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Media framing and the cancellation of NASA's space shuttle program

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Media Framing and the Cancellation of NASA's Space Shuttle Program

An Honors College Project Presented to
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College of Arts and Letters
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Abstract

This study researches and discusses the discourse surrounding the retirement of the National Aeronautics and Space Administration's manned space shuttle program in 2011, drawing conclusions about the public's reaction towards the event. This study first examines framing as a method for understanding how information gets coded in people's brains, and then gives a brief history of the space shuttle program and its cancellation. It then analyzes the rhetoric presented to the public through the three most popular newspapers by website traffic to understand the public's reaction towards this event, and draws conclusions about the likely effect of those reactions on future NASA space exploration.

Introduction

Ever since President Kennedy called for the United States to place a man on the moon, the prospects of human space exploration have been incredibly prevalent in the American public psyche (Roper Center, 2015). Even so, the space shuttle program was finally grounded in August of 2011 when the final shuttle mission was complete (Pearlman, 2011). Since the cancellation of the program, public reaction has been mixed, believing that the US should remain the leader in space exploration but also that the private sector may be better at conducting that research (Sappenfield, 2011).

I examine public reactions towards the shuttle's cancellation through *The New York Times*, *USA Today*, and *The Wall Street Journal*. These three news sources were ranked as the most popular by website traffic in the country between 2010, when the cancellation of the program was announced, and the end of 2012, when the program was finally cancelled (Alliance for Audited Media, 2012; Porter, 2010). Thus, they provide a good consensus on the public's reaction towards the event. Since public support helps determine funding for federal science programs like manned space exploration, understanding reactions towards the ending of the program is important (Kelley, 2012).

I argue that responses to the cancellation of the shuttle program from *The New York Times* were mixed, while reactions from *USA Today* were largely positive and reactions from *The Wall Street Journal* were negative. This mixed set of reactions is reflective of the overall national response to the cancellation of the event. Even so, I argue that the positions taken and rhetoric deployed in favor of the shuttle's cancellation describes to the reader of these articles a

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world where the shuttle's cancellation has more value than its continued existence would have had.

First, I utilize framing theory to examine public reactions towards events, particularly in the context of NASA and other federal science programs. I then give a brief history of the space shuttle program, starting with the development of the concept in the 1950s. Third, I conduct an analysis of the ways that *The New York Times*, *USA Today*, and *The Wall Street Journal* discussed the ending of the shuttle program. Fourth, I draw conclusions about the overall reaction from the public towards the event, and draw conclusions about the likelihood of restored funding to NASA's manned space shuttle program. I conclude with directions for future research regarding public opinion and NASA space programs.

Literature Review

Framing

The concept of framing was first introduced by sociologist Erving Goffman (Reese, 2001). I use framing as forwarded by Reese (2001), in his prologue to *Framing Public Life: Perspectives on Media and Our Understanding of the Social World*, who indicates that frames are “organizing principles that are socially shared and persistent over time, that work symbolically to meaningfully structure the social world” (p. 5). “Socially shared” knowledge creation indicates that there is an aspect of audience involvement in the development and understanding of frames, since audiences and policy makers operate in a symbolic relationship (Iorio & Huxman, 1996; Reese, 2001). The media doesn’t define an issue for the public in isolation; it uses frames that tap into memories and thought processes to influence the ways people think about topics (Reese, 2001). This is made possible by frames being socially developed by multiple groups of people (Reese, 2001). As a result, audience identity is important to the construction of meaning, as “individuals almost always focus only on a subset of possible ways to think about an issue” (Klar, Robinson, & Druckman, 2013, p. 175).

Klar et al. (2013) similarly describe this process of audience adaptation in their discussion of frames. For Klar et al. (2013), there are two different types of frames-- frames in communication, or “the words, images, phrases, and presentation styles a speaker uses to relay information”, and frames in thought, or “an individual’s understanding of a given situation” (p. 174). Frames in communication are those frames that the speaker, or in this case the news media, use to convey information, while frames in thought are those frames that the listener, or in this case the American public, use to decipher information (Klar et al., 2013). The frames in

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communication heavily influence the frames in thought an audience uses (Klar et al., 2013). This is known as the framing effect (Klar et al., 2013).

Ardèvol-Abreu (2015) provides a similar definition of framing as “a process in which some aspects of reality are selected, and given greater emphasis or importance, so that the problem is defined, its causes are diagnosed, moral judgments are suggested and appropriate solutions and actions are proposed” (p. 424). This process is important, as frames “draw attention to some aspects of reality at the expense of others”, thereby determining what the public thinks about an issue (Ardèvol-Abreu, 2015, p. 424). This process is culturally-determined, as audiences interpret knowledge based on the frames society has developed and imposed upon them (Ardèvol-Abreu, 2015).

The source of information influences how an issue is framed (Lian, 2014). As the most influential source of framing for information gathered by the public, the news media greatly affects how issues get framed (Fahmy & Al Emad, 2011; Gamson & Modigliani, 1989; Lian, 2014). Gamson & Modigliani (1989) even indicate that the media has such a large influence on the frames through which people understand issues that it is “part of the process by which issue cultures are produced” (p. 3).

A frame is an active process of meaning-making that attempts to decide which issues are relevant for the public sphere, and how issues, discourse, and meaning should be constructed and developed (Reese, 2001). Frames do not separate communication into individual parts like the sender, content, and audience, but instead rely on the interplay between all individuals involved in a communication process as one large, influential factor (Reese, 2001). Thus, frames can be

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understood as “the way events and issues are organized and made sense of, especially by media, media professionals, and their audiences” (Reese, 2001, p. 1).

As a part of this active process of meaning-making, frames change and evolve over time (Kelley, 2012). This is particularly true for NASA and space exploration, as popular arguments during the Cold War and the Space Race consisted of space as a national identity, which is no longer a particularly useful argument in favor of the space shuttle program (Kelley, 2012).

Gamson and Modigliani (1989) discuss the three main factors that determine the popularity or success of a frame in the public sphere—cultural resonance, or cultural influences on frames; sponsor activities, or the individuals and groups who use a particular frame; and media practices, or how the media uses a frame. Klar et al (2013) similarly describe the three factors determining the success of a frame as 1) the competition between frames, or which frame is the strongest at any point in time, 2) the durability of frames, or which frame lasts the longest in the public eye, and 3) political polarization intensity, or the likelihood of an audience to even consider an argument in opposition to its preconceived beliefs.

Frames are a useful metric for understanding the way arguments are presented in the public sphere (Entman, 1993; Iyengar, 1991; Reese, 2001). Frames involve “selection and salience”; making a part of an event or text easier to understand (Entman, 1993, p. 52). The fact that frames select a part or parts of an event (as opposed to the whole truth about it) is important, since it means frames don’t only draw attention towards elements of a controversy, but also away from different parts of an issue (Entman, 1993). For example, if a protest is framed as a “confrontation between police and marchers” the reason for the protest “may not be part of the story” since its purpose wasn’t relevant to the framed discussion (Reese, 2001, p. 4). The public

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may not even know the justification for a protest before making claims about the value or tactics of it (Reese, 2001). This means that frames are an exercise in power in that it “affects our understanding of the political world” (Reese, 2001, p. 3).

Framing relies on the frequency of stories about a topic, the sources who run the stories, or the denotative meaning behind the choice of words for a story (Entman, 1993; Fahmy & Al Emad, 2011; Lian, 2014; Reese, 2001). For example, when survey questions discussing the rights of individuals living with AIDS are framed in terms of civil liberties, most people support the rights of these individuals (Sniderman, Brody, & Tetlock, 1991). However, when survey questions are framed in terms of public health, most individuals support mandatory testing for individuals with AIDS (Sniderman, Brody, & Tetlock, 1991).

Frames are also particularly relevant for understanding how NASA acquires funding. Because NASA receives money from government officials who are often concerned about re-election chances, public support for NASA’s programs are integral to the program’s chances of acquiring funding. While all government projects rely on the whim of the public to acquire funding, public opinion particularly influences scientific projects, since most government officials generally don’t understand the science behind them (Kelley, 2012). Kelley (2012) gives two examples to illustrate this effect outside of NASA. The first example she provides is of biomechanics, the study of biological processes and beings through mechanics. Kelley (2012) indicates that after the New York Mets started using biomechanics as a training method, thus increasing media coverage for the field, it received significantly larger quantities of funding from the National Science Foundation. The second example is of nanotechnology, which started losing funding in 2003 when the media grew substantially more critical of it (Feder, 2004). However,

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the trend reversed in 2006, as nanotechnology became framed as a tool for resolving various “health and medical concerns” (Kelley, 2012, p. 12).

