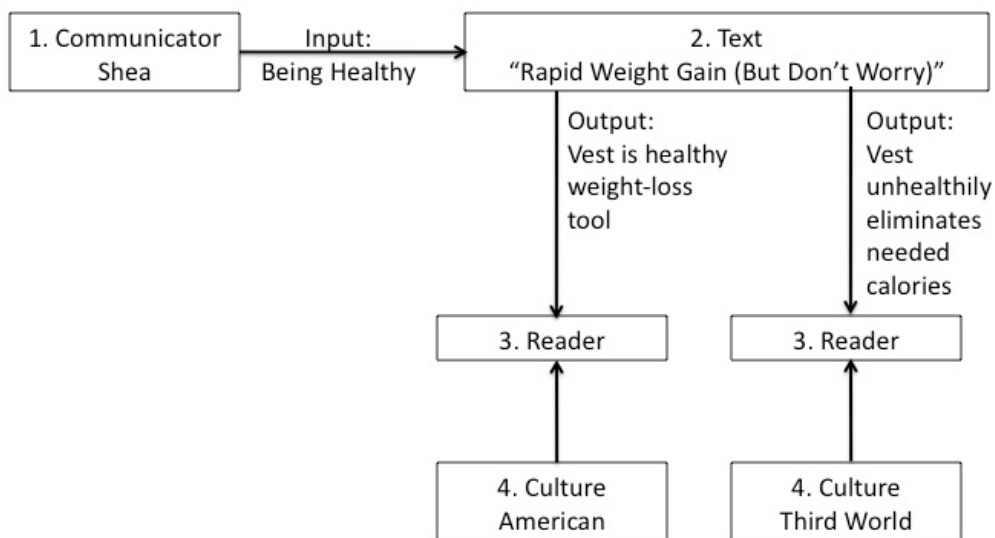


Figure 5 – Diagram Relating Stakeholders in Frame Theory Communication

It is not guaranteed that the frame that a journalists uses will correspond to individual’s understanding. Scheufele, a communication scholar, describes these different frames as media frames and individual frames (106). Media frames are the ones developed by the media in order to gain public attention. However, individuals create their own frames of understanding through life experiences, as well as the cultural

perceptions in their environment. Media frames and individual frames do not always correspond. As shown with the example in Figure 4, the media frame of “being healthy” might not correspond with the individual frame. The individual reader frame connected with American culture agrees with the media frame, but the individual reader frame associated with a Third World country does not. Media frames are processed by individual with their own unique frames and understandings.

An additional complication for a journalist communicating stories via frames is that many stories have more than one frame associated with them. Typically, the frames utilized in the story include one major frame and less important sub-frames (Park 93; Scheufele 107). The weighted vest story by Shea seems to have health maintenance or weight loss as the major frame. However, the story also discusses biomechanics, which is more of a technology and progress frame, which could be labeled as a sub-frame. It’s clear that framing is an involved process involving many parties and often, multiple frames. The fact that stories have multiple frames is important for my project because I need to identify all of the frames in order to get a clear picture of which NASA frames are successful.

3.1 The Creation of Frames

Understanding how frames are created is important for understanding why they are successful. In medicine, frames need to be developed because symptoms have unknown consequences and causes until framed. People don’t like the unknown and look to doctors for explanations of consequences and causes. For example, symptoms of difficulty breathing and tightness in the chest simply cause the patient to panic until framed. Framing these symptoms as a heart attack generates one reaction and framing

these symptoms as asthma generates another. The consequences and causes become known, generating an emotional response from the patient. Rosenberg explains, once framed, a disease can affect how a person's opinion of themselves or others. For example, someone with heart disease could be considered a fast food junkie because of clogged arteries. Once the disease has a context (frame), so does the patient. Once an event or symptom is framed, it gains meaning and people can interact with it and generate emotions about it. People have very different emotion reactions to heart attacks versus asthma. Framing the symptoms with one of these diseases lets people analyze the causes and solutions and become appropriately emotional.

However, these disease frames, like all frames, need to be constantly updated or it becomes outdated or nonsensical in the evolving culture. Rosenberg, a researcher, explains that doctors use the culture of their time to frame diseases. Leprosy is framed as a punishment from God in one century and as a bacterial infection in another. The old frame became outdated and needed to be updated. An outdated frame might not be as successful as new frame as culture changes and develops. People need new ways to understand disease and other events as knowledge evolves, so frames are modified or eliminated in order to keep pace with cultural perceptions. In NASA's case, people's perceptions of the space programs changed over time. It will be an interesting aspect of my project to see if the frames that journalists use to describe NASA programs change as well.

As culture changes and frames evolve, some frames emerge as more successful than others. Gamson and Modigliani, two of the first scholars to apply frame theory, explain that the "career" of a frame is dependent upon three factors: cultural resonances,

sponsor activities and media practices (4). “Cultural resonances” describes how a frame fits within the current culture. It will be resonant (and successful) if it fits within popular cultural beliefs (Binder 733). The weighted vest story is a resonant one in the U.S. because American culture promotes health and wellness. A sponsor of a frame also affects how it is perceived. If a sponsoring organization is closely allied with a frame and takes an action unfavorable to the public, the frame will suffer as well. For example, NASA was closely allied with the technological progress (for the sake of progress) frame and the frame became less powerful after the Challenger disaster at NASA. Finally, cultural resonances and sponsor activities mean little unless the frame fits within media norms and practices (Gamson and Modigliani, 9). If a frame will not generate a public response as the media desires, journalists will not use it and its career will be short lived. To be created and propagated in the media, a frame has to fit well within the culture and media. I need to keep these three requirements in mind when I develop a frame for explaining one of NASA’s programs in an editorial.

Another requirement for a successful frame is repetition. In fact, when not created for a specific purpose such as disease, frames are typically constructed through repetition of cultural experiences (Park 12). Experiences common to a culture get embedded within public consciousness through repetition. Park explains that these experiences become abstracted and are stored within the frame (23). These experiences, when they become a frame, become generalized and belong to the whole culture, instead of a specific person or time. War is a common cultural experience that has become a frame. The concept of war has become abstracted and is known even to people who have never experienced war. The frame of war is embedded in the culture. Embedded frames, like war, are

particularly successful because people don't remember that frames are constructed; they seem to have always been there (Tucker 144; Mazzarella and Pecora 11). Frames that fit seamlessly within cultural experiences and norms are almost indistinguishable. People do not recognize their presence. These frames, the most unobtrusive and insidious type, often are the most successful when used in the media. Identifying successful frames, using the criteria of Gamson, Modigliani and Park, will help me to determine how to frame NASA in a manner that elicits a positive emotion response from the public.

3.2 The Persuasiveness of Frames

Although framing is necessary for any type of effective communication, the way that journalists select frames is strategic (Tucker 143). Journalists do not randomly assign frames to a story, but select, emphasize, exclude and present certain facts (Ashley 264). The frame selection has an impact on the audience's view of the story's importance. To gain audience attention, journalists attempt to choose the most interesting and noticeable frames. However, many factors, such social norms, interest group pressures and the journalist's own values, impact what journalists choose as a frame (Scheufele 109). Journalists have a complicated task when choosing how to frame a story, as will I when I create my editorial.

Once a frame is chosen, journalists can emphasize certain aspects of the story in order to promote the frame (Nelson et al. cited in Nelson et al. 568; Entman 55; Tucker 143) and increase its persuasive power. Entman explains that frames are defined by what they omit, as well as what they include (55). By carefully choosing what facts to emphasize and which to omit, journalists can frame a story. These omissions and emphases make some facts seem more important, or salient, than others, which can affect

people's opinions (Nelson et al 569). For example, during the Challenger disaster, NASA tried to frame the debacle as a technological error, by eliminating any reference to people being involved. Because human error was omitted in their story, they could more easily frame the disaster as a technological error. During my analysis, it will be important to note what facts are omitted because their omission will help me define the frame that is promoted.

Omitting and emphasizing certain facts often limits the way that a reader can understand a story, which makes the frame more persuasive. Binder argues that framed emphasized becomes the dominant perception of the text and that people have a hard time comprehending the text in a different way (755). Basically, framing creates a particular way to interpret the text. In fact, Entman defines framing as selecting some aspects of reality to make more important in order to cause a certain audience reaction (52). In NASA's case, selecting the technological failures as reality was supposed to lead to the audience shifting the blame away from NASA. People's understanding was limited to the technological problems. Creating a dominant reading of the text is a power persuasive tool that I should be able to identify in my analysis.

Even though the persuasive element of framing is generally considered a negative aspect of journalism, to make stories salient and interesting to people, frames should be used to communicate events. When a frame is used, the story becomes limited, but also more understandable to people because frames determine a certain way to interpret facts. Identifying how NASA limits its program to make them more understandable to the public is critical to my project because I should be able to identify which limitations were successful and which were not.

3.3 Audience Interaction with Frames

Once I determine how NASA programs are framed, the second step is to see how audiences react to that frame. Audiences tend to activate frames when hearing or reading a story in order to connect and make sense of it. A story is just a collection of facts without a frame, so a frame must be matched to it (Park, 14). Park explains that frames also serve to generalize stories, which allows people to connect a specific story to their own life experience (100). For example, many stories are framed as the trials of “coming of age.” Everyone faces trials on the path to become an adult. Framing a story as the perils of “growing up” often connects people to their memories, which give them an emotional connection to the story. Once the story is entwined with the listener’s memories, it is not external to the audience anymore. Now that the reader has generalized the story, the narrative exists in its own “environment” (Fillmore cited in Park 14). The story has context. Activating frames when communicating information allows people to generalize the story and add context.

Although people usually activate frames when receiving information, there is a strategy to activating certain frames. To use a frame that gets people’s attention, journalists need to find a way to activate a specific frame, not just what individual frame the reader would naturally use. Frames can be activated through metaphors, catchphrases or symbol devices (Gamson and Modigliani 3; Gamson 159; Gamson 158). These communication tricks call up a frame in people’s minds without overtly stating which frame people should use to understand the story. This is usually not a random metaphor assigned to the frame, but a phrase referring to core element of a frame (Park 101). Take for example, the word “green.” Once it was just a color, now it is a symbol of the

environmental movement. Green refers to core element of the environment movement, keeping the world green. Other frames develop a certain syntax or collection of words. Words like battle, victory or defeat, can activate the war frame in people's minds. Those words stand for the entire frame. In this way, the whole frame can be activated by a small element, which stands for the whole frame (Park 107). These metaphors and symbols direct readers that direct readers toward the frame will be useful clues when identifying frames in my analysis.

