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Longitudinal Analysis of NASA Public Relations and New York Times Newspaper Articles (1963-2011)

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Longitudinal Analysis of NASA Public Relations and New York Times Newspaper Articles (1963-2011)

by

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Dedication

Dedicated to future space science communicators.

You’re the difference between a dream and a moon launch.

Ad Astra.

Acknowledgements

"But in a very real sense, it will not be one man going to the moon--
if we make this judgment affirmatively, it will be an entire nation.
For all of us must work to put him there."
President John F. Kennedy
May 25,1961

I remain in debt to many persons that have helped deepen my love for science communication and propelled my interest in space studies forward. It took the combined work of all of these professional and personal friends, an entire nation of connections, to help one more human achieve their Moon.

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Abstract

Longitudinal Analysis of NASA Public Relations and New York Times Newspaper Articles (1963-2011)

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Using Grunig & Hunt's models of public relations, this thesis provides a longitudinal content analysis of NASA press materials and New York Times newspaper articles from 1963 to 2011 with regards to various sampled crewed and uncrewed spaceflight missions. Additionally, semi-structured interviews with space industry practitioners, including NASA public affairs officers, journalists, and astronauts, were gathered to provide additional insight to content analysis. From the 1960s up until the 1990s, NASA used a public information model to inform journalists about key facts. After the 1990s, NASA public affairs used a mixed motives model, tailoring to their audiences and messages. While in the beginning, NASA could rely on journalists to share their narrative and instead focused on disseminating the scientific results to the press. Present-day NASA has developed strategies and tactics to support their brand narrative and acknowledge their various audiences that interact with the agency.

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Chapter 1: Introduction

The transearth injection burn pushed the astronauts from the Moon onto their way home. On that same day, July 22, 1969, the world's most eminent rocket scientist addressed a room, packed with reporters and camera crews from around the world. "I would like to thank all of you for all of the fine support you have always given to the program," Wehner von Braun said from the podium at NASA's Manned Spacecraft Center in Houston, Texas. "Because without public relations and good presentation of these programs to the public, we would have been unable to do it." (Scott & Jurek, 2014, p. ix) "It" meaning John F. Kennedy's challenge—the first man's steps on the Moon before the end of the 1960s.

Though von Braun could anecdotally attest to the importance of public relations in aerospace science and research, little academic research has been conducted as to the effectiveness of public relations with regards to aerospace advancements. Much research has been done with regards to space policy, such as origins and the future of the American space program, and space history, such as preserving the record and minds of the dedicated engineers and scientists in various mediums for decades to come. Books directed at the general public have shared insider information of how certain decisions and actions impacted the program. However, few books have been devoted to the impact of public relations, advertising, marketing, and other similar communicative acts on the public's impression of the American space program. Even fewer works use academic

lenses to analyze the communications used to share NASA's mission and goals with the public both at the time and over the years.

Using Grunig & Hunt's Four Models of Public Relations as conceptual lenses, this paper investigates how the National Aeronautics and Space Agency presents its crewed spaceflight missions public relation efforts to the public, and whether and how this has changed over time. In addition, this paper establishes a timeline in which NASA began using dialogic communications as their public relations efforts evolved over time.

Chapter 2: Literature Review

This chapter constitutes of some NASA history and communication academic topics. The origins of NASA and public perception covers from 1957 to 1961 to illustrate the decisions made that led to the American space program. Next, a historical survey of the type of public who supported NASA's Apollo Program. Following that, the academic topics discussed include the four models of public relations, science communication models, brand narrative, and theory of discourse. Lastly, a section on longitudinal content analysis is presented.

THE ORIGINS OF NASA AND PUBLIC PERCEPTION

After the World Wars, artists depicted postwar missiles as thick rockets with fins, shifting the context from war effort to everyday life (Prelinger, 2010, 10). New science fiction magazines blossomed in the 1950s, comparing space travel to a normal vacation for an American family, capturing the public imagination (Prelinger, 2010, 10). In October 1957, the convergent course of science fiction and reality became obvious with the launch of the USSR's Sputnik I, the first satellite to successfully enter Earth orbit. As Prelinger describes, "Space abruptly became *real*. And urgent" (2010, p.12). A polished aluminum sphere with only the capability to beep, Sputnik I successfully escaped the Earth's atmosphere, physically signaling to the world and its inheritance the dawn of the space age. The Soviet Union attempted several launches starting in 1955 during the international geophysical year, but only named Sputnik I after it successfully began orbit. The previous five failures remained unknown to the public at the time (Sparrow, 2014, p.298). By the

end of the month, its audible sounds ceased (Sparrow, 2014, p.299). Spuntik I deorbited four days into the new year. It no longer mattered that Sputnik I was no longer flying, because the race had begun and the Soviets were the pacesetters (Sparrow, 2014, p.299).

In post-Sputnik haste, the National Aeronautics and Space Administration (NASA) was established in July 1958 as a civilian space agency, under the insistence of President Dwight D. Eisenhower after being advised by Science Advisor James Killian (Logsdon, 1970, p.20). By the late 1950s, Soviet Russians had long used "technology as an instrument of propaganda and power politics" (Logsdon, 1970, p.20). Killian asserted that engaging in a space race, or any technology race, with Russia on their terms would weaken American science and prestige overall. As a result, Eisenhower determined that the American space program would be conducted openly and without military secrecy (Logsdon, 20).

John F. Kennedy's presidential campaign began in January 1960; its rhetoric included on a fictional "missile gap" and a "space gap" positing that America had fallen behind the USSR in science and global leadership (Logsdon, 1970, p.64). Their campaign statements included stressing the Eisenhower administration's lack of initiative, ingenuity, and vitality with regards to space. Kennedy's campaign issued a statement in aerospace trade magazine *Missiles and Rockets* stating that America was losing a "strategic space race with the Russians", "control of space will be decided in the next decade", and "space is our great New Frontier" (*Missiles and Rockets*, October 10, 1960, p.12-13). Ten days before the November 8, 1960 election, an overseas U.S. Information Agency survey was leaked to the press, proving that U.S. allies in Europe believed the Soviet Union's Sputnik

success foreshadowed a Communist trend would become the dominant military and technological power of the world (Logsdon, 1970, p. 65).

As early as the 1962-1963 fiscal year, Prelinger shares that when the "funding, infrastructure, and technological acumen" aligned to support placing a man on the Moon (2010, 23). Project Mercury and Project Gemini were well underway, with Project Apollo right on their heels. Since advertising in trade magazines like *Aviation Weekly* lost its spark, the recently founded NASA began to lead the narrative. Around this time, while in a political vacuum with no policy guidance, NASA committees decided to pursue the long-term goal of a rational and highly technical program of manned spaceflight development (Logsdon, 1970, p.57). A full two years before President John F. Kennedy announced the first lunar landing as a national goal, NASA planners had chosen a lunar landing objective in 1961 (Logsdon, 1970, p.57).

Prior to the 1957 Sputnik catalyst, visual advertisements in these magazines were an uneventful, sedated black-and-white. As America entered the space age, ads began "depicting [the aerospace] industry's hopes for the future" (Prelinger, 2010, p.14) as the trade industry took on artistic expression of now iconic space topics including satellites, spacecraft, and space landscape. Paramount to these topics was the human body, which prepared the human mind for a man in space. At the end of Eisenhower's presidency in 1960, scientists actively advocated against humans in space, citing that such reasons for crewed space exploration are "emotional compulsions and national aspirations," and a "man-in-space cannot be justified on purely scientific grounds" (Logsdon, 1970, p.35).

The first several months of John F. Kennedy's presidency (January - April 1961) was plagued with the decision if Eisenhower's unspoken space policy should be reversed to allow American men to reach the Moon, even though NASA researchers determined the feat scientifically achievable decades prior (Logsdon, 1970, p. 92). Kennedy was unfamiliar with space policy in general, unlike his vice president Lyndon B. Johnson, who sought to pursue an aggressive civilian space program since Sputnik in 1957. When the USSR succeeded with orbiting cosmonaut Yuri Gargain on April 12, 1961, propaganda from the country declared a victory for socialism virtues, global superiority, and world peace (Logdson, 1970, p.103). At the time, the United States equivalent achievement was Astrochimp Ham, who flew on January 31 of the same year. The Soviet flight was unexpected by the American public, with as much shock shaking the nation as the Sputnik satellite fourteen years earlier. Combined with the Bay of Pigs invasion in the background, Kennedy had to decide during the short timespan of a crisis. He determined that Russia chose space as the playing field for the Cold War. That socio-political landscape determined the May 25 announcement, post Alan Shepard's successful flight, for America to reach the Moon by 1970.

WHO ACTUALLY SUPPORTED THE APOLLO PROGRAM?

"While there were some supporters whose adulation approached religious fanaticism, it was never popular with the public as a whole," D. E. Nye writes about analyzing who supported the space program (Nye, 1996, p.69). Opinion polls in the 1960s showed the American public was not sentimental about the space program,

watching the price tag and considering other priorities of the time. Reflective historical fiction accounts (such as Tom Wolfe's The Right Stuff) suggest romanticized, widespread support that immediately dropped off after Neil Armstrong's first step in July 1969. Prelinger too references how watching the budget for NASA level-out can correspond with the excitement of the space era. Prelinger posits that after Yuri Gargarin entered orbital space in April 1961, the funding, infrastructure, and technological acumen were aligned in order to propel the human spaceflight program (2010, p.23).

Nye's data from the era, however, suggests otherwise. Through a series of surveys, Northup & Grumman found that the general public's motivations to support the Apollo program was impacted more from the Cold War than space exploration itself. In a November 1965 Nationwide Harris Poll, a mere 45% of Americans favored going to the moon while 43% opposed it and 12% remained undecided. Opposition typically held a grade school education (61% against) and earned less than $5,000 a year (56% against). After inflation, that would be $41,922 in 2020. Supporters had a college education (59% pro) and earned more than $10,000 annually (60% pro). After inflation, that amount would be $83,845 in 2020. Interestingly, support was weakest in the South even though they "disproportionately" benefited from popular facilities in Huntsville, Alabama; Houston, Texas; and Cape Canaveral, Florida, let alone among other smaller locations.

