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THE TELL TALE: AN ANALYSIS OF THE FILM THE CHALLENGER DISASTER TO THE OFFICIAL FINDINGS AND PERSONAL ACCOUNT OF COMMISSION MEMBER DR. FEYNMAN

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The Tell Tale Telling: An Analysis of the Film The Challenger Disaster to the Official Findings and Personal Account of Commission Member Dr. Feynman

A qualitative comparison of the book What do You Care What Other People Think (Feynman and Leighton 1988) and the film The Challenger Disaster (Discovery Science Channel 2013) . Using the cultivation analysis theory to understand the differences in the two narratives and their possible effects on viewer's opinions.

The Tell Tale Telling: An analysis of the film *The Challenger Disaster* to the
official findings and personal account of commission member Dr. Feynman

By Carl Clark 2014

“Science teaches us what the rules of evidence are. We mess with that at our peril.”

William Hurt as Dr. Richard Feynman

“For a successful technology, reality must take precedence over public relations, for nature cannot be fooled”

Appendix F by Dr. Richard Feynman

Abstract

The film *The Challenger Disaster* (Discovery Science Channel 2013) based off of the book by Dr. Richard Feynman *What do You Care What Other People Think* (Feynman and Leighton 1988) portrays the investigation into the loss of the space shuttle *Challenger*. The film's narrative centers on one man against the corruption and special interests of NASA and Washington D.C. It also shows Dr. Feynman using science to solve the problem and get to tell the truth. After a qualitative comparison of the film, the book on which it is based, and the *Report of the Presidential Commission on the Space Shuttle Challenger Accident*, discrepancies within the recounting of the film are apparent. The purposes of the changes are likely for time, mood, and narrative reasons which will have an effect on the audience's perception of the loss of *Challenger* through the cultivation analysis theory. Further, their perception of NASA, the investigation, and the government will change due to the cultivation analysis theory. These perceptions, according to the theory and other studies, will affect the audience's opinions surrounding the events of the film as they relate to the historical event and the current state of affairs.

Introduction/Question

On January 28, 1986 the United States lost the space shuttle *Challenger*. In the years that followed it was found mistakes were made. This happened because NASA was under extreme pressure to meet an unrealistic launch schedule for a prototype space craft. NASA and contractor management made dangerous decisions that had tragic consequences. The people who uncovered the root managerial and engineering causes of the calamity were part of the Rogers

Commission. These people made up the scientific, engineering, and government elite of the United States.

On November 16, 2013 the Discovery Science Channel released a documentary film based on the events of the Rogers Commission's investigation, and their eventual findings of the loss of Challenger. The film centers on Dr. Richard Feynman's perspective of the commission, which is based on the book by Dr. Feynman *What do You Care What Other People Think*.

The primary focus of this study will deal with the dramatic license if any taken with the film *The Challenger Disaster* (DSC 2013) in comparison with the official record of the *Report of the Presidential Commission on the Space Shuttle Challenger Accident + Report to the President Implementation of the Recommendations of the Presidential Commission on Space Shuttle Challenger Accident* (1987) and the personal account of Dr. Richard Feynman as told in the book *What do You Care What Other People Think* (Feynman and Leighton 1988). The cultivation analysis theory will play a large role in explaining what the changes in perception might be as a result of any dramatic license taken in this docudrama.

The Shuttle program is over now and the documentation of its history is just beginning in the public memory. With the cultivation analysis theory in mind the United States must now figure out what about the Shuttle Program should, we as a country chronicle. There are lessons that the country should take away from its accomplishments and failures. These are all important questions to understand how the *Challenger* disaster, the Space Shuttle Program, and NASA are viewed into the future.

Thesis

It is expected that the film will reflect the accounts of the book and the commission report's general narrative. The film will most likely not carry over every detail of the book. It will also make Dr. Feynman the focus of the Commission. The film also will use tones and set the mood of a political thriller. This will, more than anything else, bring about discrepancies between the film's account and the two pieces of source material; the book and the Commission's report to the president.

