To the Graduate Council:

I am submitting herewith a thesis written by Jodi M. Lockaby entitled "Print Media Portrayal of the culture of NASA Before and After the *Challenger* Explosion." I have examined the final paper copy of this for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science with a major in Communications.

Mark Littmann, Ph.D., Major Professor

We have read this thesis
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Vice Provost and Dean of Graduate Studies

Print Media Portrayal of the Culture of NASA Before and After the *Challenger* Explosion

A Thesis Presented for the
Master of Science Degree
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Jodi M. Lockaby
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Dedication

To my mom, who is my hero for so many reasons, and to Sand, for believing that there was nothing her sister could not accomplish. Both have always been my closest friends. To Jack, who has always cheered for me. And to Matthew, for endless encouragement and the motivation to finish.

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Abstract

In recent years, culture has become a major topic within organizational studies. The culture of an organization affects how individuals in the organization interact, what is valued in the organization, and what goals the organization strives to achieve.

However, the view of culture that outsiders hold of an organization also has significance for the organization. Mostly, the mass media influence the outsider's view of an organization's culture. Yet, organizational cultural studies have failed to look at the external perception of an organization and how the external viewpoint is affected by major actions by or events in the organization. This study attempts to expand approaches to the study of organizational culture by evaluating the print media portrayal of NASA's overall culture from the perspective of an outsider to the culture.

A content analysis of articles from four large-circulation and geographically dispersed newspapers was conducted using sampling dates from the year before and the year after the explosion of NASA's Space Shuttle *Challenger*. The articles were analyzed for evidence of established indicators of organizational culture and any positive, negative or neutral reference associated with the indicator.

The results show that the print media not only conveyed to the public indicators of NASA's organizational culture, but that the print media also influence the public's positive or negative perception of the culture. The print media's interpretation of NASA's culture shifts – within the short period of a year – from sympathy before the explosion to blame for the first months after the *Challenger* crash and then to acknowledgement of NASA's ability to move ahead with space exploration.

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Chapter I

Introduction

In trying to understand an organization or group, there is a tendency to focus on the culture of the organization because "every business – in fact every organization – has a culture … that whether weak or strong, has a powerful influence throughout the organization" (Deal & Kennedy, 1982, p.4). Culture is most often defined by the actions, behaviors, relationships and goals within a group that affect the total environment of the organization (Alvesson, 2002, p.5). Alvesson states that "Cultural meanings guide thinking, feeling and acting." From an external perspective, culture *could* be defined as the "image" of the organization. From this image, individuals, researchers and managers give culture a label as positive or negative (or possibly strong or weak) overall, without explanation of individual situations that might contradict the designated label (Alvesson, 2002, p.188), although a neutral status of the culture might be possible. However, in the case of culture, the "image" must have evidence, or indicators, to support the claims that the "image" strives to make.

Image, in this study, is distinguished from culture by function. The function of an image is to present a positive presentation of the organization as a whole to the public without specific reference to the values of the organization. In fact, a favorable image of the organization may be presented in order to cover for a negative aspect that is being exposed. Culture, on the other hand, is perceived, whether correctly or not, as a direct indication of the values, goals and important aspects of the organization. Public relations

professionals study image and how to positively promote the image of an organization externally, while culture studies have historically looked only at the internal culture and the effects of the culture on the actions of the people within the organization. There has been a lack of focus on studies that examine the image of the culture from an external perception, which makes this study a start toward understanding culture from a different, yet important, perspective.

Is the image of the culture strong – as might be measured in profit margins or client base – or does the organization have a poor image that will affect profits and service? Or, is the image of the organization's culture neutral, providing no evidence about the values of the organization? These questions are important in evaluating culture internally so that the degree of success can be measured and compared to standards and goals. The questions raised from the "image" of an organization can also be important in how outsiders view the culture of the organization. Most people do not even think about how they view the culture of an organization that they are not a part of – at least, until a major event occurs.

Major events or situations can have drastic effects on organizational morale, behavior, and overall culture because they tend to change the way an organization, or individuals in the organization, view the organization's effect on the marketplace or society, and may help the individuals decide if the organization's culture is effectively strong or weak. Further, major situations, both positive and negative, may impact public participation in the organization based on the perception of the company's culture before, during, and after the event or situation. At this point, "image-salvaging," as defined by Tierney and Webb to be the "efforts undertaken to convey positive impressions to the

public to reduce stigma resulting from perceived misconduct," is not sufficient. An organization must also understand how the culture is perceived externally.

With companies answering to public stockholders, and in the wake of the Enron and WorldCom accounting scandals of 2002, it is becoming apparent that the public's perception of the culture of an organization has a direct effect on how the public supports that organization, in both actions and financial decisions. Scandals such as Enron have further proved that a crisis or failure situation determines the strength of the public's perceptions.

Purpose of Study and Research Questions

The Space Shuttle *Challenger* explosion on January 28, 1986 was one such major event. The explosion affected hundreds of contractors throughout the United States and Canada, the American public, and NASA itself. Public views of NASA were reflected through a questioning of space exploration and the space shuttle program that had not occurred previously. As views of technology and space travel changed, views toward the credibility and responsibility of NASA possibly changed also, leaving the American public with a different perspective of what NASA represented and how it was represented. These views reflected a shift in attitude towards NASA as a decision-making institution, but did not address a possible shift in the view of NASA's culture after the explosion. Cultural associations are important because they allow a group, or an individual, to better identify or understand the activities and motives of another group or organization.

This paper explores the outsider's perspective of culture as a product of print media manifestations. The print media may be biased or discriminatory in the information that is chosen, but are still a main source of information for public consumption. A limitation to this type of study is that the actual culture of NASA may not be observed or presented due to subjectivity of the print media author(s). However, it is argued that the actual culture is not important when identifying perceptions because the public will believe that their perceptions are reality for the organization.

A single study that directly explored the outsider perspective on internal culture, and the effect that this perspective had on support or participation, could not be found. A few studies make the connection between public perception of an organization and its culture, and the attitude of the public toward the organization. A study of the a 1997 strike by Teamsters at United Parcel Service shows that good public relations is necessary for issue management because of the increase of media influence on employee-labor relations (Miller, 1999, p.5). Both sides made claims to the media, but UPS was so involved in strategies to ease the strike that it missed opportunities to present a view of what the company's culture actually was and the values that the organization felt were important (p.9). Because of this missed opportunity, most people empathized more with the Teamsters than UPS, although the claims that the Teamsters were making against UPS were not entirely true. Miller states that his study helped to show that "public relations practitioners must gather information about reactions of the public toward the organization and public opinion toward issues important to the organizations" if they are to practice issue management (p.5). The basic design of his study looked at a collection of news articles in the month of the strike as well as the 18 months prior. Articles had to

include direct labor strategy or UPS reaction to the strike to be considered in the study (p.6). Miller concludes that in the 1997 strike, "UPS learned the hard way that it is not the issues themselves, but the public's perceptions of the issues that ultimately determines who wins. In the war of public opinion, UPS lost" (p.5). While this study did not specifically look at the culture of UPS or the Teamsters, it does illustrate the need to understand the public perception of an organization for continued support.

Due to this lack of research, further investigation should be given into how outsiders to an organization view the culture of the organization, especially after a major event. The research discussed in this report examined the view of NASA's culture from an outsider's perspective (as presented by print media). Two main research questions guided the study.

RQ_1: Do print media provide a perception of culture to the public?

RQ_2: What is an outsider's view of the culture of NASA, as obtained through print media, in the 12 months prior to and the 12 months after the *Challenger* explosion on January 28, 1986?

Organization of Material

The beginning of this study presents a literature review evaluating the role of culture as an important part of organizations and how outsiders to the organization come to comfortably understand the internal culture, as well as a discussion on the limitations of organizational cultural studies that fail to study the external perception. The review also introduces the influence of NASA and its culture in public life, and looks at how the media play a powerful role in presenting NASA's culture to the public. A brief history of NASA and the space shuttle is also included for background information.

The rationale for this study and research method will be discussed in detail in later pages. The rationale centers on understanding the link between the perception of an institutional culture and participation in, or support of, an organization. The rationale notes why this topic is of specific interest to a student of science writing, as well to public relations practitioners and anyone writing about or presenting organizations to the public. The research method section sets forth a design for completing the research indicated in the guiding questions. That section also introduces the evaluation tools that will be used on each newspaper article to ensure consistency of information.

Chapter II

Review of the Literature

Organizational Culture

For this study, culture is defined as "cohesion of values, myths, heroes, and symbols that have come to mean a great deal to the people who work there [in an organization]" (Deal & Kennedy, 1982, p.4). This definition of culture brings the observable actions and traditions of the company to the front and assumes that these traits are indicators of an organization unified in its goals. An organization unified does not mean that the organization evades negative events, but asserts that the strength of the culture on the inside is portrayed to the outside, helping the organization to retain a positive image throughout a crisis. Values, heroes, and rituals will be used as operational variables in this study. These categories are further defined in the methods section as measurable cultural indicators of an organization.

Deal and Kennedy conclude "the people who built the companies for which America is famous all worked obsessively to create strong cultures within their organizations" (p.8) using the business environment, values, heroes, rites and rituals, and cultural network as the criteria for establishing strong cultures (p.13-15).

Cultural Research

Organizational cultural research "seeks an in-depth understanding of the patterns and meanings that link manifestations together, sometimes in harmony, sometimes in bitter conflicts between groups, and sometimes in webs of ambiguity, paradox, and

contradiction" (Martin, 2002, p.3). The purpose of studying culture is to seek understanding among the paradoxes and workings of an organization so that each action or paradox can be analyzed as a variable that can be understood for that culture in order to make generalizations affecting the organization (Martin, 2002, p.42). Managing, and changing, culture based on these generalizations either stimulates a culture to thrive or introduces more conflict, negatively impacting the culture, which could be devastating to the organization.

Cultures may continuously be involved in cycles of change, or adaptation, but the integrity of a culture is most tested when an event suddenly challenges the foundation of the organization's beliefs or goals. In this case, the major event, which is most often negative, but could be positive, draws attention to the culture of the organization.

Cultural studies theorists attempt to "examine the symbolic environment created by the mass media and study the role that the mass media play in culture and society" (Severin & Tankard, 2001, p.16). This emphasis on the role of media in establishing relationships between culture and society is useful for a study that will examine the influence of print media in determining how outsiders view an organization's culture.

How does an outsider learn about the culture of an organization? Individuals in an organization have both commonalities and differences that are reflective of their culture. Objectively, all organizations, and even less structured groups of people, have habits, attitudes, and behaviors that are praised or discouraged in accordance with the values that the culture shares. Habits, attitudes, behaviors, relationships with others in the organization that are highly regarded or ignored, acts of praise or disapproval, productivity and profitability are all observable symbols or results of culture that are

accessible to the media, and therefore the public, at some level. Individuals and specific groups in a culture use stories, dress, and rituals to interact within their culture, reflecting core values. All habits, attitudes or behaviors can be classified into the categories of values, rituals or heroes, which Deal and Kennedy identify as key elements to a successful culture (1982).

Research on how outsiders – the public – view the culture of an organization may indicate whether institutional culture is a necessary part of a good or successful organization, even to external observers. It may be surprising (from an organizational standpoint) if the study shows that some of the cultural actions and values the organization views as important are not perceived as important to the organization by the outside public while elements missing or of low emphasis to the organization prove to be of significant importance to the outside public's perception of the organization.

Limitations of the Cultural Approach

A main limitation to studies of culture has been the complete lack of research that studies how outsiders perceive the culture of an organization. Searches conducted on various databases, including Lexis-Nexis Academic Universe and ComAbstracts, and journal catalogs in June 2002 yielded no results of cultural studies directly examining an outsider's perspective. This is surprising because public relations practitioners work hard to get an image of the organization out to the public that emphasizes the positive aspects of a dedicated, caring culture that is driven toward specific goals and outcomes, usually profitability or funding and quality customer service. Because discussions of internal

culture are prevalent in organizational research, it seems that public relations practitioners would use the culture of an organization to promote the organization as well.