Overall the strongest opposition came from African Americans, women, the least educated, and the poor, (arguably those who did not find themselves represented in the program, were fighting for equal rights, and/or needed financial assistance). Male, well-

educated Caucasians who were young and affluent most appreciated the Apollo program, but could buy into the ideology of "commodity scientism" (Michael Smith), or from spin-off technology and improved scientific knowledge. These advances "presented a cornucopia of practical results [...] that especially appealed to the well-educated and wealthy" (Nye, 1996, p.72). Although the international media event, live and unpredictable, welded the community together, this doesn't necessarily mean the community supported it. It is especially evident after the spectacle was over, when economic support decreased. Overall, NASA's "powerful public relations apparatus and the media's lavished attention on the Mercury, Gemini, and Apollo programs" is how the nostalgia for Apollo 11's enthusiastic support comes from, which appears problematic when "in contrast to the current apathy towards space exploration" (Nye, 1996).

Table 1: Northup & Grumman's Nationwide Harris Poll. Adapted from Nye (1996).

Nationwide Harris Polls Q: "It could cost the United States $4 billion a year for the next ten years to finally put a man on the moon and to explore outer space and other planets. All in all, do you feel the space program is worth spending that amount of money or do you feel it isn't worth it?"			
	Worth it	**Not worth it**	**Not sure**
November 1965	45	42	13
July 1967 (5 month after Apollo 1)	34 (↓ 11%)	54 (↑ 12%)	12 (↓ 1%)
February 1969	34	55 (↑ 1%)	11(↓ 1%)
July 1969 (Before Apollo 11)	51(↑ 17%)	41(↓ 14%)	8 (↓ 3%)
August 1969	44 (↓ 7%)	47(↑ 6%)	9 (↑ 1%)

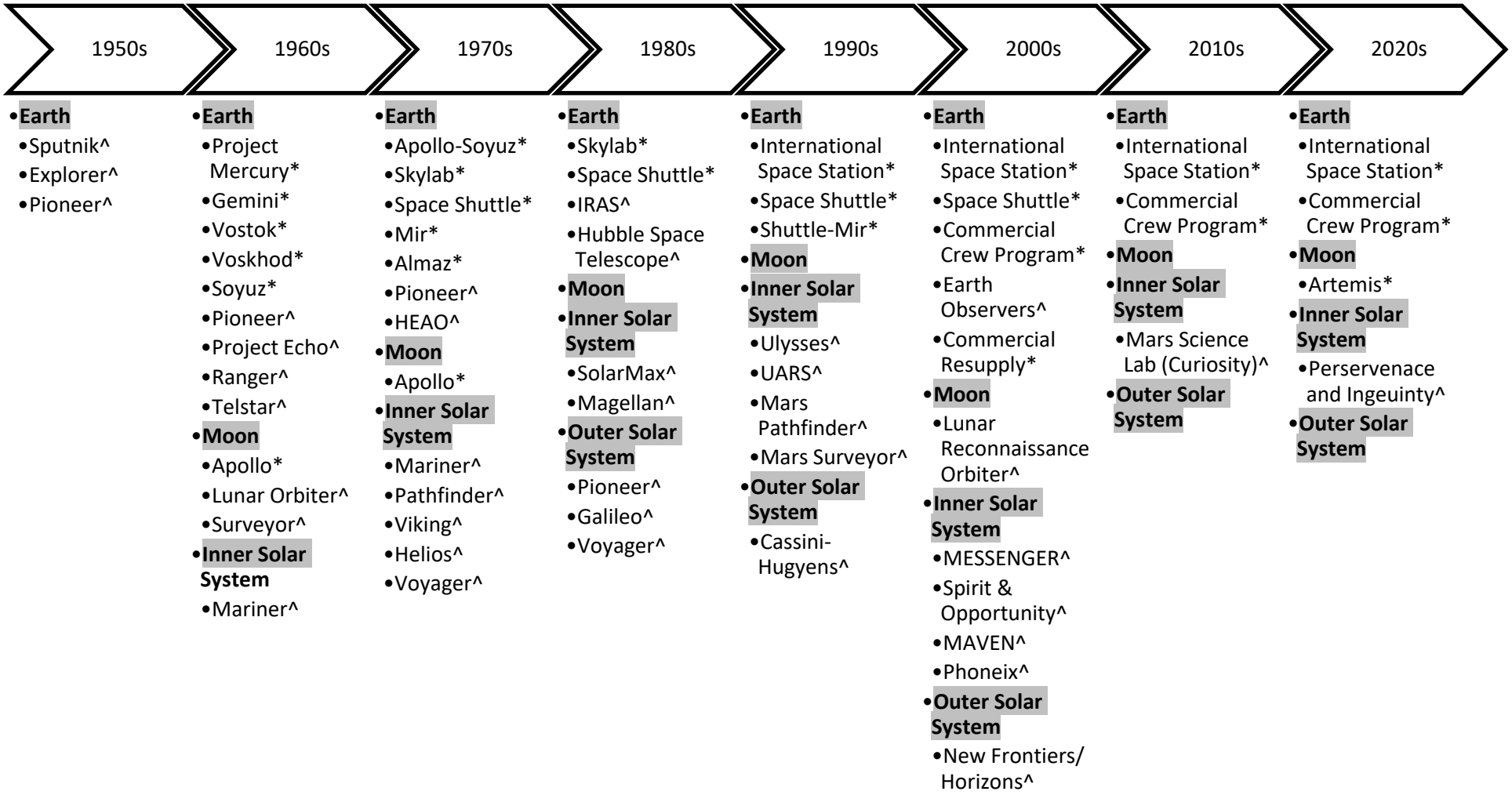


Figure 1. Timeline of Crewed and Uncrewed Missions.
(* denotes crewed mission, ^ denotes uncrewed mission)

FOUR MODELS OF PUBLIC RELATIONS

Grunig and Hunt outline four models of public relations: (1) press agentry or publicity model, (2) public information model, (3) persuasion or advocacy model, and (4) dialogue or relationship building model (1984). Later, they added a fifth mixed motive model. Each model has different characteristics that make it unique as compared to the other models. Within each model is a few characteristics: unhealthy or health, symmetrical or asymmetrical, and a particular level of rhetoric (Grunig & White, 1992).

The worldview of the organization can be distilled by how an organization approaches their publics (Grunig & White, 1992). A symmetrical approach is focused on an honest, mutually beneficial relationship where the organization disseminating the information is willing to negotiate and adapt to make compromises for the good of both the publics and the organization (Grunig & White, 1992). Attributes of a symmetrical relationship include an open system with decentralization of management, willing to take responsibility (Grunig & White, 1992). An asymmetrical approach is focused on changing the public's interests and thinking rather than changing the organization, its policies, or its views (Grunig & White, 1992). This asymmetrical relationship is a closed system focused on efficiency, elitism, and tradition with a central authority and known hierarchy (Grunig & White, 1992).

RQ_1: To what extent did NASA primarily use symmetrical or asymmetrical rhetoric in each decade?

Certain presumptions can be made with regards to an organization's relationship with their publics. A healthy relationship focuses on strategic action and interaction that accepts responsibility (Grunig & White, 1992). Overall the organization will be

Table 2: Adapted text from Grunig & Hunt (1992), Booth (1981), and VanDyke & Lee (2020).

Public Relation Model	Worldview	Presumptions	Rhetoric	Science Model
Press Agentry/Publicity *One-way Communication Model*	Asymmetrical *One-way*	Unhealthy	Sub-rhetoric *Cheating*	
Public Information *One-way Communication Model*	Asymmetrical *One-way*	Unhealthy	Mere Rhetoric *Sincerely*	Deficit Model *Education*
Persuasion/Advocacy *Asymmetrical Two-way Communication Model*	Asymmetrical *Two-way*	Healthy	Rhetoric-B *Reasoning*	Dialogic Model *Discussion*
Dialogue/Relationship Building *Symmetrical Two-way Communication Model*	Symmetrical *Two-way*	Healthy	Rhetoric-A *Discourse*	Participation Model *Collaboration*
Mixed Motives *Any combination*	Symmetrical or Asymmetrical	Healthy or Unhealthy	Sub-rhetoric, Mere Rhetoric, Rhetoric-B, or Rhetoric-A	Deficit, Dialogic, or Participation

competitive, yet cooperative, with the industry. Unhealthy relationships take on a "them v. us" mentality when it comes to mass public media, often passively involved in activities "for the sake of doing something" (Grunig & White, 1992, p.45). They are competitive, but overall individualistic, when it comes to other organizations in their industry (Grunig & White, 1992).

RQ2: To what extent did NASA create a healthy or unhealthy relationship with journalists in each decade?

Next, we have the type of rhetoric that each model encounters. Sub-rhetoric refers to "words or symbols used to deceive or obscure issues [communicated] or to evade action"

all together (Booth, 1981, p.29; Grunig & White, 1992, p.48). There is a sense of one-sidedness and deceit to heavily influence the audience, such as involved with propaganda, where truth of a message matters little. Booth gives the example of a large corporation's advertising campaign as an elaborate chain of lies to cover-up a useless or harmful product (1981, p.29). Mere Rhetoric is "the whole art of sincere selling of any cause, not just the trickery part or the disguise, but the genuinely persuasive parts too, including logical arguments" (Booth, 1981, p.29; Grunig & White, 1992, p.48). Ethos is high among mere rhetoric, allowing audiences to be moved to a known destination and outcome of the conversation lead by the rhetorician. The rhetorician sincerely and honestly believes they will prevail with gratitude to the rhetorical devices employed.