Kelley (2012) discusses the various ways news media described the Challenger disaster, creating 10 different frames applicable to NASA between 1986 and 2010¹. Several of these frames are similar while some are not applicable to the cancellation of the space shuttle program, so I draw together these frames to create three new categories of framing to discuss the

¹ The frames described by Kelley (2012) are as follows-- 1) the technological progress frame, the idea that NASA contributes to the progress of technology; 2) the manifest destiny frame, the idea that humans have a natural desire to explore space; 3) the life and death frame, the idea that space exploration consists of a life or death process; 4) the exploration frame, the idea that the American desire for exploration can garner positive attention for space exploration; 5) the endurance of the human spirit frame, the idea that people will persevere even in the most difficult of times; 6) the change frame, a negative frame that reflects the idea that “space exploration for space exploration’s sake” has a negative economic effect on other scientific programs; 7) the protection frame, the idea that other sciences are something that need to be protected with large quantities of money being used by NASA; 8) the cost-benefit frame, the idea that cost-benefit analysis should reflect the distribution of money for NASA; 9) the irresponsibility frame, as applied to NASA to prove that space spending is widely irresponsible, and only conducted for expensive thrills; and 10) the bureaucracy frame, which makes an organization seem complicated and inefficient (Kelley, 2012).

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cancellation of the program². The three frames are as follows-- 1) the science and exploration frame, focusing on the arguments in favor of and against the cancellation of the space shuttle program revolving around scientific advances and the drive for exploration; 2) the economy frame, revolving around the economic costs and benefits of space exploration; and 3) the bureaucracy frame, as described by Kelley (2012) to focus on the factors that make an organization seem complicated and inefficient.

The United States Space Shuttle Program

The United States space shuttle program was officially cancelled on August 31, 2011, after the landing of its final shuttle mission a month prior (Pearlman, 2011). While the program wasn't formally launched until the beginning of 1972, the first proposal for a space shuttle was developed in 1953, designed to carry monkeys into space (Heppenheimer, 1999). NASA began taking the space shuttle concept seriously in 1966 by beginning a study of space shuttles as a method to access a theoretical space station (Heppenheimer, 1999).

² Several of the frames described by Kelley (2012) are not applicable to the discussion of the shuttle program, such as the manifest destiny frame, the life and death frame and the endurance of the human spirit frame, so they were not included in this analysis. The technological progress frame, the exploration frame, and the irresponsibility frame were combined into the science and exploration frame in this research, while the change frame, the protection frame, and the cost-benefit frame were combined into the economic frame. The bureaucracy frame is the third category of analysis in this research and follows the same standards described by Kelley (2012).

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However, by 1968, NASA was still viewing various proposals and had not advanced the program in any substantive way (Heppenheimer, 1999). In response, George Mueller, the Associate Administrator of NASA at the time, threw his weight into the process and began massive investments into the space shuttle project (Heppenheimer, 1999). Mueller figured that the program would be important for president-elect Nixon amid the 1968 election, who had promised to put a man on the moon, making work on the project an important task for him (Heppenheimer, 1999). The office in charge of developing the space shuttle was developed in 1969, directed by Leroy Day (Heppenheimer, 1999). Shortly after its creation, the office successfully developed the first design for a space shuttle and the program was formally launched in 1972 (Heppenheimer, 1999).

The space shuttle program was designed to innovate in low-cost space flight, since previous launch vehicles were ridiculously expensive; original estimates for human space flight placed costs at roughly \$60 million per launch in the 1960s (Heppenheimer, 1999). However, since 1981, when the first space shuttle was launched from the United States, the program has cost over \$170 billion to run (Piekle, 2008). The space shuttle program was originally designed to be a cheaper alternative to manned space flight, but because of soaring costs surrounding materials, delays, and personnel, became incredibly expensive instead (Piekle, 2008). Subsequently, the program has only launched about 5% of the projected number of missions (Piekle, 2008).

Originally, communication surrounding the space shuttle program consisted of NASA scientists telling the public what was happening in the program without allowing much public input (Kelley, 2012). However, this radically changed after the Challenger disaster due to the

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devastating effect the event had on public perceptions of the space program (Kelley, 2012). Prior to the Challenger disaster, NASA believed that the previous successes of launches meant they could trust that future launches would continue to be successful (Gouran, 1987). This “insensitivity to risk” meant that NASA officials were willing to ignore concerns about Challenger expressed by dozens of people working on the project (Gouran, 1987, p. 444). Even though NASA’s press conferences following the disaster are “widely considered a textbook example of crisis communications failure” (Martin & Boynton, 2005, p. 254), these press conferences helped to calm the public (Kelley, 2012).

Methodology

I conduct a rhetorical analysis of the media discourse surrounding the cancellation of NASA's space flight program, focusing on the frames used by the three most popular by website traffic newspapers to portray the event. I discuss the word choices and rhetoric consistently used across these sources to track the most common ways the cancellation of the program was framed. I rely solely on research from as early as January 1st, 2010 to discuss the most recent opinions and rhetoric surrounding the cancellation of the program. Because the program was officially cancelled on August 31st, 2011 (Pearlman, 2011), I only analyze articles released prior to January 1st, 2012. As such, I examine the rhetoric surrounding the cancellation of the program between the dates of January 1st, 2010 and January 1st, 2012.

News sources are critical to understanding public discourse surrounding space policy, since they're the primary source of information about the cancellation of the program received by the majority of the American public. Given that "media choice matters in determining which frames win", they're incredibly influential in the creation of the rhetoric surrounding the cancellation of the program (Klar et al., 2013, p. 183). I analyze the discourse surrounding the cancellation of the program from the top three most popular newspaper sources by website traffic, since most Americans receive news from similar sources. Between January 1st, 2010, and January 1st, 2012, the top three most popular news sources by website traffic were *The New York Times*, *USA Today*, and *The Wall Street Journal* (Porter, 2010; Alliance for Audited Media, 2012). Given that "the media (even if driven to increase audience share) often aim to present a more balanced picture of different frames", I conduct targeted research designed to produce the articles with the most likely relevance to the science and exploration frame, the economy frame,

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and the bureaucracy frame (Klar et al., 2013, p. 177). As discussed by Klar et al. (2013), these frames often come “from opposing sides”, showing the value of the shuttle’s cancellation and the negative effects of it (p. 177). I follow in Klar et al (2013)’s footsteps and analyze both sides of this argument based on the relevant frames. For example, under the economy frame for each of the three newspapers, I discuss the positive benefits of the cancellation of the shuttle program and the negative effects of it.

To conduct this research, I explore the archives of these three newspapers between January 1st, 2010 and January 1st, 2012, analyzing a total of 90 different articles, 30 from each newspaper. Duplicated articles are analyzed through different frames, although not analyzed twice through the same frame. Research is conducted through Lexis Nexis for archives of *The New York Times* and *USA Today* and through ProQuest for archives of *The Wall Street Journal*. For the science and exploration frame for *The New York Times* and *USA Today* articles, the following search terms are entered—NASA w/5 “space shuttle” AND “science” AND “exploration”. For the science and exploration frame for *The Wall Street Journal* articles, the following search terms are used—NASA “space shuttle” “science” “exploration”. For the economic frame for all three newspapers, the search terms NASA w/5 “space shuttle” AND (money OR economy OR budget) are entered. For the bureaucracy frame for *The New York Times* and *USA Today* articles, the search terms NASA w/5 “space shuttle” AND (government OR bureaucracy OR leadership OR Congress) are entered. For the ProQuest search for *The Wall Street Journal* articles, the following search terms are entered—NASA “space shuttle” Congress government.

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This analysis begins with a discussion of the discourse surrounding the cancellation of the United States shuttle program in August of 2011, paying close attention to the rhetoric consistently used across different sources describing the event. It pays close attention to the three frames I described, mainly arguments conducted through the science and exploration frame, the economy frame, and the bureaucracy frame. This analysis helps draw conclusions about the likelihood of the United States government ever restoring funding for the manned space shuttle program, given public opinion's effect on funding for NASA.

The analysis section is organized based on newspaper, and then on frame. The order is as follows-- *The New York Times* through the science and exploration frame, *The New York Times* through the economy frame, *The New York Times* through the bureaucracy frame, *USA Today* through the science and exploration frame, *USA Today* through the economy frame, *USA Today* through the bureaucracy frame, *The Wall Street Journal* through the science and exploration frame, *The Wall Street Journal* through the economy frame, and *The Wall Street Journal* through the bureaucracy frame.

Analysis

The New York Times-- The Science and Exploration Frame

Most of the article written by *The New York Times* for the Science and Exploration frame discuss the cancellation of the program in a positive light while a few discuss it in a negative light. The majority of the articles positively analyzing the cancellation of the program discuss the interest that the private sector has in space exploration (Chang, 2010f; Chang, 2010i; Chang, 2011a; Chang, 2011d). Chang (2011a) quotes several scientists, concluding that “science, perhaps even more than tourism could turn out to be big business for Virgin and other companies that are aiming to provide short rides above the 62-mile altitude that marks the official entry into outer space” (para. 3). The usage of comparative rhetoric between science and tourism powerfully shows the potential inherent in private sector space development by proving that scientists have even more interest than tourists do. This is especially true for the Southwest Research Institute who already bought tickets for two scientists to be sent to space and “intends to buy six more seats”, even though the official launch date has not been set, showing that institutes and corporations are so optimistic that they are willing to buy tickets even without a guaranteed space journey (Chang, 2011a, para. 7). Chang (2011a) also indicates that “the cumulative time of the suborbital experiments could quickly overtake that of the International Space Station”, thereby helping scientists conduct potentially thousands of new experiments in space (para. 14). This is especially important for these scientists, as “it’s almost impossible to get research on the space station at the moment”, as Mark Shelhamer, a professor at Johns Hopkins University medical school, indicates (as cited in Chang, 2011a, para. 17). Chang (2011a) finally quotes Dr. Steven H. Collicot of Purdue University, who believes that “it’s a nice, really great

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addition to the facilities available for research” (para. 34). Inserting quotes from experts in the field is a rhetorical tool meant to show how seriously the private sector is taking this opportunity.

