Americans reflect on Apollo 11 and the space program

Jon D. Miller

Director
International Center for the Advancement of Scientific Literacy
Institute for Social Research
University of Michigan
Ann Arbor, Michigan 48106

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On the eve of the 50th anniversary of the landing of the Apollo 11 mission on the Moon, it is appropriate to ask what Americans think about achievements of the space program[1] over the last 60 years and about the future of space exploration. Although most Americans have grown up watching periodic space exploration events on their television, computer screen, or phone, it is important to recognize that only 45 % of today's adults (age 18 and older) were alive at the time of the first lunar landing on July 20, 1969.

To assess the public's perception of the achievements of the space program, the Science Literacy Survey at the University of Michigan asked a national sample[2] of American adults to name the two most important achievements of the space program over the last 60 years. The question was asked in an open-ended format without prompting and each respondent was able to mention the "most important achievement" and the "second most important achievement" of the space program.

Thirty-five percent of American adults cited the Apollo 11 lunar landing as one of the two most important achievements of the space program, significantly more than any other component of the space program (see Table 1). This level of recognition reflects the prominent role that the first lunar landing holds in American's collective memory.

It is important to note that American adults were able to cite a wide range of other space achievements in response to this open-ended inquiry. One in five adults pointed to achievements of the space program in planetary exploration and improving our understanding of the solar system. An additional 9% cited research on our own planet and its climate as a major achievement. Ten percent mentioned current efforts to explore Mars (see Table 1).

Apart from manned and unmanned missions, slightly more than one in five adults pointed to new technologies originated in the space program that have been expanded to serve civilian needs. Eleven percent cited communication and computer technologies specifically and 8% referred to "technologies for civilian purposes" without further specification.

Thirteen percent of adults thought that the space program had major achievements in advancing scientific knowledge and expanding our understanding of galaxies and the universe. Four percent cited the work of Hubble and other space telescopes as a major achievement.

One in five adults were not able to recall any achievements of the space program. Prior research has found that there is a high degree of issue specialization in the United States and other modern societies and this result is consistent with earlier research (Almond, 1950; Miller, 1983a; Miller, 1992; Miller & Inglehart, 2012).

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[1] President Eisenhower signed the legislation creating NASA on July 29, 1958, and the agency began operations on October 1, 1958.

[2] The interviews for the survey were conducted in November and December, 2018, by AmeriSpeak, a national survey service operated by the National Opinion Research Center at the University of Chicago. The survey was funded through a cooperative agreement between NASA and the University of Michigan (award: NNX16AC66A).

Table 1: Most important achievement of the space program in last 60 years, 2018.

Most important achievement	Percent		
	1st mention	2nd mention	Combined
Specific NASA missions			
Apollo mission; lunar landing	27.6	7.6	35.2
Space station	3.0	3.9	6.9
Mars and related programs	2.6	7.1	9.7
Hubble and other space telescopes	1.6	2.4	4.0
Manned space flight generally	2.0	1.6	3.6
Space shuttle	0.2	1.9	2.1
Other specific NASA missions	0.5	0.3	0.8
Planetary exploration and solar system			
Planetary exploration & solar system	11.9	8.6	20.5
Improved Earth & climate understand	4.0	4.7	8.7
Space colonies & life elsewhere	2.1	2.5	4.6
New technologies			
Communication & computer technol…	5.1	6.3	11.4
Technologies for civilian purposes	3.8	3.9	7.7
Space flight technology; boosters	4.2	2.8	7.0
New technologies (general)	3.2	2.6	5.8
GPS/weather forecasting	0.8	1.5	2.3
Material sciences	0.2	0.5	0.7
Advancement of science			
New scientific discoveries	1.8	4.6	6.4
Advanced scientific research	1.8	1.8	3.6
Understanding universe & galaxies	1.4	1.2	2.6
Other achievements			
Increasing national prestige	0.3	0.6	0.9
All other achievements	2.4	5.9	8.3
Could not recall any	19.0		19.0
Number of cases: 2,312. Note: the combined number of mentions may sum to more than 100%.			