In the realm of rhetorical exchange, however, the discovery of the rhetoric is important. Hence, Rhetoric-B is "art of knowing what you want, finding the really good arguments to win others to your side" (Booth, 1981, p.32; Grunig & White, 1992, p.48). Rhetoric-B is focused on understanding your audience, and using that understanding to communicate your point, in essence the language of a two-way asymmetrical relationship. Booth describes this as the art of a good lawyer or of an effective business leader (Booth, 1981, p.32). Rather than a rhetorician leading the audience, Rhetoric-B allows the audience to wander through the argument and discover their own route, but inevitably ends at the known destination the rhetorician has chosen. Rhetoric-A, on the other hand, is defined as "discover and refine in critical exchange our ends and purposes" or a rhetoric of inquiry (Booth, 1981, p.34; Grunig & White, 1992, p.48). The destination is unknown, where both parties in the conversation moves towards an outcome together. It may be the original choice as the rhetorician intended, or it may be a modified or an altogether different destination found through the dialectical discourse. This optimistic rhetoric is focused on

developing a relationship and understanding, like the foundational work for a social license to operate.

RQ3: What types of rhetoric did NASA primarily use in each decade?

The typology of Grunig and Hunt's public relations models aligns as seen in Table 2 (1992). Press agentry and publicity, pioneered by P.T. Barnum, this model focuses on an "one-way message distributed through the mass media" in which the message's information can be warped, embellished, or incomplete to create excitement about the information (VanDyke & Lee, 2020; Wilcox, Cameron, & Reber, 2015). The public information model also uses asymmetrical messaging (from the organization to mass audiences) but focuses on "accurate and complete information to the public" (VanDyke & Lee, 2020; Wilcox, Cameron, & Reber, 2015). Persuasion and advocacy models branch from the first two models by adding a feedback loop to the transmission of information, with the goal to understand publics involved to better persuade the audiences (VanDyke & Lee, 2020). VanDyke and Lee point out advertising and marketing firms often use this model (2020). The last clearly defined model is dialogue and relationship building, also known as an engagement-centric model (VanDyke & Lee, 2020); this model works to create shared meanings among all parties and incorporate feedback from audiences to adapt organizational actions and policies (VanDyke & Lee, 2020). Later research prompted Grunig to add a fifth model: mixed motives model. This is a catch-all where any combination of worldview, presumptions, and rhetoric is used to achieve a particular goal.

RQ4: What overall model of public relations has NASA used in each decade?

How science is communicated has undergone a similar process of discovery. Focusing on disseminating information, the deficit model implies scientific illiteracy among a non-expert public (Bauer, M., Allum, M., & Miller, S., 2007). The solution to generate trust and knowledge about science with this model is to unidirectionally present more information to the public. This mirrors the public information model of public relations. VanDyke and Lee write this is too simplistic to succeed due to individual beliefs and perceptions about the world around them, including their values, worldviews, attitudes, knowledge, and ideologies (2020). In the 1990s, a dialogic model was developed. This approach uses two-way communication model takes in feedback and knowledge from the publics. With this case, the knowledge is still produced and disseminated by the scientists but enriched by the public (VanDyke & Lee, 2020). This asymmetrical nature results in the public having little influence or input into the science as a hole, comparative to advocacy model of public relations (VanDyke & Lee, 2020). The last science model Van Dyke and Lee describe is an engagement model. This mirrors the relationship-building model of public relations. This final model seeks authentic engagement from active publics leading to a multidirectional communication model, taking in multiple perspective from concerned groups. The two-way symmetrical model builds on mutual understanding and interactivity with publics, which allows the collaboration to keep scientists and the public on equal footing (Yuan, S., Oshita, T., Abi Ghannam, N., Dudo, A., Besley, J. C., & Koh, H. E., 2017; VanDyke & Lee, 2020).

BRAND NARRATIVE

As designed by President Eisenhower, NASA was required to share information with the public about its progress. the National Aeronautics and Space Act of 1958 mandates that NASA should “provide for the widest practicable and appropriate

dissemination of information concerning its activities and results thereof" (Public Law #85-568, 72 Stat., 426.). First Head of Public Information Office Walter T. Bonney described in a 1959 policy memo: "In servicing the press, the PIO seeks to function as a precision-ground mirror, faithfully reflecting the activities of NASA" (Scott & Jurek, 2014, p.17). In this memo, outlined some of the first examples of brand journalism. Brand journalism emphasizes using journalistic techniques to present integrated brand messages that are multi-dimensional, multi-faceted, and complex (Arrese, A. & Perez-Latre, F. J., 2017). Bonney wrote that the PIO staff would function as "reporters within the agency" who would pen stories with "newsworthy information" and then process into a piece "useful for the press." Bonney continues that the press can use the piece similar to a wire service, but where a journalist can "rewrite the production of the PIO and … make the product [their] own." (Scott & Jurek, 2014, p.17). NASA continues this method, branching out from written stories to other media including television and social media.

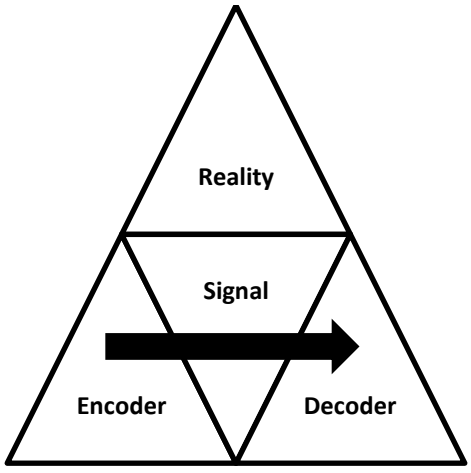
Branding refers to an organization aligning their strategic mission and marketing activities to create unique value to consumers (Bange, S., Moisander, J. & Jarventie-Thesleff, R., 2019). Though traditionally used in business realms, the term is migrating to other non-business entities such as social media influencers and government organizations. Increasingly, brand co-creation has takes place, where active publics take on strategically important roles to create or destroy a brand (Bange et al, 2019). These active publics are informed, networked, and empowered. A step past participatory "remix" culture, the contemporary co-creation culture emerges from the sharing economy where publics "participate in the process" of content creation (Bange et al, 2019). This process increases brand value through networked relationships and social interactions of active publics. Bange goes on to describe open-source branding, where admirers of a brand participate and contribute to brand knowledge, including its awareness, images, and reputation.

RQ5: To what extent has NASA used journalists to amplify brand narrative over time?

THEORY OF DISCOURSE

In 1971, Kinneavy adapts Shannon and Weaver's communication model into a single structure called a communications triangle, with the encoder, decoder, and reality on a corner. The signal sits in the middle. One person encodes a message (encoder) relative to their reality, sends the message through language (signal), and then the other person receives the message (decoder) (Kinneavy, 1971, p.19). In the Shannon-Weaver model unintended or intended distortions can be made to the signal, called noise. As you dive into the different parts of the triangle, different rhetorical studies open. The relationship of reality and signals is explored through semantics, syntactics, and linguistics. The decoder's interpretation and understanding of the received message is investigated through discourse and pragmatics.

Figure 2: Adapted text from Kinneavy, (1971, p.19).



Kinneavy organizes pragmatics into three areas: (a) arts and media, (b) modes, and (c) aims. Arts and Media is determined by the signal used (Kinneavy, 1971, p. 30). Is it language or image based? Is the signal intended for oneself or a large audience? According to McLuhan, the media itself is a piece of that message (Kinneavy, 1971, p.34), ergo the media and the art cannot be separated from the signal. Modes categorize what a signal, or text, is into genres of reality. Each mode has its own unique logic, patterns, and characteristics; using certain techniques and approaches a particular mode can be accomplished. These modes are narrative, description, evaluation, and classification (Kinneavy, 1971, p.37). Potential techniques include definition, comparison, and argumentations.

Figure 3: Adapted text from Kinneavy, (1971, p.31).

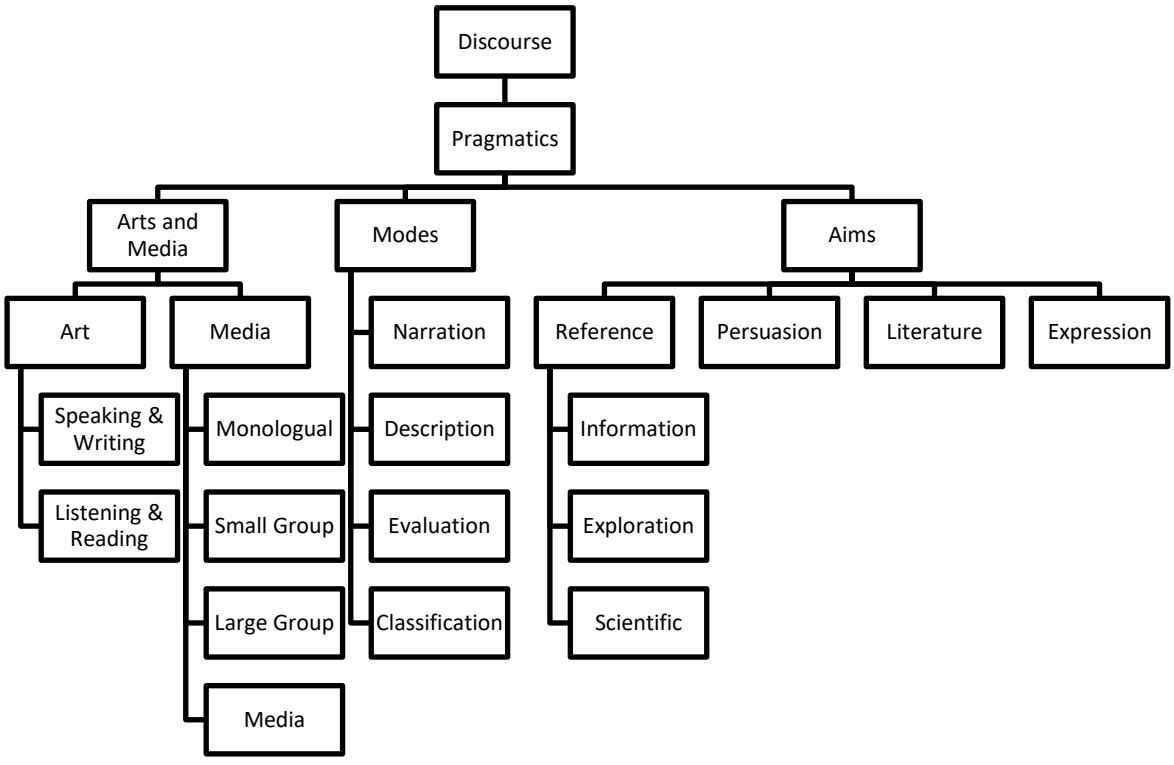
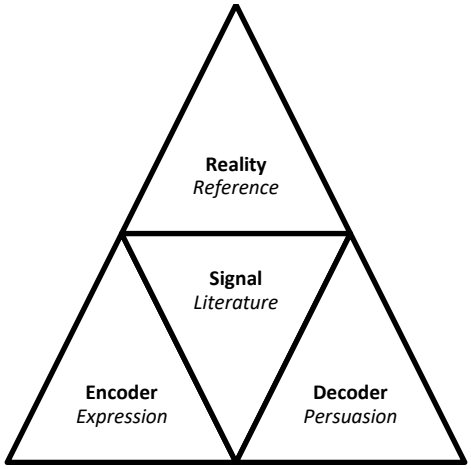


Figure 4: Adapted text from Kinneavy, (1971, p.39).