Chang (2010f) and Chang (2010i) take the same rhetorical approach as Chang (2011a) in describing private sector excitement. Chang (2010f) focuses primarily on Boeing, indicating that their efforts may “bolster the Obama Administration’s efforts to transform the National Aeronautics and Space Administration into an agency that focuses less on building rockets and more on nurturing a commercial space industry” (para. 1). Chang (2010i) discusses SpaceX’s efforts at going into space, as it “has been able to meet 17 of the 22 milestones in its contract” (para. 10). Both rhetorical choices to discuss NASA as transformed in Chang (2010f) and discussions of being close to completing milestones in Chang (2010i) show how much the private sector is working towards getting to space.

A few of these articles discuss the potential focus of NASA now, indicating that the agency can focus on several other missions instead of space flight (Chang, 2010g; Chang, 2010h; Tierney, 2010). NASA can now get its “first extended look” at Mercury, instead of the several “fly-bys” that only lasted a few hours, as they’ve done in the past (Chang, 2010g, para. 3). Chang (2010g) discusses the potential for “large deposits of ice water” to exist on Mercury, due to the temperature ranges around the poles of Mercury (para. 8). The choice to discuss the potential of water on the surface of Mercury helps draw excitement from public memory about previous attempts to find water on foreign planets. This excitement is further shown in Tierney (2010), who discusses President Obama’s goals for NASA to conduct more “research and development of technologies for trips far beyond Earth” (para. 12).

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Chang (2010h) also discusses goals NASA can accomplish due to the shuttle cancellation, focusing on a new heavy-launch rocket called for by Congress. However, Senators “expressed worries” at NASA’s ability to complete this rocket, a discussion meant to show that all of these goals may or may not get to completion (Chang, 2010h, para. 12). Rob Bishop, a representative from Utah, is even quoted as saying NASA’s assurances are “both vague and inconsistent” (Chang, 2010h, para. 14).

Finally, the cancellation of the space shuttle program is positive insofar as the shuttle is now used to conduct research upon (Fountain, 2010). Fountain (2010) quotes Stephanie Stilson of the Smithsonian Institute who wants “to hold on to things that we could potentially use” (para. 5). Fountain (2010) goes into detail in discussing the parts taken for research, discussing the “exquisitely machined pumps and plumbing that once handled thousands of gallons of liquid hydrogen and oxygen” (para. 11). Describing the parts of the shuttle as exquisite and being able to handle “thousands of gallons of liquid hydrogen and oxygen” proves how incredibly powerful the machine is, which is rhetorically designed to tell readers that the shuttle’s cancellation proves a unique purpose for science itself. (Fountain, 2010, para. 11).

However, some discuss the cancellation of the space shuttle program in a negative way, focusing primarily on the concern and cautious optimism NASA employees have about the trajectory of the agency. Leroy Chiao, a former astronaut, believes that “morale is pretty low”, as this “is a time of great uncertainty” for him and his fellow astronauts (Chang, 2010c, para. 3). Even so, Chang (2010c) concludes that “opportunities for astronauts outside of NASA are small but growing”, due to private sector investment in space exploration (para. 15). For example, Dr. Garrett E Reisman left NASA to work for SpaceX, and while “it was very, very difficult to

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voluntarily leave”, as Reisman indicates, doing so has provided him important opportunities (Chang, 2010c, para. 18). The discussion of Dr. Reisman’s voluntary leaving of NASA is meant to convey the concern and cautious optimism felt by NASA employees.

Overbye (2011) takes a negative tone throughout his entire article, indicating that “humans are no closer to the stars than they were before, and the space program is in tatters” as a result of the space shuttle program (para. 3). He believes that “it was irritating that they weren’t going anywhere but in circles around the Earth and the science they were doing was mostly boring compared with the results being beamed back from the Voyager spacecraft”, concluding by indicating that he “no longer expects to see boot prints on Mars during [his] my lifetime” (Overbye, 2011, para. 14, 26). The powerful rhetoric adopted by Overbye (2011) proves that he rejects the notion that the cancellation of the space shuttle program was useful for the development of new science and technology.

The overall focus on the value received by scientific research of the shuttle’s cancellation helps frame the event in a positive manner. These articles tell the reader that most experts in the field, including the private sector, are excited about the possibilities latent in the future of space research. These possibilities help overshadow any potentially negative effects of the shuttle’s cancellation.

The New York Times-- The Economy Frame

Only a few articles by *The New York Times* present the cancellation of the space shuttle program in a positive matter in terms of the economy frame, while most discuss the freed-up funds as being unable to resolve NASA’s financial problems. The articles focusing on positive aspects generally revolve around entrepreneurs being able to enter space (Chang, 2010c; Chang,

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2010f; Chang, 2010i). Major General Charles F Bolden, the previous administrator of NASA, believes that “NASA will be driving competition, opening new markets and access to space and catalyzing the potential of American industry” (Chang, 2010c, para. 7). Granted, the administrator of NASA is certainly bias, but the inclusion of his quote is indicative of the optimism felt, as his rhetoric is incredibly positive. This tone is primarily due to President Obama’s 2011 budget proposal that invests \$6 billion “for probably two or more companies to develop spacecraft capable of carrying people into space” (Chang, 2010c, para. 6). The choice to focus on “two or more companies”, which Chang (2010c, para. 6) believes is likely to be Bigelow Aerospace and Lockheed Martin, shows how focused this funding is, giving each company a better chance to get to space. Chang (2010i) continues this optimistic, positive tone, saying that “the hope is that the commercial crew program... will enlist companies like SpaceX to drive down the cost of space travel and allow NASA to devote its limited budget to more ambitious missions to send astronauts farther into the solar system” (para. 7). The discussion of SpaceX as another integral part of the space exploration process post-shuttle cancellation is designed to show that the benefits ripple throughout the space industry.

Some articles positively indicate that the cancellation of the program gives NASA better budgetary direction. William Gerstenmaier, the head of NASA’s Shuttle and Space Station programs, thinks that the shuttle retirement program is “tough. But the mission that the shuttle was designed for is kind of going away”, proving that head NASA officials believe the agency is getting new direction (Pogue, 2011, para. 5). Quoting Gerstenmaier provides a tone of hope, as he believes that “we’re not gonna pick a destination, but we’re gonna build a series of spacecraft, and vehicles, and technologies that we can put together to go do a mission when it comes time”

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(Pogue, 2011, para. 40). Walsh (2011) believes that NASA's pension fund for private contractors can be effectively replenished now. Michael Curie, a spokesman for NASA, believes it is "NASA's obligation to fund this, and NASA will do so", rhetoric that proves NASA is committed to this goal (para. 6).

Even so, most of these articles believe saved funds won't be enough to revitalize NASA. Chang (2010a), for example, indicates that financial difficulties will likely influence NASA to rely on other space agencies, such as the European Space Agency, to explore the stars. Because there are so many different goals for NASA now, the likelihood of any one program getting completed is low, since focus and funds are spread too thin (Chang, 2010d; Chang, 2010g; Tierney, 2010). Rhetoric from Congressional officials support this point, as they largely believe NASA's responses are "both vague and inconsistent" (Chang, 2010h, para. 14). Norman R. Augustine, former chief executive for Lockheed Martin, even believes that "with that budget, I still think there is no real meaningful space exploration that involves humans" (Chang, 2010f, para. 16). Given that Lockheed Martin is to receive a large chunk of funds set aside for private space exploration (Chang, 2010c), speaking this negatively is telling of the state of the agency. Tierney (2010) continue this negative rhetoric, focusing on the programs caused by forces outside of the government. NASA's primary problem "is not lack of money" since "its current budget is about the same size, when adjusted for inflation, as the average during the 1960s and early 1970s" (para. 4). Rather, "space exploration has become so costly that this level of financing won't even pay for a return to the Moon anytime soon" (Tierney, 2010, para. 4). Overbye (2011) even calls the shuttle program "the Flying Brickyard", a powerful statement meant to prove that the shuttle is nothing but a waste of funds (para. 6).

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The focus on the inability to resolve NASA's financial problems is not designed to show the reader that the shuttle's cancellation was problematic, but rather that the event is not a cure-all for the organization. This distinction is important, as it means that the purpose of these articles is not to sway people into believing that the shuttle's cancellation was bad. This sub-sequentially bolsters the value of the cancellation of the program.

