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Public opinion polls and perceptions of US human spaceflight ☆

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Abstract

A belief exists in the United States about public support for NASA's human spaceflight activities. Many hold that NASA and the cause of the human exploration of space enjoyed outstanding public support and confidence in the 1960s during the era of *Apollo* and that public support waned in the post-*Apollo* era, only to sink to quite low depths in the decade of the 1990s. These beliefs are predicated on anecdotal evidence that should not be discounted, but empirical evidence gleaned from public opinion polling data suggests that some of these conceptions are totally incorrect and others are either incomplete or more nuanced than previously believed. This article explores the evolution of public support for space exploration since the 1960s. Using polling data from a variety of sources it presents trends over time and offers comments on the meaning of public perceptions for the evolution of space policy and the development of space exploration in the United States.
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1. Introduction

If I have heard it once, I have heard it a hundred times, "if NASA just had the popular support that it enjoyed during the 1960s all would be well."[1] Analyzing public opinion polling data in the United States from throughout the history of the space age, however, allows the plotting of trends over a long period of time. The trends reveal several interesting insights about the evolution of spaceflight. For example, many people believe that Project *Apollo* was popular, probably because it garnered significant media attention, but the polls do not support a contention that Americans embraced the lunar landing mission. Consistently throughout the 1960s a majority of Americans did not believe *Apollo* was worth the cost, with the one exception to this a poll taken at the time of the *Apollo* 11 lunar landing in July 1969. And consistently throughout the decade 45–60 percent of Americans believed that the government was spending too much on space, indicative of a lack of commitment to the spaceflight agenda.

These data do not support a contention that most people approved of *Apollo* and thought it important to explore space. The decision to proceed with *Apollo* was not made because it was enormously popular with the public, despite general acquiescence, but for hard-edged political reasons. Most of these were related to the cold war crises of the early 1960s, in which spaceflight served as a surrogate for face-to-face military confrontation.

As in the case of other historical sources polling data must be used with caution, and always in relation to other types of date. There is considerable skepticism among Americans that public opinion polls are skewed or otherwise unreliable. While the public generally acknowledges that polls often accurately forecast elections and measure opinion on other issues, they often question the scientific sampling foundation on which all polls are based. Most seem to believe that surveys of 1500–2000 respondents—a larger than average sample

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[1] I first heard this statement within weeks of starting work at NASA in November 1990. In early December I attended a major meeting held at NASA Headquarters concerning the Space Exploration Initiative (SEI), in which several participants voiced versions of this belief.

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size for most national polls—cannot effectively represent the views of all Americans. In the science of polling, professionals insist that a randomly selected, small percent of a population can indeed represent the attitudes, opinions, and projected behavior of a much larger group (on polling see [1]). All of the polls used in this article were conducted by professional organizations using acceptable statistical methodology. They represent the best empirical quantitative data available for the subjects they explore in the human spaceflight program of the United States. I have tried to interpret these survey results appropriately, seeking to place them in the context of the times and relating them to other available historical sources. Mostly the polling data squares with other historical information, filling in what is known about the subject with quantitative knowledge.

2. The good news?

Overall there has been consistently good news for NASA and the cause of human space exploration. The public has always, insofar as data exists, accorded NASA a quite favorable rating. This is unusual for most federal agencies, as the low opinion held by the public for such organizations as the Internal Revenue Service, the Environmental Protection Agency, and Health and Human Services attest.

For example, while Americans may not know much about the space program, they have a largely favorably opinion of it—over 70 percent say they have a favorable impression, compared to less than 20 percent that hold an unfavorable impression. And this tracks over the entire life of this particular question, from 1978 to 1999.[2]

The Yankelovich polls also asked this question, "Please tell me how important you believe the space program is to our country. Would you say that it is extremely important, very important, somewhat important, not very important, or not at all important?" Fig. 1 shows the percentage that said "extremely" or "very" important, and on average 57 percent of Americans have believed that the space program was extremely or very important to the country. Although Fig. 1 shows consistent support, in 1995 it depicts the beginning of consistently high marks for spaceflight after several years of steady decline. Analysts suggested that the 1995 rise may have been the result of the Shuttle/*Mir* docking missions that began in July of that year as well as the release of the *Apollo* 13 feature film in the summer of 1995. At least the analysts could think of no other external events that might have triggered this change (see footnote 2)

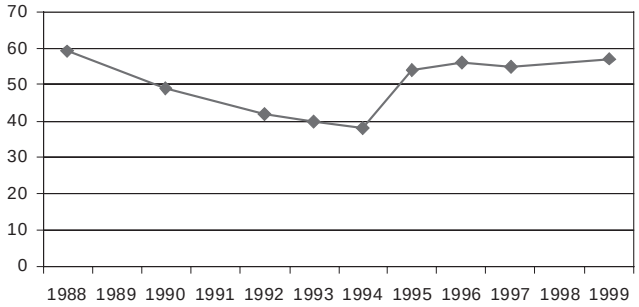

Fig. 1. Tell me how important you believe the space program is to our country.

In compiling data from several sources on the quality of the work being done by NASA between 1988 and 1999, as shown in Fig. 2, an average of more than 60 percent of those polled rated the job being done by NASA as "excellent" or "good."[3] All of this suggests that the cause of human spaceflight in general and NASA in particular enjoys relatively positive public perceptions and has for the entire period for which data exists.

Two anecdotes drawn from television situation comedies also support this overall positive conception. First, in the decade of the 1960s, the space program provided one of the leading examples of a United States government program that worked. It inspired public confidence in the ability of government to accomplish great feats. Even as other US government initiatives failed, civilian spaceflights continued to succeed. Actor Carroll O'Connor perhaps said it best in an episode of *All in the Family* in 1971. Portraying the character of Archie Bunker, the bigoted working-class American whose perspectives had more in common with our society than many observers were comfortable with, O'Connor summarized well how most Americans responded to the perceptions that *Apollo* engendered. He observed in one episode of the popular situation comedy that he had "a genuine facsimile of the *Apollo* 14 insignia. That's the thing that sets the US of A apart from…all them other losers."[4] In very specific terms, Archie Bunker encapsulated for everyone what set the United States apart from every other nation in the world, success in spaceflight. At a basic level *Apollo* provided the impetus for the perception of spaceflight as a great positive for the nation.

[2] In a set of Yankelovich polls conducted for the Boeing Company between May 1978 and December 1997 the public was asked about their agreement to the following statement: "I approve of America's current civilian space program." On average 68 percent of those polled agreed with the statement. Polls available in NASA Historical Reference Collection, NASA History Office, Washington, DC.