However, it takes more than using the critical metaphors and phrases to truly bring a frame to life. Binder suggests that journalists also need to show that the frame is relevant before readers will accept it (755). In NASA programs, progress was typically a relevant frame. The progress frame that I am citing, which defined progress as a positive endeavor, was relevant to NASA as it developed satellites and sent men to the moon. But when the Challenger disaster occurred and seven people died, the progress frame lost relevance. NASA could not demonstrate that progress was positive in this particular case. In other cases, even if the relevance is demonstrated, people still might not accept the frame or let it influence their own thinking. Just because a frame is noted in the text does not mean that it will impact the readers at all (Entman 53). As explained before, the process of communication is too complex to guarantee media influence over readers.

Despite demonstrating relevance and using key words to activate frames, journalists cannot guarantee that the frame will impact the audience. Frames can change some people's opinions, though they are not likely to change everyone's opinion. In the example about Uzbekistan, some people might be persuaded to intervene in the war to fight for freedom. However, not everyone will be persuaded that fighting for freedom is a

legitimate reason to go to war on the other side of the world. Although frames might prescribe a response (such as fighting for freedom), frames do not outwardly state an opinion for or against some policy (Gamson and Modigliani 4). When the media uses frames, journalists do not tell audiences what to believe. In my example, the journalist would never mention that going to war to fight for freedom is the best option. He or she would simply connect the war to the America ideal of fighting for freedom. Instead, the media changes opinion through selecting frames in which to portray an event (Binder 754). The selection of the frame is the ultimate media strategy. Even though not everyone will react the same way to the frame selection, choosing the right frame at the right time can have a powerful effect on public thinking. In my project, the choice of frame could mean the difference in billions of dollars of funding for NASA.

3.4 Frame Identification and Analysis

In studies such as mine, frame theory has commonly been applied as a model of understanding the media's communication with the public. According to Scheufele, studies typically treat frames as either the independent or dependent variable (107). If the frame is independent, researchers are studying audience reactions to framing (Scheufele, 107). If frames are dependent, researchers focus on the choice of the frame, the journalists' choices. However, a complete study must study both aspects of framing, from the media perspective (frames as a dependent variable) and the audience's reactions (frames as an independent variable), according to Binder (755). In my study, I will treat the frame as the dependent variable, focusing upon the reader's choice. However, I will also interpret the audience reactions through the public opinion of NASA and funding

decisions. Binder also suggests looking at which frames work, while others don't (755), which is another factor I will consider in my own project.

To determine both the journalist choices and audience effects, researchers have developed various methods for identifying frames. Frames can be examined using either an inductive or deductive method. Mazzarella and Pecora explain that an inductive method examines a series of issues, looking for patterns, while a deductive method examines the issue itself more carefully, through interviews and research (11). My study will utilize the inductive method, in which I will identify frames and then search for patterns. A deductive version of my study would use extensive research to determine which frames NASA tends to use and then I could select which one was most appropriate for each analyzed article from a list. Entman notes that my frame selections also need to be supported by the text and the audience perception of the text (52). This means that the frames that I choose have to make sense when compared to the text and the audience perception. If I say an Apollo 11 article is framed as "space exploration is unnecessary," the text and audience perception would disagree. Apollo 11 is generally considered the crowning achievement of the space program, so it is unlikely to be framed as "space exploration is unnecessary". Since I am conducting my study inductively, it will be even more important to heed Entman and compare my selected frames to the text and audience perception.

Content analysis, which Krippendorff (author of the authoritative book *Content Analysis*) defines as an inquiry into the symbolic meaning of messages (22), is commonly used to identify frames (examples: Lawrence 60; Mazzarella and Pecora 13; Gamson and Modigliani 11). This methodology uses standard rhetorical coding procedures (Gamson

and Modigliani, 11). It is a simple method for identifying patterns (and therefore frames) through coding a selection of materials. Researchers usually code the topical focus of each story (Lawrence 61). Once the materials are identified, the next step would be to note the topic of each story. The topic would then be included in the coding sheet, which is where all of the data is collected for later analysis.

However, deciphering the topic is only a preliminary step; researchers should also look for specific ideas when identifying frames. Gamson and Modigliani warn that coders should not make global judgments on which frames are present (11). According to them, global judgments about which frames are present should occur after the specific ideas have been identified. In my study, the specific ideas noted will be the catchphrases, symbols and metaphors that help to identify frames. There is no exact method for content analysis coding because often researchers don't know what there are looking for initially. In my study, inductive reasoning and pattern recognition will play a large role in coding successfully.

Since coding is not a precise method, Gerhards and Rucht have conducted a framing analysis using a different content analysis method. Although the researchers note key ideas like the others, they organize the ideas into an argumentative structure and present it graphically (574). They use this method to analyze mobilization techniques in Figure 5. By diagramming the argumentative structure, researchers can more clearly see the interrelations of the topics. Understanding how the topics are related can lead to finding frames, which are typically the glues between topics. With the diagram in Figure 5, the readers can see that domination is the global frame. It connects to all the sub-topics

and sub-arguments. By presenting it in this fashion, Gerhards and Rucht organize the sub-frames under the global frame clearly.

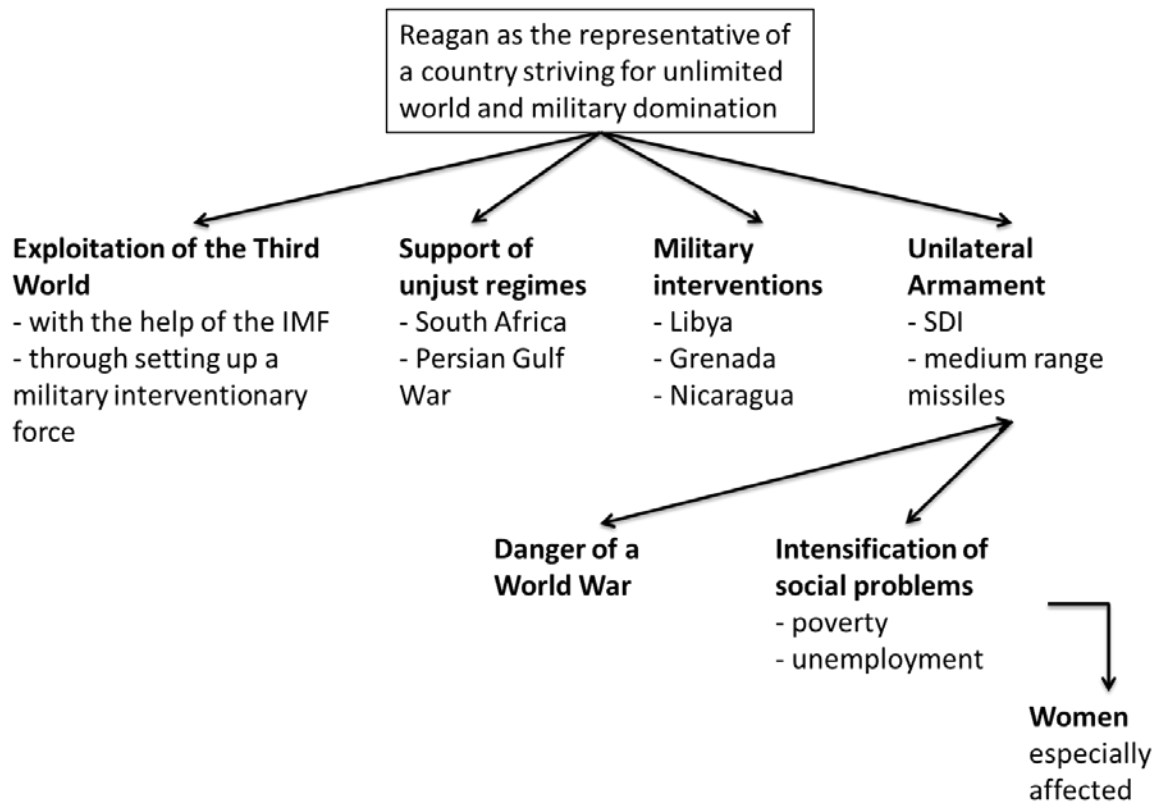


Figure 6 – Gerhards and Rucht’s Graphical Presentation of the Argumentative Structure

However, most studies do not use this more involved method. This could be because trained coders can perceive this argumentative structure without taking the time to create a graphical presentation. Although Gerhards and Rucht made use of the argumentative structure of framing more than other researchers, the overall method is still the same, linking specific ideas in order to identify a frame.

Content analysis is a simple method and it has its disadvantages. As a simple method, much is left to the researcher’s discretion. There is no consistent methodology to follow, a fact bemoaned by Scheufele (118). The researcher decides what is important or

salient, and he/she must be aware that all negative and positive words in a text are not equally important (Entman, 57). Deciding which facts are important can be a task. Many news articles suggest more than one frame and the researcher must determine which one is most important (Gamson 158).

In addition to the complications with identifying frames, content analysis does not examine audience reactions (Gamson 158). To incorporate audience reactions into a study, as Binder recommends, another analysis method must be used. In my case, I will be using funding trends as a way to incorporate audience reactions. An upward funding trend will suggest a positive reaction and a downward funding trend, a negative one. This trending, along with the content analysis, will be in my methodology, which is further described below.

3.5 Applying Content Analysis to Selected Materials

To identify frames in my chosen materials, I used content analysis, a method explained in the literature review. Typically, content analysis is used deductively, where analysts (or “coders”) simply check off the statement with which they agree. For example, in framing, coders could choose whether they agree or disagree with a certain frame identified in the material. However, because the frames in my materials have not been identified yet, I had to find them inductively through pattern recognition. Although I have researched how to identify frames inductively, this process is too complicated to teach to many coders. Instead, I used the following method to identify frames as the sole analyst. Having one coder does decrease the reliability of my study, but frame theory is too difficult to teach to non-rhetoricians in the time allotted. Instead, I increased the

reliability of my study by following a specific method and double-checking my results with an expert rhetorician.

My primary method for identifying frames in the materials was noting metaphors, symbols and visual language, which are indicative of a frame present in the material. To standardize this method, I followed the following procedure for articles.