The New York Times-- The Bureaucracy Frame

While a few articles discuss the value of the shuttle's cancellation, most decisively describe the event as problematic for NASA and bureaucracy in general.

Walsh (2011) takes the most positive tone of the articles in this section in his discussion of the pension fund NASA owes to several corporations. He expresses optimism in discussing the necessity of funding for the program, even though some Congresspeople are "threatening to block anything that could be construed as a taxpayer bailout" (Walsh, 2011, para. 10). Bill Hill, a NASA assistant associate administrator, stays positive when discussing this funding, but expresses concern that "it's coming in this fiscal environment" (Walsh, 2011, para. 11). This rhetorical choice is important, considering that Congress allocates NASA's funds and determines which companies are to receive proper pension funds. Chang (2011a) and Chang (2010h) both continue this positivity, but focus on issues other than NASA's pension fund. Chang (2011a) believes the cancellation of the space shuttle program opened room for non-governmental scientists to launch into space aboard private sector spacecraft. Chang (2010h) discusses the optimism that Dr. Holdren of the Obama Administration feels towards the development of a new heavy-lift rocket, even while citing a few Congressional officials expressing doubt about the ability of NASA to fulfil this promise. These arguments are meant to steer the reader into an

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optimistic viewpoint of the program's cancellation, as space exploration in general has a bright future.

The positivity ends there, as political infighting between the two major goals of the space agency is the central theme portrayed in the rest of these articles. The focus on political infighting matters, as it could create major problems for NASA. Tierney (2010) outlines this political infighting well, discussing how Republicans "joined with Democratic colleagues in Congress to oppose Mr. Obama's plan to reduce NASA missions and to encourage private companies' rockets to haul cargo and astronauts into space" (para. 2). Focusing on this bipartisan opposition is rhetorically powerful, given that Congress is virtually incapable of agreeing on anything in this modern age. Chang (2010f) even call this event a "clash of visions" over how NASA should exist as an organization, making funding allocation problems between President Obama's vision of a private sector focus and Congress' vision of a governmental focus dangerous for NASA's future (para. 6). Chang (2010f) believes that there is an actual trade-off between the two systems of running the agency, as the government would have to front a large portion of the costs for the private sector if President Obama's plans were to be carried out, which would prevent allocations towards a new heavy-lift rocket due to constrained budgets. Saying that there's a physical trade-off between the two manners in which NASA could be run paints a bleak picture for the future of the organization, as infighting could mean it tries to split the difference and ultimately fails at either goal. Chang (2010a) further expresses this doubt, saying President Obama's requests for the organization differ from Congressional goals and may "set off new tussles over rockets" (para. 8). Chang (2010a) believes these "tussles" would actually be a "major shift" that could cause "a protracted battle with some members of Congress"

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(para. 14). Considering the existence of a NASA budgetary provision that prevents the White House from changing the Constellation program, the risk that these battles could escalate certainly exists (Chang, 2010a). Lack of trust between the two federal branches comes off in dialogue between the two, as proven by Senators refusing to trust the White House's promise to follow through with plans to develop the new Ares I rocket (Chang, 2010h). Representative Rob Bishop doesn't think "we were terribly satisfied", calling the White House's promise "both vague and inconsistent" (Chang, 2010h, para. 13, 14). Chang (2010b) highlights some of Congress' concerns with President Obama's plan, primarily regarding job loss for state constituents. Representative Pete Olson's opinion "didn't change at all", since President Obama provided "no concrete plan, no deadlines to make it happen" (para. 11). The overall negative tone that Congress adopted towards President Obama's plan conveys to the reader how serious these fights are.

Several articles discuss political infighting more in-depth, indicating that Congressional impositions and presidential changes have been detrimental to the space agency overall. Chang (2010i) discusses SpaceX's launch of Falcon 9, saying that congressional efforts to "rein in costs across the federal government" could ruin the project (Chang, 2010i, para. 19). Putting the blame on Congress is a rhetorical move showing how much at fault the House and Senate are. Wong & Chang (2011) discuss China's efforts to expand space exploration now that the shuttle has been cancelled, indicating that China's plan is to "draw on military and civilian resources to meet the goals" of being a leader in space (para. 5). Considering that "NASA's direction tends to shift with every change of presidency" as Wong & Chang (2011, para. 10) say, there's no way for the United States to properly sustain a space leadership role. Wong & Chang (2011) conclude with

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technological differences between the United States and China that helps China develop a space leadership role; the purpose being to express concern about us losing our edge in space. For example, the Beidou Navigation Satellite System is a Chinese global-positioning system “expected to overshadow the Russian system and would provide the Chinese military with an alternative to relying on a civilian version of the American network”, having “major commercial implications” and “major security implications” as Andrew Erickson, professor of strategy at the US Naval War College, is quoted as saying (Wong & Chang, 2011, para. 16, & para. 17). Additionally, China’s Long March 5 rocket “would be enough for China to get to the moon” and be “comparable to the United States’ Delta IV Heavy rocket and much smaller than the Saturn V rocket that launched the Apollo spacecraft to the moon” (Wong & Chang, 2011, para. 24). Discussing the specific differences between Chinese and American spacecraft and technologies conveys that America is likely to lose the current space race due to this infighting. Most readers will find this important, due to American national pride.

USA Today-- The Science and Exploration Frame

In general, articles produced by *USA Today* during the designated time period were largely positive about the space shuttle program itself and its cancellation. They primarily focused on the exciting space experiments that would be conducted with the newly available funding.

These articles discussed the Hubble Space Telescope multiple times, indicating that its existence would not be possible without the creation and development of the space shuttle program and the technology it spurred (USA Today, 2011; Vergano 2011a; Vergano 2011c). These articles even indicate that various repairs done on the Hubble Space Telescope conducted

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during the “five missions featuring 23 spacewalks that first fixed and then upgraded the telescope” were only possible because of the space shuttle program because “only an astronaut could have done this” (Vergano, 2011a, para. 30). The choice to describe both the amount of spacewalks conducted and that this was a feat only accomplishable by a person is a rhetorical move that proves the importance of having the shuttle in the first place. These articles all agree that the Hubble Space Telescope was a worthwhile investment, even indicating that it’s a “scientific feat” “with more than six times as many discoveries” (USA Today, 2011, para. 2, 3), that it’s “among the most productive technical instruments authored by humanity” (Vergano, 2011a, para. 32), that it “represents a scientific triumph” (Vergano, 2011a, para. 32), and that its “lifetime has been extended several years and its discoveries are more abundant” (USA Today, 2011, para. 4) due to the space shuttle program. Several articles discuss the importance of the shuttle program to the existence of the International Space Station, discussing how Atlantis, the last US space shuttle to fly, carried “23,000 pounds of clothing, food, and equipment, [and] a year’s worth of supplies” to the space station (Vergano, 2011a, para. 2). Leger (2011a) calls this journey “the space shuttle’s largest and most ambitious legacy” (para. 16), while Leger (2011b) discusses the importance of Atlantis as a mode of delivery for a particle physics detector to the International Space Station. Leger (2011c) even calls the International Space Station “the future of America’s space program”, (para. 2). The decision to focus heavily on the International Space Station, and describing it in such powerfully positive terms is meant to show the reader that the legacy of the shuttle program would have a long-lasting impact. Arguing that the International Space Station is the “future” of America’s space program is a rhetorical tool deployed by Leger

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(2011c) to portray the cancellation in a positive way-- given that the I.S.S. still exists and receives funding, the future of the shuttle program is secure.

Considering that funding from the shuttle program was shifted towards the asteroid program, several articles also discuss that shift. Former president Obama set 2025 as the goal for landing people on an asteroid, which is criticized by these articles as being impossible to actualize, given lack of funding (Watson, 2010). Even though Watson (2010) believes funding is inadequate, he discusses doomsdays scenarios such as “an asteroid [that] could wipe out as many human lives as a nuclear bomb” as a rhetorical tool to describe how important the program is (para. 11). President Obama is serious about the program, indicating that “we’ll start by sending astronauts to an asteroid for the first time in history” (Leger, 2011b, para. 30). The president’s decision to describe this as an event “for the first time in history” is designed to rally public support for the program (para. 30). The article’s decision to deploy this quote is clearly designed to have the same effect.

The articles also discuss other programs that received funding due to the cancellation of the space shuttle program, including a Mars mission (Leiger, 2011a), a spacecraft to study Jupiter (Leiger, 2011c; Vergano, 2011c), and the National Polar-Orbiting Environmental Satellite System (Leiger, 2011c). The decision to focus on each of these different programs is meant to convey the benefits of the program’s cancellation to the reader, insofar as the event made these other cool, beneficial programs possible.