[3] Sources are ABC/WP, CNN/USAT, CBS/NYT, Gallup, Media General, and Yankelovich polls from 1988 to 1999. Copies available in NASA Historical Reference Collection.

[4] Carroll O'Connor Obituary, On *Morning Edition*, National Public Radio, 22 June 2001. This report by Andy Bowers is available on-line at http://www.npr.org, accessed 2 July 2001.

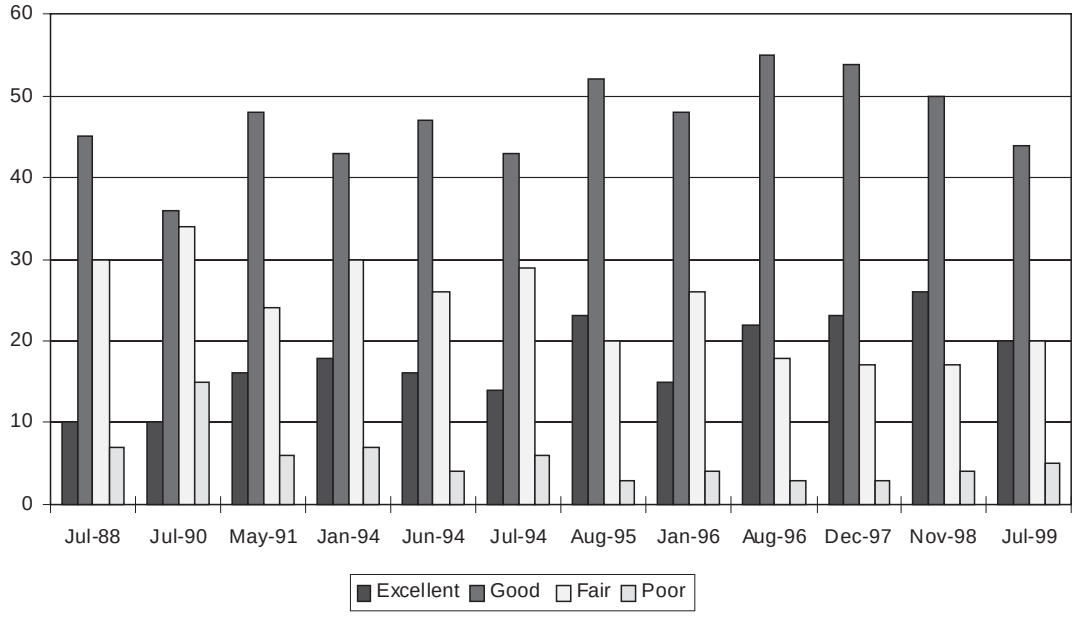

Fig. 2. How would you rate the job being done by NASA.

The second anecdote, taking place 30 years later, suggests that not much has changed. In the critically acclaimed television situation comedy about a team that produces a nightly cable sports broadcast, *Sports Night*, one episode included simply as a sidebar a discussion of space exploration. The fictional sports show's executive producer, Isaac Jaffee, played by renowned actor Robert Guillaume, was recovering from a stroke and disengaged from the daily hubbub of putting together the nightly show. His producer, Dana Whitaker, played by Felicity Huffman, kept interrupting him in this episode as he was reading a magazine about space exploration. The exchange is telling. Isaac tells her, "They're talking about bio-engineering animals and terraforming Mars. When I started reporting Gemini missions, just watching a Titan rocket liftoff was a sight to see. Now they're going to colonize the solar system." Dana suggests that perhaps Isaac is obsessing about this and he agrees. So Dana asks why? Quietly, Isaac responds, "Because I won't live to see it." It is a touching conversation about hope and aspirations and mortal limitations. But more than that, Isaac Jaffee affirms his fundamental faith in the importance of space exploration and in NASA to conduct this important mission. "You put an X anyplace in the Solar System," he says, "and the engineers at NASA can land a spacecraft on it."[5] Nothing more effectively states the public's overall confidence in NASA to carry out an exceptionally important task.

At the same time, many Americans hold seemingly contradictory attitudes on NASA and human space exploration. Most are in favor of the human exploration and development of space and view it as important, but also believe that federal money could be better spent on other programs. This relates closely to empirical research on other aspects of public policy. The American public is notorious for its willingness to support programs in principle but to oppose their funding at levels appropriate to sustain them.[6] Most are also in favor of NASA as an organization, but are relatively unfamiliar with the majority of its activities and objectives, and sometimes question individual projects.

3. Exploding the myth of popular support for project Apollo

The belief that *Apollo* enjoyed enthusiastic support during the 1960s and that somehow NASA has lost its compass thereafter enjoys broad appeal to the present. This is an important conception, for without the active agreement of political leaders and at least public acquiescence no exploration effort may be sustained for any length of time (see also [2]). The level of popular support that most people believe the public held for the Kennedy decision to undertake the Moon landings are, therefore, perceived as something that must be gained for the present space exploration agenda to succeed.

[5] The Sweet Smell of Air, *Sports Night*, first aired 25 January 2000, videotape in possession of author.

[6] Howard E. McCurdy to author, 12 December 2002, copy in possession of author.

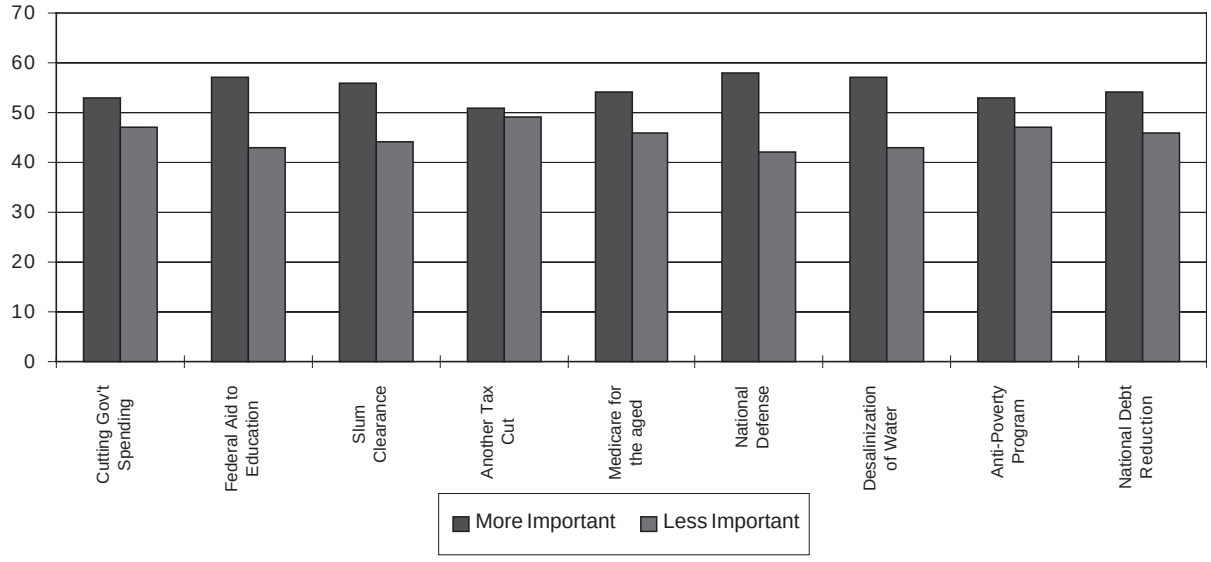

Fig. 3. Importance of other government programs vs. space October 1965.

