Physics, Patriotism, and Propaganda:

American Education's Continuity and Changes After Sputnik

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The aftermath of World War II brought many social changes to the US, with a sudden return to peacetime industry, women's return to the domestic sphere, and relative prosperity for much of the population. At the same time, the developing Cold War between the US and the Soviet Union displayed Soviet-US tensions on many different stages, each intended to assert ideological and cultural supremacy while avoiding direct, destructive military conflict. These competitions were both literal and symbolic: while proxy hot wars in third-world countries were used to project military supremacy, the two superpowers also battled indirectly using propaganda and espionage; their war became completely symbolic in arenas such as international sports contests and even chess.[1] Such symbolic confrontations were an effective way for the respective governments to gather ideological support within their home countries.[2] One of the most prominent areas of US-Soviet competition was the Space Race, in which the two nations vied for scientific and technological dominance in the developing field of exploration outside the earth's atmosphere. In the US, numerous long-term developments occurred as a result of the Space Race, including specific technological advances which, over the course of decades, led the way to America's current high-tech society (for example, computers, telecommunications, and solar power); innovation in diverse fields, including materials science, healthcare, and transportation, and gains in industrial efficiency. However, one area in which the Cold War and the Space Race had an immediate effect on US culture was public education. As a result of the Soviet launch of Sputnik and the resulting American anxiety about keeping up with Soviets, the United States expanded its reach into public education both by actively emphasizing science and math and by

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[1]"Moscow Seeks an Alibi," editorial, *New York Times*, August 24, 1972, https://www.proquest.com/historical-newspapers/moscow-seeks-alibi/docview/119513767/se-2?accountid=36166.
[2]Antulio J. Echevarria, "Wars of Ideas and the War of Ideas," Strategic Studies Institute, US Army War College (June 2008): 3-4, http://www.jstor.org/stable/resrep11904.

continuing the anti-communist ideological indoctrination that had existed before Sputnik, while contradictorily leaving racial and gender disparities in science education largely unaddressed.

The Soviets' launch of the Sputnik I satellite in 1957 immediately created a great sense of alarm in the US regarding its own technological and military preparedness.[3] The resulting Space Race significantly increased the American public's focus on science and mathematics education. Compounding the worry, the month after Sputnik launched, a confidential US government report was leaked to the press; it stated that in a nuclear war, the Soviet Union could inflict 50 percent casualties on the US, and vice versa, prompting a public uproar.[4] Only a few months later, the widely-read magazine *Life* began an "urgent" four-part series entitled "Crisis in Education." Its first installment was a highly unflattering contrast between high school education in the US and the USSR, essentially affirming the superiority of Soviet educational rigor.[5] American public opinion regarding the Space Race grew increasingly more concerned with each successive Soviet space accomplishment (Sputnik II and the Soviets' first manned space mission).[6]

To an even greater degree than the public, numerous parts of the US government reacted to the Space Race by focusing on science education. One such entity was the National Aeronautics and Space Administration (NASA), which was itself created in response to Sputnik. In 1959, a research memorandum prepared for NASA by the RAND Corporation dedicated a substantial section to education, and in particular to the expected problem of both shortages and

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[3]Donald N. Michael, "American Reactions to Crisis: Examples of Pre-Sputnik and Post-Sputnik Attitudes and of the Reaction to Other Events Perceived as Threats" (presentation, International Affairs Seminars of Washington, Washington, DC, October 15-16, 1958).
[4]Zuoyue Wang, *In Sputnik's Shadow: The President's Science Advisory Committee and Cold War America* (New Brunswick, NJ: Rutgers University Press, 2008), 81.
[5]Sloan Wilson, "Crisis in Education: Schoolboys Point Up a U.S. Weakness," *Life,* March 24, 1958, https://crystalbook.ru/wp-content/uploads/2021/08/Crisis-in-Education.-Life-Magazine-24.03.1958.pdf.
[6]Ian Kennedy, "The Sputnik Crisis And America's Response" (master's thesis, University of Central Florida, 2005), 4, https://stars.library.ucf.edu/cgi/viewcontent.cgi?article=1578&context=etd.