Additionally, the USA Today articles discuss the value of the cancellation of the program in favor of the booming space tourism industry (Jones, 2011). John Spencer, the founder of the Space Tourism Society, says “there’s a market. There’s a waiting line” and that space tourism is

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getting on its feet (as cited in Jones, 2011, para. 3). Calling the industry “a market” is a rhetorical tool that solidifies the existence of it, as markets are more solidly existent than ideas. Jones (2011) furthers this notion in discussing the investments Virgin Galactic and XCOR Aerospace have put into exploration, citing 425 different people who have signed up for the journey into space, accumulating roughly \$60 million for the industry. Considering the value of space exploration, private companies “are looking to fill a new niche” (Jones, 2011, para. 27) insofar as materials need to be transferred into space for the International Space Station and such.

Describing the industry as a niche makes it seem special, like something that people are heavily investing in, which Jones (2011) further proves in discussing the creation of spaceports (airports for space travel). Chris Anderson, the executive director at the New Mexico Spaceport, believes the primary goal of these spaceports for now is to “[motivate] and [inspire] students in science, technology, engineering, and mathematics” (Jones, 2011, para. 34). Terms like “motivate” and “inspire” help to solidify the positivity surrounding the fledgling industry

Even so, a few articles took a negative tone when approaching the science and exploration frame in light of the cancellation of NASA’s space shuttle. Since Oberg (2011) indicates that the cancellation of the program was necessary and “straightforward”, he believes that Americans should not expect any sequel to the space shuttle program, and instead advocates for NASA developing new technology based on non-human exploration (para. 2). Oberg (2011) directly contradicts the positive technological frame position taken by the other articles, insofar as it indicates that the technology created by the program is unlikely to progress American space exploration or development.

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The overall focus on the scientific developments and private sector advances because of the shuttle program help describe the benefits accrued to its existence for the reader. Coupling that with the discussion of other programs who receive funding now that the shuttle has been cancelled is meant to convey the value of the shuttle's cancellation to the reader.

USA Today-- The Economy Frame

Every article fitting under the economy frame for *USA Today* discussed the shuttle cancellation in a positive tone except for one. This helps shape the overall benefits attached to the shuttle's cancellation that readers of *USA Today* were exposed to. Several of these articles detail private sector developments created to fill the niche of manned space exploration now that the program has been cancelled (Jones, 2011; Swartz, 2011). Jones (2011) uses rhetoric about the large "waiting line" to have "tens of thousands of space tourists actually leave Earth, go to orbital cruise ships, lunar ships, lunar resorts, and have a great time", creating a focus on the large tourism aspect of the private space sector (para. 3). The rhetorical deployment of terms dealing with time helps show the reader the vast interest expressed by the private sector for private space exploration. This interest is particularly important, as various space entrepreneurs such as Stephen Attenborough of Virgin Galactic dream of ensuring everyone who's interested in space getting there (Jones, 2011). Jones (2011)'s decision to discuss this dream further proves the mass interest in private space development. Curt Carlson, the CEO of SRI International, believes "this should be the best time ever for innovation in the U.S." due to "an abundance of opportunity in energy, health care, IT, [and] media", proving how positive the private sector outlook is towards this opportunity (Jones, 2011, para. 6). Considering that NASA itself faces "major challenges", as Inspector General Paul Martin (as quoted in Swartz, 2011, para. 12)

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indicates, “attracting the talents of the best and brightest from other countries can help prospects for American workers”, as Brad Smith of Microsoft believes (as quoted in Swartz, 2011, para. 15). Swartz (2011) calls this a “global brain race”, rhetoric meant to prove how timely US private investment in space exploration is, as the idea of a race details this situation as a competition (para. 19).

Most of these articles discuss the economic value of the cancellation of the program since that money can facilitate other NASA missions (Leger, 2011a; Oberg, 2011; Vergano, 2011b; Watson, 2010). Leger (2011a) discusses plans to use money from the space shuttle program to develop a Mars mission. It quotes Senator Bill Nelson, who indicates that “we’re going to Mars” and expresses lots of optimism about the United States getting there (Leger, 2011a, para. 5). The article also indicates that NASA’s final launch got 70% higher viewings because of the incident involving Representative Giffords in which she was shot (Leger, 2011a). Giffords’ injury helped change the rhetoric surrounding the program itself positively, as she has been incredibly heavily involved with supporting it (Leger, 2011a). Even so, Leger (2011a) concludes budgetary problems will severely constrain NASA in the future, quoting Allard Beutel, a spokesperson for NASA, who says “there’s no way we’re going to have the budget we had during the Apollo era” and that “we’ve got to work within the reality of the budget” (para. 35). The discussion of NASA’s budget helps portray the cancellation as valuable economically, as NASA can now better allocate funds to accomplish other missions.

Watson (2010) discusses President Obama’s plan to land an astronaut on an asteroid by 2025 and how funding from the space shuttle program can be allocated to help facilitate that goal. It indicates that President Obama has been unwilling to discuss the cost of the program,

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even though he remains hopeful that the United States can eventually do it, even with limited funding (Watson, 2010). Watson (2010) does indicate that President Obama promised to increase NASA's funding by \$6 billion, but that the projected funding increase is still unlikely to cover the cost of the program. Even so, it quotes a NASA official who remains optimistic about the funding from the space shuttle program being put to good use in creation of the asteroid program (Watson, 2010). This rhetorical strategy of being optimistic against all odds shows that NASA officials refuse to give up and will continue to do whatever they can to keep moving forward; a description meant to instill a sense of determination in the reader.

Several of these articles do not discuss a particular project that funding from the space shuttle program is to be allocated towards but rather the ability of that funding to create new technologies (Oberg, 2011; Vergano, 2011b). This vagueness is deliberate, as it helps inspire a sense of awe and wonder at the future of space exploration in the reader. This contributes to the overall value of the cancellation of the shuttle program economically by providing funds to supply these programs. These articles additionally differ from Jones (2011) and Swartz (2011) by focusing on the creation of these technologies by NASA instead of the private sphere-- a rhetorical move designed to prove the value NASA's existence still has. Oberg (2010) says funding from the shuttle program is being diverted to "pay for the next generation of spaceships", an important task since space is "full of surprises; therefore, our spacecraft must be nimble and robust" (para. 2, 5). The rhetoric of the "next generation" of spaceships and the characteristics to be imbued in them is indicative of the optimism felt towards these new projects by proving NASA refuses to give up. Even so, Oberg (2011) says the US space program is so heavily reliant on previous designs that finding new ones will be incredibly difficult. Oberg

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(2010) further details this challenge by discussing the frugality of NASA officials, even going so far as to call new designs “frills whose futures cannot be imagined” (para. 11). This rhetoric is not indicative of the author’s opinion, but rather of NASA officials. Vergano (2011b) quotes a few different officials who, without isolating specific technology, indicate that the space shuttle program has helped make several technologies economically possible. Mike Griffin, the former NASA chief, says “the main legacy of the space shuttle is that, while it did not make the spacecraft as its designers intended, it made spaceflight far more accessible than any vehicle, Russian or American, to date” (as cited in Vergano, 2011b, para. 13). Luke Sollitt, a physicist, also believes that “when historians look back a century from now, they will see the idea of the shuttle, a reusable spacecraft to carry people regularly into orbit, was an essential step in human spaceflight” (Vergano, 2011b, para. 45). Given that these quotes come from experts on space exploration, they help to solidify the inspiration the reader feels due to these articles.

Finally, several of the articles take the general position that the cancellation of the program saves a lot of money. USA Today (2011b) provides a review of a previous USA Today article and indicates that “economically, you can’t make an argument for it” in reference to the space shuttle program, using this rhetorical device to prevent disagreement and solidify the author’s argument (para. 2). USA Today (2011b) does say the program was valuable for the development and protection of the Hubble Space Telescope, but that the ending of the program was nevertheless important. Vergano (2011a), however, takes a more detailed approach when discussing the cancellation of the program, indicating that each space shuttle launch cost about \$1.6 billion in 2010 and has been rising since then. The numerical discussion, as well as the

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discussion of continually rising costs, helps show the reader the importance of the ending of the program for the purpose of saving funds.

Hickam (2010a) was the sole article taking a negative tone, providing powerful rhetoric but weak argumentation. Hickam (2010a) provides a personal narrative of the author's meeting with John F. Kennedy when he was still a senator in 1960 before he developed the space program. Going back to Kennedy in this discussion is important for making his argument powerful, as Hickam (2010a) relies on shared memory about the importance of the shuttle program when it was developed. Hickam (2010a) indicates that the space shuttle program was integral to the development of the United States economy (without detailing how true that claim is or how future investment in the program could help revive economic progress) and concludes by indicating that "if a nation wants to be great, it has to do great things", such as the space shuttle program (para. 11). The combination of this powerful rhetoric with the author's personal narrative about JFK reveals how important the existence of the shuttle program is to him, but not necessarily to the future of the country. This personal narrative may reverberate with some readers, but does not overall provide a persuasive argument, as it is too personally tailored to the author.

Given that the sole article heavily discussing the cons of the shuttle's cancellation provides weak argumentation, the articles provided by *USA Today* in regard to the economy frame largely believe the cancellation was beneficial.

USA Today-- The Bureaucracy Frame

Several of the articles relevant to the bureaucracy frame had other primary purposes, but all discuss the cancellation of the program in a positive light when discussing bureaucracy.