Repeatedly a chorus of remorse for the lukewarm popular support enjoyed by specific space exploration activities is followed with a heavy sigh and the conclusion, "if only our current efforts had the same level of commitment enjoyed by *Apollo*, all would be well." This issue has been explored by Kauffman [3].

While there may be reason to accept that *Apollo* was transcendentally important at some sublime level, assuming a generally rosy public acceptance of it is at best a simplistic and ultimately unsatisfactory conclusion. Indeed, the public's support for space funding has remained remarkably stable at approximately 80 percent in favor of the status quo since 1965, with only one significant dip in support in the early 1970s. However, responses to funding questions on public opinion polls are extremely sensitive to question wording and must be used cautiously [4]. For example, in the summer of 1965 one third of the nation favored cutting the space budget, while only 16 percent wanted to increase it. Over the next three-and-one-half years, the number in favor of cutting space spending went up to 40 percent, with those preferring an increase dropping to 14 percent. At the end of 1965, the *New York Times* reported that a poll conducted in six American cities showed five other public issues holding priority over efforts in outer space (Fig. 3).[7] Polls in the 1960s also consistently ranked spaceflight near the top of those programs to be cut in the federal budget (Fig. 4). Most Americans seemingly preferred doing something about air and water pollution, job training for unskilled workers, national beautification, and poverty before spending federal funds on human spaceflight. The following year *Newsweek* echoed the *Times* story, stating: "The US space program is in decline. The Vietnam war and the desperate conditions of the nation's poor and its cities—which make space flight seem, in comparison, like an embarrassing national self-indulgence—have combined to drag down a program where the sky was no longer the limit."[8]

Nor did lunar exploration in and of itself create much of a groundswell of popular support from the general public. The American public during the 1960s largely showed a hesitancy to "race" the Soviets to the Moon, as shown in Fig. 5. "Would you favor or oppose US government spending to send astronauts to the Moon?" these polls asked, and in virtually all cases a majority opposed doing so, even during the height of *Apollo*. At only one point, October 1965, did more than half of the public favor continuing human lunar exploration. In the post-*Apollo* era, the American public has continued to question the validity of undertaking human expeditions to the Moon. Fig. 4 also shows the result of the recent return to the Moon with the Clementine space probe in 1994, which found evidence of embedded ice at the poles, and even then support for human exploration was essentially equally divided.[9]

[7] These charts are the result of research over time compiling polls from various sources showing the public's perception of NASA. While one may question the validity of polls, they tend to show several trends that offer verisimilitude. Copies of all polls are available in the NASA Historical Reference Collection, NASA History Office, Washington, DC.

[8] *The Gallup Poll: Public Opinion.* 1935–1971, III: 1959–1971, pp. 1952, 2183–84, 2209; *New York Times*, 3 December 1967; *Newsweek* is quoted in Administrative History of NASA, chap. II, p. 48, NASA Historical Reference Collection.

[9] This analysis is based on a set of Gallup, Harris, NBC/Associated Press, CBS/New York Times, and ABC/USA Today polls conducted throughout the 1960s, copies available in the NASA Historical Reference Collection.

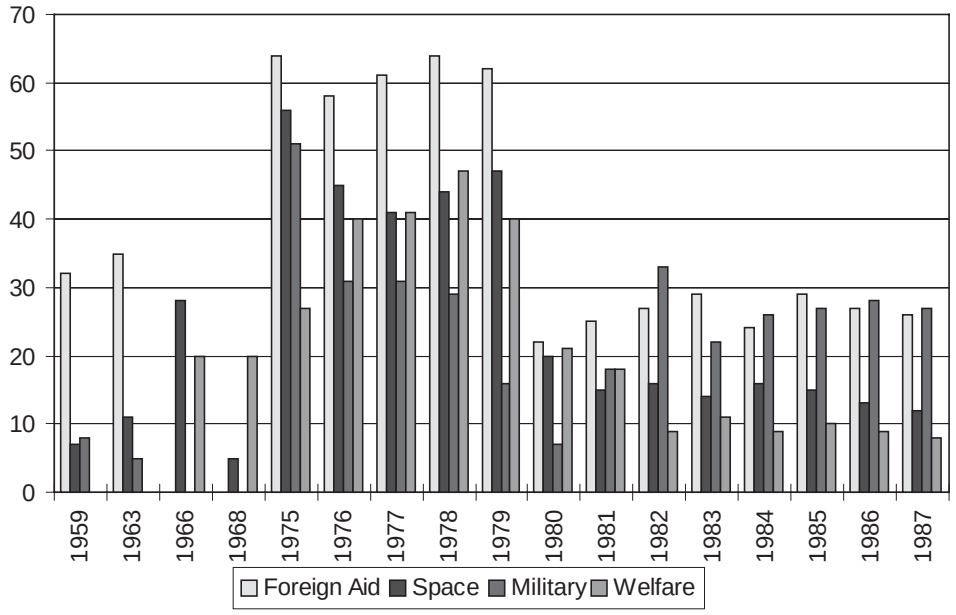

Fig. 4. Percentage age who believe government funding should be decreased.