Literature Review

The book *What do You Care What Other People Think* (Feynman and Leighton 1988) covers in detail Dr. Feynman's participation in the Roger's Presidential Commission. This book serves as one of the two critical points of reference to the film *The Challenger Disaster* (Discovery Science Channel 2013). He and the Commission found that a culture of compliance and lack of communication led to an acceptance of risk. This was due to the fact NASA needed to prove the worthiness of the Space Shuttle as a space transportation system that was reliable, robust, and cheap to fly. The book also covers the difficulties Dr. Feynman had navigating the commission's structure and Washington D.C. He did, however, get a long way when talking to ground-level engineers. This is where he got most of his information about the flight system of the Space Shuttle and the lack of communication between the floor engineers and NASA's mid-level management. His conclusion was the momentum of Project Apollo (flights to the moon) motivated everyone at NASA to communicate well with one another. When the Apollo Project was over The United States had all the personnel from the project and no new task was set for

them to accomplish. NASA needed to convince Congress that only it could do the next big project in space. This was to make space safe and economical with a space transportation system. The design level engineers were ignored so the mid and upper level managers could testify to Congress without giving false testimony on the true cost, complexity, and reliability of the Space Shuttle. As this happens over time it discourages communication through the hierarchy of NASA and soon it becomes institutionalized. The exaggeration at the top being inconsistent with the reality at the bottom communication gets jammed.

The Report of the Presidential Commission on the Space Shuttle Challenger Accident + Report to the President Implementation of the Recommendations of the Presidential Commission on Space Shuttle Challenger Accident (1987) looks, in the greatest of detail, at the events of the morning of January 28, 1986 the flight of STS-51L (*Challenger's* final flight's official designation). This exhaustive document services as the second primary reference point of comparison to the film *The Challenger Disaster* (Discovery Science Channel 2013). All of the data and records leading up to the launch, including the conversations with Morton Thiokol the contractor responsible for building the Solid Rocket Boosters (SRBs) were recorded in the report. The report also covered the entire history of the shuttle flights until that point as evidence and context for what happened to *Challenger*. The specifics of the flight data itself leading to the conclusion that lowest tang and cleaves joint on the Right SRB had a case of blow by (this is when the hot gas escapes the joints first O-ring due to lateral forces contorting the SRB). In the case of STS-51L's R-SRB, the cold had made both O-rings fail due to the loss of elasticity needed to reseal the joint after Joint Rotation. This started the fateful chain of events that lead to the breakup of *Challenger*. As the propellant burned, a jet of hot gas was emitted from Aft Field Joint (a relief valve for field maintenance of the SRB). This jet of gas broke the lower connection

of the R-SRB to the External Fuel Tank (ET). This caused the R-SRB to swing out and the Shuttle's flight control systems to attempt to compensate for the change in delta V (the direction thrust moves the vehicle). Simultaneously, Hydrogen was venting out of the ET due to the burn through from the R-SRB. That same instant the main engine fuel mixture and throttle attempted to compensate for the change in Hydrogen pressure. At the same time the R-SRB impacts the top of the ET and breached the inner oxygen tank. At this time the Hydrogen inner tank fully ruptured and the bottom fell off which released the propellant. The Space Shuttle Main Engines (SSMEs) correspondingly perform the prescribed emergency shutdown. The oxidizer and propellants mixed and *Challenger* was broken apart from the overload of aerodynamic forces. Less than a second passed from the time the R-SRB's lower connection failure to the breakup of *Challenger*.

The finding of what led the loss of *Challenger* and her crew were that the resiliency of the R-SRB's O-ring at the Aft Field Joint was reduced to such a degree that it would not expand to reform the seal of the Aft Field Joint, due to the cold. There were three plausible causes of the joint compression; lateral misshaping during transportation, assembly contamination of the joint (tests were not concluded by the time the report was published), or the most likely the initial lateral forces of ignition at launch caused the joint to compress. This let hot gas through the Aft Field Joint and brought about the destruction of the *Challenger*.

The commission concluded that the management structure was also at fault, concerns were raised over hardware problems, but never pushed forward and decisions were reversed to accommodate NASA who was a major customer of the Morton Thiokol. Over all, the analyses of the events of STS-51L were covered in scrupulous detail. The findings of the commission did not reflect well on the management, and engineering decisions of Morton Thiokol and NASA. The

commission offered recommendations to NASA and these recommendations for more safety were subsequently implemented.