- I highlighted metaphors, symbols and visual language in the first read-through.
- I read through a second time for content.
- I grouped the highlighted words into similar themes, or frames. If one frame was more prevalent than the others, it was designated the global frame, and the other frames will become sub-frames.

If a transcript for the documentary was available, it was treated as described above for written articles. The procedure that I used to analyze the video samples without transcripts was similar:

- I first watched the video solely for an understanding of the content.
- I stopped the documentary and noted the time when I heard visual language or metaphors during the second viewing.

Then, I followed the same method as above, grouping the noted words into frames, identifying a global frame (if any), and inputting the data into a spreadsheet with the article frames.

Once I collected the data, I scanned it for patterns. Once I recognized the frame patterns recognized in each time period, I compared to them to NASA's funding over each era and the culture in which they were written in order to gauge their success. With this analysis, I correlated which frames were connected to increased funding and

decreased funding. Based upon this information, I wrote my final editorial article describing NASA in a way more likely to increase funding.

4. Determination of the Success of NASA Depictions by the Media through Application of Frame Theory

Prior to the Challenger space shuttle disaster in 1986, journalists consistently depicted NASA using the married frames of “progress” and “cost-benefit” to create the “benefits of technological progress” frame. This portrayal of NASA enjoyed relative success; the space agency received funding for both the costly Apollo and space shuttle projects during the era that this frame was applied. However, the Challenger disaster fractured the use of this frame by the news community. The betrayal that new communicators felt after the Challenger disaster led them to seek new ways to depict NASA. Since the disaster, journalists have not use a consistent method of depicting NASA; instead they have utilized a variety of different frames. I argue that the lack of a cohesive framework to depict NASA has changed the public perception of the space agency, leading to the agency’s current challenges in garnering support and funding.

To defend this assertion, I present my findings in the following four sections. The first two sections (4.1 and 4.2), which explain the frames utilized in Era 1 (1958-1969) and Era 2 (1970-1986) and demonstrate the widespread application of the married progress and cost-benefit frame, the benefits of technological progress. In each era, these two frames appear twice as often as any other and a small number of other frames appear. These results support my argument that the married frame was employed most often in these eras. The third section (4.3) details the frames applied after the Challenger disaster (1986-2010). My analysis revealed that, in this era, journalists no longer applied the benefits of technological progress frame. Instead, they applied ten different frames and none was used more than once. The third section proposes that the post-Challenger era

has lacked a consistent framing of NASA. This suggests that the Challenger disaster ended the use of the frame as a consistent way to describe NASA. This finding and others from all three eras are discussed in the final section (4.4).

4.1 Frames Identified from 1958 to 1970

The two global frames applied in the samples, benefits of technological progress and manifest destiny, supported each other by generating excitement for expansion and progression (Figure 7). Both frames are connected to the idea of progression and moving forward. Used in conjunction, they intend to persuade audiences that progress is both destiny and gives benefits. The other frames utilized in this period are sub-frames of this larger focus on progression. Economic benefits and aid supports the benefits of technological progress frame and discovery and unity support the manifest destiny frame. Together, and supported by the sub-frames, the benefits of technological progress and manifest destiny provide a unified message about the excitement of progression.

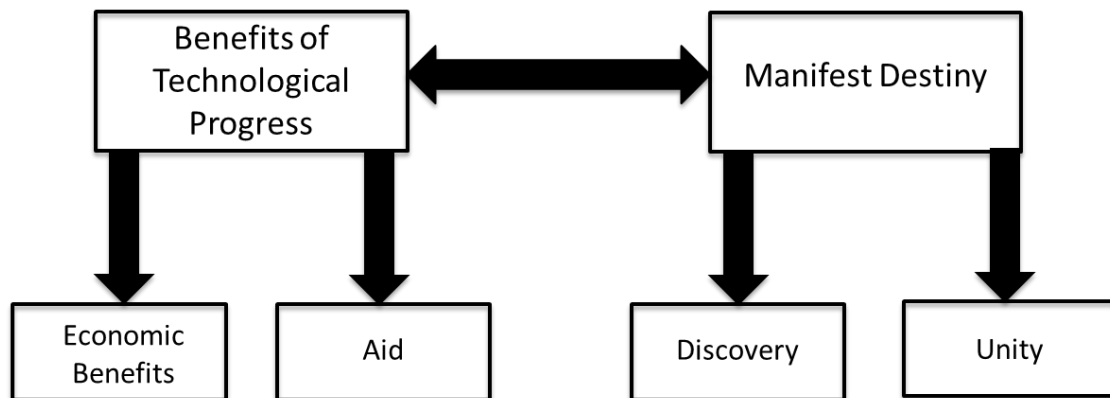


Figure 7 – Interrelationship of Frames (1958-1970)

The three authors that I analyzed in this first era -- Clark, Tomaszewski and Whitaker – applied the “benefits of technological progress” frame, a melding of the progress and cost-benefits frame, in order to persuade audiences that NASA was using its

funding to provide benefits for the United States. In his article, “NASA to Restudy Ramjet Engines,” Clark describes new aircraft that would be “twice as fast as the supersonic airliners projected for the nineteen-seventies” (48). By comparing new technologies to current technologies, Clark implies that the new technologies are a desired improvement. Tomaszewski also employs this frame with similar methods in “Space Technology Providing Benefits”. The progress frame is introduced in the second paragraph when he cites developed technology “that did not exist at the time President (Kennedy) spoke” (F28). He also describes how satellite photographs can detect diseased crops *better than* regular color photography and how Earth resources mapping is giving *better* quality information. Like Clark, he demonstrates how new technology is beneficial by showing how it is superior to older methods.

The documentary, *Within this Decade: America in Space*, written by Walter Whitaker, also lists the technological improvements developed by NASA. Whitaker lists the “practical benefits here on Earth,” such as “...satellites (that) provide a constant watch on the world’s weather, serve as beacons for navigation by ship or plane, send voice and picture from any point on Earth to any other.” By using words like “provide” and “serve,” Whitaker hints that NASA is generously helping the American people through providing new technology like satellites. The progress frame utilized in the three texts is a frame that is continually used by journalists to describe NASA until the Challenger tragedy in 1986.

NASA’s entwinement with the progress frame enhanced the agency’s image at the time and argued for continued funding, but it gained its strength from the 1960’s cultural perception of progress. In the 1960’s, progress was deeply embedded in the

American culture. The economy was strong and improving. Martin Luther King Jr. was making progress in his quest for equality. Parallel to this social progress, in NASA's first years, Alan Shepherd became the first American in space and John Glenn was the first American to orbit the Earth. Associating NASA's technological progress with social progress was a clever link in the 1960's because it connected abstract technological innovations with everyday life. Although the connection between NASA and progress did help the agency's reputation at the time, it only works as long as the population believes that progress is beneficial. If society starts thinking of progress as moving too quickly, the space agency's reputation will suffer as well, seeming hasty due to its connection with the progress frame. However, authors' framing of NASA programs as progressive during the 1960's bolstered the agency's strength of character because connecting NASA to the positive perception of progress improved the image of the space agency.

To strengthen the impact of the progress frame, all three authors omit any mention of setbacks to NASA programs. Clark omits the difficulties of ramjet research when describing the three research steps. Although he mentions the \$3 million cost of the first step, he does not cite the either time or monetary commitment for the second and third step. The perception that audience would get from this depiction is that progress happens immediately and without roadblocks, which is an unlikely scenario. Tomaswezki also avoids mentioning when NASA has not been progressive. His article lists the benefits that space technology has given to other fields, but he does not mention the developments that did not benefit other fields. Some space technology does not benefit any field other than space research, but Tomaswezki omits these items. Although Clark and Tomaswezki omit small details, the documentary is the source of the biggest absence of setbacks. The

only allusion to setbacks is one sentence: “Sometimes there were accidents and failure that claimed men’s lives.” During the narration of the sentence, a video of a failed lunar lander was shown. “The astronaut pilot of this research vehicle landed safely,” assured the narrator. Even though an error was shown, the narrator downplayed this setback because no one was hurt. Additionally, there was no mention of the Apollo 1 fire that claimed three lives, even though the documentary claimed to chronicle the entire Apollo program. Omitting these errors is a rhetorical tool for strengthening the persuasiveness of the benefits of technological progress frame. As described in Chapter 3, omission make the included facts seem more important or salient. In these articles, journalists use omission to imply that the included technological benefits were more important than the omitted setbacks.

The manifest destiny frame, used in Whitaker’s documentary, supports the benefits of technological progress frame by highlighting the excitement of progression and expansion. Whitaker invokes the images of manifest destiny, romanticizing the voyage to moon, in order to demonstrate that is American’s destiny to explore the moon. The frame of manifest destiny is strongly linked to romanticism. According to Sage, author of *Framing Space*, when manifest destiny became culturally embedded during the expansion into the American West, the expansion was portrayed romantically. Sweeping landscapes paintings inspired people to seek the “new frontier.” This phenomenon was repeated with space as the new frontier. Sage explains that artists even captured the excitement and glory of exploring new areas in their paintings (Figure 6).



Figure 8 - Charles Bonestell's *The Conquest of Space*

Whitaker taps into this cultural inclination toward expansion by narrating, “Sea of Tranquility now awaits the arrival of the first men from Earth.” He uses the cultural notion of manifest destiny to assure people that humans are meant to reach the moon; it’s even waiting for us. The notion of exploring and expanding buried deeply in the American consciousness. Roland in “Ship for this New Ocean,” cites the American preoccupation with exploration. He explains that the National Air and Space Museum recently had an exhibit celebrating five hundred years of exploration, starting with Columbus and concluding with the space program (524). With this example and others, Roland points to the American cultural inclination toward exploration and expansion. Using the manifest destiny frame, Whitaker connects the moon trip to five hundred years of exploration (Columbus, the American West etc.), hoping to generate the same excitement that previous exploration did. This framing is used again through the next era of NASA history (1970-1986).

