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Group Decision Fiascoes Continue: Space Shuttle Challenger and a Revised Groupthink Framework

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This paper reviews the decision situation surrounding the decision to launch the space shuttle Challenger in January 1986 in the light of the groupthink hypothesis. A revised framework is presented that proposes time and leadership style as moderators of the manner in which group characteristics lead to groupthink symptoms.

KEY WORDS: groupthink; Challenger; decision making; group characteristics.

INTRODUCTION

In 1972, a new dimension was added to our understanding of group decision making with the proposal of the groupthink hypothesis by Janis (1972). Janis coined the term "groupthink" to refer to "a mode of thinking that people engage in when they are deeply involved in a cohesive in-group, when the members' striving for unanimity override their motivation to realistically appraise alternative courses of action" (Janis, 1972, p. 8). The hypothesis was supported by his hindsight analysis of several political-military fiascoes and successes that are differentiated by the occurrence or non-occurrence of antecedent conditions, groupthink symptoms, and decision making defects.

In a subsequent volume, Janis further explicates the theory and adds an analysis of the Watergate transcripts and various published memoirs and accounts of principals involved, concluding that the Watergate cover-up decision also was a result of groupthink (Janis, 1983). Both volumes propose prescriptions for preventing the occurrence of groupthink, many of which have appeared in popular press, in books on executive decision making, and in management textbooks. Multiple advocacy decision-making

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procedures have been adopted at the executive levels in many organizations, including the executive branch of the government. One would think that by 1986, 13 years after the publication of a popular book, that its prescriptions might be well ingrained in our management and decision-making styles. Unfortunately, it has not happened.

On January 28, 1986, the space shuttle Challenger was launched from Kennedy Space Center. The temperature that morning was in the mid-20's, well below the previous low temperatures at which the shuttle engines had been tested. Seventy-three seconds after launch, the Challenger exploded, killing all seven astronauts aboard, and becoming the worst disaster in space flight history. The catastrophe shocked the nation, crippled the American space program, and is destined to be remembered as the most tragic national event since the assassination of John F. Kennedy in 1963.

The Presidential Commission that investigated the accident pointed to a flawed decision-making process as a primary contributory cause. The decision was made the night before the launch in the Level I Flight Readiness Review meeting. Due to the work of the Presidential Commission, information concerning that meeting is available for analysis as a group decision possibly susceptible to groupthink.

In this paper, we report the results of our analysis of the Level I Flight Readiness Review meeting as a decision-making situation that displays evidence of groupthink. We review the antecedent conditions, the groupthink symptoms, and the possible decision-making defects, as suggested by Janis (1983). In addition, we take the next and more important step of going beyond the development of another example of groupthink to make recommendations for renewed inquiry into group decision-making processes.

THEORY AND EVIDENCE

The groupthink hypothesis has been presented in detail in numerous publications other than Janis' books (Flowers, 1977; Courtright, 1978; Leana, 1985; Moorhead, 1982; Moorhead & Montanari, 1986) and will not be repeated here. The major categories will be used as a framework for organizing the evidence from the meeting. Within each category the key elements will be presented along with meeting details that pertain to each.

The meeting(s) took place throughout the day and evening from 12:36 pm (EST), January 27, 1986 following the decision to not launch the Challenger due to high crosswinds at the launch site. Discussions continued through about 12:00 midnight (EST) via teleconferencing and Telefax systems connecting the Kennedy Space Center in Florida, Morton Thiokol (MTI) in Utah, Johnson Space Center in Houston, and the Marshall Space

Flight Center. The Level I Flight Readiness Review is the highest level of review prior to launch. It comprises the highest level of management at the three space centers and at MTI, the private supplier of the solid rocket booster engines.

To briefly state the situation, the MTI engineers recommended not to launch if temperatures of the O-ring seals on the rocket were below 53 degrees Fahrenheit, which was the lowest temperature of any previous flight. Laurence B. Mulloy, manager of the Solid Rocket Booster Project at Marshall Space Flight Center, states:

...The bottom line of that, though, initially was that Thiokol engineering, Bob Lund, who is the Vice President and Director of Engineering, who is here today, recommended that 51-L [the Challenger] not be launched if the O-ring temperatures predicted at launch time would be lower than any previous launch, and that was 53 degrees . . . (*Report of the Presidential Commission on the Space Shuttle Accident*, 1986, p. 91-92).