In the book, *A Political History of NASA's Space Shuttle: the Development Years* the chapter by Woods, B. (2009) talks extensively about the development of the space transportation system, or space shuttle program. Historical narrative helps to support some of the commission's findings about the systemic problems of the Space Shuttle Program. Which had their start at the inception of the vehicle's development. The program was mired in uncertainty and developmental difficulties for a variety of reasons including time constraints, budget limits, and technological development. The chapter on the political reasoning why the space shuttle came to be. At the end of the Apollo era, it was questioned whether the Nixon administration would support the space shuttle, given the president's disdain for academia. His opponent in the upcoming election looked at NASA and saw the industrial military complex; therefore he opposed the space shuttle and all of NASA. Nixon supported the shuttle as a way of looking strong on national defense and hanging on to the jobs in Florida, a key state to win for the presidency. This can be looked at two ways. One, the candidates were being responsive to the varying public interests in the upcoming election. Two, they were influenced by the international sphere in different ways, which lead to their different positions on the space shuttle. Even though the first scenario is more likely. The industrial military complex is a foreign policy issue and that is the frame in which the space shuttle was debated and used in the election of Richard Nixon.

The Story of the Space Shuttle (Harland 2004) tells the technical and political history of the program. Several chapters focus on the loss of *Challenger*. This helps as an independent account of what happen on the morning of January 28, 1986. The first part of the book's description of the event is a technical breakdown of what happened leading up to the launch and

the launch itself. A second by second timeline of the flight gives the details of the breakup of *Challenger*. The book also addresses the possibility of a Return to Launch Site Abort or (RTLS). For the flight of STS-51L the book postulates this might have been a possibility if the ground or the crew would have known the dire peril *Challenger* was in. The RTLS would have been only possible up to T+63 (number of seconds in to the flight), when R-SRBs internal pressure fell below normal operational parameters. After this time the six seconds needed to jettison the SRBs were unavailable to the crew. The ET was ruptured by a plume of flame from the R-SRB. After T+66 *Challenger* and her crew were essentially doomed, even though the breakup did not occur until T+73. The plume of flame from R-SRB was not visible to the Flight Director or any other means of detection. This meant an abort could not be initiated regardless of the shuttle's capability to do so. The book states that under normal circumstances an RTLS would only happen after the SRB propellant is spent and jettisoned at T+128. RTLS under *Challenger's* circumstances were not initially discussed since it would be nearly impossible to perform. As a result of the Rogers Commissions' recommendations the shuttle would no longer be the only access to space for satellite deployment, and modifications to shuttle were made to ensure greater safety of the SRBs and the orbiter.

The next two studies, "NASA Revisited: Theory, Analogy, and Public Sociology" (Vaughan 2006). "NASA in Crisis: The Space Agency's Public Relations Efforts Regarding the Hubble Space Telescope" (Kauffman 1997), look at different crises NASA has been through. Throughout the extensive analysis of the *Columbia* disaster and the Hubble malfunction, a number of systematic changes can be seen to happen in regards to the public relations conducted by NASA. Due to the difference in the problems Hubble had in comparison to the loss of the shuttles, it is somewhat harder to see differences in rhetoric changing over time. There are

similarities in procedure in the agency's public relations. Due to the fact that the loss of *Columbia* was similar to the loss of *Challenger*, we can clearly see how NASA has adapted and changed public relations policy. Early on in the shuttle program, it was their practice to over-emphasize possible solutions to problems as genuine solutions. Also, NASA's doors were closed during the loss of both shuttles. However, in the case of *Columbia* in 2003, NASA was far more forthcoming with information that was relevant and undistorted. This openness led to a vastly different and positive, albeit mournful, public reception to the *Columbia* disaster than other crises in the history of the Space Shuttle program. This research offers the view of history and how an organization like NASA learns how its communication methods affect public perception of its operation.

The book *Documentary: The Margins of Reality* (Ward 2005) covers in its second chapter how reality can be distorted for dramatic license, yet in its essence remain a true representation of real events. The book directly talks about the story of Aileen Wuornos. In the book, there is an analysis of two films, each of which give two different interpretations of Wuornos's story. It is important to note that this chapter and the films are covering the same type of documentary, which uses testimony for re-enacting and improvised drama, much like the film *The Challenger Disaster* (DSC 2013). This dramatic license or simply framing of an event purely for narrative reasons can have a dramatic effect on how the story of a real event is told.