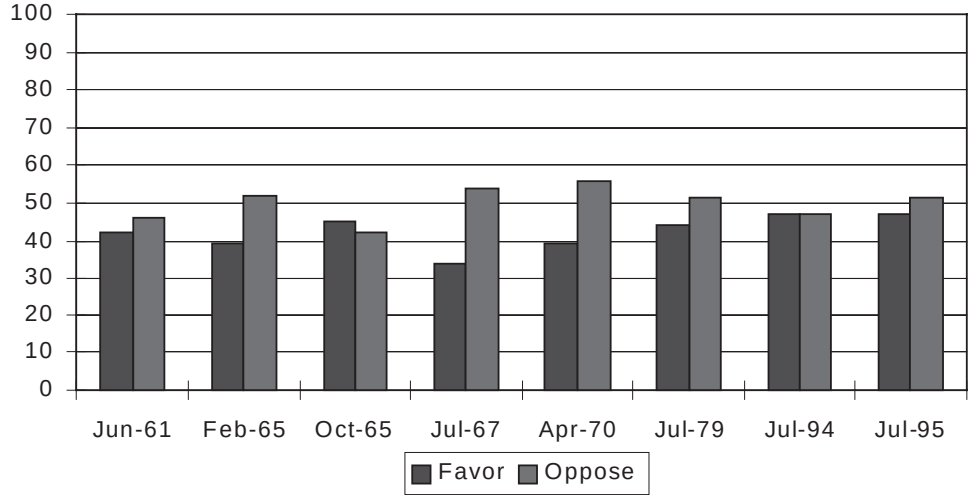

Fig. 5. Should the government fund human trips to the Moon.

Some conclude from these opinion polls that even though the American public might have been generally unsupportive of human lunar exploration, that Project *Apollo*—wrapped as it was in the bosom of American virtue, advocated by the most publicly wholesome of astronaut heroes, and hawked by everyone from journalists to Madison Avenue marketers—enjoyed consistent popularity. There is some evidence to suggest this, but it is, in the main, untrue. From the 1960s to near the present, using the polling data that exists, there is little evidence to support an expansive lunar exploration and colonization program. One must conclude from the results shown in Fig. 5 that the United States undertook and carried out *Apollo* not because the public clamored for it during the 1960s, but because it served other purposes. Furthermore, the polling data in Fig. 5 suggest that should the United States mount another human mission to the Moon in the future it will also be because the mission serves a larger political, economic, or national defense agenda.

The only point at which the opinion surveys demonstrate that more than 50 percent of the public believed *Apollo* was worth its expense came in 1969 at the time of the *Apollo* 11 lunar landing, as shown in Fig. 6. And even then only a measly 53 percent agreed that the result justified the expense, despite the fact that the landing was perhaps the most momentous event in

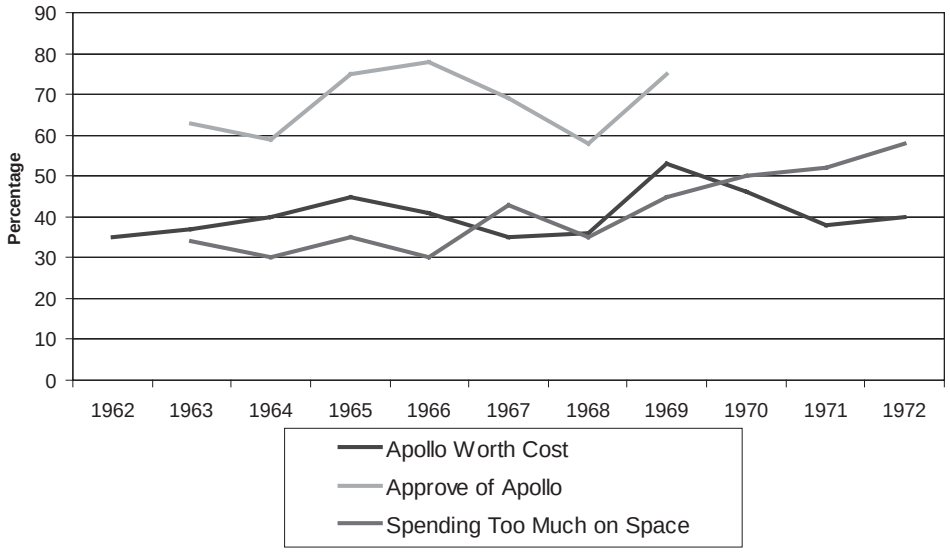

Fig. 6. Public support for *Apollo*.

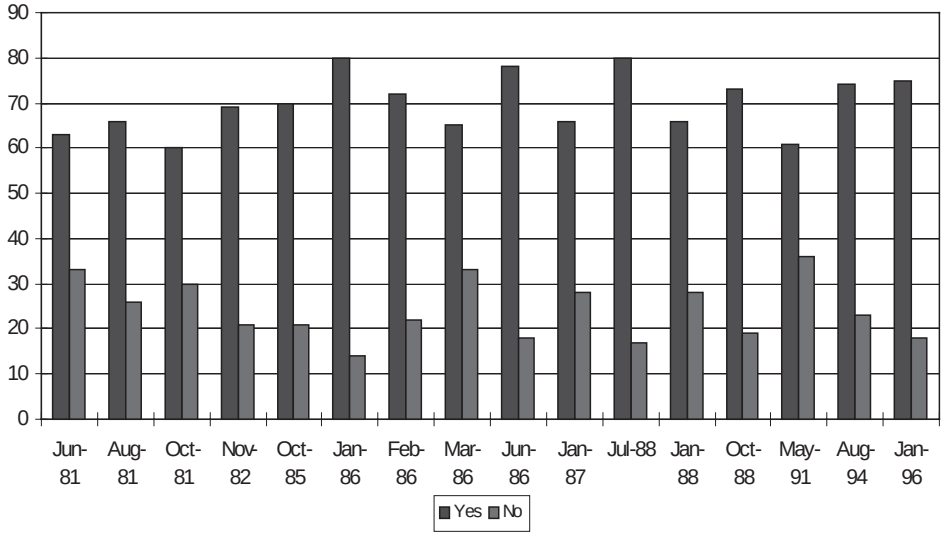

Fig. 7. Is the space shuttle a good investment.

human history since it became the first instance in which the human race became bi-planetary.

These statistics do not demonstrate an unqualified support for NASA's effort to reach the Moon in the 1960s. They suggest, instead, that the political crisis that brought public support to the initial lunar landing decision was fleeting and within a short period the coalition that announced it had to re-consider their decision. It also suggests that the public was never enthusiastic about human lunar exploration, and especially about the costs associated with it. What enthusiasm it may have enjoyed waned over time, until by the end of the *Apollo* program in December 1972 one has the image of the program as something akin to a limping marathoner straining with every muscle to reach the finish line before collapsing.

4. Whither the Space Shuttle?

In contrast to the lukewarm support the public showed for the efforts to land Americans on the Moon, as shown in Fig. 5, the public has consistently agreed that the Space Shuttle is a good investment (see Fig. 7).[10] That does not directly translate, however, into willingness on the part of the public to fly in space, as shown in Fig. 8. [11]

[10] This analysis is based on a set of Harris, Media General, NBC/Associated Press, NBC, Gallup, CBS/New York Times, and ABC/WP polls conducted between the 1980s and the present, available in the NASA Historical Reference Collection.