"inadequate quality" of scientists and engineers that could slow NASA's growth.[7] It listed numerous problems faced by the American education system at every level. More directly, the National Science Foundation (created a few years earlier, in 1950) took action in the form of a $500 million investment in new science and math curricula for schools.[8] Finally, Congress passed the National Defense Education Act (NDEA) in 1958 to advance science and defense education with hundreds of millions of dollars for school scientific equipment and teacher education, as well as financial assistance for university students.[9] The NDEA was followed by the Higher Education Act of 1965 to support postsecondary education.[10]

Besides government agencies and Congress, prominent politicians joined in with calls for more science education. Reacting to the news of the Sputnik launch, Democratic presidential hopeful Lyndon Johnson immediately magnified the issue and pledged, if elected, to outdo President Eisenhowers's space budget.[11] Eisenhower, facing growing public pressure, appointed the first White House science adviser about a month after the Sputnik launch, and subsequently established the President's Science Advisory Committee (PSAC).[12] Senate hearings featured prominent scientists and military officials, who called for educational programs that would create a scientific elite and support scientific research as a matter of national survival.[13]

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[7]Joseph M. Goldsen, "Public Opinion and Social Effects of Space Activity" (research memorandum, RAND Corporation, Contract NASW-91, July 20, 1959), 11-14, https://www.rand.org/content/dam/rand/pubs/research_memoranda/2008/RM2417.pdf.
[8]C. Juan Lucena, *Defending the Nation: U.S. Policymaking to Create Scientists and Engineers from Sputnik to the 'War Against Terrorism'* (Lanham, MD: University Press of America, 2005), 12-13, 43.
[9]Hyeonggu Cha, "Soviet Launch of Sputnik: Sputnik-Inspired Educational Reform and Changes in Private Returns in America" (PhD diss, Clemson University, 2015), 69.
[10]J. Gerard Degroot, *Dark Side of The Moon: The Magnificent Madness of the American Lunar Quest* (New York: New York University Press, 2006), 75.
[11]Degroot, *Dark Side of The Moon*, 69-70.
[12]Wang, *In Sputnik's Shadow*, 82.
[13]Lucena, *Defending the Nation*, 33.

There were pre-existing structures for the US to build on as it ramped up its science education resources. NASA's memorandum from the RAND Corporation emphasized that Americans did not completely lack enthusiasm for science before Sputnik, noting specifically the American Rocket Society's statistic that there were around 10,000 amateur builders of rockets (of whom 162 had been injured in a six-month period). The memorandum concluded that this sort of activity needed to be developed in terms of scientific discipline as well as the relation of science to American cultural and political heritage - to support the US's standing in the world.[14] Further, not only amateur science but also school science clubs and science fairs had existed before Sputnik. Science fairs had been held since the late 1920s, and the nation's World War II mobilization had already transformed these programs into a patriotic effort and led to the creation of the national Science Talent Search.[15] The mobilization of US schools for national defense, military security, and economic prosperity that had begun during the war continued well into the post-World War II period. These pre-Sputnik events had encouraged promising American students with opportunity and motivation to explore scientific concepts beyond their regular curriculum through merit recognition and awards. Still, science clubs and fairs were limited to large urban areas, and many US children lacked access even to science courses in school.[16] The launch of Sputnik powerfully focused the nation on the work to be done in science education, ultimately encouraging many students to pursue science and engineering and, most broadly, to help the US defeat the Soviets in the Space Race.

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[14]Goldsen, "Public Opinion and Social Effects of Space Activity," 13.
[15]Sevan G. Terzian, *Science Education and Citizenship: Fairs, Clubs, and Talent Searches for American Youth, 1918-1958* (New York: Palgrave MacMillan, 2013), 2.
[16]Terzian, *Science Education and Citizenship*, 2-3.