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Vergano (2011a) is the sole exception, providing both arguments in favor of and against the cancellation of the shuttle program in order to show the importance of bureaucracy to the existence and subsequent cancellation of the shuttle program. Vergano (2011a) first quotes Chris Ferguson, the Atlantis Commander who believes that the ending of the program “will be a celebration” as they “did everything they set out to do 30 years ago”, but then quotes John Logsdon, the author of *John F Kennedy and the Race to the Moon* who believes that a decision during the 1970s to develop the space shuttle as a cheaper alternative for space travel “put space into the realm of politics”, and as a result, “we are now paying the price” (para. 8, 18). This is a substantial cause of the “gap in U.S. astronaut launching capability that will follow the retirement of the space shuttle program” and has significantly contributed to a “rushed launch schedule” that caused the Columbia disaster (Vergano, 2011a, para. 19). The discussion of the Columbia disaster relies heavily on shared memory, as this disaster is commonly referred to as the largest mistake taken by NASA (Gouran, 1987; Kelley, 2012; Martin & Boynton, 2005); as such, it provides a commonly known example designed to heighten public connection to the central argument. This rhetoric is purposefully both positive and negative, to show how important bureaucracy itself was throughout the process.

Leger (2011a) and Swartz (2011) discuss the bureaucratic support NASA is to receive post-cancellation of the program. Because Representative Giffords is “one of the most ardent champions of the space program in Congress” and such a powerful member of Congress, she is likely to sway Congressional opinion in support of the program writ-large (Leger, 2011a, para. 22). Leger (2011a) believes NASA may receive more political support as the space shuttle program ends, even though, as a NASA spokesperson indicates, “there’s no way we’re going to

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have the budget we had during the Apollo era” which will constrain the organization in general (as cited in Leger, 2011a, para. 35). Swartz (2011) makes a similar argument about the support NASA is likely to receive, but instead focuses on the government-led research to be developed. While Swartz (2011) does indicate that government investment in private sector research and development has declined by nearly two-thirds since the 1960s, it indicates that there are dozens of different private sector companies and groups looking to get involved in the space research process post-cancellation of the program, such as Hewlett-Packard and Intel. The choice to describe the decline in government-funded R&D is a rhetorical move designed to pre-empt arguments against the author’s original argument, further proving how important the cancellation of the program was. Swartz (2011) indicates that, while interest in this investment is inevitable regardless of bureaucratic and Congressional support, the ability of these companies to develop new technology is a result of increased Congressional and federal support post-cancellation of the program. The discussion of bureaucratic backing is an important way that the authors support the program’s cancellation, as the only way NASA can properly function is if it receives support from various parts of the federal government. Thus, the authors help solidify what NASA can do because of the shuttle’s cancellation.

Watson (2010) discusses NASA’s new goals, focusing on President Obama’s asteroid program. While Watson (2010) does quote NASA officials who indicate that the mission is uncertain, rhetoric discussing the program is positive, supporting the claims upheld by Leger (2011a) and Swartz (2011) that NASA is to receive a lot of support.

Finally, Jones (2011) discusses the positive effects on private sector space tourism due to bureaucratic investment in NASA. Jones (2011) says companies such as Virgin Galactic and

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XCOR, “with the help of some government funding, are spending tens or even hundreds of millions of dollars to create vehicles that could ferry tourists into space” (para. 8). The discussion of “hundreds of millions” is meant to exaggerate this positivity, as the US bureaucracy has repurposed funding to help private sector companies explore space.

The Wall Street Journal-- The Science and Exploration Frame

Only two of these articles took a positive approach towards the cancellation of the space shuttle program, while the rest took a negative stance towards it.

Weinberg (2010) makes the strongest case for the cancellation of the space shuttle program saying it “masquerades as science” even though it “actually crowds out real science at NASA, which is all done on unmanned missions” (para. 2). Weinberg (2010) believes that “all of the brilliant past discoveries in astronomy for which NASA can take credit have been made by unmanned satellite-borne observatories, and there is much more to be done” (para. 4). The examples given by Weinberg (2010) involve “studying the polarization of cosmic microwave radiation” to understand the Big Bang, and “sending laser beams between teams of satellites” to “detect gravitational waves directly from collisions between neutron stars and black holes” to help explain dark energy (para. 4). Weinberg (2010) believes that the only value of having a manned spaceflight program is for discovering “the technology of keeping people alive in space” which is only valuable “in the manned space flight program itself”, proving that the existence and popularity of the program is a tautology (para. 10). Given that “none of this involves astronauts”, and the extremely expensive price tag associated with the manned space shuttle program, the rhetoric in this article strongly indicates that the cancellation of the program was a good thing (para. 5).

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Pasztor (2011b), on the other hand, makes a weak case in favor of the program's cancellation. Pasztor (2011b) discusses President Obama's NASA budget, saying it "calls for setting up an independent, non-profit organization that eventually would coordinate and oversee all research conducted on the International Space Station" (para. 1). Pasztor (2011b) draws a distinction between President Obama's funding request and previous funding requests, as the International Space Station is described as "the primary platform for research by NASA" (para. 11). Even though industry reactions were largely negative, as allocated funds were substantially lower for NASA than they've been in previous years, several private sector industry executives were happy the agency was funded at all (Pasztor, 2011b). As such, the overall tone of this article describes the value of the shuttle's cancellation, even if that is cut by negativity (Pasztor, 2011b).

Every other article took a negative tone when discussing the program's cancellation, focusing on NASA's lack of purpose. Given that the US is "mired in a political fight that threatens its leadership role and ambitions for manned exploration" due to competing visions over how NASA should operate, it seems unlikely that finding a purposeful resolution for the agency is possible in the near future (Pasztor, 2010d, para. 1). Pasztor (2010g) discusses this political infighting in detail, citing how the House Committee on Science and Technology "blasted" Charles Bolden "for failing to provide realistic budget numbers to back up the White House's proposals". It quotes Representative Bart Gordon of Tennessee who believes that faulty cost projections "could be devastating to the rest of NASA's programs" (Pasztor, 2010g, para. 2). This political infighting spreads outside of Congress and the White House and towards federal agencies in Pasztor (2010a), which discusses the "sharp disagreement" because the Federal

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Aviation Administration and NASA who both believe they have sole jurisdiction over private sector space flights (para. 9). The fact that this is a part of the media's analysis when covering the shuttle cancellation is important, as it shows how massively important the program was to the public and the government writ-large; as such, the reader gets a sense that the shuttle's cancellation had more ill effects than earlier articles let on. This is especially devastating for corporations like Alliant, who are forced to outsource "large chunks of U.S. manned space exploration" (Pasztor, 2010f, para. 1). The discussion of outsourcing is interesting, as it alludes to the large international space sector where companies can compete with or without NASA-backing, showing how devastating this lack of focus is for the United States. Pasztor (2010d) outlines the importance of keeping companies in the US, explaining that "losing the lead in space has national-security and industrial consequences" for "such industries as shipping, airlines and oil exploration" who "depend on orbiting satellites to gather and send essential data" (para. 6). These industries are worth "more than \$260 billion annually" (Pasztor, 2010d, para. 6). Pasztor (2010d) chooses to deploy exact numbers to show how important these industries are-- very few people could dispute that \$260 billion annually is a lot of money. Pasztor (2010d) also discusses security aspects of space, as "the Pentagon views space as a frontier where foes will try to undermine U.S. security", since "Russia, China, India and Brazil all have, or are determined to create, robust space programs" that could be used to undermine our national security (para. 7, 8). National security is interesting rhetorically, as it conjures images of international threats that help shape public opinion in favor of the existence of a federally-funded shuttle program. This discussion may even conjure Cold War fears of the space race and thermonuclear conflict in a reader, due to the rhetorical decision to list Russia first in the list of countries competing to

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potentially undermine the United States in space. As such, Pasztor (2010d) provides strong argumentation in favor of programs that keep space industries in the United States, which he indicates requires a continuation of the shuttle program.