This recommendation was made at 8:45 pm, January 27, 1986 (*Report of the Presidential Commission on the Space Shuttle Accident*, 1986). Through the ensuing discussions the decision to launch was made.

Antecedent Conditions

The three primary antecedent conditions for the development of groupthink are: a highly cohesive group, leader preference for a certain decision, and insulation of the group from qualified outside opinions. These conditions existed in this situation.

Cohesive Group. The people who made the decision to launch had worked together for many years. They were familiar with each other and had grown through the ranks of the space program. A high degree of *esprit de corps* existed between the members.

Leader Preference. Two top level managers actively promoted their pro-launch opinions in the face of opposition. The commission report states that several managers at space centers and MTI pushed for launch, regardless of the low temperatures.

Insulation from Experts. MTI engineers made their recommendations relatively early in the evening. The top level decision-making group knew of their objections but did not meet with them directly to review their data and concerns. As Roger Boisjoly, a Thiokol engineer, states in his remarks to the Presidential Commission:

... and the bottom line was that the engineering people would not recommend a launch below 53 degrees Fahrenheit . . . From this point on, management formulated the points to base their decision on. There was never one comment in favor, as I have said, of launching by any engineer or other nonmanagement person. . . .

I was not even asked to participate in giving any input to the final decision charts (*Report of the Presidential Commission on the Space Shuttle Accident*, 1986, p. 91-92).

This testimonial indicates that the top decision-making team was insulated from the engineers who possessed the expertise regarding the functioning of the equipment.

Groupthink Symptoms

Janis identified eight symptoms of groupthink. They are presented here along with evidence from the *Report of the Presidential Commission on the Space Shuttle Accident* (1986).

Invulnerability. When groupthink occurs, most or all of the members of the decision-making group have an illusion of invulnerability that reassures them in the face of obvious dangers. This illusion leads the group to become overly optimistic and willing to take extraordinary risks. It may also cause them to ignore clear warnings of danger.

The solid rocket joint problem that destroyed Challenger was discussed often at flight readiness review meetings prior to flight. However, Commission member Richard Feynman concluded from the testimony that a mentality of overconfidence existed due to the extraordinary record of success of space flights. Every time we send one up it is successful. Involved members may seem to think that on the next one we can lower our standards or take more risks because it always works (*Time*, 1986).

The invulnerability illusion may have built up over time as a result of NASA's own spectacular history. NASA had not lost an astronaut since 1967 when a flash fire in the capsule of Apollo 1 killed three. Since that time NASA had a string of 55 successful missions. They had put a man on the moon, built and launched Skylab and the shuttle, and retrieved defective satellites from orbit. In the minds of most Americans and apparently their own, they could do no wrong.

Rationalization. Victims of groupthink collectively construct rationalizations that discount warnings and other forms of negative feedback. If these signals were taken seriously when presented, the group members would be forced to reconsider their assumptions each time they re-commit themselves to their past decisions.

In the Level I flight readiness meeting when the Challenger was given final launch approval, MTI engineers presented evidence that the joint would fail. Their argument was based on the fact that in the coldest previous launch (air temperature 30 degrees) the joint in question experienced serious erosion and that no data existed as to how the joint would perform at colder temperatures. Flight center officials put forth numerous technical rationalizations faulting MTI's analysis. One of these rationalizations was

that the engineer's data were inconclusive. As Mr. Boisjoly emphasized to the Commission:

... I was asked, yes, at that point in time I was asked to quantify my concerns, and I said I couldn't. I couldn't quantify it. I had no data to quantify it, but I did say I knew that it was away from goodness in the current data base. Someone on the net commented that we had soot blow-by on SRM-22 [Flight 61-A, October, 1985] which was launched at 75 degrees. I don't remember who made the comment, but that is where the first comment came in about the disparity between my conclusion and the observed data because SRM-22 [Flight 61-A, October 1985] had blow-by at essentially a room temperature launch. I then said that SRM-15 [Flight 51-C, January, 1985] had much more blow-by indication and that it was indeed telling us that lower temperature was a factor. I was asked again for data to support my claim, and I said I have none other than what is being presented (*Report of the Presidential Commission on the Space Shuttle Accident*, 1986, p. 89).