By ignoring the external perspective on institutional culture, researchers have also overlooked the opportunity to further study the impact of the media in shaping the thoughts of the public. Entman suggests that the media cannot tell the public what to think because "Americans exercise their own idiosyncratic dispositions as they ponder the news, but the media's selection of data makes a significant contribution to the outcome of the thinking" (1989, p.362). A study on the external perception of culture as presented by the media, or from the standpoint of any entity in a position to espouse knowledge, provides the opportunity to research the effect of the media on how outsiders view an organization's culture, as well as the importance of cultural understanding to outside participants.

Interesting to this study is the fact that NASA, as a government agency, is not allowed to promote itself to the public or Congress. Therefore, they utilize the public affairs department to get *information* out to the media and the public. Peggy Cleggett, public affairs deputy associate administrator for NASA, defines the difference as follows: "I see public relations as trying to convey the best about a company. Public affairs is providing information and access to anyone and everyone" (Case Study, *PR News*, 1999). Much of the difference between public relations and public affairs is in the title, as many public relations professionals work to portray the best image of a company by providing access and information to the media and the public. The main distinction is possibly in the fact that NASA cannot officially run a public relations campaign to acquire support, although many would argue that NASA does run public relations campaigns, such as the

Glenn flight in October 1998 (Hynes, 1998). In examining how an outsider views the culture of an organization, the difference between public relations and public affairs may become blurred because the media is not only allowed interpret the information, but to influence how the information presented from either department is used in dissemination to the public. Because NASA cannot officially promote itself, it must rely on the media, more so than non-government agencies, to give fair and accurate coverage.

A second limitation in cultural research is the lack of understanding that outsiders have of why or how members of a culture make certain choices or decisions based on their culture. Values and rituals of an organization become variables defining the culture of its units and individuals. The rituals that individuals in a unit or group follow and the values that the entire group tries to attain not only define the culture, but determine the strength of the individuals and individual groups (or divisions) in an organization. How different individual groups or divisions are perceived together is important in understanding the culture of an organization as a whole. However, most current research examines a managerial viewpoint only, or excludes a cross-section of the culture by focusing only on certain groups within, without examining the importance of interaction of rituals and values among the many different groups in influencing the culture. This is problematic because the individuals may give a positive image of the organization, even if this view is not accurate. For instance, in an article titled "What it's like to work in IT at NASA," the director of the information technology and communications division, Sandra Daniels Gibson, was interviewed about the culture of the entire IT organization (Goff, 1999). Gibson gives her description of the culture, which may or may not be accurate, but is most likely different from someone who works in a beginning IT position

at NASA because of the difference in everyday tasks that each faces. If Gibson's is the only view of the culture presented to the public by the media, then the public must decide if this is what they believe NASA's IT culture to be, or whether it is a merely the image management would like to see for the culture of the IT department. It is important to note that this study will not try to find an accurate view of NASA's culture, but instead will focus on the view, accurate or not, that is portrayed to outsiders by the media.

NASA: A Brief History

When the space program was launched in 1958, everyone involved expected risks. In the following years, out of a highly qualified group, seven astronauts were selected and presented to the American public as heroes. All of them had jet test pilot experience, thousands of hours of flight time, and an education marked by at least a bachelor's degree. All of the astronauts were perceived as family men who seemed to exemplify the ideals of the American dream in their home lives.

Most importantly, these first seven defied the risks. They worked with little concern about their rockets exploding and being killed in space. Each of the men was well aware of the dangers involved in space travel because they faced many of the same dangers every time they climbed into the cockpit of a jet. In *Moon Shot*, Alan Shepard and Deke Slayton describe the mentality of the astronauts: "None of the Mercury Seven believed a word of the hype. Hell, they were test pilots and that was that. They simply wanted to fly higher and faster, and in the process they'd do anything to establish America as the world's leader" (1994, p.62).

During this time, the public viewed the culture of NASA as courageous and intelligent because of the focus on a group of individuals working at NASA who were willing to accept high risk for the good of the country. Author Tom Wolfe describes the outsider's view of NASA's culture with the question, "What is it that makes a man willing to sit on top of an enormous Roman candle, such as a Redstone, Atlas, Titan, or Saturn rocket, and wait for someone to light the fuse? (1979, p.ix)" The Mercury program was highly successful.

In May 1961, President John F. Kennedy committed the nation to putting a United States astronaut on the moon before the end of the decade. This one announcement was an inspiration to NASA and the public, a commitment that America would win the space race against the Soviet Union that began with the Soviet launching of *Sputnik* in 1957. As the space race proceeded, NASA came to represent America's superiority as a scientific and technological nation. Most importantly, most of America was behind NASA because NASA had something that could appeal to almost every American. This surge of patriotism and support for NASA is the reason why it is important to understand how outsiders view the culture of the organization. The whole country was involved in the race to put an American on the moon, and they were proud of the program that would get them there. By the late 1960s, the outside perspective of NASA was that it was an unstoppable organization with a culture of people committed to accomplishing the near impossible by the extraordinary dedication of highly intelligent scientists and engineers, and a corps of skilled and brave astronauts.

Under the influence of President Kennedy and NASA, the Apollo project and its predecessors became the focus of America's attention, putting the goal-driven culture of

NASA on display for the public. Even when Congress wanted to limit the funds that NASA would receive, Congress and the public were quickly persuaded that NASA was making progress in many areas that would be useful to all, continuing the image of NASA's culture as a dedicated team.

However, on January 27, 1967 a fire broke out during a routine ground test of the Apollo spacecraft, killing all three astronauts inside when they could not open the hatch to exit the capsule. This event caused alarm because it was the first time that American astronauts had been killed during a NASA training exercise or spaceflight. The effect of the Apollo fire on the public attitude's toward NASA's culture was that the public felt better about the program after the investigation was completed and the mandated changes were made to correct the problems with the hatch and other defects of the Apollo Command Module. The public now viewed NASA's culture as responsible and conscientious.

Eventually, the Apollo 11 mission did land men on the moon and brought them back to earth safely. The Apollo 11 moon landing seemed perfect. Only years later would the public learn disquieting details, such as the fact that Neil Armstrong and Buzz Aldrin were so low on fuel that they had barely enough to land the lunar module (Shepard & Slayton, 1994, p.23-29). What mattered most on July 20, 1969 was that America had beaten the Russians to the moon, where an American flag now stood. The media carried images and stories that satisfied the inquisitiveness of the public to know everything about the mission, the astronauts, and what they did while they were on the moon, reflecting the ultimate accomplishment of NASA's culture to the public. The image of an

astronaut standing on the moon, with the American flag, the lunar module, and the other astronaut reflected in his visor stirs up feelings of national pride even today.

Not all of the Apollo missions would be successful. On April 30, 1970, while Apollo 13 was en route to the moon, a short circuit in wires near an oxygen tank caused an explosion that nearly doomed the astronauts and converted their mission from a lunar landing to a fight for survival. The flight path of the spacecraft was altered to get the astronauts home as quickly as possible. Engineers worked to find ways to filter air and to conserve what little power the astronauts had to work with. For the first time in the history of the space program, the public and NASA were faced with a high probability that a crew would not return safely. Suddenly, the dangers of spaceflight were painfully evident. As Claude Jensen notes in his book *No Downlink:* "Now the media took notice … The Senate asked all private companies and public institutions to allow a short break so that their employees could pray for Almighty God's help in bringing the astronauts safely home … *Le Monde* wrote that the whole human race had been united in its concern for their fate" (1996, p.127). This quote gives insight into how the public, the outsiders, viewed the culture of NASA during the Apollo 13 crisis. When the crew landed, they and the innovative engineers, technicians and flight controllers were instant heroes. NASA, by saving the lives of three astronauts on a mission that had failed to accomplish its objectives and jeopardized the lives of the crew, earned the further respect and confidence of the public as an organization that valued safety and responsibility to the crew.

Challenger: Background Information

On January 28, 1986 NASA launched the Space Shuttle *Challenger* carrying a crew of seven, including America's first private citizen in space. The launch was originally scheduled for several days earlier, but technical trouble and other conditions delayed launch. On the morning of January 28, the decision to launch was once again debated due to uncharacteristically cold temperatures for Florida and ice on the shuttle. However, after tense conversations with engineers and managers at both NASA and Morton-Thiokol, the decision to launch was made. The media, the government, and the American public, all of which had waited anxiously for months for this launch, welcomed (expected) this decision.

Seventy-three seconds into launch, *Challenger* erupted in a huge fireball. All seven astronauts died. Although the exact cause of death is uncertain, three emergency air canisters had been activated, and it is almost certain that the orbiter remained intact after the explosion and during the gravitational free fall. This evidence leads many to believe that the astronauts were alive until ocean impact, which at 207 miles per hour would have caused instant death. Gauges on the canisters indicated that some were used for two minutes forty-five seconds, the amount of time between the explosion and ocean impact. However, it cannot be determined if the astronauts were alive, or if they were conscious for any of the two minute forty-five second fall (Burrows, 1998, p. 556; Jensen, 1996, chapter 44). This evidence would hurt a view of NASA's culture as responsible for the safety of the astronauts. The public was upset to know that the astronauts might have survived the explosion, but that nothing could be done to help them after one of the rocket boosters malfunctioned to set off an explosion in an adjoining fuel tank.

What went wrong mechanically with *Challenger* was investigated and thoroughly documented in a special report to Congress. After an exhaustive investigation it was determined that a rubber O-ring in one of the two solid rocket boosters had cracked from the freezing temperatures, allowing flames from the booster to penetrate the liquid hydrogen tank and ignite it. Morton-Thiokol, the company responsible for developing the solid rocket boosters and the faulty O-ring, was brought in front of the cameras. NASA was also severely reprimanded for the incident, and underwent extensive change in program management and organization, as well as shuttle design. Due to the observable negligence of both NASA and Morton-Thiokol, it was easy to place the blame on these two parties, possibly causing a dramatic shift in how people viewed the culture of NASA.

Media Influence on External Perspectives of Culture

It has been said, "Television and reporters were just as vital to the space exploration agency here on earth as oxygen was to the astronauts in space" (Jensen, 1996, p.362). This section will look at the literature discussing the influence of the media on the public by briefly examining the role of the media in presenting NASA to the public. The literature in this section builds on the idea that the media are mainly responsible for forming the perceptions of the general public.

The media assumed a lot of responsibility in building up the space program. From the beginning of NASA, all forms of media – newspaper, radio, and television – presented the story of the government agency in the words and images of the communication medium and the industry. Initially, the media presented the stories that evoked curiosity and made everyone feel good about the actions of NASA, giving

NASA's culture a positive image. The few disasters and near tragedies that occurred were regarded as acceptable risks because society was willing to accept setbacks in order to reach the goal of landing men on the moon. In the face of adversity and setback, the media pushed the all-American dream of space travel. They presented the human-interest stories of astronauts with their families and having fun outside of training. Like many organizations, NASA was active in promoting this kind of attention from the media, and even had Lt. Colonel John Powers coach the astronauts and other NASA officials about what to say to the media in order to build up favorable public opinion of NASA's culture by giving the public information that was easy for people outside of NASA to relate to (Kaufmann, 1994, p.17). Most astronauts, with the exception of John Glenn and a few others in later astronauts classes, were uncomfortable in the demanding spotlight that press conferences and other media events presented because they were not about the technology of spaceflight or other aspects of the missions. Instead, they were about shaping external perceptions of NASA's image. The public liked media events because they felt as though they were having discussions with the astronauts that one could not find in the latest edition of *Life* magazine.

Life magazine played a critical role as a print medium in presenting NASA's culture to the American public, while at the same time causing resentment among others in print media. In 1959, NASA signed a contract giving *Life* magazine exclusive rights to the personal stories of the astronauts and others, the missions, and inside NASA (Kaufmann, 1994, Chapter 4). The contract eliminated competition among the astronauts for contracts, allowing them to concentrate on upcoming missions and their other roles in NASA instead of negotiating media deals. The contract also provided a common media

experience for the public by presenting all information from one medium. *Life* magazine merged photographs and text to give a more complete story and to reach a larger audience that would not be as constrained by education level. Astronauts, their families, and key engineers and flight controllers were able to submit stories from their viewpoints. The partnership with *Life* ended in 1970.

With NASA's skillful assistance, the media played a major role in keeping the public focused on the goals of the program and how each "failure" was a learning experience toward reaching the final objective. The media also reminded the public that the space program had provided this country with heroes and a sense of national pride. No matter what went wrong one day, or would need to be fixed the next, the media helped foster the attitude that the United States would be the first country to put a man on the moon because of a culture of hardworking, dedicated people.