Beyond media and modes lies aims. Aims focus on the purpose of the signal. The mode might limit what aims are applicable, due to inherent limitations of the structure (Kinneavy, 1971, p.38). The aims are reference, persuasion, expression, and literature. The aim can easily be determined by the focus of the text. Referential aim focuses on conveying reality. When determined to affect a decoder, such as convincing them of a certain reality, the aim is persuasive. Expression can be used to convey an encoder's inner thoughts. Lastly, literature is used to draw attention to the text itself.

RQ6: What is the aims of the journalists when writing about NASA?

LONGITUDINAL CONTENT ANALYSIS

Content analysis obtains objective data through the systemic observation and quantitative description of the manifest content of communication (Babin & Zikmund, 2016, p.219; Treadwell, 2017, p.217). This research method allows scientists to bridge quantitative and qualitative research to examine the nuances of a dataset. The strength of content analyses stems from systematic sampling, clear definition of units, and clear coding guidelines (Treadwell, 2017, p.217-225). Coding units can be physical, syntactical,

categorical, propositional, or thematic (Treadwell, 2017, p.224). Overall, content analysis can be used to exhume patterns found from the sample data to be interpreted into themes (Treadwell, 2016, p.230).

For this thesis, content analysis can be used to gain data from NASA press materials and newspaper articles. Relating to research questions one, two, three, and four, content analysis of press materials can be used to code for Grunig & Hunt's four models of public relations and their respective components: worldview, presumptions, and rhetoric. For research questions five and six, insight into the aims of the journalists and NASA's brand narrative can be gleaned from content analysis of newspaper articles that correspond to the same missions as the press materials.

Stijn Joye performed a longitudinal analysis of international news coverage in Flemish newspapers spanning from 1986 to 2006 (2010). His longitudinal design followed eight selected individual, non-adjacent years over a twenty-year span from three different Flemish newspaper companies to investigate how international news coverage has changed, taking into consideration stories and their accompanying pictures. The research population was screened by twenty-four students and Joye to select a day of each month of a given year, resulting in 288 newspapers selected. Rather than focus on word count, Joye and his students worked in cm^2 of an article, including the pictures, to determine the physical space dedicated to international news as a percentage of the enter area of the newspaper. They read and physically measured a sample of 8609 articles about international issues, an average of thirty articles per newspaper (Joye, 2010). The physical measurement of the international news stories was thought to denote the interest and newsworthiness in a given topic. In addition to reading the articles, eight semi-structured in-depth interviews with journalists of newspapers and news agencies were performed.

Joye found about 15.5% of the physical space in the newspapers were dedicated to international events; of that amount 6.5% of the physical space in the newspaper were considered newsworthy enough to be covered on the front page (2010). Daily, 3.5 out of the 23 pages of a given newspaper covered international news. International news themes were slanted towards bad news, with an emphasis on "violence, conflict, natural disasters, or on politics and elite actors" (Joye, 2010, 33). Overall there was a focus on hard news, but Joye found in Flemish newspapers a gradual rise in soft news over the years, including more attention to human-interest stories and North American entertainment (2010). Other biases were found, such as particular attention to the United States of America and Europe (Joye, 2010). Interviews with journalists revealed insight that when determining stories to publish newspaper agencies are mindful of their target audience and editorial policies, which can affect the quantity and quality of international news covered. Journalists also point out a radically changed news ecology, where the internet has had profound impact. Sources and accessible information have increased exponentially for journalists with the introduction of the internet, but newspapers have developed unique brands that compete with other media channels.

SEMI-STRUCTURED INTERVIEWS

Semi-structured interview format allows interviewers to ask broad, probing questions interviewees (Treadwell, 2017, p.199). The interviewer can keep the conversation focused but allow the interviewee the ability to maneuver through their thoughts (Treadwell, 2017, p.199). The advantages of this format include allowing the interviewees the interviewees the flexibility to volunteer information they think is important for the conversation (Treadwell, 2017, p.199; Brennen, 2017, p.29). Follow-up questions are encouraged as conversation points with the interviewee (Treadwell, 2017,

p.199). Additional probing can lead to exploring a particular topic more deeply or clarifying a particular answer an interviewee gave (Brennen, 2017, p.29). Semi-structured interviews can be used to tackle research questions five. For research question five, interviewing practitioners can glean information about brand narrative.

Chapter 3: Methods

To explore NASA's relationship with the public, a longitudinal content analysis was used to glean understanding about the past sixty years. Historic press materials and newspapers were used to gather information about NASA's public relations approaches over time. More specifically, Grunig and Hunt's four models of public relations are conceptual lenses to investigate how NASA presented its crewed and uncrewed spaceflight missions to the American public via journalism. Semi-structured interviews explore more deeply the relationship between astronauts, public affairs officers, and journalists.

The following sections are presented by source: press materials, newspapers articles, and interviews with practitioners.

PRESS MATERIALS

The NASA History Department stores press kits and press releases from 1962 to 2011 on their program office website. Press kits past 2011 can be found on NASA's website. These primary sources became the base of the investigation. To determine which years to use, a list was completed naming the year, presidency, number of press kits available, and the major NASA milestones of said year (e. g. 1963, President John F. Kennedy, one press kit, Final Mercury Launch). From there, the list was organized by the number of press kits released each year. Every ten years were highlighted in a new color For example, the first group of years had between one and five press kits. These years were 1988, 1961, 1986, 1962, 2012, 1970, 1974, 1980, 1983, and 1990. The years with the most press kits from each group of ten were chosen. 1990 had five press kits, the most of the first group of years. After one year from each group was selected, additional years were selected to ensure that every presidency was represented at least once. The fifteen years and the events used for this sample are listed in Table 3.

Table 3: Years analyzed, president at the time of that year, the number of events from each year, and the list of events analyzed from each year .

Decade	Year	President	# of Events	Event
1960s	1963	Kennedy	1	*Mercury MA9 (Faith 7)*
	1966	Johnson	11	*Apollo Saturn 201, 202, & 203; Gemini 8 & 12; Orbiting Astronomical Observatory A; Nimbus Satellite 2; Orbiting Geophysical Observatory B; Lunar Orbiter I & II; Pioneer 7*
	1969	Nixon	12	*Orbiting Solar Observatory F & G; Mariner 6 & 7; Apollo 9, 11, & 12; Nimbus Satellite 3; Orbiting Geophysical Observatory F; Explorer 41; Pioneer E*
1970s	1971	Nixon	7	*Apollo 14 & 15; Explorer 43 & 45; Mariner 8 & 9; Orbiting Solar Observatory H*
	1973	Nixon	8	*Pioneer 10 & 11; Skylab 2, 3, & 4; Explorer 50 & 51, Mariner 10,*
	1975	Ford	8	*Explorer 53; Orbiting Solar Observatory I; Nimbus Satellite 6; Apollo Soyuz Test Project; Viking 1 & 2; Atmosphere Explorers D & E*
	1979	Carter	4	*Pioneer Venus 1 & 2; Nimbus Satellite 7*
1980s	1981	Reagan	4	*Voyager 2; Satellite Business Systems; STS 001; STS 002*
1990s	1990	H. W. Bush	3	*ROSAT; STS 031; STS 035*
	1996	Clinton	8	*Galileo; STS 072; STS 076; STS 079; Mars 96; Mars Exploration; Mars Global Surveyor; Mars Pathfinder*
	1999	Clinton	4	*STS 096; STS 093; STS 103; Mars Climate Orbiter*
2000s	2000	Clinton	5	*Mars Polar Lander; Zvezda; STS 101; STS 106; STS 092*
	2002	W. Bush	5	*ISS Expedition 5 & 6; STS 111; STS 112; STS 113*
	2007	W. Bush	7	*New Horizons Jupiter flyby; ISS Expedition 15 & 16; Phoneix Launch; STS 117; STS 118; STS 120*
2010s	2011	Obama	4	*STS 133; STS 135; Mars Science Laboratory; ISS Expedition 30*

These fifteen years had a total of 160 press kits, with the average per year being 11. A second chart was made, listen the events of the press kits of each year and descriptively labelling events as crewed/uncrewed or historic/ordinary. By reducing missions that were similar or duplicates to other events in the same year, the total number press kits by the end of the process are 93 NASA press kits. Press kits and press releases were read and then coded with one of Grunig & Hunt's five models of public relations: press agentry/publicity, public information model, persuasion/advocacy, dialogue/relationship building, or mixed motives (1984). To help determine which model identifies most with a given press kit or press release, each press material was analyzed for worldview (symmetrical or asymmetrical), presumptions (healthy or unhealthy), and rhetoric (no rhetoric, subrhetoric, mere rhetoric, rhetoric B, or rhetoric A) before being assigned a public relations model.

NEWSPAPER ARTICLES

The New York Times (NYT) is oft referred as the newspaper of record for American historical events often in the realms of history, law, and librarianship (Martin & Hansen, 1996). Inter-media agenda setting research studies measure the influence of one media outlet over another (Golan, 2007). Numerous studies have measured that elite newspapers, like NYT, have agenda-setting effects on local newspapers (Golan, 2007). This study analyzes NYT science coverage to compare with the press material.