Even the articles discussing what actions to be taken by NASA took a negative tone when discussing the program's cancellation, indicating that it would have been preferable to any alternative. Pasztor (2010h) talks about the \$58 billion bill passed to "revive NASA's manned-exploration programs while funding plans for pioneering rockets able to blast astronauts into orbit" (para. 2). Even though this bill was a compromise between the White House's private sector goals and Congress' government-focused goals, the bill only authorized about half of the funding requested by the White House, meaning it "falls short" of what "traditional aerospace contractors such as Lockheed Martin Corp. and Alliant Techsystems Inc. initially sought" and fails to "support NASA's drive to outsource some of the agency's core missions" (Pasztor, 2010h, para. 11). Pasztor (2011a) starts off positively but quickly shifts by saying "NASA's funding remains in flux", citing several nameless officials who "have warned they may need more money and time than Congress has provided to build a heavy-lift rocket" (para. 14). NASA itself has even drawn fire for various actions, as Pasztor (2010e) points out in discussing the "generous" bonus plan that NASA chief Charles Bolden developed for himself and other astronauts (para. 1). The discussion of bonus plans is designed to prove to the reader that NASA is incapable of handling any extra money received, thereby supporting the initial claim provided by these articles that the shuttle program should not have been cancelled. Hickam (2010b) attempts to resolve NASA's problems by giving it a focus on developing a moon base, but expresses skepticism at the efficacy of this proposal. Hickam (2010b) blasts President Obama's

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choices for NASA leadership, as “Mr. Holdren is prone to apocalyptic climate-change visions. Mr. Bolden has never led anything more than a six-person shuttle crew. And Ms. Garver, who has held administrative posts at various organizations including NASA, is known primarily for touting herself as the ‘Astromom’ while trying to convince dubious contractors to pay the Russians to fly her into space” (para. 4). Hickam (2010b) finally criticizes the way NASA operates post-cancellation of the shuttle program, as “without solid goals or leadership from NASA headquarters, they [NASA personnel] attend meetings, create PowerPoint charts, and count the days until retirement” (para. 7). The characterization of NASA as workers without a goal is important here by directly contradicting the notion that it has any goals or purpose now that the shuttle program has been cancelled.

The Wall Street Journal-- The Economy Frame

Several of these articles had a positive spin on the cancellation of the shuttle program, while most had a negative spin. Krauss (2011) provides the most positive detail, indicating that it “provides an opportunity to rethink space exploration, and to cut losses from a failed program that has been a colossal waste of resources, time and creative energy” (para. 1). Describing the program as a “colossal” waste helps support the author’s argument that the “lion’s share of costs associated with sending humans into space is devoted... to making sure they survive the voyage” and that “no other significant science has emerged from a generation’s worth of round trips in near-earth orbit”, meaning costs associated with the program were not worth its continuation (Krauss, 2011, para. 6). Krauss (2011) compares exorbitant costs associated with the shuttle program with various non-manned space projects, such as the Next Generation Space Telescope, and concludes that those non-manned space projects are substantially more cost-effective and

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useful at gathering data and collecting information. Considering that “the real science done by NASA has not involved humans”, the author heavily believes the cancellation of the space shuttle program was a valuable action (Krauss, 2011, para. 10). Krauss (2011) additionally pre-empted a few arguments in support of the shuttle program, particularly that it’s necessary for access to the I.S.S. and to fix the Hubble Space Telescope. Regarding the I.S.S., Krauss (2011) calls the station “a largely useless international make-work project that was criticized by every major science organization in this country” (para. 9). Krauss (2011) contrasts this negative tone in discussing the Hubble Space Telescope, as he believes missions fixing it “were not only exciting, but useful” (para. 7). Even so, Krauss (2011) questions whether “they were necessary to achieve the science goals”, and concludes that the “multibillion yearly price tag for the shuttle program” was too costly to justify anyways (para. 7, 8). Because Krauss (2011) describes each of these arguments in economic terms, focusing primarily on the significant cost attached to the shuttle program and each of its spinoffs, he heavily portrays the benefits of the shuttle’s cancellation to the reader.

The Wall Street Journal (2011) agrees that ballooning costs justified the cancellation of the program, specifically citing costs over the years to prove its argument. This author indicates that the program cost “between \$115 billion and nearly twice that amount”, and that its sequential cancellation was important economically (The Wall Street Journal, 2011, para. 2). These costs also don’t account for various “wild cards” that influenced how expensive the program was, such as the “opportunity costs of capital invested that otherwise might have been spent elsewhere”, or “Defense Department spending on the shuttle, which by 1996 had totaled roughly \$18 billion, in today’s dollars” (para. 12). This is important since very few authors are

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willing to detail the costs of the shuttle program over the years and account for extraneous or miscellaneous costs.

Pasztor (2010h) focuses primarily on the budget compromise that resulted between the White House and Congress to determine the space agency's funding, taking a skeptically positive tone when discussing the situation. It quotes a few Representatives who believe that they are "saving jobs" and that it's "better to consider a flawed bill than no bill at all", since it gives "clear direction to an agency that's floundering" (Pasztor, 2010h, para. 12, 5). The idea that this compromise is better than nothing helps detail for the reader that NASA still has some purpose for existing.

Campo-Flores (2011) and Pasztor (2011f) describe the cancellation of the shuttle program as negative by relying on the rhetoric of job loss. Campo-Flores (2011) discusses job loss along The Space Coast in Florida, amounting to roughly 9,000 lost jobs in the small region. As a result, private companies such as SpaceX and Embraer SA are attempting to fill the gap left behind in the region (Campo-Flores, 2011). There's "still a long way to go to fill the void left by the shuttle program", and "jobs are scarce for many space-program veterans", proving that the shuttle was integral to the economic well-being of this region of the country (Campo-Flores, 2011, para. 5). Pasztor (2010f) focuses on the damage that Alliant Techsystems Inc, who had a \$400 million investment in Constellation, experienced because of the cancellation of the program. Alliant was "potentially the biggest corporate loser", even though they're expecting "a strong outlook" due to expanded and diversified investment outside of NASA (Pasztor, 2010f, para. 1, 6). This rhetoric of "a strong outlook" cuts strongly against the general negativity of the article, being especially stark in contrast to its quote by Representative Giffords who believes

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that President Obama's plan "discards five years and \$10 billion of development" and "offers little in return" (Pasztor, 2010f, para. 5). This powerful rhetoric helps prove to the reader that the shuttle's cancellation was problematic for spending concerns.

Along similar lines, several articles discuss the budgetary fights spurred due to the cancellation of the program creating a lack of focus for the space agency that's bad for investments in space in general. NASA is "scrambling" to come up with a focus to "placate congressional critics as senior members of the House Appropriations Committee say that White House's plan for the agency won't fly on Capitol Hill", as Pasztor (2010b, para. 1) discusses. This idea of NASA "scrambling" is important to consider in the context of their current budget cuts, since they're left with little room to maneuver. As a result of these budget cuts, NASA is expected to "rely on technical collaboration and perhaps some financial cooperation with other nations in order to get its astronauts deeper into space", which, as Representative C.A. Ruppersberger from Maryland is quoted as saying, proves that the cancellation of Constellation was "too quick" (as cited in Pasztor, 2010b, para. 12). Pasztor (2010g) takes this discussion a step further by indicating that Bolden was "blasted" during a hearing for "failing to provide realistic budget numbers to back up the White House's proposals" (para. 2). Congressional officials are especially concerned about the lack of basic detail in NASA's budgetary plan due to the immense health benefits plan Bolden proposed for previous astronauts (Pasztor, 2010e). Pasztor (2010d) discusses the economic reasons these budgetary battles matter, as space industries and assets have a combined worth of "more than \$260 billion annually", due to a whole load of important things relying on it, including "such industries as shipping, airlines and oil exploration" as well as "TV signals, cell phones, ATMs, some credit card machines and many

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Internet connections” (para. 6). Pasztor (2010d) ties this back into the cancellation of the shuttle program, as it “initiated a chance to chart a new course for the U.S. space program”, “but instead triggered conflict that is as much political as technological” (para. 13). These criticisms force the reader to critically interrogate the potential benefits accrued from the shuttle’s cancellation, since these industries and technologies are critically important for the existence of the modern economy.

The final economic criticism comes from Lee Hotz (2011) who discusses how the cancellation of the program cedes US space leadership to Russia. This increases the costs for the US to fly into space, as NASA plans on spending roughly \$43.4 million per astronaut to fly aboard the Russian space shuttle Soyuz to the International Space Station, “a 57% increase from the first-half cost” (Lee Hotz, 2011, para. 9). While Lee Hotz (2011) does not discuss the value of US space leadership itself, this discussion of Russia could be a rhetorical move to elicit Cold War fears about losing the Space Race.

The Wall Street Journal-- The Bureaucracy Frame

These articles focused on the budgetary battle that split the White House and Congress post-cancellation of the space shuttle, and were divided about whether the cancellation was positive or negative. The articles discussing the event in a positive light focused on budgetary concessions being valuable. Pasztor (2010c) talks about these concessions in the context of actions being taken by the White House to “placate critics”, including “details of the decision to use the Orion space capsule” and “help[ing] Lockheed and the government avoid significant termination costs associated with shutting the Orion project down” (para. 1, 3). The rhetoric of “placating critics” helps show that the author has designed an argument with the explicit

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intention of swaying the public to believe that these concessions are valuable and deal with budgetary battles as they arise. Considering that these concessions “are expected to save some 2,000 Florida jobs”, this is a rhetorical move meant to placate critics of the shuttle’s cancellation (Pasztor, 2010c, para. 10). Pasztor (2010i) discusses the benefits these concessions have on the private sector in the context of SpaceX’s Dragon capsule, the first successful space capsule launch conducted by a private company. This flight “provided a high-profile boost to President Barack Obama’s controversial move to outsource some of the core functions of the National Aeronautics and Space Administration” to private companies, giving credit to these concessions (Pasztor, 2010i, para. 10). Weinberg (2010) continues this idea by praising the agency’s shift in focus towards unmanned and private sector development, as “the argument for using astronauts to service satellite observatories is now out of date” (para. 7). The focus on the private sector is designed to show the reader that space exploration will continue in full-force due to the program’s cancellation.