After Apollo, Congress continuously cut NASA's budget. Suddenly, the civilian space program was competing with the armed forces for space grants, contracts, and budgets. Gone were the days that NASA could ask for almost anything and receive the needed budget or support without hurdles or probing questions.

After the Apollo missions and the Space Lab space station that was used for three long-duration flights, NASA's next big project was a space shuttle proposed to be a reusable launch vehicle. The space shuttle would be capable of delivering payloads into orbit at a lower cost than the small, single-use capsules of the Gemini and Apollo programs. Not only would the shuttle be a reusable vehicle, the size and functionality of the shuttle would also save time and money, and allow for a more consistent flight schedule. The size of the orbiter would allow for room to carry several large pieces of

equipment at once. This equipment included satellites for communication and security purposes, space probes for solar system missions, and instruments and supplies for experiments that the astronauts would conduct in orbit. All of this equipment provided tangible services and products for the American public. The added benefits of experimentation along with money-saving capabilities of the shuttle helped sell it to the American public, along with the perception of NASA's culture as progressive and responsible.

The addition of the space shuttle also added a new perception of responsibility and safety to the space program and the culture of NASA. The American public was familiar with airplane travel, and its technology seemed completely manageable and reliable. Airplane crashes were considered tragedies, but no one ever considered halting air travel because the relatively few number of crashes and fatalities in comparison to the huge number of successful flights was (and still is) considered an acceptable risk for the luxury of flight. Thus the space shuttle, introduced with the inaugural flight of *Columbia* in 1981, seemed safer than previous manned missions in space because it was comparable to the flight of an airplane.

The description, functionality and media treatment of the shuttle denoted that it was to be considered just a high-tech airplane. The space shuttle itself did nothing to distract from this perception. The shape and look of the space shuttle is close to that of a commercial airplane. The shuttle can also land manually on a runway, just as an airplane would land. However, few Americans were aware that the pilot has little control over the shuttle unless the computer is overridden to gain manual control in order to make navigational corrections. All that mattered was that the American public was sold on the

image of the space shuttle as a safer and more economically friendly technology, which gave NASA's culture the same image.

NASA had decided upon a basic layout for the space shuttle by 1972 (Chiles, 2001, p.72). When the space shuttle program began, the organization and culture at NASA had changed from the early days. The "visionary leadership" (Jensen, 1996, p.78) of the early NASA culture where engineers, astronauts, and technicians were expected to admit mistakes so that they could be discussed and fixed had disappeared. Money was tight and people were scared to admit mistakes because they would be dismissed. There was not time or money for proper testing so safety measures were often worked around. In his book *Inviting Disaster: Lessons from the Edge of Technology,* James Chiles summarizes this problem: "To those in charge at NASA, caught between deadlines and the problem of never enough money, the fact that a booster hadn't burned through so far was proof of safety" (2001, p.67). The culture of NASA now revolved around the decisions of managers who were suddenly calling all of the shots without input from the engineers or astronauts, and it seemed, without following a basic value of safety. "To some people [in NASA], NASA was no longer NASA" (Jensen, 1996, p.185).

Development and testing of the shuttle components began in the mid-1970s, but NASA would run into budget problems in getting the reusable manned launch vehicle they had envisioned. NASA was under pressure to produce a complicated machine without the money to develop the technology. The space shuttle was to be built at a lower price than was feasible. By 1986, the shuttle was no longer a novelty to the American public. Instead, it represented billions of tax dollars, delays in schedules, and, in the eyes

of many, broken promises by NASA because it was not able to deliver the ambitious flight schedule NASA had once predicted.

Arguably, the magic of Tom Wolfe's portrait of NASA and its astronauts having the "right stuff" (1979) had also been lost by the time *Challenger* was launched because the public did not view the newer astronauts as meeting the stringent requirements of the first groups of astronauts. No longer did an astronaut have to come from a military test pilot career with perfect health and claims of an ideal family life. Instead, astronauts were more like everyday people who chose a career with NASA instead of the corporation down the road. Some would ride the space shuttle into space for a few days or even spend several months on the International Space Station, but it all seemed safe and routine. The American public could not even name the astronauts because there were too many and they did not receive the "hero" press coverage that the earlier astronauts had received. The culture of the "right stuff" among the astronauts and at NASA no longer seemed necessary for spaceflight.

Media and the Image of *Challenger*

Unlike the Soviet Union, the United States could say that the no astronaut had ever been lost in space. In fact, the only astronauts lost during NASA mission training were the three killed in the launch pad fire in the early stages of the Apollo program. Astronauts were killed in plane or car crashes, but these were not considered reflections of the program, even in the case of two that died in a fighter plane crash en route to a manufacturer to inspect a space capsule. This attitude is reflected in a headline from the Saturday, January 28, 1967 (when a later astronaut died) edition of *The New York Times:*

"Astronaut Toll of U.S. Is Now 6, But None Has Been Lost in Space" (p.1). Therefore, the explosion of the *Challenger* was the first time that American astronauts had been lost in the air. When the Apollo ground test fire broke out, it killed three astronauts and reflected negatively on the space program, but it was not seen as a disaster in flight, which *Challenger* definitely was.

This shift in the way society viewed the *Challenger* disaster was reflected in society's inability to look forward to the other goals of NASA after the explosion and the difficulty in understanding the decision to launch by those in control of spaceflight. The administration, the press, and the American public did not know what to think or how to respond, causing the public to question what they thought they knew about NASA's culture, as was shown in the anger and disgust of the public after the explosion (Chiles, 2001, p.67). For once, it was hard to look past the tragedy to the goals of the program because there was not a specific tangible goal to focus on, such as landing men on the moon. Instead, the Hubble Space Telescope, the space station, and the deployment of various satellites divided the interests of NASA. The result was that no one project gathered the excitement or support that earlier missions had attained. Therefore, after *Challenger*, the media presented the stories of the lost astronauts but kept returning to the main theme – that the disaster perhaps could have been prevented. That realization was hard to accept by a public that had considered spaceflight to be safe and routine.

A survey by R.H. Bruskin reported that 69% of American adults knew of the explosion within thirty minutes of the disaster (Singer & Endreny, 1993, p.3). This number would not have been possible without the influence of mass media. By addressing the national media, attention is directed toward the reporters, newspapers, and

TV broadcasts that encouraged the American public to believe that the first seven astronauts had the "right stuff," that the distant moon was within range, that NASA could do anything, and that the shuttle was as safe as a Delta airline flight. When the *Challenger* exploded, Americans looked toward the media to discover the answers.

Chapter III

Method

Study Introduction and Rationale

This study looks at culture from an approach that has not been taken before – observing the view of the culture of an organization that is presented by the media to shape the outsider's perspective of that culture. Using print media as a tool for evaluation, the idea behind this study suggests that outsiders (defined as the American public) are significantly influenced by the presentation of culture from the media. Finally, the rationale for this study argues that culture is a powerful force in organizations, both to the people in them and the people who are outside of the organization.

NASA was selected as the organization of interest for this study for several reasons. First, NASA is an example of an organization that most of the American public wanted to succeed, especially during the Cold War and the race for the moon. Although these specific challenges have passed, NASA still represents American ideals of exploration and intellect in science and technology. Further, NASA's budget comes from taxpayer money, giving the public a financial incentive to have an interest in the culture of NASA. The *Challenger* explosion was also a public failure that impacted diverse segments of the public differently. Yet, most importantly, it also affected most of the American public (Jensen, 1996, p.5-6). Finally, as a government agency, NASA's records are more open to the public than those of a private corporation. While this study does not rely heavily on NASA records, future research might use NASA's records to validate or

disprove cultural claims and these records will be available. For these reasons, NASA is an appropriate choice for the organization analyzed in this study.

Public relations professionals in all organizations, not just those associated with science, strive to project and maintain a positive image of the organization. The rationale of this study suggests that there could be a significant amount to be learned about public opinion of the culture of organizations to which individuals do not belong but which have, or have had, significant impact on their lives. Accounting scandals in major corporations serve as an example of the influence of the public participation in an organization, because stock prices and support often drop, or at least fluctuate, after major news or events, such as accounting scandals or earning announcements.

This topic may be of specific interest to science writers because writing about science and technology will also involve writing about science and technology organizations, such as NASA. This study might give valuable insight into the information about the culture and values of the organization that might be presented with this science, and what kind of influence this might have on the attitude of the audience (in this example, the American public) toward both the organization and the science.

On a personal note, this topic is of special interest to the researcher because the explosion of the *Challenger* was a significant influence in the decision to study science communication. The researcher desires to contribute to informing and educating the public about scientific and technological organizations so that the both the science and technology and the organizational culture and mission is understood. This study should provide some direction in accomplishing this goal in either the workforce or academia.

Operational Definitions of Cultural Indicators

Deal and Kennedy state that "established heroes, values, and rituals are crucial to a culture's continued strength" because these traits help an individual feel connected with the organization's people and goals (1982, p.13). Although they may be interpreted differently than intended, these traits are observable to people outside of an organization and can be used as tangible indicators of culture. An operational definition of each of the cultural indicators follows.

Heroes are "people who personify the culture's values and as such provide tangible role models for employees to follow" (Deal & Kennedy, 1982, p.14). For instance, the first group of astronauts would be considered heroes that exemplified the risk-taking nature of NASA in the early years. In this evaluation of culture, the definition of heroes also provided for groups or individuals with NASA that are described unfavorably as "villains." The concept of villain allows individuals to place negative emotion on a group or individual in the same way that a hero would be admired. After the explosion, engineers involved in the decision to launch might be considered in the villain category, exhibiting behaviors that NASA or the public would not want emulated.

Values were broken down because of their importance as a foundation for the organization and the other cultural indicators. Deal and Kennedy indicate that "choices must be made [in an organization], and values are an indispensable guide in making them (1982, p.22)." A challenge here is in defining key values for NASA.

The values used in this study were determined after a review of the NASA History site at http://history.nasa.gov/ (visited August 5, 2002). This page states, "Since its inception in 1958, NASA has accomplished many great scientific and technological

feats in air and space." (The history page was used so that values were not based solely on the current mission statement on the NASA Web site (http://www.nasa.gov/) that might not reflect values important at the time of the *Challenger*. Using the history page could be problematic depending on how the historians at NASA present the history of the program in hindsight, but the history page was still considered to be the best option for gathering past information about NASA.) Following this lead, the following key values were identified for NASA:

- Progress, defined as scientific advancement, exploration, or knowledge;
- Efficiency, defined as cost effective or budget conscientiousness, not wasteful of time or resources; and
- Responsibility, defined as taking an active role in promoting the safety and well-being of NASA employees and NASA resources and commitments.

Rituals are defined as actions or procedures that are carried out before, during, or after a launch or in the process of NASA business that are observable. Rituals included the "systematic and programmed routines of day-to-day life in the company" (Deal & Kennedy, 1982, p.14) and "their [the organization's] extravaganzas – which we call ceremonies – they provide visible and potent examples of what the company stands for" (p.15). This might include routine press conferences, outlined safety checks, or even a salute to the crew before flight.

For the purposes of this study, all outsiders to NASA, which are assumed to be everyone not associated with the NASA organization or projects through contract work or research, were treated collectively as one group. It was also assumed that the media affect this group's view of the culture of NASA. There was also no attempt to separate claims

of culture between groups that make up NASA, such as management, astronauts, contractors, etc. NASA was viewed as one entity.

Research Design

This research investigates media coverage of the culture of NASA in the 12 months prior to and the 12 months after the *Challenger* explosion based on print media's presentation of NASA culture during these time frames. Designing the methodology for this study was challenging because of the lack of research in this area and the ambiguity of defining culture. This methodology follows the definition of culture identified by Deal and Kennedy (1982) and discussed in the literature review section.

Media coverage was used as the basis for external perceptions of the culture of NASA. For this initial investigation, the medium explored was newspapers. Four major United States papers were selected from widespread geographic regions. The papers selected all have a significant readership, the assumption being that a larger readership gets news and information out to more of the public. Newspapers chosen for analysis in this study were the *Atlanta Journal-Constitution, Chicago Tribune, Los Angeles Times* and *New York Times*.