The study, "The Psychological Impact of Viewing the Film *JFK*: Emotions, Beliefs, and Political Behavioral Intentions" (Butler, Koopman, Zimbardo 1995) looks at a statistically small sample size of people who are about to view and who have viewed the film by Oliver Stone, *JFK*. This study shows the power of cultivation analysis theory. The major finding was that their opinions did change about the conspiracy or lack thereof, and made them angry and less hopeful

about getting involved in politics. The people who viewed the film also thought the evidence presented in it was fairly accurate. The study notes the high level of education of the audience, which one would think would make them more skeptical. The study cites two interesting findings in the data. First, more conservative people were unsure of their conclusions about the assassination. Second, younger people born after the assassination were more confident in their assessments of a conspiracy. Those who thought there was a conspiracy had the greatest confidence of any group. Finally, there was no carry over from the JFK conspiracy view to that of the subject's view of a conspiracy in their own lives.

The article, "Presidential Rhetoric and the Economy" (Wood, B., Qwens, C., Durham, B. 2005) essentially states that the relative optimism of presidential rhetoric does have an effect on the United States economy. This shows that the cultivation analysis theory can lead to action after the fact. All of the effects rhetoric have are indirect and have substantial impacts in economic growth and unemployment. This shows that the message carried by the president has far reaching effects on how society functions in quantifiable ways. This study used the content analysis and simulation analyses to draw these conclusions. While this study does not directly use cultivation analysis theory, it has a close relationship to it. If people believe the economy is getting better through the presentation of information, then people make it better based off of the actions due to a belief that is in part the cultivation analysis theory. Through the repetition of the message by an opinion leader, in this case the president of the United States, people will start to think what the president is saying is true. Even if it is not, however, in the case of the economy where much of its state is based on perception, if people think it is doing well, they start acting like it. They may buy more or invest in something that can grow. Through this behavior, brought on by a perception, demand for the produces people are buying goes up, companies make more

money, and investments start to pay off. In the end, a different perception than what is really happening brings about that perception. The first step in this process requires the cultivation analysis theory.

In the research paper, “Effects of documentary and fictional television formats on children’s acquisition of schemata for unfamiliar occupations the question of understanding unfamiliar information based on fiction and nonfiction is covered.” (Huston, Wright 1997). The study focused on children and their ability to understand reality based on multiple viewings of real and fictional TV. The study found that the real portrayals were understood to a greater degree, so long as the fiction was obvious through cues like comedy or when the portrayal is not perceived as socially realistic. Understanding what people use to perceive reality and fiction will be useful when analyzing any other material for the same cues or the lack there of. This is particularly important for films that use the docudrama format as they are framed as a near accurate portrayals of reality.

Method

The film; *The Challenger Disaster* (DSC 2013) will have a qualitative content analysis of each scene which, is then is compared to the book *What do You Care What Other People Think* (Feynman and Leighton 1988) and the *Report of the Presidential Commission on the Space Shuttle Challenger Accident* (1987). This method will find the variations in the narrative of the film and the official accounts. The analysis will help give insight into how the film portrayed the people in comparison to the book, and to the official record of what happened. The stylistic choices will reveal what the film did to present an accurate and/or an inaccurate portrayal of what happened during the investigation. These questions will be answered through the qualitative examination of the film and the written documentation. This examination will take

into account the literature review and the information that was found about similar historical portrayals of real events.

The theory of cultivation analysis is the theory that is applicable, and gives the greatest understanding to the effects of this film. The mood, tone, and narrative of the film will leave the greatest impression on the audience. If these story telling tools tell a different story with a different message than that of Dr. Feynman or the official record, then the audience's perception of what happened will differ from the genuine accounts. Finding the differences in each segment of the film and the official accounts will give insights as to what, through cultivation analysis, the discrepancies in the accounts, and potential differences of perceptions of the event will be.

Analysis

The official narrative and the narrative of the docudrama have several differences. First is the chronology, the film *The Challenger Disaster* (DSC 2013) moves a number of the events around to better serve its narrative purposes. The narrative of the film is a -who dun it- and a man against the corrupted government/corporate machine. The order of events was changed to more dramatically show the triumph of the lone man using science to bring light to a dark mystery.