[11] This analysis is based on a set of NBC/Associated Press, NBC, CBS/New York Times, ABC/WP, Harris, and Gallup polls conducted between the 1980s and the present, available in the NASA Historical Reference Collection.

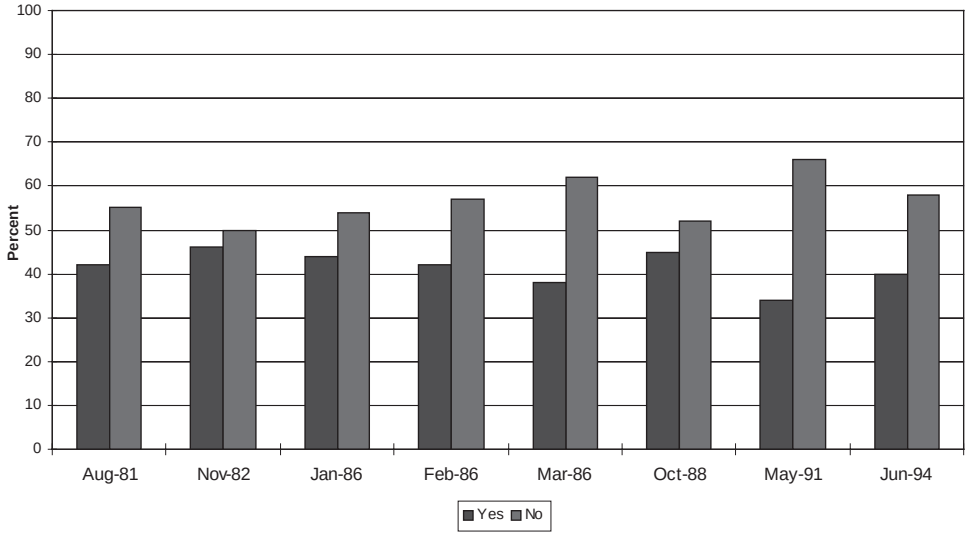

Fig. 8. Public willingness to travel in space.

While it is not specifically tied to these public perceptions, some interesting conclusions may be offered about the Space Shuttle program based on these sources and other data. First, and certainly most significant, despite the recent loss of *Columbia* and the 1986 loss of *Challenger* with their crews, most agree that the Space Shuttle is a magnificent machine. A massively complex system—with more than 200,000 separate components that must work in synchronization with each other and to specifications more than any other technological system in human history exacting—the Space Shuttle must be viewed as a triumph of engineering and excellence in technological management. Any assessment of the Space Shuttle that does not recognize this basic attribute of the system is both incomplete and inaccurate (see [5]).

Because of its technological magnificence, the Space Shuttle has become an overwhelmingly commanding symbol of American excellence for the world community. Ask almost anyone outside the United States what ingredients they believe demonstrate America's superpower status in the world, and in addition to military and economic might they will quickly mention the Space Shuttle—as well as NASA's larger space exploration program—as a constant reminder of what Americans can accomplish when they put their minds to it [6].

Second, despite two tragic accidents, the Space Shuttle has been remarkably reliable over the course of its operational history. Two exceptionally catastrophic accidents, the *Challenger* explosion that killed the crew of seven on 28 January 1986 and the recent *Columbia* accident during re-entry on 1 February 2003, ruin an otherwise exceptional reliability record.[12] Without minimizing those tragic accidents, one is still compelled to conclude that NASA engineers have been enormously successful in operating effectively a vehicle that is 1970s technology at best and always a research vehicle never capable of airline-type operations. It has done so in an exceptionally difficult flight regime that includes the stresses of launch and multiple Gs, the microgravity/vacuum environment of space and the hazards of atmospheric re-entry and hypersonic flight. Through all of this, the shuttle remains the most reliable launch system now in service anywhere in the world, with a success-to-failure ratio of greater than 0.98 [8].

Third, the Space Shuttle remains a mature system at this point in its career and that is an important factor in its performance over the past several years. At the beginning of the 21st century, the Space Shuttle appropriately deserves the same plaudits and suffers from some of the same criticisms that have been made clear since not long after the program first began. It remains the only vehicle in the world with the dual capability to deliver and return large payloads to and from orbit. The design, now more than two decades old, is fast becoming outdated—although some parts are still state-of-the-art, including computerized flight control, electrical power systems, thermal protection system, and main engines. It is obsolete in some respects, however, and requires replacement within the decade. In the aftermath of the *Columbia* accident perhaps the nation will finally realize the necessity of moving forward with a replacement human spaceflight vehicle. The decision to do so may be one of the most significant outcomes of the *Columbia* accident investigation [9].

Finally, despite its problems, the Space Shuttle has proven itself one of the most flexible space vehicles ever flown. Most assuredly, the range of possibilities for

[12] While there have been many books written about the *Challenger* accident, by far the most sophisticated treatment may be found by Vaughan [7].

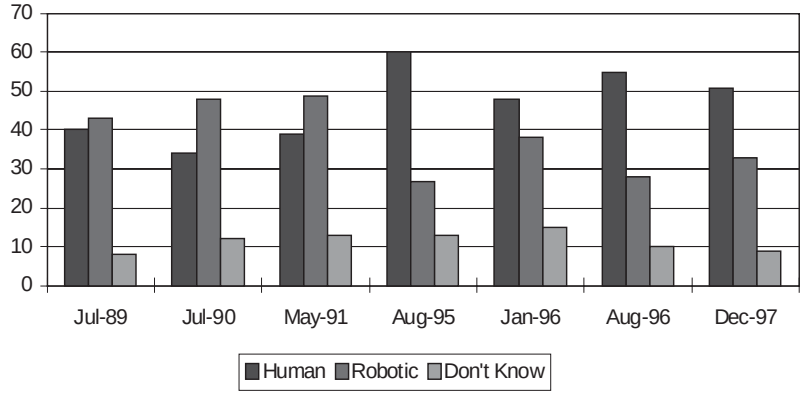

Fig. 9. What should be the primary emphasis of NASA programs.

operations on-orbit expanded dramatically with the launch of *Columbia* in 1981. With its large payload bay, satellite deployment, capture and return to Earth, and repair and redeployment all for the first time became possibilities once the shuttle first flew. Requirements to perform these tasks have ensured that the crew of every Shuttle mission has a much broader range of required activities than the pioneering astronauts of the Mercury, Gemini, *Apollo*, and even the Skylab programs. The range of these missions is discussed by Harland [10].