Papers were reviewed in a time period of 12 months prior to the *Challenger* explosion and 12 months after. The specific search date criteria were from January 28, 1985 to January 27, 1986 to cover the 12 months prior to the explosion and from January 29, 1986 to January 30, 1987 to cover the 12 months after the explosion. All the papers were reviewed on either January 28 or January 29, 1986 (whichever day the paper first covered the explosion) to analyze immediate information that was released and possible

initial evaluations or evidence of the culture after the disaster. The sampling method for selecting dates is discussed at the end of this chapter.

For selected dates, the articles obtained from each newspaper were divided into one of two initial categories by type of story: Editorial/Opinion articles and News/Feature/Investigative articles. The Editorial/Opinion category was further broken down into syndicated columnist, letter to the editor, freelance opinion, and the paper's own opinions. Editorials were separated out so that a distinction could be made between the perspective of the media and the perspectives of individuals. Cartoons were categorized as editorials authored by a syndicated columnist. The second category did not make a distinction between news, feature, or investigative article. Each group was evaluated using similar criteria, with modifications made as necessary to the nature of articles in each group.

Each article was then evaluated based on "hard" observations. Article placement within the paper was noted as a technique that could be used to draw attention to an article. The number of lines in each article was counted to determine the amount of space devoted to NASA before and after. Some editorials use lines of double column width. This was taken into consideration and the number of lines was doubled to make the data comparable.

In the Editorial/Opinion category, placement on the page was noted. Overall placement within the paper was not a factor here as most papers have separate editorial/opinion sections.

For each article, the page and section on which the story began, its origin (locally written or syndicated article), and the type of article was noted (Donohew, Helm, & Haas,

1989, p.230). These criteria were used to establish the potential effect of the article on the public by placement. Articles with "prime" placement, identified as being in the first five pages of the main, or first, section of the paper were evaluated with more weight, or influence, than other articles.

Articles dealing with Reagan's "Star Wars" Space Defense Initiative plan were not included in the analysis, as they do not reflect NASA or the space program.

Establishing Coding Definition and Reliability

Cultural aspects of the articles were established by identifying any of three main cultural indicators established by Deal and Kennedy, which are values, rituals, and heroes. The references to a cultural indicator represented the coding decisions in this study and were noted on the coding tool used for evaluation. Mainly, references to cultural indicators in the categories were noted and the article was rated as a positive, negative or neutral reflection of NASA's culture based on the choice or action of the referenced indicator. This method did not look at frequency of the indicator in the article, but the overall impression of the indicator to the public. It is important to note that some of the indicators were negative in regard to another organization, such as the government, but reflected positively on the culture of NASA because NASA's culture was not being blamed for the actions, or lack thereof.

All values were noted, or counted, in order to evaluate the strength of exposure of a positive or negative connotation. The count was used to determine if the media highlighted NASA's culture as whole or aspects of the culture more or less often pre- and

post-*Challenger*. A change in the amount or type of coverage might have an effect on the external perception of NASA's culture.

A coding tool (Figure 1) was used to note all of the placement and headline observations, as well as the cultural indicators. Using the coding tool, correlations were made between perception of culture before the explosion and after to see if the explosion altered the media's perception of NASA's culture.

Another coder was trained in how to identify indicators and mark the positive, negative or neutral connotation. The coder also received the coding manual (Appendix A). A second meeting was used to discuss questions. Once all of the definitions and objectives were clearly established, the other coder was responsible for coding a number of articles from each of the newspapers. High intercoder reliability was obtained with an intraclass correlation coefficient of .91.

Sampling Method

The study used a systematic sampling method selecting every n^{th} day from the selected first date of January 28, 1985 (this date was included in the analysis). The time period of the study represents 731 days. The number 12 has been selected to represent n in this study. Using 12 as the sampling number yielded approximately 9 sample dates for each day of the week through the two-year period. This sampling ensured that each day of the week received a fair amount of coverage in case any of the papers ran a special column, perhaps pertaining to technology, science, or space travel (which might give examples of NASA culture), on a certain day of the week. A list of dates used is shown in Appendix B.

Date of Article: _____ Evaluation Date: _____
Newspaper: _____ Evaluator: _____

Type of Article: News
Editorial:
Letter to the Editor/ Freelance Opinion/ Sydicated Columnist/ Paper's Opinion

Article Notes					
Placement					
Overall:		**Page Position:**			
Headline					
Length:					
Cultural Indicators					
Heroes			**Positive**	**Negative**	**Neutral**
Villians					
Rituals		**Totals for Heroes**			
Values		**Totals for Rituals**			
Progress					
Efficiency					
Responsibility					
		Totals for Values			
		Overall Total			

Figure 1: Coding Worksheet

Chapter IV

Results

Introduction

The purpose of this study is to examine how print media portray the culture of NASA to the public. How do print media affect the external perception of NASA's organizational culture? Four newspapers, the *Atlanta Journal-Constitution, Chicago Tribune, Los Angeles Times* and *New York Times,* were reviewed on selected sampling dates for articles relating to NASA or the space program.

A total of 339 articles were found, analyzed, and coded for the two-year period reviewed. This number consists of 48 editorials and 291 news stories. The results of the analysis are presented in this chapter. All results are for the four newspapers taken together, broken down into one-year time frames. These time frames are January 28, 1985 to January 27, 1986, the year before the explosion of the Space Shuttle *Challenger*, and January 28, 1986 to January 28, 1987, the year after.

Totals

This analysis relied on print media coverage of NASA and the space program, as well as references to defined cultural indicators in the coverage found. Table 1 shows the total number of articles for each newspaper during each one-year period.

Table 1: Number of Articles for each Newspaper in each One-Year Period

	Atlanta Journal-Constitution	Chicago Tribune	Los Angeles Times	New York Times
1985-1986	24	19	27	21
1986-1987	50	47	65	86

Figures 2 and 3 show the total number of articles, and the total number of positive, negative, and neutral indicators for each of the newspapers graphically. The combined number of indicators is greater than the number of stories because each story could have none to several indicators. Figure 2 covers the year before the explosion and Figure 3 the year after.

Figures 2 and 3 indicate that NASA and the space program received significant coverage in all four newspapers sampled for both years. The number of articles increased in the year after the explosion, and the amount of cultural indicators portrayed increased in relation to the increase in articles.

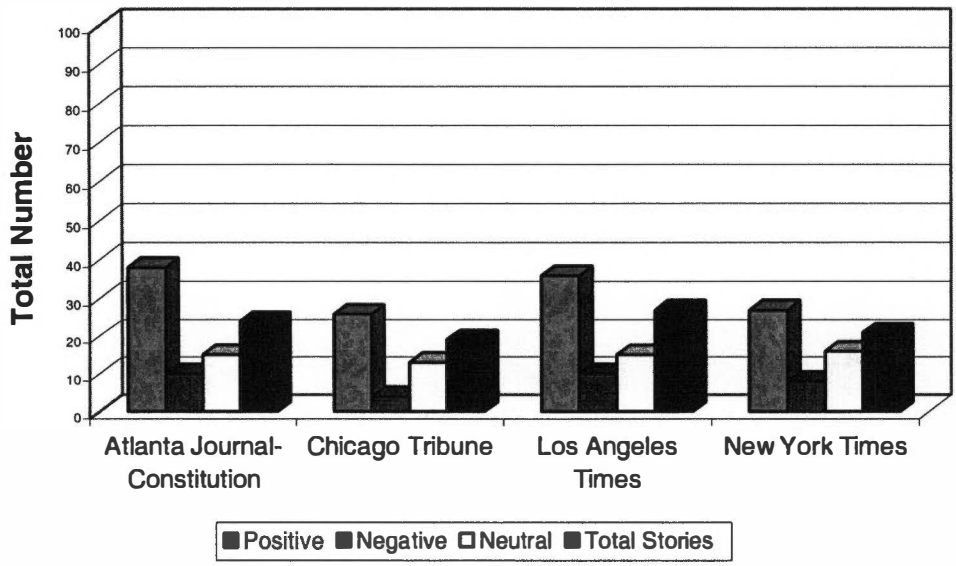

Figure 2: The Number of Stories and Cultural Indicators in the Year Before the *Challenger* Explosion, 1985-1986

(The total number of indicators may be greater than the number of articles because each article could contain none or several indicators.)

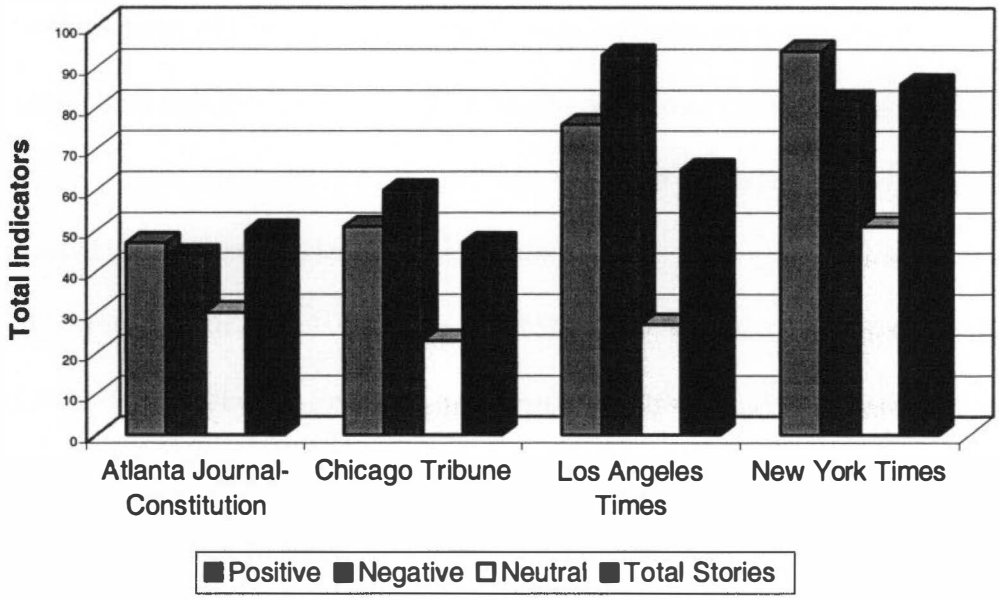

Figure 3: The Number of Stories and Cultural Indicators in the Year After the *Challenger* Explosion, 1986-1987

(The total number of indicators may be greater than the number of articles because each article could contain none or several indicators.)

Figures 2 and 3 also suggest that the print media conveyed a significant amount of information about the culture of NASA to the public. The total number of combined cultural indicators is over double the total number of stories in both years sampled. This demonstrates that although some stories contained no indicators, many contained more than one, potentially portraying more information on NASA's culture to the public.

News vs. Editorials

For the purposes of this study, news articles were separated from editorials. Figures 4 and 5 show the breakdown between editorial and news articles during each one-year period.

Due to the relatively small number of editorials compared to news articles in both time periods, editorials were not analyzed as originally intended by breaking them down into the categories of letters to the editor, syndicated columnists, the paper's opinion, and freelance opinion for separate study as indicators of organizational culture. In the year prior to the explosion, editorials accounted for only 5 of 91 total articles, or roughly 5% of the articles. In the year after the explosion, editorials accounted for only 43 of 248 articles, or 17%. While this was an increase of 860% for editorials from the 1985-1986 timeframe to the 1986-1987 timeframe, the number of editorials was still too small to justify an analysis of the editorials by category. Instead, the editorials were analyzed as a single group, and were then combined with news articles to look at organizational culture indicators.