To support the manifest destiny frame, Whitaker also applies the frames of discovery and unity to portray NASA's journey to the moon as the result of the efforts of all humankind. Invoking the discovery frame, the narrator demonstrates how "man has learned the nature of microscopic particles in space, he has measured air density at great altitudes, discovered how electrons deflect radio waves in the ionosphere and where radiation belts encircle our planet." The word "discover" is even listed in the sentence. The film also portrays NASA as ethical by associating discovery with "the light of new knowledge." In many instances in the film, space is considered dark and discovery brings light. Whitaker also demonstrates the connection between light and discovery with a reading of Genesis. The passage chosen is about when God created the light and the dark. Discovery is strongly associated with the light. With all these clever linkages, NASA associates itself with discovery, light and even religion. The contrast of light and dark is an ages-old appeal. Throughout history, religion and culture have associated light with good and dark with evil. By aligning NASA with light, Whitaker is implying that the space agency is good. NASA also bolsters its own character by aligning itself with the world (unity). The space agency aligned itself with the world through constant use of the word "we" and "man." "Television cameras took *us* live and close-up to the lunar surface." NASA even used images to cement the idea of unity, showing footage of the Olympic games, a common symbol of international cooperation (and competition).

Although a powerful frame in the 1960's, the manifest destiny frame did not directly address the public interest in NASA's budget. The American taxpayer, whose payments to the government lead to NASA funding, typically scrutinizes the NASA budget. A long-held notion holds that during the 1960's, the American public was wholly

supportive of NASA programs. However, recent research by scholars such as Launius and Steinberg shows that NASA's budget was still questioned during Apollo's heyday. Immediately after the moon landing, the highlight of the American space program, Richard Lyons published an article, "Costs of Landing Put at \$30 Billion," describing the cost of the Apollo program. He discusses the varying methods of measuring the cost of the Apollo program. For example, Lyons explains that the Apollo 11 trip cost \$350 million, but the research and development costs were "staggering" (27). Lyons wrote multiple articles on the topic of NASA spending, such as "\$400 million Spent to Re-Design Space Capsule with Safety as a Vital Objective." The work of Steinberg and Launius, as well as Lyons articles, argues that the 1960's public had an interest in the cost of spaceflight.

In response to the public interest in NASA's budget, Tomaszewski began examining NASA through the frame of economic benefits, which supported a positive image of NASA by implying that the space agency using its massive budget to benefit the American economy. The economic benefit frame becomes apparent by fifth paragraph of the article where Tomaszewski cites the "billions of dollars this country is spending in the space effort" (F28). Throughout the article, he depicts NASA spaceflight programs in terms of costs and benefits, using financial terms such as "return from investment," "diversifying," and "paid off already." These terms imply that NASA is an "investment" of public funding. Tomaszewski then demonstrates the technological benefits of NASA as a "return" of the investment in the space program. The primary focus of his article is demonstrating how NASA technologies have reduced costs in other fields. "In the future, weather may be predicted two weeks in advance that could bring potential savings of

about \$2.5 billion annually” (F28). With this focus, Tomaswezki implies that NASA saves money more than spending it, especially since he omits the cost of many programs and instead focuses on the savings that they could eventually bring.

Giving aid was another unique frame that Tomaswezki alone applied in order to depict NASA as a generous agency, applying its resources in a beneficial way. The journalist describes the money dedicated to the space program as a “transfusion into the veins of our economy” (F28). With the metaphor of blood transfusions, Tomaswezki suggests that spaceflight money has given life to the economy. He also describes NASA’s technological development for other fields as an “aid.” However, Tomaswezki’s word use precluded an emotional response to the NASA program. Even the life-giving transfusion was directed at the economy. Aid was referred to as “spinoffs or fallout.” Instead of depicting the agency as wholly generous, Tomaswezki depicts NASA’s aid as just a natural consequence of many engineers working with a lot of money. He also confuses the reader by depicting NASA as a hero for saving a town from flooding by providing weather images and then depicting NASA as a healer of the economy. Both these frames require giving aid, but the lack of one cohesive frame confuses the reader and weakens the argument, which may explain why this frame was not used again in any of my analysis samples. Another reason is that it is a mostly logical frame; add money and engineers to get spinoffs. It did not bolster the NASA’s reputation by demonstrating its generosity.

During this first ten years of NASA’s history, journalists began to define the space agency as vehicle for beneficial technological progress. NASA’s actions supported this definition. In 1969, the space agency landed the first men on the moon. Satellites

improved communications (Whitaker). NASA's actions typically supported the use of the frame, so journalists applied it often, closely linking it to the space agency. This strong connection between NASA and technological progress continued through the next sixteen years of NASA history.

4.2 Frames Identified from 1970 to 1986

After reaching the moon in 1969, a new era began in NASA's history, the time of the space station and space shuttle. Despite the end of the Apollo program, journalists continued the framing trend started in the 1960's, often depicting NASA as providing technological benefits to the United States and supporting this notion of progress with a manifest destiny frame (Figure 9). Deitch, Biddle and Van Valkenburg, the authors I analyzed in this period, reflected this trend. However, progress was not such a cultural norm in the 1970's. In the 1960's, the Civil Rights movement and the interest in women's rights led to a strong positive cultural perception of progress. With progress less culturally ingrained in the 1970's, journalists like Biddle and Deitch added new frames to the NASA repertoire in order to demonstrate the ethics of the space agency. In some cases, these new frames, like bureaucracy and secrecy, were used against those opposing NASA in order to contrast NASA's depiction as an ethical and open agency. However, the space agency's ethical character was more likely to be challenged in the next era, after the Challenger tragedy.

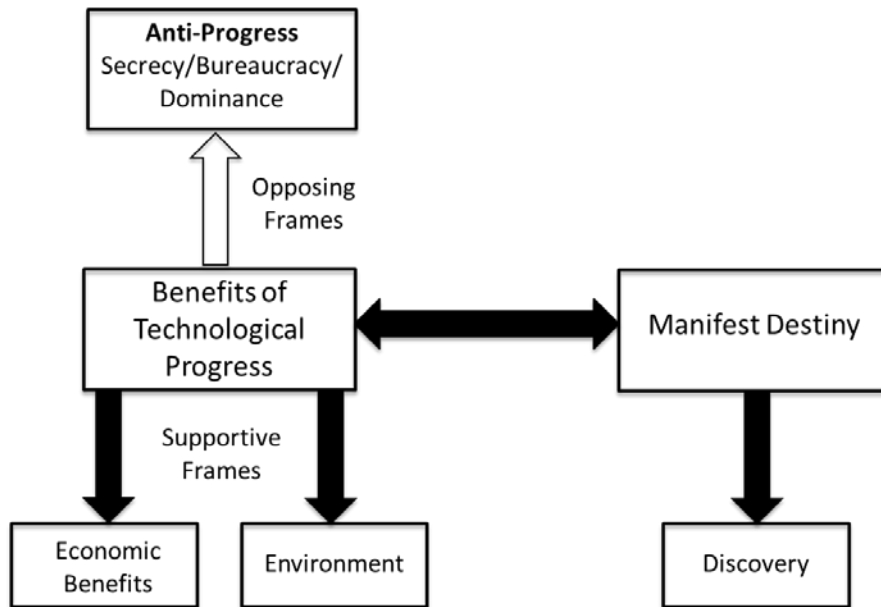


Figure 9 – Interrelationship of Frames (1970-1986)

The benefits of technological progress frame was repeatedly used to describe NASA as a progressive institution, constantly providing new technologies and knowledge. In Joseph Deitch’s article, “Satellite’s Cameras Scanning Coast,” he cites the technological benefits of the satellite. “(The satellite) will map the United States with 500 pictures. Conventional aircraft photography would require 500,000 pictures to cover the country” (93). Deitch clearly states how NASA-developed technology is an improvement upon conventional techniques, an argument echoed by writer George Van Valkenburg in the documentary *Pioneer 10: Jupiter Odyssey*. He explained how images from Earth-based telescopes could never compare to the photographs captured by a Jupiter flyby. At the conclusion of the film, Van Valkenburg even explicitly states the scientific benefits of the program, citing the knowledge gained from the Pioneer program. Wayne Biddle, in his article, “Military’s Role in Space,” describes the NASA in terms of “science,” “engineering” and “knowledge gained.” He also invokes technological benefits when citing “NASA’s...reputation on the cutting edge of space science and engineering” (A1).

These later authors often continued to use the same wording to invoke the benefits of technological progress frame with few exceptions. For example, Deitch describes how new technology (ex. satellite pictures) is superior to previous technology (ex. conventional aircraft photography). Van Valkenburg uses the same method to explain how pictures from robotic missions are better than Earth-based telescopes. In the previous period, Clark and Tomaszewski also demonstrated how new technology was superior in order to invoke the benefits of technological progress frame. However, Biddle doesn't even feel the need to demonstrate technology in order to invoke the frame. Instead, he cites NASA's "reputation on the cutting edge of space science and engineering" (A1), which is already implicitly linked to the benefits of technological progress. The authors in the 1960's already laid the foundation for this link, so Biddle could make the connection without explicitly stating benefits.

Writers like Van Valkenburg also continued to depict NASA through the lens of the manifest destiny frame in order to justify continued exploration of the solar system. Van Valkenburg heavily utilizes romantic language to describe the Pioneer 10 program. Even the video's title *Pioneer 10: Jupiter Odyssey* gives the program a feeling of a Homeric epic. The evocative imagery continues with descriptions of Jupiter's "huge coiling storm areas larger than the Earth" and "inscrutable cloud tops." Van Valkenburg, like many at NASA before him, tried to create a romantic vision of space travel by constantly connecting the space program to Columbus's discovery of America, a fact noted by Roland in his article *Ships for this New Ocean*. In the documentary, deep space probes "sail across uncharted seas" and astronauts are "star sailors on formidable seas." With this wording, Van Valkenburg connects the Pioneer mission to five hundred years

of American exploration, starting with Christopher Columbus. The imagery also connects to the sweeping landscapes depicted during the expansion into the American West (Sage).

The manifest destiny frame is strengthened by a sub-frame, discovery, which is visible through the discussion on alien civilizations and life in the solar system. Finding alien life would be one of the greatest discoveries ever. By tapping into the excitement associating with exploration (as explained in the previous section), Van Valkenburg hopes to enthuse people about the Pioneer program. Van Valkenburg's use of the manifest destiny frame in conjunction with the discovery sub-frame is intended to add romance and excitement to the depiction of a robotic mission to Jupiter.