Despite this, for most of the Shuttle era—1981 to the present—the public has believed that robotic spaceflight should be pursued more aggressively than the human program that relied on the shuttle. Between 1989 and 1997 several polls asked the question, "Should the US space program concentrate on unmanned missions like planetary probes or on manned programs such as the space shuttle?" Consistently until 1995 the answer came back that more Americans favored robotic missions over the Shuttle flights. This changed suddenly in the summer of 1995 and the public has favored human missions over probes since that time. This transformation is depicted in Fig. 9.[13]

What accounts for this transformation? Several potential explanations are possible. Of course, the 1989–1995 data might be an anomaly in a much longer infatuation with human spaceflight over robotic missions. Since we do not have good polling data for the period before 1989—and after 1997—limitations abound in what we might conclude. At the same time, an intriguing possibility may be that for the first time in the summer of 1995 the Space Shuttle docked with the Russian space station, *Mir*, and began a series of cooperative missions. The excitement of the Shuttle/*Mir* program may have sparked recognition of the importance of human exploration in opening the high frontier of space.[14]

But there seems also to have been more to any changes than the Shuttle/*Mir* program. The pollsters suggested in their analysis that there seems to have been a close relationship between public perceptions of NASA and spaceflight depictions in popular culture. For example, the film *Apollo* 13 seems to have been an important factor in the shift in favor of human spaceflight over robotic missions in 1995. Coming out in the summer of 1995, it excited the public as the reality of human spaceflight had not done for several years. Near-term science fiction films seem to have helped sustain public enthusiasm for human spaceflight, e.g. *Armageddon*, *Deep Impact*, *Contact*, *Space Cowboys*. These images from popular culture, coupled with real-world accomplishments in human exploration and development of space, worked together to create powerful visions for the 21st century. There is really nothing very unusual about this connection. Political scientist Howard E. McCurdy and sociologist Constance Penley, among others, have drawn tight connections between popular culture and public perceptions of spaceflight. The relationship between popular culture and public policy requires additional exploration; something I hope to turn my attention to in the near term (see McCurdy's study in Ref. [14]).

[13] This analysis is based on a set of Yankelovich, ABC/WP, and Gallup polls conducted between the 1980s and the present, available in the NASA Historical Reference Collection.

[14] The Shuttle–*Mir* program has received considerable historical discussion. An illustrated history, containing a CD/ROM with oral histories, documents, and multimedia materials, is given by Clay Morgan [11]. Bryan Burrough's [12], provides a journalistic analysis of the American–Russian cooperation in space in the mid-1990s about the *Mir* space station. It was a "dress rehearsal" for the two countries' partnership in a new International Space Station they were building back on Earth. On the summer docking mission see [13].

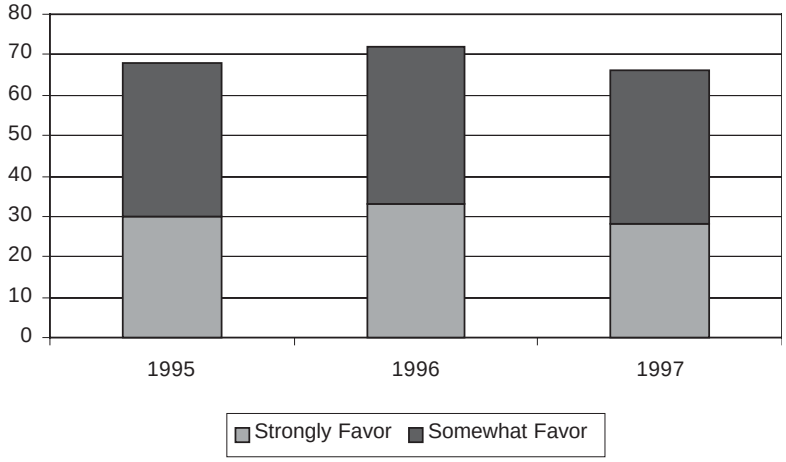

Fig. 10. Support for space station.

5. Working for a living in space

In the State of the Union Address of 1984 President Ronald Reagan challenged the nation to build a space station. Reagan told Congress and the nation that "sparkling economy spurs initiatives, sunrise industries, and makes older ones more competitive." He added:

> Nowhere is this more important than our next frontier: space. Nowhere do we so effectively demonstrate our technological leadership and ability to make life better on Earth. The Space Age is barely a quarter of a century old. But already we've pushed civilization forward with our advances in science and technology. Opportunities and jobs will multiply as we cross new thresholds of knowledge and reach deeper into the unknown…
>
> America has always been greatest when we dared to be great. We can reach for greatness again. We can follow our dreams to distant stars, living and working in space for peaceful, economic, and scientific gain. Tonight, I am directing NASA to develop a permanently manned space station and to do it within a decade. A space station will permit quantum leaps in our research in science, communications, in metals, and in lifesaving medicines which could be manufactured only in space [15].

And, as they say in sports, "the crowd goes wild." The very public announcement by President Reagan of the commitment to build a space station represented the high-water mark of the overall program's support. The challenges proved enormous and the trials—political and otherwise—fatiguing but nothing seemed insurmountable in the first few weeks after the president's speech.

Quickly, however, the space station program became controversial. Most of the debate centered on its costs versus its benefits. One NASA official remembered that "I reached the scream level at about $9 billion," referring to how much US politicians appeared willing to spend on the station. Quoted in McCurdy [16]. As a result, NASA constantly sought to reduce the cost of the station, but this proved to be a losing battle that led to constant controversy, reviews, redesigns, and political hijinks (see Smith [17]).[15]

With these difficulties over the space station, one would expect that the public would turn against the project. Such does not seem, however, to be the case. While the polling data is both unsophisticated and limited in time frame, Fig. 10 suggests that, even during very public problems with the program in the latter 1990s, the public supported the effort.[16] When asked about the reality of cooperation with the former Soviet Union in building the space station, there is even more support. From the point that the Soviet Union began to collapse in the mid-1980s, the public consistently favored large cooperative programs with the Russians, as shown in Fig. 11.[17]

6. Should we go to Mars?

Apollo was the penultimate activity for the human exploration of space during the first 40 years of the space age. Landing humans on the Moon had never been done before in human history and certainly that great accomplishment has lasting significance. Too many space enthusiasts, however, like to point to the bold

[15] The story of the International Space Station's political and budgetary woes is told in [18].

[16] This data is from a set of Yankelovich polls conducted for the Boeing Company between 1995 and 1997. Polls available in NASA Historical Reference Collection.

[17] This is based on a set of Harris, NBC/Associated Press, Rockwell, and ABC/WP polls available in the NASA Historical Reference Collection.