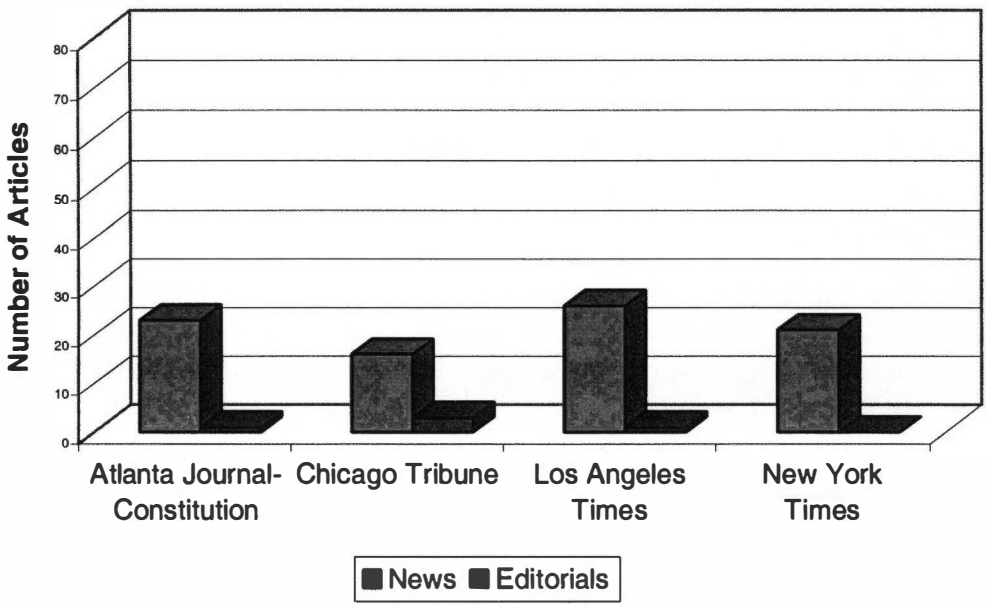

Figure 4: Number of News Articles vs. Editorials about NASA in the Year Before *Challenger* Explosion, 1985-1986

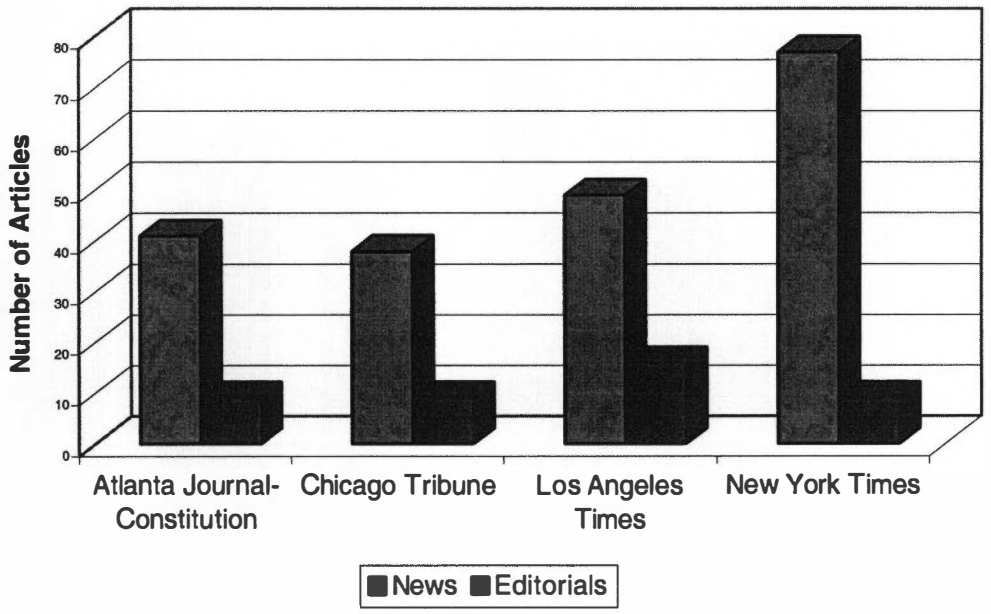

Figure 5: Number of News Articles vs. Editorials about NASA in the Year After the *Challenger* Explosion, 1986-1987

Average Lines

Lines per article, headline length, page placement in the newspaper, and page position were all noted to determine the potential effects of an article on a reader based on priority placement and other efforts to gain reader attention. The examination of lines per article was the most significant indicator of exposure to information about NASA. The other categories did not show a consistent or noticeable change that would affect reader awareness of articles pertaining to NASA. Figure 6 shows the average number of lines per article per newspaper for news stories and editorials combined, as well as the total average number of lines for an article in each one-year time period.

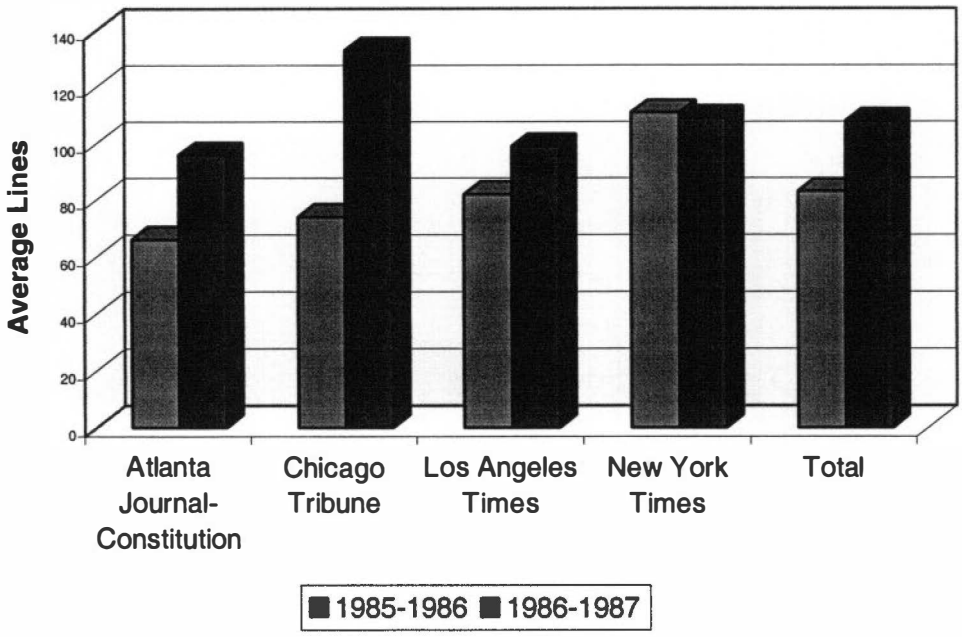

Figure 6: Average Lines Per News Story and Editorial Combined

The average number of lines per article goes up in each newspaper after the explosion, with the exception of the *New York Times*. This is possibly attributed to the *New York Time's* continuous coverage of science news and issues in a large section devoted to science news on Tuesdays, and the benefit of having at least one consistent science writer on staff who covered the NASA beat. Therefore, the *New York Times* was able to devote a higher average number of lines than other newspapers before the explosion. Only the *Chicago Tribune* did not have a dedicated science section each week.

Cultural Indicators

The main purpose of this study was to examine an outsider's perception of the culture of NASA as presented by print media. The cultural indicators of heroes and villains; rituals; and values, broken down into progress, efficiency, and responsibility,

were analyzed for each of the one-year time periods. The first reason for this analysis was to determine if print media represented by four big-city daily newspapers portrayed organizational culture indicators that influenced public perception. The second reason for this analysis was to examine any change in how cultural indicators were portrayed if indicators did occur. Table 2 shows chi-square test results of statistical significance for each of the cultural indicators.

Table 2: Chi-square Test Results for Each Indicator During Each One-Year Period

	Heroes	Villains	Rituals	Progress	Efficiency	Responsibility
1985-1986	8.34	5.44	16.62	29.4	6.23	21
1986-1987	125.22	64.06	23.4	19.93	18.85	87.77

(df=2; Critical X^2*=5.991,* $p < .05$*)*

The following sections show the results of each of the organizational culture indicators examined in this study. It is important to note that each indicator found in the study was evaluated as positive, negative, or neutral in regard to how it reflected or portrayed the culture of NASA. For instance, several articles portrayed the government as the cause of NASA's shuttle delays and even the technical trouble with *Challenger* because the government kept cutting the budget for the space program. The article portrayed the government in a negative manner and even as a non-supporter or hindrance to the space program. However, although the government was listed as a "villain" in the article, this article actually reflected positively on NASA because the government was blamed for problems and NASA was merely seen as a victim. If an article merely discussed an outside group as a source of problems, but does not attribute the group's actions to the explosion through budget cuts, etc. then the group is considered neutral.

Heroes and Villains

A heroes or villain could be NASA, the government, a contractor, or a shuttle crew collectively as well as a reference to one individual. The reference to a hero or villain portrayed the entity in a positive or negative light by highlighting specific positive or negative actions or words such as "brave," "dedicated," "faulty," or "indecisive."

A total of 206 indicators were found in the category of heroes or villains. In the year before the explosion, there were 25 hero/villain indicators: 16 positive (64%), 3 negative (12%), and 6 neutral (24%). In the year after the explosion, there were 180 hero/villain indicators: 88 positive (49%), 65 negative (36%), and 28 neutral (15%). Figure 7 shows the breakdown of these indicators between each one-year period.

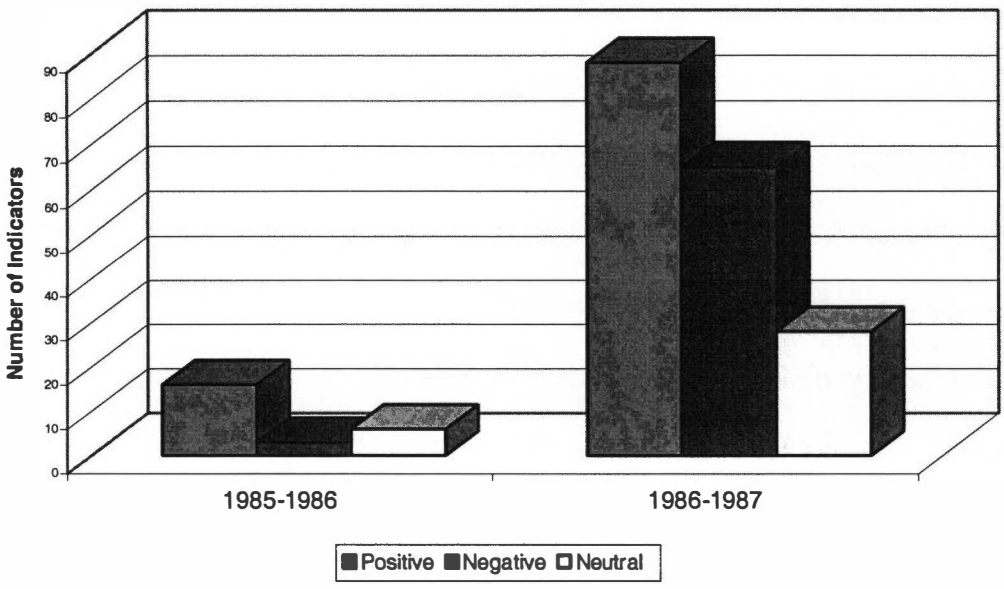

Figure 7: Number of Cultural Indicators of Heroes and Villains

The category of heroes and villains taken collectively gives information about the value placed on people who impact NASA before and after the explosion. After the explosion, the print media, and therefore the public, began to pay greater attention to the people and organizations that help or hurt the space program through decisions and actions. However, this category is a more meaningful measure of this cultural value if it is broken into the separate categories of heroes and villains so that a comparison can be made between the two groups.

The category of heroes is first. In the year before the explosion, there were 18 indicators of heroes found: 11 positive (61%), 1 negative (6%), and 6 neutral (33%). During this frame, heroes usually consist of astronauts or other members of the NASA community who perform well when an experiment or piece of equipment fails. In the year after the explosion, 114 indicators were found: 78 positive (68%), 12 negative (11%), and 24 neutral (21%). During this time frame, the greatest increase occurs in positive indicators of heroes. Most of these indicators refer to the crew of *Challenger* and members of the astronaut corps in general. Christa McAuliffe received many of the hero indicators for risking her life to teach others about space. Figure 8 shows the breakdown of these indicators between each one-year period.

In the year before the explosion, there were 7 indicators of villains found: 5 positive (71%), 2 negative (29%), and 0 neutral (0%). In the year after the explosion, 67 indicators were found: 10 positive (15%), 53 negative (79%), and 4 neutral (6%). Figure 9 shows the breakdown of these indicators between each one-year period.