To strengthen the manifest destiny and benefits of technological progress frame, all three writers continued to omit the setbacks, errors and costs of NASA programs. Deitch never demonstrates the benefits of conventional photography methods (i.e. aerial photography) over NASA-created methods. For example, aircraft photography can focus on certain area at certain times as compared to the satellite, which only passes over the correct areas every once in a while. In *Pioneer 10: Jupiter Odyssey*, Van Valkenburg avoids mentioning the monetary cost of the program and any setbacks or delays are cast in a positive light. For example, the spacecraft was late to send a signal after circling Jupiter, but it wasn't late enough to cause worry. Biddle article, which portrays progress as positive and secrecy as negative, does not mention NASA's past secrecy or failures with progress, despite scathing reports about the agency, such as Wilford's article "NASA Assailed for Secrecy on Apollo Problems" during the Apollo 1 fire fifteen years before. The writers intend to leave the perception of NASA untarnished by past or

present difficulties. Despite the end of the Apollo program, journalists often continued to depict NASA with the same methods introduced in the 1960's.

Although monetary costs (or omission thereof) became more important under the increased public interest in cost, the economic benefit frame was still not heavily utilized. This frame could have been used to address the public's concerns about costs in the 1970's as the Vietnam War ended and the economy began to recess. During this era, people were losing their jobs and inflation was rocketing costs of necessities. The economic benefit frame could have painted NASA in a positive light, but only Deitch utilizes it in his article. He uses money-centered terminology, such as the (practical) "value" of the satellite (93). Deitch also argues for the "savings in money and time" (93) that the satellite can contribute, meticulously detailing how NASA's E.R.T.S. -1 program reduces costs of aerial photography on the New Jersey Shore. Like Tomaswezki, he treats the satellite as an investment and the time and money savings in aerial photography are the return on the investment. However, unlike Tomaswezki, Deitch actually cites the cost of the satellite and its use by the New Jersey Department of Environmental Protection. This could reflect the interest in the program budget due to the economic downturn.

Although the economic benefit frame wasn't readily used, journalists did use new frames to update the image of NASA in order to parallel the space agency and current public interests. Deitch's article has an environmental frame, which describes how the satellite photos are being used to determine where to "pump waste into the ocean" (93). He mentions how the satellite's photos can help "efforts to protect coastal areas" (93). Using the environment to demonstrate the benefits of the satellite was a resonant frame to use in 1972. The environmental protection movement had been gaining momentum in the

past few years, according to Silveira in her article “The American Environmental Movement.” It started with the Wilderness Act in 1965 and culminated in the first Earth Day (1970) and the founding of the Environmental Protection Agency, which were major events cited by Silveira. Deitch connected NASA to this interest in environmentalism by choosing to highlight the E.R.T.S.-1 program’s contributions to an environmental project. The program was used to photograph many areas, but Deitch chose an environmental area. By demonstrating how NASA was helping an environmental cause, Deitch depicts NASA as environmental, which could have strengthened the space agency’s public image.

Biddle also attempted to update the image of NASA by contrasting the agency’s ethics with those of military, which he framed using espionage frames such as secrecy, bureaucracy and dominance. He uses monetary statistics to demonstrate the military’s dominance of NASA, citing the Defense Department’s \$8.5 billion budget for a military space program, as compared to NASA’s \$6.6 billion (A1). By typifying the military as the aggressor and NASA as the underdog, Biddle persuades readers to cheer on NASA as the military tries to dominate it. Then, Biddle describes the Air Force as “cloaking the next shuttle flight in secrecy” (A1). As a civil institution, NASA was typically displayed its shuttle flights to the public, but was unable reveal a military flight. Biddle also frames the military as bureaucratic, constantly citing the various governmental military organizations such as the Department of Defense. He also links the military to the president. Biddle applies these negative frames to the military in order to highlight how NASA is different from the military. Where the military is secretive, NASA is open. Where the military is bureaucratic, NASA is progressive.

Biddle's depiction of the military with espionage frames was culturally resonant in the 1970's. During the previous year, the American government had invaded Grenada. The deception of the press before this event led to public perceptions of the military as secret. The decision to invade Grenada was made by the highest bureaucrat of all, the President. Clines summed up the situation in his article "A Day of Crisis for the President; Gold, a Tragedy and Secrets." In the article, Clines describes a day of President Reagan's life in which he deals with the Grenada crisis. The President is immediately cast as a secretive person. "The President, already a legend in the Administration for keeping his own counsel, had begun the most secretive and momentous week of his incumbency..." (A1). Articles like Clines suggested that the bureaucratic managers of the country were too secretive and aggressive during the invasion of Grenada. A year later, Biddle taps into this cultural perception of the military and government as involved in espionage to depict NASA as an agency worth supporting because it is not like the military or government.

Although all the frames used in this era depict NASA in a positive light, the most persuasive frame is probably the benefits of technological progress frame because of its constant usage. According to Park, frames increased their power (or persuasiveness) through repetition and this frame is used in conjunction with NASA in every article I analyzed. It's probably fairly powerful. Additionally, since it is so closely allied with NASA, the frame relies on the space agency as well. Gamson and Modigliani explain that close associations mean that the perception of frame (and its power) is dependent upon the actions of the agency it represents. When NASA faces tragedy in 1986 with the Challenger disaster, so does the benefits of technological progress frame.

4.3 Frames Identified from 1986 to 2010

According to rhetorical scholars like Dorothy Nelkin, the Challenger tragedy changed that way that journalists depicted NASA. In Chapter 2, I describe how this even sparked a new science communication model. Before the disaster, journalists typically passed along scientific stories fed to them by NASA. However, during the Challenger disaster, NASA prevented high-ranking officials to talk to the press (Martin and Boynton 270). Feeling betrayed by NASA's unwillingness to share and its previous secrecy about the dangers of the shuttles, journalists no longer passed along science stories but analyzed them like any another. This break with NASA and its depiction of science affected the benefits of technological progress frame. Also broken by the Challenger disaster, it did not appear in most articles I analyzed. Instead, throughout this time period, journalists started to apply new frames to NASA (Figure 10). This era used ten different frames when depicting NASA as compared to seven or eight in the previous time periods. Half of them were used in conjunction in one article to oppose NASA's spaceflight agenda. The others were linked with manifest destiny, with the exception of "life and death," which was a category of its own. No longer did journalists constantly use a cohesive frame to describe NASA in this era.

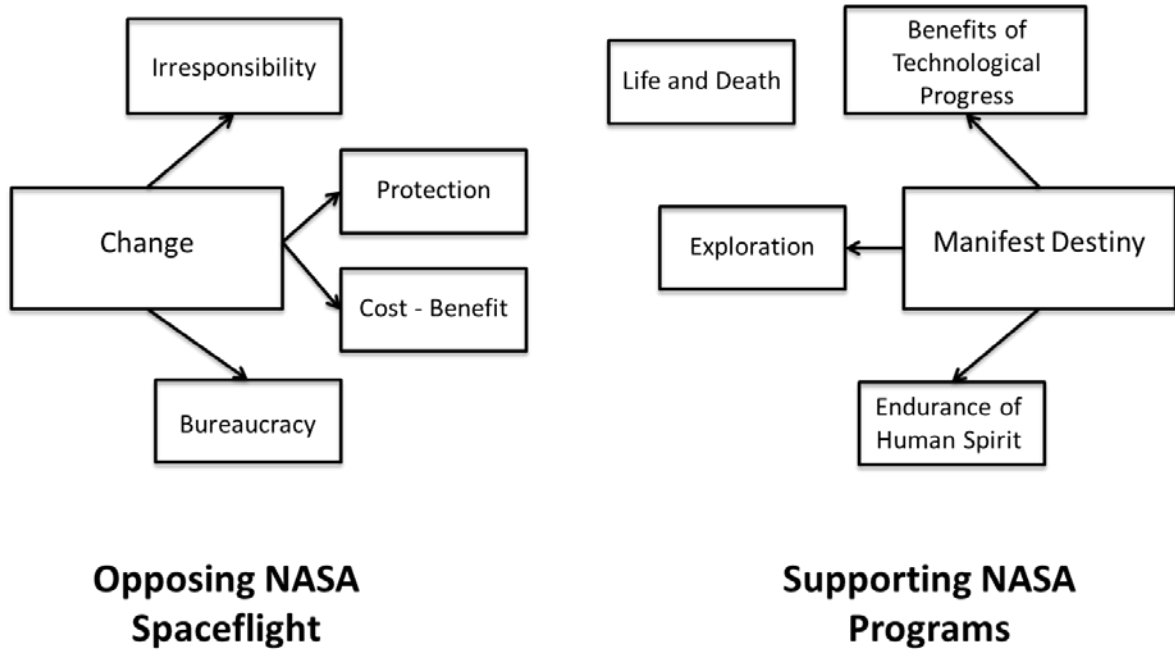


Figure 10 – Lack of Relationship between Frames (1986-2012)

The benefits of technological progress frame fell out of favor with journalists after the Challenger disaster. In the three articles that I analyzed, only one had echoes of the frame. Warren E. Leary’s “Robot Named Dante to Explore Inferno of Antarctic Volcano” does mention some of the benefits of technological progress, but the overarching manifest destiny frame dominates it. To invoke the benefits of technological progress frame, Leary discusses how the Dante mission will “give volcanology a valuable new tool” (C4). He often cites how the robotic explorers are superior to human explorers, such as when he describes the lava lake “out of the reach of human explorers.” Humans cannot stand the “1,100 degree Fahrenheit gases and corrosive smoke” (C4) that the robot is built to handle. The robot is a feat of technological progress.

However, this is a sub-frame of the dominant manifest destiny frame. Leary begins the focus on manifest destiny with a description of a “smoldering crater” and a “lave lake that long has remained out of the reach of human explorers” (C4). These

phrases connect to the manifest destiny frame by demonstrating the exciting foreignness of an unexplored crater. Like earlier writers, Leary closely links manifest destiny and exploration. However, his focus is manifest destiny because he often discusses expanding into areas that humans cannot currently reach. Expanding into new areas is the manifest destiny frame. Later, he quotes an interviewee that described robots as “the next century’s counterparts of Lewis and Clark” (C4). Like Van Valkenburg and Whitaker, Leary connects the NASA program with hundreds of years of American exploration. Lewis and Clark, who mapped the American Northwest, were told to note resources in the newly acquired Louisiana Purchase (Smithsonian). Expanding to obtain new resources is part of manifest destiny. Mentioned throughout the article, the manifest destiny frame clearly dominates the brief mention of the benefits of technological progress.