Access to historical newspaper articles was available through ProQuest. To follow a particular event, first a month's range before and after the event would be used to restrict the search for articles. Next, search terms would be used to identify the event. In most cases, the flight number (e. g. "Pioneer 7") was enough to focus in on the particular event. In some instances, additional terms were needed to restrict the event due to one of the terms being a part of common language (e. g. "phoenix AND Mars" and "Mercury AND

Cooper"). The search terms, decade, and corresponding mission was recorded for each article. Next, the hyperlink, title, author, and date were recorded. Additionally, the author was discerned to be a human or a wire service. Lastly the aim of the discourse, the control, and if any press material was referenced as recorded. Overall, 739 newspaper articles were analyzed, starting May 1, 1963 and ending with December 31, 2011.

INTERVIEWS

Interviewees were selected via convenience sampling. By adding practitioners within the space industry, information that press materials and newspaper articles cannot provide as easily. For example, uncovering information about the presumptions NASA makes can more easily be understood through conversation with a journalist who has interacted with the organization in a professional context. Press materials can be seen as healthy or unhealthy, but the perspective of the journalist is invaluable. These interviews are designed to strengthen results found with the content analysis, particular for research questions two, three, and five.

Interviews were completed in February and March of 2021. Interviewees included three NASA public affairs officers, three space and science beat journalists from national newspapers, and two NASA astronauts. Respondents' pseudonyms and details about their career experience can be found in Table 4. Public Affairs Officers' experience include the Apollo program, the Space Shuttle program, and the Commercial Crew program. Journalists' experiences include the Space Shuttle program and the Commercial Crew program. Astronauts' experiences include the Apollo program, the Space Shuttle program, and the Commercial Crew program.

Interview questions were as follows:

1. What was your role at your organization?

2. What was it like to work with the (a) media and journalists; (b) public affair officers; or (c) scientists, technicians, and astronauts?
3. How would you describe the Public Affairs Office's (PAO) worldview?
4. What are the presumptions of the PAO about journalists and media?
5. What rhetoric did NASA focus on using with journalists and the public?
6. Overall, how would you describe the public relations model of NASA?
7. What was your aim in communicating via the media?

Questions were tailored to the interviewee based on their role in their organization at the time. After the first two inquiries, each question coordinated with research questions outlined. Question three corresponds with asymmetrical or symmetrical worldview (Grunig & White, 1992). Question four investigates whether the NASA PAO office makes unhealthy or healthy presumptions about working with journalists and the media (Grunig & White, 1992). Question five corresponds with the type of rhetoric NASA used to communicate with journalists and the public: sub-rhetoric, mere rhetoric, rhetoric-B, and rhetoric-A (Booth, 1981; Grunig & White, 1992). Question six seeks to gather more details the interviewee to determine which model of public relation is used (Grunig & Hunt, 1984). The final question corresponds with aims of the communicator (Kinneavy, 1971).

Table 4: Interviewee Descriptions

Respondent	Demographics	Occupation	Location	Years
Dan	Male, 80s	PAO	Johnson, Headquarters	1966 to 1999
Patrick	Male, 70s	PAO	Johnson	1978 to 2010
Sally	Female, 30s	PAO	Langley	2010 to now
Emily	Female, 60s	Journalist	Washington Post	1986 to 2004
Colton	Male, 40s	Journalist	Washington Post	2000 to now
Anwar	Male, 50s	Journalist	New York Times	2000 to now
Gene	Male, 80s	Astronaut	Johnson	1966 to 1979
Nick	Male, 60s	Astronaut	Johnson	1994 to now

Chapter 4: Results

As outlined in Table 3 in Chapter 3, there were ninety-seven events analyzed for this research project, with forty crewed missions and fifty-seven uncrewed missions. This distinction between missions is for many reasons. Traditionally, crewed missions have a more relatable narrative, and robotic missions remain more difficult to fund. Shifts in the two topics can indicate differences in media coverage and ultimately public knowledge on a space mission.

Ninety-one press kits and two hundred and twenty-nine press releases were analyzed for worldview, presumptions, rhetoric, and models of public relations. Seven hundred and fifty New York Times newspaper articles were analyzed for communicative aim and the presence of NASA produced information. The decadal breakdown by mission type for press kits, press releases, and newspapers can be seen in Appendix B. Press kits and press releases were originally separated as two data sets so they can corroborate each other during the results.

The following sections organized the results are in order of the research questions. First worldview, presumptions, rhetoric, and model of public relations results will be reported. Then dialogue and communicative aim. Interview material will be filed under the apt research question, but key topics and insights will be addressed at the end as well.

WORLDVIEW

Overall worldview was asymmetrical for press kits (85.71%) and press releases (79.04%). There are three decades with exceptions. One for press kits, during the nineties decade, where the two worldviews seen are distributed more fairly in press releases (asymmetrical = 57.14%). Another in the eighties decade for press releases, where symmetrical press releases exceeded asymmetrical ones (asymmetrical = 20%). The last was in the twenty-

tens for press releases, where again the symmetrical press releases exceed the asymmetrical ones (asymmetrical = 35%). Ergo, looking at research question one, NASA primarily used an asymmetrical worldview over the past 60 years.

Table 5: Decadal breakdown of press kits by worldview.

Decade	**Asymmetrical**	**Symmetrical**	***Total***
1960s	18	5	*23*
1970s	27	2	*29*
1980s	5	0	*5*
1990s	8	6	*14*
2000s	16	0	*16*
2010s	4	0	*4*
Total	*78*	*13*	*97*

Table 6: Decadal breakdown of press releases by worldview.

Decade	**Asymmetrical**	**Symmetrical**	***Total***
1960s	37	2	*39*
1970s	34	2	*39*
1980s	1	4	*5*
1990s	65	13	*78*
2000s	38	16	*54*
2010s	6	11	*17*
Total	*181*	*48*	*97*

Dan and Patrick described the NASA office as traditional yet innovative, with a focus on responsibility and openness. Sally added interdependence and efficiency is key. Patrick pointed out that generally PAOs were able to "freewheel," with lots of latitude to engage with employees all over the center to create public affairs materials. Dan, Patrick, and Sally were all previously reporters before working at NASA and was comfortable with this freedom, as it mirrored what a typical journalist receives from their editors and

managers. Patrick described public accessibility to NASA as a vital necessity, facilitated through the media. “The media was an important conduit to the public. The public paid for all of this [the space program] and they deserve to see it as much as possible.” Notable exceptions included Apollo 1 and Challenger accidents, where an asymmetrical worldview became dominant. This will be discussed in a later section.

Looking at research question one, the content analysis demonstrates that NASA primarily used an asymmetrical worldview over the past 60 years. However, interviews suggest that the relationship was symmetrical.

PRESUMPTIONS

Overall presumptions were healthy for press kits (79.12%) and press releases (68.12%). In the 2000s, press releases were more likely to be unhealthy (healthy = 44%). A similar pattern to worldview appears with NASA PAO’s presumptions. Dan highlighted that the relationship with the media was generally good, “particularly during the Gemini and Apollo programs.” Patrick highlighted sometimes crewed spaceflight information would be released in a press conference at three A.M. because of the “huge focus of attention on NASA during space missions.” There was a demand for information to the media, and the public affairs officers performed those actions to “facilitate access to NASA without causing pain” (Patrick).

Dan remarked that the way the information program was structured “primarily around the media” allowed NASA to create these “excellent relationships with the press.” The press was also “extremely knowledgeable” about the topic. Most journalists had begun following NASA “since the beginning” during the Mercury program (Dan). Public Affairs Officers describe themselves as a focus on strategic action, assuming and accepting responsibility; aware of strengths, competencies, deficiencies, and improvements; and

lastly a competitive yet cooperative industry focus. Overall, the worldview for NASA was healthy allowing journalists relatively open access to the government space program through the public affairs officers.

Table 7: Decadal breakdown of press kits by presumptions.

Decade	**Healthy**	**Unhealthy**	***Total***
1960s	15	8	*23*
1970s	27	2	*29*
1980s	4	1	*5*
1990s	11	3	*14*
2000s	12	4	*16*
2010s	3	1	*4*
Total	*72*	*19*	*97*

Table 8: Decadal breakdown of press releases by presumptions.

Decade	**Healthy**	**Unhealthy**	***Total***
1960s	33	6	*39*
1970s	36	0	*36*
1980s	5	0	*5*
1990s	48	30	*78*
2000s	24	30	*54*
2010s	10	7	*17*
Total	*156*	*73*	*229*

Colton shared that accessibility is relative to the center, stating it as a “big agency with fiefdoms.” Anwar shared sometime similar bout how some centers “are great and others haven’t been terribly helpful.” Administrators can have a large impact as well. Jim Bridenstine would focus on helping journalists understand what he was trying to share, whereas previous administrators could have unclear and inconsistent messaging. To Colton and Anwar, NASA is “another source in which to create a story with” and does not have a

particularly unique relationship with the space agency (Anwar). Emily added that some of the NASA centers were very public relations focused, while others were more transparent. The subject matter that the center covered tended to impact this.

To answer research question two, generally, NASA created a healthy relationship with the press. The 2000s was the only decade that was unhealthy.

RHETORIC

Press kit rhetoric present consisted of mere rhetoric (82%), rhetoric B (12.09%), and rhetoric A (4.4%). One press kit was coded as no rhetoric, which was a type of technical paper summarizing the Apollo-Soyuz Test Project. The author found some entry errors with NASA's system, so it unknown if this is an error or part of the press kit that was presented to journalists at the time of the event. Press release rhetoric present was sub-rhetoric (0.44%), mere rhetoric (73.8%), rhetoric B (6.99%), and rhetoric A (18.78%).

Table 9: Decadal breakdown of press kits by rhetoric.

Decade	**No Rhetoric**	**Sub Rhetoric**	**Mere Rhetoric**	**Rhetoric B**	**Rhetoric A**	***Total***
1960s	0	0	20	3	0	*23*
1970s	1	0	20	8	0	*29*
1980s	0	0	5	0	0	*5*
1990s	0	0	10	0	4	*14*
2000s	0	0	16	0	0	*16*
2010s	0	0	4	0	0	*4*
Total	*1*	*0*	*75*	*11*	*4*	*97*

Table 10: Decadal breakdown of press releases by rhetoric.