Recognition of civilian use of space technologies

The responses to the open-ended inquiry indicated some recognition of the value of technologies originally developed by NASA that have been transferred or adapted to broader civilian uses. A series of national surveys of American adults over the last 30 years have found a more explicit indication of awareness and support for this outcome.

Beginning in 1988, national surveys[3] have asked adults to agree or disagree with the statement "the space program has paid for itself through the creation of new technologies and scientific discoveries." The percentage of American adults who agree with this statement increased from 56% in 1988 to 69% in 2018 (see Table 2). The steady increase in the proportion of American adults who recognize the value of new technologies and science produced by the space program indicates a growing recognition that some of the technologies that they experience in their daily life originated in or were created by the space program.

Table 2: Public agreement with statement concerning the value of new technologies from the space program, 1988-2018.

	Year		
	1988	2007	2018
Strongly agree	6.6	13.9	19.0
Agree	49.5	45.4	50.1
Not sure/don't know	6.4	3.2	2.7
Disagree	35.2	30.7	24.2
Strongly disagree	2.3	7.0	4.0
Number of cases	2,041	1,407	2,859

Percentage of adults agreeing or disagreeing with the statement "On balance, the space program has paid for itself through the creation of new technologies and scientific discoveries."

Thinking about the future

Turning from past achievements to the future, surveys over the last 30 years have asked national samples of American adults to agree or disagree with the statement "The United States should seek to explore space in the same spirit that led the Europeans to explore this planet in earlier centuries."

[3] The 1988 survey was designed by Jon D. Miller and conducted by the Public Opinion Laboratory at Northern Illinois University using a national probability sample of residential telephone numbers. The survey was funded by the National Science Foundation (award: SRS88-07409) and the results were published in part in the 1988 Science and Engineering Indicators. The 2007 survey was designed by Jon D. Miller and conducted by Knowledge Networks using its national panel of adults. The 2007 survey was funded by the National Science Foundation (award: ESI-0515449) and by a supplemental grant from Michigan State University.

The statement is broad by design and meant to assess whether American adults today think of space exploration in the same way that they might think of earlier explorers who crossed unknown oceans to see what might reside over the horizon.

A national survey conducted in 1988 found that 67% of American adults agreed that we should think of space exploration in terms similar to the early explorers of this planet. Thirty years later, a 2018 national survey found that 72% of American adults agreed with the same statement. This level of continuing general support for space exploration indicates that most Americans see the last six decades as a period of positive achievement and that they are supportive of continued efforts to explore space.

Although the aggregate level of public support for viewing space exploration in a manner similar to the early European explorers of this planet, it is useful to examine the characteristics of the adults who indicated agreement in 1988 and 2018.

As noted earlier, 55% of today's adults were not born at the time of the 1969 Apollo landing, suggesting that the distribution of support for this idea may change by the age of the respondents. A comparison of 1988 and 2018 indicates that a significantly higher proportion of adults now 55 years of age or older express support for viewing space exploration in the same way as earlier European explorers of this planet (see Table 3). A substantial majority of American adults supported this view in both 1988 and 2018, but the level of support increased the most among adults who were old enough to remember the Apollo landing. The small declines in support for this view of space exploration among younger respondents is not a loss of support for space exploration, but a reflection that many of today's younger adults did not personally view the Apollo landings in 1969 and the early 1970's and may have a less personal sense of the spirit elicited by those events.

During the last 30 years, the proportion of men and women endorsing this view of space exploration increased, but there was a larger increase among women than men (see Table 3). Other studies have found similar increases in the level of interest in science and science-related subjects by women over recent decades. During this 30-year period, the proportion of women entering college increased significantly and for the last two decades a higher proportion of young women earn a baccalaureate than young men. Since all American baccalaureate students are required to complete at least a year of college-level science courses, a larger proportion of women are being exposed to science courses.