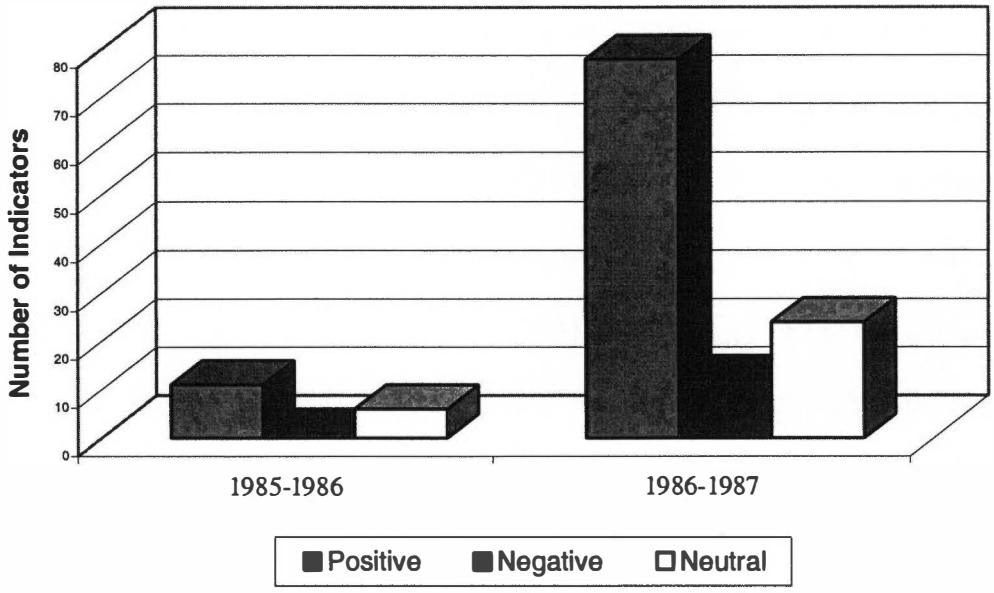

Figure 8: Number of Cultural Indicators of Heroes

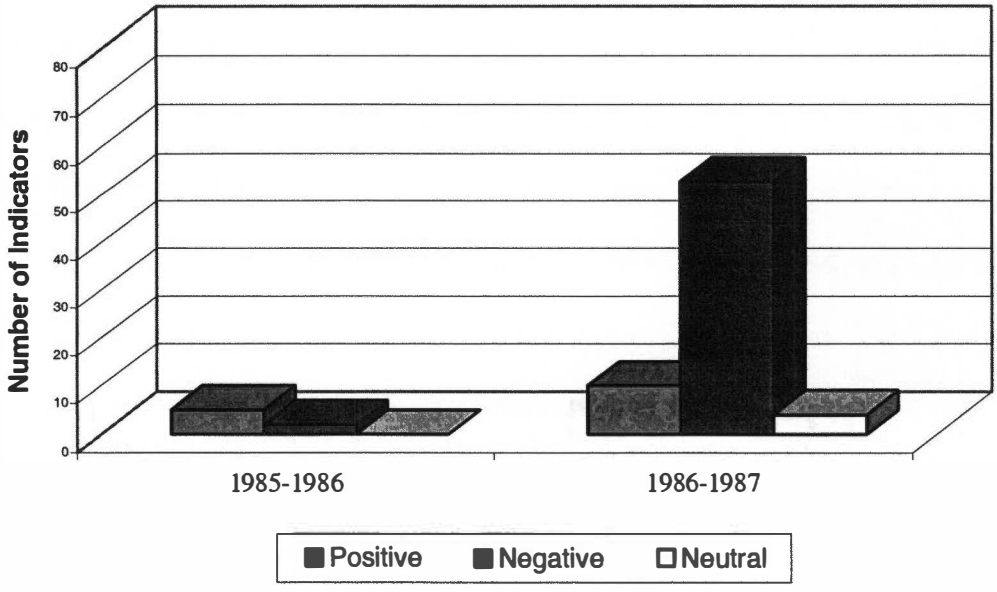

Figure 9: Number of Cultural Indicators of Villains

The category of villains reveals that after the explosion there was an increase in negative indicators of villains. NASA administrators and officials, along with Morton-Thiokol officials, become the main villains of their own program, although the government is also mentioned a lot for reducing the budget and showing concern for the delayed launch schedule. Two Morton-Thiokol engineers who protested the launch, Allan J. McDonald and Roger Boisjoly, are also included in the villain category because although their actions were commendable, they become a villain of NASA during the investigation by making the space program administrators look bad.

Rituals

Rituals were defined as observable actions or procedures that were not unique to one event. Rituals were triggered in articles by words or phrases that indicated the action occurred on a regular basis. The journalist noting NASA's lack of completing an expected ritual also indicated rituals. For example, processes such as countdowns and training that occurred with every launch were marked as a ritual.

A total of 68 indicators were found in the area of rituals. In the year before the explosion, 38 indicators were found: 24 positive (63%), 4 negative (11%), and 10 neutral (26%). In the year after the explosion, 30 indicators were found: 22 positive (73%), 1 negative (3%), and 7 neutral (23%). The category of rituals was the only area of cultural indicators that decreased in references in the year after the explosion as compared to the year before, although too slightly to be taken as significant. Figure 10 shows the breakdown of these indicators between each one-year period.

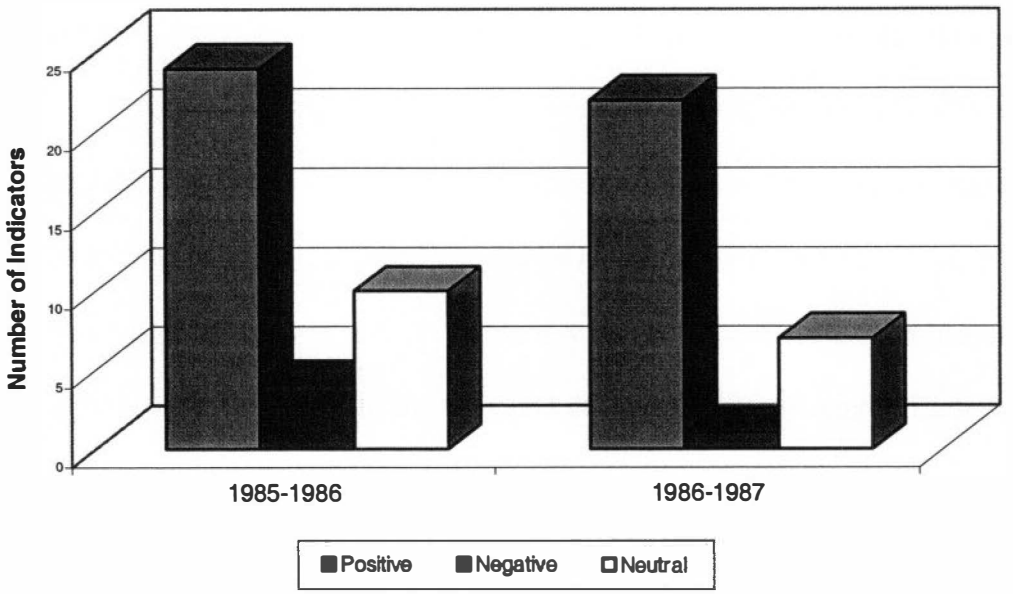

Figure 10: Number of Cultural Indicators of Rituals

Values

The category of values was broken down into areas that define three main values of NASA as determined from the NASA History Web site. These values are progress, efficiency, and responsibility. Values are integral to the actions and goals of a company, possibly making the category of values the most significant category. Any one of the defined values had more indicators than either heroes and villains or rituals. Due to the large number of references to the indicators in values, the results for each of the defined values are reported separately.

Progress

Progress was defined as scientific advancement, exploration, or the advancement of knowledge and information. Indicators included the announcement or promotion of educational programs that conveyed knowledge of NASA to the public, support for the

space program through actions or statements (because support here is viewed as progress for NASA's culture in gaining/maintaining support), and the acquiring of new knowledge through missions or space probes. General information about space and the planets were all included in progress, as well as information that led to knowledge about the explosion.

In the two-year period, 246 indicators of progress were found in the articles. In the year before the explosion, there were 82 indicators of progress: 48 positive (59%), 8 negative (9%), and 26 neutral (32%). In the year after the explosion, there were 164 indicators of progress: 80 positive (49%), 34 negative (21%), and 50 neutral (30%). Figure 11 shows the breakdown of cultural indicators under progress in the values category.

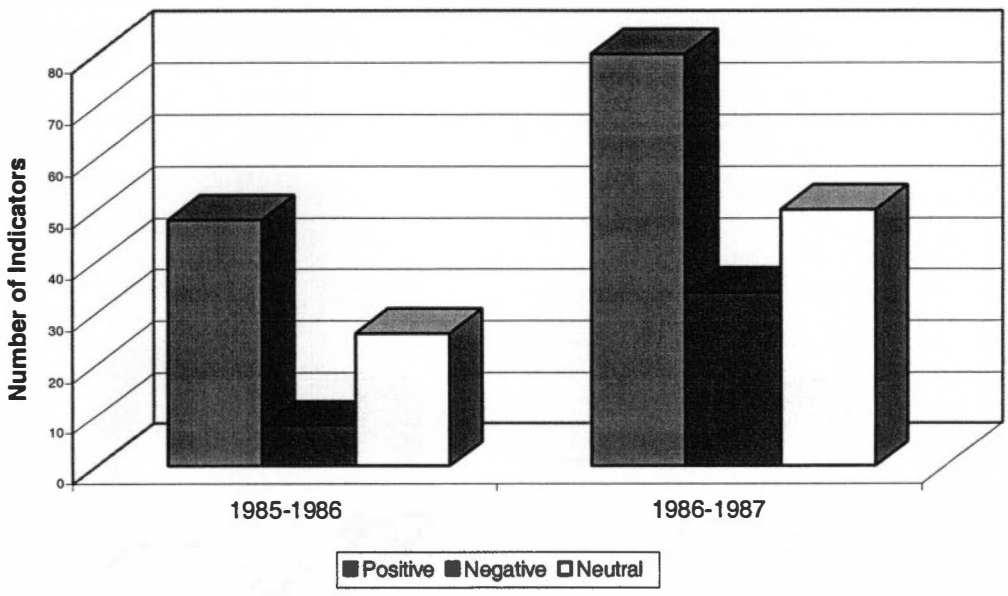

Figure 11: Value 1: Number of Cultural Indicators of Progress

Efficiency

Efficiency was defined as cost effective or budget conscious, not wasteful of time or resources. This category was the most straightforward as it dealt with delays, costs, and shuttle or program performance, and processes that were not included in rituals. For instance, articles that emphasized that something worked efficiently included statements such as "satisfactory performance," "reached target" and "fixed in-flight problems."

This indicator had a total of 180 indicators in the two-year period. In the year before the explosion, there were 56 indicators of efficiency: 27 positive (49%), 17 negative (30%), and 12 neutral (21%). In the year after the explosion, there were 124 indicators of efficiency: 28 positive (22%), 64 negative (52%), and 32 neutral (26%). Efficiency is the second most targeted area for negativity after the explosion. Figure 12 shows the breakdown of cultural indicators under efficiency in the values category.

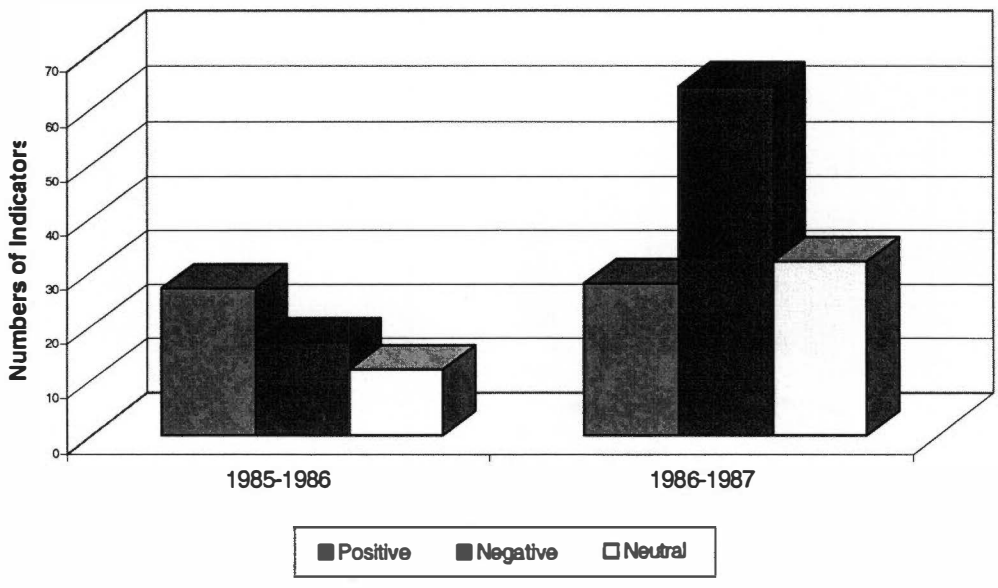

Figure 12: Value 2: Number of Cultural Indicators of Efficiency

Responsibility

Responsibility was defined as taking an active role in promoting and ensuring the safety and well-being of NASA employees and the public, and taking care of NASA resources and commitments. Issues of safety such as proper or improper testing, response to concern surrounding the space program employees and equipment, and investigations or inquires into concerns were noted in this category. For instance, comments from the hearings about NASA's lack of communication about shuttle concerns were coded as negative indicators of NASA's culture because these comments indicate a lack of communication among the engineers and administrators making the decision of whether or not to launch.