However, Leary continues the trend of using positive frames to describe NASA, as does National Geographic in the documentary, *Five Years on Mars* created by National Geographic. The documentary depicts two small robots, “Spirit” and “Opportunity” that are searching Mars for signs of water. The first frame applied is “life and death,” which depicts the rovers as living beings. In the first two minutes of the video, the rovers are described as “living on Mars,” implying that they are alive. At the second minute mark, interviewees warn that the rovers could “drop dead, die tomorrow, or be dead right now” (due to the lag time between Earth and Mars). Although this could be described as “powering down,” the filmmakers instead depict the rovers as dying. By implying that the rovers are living, National Geographic intends for the audience to connect with the rover’s trials. When the rover Spirit only finds lava rock and it is a “crushing

disappointment,” viewers can sympathize with the feeling of disappointment. When the rover “Opportunity” is on the verge of “freezing to death,” viewers can understand. By framing the rovers as living, National Geographic is able to depict their five years on Mars as a life and death struggle, which is typically more interesting to an audience than a description of their technical capabilities.

Continuing the use of positive frames to describe NASA programs, the rovers are also framed as explorers. The rover Opportunity faced “an epic overland expedition.” Doing something new is also a part of the exploration frame. Spirit climbing a hill is depicted as the “first ascent of a mountain on another planet.” Like the closely related manifest destiny frame, the exploration frame is intended to connect to the American tradition of exploration in order to generate interest in the story. The documentary concludes with a third frame, the endurance of the human spirit. . National Geographic showed how, through endless hours of engineering work and progress that was “measured in inches a day” that the rover could climb the hill. The endurance of the human spirit frame is applied to people who continue despite insurmountable tasks and the rovers were painted with the same brush. Through the application of this frame, the rovers are depicted as human, enduring struggles and emerging victorious. National Geographic intends to use this idea of the rover’s “life” and “humanity” to convince audiences that they are vicariously living on Mars through the rovers.

However, in a clear break from the trends of the first two periods, Cornelia Dean, author of “At NASA These Days, Clouds Are Just What You Zoom Through on the Way to Mars,” applies frames in order to depict NASA negatively. In her article, she argues that the President Bush’s Moon-Mars human spaceflight agenda is supplanting vital

scientific programs. The change frame is the global or dominant frame, which Dean uses to suggest that changes in the accounting system are harmful to science programs and only benefit the spaceflight program. Dean cites how officials are now “much more free to shift money to the shuttle and space station from other programs” (A10). She then implies that this redistribution of money is negative because it is taking money “away from science” (A10). In fact, she describes Dr. Wilson’s scientific investigation of tropical clouds as a “casualty of accounting changes” (A10). She implies that the redistribution of funding is killing the science programs at NASA.

Dean then supports her change frame with a protection frame, which she uses to show that NASA’s aggressive spaceflight program is overwhelming the science programs that need to be protected. She describes the science programs as previously “shielded” from cost overruns in the spaceflight program. Dean continues this frame by mentioning that “many scientific programs could suffer” (A10). She also characterizes the mood of NASA scientists as “an odd combination of confusion, gloom and struggle.” By describing science programs as struggling and suffering, Dean suggests that science is in trouble and needs to be protected from the aggressive spaceflight agenda of President Bush.

Dean also implies that the NASA spaceflight program is not a good investment of public money through the application of a cost-benefit frame. This frame is constantly noted in the “cost overruns” (A10) of the spaceflight program. Dean includes these cost overruns to demonstrate that the NASA spaceflight programs are not meeting expected costs. She also notes the minimal benefits of the human spaceflight program by describing how the space station has “few uses” and has “produced almost nothing for

physical science” (A10). Here, Dean focuses on the high cost and lack of benefits from the spaceflight programs. From an economic viewpoint, an investment that has a high cost and low return is not a good investment. By connecting the NASA spaceflight program to high costs and few benefits, Dean implies that it is a poor investment of public money.

She continues to paint NASA spaceflight programs in a negative light by suggesting that the agency is bureaucratic and irresponsible. When discussing the spaceflight program, Dean often cites “managers,” and “the Bush administration.” She even explains that the exploration program to the moon “is a decision that is made by the executive and legislative branch of our government” (A10). Bureaucracy has traditionally been frowned upon in the U.S, a nation where democracy and collaboration is lauded. The entire nation was founded in order to depose a bureaucrat, King George, and institute a democracy through the Constitution. By connecting NASA spaceflight programs to bureaucracy, a notion that most Americans don’t like, Dean intends to depict NASA as aggressive and single-minded. Dean also characterizes the programs as irresponsible. She cites Dr. Kennedy, who explains, “the plan to send people to the Moon and Mars ‘may not be a worthless boondoggle’” (A10). The implication is that the plan is probably a waste of time and money. Dean then likens the spaceflight programs to “extreme sports” (A10). By depicting the spaceflight program through a frame of irresponsibility, Dean proposes that the program is reckless. Like extreme sports enthusiasts, NASA spaceflight leaders are depicted as going to the Moon and Mars for the “the thrill” instead of in search of scientific knowledge. With this framing, NASA spaceflight programs are depicted as an unnecessary risk, like skydiving.

With the benefits of technological progress frame shattered by the Challenger tragedy, NASA is no longer depicted in a cohesive fashion, which, with a variety of other factors, could have led to journalists' current lack of interest in the space agency. This lack of interest is evidenced by the shutdown of the space shuttles and NASA's withdrawal from a joint venture with the European Space Agency. Without repeated use, none of the ten frames applied during this post-Challenger era are likely to gain persuasive power in the public consciousness, like the benefits of technological progress frame did in the previous eras. The addition of negative frames used by Dean and others to portray NASA's spaceflight programs is also not likely to curry public favor.

Although there are many factors in determining NASA's funding, my pre-Challenger frame analysis shows that the agency may be able to regain public interest and investment through depicting its program with a certain type of frame. Like the benefits of technological progress frame, this frame should be used repeatedly to journalists to portray NASA programs. Additionally, this frame needs to be culturally relevant, as the benefits of technological progress frame was in the progressive 1960's. It also needs to make sense when applying it to NASA programs. Applying an appropriate frame that fits these criteria could help NASA consistently portray itself in a positive light, as it did before the Challenger disaster.

4.4 Summary of Results

Although I anticipated a different framing of the space agency after the Apollo 11 moon landing in 1969, the frames applied from 1958 to 1986 were remarkably similar. In the 1960's, journalists introduced the benefits of technological progress frame because it fit well within the culture. It was used in all the articles that I analyzed in that era.

However, even as the culture shifted in the 1970's and early 1980's, the benefits of technological progress frame was still consistently used to portray NASA (Figure #). In fact, it was so closely linked with NASA that Biddle could invoke it by simply stating NASA's reputation. Even the shifting culture in the 1970's and 1980's could not dissuade journalists from using the frame.

Table 1 – Five Most Commonly Used Frames Broken Down by Era

Article	Five Most Common Frames				
	Benefits of Technological Progress	Manifest Destiny	Economic Benefits	Discovery and Exploration	Bureaucracy
NASA to Restudy Ramjet Engines	1				
Space Technology Providing Benefits	1		1		
Within this Decade: America in Space	1	1		1	
Satellite's Camera's Scanning Coast	1		1		
Pioneer 10: Jupiter Odyssey	1	1			
Military's Role in Space	1				1
Robot Named Dante to Explore...	1	1			
At NASA These Days, Cloud are Just What You Zoom Through on the Way to Mars					1
Five Years on Mars				1	
Total	7	3	2	2	2

Although the benefits of technological progress frame weathered the changing culture without losing persuasive power, it could not survive the Challenger disaster. The only ubiquitous frame in the samples I analyzed from 1958 to 1986 suddenly disappeared. After the Challenger disaster, the frame only appeared in one article and it was a sub-frame of a larger manifest destiny theme. The frame was shattered by the

Challenger disaster, which directly opposed the benefits of technological progress.

Challenger demonstrated that technological progress was not always beneficial by showing the pinnacle of space technology, the shuttle, was seriously flawed.

In addition to opposing the implications of the frame, the Challenger disaster also showed that NASA could make mistakes, which weakened the frame. The space agency refused to let high-ranking officials comment after the disaster (Martin and Boynton), leading journalists to feel deceived. NASA's reputation suffered. Poor reputation can have a big impact on the stakeholders involved with NASA. Bonini discusses in "Rebuilding Corporate Reputations" how companies with reputation problems can "incur the wrath" of the public (75). Since NASA is indirectly funded by public opinion, an unhappy public can drastically alter its funding. Additionally, Gamson and Modigliani suggest that a frame closely linked with a corporation will suffer if the corporation does something unsavory. In this case, NASA's diminished reputation in the eyes of journalists also decreased the power of the frame.

Other frames less closely allied with NASA weathered the Challenger disaster without losing their persuasive power. Manifest destiny appeared once in each era. Within my analysis, it was the second most common frame. This particular frame has weathered many cultural shifts without losing its potency. Manifest destiny has been part of American culture for 500 years, as demonstrated by the exhibit on exploration that Roland cited (524). It has been in the culture for so long that one event is not enough to eliminate it. However, while it has persuasive power, use of manifest destiny is limited. It can only be applied to programs that are expanding humanity's reach in the solar system, like the Mars rover program. The discovery and exploration frame appears to follow the

same pattern, appearing across multiple eras, but not often. Since this frame was often used in conjunction with the manifest destiny frame, it makes sense that it is used in a similar way – for specific programs where it is applicable. These two frames were relevant in all three eras, but their application was limited to certain types of NASA programs.

The bureaucracy frame was unique in that it was applied in two different eras, but with entirely different results. In the second era, the bureaucracy frame was used to demonstrate that NASA is not bureaucratic, like the military. In contrast, NASA's spaceflight program was depicted as bureaucratic in the third period. The bureaucracy frame did not change much throughout the eras. Americans have generally considered bureaucracy to be a negative attribute, though the negative feeling may have been more powerful at some times than others. However, the journalist's application of the frame radically changed. In the second era, it was used to paint NASA in positive light. In the third period, it was used to portray NASA's spaceflight programs in a negative light.