Discussions became twisted (compared to previous meetings) and no one detected it. Under normal conditions, MTI would have to prove the shuttle boosters readiness for launch, instead they found themselves being forced to prove that the boosters were unsafe. Boisjoly's testimony supports this description of the discussion:

... This was a meeting where the determination was to launch, and it was up to us to prove beyond a shadow of a doubt that it was not safe to do so. This is in total reverse to what the position usually is in a preflight conversation or a flight readiness review. It is usually exactly opposite of that... (*Report of the Presidential Commission on the Space Shuttle Accident*, 1986, p. 93).

Morality. Group members often believe, without question, in the inherent morality of their position. They tend to ignore the ethical or moral consequences of their decision.

In the Challenger case, this point was raised by a very high level MTI manager, Allan J. McDonald, who tried to stop the launch and said that he would not want to have to defend the decision to launch. He stated to the Commission:

... I made the statement that if we're wrong and something goes wrong on this flight, I wouldn't want to have to be the person to stand up in front of board in inquiry and say that I went ahead and told them to go ahead and fly this thing outside what the motor was qualified to... (*Report of the Presidential Commission on the Space Shuttle Accident*, 1986, p. 95).

Some members did not hear this statement because it occurred during a break. Three top officials who did hear it ignored it.

Stereotyped Views of Others. Victims of groupthink often have a stereotyped view of the opposition of anyone with a competing opinion. They feel that the opposition is too stupid or too weak to understand or deal effectively with the problem.

Two of the top three NASA officials responsible for the launch displayed this attitude. They felt that they completely understood the nature

of the joint problem and never seriously considered the objections raised by the MTT engineers. In fact they denigrated and badgered the opposition and their information and opinions.

Pressure on Dissent. Group members often apply direct pressure to anyone who questions the validity of the arguments supporting a decision or position favored by the majority. These same two officials pressured MTT to change its position after MTT originally recommended that the launch not take place. These two officials pressured MTT personnel to prove that it was not safe to launch, rather than to prove the opposite. As mentioned earlier, this was a total reversal of normal preflight procedures. It was this pressure that top MTT management was responding to when they overruled their engineering staff and recommended launch. As the Commission report states:

... At approximately 11 p.m. Eastern Standard Time, the Thiokol/NASA teleconference resumed, the Thiokol management stating that they had reassessed the problem, that the temperature effects were a concern, but that the data was admittedly inconclusive . . . (p. 96).

This seems to indicate that NASA's pressure on these Thiokol officials forced them to change their recommendation from delay to execution of the launch.

Self-Censorship. Group members tend to censor themselves when they have opinions or ideas that deviate from the apparent group consensus. Janis feels that this reflects each member's inclination to minimize to himself or herself the importance of his or her own doubts and counter-arguments.

The most obvious evidence of self-censorship occurred when a vice president of MTT, who had previously presented information against launch, bowed to pressure from NASA and accepted their rationalizations for launch. He then wrote these up and presented them to NASA as the reasons that MTT had changed its recommendation to launch.

Illusion of Unanimity. Group members falling victim to groupthink share an illusion of unanimity concerning judgments made by members speaking in favor of the majority view. This symptom is caused in part by the preceding one and is aided by the false assumption that any participant who remains silent is in agreement with the majority opinion. The group leader and other members support each other by playing up points of convergence in their thinking at the expense of fully exploring points of divergence that might reveal unsettling problems.

No participant from NASA ever openly agreed with or even took sides with MTT in the discussion. The silence from NASA was probably amplified by the fact that the meeting was a teleconference linking the participants at three different locations. Obviously, body language which

might have been evidenced by dissenters was not visible to others who might also have held a dissenting opinion. Thus, silence meant agreement.

Mindguarding. Certain group members assume the role of guarding the minds of others in the group. They attempt to shield the group from adverse information that might destroy the majority view of the facts regarding the appropriateness of the decision.

The top management at Marshall knew that the rocket casings had been ordered redesigned to correct a flaw 5 months previous to this launch. This information and other technical details concerning the history of the joint problem was withheld at the meeting.

Decision-Making Defects

The result of the antecedent conditions and the symptoms of groupthink is a defective decision-making process. Janis discusses several defects in decision making that can result.

Few Alternatives. The group considers only a few alternatives, often only two. No initial survey of all possible alternatives occurs. The Flight Readiness Review team had a launch/no-launch decision to make. These were the only two alternatives considered. Other possible alternatives might have been to delay the launch for further testing, or to delay until the temperatures reached an appropriate level.

No Re-Examination of Alternatives. The group fails to re-examine alternatives that may have been initially discarded based on early unfavorable information. Top NASA officials spent time and effort defending and strengthening their position, rather than examining the MTT position.