The indicator of responsibility had a total of 203 indicators in the two-year period. In the year before the explosion, there were 24 indicators of responsibility: 18 positive (75%), 0 negative (0%), and 6 neutral (25%). In the year after the explosion, there were 179 indicators of responsibility: 50 positive (28%), 115 negative (64%), and 14 neutral (8%).

The value of responsibility is the most targeted area for negativity after the explosion. This is accentuated by the fact that all of the 115 negative indicators occur in the one-year period after the *Challenger* explosion. The area of responsibility also has the most negative indicators of all the categories examined, including those outside of values. As the graph also indicates, the area of responsibility was given considerably more attention in all four newspapers after the explosion. Figure 13 shows the breakdown of cultural indicators under responsibility in the values category.

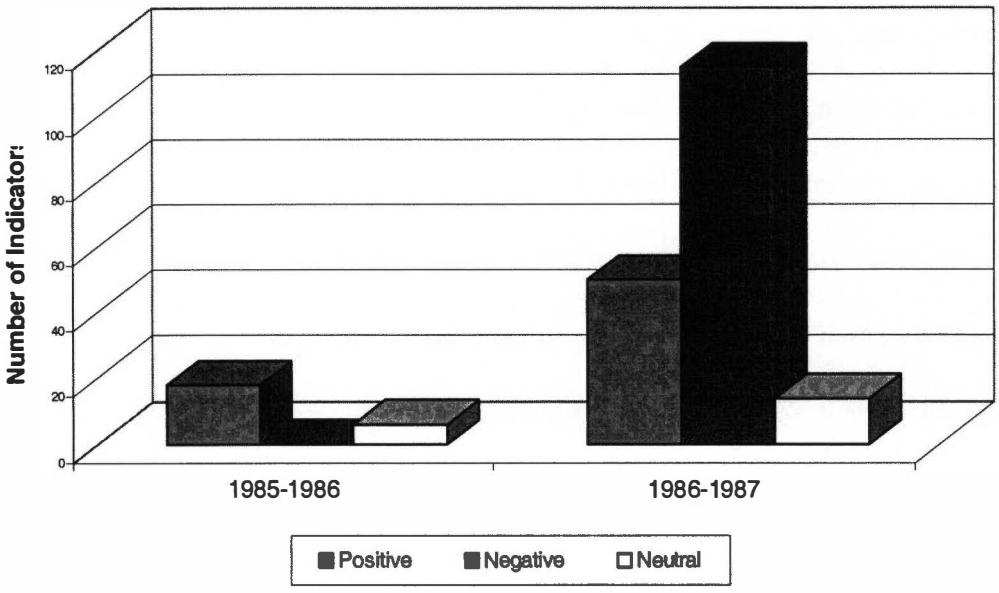

Figure 13: Value 3: Number of Cultural Indicators of Responsibility

Chapter V

Discussion

Conclusions and Considerations

The results presented in the previous chapter acquire greater meaning and provide a better understanding of an external perception of organizational culture when discussed in reference to the research questions guiding this study.

External Cultural Perception

The results of this study suggest that there was a change in the coverage of NASA's culture from before to after the *Challenger* explosion, and that this change in coverage affected the depiction of NASA's culture to the outside public. NASA was seen as still progressive in its goals, but less efficient and responsible than the public had previously thought. Before the explosion, the culture of NASA was seen as relatively cohesive by the newspaper print media and the public. NASA was perceived as a unified entity. After the explosion, the perception of NASA's culture changes into a more complex and fragmented view. For instance, after the explosion the category of heroes and villains becomes fragmented by the increase in positive indicators for astronauts as heroes and the increase in negative indicators of NASA administrators and Morton-Thiokol.

Seen from a wider perspective, the data of this study, although collected from newspapers depictions of NASA's culture, give insight into why the external view of an organization's culture should be understood.

This study assumed a correlation between participation in an organization and an outsider's perception of the organization's culture, meaning that how an outsider views an organization's culture will determine the degree of outsiders' support and involvement in the organization. This assumption does not assert that a crisis or scandal will necessarily result in negative support or a poor perception of the culture, because some events will be positive for the organization and some organizations will retain a positive image during negative events. Instead, the results of this study helps to affirm that in almost all situations an organization should strive to maintain a positive external perception through goals and contributions that can be observed and reported by the media to influence the public's perception of the organization's culture.

In the year after the explosion, public support of NASA contributed toward the decision by President Reagan and Congress to provide funding for a shuttle orbiter to replace *Challenger*. Public participation also was important in embracing the space program's loss and encouraging scientific advancement and discovery to proceed. This support is seen in opinion polls reported in the four newspapers and in the editorials written in the year after the explosion. A poll reported in the *Los Angeles Times* on February 28, 1986, a month after the crash, reported that three out of four Americans supported the space program and 52% supported spending $1.5 billion to build a new shuttle (Redburn, 1986).

In the year after the explosion, the American public still supported the goals of the space program with two exceptions. The first exception was that the public wanted to see more use of unmanned space probes and rockets to alleviate an almost total reliance on the manned space shuttle, and the second exception was that the public encouraged the

temporary suspension of sending civilians (non-astronauts) into orbit. In response to the negative portrayal of the values of efficiency and responsibility in NASA's culture, the public also expected NASA to become more efficient and responsible before the space shuttle program continued. NASA answered these concerns by reorganizing its administration and offering early retirement or accepting the resignation of high officials in the decision-making process to launch the *Challenger*. These actions indicated that the external perception of NASA's culture was important in determining the next steps of NASA in order to stay successful and retain public support.

Public participation in an organization, whether through stockholders or support of a product or service, is critical for the success of an organization. Understanding the external perception of culture, and how it is portrayed, gives organizations an advantage in managing public reaction and participation, especially during times of crisis or change.

Print Media Influence on External Perceptions of Culture

The first research question examined how an outsider receives information that shapes perceptions of culture. It is important to know how outsiders to a culture are receiving information in order to understand how to better portray the culture of an organization externally. This study examined print media exclusively, so the second research question specifically examines print media's relationship to the external perception of culture.

RQ_1: Do print media provide a perception of culture to the public?

Although television is the mass medium that most influences the public, this study shows that print media conveyed indicators of organizational culture to the American

public also. Out of 339 articles analyzed, 20, or 6%, were coded as having none of the defined cultural indicators, meaning that 94% of the articles carried indications of NASA's culture. The newspaper print medium not only provided indicators of organizational culture in NASA, but the indicators were portrayed in a manner that connotes a positive, negative or neutral impression of the culture to the public.

An Outsider's View of the Culture of NASA

A main research question in this study explored the link between the mass media and the dissemination of portrayals of organizational culture.

> RQ_2: What is an outsider's view of the culture of NASA, as obtained through print media, in the 12 months prior to and the 12 months after the *Challenger* explosion on January 28, 1986.

In the year before the explosion, NASA is not often discussed. Of the 339 articles analyzed during the two-year period, only 91 (27%) of them are from the 12 months prior to the explosion. During the 12 months prior to the explosion, an average of 83 lines per article were devoted to the space program, with a range from 9 to 358 lines in an article. If the space program or NASA was mentioned, and cultural indicators were referenced, they were usually positive about the progress of NASA, or a mix between negative efficiency and positive responsibility in regard to delays, depending on how the information was presented in the article.

Interestingly, there are few editorials or letters to the editor about NASA published during the year before the explosion. In the *New York Times*, no editorial-type articles were found. Two of the papers had only one editorial each for this time period. Editorials accounted for only 5 (5%) of the 91 total articles found in the one-year time

period before the explosion. One explanation for this is the lack of attention on NASA during this time. On the dates sampled, even the Teacher-In-Space program that put Christa McAuliffe on the *Challenger* flight was seldom discussed. If anything, the decision to put non-astronauts in space seemed to be accepted because a U.S. senator and a U.S. representative flew during this time.

A paucity of all types of articles (news and editorials combined) during this time frame illustrates that NASA and the space program no longer held the fascination of the American public, and that NASA was not often considered newsworthy, even as a human interest story. The shuttle launch of January 28, 1986, was the routine and boring 24th in the shuttle launch series. The modest mass media coverage it received – only NBC and CNN carried the launch live – was stimulated by the civilian aboard. However, although NASA was not often discussed, it is still important to note that the cultural indicators referenced during the year before the explosion presented a positive, or accepting, view of the organizational culture of NASA conveyed to the public by these four major newspapers.

In the month after the explosion, NASA is portrayed as a victim of the technology and the human desire to advance and explore in the name of science. The media, and therefore the public, empathized with NASA, upholding the astronauts as heroes and the goals of the program as noble and worth continuing. This print media affection for NASA, which was conveyed to the public, is demonstrated in this study by the jump in the number of references to the value of progress and the heroes of the program in the first week after the explosion. The references are overwhelmingly positive; with a majority of the articles on the continuation of the program and that the explosion was a

tragic learning experience for a better design. The crew of *Challenger,* although relatively unknown with the exception of Christa McAuliffe, began to be hailed as having the "right stuff" usually attributed only to the first group of astronauts in the American space program. Obituaries tend to accentuate the good about a person while minimizing mention of negative aspects of a person's life. Thus, the astronaut's obituaries provided positive publicity that helped to gather support for NASA during year after the explosion.

It is only after a week, when the independent committee formed by President Reagan began to investigate the explosion, that the organizational culture indicators presented in the print media began to become more negative than positive. President Reagan formed the independent committee on February 3, 1986 to ensure that the explosion was evaluated objectively, although it was noted that NASA would cooperate extensively with the committee. The 12-member committee, which included several professors and scientists prominent in the field, businessmen in the aerospace industry, and several former astronauts and test pilots, was given 120 days to make a report on their findings.

The investigation made public the communication and decision-making process at NASA and shuttle contractors that the newspapers begin to take a more critical turn in evaluating the culture of NASA. For instance, the head of the presidential committee investigating the explosion, William P. Rogers, made the statement after the hearings, but before the final report on the investigation was released, that it appeared that "flawed decision making" had occurred in the launch of the shuttle. The communication process and bureaucratic structure of NASA came under investigation as this statement was repeated constantly during the six months after the explosion in all four newspapers

analyzed. It was learned that high-ranking NASA officials were not told of the hesitance to launch or possible deterioration of the O-ring in cold weather, that a possible "no-go" decision from Rockwell was ignored, and that NASA managers had possibly even removed the O-ring design flaw from a list of problems because it was not considered flight critical, meaning that it was not likely to destroy the shuttle orbiter or crew.

At this point in the coverage, articles in the four newspapers depicted NASA as directly to blame for the death of seven "heroes" and the failure of the space shuttle. No longer was the explosion considered just one of the risks of scientific advancement. Problems with the decision to launch and the quality of shuttle parts caused the increase in attention to the cultural indicators of efficiency and most noticeably responsibility after the explosion.

Unfortunately for NASA, the attention increases drastically in the negative direction, giving the public a perception of NASA's culture as irresponsible and inefficient. Interestingly, the value of responsibility was the least referenced indicator in the year before the explosion, indicating that print media, and therefore the public, did not put much emphasis on the element of responsibility in the culture of NASA because it was taken for granted that NASA operated with a great deal of responsibility for the lives of the astronauts and the recovery of equipment. After the explosion, responsibility was considered of great importance because the concept of NASA as safe and responsible had been destroyed.