This change in the use of the bureaucracy frame was indicative of a larger shift toward negativity in journalist's depictions of NASA. In the first two eras, I never found a negative aspect of NASA highlighted. Generally, in the samples I analyzed, NASA's failures were omitted. Yet, in the third era, Dean portrayed NASA as irresponsible and bureaucratic. She even focused on specific failures, like the space station's inability to produce useful results for physical sciences and the spaceflight programs' cost overruns. This was a sharp contrast to the portrayals of NASA in the first two eras.

With the chaotic application of frames of the final era, it is now a challenge to depict NASA with a consistent relevant frame, such as the benefits of technological

progress frame. In the following chapter, I analyze what culturally relevant frame that NASA may use consistently to depict its programs. Then, I apply this frame to a current program, the Mars Atmospheric Volatile Evolution mission, to demonstrate how it may be used to depict NASA. The consistent use of this new frame, investigation, to depict NASA could eventually rival the persuasive power of the benefits of technological progress frame used before Challenger.

5. Analysis and NASA Application of a Frame with Popular Appeal

Through research and my analysis, I have shown that repeatedly using one relevant frame to depict NASA gives that frame greater persuasive power. In Chapter 3, I cited Park, who explained that frames gain power throughout repetition. Through repeated use, these frames become closely connected with the topic of the stories. The topic and frame become interdependent. I discovered that NASA built an interdependent relationship with a “benefits of technological progress” frame in my analysis in Chapter 4. This frame was repeatedly used to describe NASA in the era before Challenger, appearing in all the articles that I analyzed. However, the Challenger disaster led to journalists discontinuing use of the benefits of technological frame when writing about NASA. My analysis in Chapter 4 shows that the frame was no longer dominant after the Challenger disaster in 1986. Instead, journalists applied a wide variety of frames to portray NASA. Without a consistent framing, none of the frames applied to NASA has gained a considerable amount of persuasive power.

Once again applying a consistent frame to the space agency could help to increase the agency’s funding and public perception. The benefits of technological progress frame was consistently applied during NASA’s “golden years,” the years of Apollo and Gemini and the creation of the space shuttle, linking it to the increased funding that these programs received. In Chapter 2, I demonstrated that the media framing of other science programs, like nanotechnology and biomechanics, has an impact on the funding that the discipline receives. This principle does apply to NASA. However the space agency has a complex relationship with public opinion, as demonstrated by Steinberg, who analyzed the responsiveness of NASA policy to public opinion. If framing can affect NASA

funding as strongly as the depiction of nanotechnology in Chapter 2, applying a consistent frame to NASA could have a dramatic impact on public interest in funding.

In this chapter, I demonstrate how a new culturally relevant frame applied consistently to NASA could persuade the audience to support NASA. In the first section, 5.1, I detail the method that I used to find the most appropriate frame for NASA in the current cultural milieu. The second section, 5.2, contains my analysis of physics articles that I used to deduce what frame worked well for physics. Following this analysis, I wrote an article about a NASA mission in 5.3 using the investigative frame that I discovered in the physics articles. The final section, 5.4, is my reflection on the process of applying the investigative frame to the NASA MAVEN mission.

5.1 Method for Applying a New Frame to NASA

Simply applying a consistent frame to NASA will not be enough to change public opinion. In Chapter 2, I cited Gamson and Modigliani, who explained that the success of a frame also depends upon cultural resonance, media practices and sponsor activities. To choose a frame that fits these criteria, I analyzed another branch of science that has been more successful than NASA in garnering funding. A successful discipline most likely will constantly apply a frame with cultural resonance. The frame that they are using is probably gaining persuasive power in current culture through repetition. Also, if it is often applied to the discipline, the frame used will most likely fit within media practices. A successful frame from another scientific branch will likely have cultural resonance and conform to media practices, criteria that are critical to the frame's success.

In addition to being a currently successful frame, this frame also had to be compatible with NASA's activities (sponsor activities). Although the National Science

Foundation grants massive amounts of money to health research, the frames used in health may not be applicable. Another successful discipline that was more similar to NASA would have more appropriate frames for the space agency. Physical sciences and mathematics has received over \$1 million (USD) per year (2009-2011) from the National Science Foundation (NSF 10-323). In addition to the NSF funding, physics has enjoyed popular attention. Physics has also enjoyed public popularity through *The Big Bang Theory*, a sitcom that depicts the life of two particle physicists. In 2009, the season opening episode had 12.83 million viewers (CBS), suggesting that particle physics is on the minds of Americans. Another example of popular interest in physics is the song created by an Irish band, the Corrigan Brothers (Overbye, “Particles faster than the speed of light? Not so fast, some say”), about the faster-than-light neutrino experiment in Geneva. With this popular appeal, physics frames should have cultural resonance and conformance to media practices. Additionally, they should fit NASA’s activities.

Physics and space technology are related disciplines. Physics examines everything from subatomic particles to galaxies in order to determine the origins of the universe and verify theoretical laws about energy and force. These examinations often require access to space technology, such as orbiting telescopes. NASA is the primary U.S. supplier of these required space technologies, often incorporating physics instruments on its spacecraft. The two disciplines share similar goals and equipment. Recently, Dennis Overbye reported that physicists used a set of orbiting gyroscopes to verify Einstein’s theory of gravity and relativity. In this case, a NASA space technology was used to verify a physics theory. Additionally, both disciplines also require large amount of funding. The Large Hadron Collider, the pinnacle of particle physics experimentation, cost a hefty \$10

billion (as reported by Dennis Overbye in “With a Mighty Smash, Europe Seizes the Lead in Big Physics”). Comparably, on the side of space technology, the James Webb Space Telescope has reached the \$6.5 billion dollar mark, according to a 2011 editorial in the *New York Times*. The disciplines should face similar obstacles in garnering funding for these expensive projects. These links between the two fields will simplify the process of transitioning physics frames to apply to NASA.

5.2 Physics Frame Analysis

To determine what frame supports physics’ current popularity, I completed an analysis of thirty articles from the *New York Times*. I found these articles by using the keyword “physics” and selecting articles from 2007 to 2012. Most of the articles were published in 2009 and 2010. I focused on this time period because my research showed that NSF funding was above \$1 million during these years. Unlike the NASA articles analyzed in Chapter 4, I did not have time available to thoroughly analyze each article. Instead, I highlighted evocative words in each article. Journalists use certain words to apply frames. In the first articles, I had to find frames inductively, through recognizing patterns in word choice. Eventually, patterns began to emerge and I was able to identify words that invoked a particular frame. I summarized these results in a table and summed how many times each frame appeared.

The most common frame, appearing in twenty-three of the thirty articles, was “investigation.” Twenty-three of the thirty articles applied an investigative frame (Table 2). I found this frame by the keywords “suspect, find, identify, deduce, clues and evidence.” Additionally the topic choice of many physics articles supported an investigative frame. For example, the Higgs-Boson is a particle that physicists are hoping

to find by colliding atoms at the Large Hadron Collider in Switzerland. Journalists' articles about this topic portray the Higgs-Boson as an elusive particle, practically hiding from physicists. Depicting the Higgs-Boson particle this way is indicative of the investigative frame.

Table 2 – Most Commonly Applied Physics Frames

Commonly Applied Physics Frames					
Date	Investigative	Novelty	Action	Competition	Progress
12/26/2007					
2/22/2008					1
6/9/2009		1			
10/7/2009		1			
10/29/2009	1		1		
11/21/2009	1				
12/10/2009	1		1	1	
2/6/2010	1	1			
2/16/2010	1		1		
3/20/2010	1	1	1		
3/31/2010	1	1	1	1	1
4/4/2010	1	1	1		
5/18/2010	1	1		1	
7/13/2010		1			1
7/27/2010	1			1	
10/6/2010	1	1		1	1
1/18/2011	1		1	1	
2/1/2011	1		1		1
2/22/2011			1		1
4/6/2011	1	1		1	
4/14/2011	1	1			
5/11/2011	1				
8/2/2011	1	1	1		1
9/23/2011	1	1			
9/24/2011	1	1	1		
10/5/2011	1		1	1	
10/25/2011				1	
11/29/2011	1	1			
12/14/2011	1		1	1	
2/23/2012	1		1		
Totals	23	15	14	10	7

Journalists' word choice and their depiction of physics as a mystery link physics and detective work. A prime example is Dennis Overbye's article "3 Win Nobel for Work on Accelerating Universe," which portrays dark energy as a mysterious force responsible for the expansion of the universe. In addition to portraying dark energy as a mystery to be solved, Overbye also employs word choice to evoke the frame. In the article, Overbye notes, "cost overruns and delays on the James Webb Space Telescope had left no room in the budget until the next decade for an American satellite mission to *investigate* dark energy." He explicitly uses the word *investigate*. Overbye also uses words that have meaning in both investigative work and science. Investigation often relies on predictions and speculations, a thread that Overbye continues, with "they *speculate* that are a multitude of universes." Science also relies on speculations and predictions. Both fields also rely upon evidence to verify the predictions. "...Astronomers and physicists have *no conclusive evidence* of what it is." Overbye uses the idea of evidence to ally the two different fields, detective work and physics. Another way that Overbye connects physics and investigation is by demonstrating uncertainty. The passage cited above mentions that there is no conclusive evidence. The mystery has not been solved; uncertainty remains.

The uncertainty generated by Overbye's framing is intended to pique the audience's curiosity and investment in the mystery. Silvia Knobloch-Westerwick asserts that high uncertainty situations increase curiosity and that this curiosity leads to enjoyment in "Mystery Appeal: Effects of Uncertainty and Resolution on the Enjoyment of Mystery." Human curiosity can be a powerful motivator. In an article published in the British Psychological Society, Berlyne cites curiosity, this human need to acquire

knowledge, as an issue to be studied. Coupled with Knobloch-Westerwick's research, this suggests that curiosity is a common emotional response, especially to situations with high uncertainty.

Of the frames used to support the investigative frame, one of the more effective ones was the "violence" frame because it added suspense to the already implied investigation. The violence frame was applied when depicting the methods that physicists use to solve the mystery. In "Data Hints at Elusive Particle, but the Wait Continues," Overbye describes experimentation with the Large Hadron Collider (LHC) as "the old-fashioned *train-wreck* way, by *smashing* subatomic particles together..." Train wrecks are certainly violent and the imagery provided by this phrasing is intended to remind audiences of an action movie. Smashing also is a violent depiction of what the LHC does. Most of the articles I read, however, describe the LHC as smashing or colliding atoms. Combined with the investigative frame, the article intends to convey a sense of suspense and excitement. Zillman argued that people appreciated suspense in his 1975 study, "The Effect of Suspense and its Resolution on the Appreciation of Dramatic Presentations." Mystery novels can tap into this appreciation through providing suspense. Physics also attempts to link to this appreciation through the application of the violence frame.