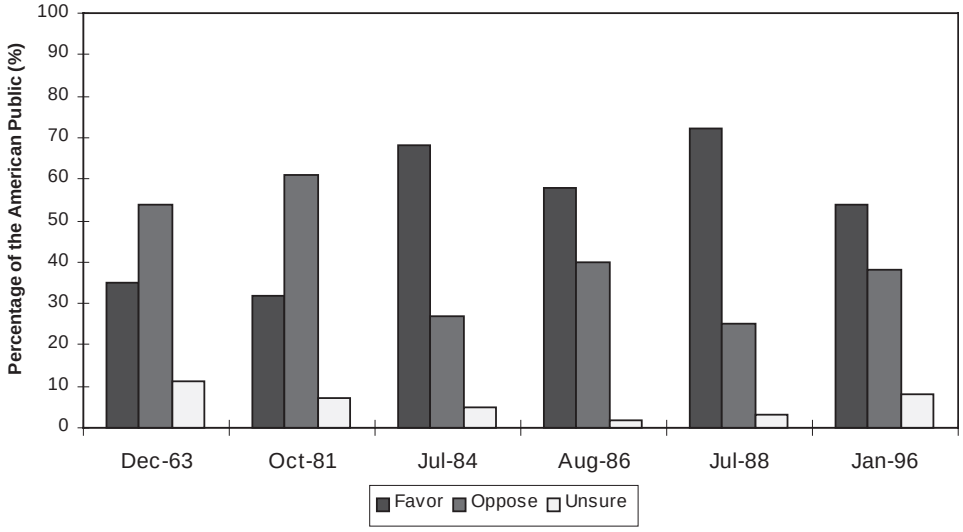

Fig. 11. Major space cooperation with soviet union/Russia.

Nation	Successful Missions	Partially Successful Missions	Unsuccessful Missions
USA	9	0	5
USSR	2	5	10
Total	11	5	15

Fig. 12. Robotic missions to Mars, 1960–2002.

lunar decision of President Kennedy and lament the lack of political resolve for sending humans to Mars. Believing that JFK's *Apollo* decision was the normative process in policy formulation represents one of the most significant failures of the space community to understand the nature of the policymaking process. On Kennedy's decision see Logsdon [19].

Unfortunately, too many fail to recognize the very real cold war objectives that led Kennedy to his decision. Absent that crisis he would never have committed to Project *Apollo*. A recently released tape of a White House meeting taking place on November 21, 1962, between President Kennedy and NASA Administrator James E. Webb demonstrate this fact beyond all dispute. Kennedy explained, "Everything that we do should be tied into getting on to the Moon ahead of the Russians. We ought to get it really clear that the policy ought to be that this is the top priority program of the agency and one…of the top priorities of the United States government." He added:

> Otherwise we shouldn't be spending this kind of money, because I am not that interested in space. I think it's good. I think we ought to know about it. But we're talking about fantastic expenditures. We've wrecked our budget, and all these other domestic programs, and the only justification for it, in my opinion, is to do it in the time element I am asking. (Tape Recording of meeting between President John F. Kennedy and NASA Administrator Webb [20].)

In the end a unique confluence of foreign policy crisis, political necessity, personal commitment and activism, scientific and technological ability, economic prosperity, and public mood made possible the 1961 decision to carry out a forward-looking lunar landing program [21].

For those advocating a human Mars mission the challenge is daunting. For one thing, it is technologically much more challenging simply because it is much farther and more difficult to reach than the Moon. Furthermore, the success rate for robotic missions to Mars, outlined in Fig. 12, suggests the magnitude of impediments to the effort. With significantly more failures than successes, and half of the eight probes of the 1990s ending in failure, any mission to Mars is at least an order of magnitude greater in complexity, risk, and cost than returning to the Moon (see [22]).

A human Mars mission also has never enjoyed much support from the American public. Consistently, as shown in Fig. 13, more people polled have opposed the

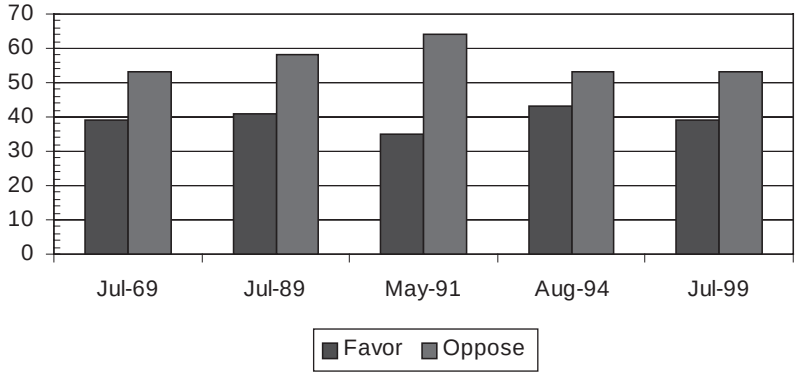

Fig. 13. Should the government fund human trips to Mars.

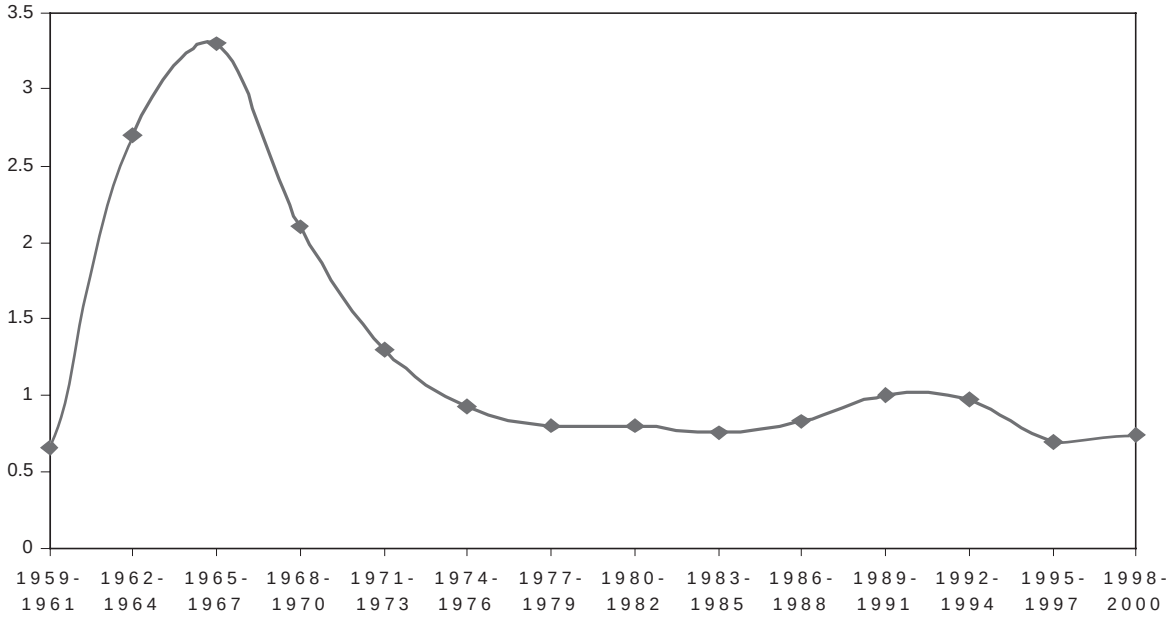

Fig. 14. NASA budget as a percentage of the federal budget.