Pasztor (2010h) has a negative stint to his positive approach to the cancellation of the shuttle program, indicating that the “unusual bipartisan fashion” by which the House of Representatives “approved a three-year \$58-billion compromise bill intended to revive NASA’s manned-exploration programs while funding plans for pioneering private rockets able to blast astronauts into orbit” is unlikely to be helpful, due to insufficient quantities of funding (para. 1). The idea of this compromise being “unusual” portrays the confusion that Congresspeople feel post-shuttle cancellation, as they are more willing to compromise to get out of this odd situation. This is meant to show readers that Congresspeople understand the concerns of the American people after the shuttle’s cancellation and are doing what they can to address those concerns.

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Even though it's "unusual" and "falls short" of expectations, the article indicates the compromise bill is positive, as "nearly every speaker concluded that swift approval was preferable to leaving NASA in limbo for months longer" (Pasztor, 2010h, para. 15). The comparative rhetoric describing the bill as better than the alternative provides Pasztor (2010h)'s negative stint, since, while ultimately positive, the compromise bill could be substantially better.

Several of these articles take the stance that the budgetary battles and concessionary bill were negative. Pasztor (2010d) and Pasztor (2010g) both believe these political fights are terrible for NASA's edge in space exploration, as "the U.S. will end up without a clear plan, destination and timetable for sending astronauts deeper into the solar system" (Pasztor, 2010d, para. 5). Calling this budget battle a "political fight" that could "leave the U.S. with no way to blast astronauts deeper into space until close to 2020", portrays the idea that it could leave NASA with no clear purpose (Pasztor, 2010d, para. 10). Pasztor (2010g) additionally criticizes Bolden's inability to provide accurate funding projections, as these "faulty cost projections" could "be devastating to the rest of NASA's programs", as Representative Bart Gordon of Tennessee is quoted as saying (para. 5). This isn't just damaging to NASA's space exploration programs, but also to the health care programs provided for astronauts, as proven by Congressional backlash to Bolden over his expensive health care plan for astronauts (Pasztor, 2010e). These budget battles are also detrimental for private companies such as Alliant Techsystems, who is slated to lose \$400 million over the cancellation of the shuttle program (Pasztor, 2010f). This portrayal and discussion is important, as it shows the reader that NASA's value becomes baseless and difficult to defend now that its primary showpiece is non-existent.

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This bureaucratic infighting does not only exist between Congress and the White House, but also within agencies claiming express authority to regulate the newfound private sector space investment (Pasztor, 2010a). The FAA and NASA have engaged in bitter disputes over who regulates private sector space launches, as the FAA “currently has safety oversight of rocketships intended to blast tourists to the edge of space” and thus believes they have authority, while NASA, who is “developing its own, independent safety requirements covering proposed commercial transportation of astronauts” also has reason to believe they have authority here (Pasztor, 2010a, para. 3, 4). Pasztor (2010a) details the verbal fight between George Nield, the official in charge of commercial space transportation for the FAA, and Senator Bill Nelson of Florida, who argues in favor of NASA having control over this sector to further prove how much of a bureaucratic mess the cancellation of the shuttle program is. This is a valuable rhetorical discussion, as these are important officials in the field of space exploration, proving how divided people are over regulating private space exploration.

Various museums throughout the United States and the rest of the world are even arguing over who gets ownership over these shuttles now that they are no longer in use (Michaels, 2010). NASA has offered “the space planes for free” as long as museums pay for shipping and handling—a whopping \$28.8 million per shuttle, meaning few museums can afford to buy one (Michaels, 2010, para. 3). Even so, various politicians are already “bickering over” where the shuttles are to go (Michaels, 2010, para 9). For example, New York Senator Charles Schumer believes that New York should receive a shuttle, while claims from “Ohio’s entire congressional delegation” have made the argument that Ohio deserves one (Michaels, 2010, para. 8). Even Cité de l’Espace in France has put in an offer for the shuttle (Michaels, 2010). That being said,

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Michaels (2010) discusses how Congressional involvement in the process is inevitable, and that as soon as NASA decides where these ships are to go, “Congress will immediately go into an uproar and un-decide for them”, as shuttle expert Dennis Jenkins is quoted as saying (para. 6). The inclusion of Jenkins’ quote is important, as it proves how widespread arguments about ownership of the space shuttles is.

Discussion

Given the conflicting opinions of these articles, it's hard to say definitively how the public writ-large reacted towards the cancellation of the US space shuttle program. Even so, it can be concluded that articles published by *USA Today* were almost completely positive when discussing the event, articles published in *The Wall Street Journal* took an almost completely negative stance in discussing the event, and those published in *The New York Times* were mixed in their reactions. This is also true for each of the frames discussed—the science and exploration frame and economy frames were mostly positive with some negative reactions mixed in, while the bureaucracy frame were mostly negative with some positive reactions mixed in. This is reflective of the overall opinion of the American public towards the shuttle's cancellation--mixed.

However, some conclusions can be drawn about reactions towards the end of the program based on the frames. Most articles discussing the cancellation of the shuttle program through the science and exploration frame that took a positive tone rely on the rhetoric of newfound research and pushing towards new developments in space science. Those articles who take problem with the program's cancellation rely on the rhetoric of NASA lacking purpose, a problem, however, that should be sufficiently remedied by various directions being taken with new NASA research. And even if NASA does lack a focus in its scientific research, most of the articles covering the shuttle's cancellation discuss the massive incentives in private sector space research that should cover the problem. Thus, the positive rhetoric and argumentation should overwhelm any of the negative rhetoric and argumentation.

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In terms of the economy frame, the positive rhetoric of private sector investment should outweigh the negative rhetoric as well. The majority of these articles discuss the large amounts of money that NASA has to invest in other projects and companies; as such, it has incredible ability to push new research forward. The rhetorical focuses of those articles taking a negative stance related to job loss and lack of focus for NASA research and increased private sector investment should be more than capable of overcoming job loss since private companies can simply hire the workers who lost their jobs, an argument that's even admitted to be true in the article written by Campo-Flores (2011). And the arguments in favor of NASA's lack of scientific focus is broad and persuasive, as there are a lot of cool things NASA can focus on now that the shuttle program has been cancelled.

For the bureaucracy frame, negative rhetoric surrounding the program's cancellation overwhelm positive rhetoric, given that almost every article discusses political infighting among the federal government and the private sector. This would be devastating for those who believe the event was portrayed in a positive light by the media if this infighting mattered much for the public. Given that newspapers can strategically frame the discussion to be around cool, new scientific explorations and getting the government a lot of money, the rhetorical focus on political infighting is weak.

This analysis reveals that the space shuttle program was a national treasure whose time had come. Given how expensive the program was, newspapers could easily describe its cancellation in a way that made freed up funding seem helpful for other projects. But given how important the shuttle has been to the American public, the transition to a world without it is bound to be difficult, especially for those who worked on the program and those in public office

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who consistently supported it. Most complaints regarding the program's cancellation revolve around the lack of focus for NASA, either as an agency, for its workers, or as something for the United States to show off to the world. This fact simply proves that the transition away from the shuttle program is going to take a while to acclimate to.

The choice to analyze newspapers is an important part of the process of figuring out how NASA will refocus itself in the future since these articles were available to a wide audience and cited numerous officials working in relation to space exploration, from Congresspeople, to NASA employees, to private sector workers. News sources also shape the public's perception of an issue, which is important when determining the likelihood of federal funding for science programs (Kelley, 2012).

Conclusion

Based on the public reaction towards the cancellation of the shuttle program given prominent newspaper coverage of the event, it seems likely that the public's response towards the event was overall positive with a slightly negative bent. This mixed response makes sense, given how ingrained in the public psyche the American space shuttle program has been for the past several decades (Roper Center, 2015). From this, the conclusion can be drawn that full funding for the shuttle program is unlikely to be restored, at least for a long time. Given the recent election of Donald Trump, this seems even more likely, due to his anti-government stance on research and development in general.

Future research on this topic could focus on a few things. Analyzing official government discourse on this event, with sources ranging from press releases to official speeches, would be a good form of inquiry. Re-conducting this analysis with an inclusion of duplicated articles would be interesting, as the re-appearance of these articles may indicate a higher likelihood of them being read by a larger number of people. Searching for articles discussing the program's cancellation and the use of a Cold War metaphor may be useful for describing how the Cold War still prominently affects American society. Additionally, research that takes a regional approach towards the event would be a place to conduct future analysis, as responses to the event were likely more negative in sections of the country relying on space jobs, like in the parts of Florida or Texas where NASA space jobs were clustered.

Regardless, this event does not spell the ending of the space program in America, given the numerous blossoming corporations interested in furthering space exploration. Additionally,

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NASA still has funding for non-manned space exploration. All of these different factors make it likely that America's exploration of the cosmos will continue in the future.

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