Framing physics as an investigation of a mystery underscores how important physics is – if physics is not supported, the mystery cannot be solved. By trying to tap into the audience's curiosity and appreciation of suspense, solving physics mysteries is depicted as important. This frame could be transferred to NASA in the hopes of the same result, showing NASA as vital to unraveling the mysteries of the universe.

5.3 Editorial Applying Investigative Frame to NASA

In this section, I applied the investigative frame to depict the NASA Mars Volatile Evolution (MAVEN) program. I chose this program because it is recent and there was a multitude of information about it on the NASA website. Before writing, I studied six articles published by NASA on the program. Two were written by Bill Steigerwald of the Goddard Spaceflight Center. In ““MAVEN Mission to Investigate How Sun Steals Martian Atmosphere,” he applies a thief frame, citing the Sun as the culprit. There are also hints of an investigative frame in his article “New NASA Missions to Investigate How Mars Turned Hostile.” These articles and four other internal publications provided the specifications for the MAVEN mission. From these articles, I listed MAVEN’s capabilities, including the instruments that provided the data. I also learned the purpose of mission and how it is related to other Mars missions, such as Curiosity. These articles also gave a good overview of the science applied, explaining ions and solar wind in detail. My research was limited to NASA published documents because I was curious about how the space agency portrayed this program. However, I did not have the time available to thoroughly analyze all six documents for frames applied.

I wrote this editorial with “investigation” as the dominant frame. Utilizing what I learned in my particle physics analysis, I chose verbs that invoked the investigative frame. Many of the verbs that I chose were “identify,” “deduce,” and “detect.” In addition to my word choice, I focused on the mysterious disappearance of the water on Mars. This is comparable to the physicist’s search for the Higgs-Boson particle. By using the proper verbiage and focusing on the questions to be answered, I was able to apply the investigative frame to the MAVEN program.

This article is intended to connect to audiences' experience with water, excite them about the investigation of the water missing from Mars and change how the audience views our atmosphere. Water is something that everyone can relate to, which is why I focused on it as the subject of the investigation. To connect this water investigation to the audience's daily life, I linked Mars' atmosphere and Earth's, citing how what we learn about Mars can help us sustain Earth's atmosphere.

Missing: Mars' Water

As the mercury climbs past 80 degrees in mid-April and Boston marathoners chug gallons of Gatorade, one begins to appreciate the importance of water. Essential to life, water is an abundant resource on Earth. We can't imagine life without it. Without water, there would be no life on Earth. That is why astronomers are currently probing the skies for distant planets that have the hazy look of a watery atmosphere, in hopes that the presence of water will indicate life. At the Laboratory for Atmospheric and Space Physics at the University of Colorado at Boulder, Bruce Jakosky is investigating a much closer planet in search of water, Mars.

For years, atmospheric scientists, like Jakosky, have been following hints of water on the mysterious red planet. Years ago, rovers identified minerals that only form in the presence of water and rock formations that resemble Earth's riverbeds. These tantalizing clues have perplexed Jakosky and other researchers. If Mars once has water, where is it now?

Intrigued by this mystery, Bruce Jakosky is leading the mission design team of a recent NASA project, the Mars Atmospheric Volatile Evolution (or MAVEN), which may hold the key to unlocking the mystery of Mars' vanished water.

NASA Goddard Space Flight Center with MAVEN Project Manager, Dave Mitchell, and the California Institute of Technology's Jet Propulsion Laboratory are partnering with Jakosky to prepare MAVEN for its investigation.

Armed with a large array of tools, MAVEN will detect ions in Mars' atmosphere. Ions, which are small charged particles, are the remains of elements once found in the Martian atmosphere and on the surface. Jakosky and others on the team suspect that the powerful ultraviolet rays of the sun, which give us sunburns here on Earth, also shatter elements in the atmosphere of Mars. Ions are the last traces of these elements. By detecting these ions, MAVEN can help Jakosky and his partners predict what elements used to be in Mars' atmosphere. Perhaps MAVEN will even find the ionized remains of water...

But a puzzle remains: even if all the water on Mars was broken into ions by the sun, where is it now? Will MAVEN find all the water that was once on Mars as ions in the atmosphere? Jakosky suspects not.

He and others predict that the ion remnants of Mars' water have vanished into space. MAVEN will help them piece together the clues by observing the solar wind around Mars. Jakosky and the MAVEN team theorize that the ion remains of water have been taken away by the powerful solar wind, an electrically charged gas constantly emitted from the sun.

The ions are lured into the solar wind by the temptation of magnetism. Ions have a positive or negative charge, meaning that they have too many or too few electrons. The electrically charged solar wind ensnares these ions magnetically, drawing them in before disappearing with them. Jakosky speculates that Mars' ancient water attracted by this

magnetic wind, disappearing with it into unknown reaches of the solar system. MAVEN will help him find the vanished water, by tracing the ions and how they interact with the solar wind.

Solving the mystery of Mars' vanished water could help us understand the impacts of atmospheric changes here on Earth. Is Earth's atmosphere the only protection against having our water vanish into the cosmos? Earth's atmosphere may be the only thing standing between our life-filled watery planet and a barren desert. MAVEN could give us clues how to protect our own atmosphere. Perhaps taking public transportation more often could help us avoid Mars' waterless fate.

If having no atmosphere does result in water disappearing into space, losing our atmosphere would have dire consequences, far more nerve-racking than thirsty Boston marathoners.

MAVEN will investigate how nervous we ought to be.

5.4 Intended Frames and Reactions to Editorial

The purpose of my article was to demonstrate that finding where Mars' water has gone could augment scientists' understanding of Earth's atmosphere in order to prevent Earth's water from going missing as well. Although my audience probably doesn't care about where Mars' water has gone, they more likely care about Earth's atmosphere and maintaining their own supply of water. Needing water is an activity that people can relate to and maintaining water is an activity that they can invest in. At the conclusion of the article, I tried to demonstrate that understanding how Mars' water disappeared could help us keep ours from doing the same

Finding an appropriate topic for the investigation frame was a challenge because NASA experiments often investigate processes. Many physics experiments have the same goal, to find the Higgs-Boson particle, which is a concrete item that could be found eventually. Contrastingly, many of NASA's programs are investigating processes, like how the solar wind interacts with the ions on Mars atmosphere. MAVEN is investigating that particular process. It was difficult to simplify the complex mission to make it fit into an investigative frame. To find an appropriate topic, I chose the mission capability that the audience would understand and potentially care about, water. Previous Mars mission have also used the search for water as a frame (ex. Five Years on Mars), which set a precedent for me to follow. However, it was difficult to explain the complexities of the MAVEN mission under the limitations of "investigating water."

The investigative was used in an attempt to pique reader's curiosity, giving them an emotional attachment to the article. As discussed previously, curiosity is an element that leads to enjoyment, according to Knobloch-Westerwick. The frame was implemented through describing how Mars's water has vanished, portraying the mission as an investigation of where the missing water went. Since the science team isn't sure exactly where the water went, I was able to maintain an element of uncertainty, which was intended to arouse the audience's curiosity. Word choice also helped me invoke the investigative frame and get the intended audience response. I used words like "identify," "detect," and "clues" to describe elements of MAVEN's mission.

Despite the difficulties in applying the investigative frame to some programs, consistently applying the investigative frame to NASA programs like MAVEN could strengthen the frame's persuasive power and generate public interest in the space agency.

The application of the frame in physics suggests that the investigative frame is appropriate for the current American culture and media practices. I have demonstrated that NASA's activities can be portrayed using the frame, so the frame aligns with NASA's sponsor activities. The investigative frame fulfills Gamson and Modigliani's criteria for success: cultural resonance, media practices and sponsor activities. Although NASA has a complicated interplay of factors that determine its funding, it may be possible to increase public opinion of (and perhaps funding for) the space agency through constant application of an appropriate frame like investigation.

6. Conclusion

In an era where the space shuttle has been canceled and NASA is scrambling for funding, it seems that the space agency is largely forgotten by the American people; yet, at the same time, Americans lined the streets to catch a glimpse of the Discovery shuttle flying to its final resting place. These contrasting views of the space agency's appeal are indicative of a complicated web of relationships requiring serious study in order to unravel.

In my study, I analyze the relationship between media depictions and NASA funding and suggest a link between a consistent relevant frame and increased funding. The power of a unified frame has been well documented. However, the benefits of technological progress frame also provided some examples of the complexities of applying frames. First, the frame has to be developed. The frame that I found was developed in the 1960's, where it paralleled social progress. However, as the culture shifted, the frame did not; yet it was still fairly successful. Why was it still successful even when it was less culturally relevant?

The Challenger disaster demonstrated how difficult it can be to maintain this unified frame throughout cultural shifts. Even though the benefits of technological progress frame weathered the 1970's and 1980's without faltering, the Challenger disaster ended its common use. This accident can be seen as warning against aligning a company and a frame too closely. They become interdependent, where the intended application to the company relies upon the relevance of the frame and the strength of the frame relies upon the company's conformance to the frame. Additionally, even though

they are powerful, should companies take the risk of allying themselves with a unified frame and becoming interdependent?

The improved persuasiveness of unified frames raises ethical questions about how frames are used to sway public opinion. Should unified frames even be used, since they are so persuasive? More research considering how much more persuasive unified frames are compared to other frames could be conducted.

In addition to the questions raised about frames, I encountered some unexpected relationships between NASA events, such as the importance of the Challenger disaster. It was surprising to me that the Challenger disaster caused more framing shifts than the Apollo 11 moon landing. Do negative events cause greater frame shifts than positive ones? I also did not investigate how the Columbia explosion impacted the framing of NASA. Did it have the same impact as the Challenger?

These are some of the many questions left to be answered about how frames and NASA can work together. The conclusions gained from answering these questions could have a major impact on how NASA is perceived by the media and the public.

Understanding the relationship between frames and NASA could lead the space agency into a new age of public support, or leave it languishing in the debris of a nearly thirty year old disaster.

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