Another change from the book and commission reports is how specific events happened. Some events were told in a different context and others were amalgams of real events told as one event. An example of this is when Dr. Feynman is investigating at the Marshal Space Flight Center close to the beginning of the film. At this point in the film, the cause of the accident was unknown. He sits down with some engineers having lunch and asks them what they think the

probability of a failure is. No one says anything, and Dr. Feynman suggests they could just write it on a piece of paper. Later when he returns to Marshal and looks at the Space Shuttle Main Engines (SSME), he finds a piece of paper in his jacket pocket after changing out of a clean suit. It says *we think ivory soap, 99.4% pure*. The comment 99% pure comes from a soap commercial of the time. Later, in the committee hearings, when questioning Mr. Loveingood responds to the same question with the answer *1 in 10 to the power of 5 minus epsilon*. Dr. Feynman goes on to grill the NASA and Morton Thiokol officials about the ridiculousness of that figure.

What happened in the first hand account from Dr. Feynman was at the time the commission had very early on determined the problem with the SRBs and O-rings. Dr. Feynman got bored with the technical parts of writing the analysis of the 73-second flight of *Challenger* and went to see if there was similar communications break down between engineers and manager in other departments outside of the boosters. He sat down with some engineers from the Space Shuttle Main Engine (SSME) department and asked them to write down what they thought the chance of a catastrophic failure was. The engineers wrote down on average the figure was one in two to three hundred, or 99.4% and one engineer even wrote underneath the figure *ivory soap*. The manager wrote down *1 in 10 to the power of 5 minus epsilon*. This was an unfair question the engineers would later protest on a subsequent visit of Dr. Feynman's, and Dr. Feynman agrees with them, but says that was not the point in him asking the question. The test, had proven Dr. Feynman's point. There was a breakdown of communication between engineers and the mid-level management.

These two different narratives of roughly the same information tell a different story through the context and chronology. For instance in the film, it was not Mr. Lovingood in the meeting at Marshal; he was in the hearing and commented with much the same ridiculous figure

as the manager in the SSME department. This scene also was not crafted this way for time purposes, it was spread through three different places within the film and took up a lot of time to portray the investigation in the context which it did. In the book there were no internal memos or any evidence to say this information was deliberately spread around, it simply just happened.

The differences between the film and the official report are also narrative based. The film sets out to tell a story while presenting facts in a particular artistic context. The commission report seeks to present the facts of the events of January 28, 1986 in the context of history. Therefore the differences between these two pieces of information are different to the point of not being comparable, except for the few technical terms the film uses. The technical information presented in the film was accurate.

Examples like these permeate the film for the purpose of adding a particular context to the story about investigating the loss of the *Challenger*.

Conclusions

The Film *The Challenger Disaster* (DCS 2013) when compared to the book *What do you Care What Other People Think* (Feynman and Leighton 1988) and the Commission's Report portrays the essence of what happened. However, the film does not precisely portray the events of the investigation into the loss of space shuttle *Challenger*. The tone and mood of the film as compared to the book and commission report are very different. As the literature shows, the cultivation analysis theory describes how people begin to think what is portrayed in the media is what is happening in reality. It could be surmised from Butler, Koopman, and Zimbardo (1995) that a person's only exposure to a piece of information on an event in history will greatly influence that person's opinion of that event.

The first major discrepancy between the books account, the official account in the commission report compared with the film is chronology. This resulted in the omission of information from the film. The reason for this is time and the need for a narrative based story arc. The amount of information and characters in the book *What do You Care What Other People Think* , Feynman and Leighton (1988) would be too much for a ninety minute television film.

In the film there was no mention of Dr. Feynman's trip to Houston, all of the public hearings the commission had, or the numerous trips they took to all the NASA centers. In reality the first hearing the commission had was the last hearing portrayed in the film. This is when Dr. Feynman doses his O-ring in the ice water demonstration.