mission than supported it. With that lukewarm support the nation's elected leaders will certainly not proceed down this policy path unless something else—probably some crisis—requires it. Accordingly, the advocates of human exploration of Mars must appreciate the historical issues at play with the JFK decision to move forward with *Apollo*. And using *Apollo* as a model—addressed as it was to a very specific political crisis relating to US/Soviet competition—one question for those seeking a decision to mount a human expedition to Mars is quite simple. "What political, military, social, economic, or cultural scenario can they envision to which the best response would be a national commitment on the part of the president and other elected officials to send humans to Mars?" The answer to that question would go far toward informing the public debate and the presidential commitment to a future aggressive space exploration effort to go back to the Moon or on to Mars [23].

7. A Final data point: false conceptions about NASA spending

One final observation from this review of polling data relates to the level of spending for NASA programs. With the exception of a few years during the *Apollo* era, the NASA budget has hovered at about one percent of all money expended by the US treasury. As shown in Fig. 14, with the exception of a few years in the mid-1960s as NASA prepared for *Apollo* flights to the Moon, stability has been the norm as the annual NASA budget has incrementally gone up or down in relation to that 1-percent benchmark.[18] But the public's perception of this is quite different, as shown in Fig. 15. For example, in

[18] This observation is based on calculations using the budget data included in the annual *Aeronautics and Space Report of the President* (Washington, DC: NASA Report, 2002), which contains this information for each year since 1959.

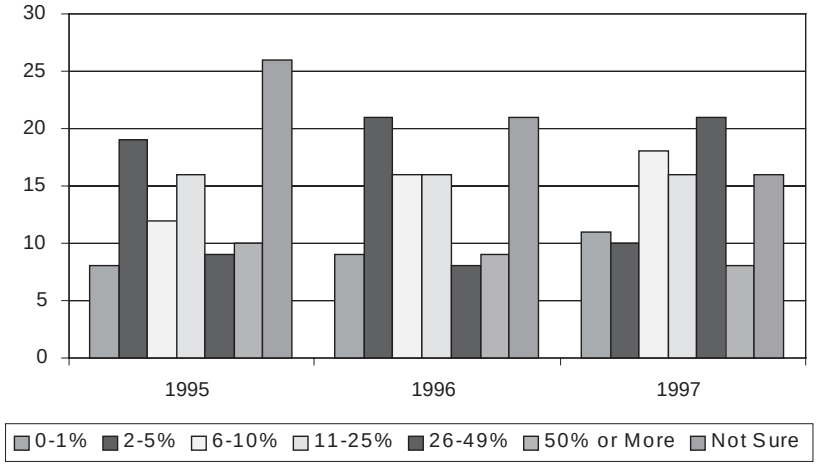

Fig. 15. NASA'S estimated share of the federal budget.

1997 the average estimate of NASA's share of the federal budget by those polled was 20 percent. Had this been true, NASA's budget in 1997 would have been $328 billion. If NASA had that amount of money it would have been able to undertake a program to send humans to Mars.

It seems obvious that most Americans have little conception of the amount of funding available to NASA. At a fundamental level, all federal programs face this challenge as Americans are notoriously uninformed about how much and what the federal government spends on its programs.[19] As a result there is a general lack of understanding that NASA has less than one percent of the Federal budget each year, and that its share of the budget has been shrinking since the early 1990s. Most Americans seem to believe that NASA has a lot of money, much more than it annually receives. Turning around those false perceptions of funding is perhaps the most serious challenge facing those who wish to gain greater public support for space exploration.

8. Conclusion

There are several other observations emerging from this review. Some of them are seemingly contradictory to the general findings discussed about support for *Apollo*. They include the following:

- The American public has long held generally positive attitudes toward the space program, but is not very familiar with its details.
- Over the history of the space age, an average of more than 60 percent of those polled rated the job done by NASA as either "excellent" or "good."
- Most Americans have shown support for space exploration and view it as important over the years, but also believe that federal money could be better spent on other programs.
- Most are also in favor of NASA as an organization, but are relatively unfamiliar with the majority of its activities and objectives.
- These polls also suggest historically close relationships between public perceptions of NASA and spaceflight depictions in popular culture, especially film. These images from popular culture, coupled with real-world accomplishments in spaceflight, work together to create powerful visions affecting the public consciousness.

The polling data discussed here offer several insights about *Apollo*, the signature program of NASA in its first decade and a half, and the potential for human trips to Mars. *Apollo* never enjoyed the strong public support that many have romantically projected into the project. JFK's *Apollo* decision was based on political opportunism as much as anything else, and was much more complex and involved than most have generally believed. Because of its success, *Apollo* left a divided legacy for NASA and the aerospace community. The *Apollo* decision created for the space agency an expectation that the direction of any major space goal from the president would always bring NASA a broad consensus of support and provide it with the resources and license to dispense them as it saw fit. Something

[19] This is an uncontestable conclusion. Probably no citizenry gripes more about how its government spends the national treasury without understanding how much money is allocated to various programs than that of the United States. The Concord Coalition, dedicated to ending the federal deficit in the 1990s, held numerous public workshops on balancing the budget. A Concord Coalition staffer opined that most people came to these workshops with the assumption that by eliminating fraud, waste, and abuse in government; reducing foreign aid; and cracking down on welfare cheats (not those receiving aid legitimately) they could balance the US budget. That naïve position suggests just how poorly American understand the federal budget, what is spent and how.

NASA officials have been slow to understand is that *Apollo* had not been conducted under normal political circumstances and would not be repeated.[20] Those who wish to send a human expedition to Mars are still wrestling with this legacy.

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[20] This argument is made by Launius and McCurdy [24]. As a specific example, see the argument made in George M. Low, Team Leader, to Mr. Richard Fairbanks, Director, Transition Resources and Development Group, "Report of the NASA Transition Team," 19 December 1980, NASA Historical Reference Collection, advocating strong presidential leadership to make everything right with the US space program.