Overall, in the one-year period before the *Challenger* explosion, the print media do not give NASA much coverage. The coverage that NASA does receive is generally positive in reference to the defined cultural indicators. In the one-year period after the

explosion, coverage of NASA in the print media increases, and the references to the defined indicators are positive or negative depending on the indicator being examined. The cultural indicator of heroes and villains was seen more positively in the year after the explosion. References to the indicator of rituals decreased in the year after the explosion, but remain consistent in how rituals are portrayed in the year before the explosion, which is mainly positive or neutral. Negative references to rituals decreased the most in the year after the explosion, indicating that this area of NASA's culture was still regarded favorably. The suspension of the flight schedule until the *Challenger* explosion had been thoroughly investigated and all problems with the space shuttle and rocket boosters fixed is one explanation for the decrease in the indicators of rituals. With no space flights occurring, the print media were not able to observe rituals associated with NASA. Arguably, NASA observes other rituals but space flights allowed the greatest opportunities for an outsider, such as the print media, to observe and notice rituals.

As far as the indicators of value in NASA culture, positive, negative, and neutral references of progress, efficiency and responsibility all increased in the year following the explosion. In the value of progress, positive references increased the most, which is consistent with the perception that space exploration must proceed despite the risks. The values of efficiency and responsibility increase the most in negative references, which illustrates the shift in perception away from NASA's culture as safety-conscious and effective.

Other Considerations

Location and page placement of the articles were recorded, as well as headline length, in an attempt to determine if NASA received priority placement after the explosion compared to beforehand. There were no differences from before to after the explosion to suggest that the articles about NASA received more priority placement after the explosion. NASA did receive first page priority (and at least the first five pages of all of the sampled newspapers) on the day of initial coverage of the explosion. After the initial day, NASA received front-page news coverage only when major announcements or discoveries were made in regard to the investigation of the explosion. Major announcements, such as a secret military mission, had received front-page coverage in the year prior to the explosion. This suggests that NASA was receiving fair coverage when the event met newsworthiness criteria when compared with other news that day.

During the first month after the explosion, articles about NASA usually appeared in the first section of the paper, but not the first few pages. Before the explosion, stories about NASA also usually appeared in the first section, but not the first few pages, and were usually brief news articles rather than feature stories or editorials. The main difference in these placements is that before the explosion NASA articles were confined to news briefs while the articles after the explosion were longer and contained more information about NASA and the space program in general. Of the 339 articles analyzed, 91 of the articles were from the year before the explosion, with an average of 83 lines per article. After the explosion, the newspaper articles contained an average of 108 lines about NASA. This average is true even if the initial newspaper covering the story is

excluded, because articles about NASA were generally longer in the year after the explosion. The initial coverage of the explosion did not greatly boost the average line per article because coverage was broken into many articles of moderate length instead of a few longer articles. Public apathy toward the space program before the explosion and the expectation that the program would always succeed are two explanations for the lack of articles about NASA before the explosion.

Limitations and Opportunities of This Study

Several limitations exist in this study that could be addressed in future studies that examine external views of organizational culture. The first is that only four of many newspapers in the United States were used for analysis. Although the four newspapers selected did represent a large readership and different geographical regions, it is possible that these major newspapers have a different agenda in representing organizations than smaller papers. Newspapers from regions of the country likely to be most affected by the explosion were also excluded, such as Florida, Texas, Utah, and Alabama. Space centers or contractors with main responsibilities in mission control, astronaut training and launch decisions are located in these states.

A greater number of sampling dates could also be used. To see if the results of this study hold true, the range of time explored could be expanded forward and backward. The narrow window used in this study was appropriate for the questions asked here but does not provide an understanding of how newspaper medium portrayal of NASA's culture changed from the early days of NASA to the days prior to the *Challenger,* and how it continues to evolve. An understanding of how the culture has been portrayed in

the newspaper medium from the beginning of NASA might reveal patterns that would be useful in analyzing media portrayal of other organizations.

The main limitation in this study is the ambiguity of defining and understanding culture. Culture has been defined in numerous ways and many functions have been attributed to it. This study was conducted using Deal and Kennedy's definition of culture based on the understanding and viewpoint of the researcher. The same study could be conducted using a different definition of culture that would identify other indicators not analyzed here.

Another limitation of this study is in the interpretation of positive, negative, and neutral indicators. Although the indicators and coding method were defined, and both coders trained, some subjectivity was still possible.

This study was conducted more than 16 years after the *Challenger* explosion, and NASA still exists and flies the space shuttle, so it is possible to conclude that NASA was able to overcome the adversity and negative perception of its organizational culture that after the explosion. Future studies might look at ways that NASA maintained or changed the external perception of its culture in order to regain the confidence of the American public.

NASA might use these findings to monitor mass media to see how their organizational culture is being portrayed today. If the results are not positive, NASA might be able to allow the media to see more of what goes on at NASA, or NASA might be encouraged to make changes that would affect the organizational culture.

Future research might also take a broader view and search major international papers to see how NASA's organizational culture is portrayed as a product of United

States social culture, and to compare the international views of NASA's culture with that presented in the American print media.

Other media could be analyzed to examine the relationship between media type and public perception. For instance, few television networks and stations carried the launch live, but all of the networks broadcast the disaster continuously for the rest of the day, burning the image of the explosion into the minds of the public. This suggests that an analysis of television media could be useful also.

Finally, Deal and Kennedy argue that strong companies have strong cultures. Future research in the area of the external perceptions of organizational culture might test this assumption using organizations that have experienced both positive and adverse external cultural perceptions and contrasting their survival or downfall.

The results of this study show that the newspaper print medium convey to the public indicators of NASA's organizational culture in a manner that influences the public's positive or negative perception of the culture. This data can be used as a first look at how the organizational culture of an organization is portrayed externally, and what the effect of the public's perception of an organization's culture has on participation and support for the organization.

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Appendices

Appendix A: Coding Manual

Top of Sheet: Basic Information

The top of the coding sheet contains basic information about the article and the coder. This information includes: the name of the newspaper, date of the paper in which the article being coded appeared, date of coding, coder's name, and type of article. News stories should be noted as local or Associated Press. Editorials should be designated by type using the choices given on the coding sheet: Paper's Opinion, Letter to the Editor, Syndicated Columnist, or Freelance Opinion. Cartoons are categorized as editorials authored by a syndicated columnist (in this case, a cartoonist). The separation is important because news stories will be separated from editorials. The distinction in editorial categories will allow for additional analysis, such as between the opinion of paid journalists (the media) and the voice of the people (through letters to the editor).

Article Notes Section: Placement and Headline data

Overall placement of the article should be noted by section and page, such as Section 5, page 2 or B3 for newspapers that use alpha section indicators. Placement on the page is noted from top to bottom by "top," "middle," or "bottom." Left, right, or middle is used to note placement across the page. Placement runs from left to right (from the point of view of the coder when facing the article).

Headlines are written on the coding sheet for further reference to the article. Article length by number of columns and number of text lines should be noted.

Cultural Indicators

The next section of the coding sheet should note the cultural indicators in the article, as well as the indicator's positive, negative, or neutral connotation on NASA's culture. The coding sheet has a space to list the indicator so that possible patterns, changes, and connections in the media portrayal of the culture of NASA can be observed. It is suggested that the coder read the entire article first and then dissect it for indicators. Many articles will not have all the indicators. In fact, many articles will have just a few, only one, or none.

It is important to note that each indicator should be evaluated as positive, negative, or neutral in regard to how it reflects or portrays the culture of NASA. For instance, an article may portray the government as the cause of NASA's shuttle delays and even the technical trouble with *Challenger* because the government kept cutting the budget for the space program. The article may portray the government in a negative manner and even as a non-supporter or hindrance to the space program. However, although the government will be listed as a "villain" in the article, this article actually reflects positively on NASA because the government is being blamed for problems and NASA is seen as merely a victim. If the article merely discusses an outside group as a source of the problem, but does not attribute the group's actions to the explosion through budget cuts, etc. then the article is considered neutral for NASA.

Neutral is provided as an option for indicators that fit into a category of cultural indicator but does not portray a negative or positive connotation of NASA's culture. An indicator must be contained in a statement that provides a negative or positive context, or presents blame or admiration, in order to be considered influential. For instance, merely

mentioning cost does not denote negative (although it may seem high). However, the statement, "the high cost of a new shuttle at $$" denotes a negative meaning.

Heroes and Villains

Heroes or villains can be NASA, the government, a contractor, or a shuttle crew collectively as well as in reference to one individual, such as Christa McAuliffe or John Glenn. The reference to a hero or villain must portray the entity (person or organization) in a positive or negative light by highlighting specific positive or negative actions or through words such as "brave" or "dedicated," or "faulty", "indecisive", or "pressured."

Rituals

Rituals are defined as observable actions or procedures that are not unique to one event. Rituals will be triggered in articles by words or phrases that indicate the action occurs on a regular basis. Sometimes rituals will also be indicated by the journalist noting NASA's lack of completing an expected ritual. For example, processes such as countdowns and training that occur with every launch are marked here. Processes for the Teacher-In-Space-Program is not included here because it is unique to one event.

Actions of NASA in regard to the explosion will be noted although they are unique events. For example, an observed silence or memorial event for the *Challenger* or crew would be noted in rituals because it is an action that deals exclusively with the explosion.

Values: Progress

Progress is defined as scientific advancement, exploration, or the advancement of knowledge and information. Indicators include the announcement or promotion of educational programs that convey the knowledge of NASA to the public, support or advocacy for the space program through actions or statements (because support here is viewed as progress for NASA's culture in gaining/maintaining support), and the acquiring of new knowledge through missions or space probes. Information about space, planets, and the effects of weightlessness are all included in progress, as well as information that leads to conclusions or knowledge about the explosion. The progress or inadequacies of other space programs compared with those of NASA are noted in this category to provide a basis of measure of NASA's progress.

Values: Efficiency

Efficiency is defined as cost effective or budget conscious, not wasteful of time or resources. This category is the most straightforward as it deals with delays, costs, and shuttle or program performance, and processes that are not included in rituals (or those that are unique to one event). For instance, articles that emphasize that something worked efficiently might include statements such as "satisfactory performance," "reached target" and "fixed in-flight problems."

Values: Responsibility

Responsibility is defined as taking an active role in promoting and ensuring the safety and well-being of NASA employees and the public, and taking care of NASA resources and commitments. Issues of safety such as proper or improper testing, response

to concern surrounding the space program employees and equipment, and investigations or inquires into concerns are noted in this category.

NOTE: An indicator can very easily flip between responsibility and efficiency depending on context. For instance, an article that notes NASA's concern about bad weather as the reason behind a seventh shuttle delay has a positive connotation for safety and responsibility, while an article that merely states that the shuttle scheduled suffered a record seventh delay is a negative connotation for efficiency.

Appendix B: Chart of Dates

	1985	1986	1987
January	Monday, 28	Saturday, 11 Thursday, 23 **Tuesday, 28 or Wednesday, 29**	Tuesday, 6 Sunday, 18 Wednesday, 28
February	Saturday, 9 Thursday,21	Tuesday, 4 Sunday, 16 Friday, 28	
March	Tuesday, 5 Sunday, 17 Friday, 29	Wednesday, 12 Monday, 24	
April	Wednesday, 10 Monday, 22	Saturday, 5 Thursday, 17 Tuesday, 29	
May	Saturday, 4 Thursday, 16 Tuesday, 28	Sunday, 11 Friday, 23	
June	Sunday, 9 Friday, 21	Wednesday, 4 Monday, 16 Saturday, 28	
July	Wednesday, 31 Monday, 15 Saturday, 27	Thursday, 10 Tuesday, 22	
August	Thursday, 8 Tuesday, 20	Sunday, 3 Friday, 15 Wednesday, 27	
September	Sunday, 1 Friday, 13 Wednesday, 25	Monday, 8 Saturday, 20	
October	Monday, 7 Saturday, 19 Thursday, 31	Thursday, 2 Tuesday, 14 Sunday, 26	
November	Tuesday, 12 Sunday, 24	Friday, 7 Wednesday, 19	
December	Friday, 6 Wednesday, 18 Monday, 30	Monday, 1 Saturday, 13 Thursday, 25	

Selected Dates Chart

This chart shows the sampling dates used for evaluation.

Vitae

Jodi Lockaby has a Bachelor of Science in Science, Technology, and Culture from the Georgia Institute of Technology in Atlanta, Georgia. She is interested in the fields of science and risk communication, specifically in the areas of aeronautics and space exploration.

After graduation, Jodi is marrying Matthew Ware and moving to Greenville, South Carolina, where she hopes to find a job in science communication.