A comparison of the impact of formal education in 1988 and 2018 on attitudes toward space exploration shows gains at both ends of the educational spectrum. Adults with a high school education or less reported a significant increase in support for viewing space exploration in a way similar to earlier Earth explorers, as did adults with a graduate or professional degree (see Table 3). The growth of agreement with this view among adults without post-secondary educational experience may reflect an adoption of broader societal views. Earlier studies of public perceptions of space exploration immediately after the Challenger accident in 1986 found a high degree of

Table 3: Sources of change in public expectations about space exploration, 1988-2018.

	Year		Change
	1988	2018	
All adults (age 18 or more)	66.6%	72.2%	+ 5.6
Age			
18 to 24 years	72.3	69.2	- 3.1
25 to 34 years	69.8	71.1	+ 1.3
35 to 44 years	70.4	69.4	- 1.0
45 to 54 years	63.5	71.4	+ 7.9
55 to 64 years	61.4	74.0	+12.6
65 or more years	58.7	76.4	+17.7
Gender			
Female	59.4	66.8	+ 7.4
Male	74.7	77.8	+ 3.1
Education			
Less than high school	61.3	69.7	+ 8.4
High school graduate or GED	65.6	71.8	+ 6.2
Associate degree	76.8	70.8	- 6.0
Baccalaureate degree	73.9	72.0	- 1.9
Graduate or professional degree	72.9	75.7	+ 2.8
Civic scientific literacy			
Not CSL	65.3	70.4	+ 5.3
Scientifically literate	79.2	80.6	+ 5.2
Attentive top space policy			
Not attentive	64.5	70.6	+ 6.1
Attentive to space policy	84.8	88.4	+ 3.6
Number of cases	2,041	2,312	--
Percentage of adults agreeing with the statement "The United States should seek to explore space in the same spirit that led the Europeans to explore this planet in earlier centuries."			

national pride in the space program despite the accident and a strong desire to fix the problem and continue with the space program (Miller, 1987; Launius, 1994). The growth of support for this view among adults with graduate or professional degrees may reflect their greater exposure to scientific ideas and the development of a stronger ability to visualize national goals.

During the last three decades, the proportion of adults with a functional level of scientific literacy – referred to as *civic scientific literacy* because of its link of science and technology policy issues – has increased from 10% to 32% (Miller, 1983b, 2010; Miller, Pardo, & Niwa, 1997). A comparison of adults that qualify as civic scientifically literate (CSL) in 1988 and 2018 shows that both groups increased their support of the idea that space exploration should be viewed in a manner similar to earlier European explorations of this planet (see Table 3). Scientifically literate adults, however, were more likely to express this view in both 1988 and 2018, and the rate of increase in both groups over the last 30 years was essentially the same.

Finally, it is interesting to compare the views of citizens who have a high level of interest in space policy issues and who think that they are well informed about space issue to the views of citizens with lower levels of policy interest in space. Citizens who are attentive to space policy issues tend to follow space matters more closely in the media and to seek additional information about space exploration and space science from the Internet and other sources. They are more likely to become involved in public policy issue involving space. In both 1988 and 2018, citizens who were attentive to space policy were substantially more likely to see space exploration as similar to earlier European exploration than citizens who were not attentive to space issues, but the difference between the two groups narrowed slightly over the last three decades (see Table 3).

Today and tomorrow

This brief examination of national survey data from 1988 and 2018 indicates that American adult tend to recall the first Apollo lunar landing as a landmark achievement of the space program, citing it more often than any other activity as the best achievement of the space program. Parallel national survey data indicate that a majority of American adults think that the space program has paid for itself through the development of new technologies and new scientific discoveries. The proportion of American adults holding this belief has increased steadily over the last 30 years.

Looking to the future, a substantial majority of American adults continue to believe that today's space exploration should be viewed as similar to the earlier European explorations of this planet. The proportion of adults holding this view has increased over the last 30 years and it broadly shared by American adults.

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