In the book and reality, Dr. Feynman went back and forth from Washington to California several times. In the film He only retunes to California one time and that was after his disease had caught up with him and he felt defeated by the system. In reality this never happened. The only mention of disease in the book is when he tries the ice water experiment, and it was a cardiologist not an oncologist. In the book he visits the NASA sites many different times and in a different order then is portrayed in the film. Other parts where altered or outright omitted. The film never showed Dr. Feynman's visit to the Smithsonian with Bill Graham. The car driver that asked for an autograph drove a limo in the book and didn't see Dr. Feynman again after their first meeting. In the film the driver was driving a taxi and saw Dr. Feynman two times. These changes were not only done for the sake of timing in the film but for the sake of the narrative. This film was of a suspenseful investigation, by the underdog scientist against the corrupt system of Washington. The most drastic change of the chronology for narrative's sake was moving the O-ring ice water demonstration to the end of the film. The O-ring demonstration was portrayed in the film as science penetrating the smoke screen of NASA and the Morton Thiokol were

putting up to alleviate blame for the loss of *Challenger*. Moving the demonstration to the end makes a better climax than the commissioners writing up the report and Dr. Feynman raising a fuss about the tenth recommendation of the report. It also fits with the theme of the film that good science can and should be used to solve problems.

Tone and mood have a great effect on the accuracy and narrative of the film. The film portrays the people in Washington and NASA as cagey. The people at NASA undermined Dr. Feynman and were not forthcoming with relevant information. When this was the opposite of what happened in the book and report. In the book and report it is stated that some NASA employees were a little reluctant to share information, but that was only at the beginning of conversations they had with commissioners. The NASA employees were overall in fact very helpful, enthusiastic, and forth coming with information. There were some issue with people in management talking about the problems but, NASA management in Washington sent over information very rapidly. Even though through error it was the wrong information and was promptly corrected. Were as in the film Washington was the main place of obstruction and deceit. Things in the investigation did move slowly. This bureaucratic method was very different from Dr. Feynman's direct questioning and investigation methods. This more than anything led to the conflict Dr. Feynman had with Mr. Rogers. In the film this is not the case, Mr. Rogers is seen as almost purposefully obstructive. In reality they simply did things in different ways. Never the less they worked together as did all the commissioners. It is expected in an investigation with so much information and differing understandings of the issue at hand for there to be legitimate disagreements. In the film the commissioners, other than General Kutyna and Dr. Ride, did not contribute that much to the investigation. In reality they were all major

contributors to the report and investigation. This was likely for two reasons; time and making the story about Dr. Feynman using science to find the truth and fight corruption.

The discrepancies in the film, give the portrayal that the commission was corrupted by government influences and NASA was a corrupted organization. While it is true that Dr. Feynman was the only independent. Also that General Kutyna used Dr. Ride's information to help point Dr. Feynman in the right direction is fairly accurate. In reality this information was also used to point the entire commission in the right direction. This portrayal could have a negative effect on the perception of NASA and the government. It is true there were very serious problems with the structure of NASA operations in the Shuttle Program, this should never be ignored. The portrayal of NASA in the book and commission report was far more accurate. These deficiencies happened over a long period of time and happened as a result of the political and financial climate that surrounded the Space Shuttle Program. Understanding the realities of a situation that brought about a success or in this case a tragedy can help insure these circumstances do not happen again.

Essentially, the book does a much better job of explaining the little clues Dr. Feynman finds. Also it more realistically portrays the politics of the Space Shuttle Program and the relationship between NASA and the contractor community. NASA as a whole was not obstructionist, some management might have been but not the overall agency as was portrayed in the film compared to the book. The obstruction of the chairman and the general corruption in Washington was exaggerated in comparison to Dr. Feynman's words in the book. Also NASA was portrayed as perusing PR stunts which in some ways was true. For example a teacher in space, but that is one of NASA objectives to encouraging interest in science and the shuttle program was in fact perusing hard science in space. A simple read of the flight manifest of every

space shuttle flight will easily reveal this fact. In addition the teacher in space program was a directive from the president of the United States. The relationships Dr. Feynman had in the book were portrayed in a more simplified manner in the film. In the case of General Kutyna it was very accurate how his friendship was portrayed with Dr. Feynman. The book is a more detailed and chronologically true account of the investigation into the *Challenger* disaster.

In a broader context of history, we as a society need to understand that how we portray our past effects our perception of the future. We owe it to ourselves and future generations that the failures of the past are accurately told and the ideals that bolster progress and the well far of all are upheld. As nature cannot be fooled, neither should our read of history be deliberately distorted.

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