Decade	No Rhetoric	Sub Rhetoric	Mere Rhetoric	Rhetoric B	Rhetoric A	*Total*
1960s	0	1	35	1	2	*39*
1970s	0	0	32	2	2	*36*
1980s	0	0	1	1	3	*5*
1990s	0	0	64	4	10	*78*
2000s	0	0	33	5	16	*54*
2010s	0	0	4	3	10	*17*
Total	*0*	*1*	*169*	*16*	*43*	*229*

The retired PAOs, Dan and Patrick, described Mere Rhetoric overall, providing information about the space program to the public and media. A PAO is a person who becomes "acquainted with everything" happening at the Center and "[interfaces] the scientists with [the press]" (quoting Patrick and Dan, respectfully). At one point, Patrick shared how in the 1990s NASA became more strategic with their communications approach, weighing in stakeholders and political influence, highlighting Rhetoric-B language. Rhetoric-B continued from the 1990s as Sally also described it in her interview: "Why what we are doing is important is the big question behind what we want to share." This illustrates that there is more than information being disseminated, but there is a logic and reasoning to what is being shared with the public.

Astronauts Gene and Nick described press conferences as dialogue based, where journalists can actively participate by asking questions and they can answer openly. Gene shared that sometimes journalists "weren't too smart about space" with regards of knowing to technical knowledge about the Apollo program, so he would receive questions about "the human-interest side of things." Other journalists had "some study in space" and had been "covering space" for most of the program's existence, so those journalists were able to ask detailed questions about technical topics. Gene's willingness to answer questions

demonstrates openness and dialogue, signaling Rhetoric-A. Gene stated that there is "no reason to dodge [questions], you answer it as the best way you know how." Nick shared some insight that mimics Rhetoric-B, such as when he said "[Astronauts] like to know who the audience is so we can direct what we're saying to the audience." Overall, Nick tends to dialogue when possible, such as in a press conference where he fields questions. For his answers, he provides everything he can legally and ethically, such as when a press member might ask about an astronaut's health when that information is subject to medical privacy. These signals open dialogue, which is Rhetoric-A.

Journalist Anwar shared that generally working with PAOs the focus is on the scientific information, but with regards to policy works to be persuasive. According to Anwar and Colton, Jim Bridenstine was a better than most administrators because he had experience as a politician. Bridenstine was good at messaging and had a "Space Stump Speech," as Anwar calls it. Whenever Bridenstine needed to fill time when talking to a journalist or group of people, he would begin sharing current key messages from the industry, such as returning to the Moon sustainably or landing the first woman on the lunar surface. "He could fall back on that when he needed to," Anwar shares. "He was repeat the [key messages] so everyone knew … where Bridenstine would take NASA." From a journalist perspective, this rhetoric could range from mere rhetoric to Rhetoric-B.

To answer research question three, the rhetoric for NASA used during each decade was generally mere rhetoric, except in the 2010s with a shift to Rhetoric A. PAO Interviews reflected that prior to the 1990s, NASA focused on using mere rhetoric. After the 1990s, NASA shifted to Rhetoric-B. Astronauts tended to engage in Rhetoric-A, being able to dialogue with the audience, but more recently including Rhetoric-B when thinking about audience interests in the space program. Journalists still hear mere rhetoric and Rhetoric-B when interacting with NASA.

MODEL OF PUBLIC RELATIONS

With regards to press kits and the four models of public relations, the public information model dominated (69.23%). The other models commonly used were persuasion (12.09%), dialogue (5.49%), and mixed motives (13.19%). With regards to press releases and the four models of public relations, public information model dominated with (74.24%). The other models used were press agentry (0.44%), persuasion (5.68%), dialogue (18.34%), and mixed motives (1.31%).

Sally also shared NASA is working to be more inclusive of groups by "[making] connections to reach out to diverse groups besides NASA fans." This insight aligns more closely with relationship building and dialogue model of public relations. Sally also shared that recently NASA introduced new digital media tactics like podcasts, videos, social media, and influencers. This approach does not take away from traditional media tactics but adds on to "meet the audience where they're at" in the digital realm.

Apollo Astronaut Gene referred to his outreach as a "week in the barrel," which was a common phrase among the astronaut corps at the time. Ideally, one astronaut went about performing outreach and fielding journalists for a week so the others could focus on their training. "We were busy all the time … with the spacecraft and getting ready to launch," Gene shared. He didn't interact much with the press beyond postflight press conferences, where he could answer journalist' questions and summarize the event. As said previously, "there was no reason to dodge [a question, so] you answer it as best as you know how." From an Apollo Astronaut's perspective, the focus was to train for the lunar mission at hand and then provide tat information to the press as needed. While there is dialogue involved this is primarily a public information model.

Table 11: Decadal breakdown of press kits by public relation models.

Decade	Press Agentry	Public Information	Persuasion	Dialogue	Mixed Motives	*Total*
1960s	0	12	3	1	7	*23*
1970s	0	18	8	0	3	*29*
1980s	0	5	0	0	0	*5*
1990s	0	10	0	4	0	*14*
2000s	0	15	0	0	1	*16*
2010s	0	3	0	0	1	*4*
Total	*0*	*63*	*11*	*5*	*12*	*97*

Table 12: Decadal breakdown of press releases by public relation models.

Decade	Press Agentry	Public Information	Persuasion	Dialogue	Mixed Motives	*Total*
1960s	1	35	1	2	0	*39*
1970s	0	32	2	2	0	*36*
1980s	0	1	1	3	0	*5*
1990s	0	63	3	10	2	*78*
2000s	0	34	5	15	0	*54*
2010s	0	5	1	10	1	*17*
Total	*1*	*170*	*13*	*42*	*3*	*229*

Nick has ridden on the Space Shuttle and Soyuz to reach the space station. His experience and perspective was indirect contrast to Gene's. Nick is mindful of his audience and is interested in "[convincing skeptical] scientists, parents, and communities" of the value that NASA brings to humanity. He can tailor his answers, but is careful of proprietary information from private companies, a relatively new expectation of astronauts. Nick will "look at what [the private company] has put out publicly and repeat that [information]." He described outreach as one of astronauts "primary jobs," and looks forward to discussing the space program with citizens and journalists alike. From this perspective, Nick tailors

his actions to who he interacts with, fluctuating between public information, advocacy, and dialogue models depending on his audience. This signals mixed motives model.

Space journalists' role is to communicate information about the industry to the general public. Overall, Anwar, Colton, and Emily agreed that their relationship with NASA depended on many factors and could not be easily categorized as healthy, unhealthy, symmetrical, or asymmetrical. Different NASA centers have different tendencies, often corresponding with the nature of the scientific work they do. One center could be rigid and closed about human spaceflight, while another across the country is open and innovative about robotic planetary missions. The journalists all described an organization that used different tactics and public relation models based on their varying needs for varying stories, hence a mixed motives approach overall.

To answer research question number four: from 1960s through the 1980s, the overall model of public relations NASA used was the public information model. Around the 1990s began, NASA moved away from the public information model and towards a more engaging one. Patrick described the model of the 1990s as advocacy or persuasion. Sally described more of a mixed method model, where NASA can use techniques strategically depending on the medium. Nick, began working for NASA in the 1990s, described a mixed motive model. The press materials suggest a push to dialogue and relationship building. The press experienced a mixed methods approach, where individual centers had its own tendencies.

BRAND NARRATIVE

Presence of NASA was analyzed in two ways: (a) who had control of the article and (b) press release and press kit phrases and images present. Control options were the author, NASA, both, or other. Since had human coding was used to check for the presence

of press release and press kit phrases, either “Maybe” and “Yes” should be considered as positive presence of the NASA material. The majority of articles analyzed had a presence of NASA material (67.7%). In addition, for the majority of newspaper articles, NASA kept control of the narrative and the information (64.06%).

Speaking to who had control of the article first, NASA had clear presence or control of the newspaper article analyzed in four hundred and eighty-three cases. The other held control of the narrative in two hundred and two cases. In thirty-six articles it was unclear who dominated the narrative, but there was clearly NASA and the author contributing to the story together. Lastly, in twenty-six articles someone other than the author or NASA dominated the narratives. This ranged from the USSR to persons involved with trial cases involving indited former astronauts. Overall, NASA keeps control of the narrative and contributions to the conversation. In the 1980s, journalists and NASA both keep control of the articles. In the 2010s, journalists lead control of the articles. NASA keeps control of the narrative and contributions to the conversation with producing press materials.

Table 13: Decadal breakdown of NYT articles by presence of press material.

Decade	**Author**	**NASA**	**Both**	**Other**	***Total***
1960s	71	122	0	19	*212*
1970s	28	106	19	3	*156*
1980s	19	14	1	0	*34*
1990s	26	116	5	2	*149*
2000s	37	123	8	2	*170*
2010s	21	5	3	0	*29*
Total	*202*	*486*	*36*	*26*	*750*

Journalist Emily shared that she has had a wide array of experiences with NASA, where when first introduced as a source, scientists and PAOs could be “reticent” until a

relationship was further developed. Those earlier pieces, NASA would seek to control the narrative through what information was given to Emily, until trust was gained.

Retired PAO Dan described a shift in focus in the press corps after the 1986 Space Shuttle Challenger accident. Originally, journalists were "by and large a scientifically oriented group of people." After the accident, broadcast and print media shifted from sending science reporters to cover crewed missions to investigative reporters. Dan describes the media having a misconception that if reporters did less "cheerleading" for NASA and paid more attention to the program's "shortcomings" then perhaps the accident would not have occurred. Dan also described that after Apollo NASA's mission shifted somewhat "away from science," leaving many science reporters who were once covering the crewed space program to JPL to cover robotic missions.

Table 14: Decadal breakdown of NYT articles by NASA Control.