Rejecting Expert Opinions. Members make little or no attempt to seek outside experts opinions. NASA did not seek out other experts who might have some expertise in this area. They assumed that they had all the information.

Rejecting Negative Information. Members tend to focus on supportive information and ignore any data or information that might cast a negative light on their preferred alternative. MTT representatives repeatedly tried to point out errors in the rationale the NASA officials were using to justify the launch. Even after the decision was made, the argument continued until a NASA official told the MTT representative that it was no longer his concern.

No Contingency Plans. Members spend little time discussing the possible consequences of the decision and, therefore, fail to develop contingency plans. There is no documented evidence in the Rogers

Commission Report of any discussion of the possible consequences of an incorrect decision.

Summary of the Evidence

The major categories and key elements of the groupthink hypothesis have been presented (albeit somewhat briefly) along with evidence from the discussions prior to the launching of the Challenger, as reported in the President's Commission to investigate the accident. The antecedent conditions were present in the decision-making group, even though the group was in several physical locations. The leaders had a preferred solution and engaged in behaviors designed to promote it rather than critically appraise alternatives. These behaviors were evidence of most of the symptoms leading to a defective decision-making process.

DISCUSSION

This situation provides another example of decision making in which the group fell victim to the groupthink syndrome, as have so many previous groups. It illustrates the situation characteristics, the symptoms of group think, and decision-making defects as described by Janis. This situation, however, also illustrates several other aspects of situations that are critical to the development of groupthink that need to be included in a revised formulation of the groupthink model. First, the element of time in influencing the development of groupthink has not received adequate attention. In the decision to launch the space shuttle Challenger, time was a crucial part of the decision-making process. The launch had been delayed once, and the window for another launch was fast closing. The leaders of the decision team were concerned about public and congressional perceptions of the entire space shuttle program and its continued funding and may have felt that further delays of the launch could seriously impact future funding. With the space window fast closing, the decision team was faced with a launch now or seriously damage the program decision. One top level manager's response to Thiokof's initial recommendation to postpone the launch indicates the presence of time pressure:

With this LCC (Launch Commit Criteria), i.e., do not launch with a temperature greater [sic] than 53 degrees, we may not be able to launch until next April. We need to consider this carefully before we jump to any conclusions . . . (Report of the Presidential Commission on the Space Shuttle Accident, 1986, p. 96).

Time pressure could have played a role in the group choosing to agree and to self-censor their comments. Therefore, time is a critical variable that needs to be highlighted in a revised groupthink framework. We

propose that time is an important moderator between group characteristic and the development of the groupthink symptoms. That is, in certain situations when there is pressure to make a decision quickly, the elements may combine to foster the development of groupthink.

The second revision needs to be in the role of the leadership of the decision-making group. In the space shuttle Challenger incident, the leadership of the group varied from a shared type of leadership to a very clear leader in the situation. This may indicate that the leadership role needs to be clearly defined and a style that demands open disclosure of information points of opposition, complaints, and dissension. Inclusion of leadership in a more powerful role in the groupthink framework needs to be more explicit than in the Janis formulation in which leadership is one of several group characteristics that can lead to the development of the groupthink symptoms. We propose the leadership style is a crucial variable that moderates the relationship between the group characteristics and the development of the symptoms. Janis (1983) is a primary form of evidence to support the inclusion of leadership style in the enhanced model. His account of why the *same* group succumbed to groupthink in one decision (Bay of Pigs) and not in another (Cuban Missile Crisis) supports the depiction of leadership style as a moderator variable. In these decisions, the only condition that changed was the leadership style of the President. In other words, the element that seemed to distinguish why groupthink occurred in the Bay of Pigs decision and not in the Cuban Missile Crisis situation is the president's change in his behavior.

These two variables, time and leadership style, are proposed as moderators of the impact of the group characteristics on groupthink symptoms. This relationship is portrayed graphically in Fig. 1. In effect, we propose that the groupthink symptoms result from the group characteristics, as proposed by Janis, but only in the presence of the moderator variables of time and certain leadership styles.

Time, as an important element in the model, is relatively straightforward. When a decision must be made within a very short time frame pressure on members to agree, to avoid time-consuming arguments and reports from outside experts, and to self-censor themselves may increase. These pressures inevitably cause group members to seek agreement. In Janis's original model, time was included indirectly as a function of the antecedent condition, group cohesion. Janis (1983) argued that time pressures can adversely affect decision quality in two ways. First, it affects the decision makers' mental efficiency and judgment, interfering with their ability to concentrate on complicated discussions, to absorb new information, and to use imagination to anticipate the future consequences of alternative courses of action. Second, time pressure is a source of stress

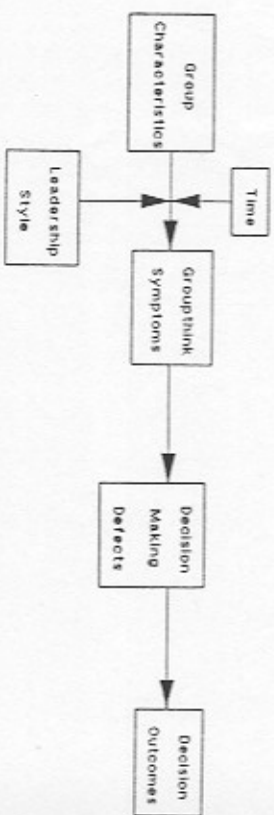


Fig. 1. Revised groupthink framework.

that will have the effect of inducing a policy-making group to become more cohesive and more likely to engage in groupthink.

Leadership style is shown to be a moderator because of the importance it plays in either promoting or avoiding the development of the symptoms of the groupthink. The leader, even though she or he may not promote a preferred solution, may allow or even assist the group seeking agreement by not forcing the group to critically appraise all alternative courses of action. The focus of this leadership variable is on the degree to which the leader allows or promotes discussion and evaluation of alternatives. It is not a matter of simply not making known a preferred solution; the issue is one of stimulation of critical thinking among the group.

Impact on Prescriptions for Prevention

The revised model suggests that more specific prescriptions for prevention of groupthink can be made. First, group members need to be aware of the impact that a short decision time frame has on decision processes. When a decision must be made quickly, there will be more pressure to agree, i.e., discouragement of dissent, self-censorship, avoidance of expert opinion, and assumptions about unanimity. The type of leadership suggested here is not one that sits back and simply does not make known her or his preferred solution. This type of leader must be one that requires all members to speak up with concerns, questions, and new information. The leader must know what some of these concerns are and which members are likely to have serious doubts so that the people with concerns can be called upon to voice them. This type of group leadership does not simply assign the role of devil's advocate and step out of the way. This leader actually plays the role or makes sure that others do. A leader with the required style to avoid groupthink is not a laissez faire leader or non-

involved participative leader. This leader is active in directing the activities of the group but does not make known a preferred solution. The group still must develop and evaluate alternative courses of action, but under the direct influence of a strong, demanding leader who forces critical appraisal of all alternatives.

Finally, a combination of the two variables suggests that the leader needs to help members to avoid the problems created by the time element. For example, the leader may be able to alter an externally imposed time frame for the decision by negotiating an extension or even paying late fees, if necessary. If an extension is not possible, the leader may need to help the group eliminate the effects of time on the decision processes. This can be done by forcing attention to issues rather than time, encouraging discussion and confrontation, and scheduling special sessions to hear reports from outside experts that challenge prevailing views within the group.

Janis presents, in both editions of his book, several recommendations for preventing the occurrence of groupthink. These recommendations focus on the inclusion of outside experts in the decision-making process, all members taking the role of devil's advocate and critically appraising all alternative courses of action, and the leader not expressing a preferred solution. The revised groupthink framework suggests several new prescriptions that may be helpful in preventing further decision fiascos similar to the decision to launch the space shuttle Challenger.

Much additional research is necessary to test the revised framework. First, laboratory research is needed to refine details of how time affects the development of groupthink. Second, the impact of various types of leadership style that may be appropriate for group decision-making situations needs to be investigated. Finally, research which tests the revised framework with real decision-making groups will be needed to refine new prescriptions for preventing groupthink.

CONCLUSION

This paper has reviewed the basic tenets of groupthink and examined the decision to launch the space shuttle Challenger in January 1986. The report of the Presidential Commission provided enough evidence of the antecedent conditions, the symptoms, and the decision-making defects to support a conclusion that the decision to launch can be classified as a groupthink situation. We have proposed, in addition, that other conditions may play important roles in the development of groupthink. These two variables, time and leadership style, are proposed as moderators of the relationship between group characteristics and groupthink symptoms. These

two moderators lead to new prescriptions for the prevention of groupthink. Much additional research is needed to test the degree to which the revised framework can be used to guide prescriptions for prevention.

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