Decade	**Yes**	**Maybe**	**No**	**Neither**	***Total***
1960s	30	100	75	7	*212*
1970s	62	87	7	0	*156*
1980s	5	16	12	0	*34*
1990s	49	75	25	0	*149*
2000s	35	42	67	26	*170*
2010s	3	7	17	2	*29*
Total	*184*	*330*	*204*	*32*	*750*

Astronaut Nick shared that "many journalists have a story to tell." Rather than paying attention to what he is saying, journalists can insert his quotes out of context into an entirely different story. Anwar shared how his newspaper seeks to create its own brand, the newspaper is shifting away from using wire stories that other papers have access to. As a result, he writes more small stories that he didn't have to when he first started his career

in journalism. Anwar will also visit a public affairs office after a news conference to follow up on technical questions and ensure accurate information from his source.

Taking into consideration this information, the content analysis dataset was analyzed for wire stories and human reporters. Wire stories account for 43% of NASA articles. After the 1960s, a decline in wire stories is seen, with more stories written by journalists. In the 1960s, 59% of the articles were wire stories. In contrast, in the 1970s, 35% of the articles were wire stories. The 2010s had 2 wire stories for the years analyzed.

Table 15: Decadal breakdown of NYT articles by author type.

Decade	**Wire**	**Reporter**	***Total***
1960s	127	85	*212*
1970s	56	100	*156*
1980s	12	22	*34*
1990s	69	80	*149*
2000s	62	108	*170*
2010s	2	27	*29*
Total	*328*	*422*	*750*

To answer research question six, NASA have used journalists to amplify and share their story through journalists. From this research study, journalists generally rely on NASA to present information in which the journalists can paraphrase for their articles.

AIMS OF THE JOURNALISTS

The communicative aim for newspaper articles was referential. Within referential, two of the three subtypes were present: informative (699 articles) and explorative (1 article). Overall aim was referential (92.84%). From withing the referential aim, the overwhelming majority was the informative type (92.71%).

Colton summarized his aim was "to inform the public about the national space program. Comments from Anwar and Emily also matched this sentiment. Ergo, these comments can be seen as informative reference, which matches the content analysis.

Table 16: Decadal breakdown of NYT articles by communicative aim.

Decade	Referential	Expressive	Persuasive	Literary	*Total*
1960s	206	2	4	0	*212*
1970s	151	4	1	0	*156*
1980s	33	0	0	1	*34*
1990s	145	3	13	0	*149*
2000s	151	6	13	0	*170*
2010s	14	6	7	2	*29*
Total	*700*	*21*	*26*	*3*	*750*

To answer research question seven, the aim of journalists is to inform the public about NASA, which is a referential discourse.

INTERVIEWS

A total number of eight interviews were conducted. Quotes and insights have been shared in the other section of the results as applicable, but key themes outside of previously reported results will be shared in this section.

Press Conferences

Dan highlighted how working with scientists was most enjoyable to him, as compared to the press and astronauts. Part of his role as a public affairs officer was "[arranging] a series of briefings and press conferences prior to the mission" and he "would organize those science briefings." His goal as a PAO was to make the space program open and accessible since it "belongs to the public." Press conferences for journalists was one

way of doing that. Gene shared that press conferences were "the number one way" he interacted with the press, although he gave a few interviews that were organized through the public affairs office.

The goal of a press conference was to inform the press corps about pre-flight or post-flight operations. Gene described his responses as tailored to "what the journalists asked" during the Q&A portion of the press conference. He added that there was "no political content" around a space mission, leaving astronauts the ability to answer openly and honestly about the technical aspects and their experiences. During a space mission, engineers in mission control would provide updates. Only right before or right a mission did astronauts participate in the press conference. Gene shared that he did not know much about NASA's communication goals or operations beyond attending press conferences. Nick shared that when the press approaches him, he is "more than willing to talk to anyone," and during a press conference he fields what question he can while sticking to his exercise. At times, the journalists can press for answers, but Nick always considers the legalities and ethics involved when providing information. If something is private or proprietary has dodges, but otherwise remarks that astronauts share "everything that they can about what's happened."

Journalists shared that news conferences were the most helpful for them when writing a story. Anwar's process is to attend a press conference or briefing, read press releases, then ask additional questions to the public affairs office. For longer pieces, Anwar will reach out to perform interviews as well.

Media as Cheerleaders

Kathy, Patrick, and Dan touched on how the media could be "cheerleaders" for NASA. Patrick remarked that media support was "largely" constant for the history of

NASA, with the justified exception of "some big errors," namely the Apollo 1 fire, Challenger, Columbia, and the Hubble Space Telescope. He continued, describing the media as perpetuating hero worship of the astronauts and the sense of media joining the adventure of space travel, even if just by proxy. At times, NASA would strategically target influential members of the press corps. The space agency would introduce the journalists to astronauts, allow them to participate in some training, and receive other interactive engagements in the hopes that the journalist code write better coverage about NASA.

At one point Dan quoted former NASA PAO Brain Duff, stating "what the [American] public gets out of the space program is the imagery." According to Dan, the literal pictures and videos that come from the space program is tremendously influential for gathering and maintaining public support. For example, according to Dan, Apollo 17's *Blue Marble* picture was distributed more often to the news media than any other Apollo image combined. During the content analysis, several press releases were issued in how to order that picture of the Earth, which supports Dan's statement.

Both Gene and Nick shared how journalists would ask for the human-interest side of the story. "More than anything, [the press] wants to know what it's like," said Nick. Gene had described those who were new to reporting the Apollo program would ask "questions about your personal feelings." Other career journalists focus on detailed technical questions for the astronauts. Nick still finds himself with "opportunities" to share with journalists about the existence of the International Space Station and NASA's spaceflight programs.

Shifts in Media Relations After Errors

Following the Apollo 1 and Challenger accidents, a temporary adversarial and unhealthy relationship with the general media formed. Dan and Patrick described it as a

"them and us" dynamic, but acknowledged that break in trust was not unwarranted, nor did they take on a "mass media is evil" tone internally. Beyond unique incidents with human loss of life, generally the PAO Office had a healthy presumption with the media.

The Challenger accident occurred in 1986 and seven astronauts died in the process. Patrick shared that at the time the media felt as if NASA was not forthcoming with information about the incident. As a result, media "had to dig out the information on their own," which caused trust between the two groups to erode. According to Dan, there was a misconception that if the media had been more diligent in reporting and had less "cheerleaders" then the Challenger accident could have been avoided. As a result, news organizations began sending investigative reporters rather than science journalists to cover NASA stories. Patrick noted that a similar sentiment was believed after the Apollo 1 fire in the 1960s, but the press corps did not change dramatically.

Emily was one of those investigative reporters who interrogated NASA for the Challenger accident. Her first day on the job was literally the day after the disaster. Emily greeted to a room full of male science journalists who had "comfortable" relationships with the NASA PAOs since the Mercury and Apollo programs. Prior to the Challenger, NASA could "do no wrong" and was a flagship for American technology and success. Emily's reporting contributed to uncovering NASA's shortcomings such as the pressures of congress and missed deadlines which contributed to the Challenger accident. NASA has learned from these communication mistakes over time. Anwar remarked that during the Columbia tragedy NASA sought to transparent and "exposed," sharing information daily.

Chapter 5: Discussion

This research provides insight to the public relations arm of the American space agency. As NASA continues forward, robust research into past strategies will help prepare for more effective communications in the future. The space agency has been able to pivot to a new model of public relation well in a rapidly changing environment. Press materials and press conferences remain as a vital piece of reaching journalists. NASA will need to maintain a strong brand as it has done in the recent past to ensure control over the narrative that the media and the public seek from the organization.

Table 17: Summary of Results.

	1960s	1970s	1980s	1990s	2000s	2010s
Worldview	Asymmetrical	Asymmetrical	Asymmetrical	Asymmetrical	Asymmetrical	Asymmetrical, Symmetrical
Presumption	Healthy	Healthy	Healthy	Healthy	Unhealthy	Healthy
Rhetoric	Mere Rhetoric	Mere Rhetoric	Mere Rhetoric	Mere Rhetoric, Rhetoric B	Mere Rhetoric, Rhetoric B	Mere Rhetoric, Rhetoric A, Rhetoric B
Model	Public Information	Public Information	Public Information	Mixed Motives	Mixed Motives	Mixed Motives

MODELS OF PUBLIC RELATIONS

From the 1960s through the 1980s, the model of public relations NASA used was primarily Public Information Model. This is determined through the content analysis and interviews conducted. Astronaut Gene did describe Rhetoric-A during press conferences, but when considered holistically, the overall model use was public information model. Looking at the 1990s through the 2010s, NASA primarily used a mixed motives model, tailoring their approach to their audience and their organizational needs.

The divide could be where Patrick and Dan described as when NASA management sough to be more strategic with their communication with stakeholders, including journalists. It is entirely possible that management was reading the latest public relations theories such as Grunig's and Hunt's work in 1992 about models of public relations and was seeking to apply the theory to the organization. Patrick expressed that this type of strategic communication was "too slick" for his taste but acknowledged that the method was effective in reaching their audiences. Joining NASA in the 2000s, Sally's experience of using the question "why what we are doing is important" for the backbone of her actions with journalists and the public helps illustrate a shift towards strategic communication as compared to Patrick and Dan.

PRESS MATERIALS AND PRESS CONFERENCE

The press materials generally corroborated the findings of a given decade's worldview, presumptions, and rhetoric, which all factored into determining the model of public relation. Something worthy of note is the scope of press materials. Press kits may be released weeks or months before, allowing the time for journalists and media to become familiar with the upcoming event. Press releases are distributed closer to or right after the event date to announce key information. This change in timing effects the content of the release and can affect the accuracy of press kits if a version is not updated or re-issued.

By nature, press kits and press releases are unidirectional, directing the information to the intended audience without developing a reciprocal relationship. A press conference, on the other hand, allows for conversation and dialogue between the organization and the press. Press kits and press releases that indicated press conferences were considered as symmetrical as a result. With this in mind, there is an increase of press releases that announce symmetrical activities after the 1990s.

Press conferences are effective for dialogue about events that have occurred recently. It provides astronauts the opportunity to be seen and answer journalists' direct questions as well as write stories on the events that just occurred. If needed, a journalist can follow up with a public affairs officer. Moving forward to the future, astronauts will need to prepare for questions that potentially ask about proprietary information as the commercial crew program advances.

BRAND NARRATIVE

In the 2000s, the presumption was considered unhealthy. Despite the connotation, unhealthy presumptions are not necessarily negative in nature as it relates to the strategic action and interaction with regards to responsibility and activeness. An unhealthy relationship can simply signal NASA needed to create a more dominant brand voice. This is consistent with the direction NASA has moved in, focusing on competitive and cooperative commercial industry relationships, and increasing media activeness directly with the public instead of exclusively through the space industry journalists.

Journalists seek communicate informative, referential discourse to the public. NASA did not control the brand narrative through sheer quantity of the same articles using a wire service. Newspaper and media journalists wrote quality stories that reinforced NASA's narrative. As a result, journalists were seen as cheerleaders for the American space program. After the Challenger accident in 1986, newspapers reconsidered who should write stories about NASA. Investigative reporters were sent to cover space topics instead. A potential reason for a shift around the 1990s to mixed motives model is that NASA felt it needed more control of its brand narrative, rather than relying on journalists to enthusiastically report accurate information about the program.

Generally, NASA coverage sampled was positive except in the case of extreme events or "errors." These were not always directly NASA-related. Two non-NASA errors include when Astronaut Lisa Nowak accosted a romantic rival in 2007 and U.S. Representative Gabby Giffords nearly assassinated during a constituent meeting in 2011. As reporters attended Nowak's trial, her occupation as an astronaut and the male astronaut she was romantically involved with made news across the world (Gentile, 2007). With regards to Gabby Giffords, her husband is Astronaut Mark Kelly was scheduled to launch on STS-134 as the commander of the mission (Schwartz, 2011).

IMPLICATIONS

NASA has adapted well over the years to a changing media environment. By using a strong strategy with mixed motives model of public relations, the space agency has been able to apply tactics to new technologies and social changes. Partnering with influencers with the NASA Social program and adapting to online events during the 2020 COVID-19 pandemic are two examples of these tactics that are founded in strong strategy. Once NASA becomes aware of their use of the mixed motives model, they can work to better categorize and understand which worldviews, presumptions, and rhetoric when working with stakeholder groups and the American public.

To keep a healthy relationship with their publics, NASA maintain their strong brand identity. While journalists will remain in their role of informative referential discourse, NASA will need to take on persuasive discourse to engage the decoder/publics more actively. This can be a tricky realm for a government entity. The persuasive discourse that NASA seeks can be done by the organization itself or by using NASA fans to support the agency. Branching out to new publics beyond "NASA fans" and enticing more positive public opinion will be necessary as the space agency aims for higher targets such as the

Artemis program. NASA will need to continue their path of diversity and inclusivity to achieve this. In a way, NASA becomes an open-source brand, where both the fans and the agency are co-creators in the meaning and creative production of the space program.

FUTURE RESEARCH

Assessing NASA's strategic communication legacy is one keyway that space science communication can be evolved to successfully engage with citizens in an age of rapidly changing media technologies and information habits. Beyond the immediate need of analyzing additional years in past decades for repeatability, efforts should be made to collect and analyze press and news conferences NASA hosted or contributed to hosting. Both astronauts and space industry journalists referenced press conferences expansively in their conversations as a press material tool they use, while public affairs officers focused on naming the full breadth of their work with little to no mention of conferences. Another key insight from journalists was how different centers have different personalities. Repeating this study looking at individual centers instead of analyzing NASA on an agency model could prove useful as well, as each center provides different services and have different recognizability from the general public.

How NASA's strategy reacts to changing media environments remains to be analyzed and will continue to be important as technology increases exponentially. This influence on branding with new general and social media technologies has caused many organizations to adapt to the fluxing media environment, such as with The Washington Post sharing news stories via trending TikTok styles; The New York Times diving into podcasts and alternative reality apps; and Lockheed Martin collaborating with Instagram influencers. NASA has taken on some of these digital media items, but the effectiveness of

the emerging mediums and technologies with regards to the space and science industry will be another key area of research in future years.

In contrast to many brands who sell directly and clearly to consumers, NASA and the general space industry does not. However, space fans continue to align themselves with brands and figures such Blue Origin, Elon Musk, NASA, and Lockheed Martin. Fandom research for business-to-business companies could be applied to dive into this topic, such as David Scott Meerman touches on in his book *Fanocracy*. Additional medium analysis can be branched out beyond digital medium to the to traditional news sources versus contemporary social influencers. NASA has embraced these fandoms on some levels with its NASA Social program, bringing social influencers similar opportunities to visit NASA centers behind the scenes as journalists receive. The effectiveness of this strategy and how to approach going forward as social media channels increase should be considered.

Lastly, one of the interviewees claimed that the American public does not focus on return on investment or benefits of space technology on Earth, but rather the gains are the imagery provided by the astronauts of Earth and our solar system. This approach could be instrumental to continued presence in space and new mission bases on the moon. In literature and previous research, traditional ROI as a conversational point for justifying the program, not the imagery provided. Training for astronauts in science communication to help support this imagery and narrative would be essential, as they are a public figurehead for the industry and agency. In contrast, this would support the human-interest angles that journalists typically write about the space industry.

CONCLUSION

This thesis defined NASA's models of public relations models throughout the past six decades using Grunig's and Hunt's research. From the 1960s up until the 1990s, NASA

used a public information model to inform journalists about key facts who in turn informed the public about those facts using news articles the journalists created. After the 1990s, NASA public affairs used a mixed motives model, tailoring to their audiences and messages. While in the beginning, NASA could rely on journalists to share their narrative and instead focused on disseminating the scientific results to the press. Present-day NASA has developed strategies and tactics to support their brand narrative and acknowledge their various audiences that interact with the agency.

Appendix A: Methodology Reference

Table 18: Worldview

Asymmetrical	**Symmetrical**
• Internal Orientation • Closed System • Efficiency • Elitism • Conservatism • Tradition • Central authority	• Open system • Moving equilibrium • Equity • Autonomy • Innovation • Decentralization of management • Responsibility • Conflict resolution • Interest-group liberalism

Table 19: Presuptions

	Unhealthy	**Healthy**
Humanity's Relationship to Nature	Dominance and Subjugation	Fellow Human Beings
Nature of Reality and Truth	Defensive to Avoid Responsibility	Assume and Accepts Responsibility
Nature of Human Nature	"them and us" "good and bad" mass media is evil	Knows strengths and competencies but also deficiencies and improvements
Nature of Human Activities	Passive and fatalistic "for the sake of doing something"	Strategic action "accepts guilt and anxiety induced by crises in order to act against them"
Nature of Human Relationships	Competitive and individualistic	Competitive and cooperative

Table 20: Rhetoric

No Rhetoric	
Sub Rhetoric	Words and symbols used to deceive or obscure issues or evade action
Mere Rhetoric	Sincere selling of any cause, genuinely persuasive including logical arguments, but also trickery and disguise
Rhetoric-B	Art of knowing what you want, finding the really good arguments to win others to your side
Rhetoric-A	Discover and refine in critical exchange our ends and purposes

Table 21: Four Models of Public Relations

Press Agentry/ Publicity	One-way Communication Model	Unhealthy Subrhetoric Asymmetrical
Public Information Model	One-way Communication Model	Un/healthy Mere Rhetoric Asymmetrical
Persuasion/ Advocacy	Asymmetrical Two-Way Communication Model	Healthy Rhetoric-B Asymmetrical
Dialogue/ Relationship Building	Symmetrical Two-Way Communication Model	Healthy Rhetoric-A Symmetrical
Mixed Motives		Healthy Rhetoric A or B Asymmetrical or Symmterical

Table 22: Aims of the Communicator

Referential	Refers to external states of affairs to represent them in discourse. Can be Informative, scientific, and speculative.
Expressive	Expresses their inner state of mind
Persuasive	Tries to induce the audience to accept his expressed opinion about the topic or to move the audience to do something
Literary	Calls attention to the language of the discourse itself in order to produce an aesthetic experience in the receiver

Appendix B: Mission Breakdown

Table 23: Decadal breakdown of missions by mission type.

Decade	Crewed	Uncrewed	*Total*
1960s	6	18	*24*
1970s	7	26	*32*
1980s	2	2	*4*
1990s	8	7	*15*
2000s	13	4	*17*
2010s	4	1	*5*
Total	*40*	*57*	*97*

Table 24: Decadal breakdown of press kits by mission type.

Decade	Crewed	Uncrewed	*Total*
1960s	6	17	*23*
1970s	6	23	*29*
1980s	3	2	*5*
1990s	9	5	*14*
2000s	14	2	*16*
2010s	3	1	*4*
Total	*41*	*50*	*97*

Table 25: Decadal breakdown of press releases by mission type.

Decade	**Crewed**	**Uncrewed**	***Total***
1960s	23	16	*39*
1970s	16	20	*39*
1980s	4	1	*5*
1990s	34	44	*78*
2000s	48	6	*54*
2010s	11	6	*17*
Total	*41*	*50*	*229*

Table 26: Decadal breakdown of NYT articles by mission type.

Decade	**Crewed**	**Uncrewed**	**Neither**	***Total***
1960s	88	91	7	*213*
1970s	49	107	0	*156*
1980s	22	12	0	*34*
1990s	87	41	21	*149*
2000s	119	10	41	*170*
2010s	18	4	7	*29*
Total	*383*	*291*	*76*	*750*

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Vita

Born-and-raised Texan, Andrea Lloyd fell in love with science at an early age. She grew up in Houston, with ample access to NASA and the ocean, which influenced her favorite sciences to share with the public. After graduating from High School, Lloyd sought a science degree to write interesting and entertaining mathematics textbooks. She soon after found her true passion in science communication. She received her Bachelor of Science in Telecommunication Media Studies from Texas A&M University in 2018, with a minor in English and certificates in Strategic Communication and Professional Writing. She went on to NASA Langley Research Center as a communications intern for the spring and summer semesters of 2019. Lloyd is excited receive her Masters of Arts in Advertising from the University of Texas at Austin in 2021, where she primarily focused in science communication. Upon graduation, she will be a communication specialist at the United States Geological Survey this summer.

This dissertation was typed by the author.