In addition to the new push for improved science education following Sputnik, the Space Race era also saw other changes in US education. One result of the Second World War's end (twelve years before Sputnik) was the realization that the Soviet Union and the US were truly in opposition to each other.[17] With the dawn of the Cold War, there was a new focus in schools on forming future citizens who believed in democracy and would combat the threat of communism and the Soviet Union. In other words, schools taught young Americans how to live in a democracy and were even distributors of anti-communist propaganda.

Even before the Cold War and the Soviet Union's launch of Sputnik in 1957, American schools had incorporated lessons on democratic values and even anti-communist sentiments. The promotion of democracy had always aimed to instill in American students a strong sense of national identity, patriotism, and the importance of individual freedoms.[18] During the Cold War, the educational system continued to be enlisted to cultivate maturing citizens who would actively resist the perceived threat of communism's ever-expanding influence and actively preserve democratic principles. Youth could also promote pro-American sentiment within their private spheres, passing on what they had learned in the classroom to their parents.

During this period, public schools became both overt and subtle distributors of anti-communist propaganda. Textbooks often included passages and diagrams that portrayed communism (particularly Soviet Communism) as an oppressive and totalitarian system, in contrast to inherently superior democracy. Students were taught about the importance of American capitalism and free markets while being warned against the dangers of Soviet ideology

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[17]Harry Truman, "Commencement Address at the University of California, June 12, 1948," https://www.presidency.ucsb.edu/documents/commencement-address-the-university-california.
[18]Marilyn Irvin Holt, *Cold War Kids: Politics and Childhood in Postwar America, 1945-1960* (Lawrence: University Press of Kansas, 2014), 48, http://www.jstor.org/stable/j.ctt1qft2gk.

and influence. For example, Pennsylvania announced in 1956 that its public schools would provide courses on the dangers of communism, since teachers had been emphasizing the positive side of democracy but had not gone into the faults of ideologies such as communism for fear of controversy.[19] This approach within education was intended to create strong anti-communist sentiment among the younger generation as well as to promote patriotic sentiment. Ironically, by attempting to erase diverse thought and minority opinion in order to push the importance of democracy and freedom, the US exemplified the opposite of the values it claimed made America great. However, many perceived the cause just and did not consider their actions to be propaganda due to their own perspective of American superiority, and considered it to be necessary and accurate education rather than indoctrination.

After Sputnik launched, even broader-based educational initiatives and organizations emerged to promote anti-communist ideals. One example was the National Education Association (NEA), which developed programs and resources to teach students about the perils of communism and the virtues of democracy.[20] Two months after Sputnik, the American Legion even reversed its position regarding anti-communism instruction in public schools, and joined forces with the NEA to consider textbooks for courses about communism (the joint committee at the same time recommended that high priority be given to improving science, engineering, and math courses in public schools).[21] Other federal government entities, like the Federal Bureau of Investigation (FBI) and the House Un-American Activities Committee (HUAC), also played a

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[19]"Courses on Communism: Pennsylvania Will Give Them in Public Schools," *New York Times*, December 10, 1956, https://timesmachine.nytimes.com/timesmachine/1956/12/10/105220875.html?pageNumber=19.
[20]Campbell F. Scribner, "'Make Your Voice Heard': Communism in the High School Curriculum, 1958-1968," *History of Education Quarterly* 52, no. 3 (2012): 356–57, http://www.jstor.org/stable/23251453.
[21]"Communism Study: N.E.A. and American Legion Plan a School Program," *New York Times*, December 15, 1957, https://timesmachine.nytimes.com/timesmachine/1957/12/15/90868512.html?pageNumber=201.

role in monitoring and influencing the content taught in schools to force a firm anti-communist curriculum.[22] They relied, respectively, on intimidation and ostracism as techniques for keeping schools in line with their pro-capitalist message. Members of the public joined in these efforts as well. In 1952, for example, the Scarsdale Board of Education had to repeatedly deny allegations of a communist infiltration, affirm the patriotism and integrity of its entire school staff, and formally reject the censoring of textbooks, library books, faculty members, and assembly speakers.[23] The Red Scare had left a deep-seated fear of "othering" in many Americans, and HUAC in particular took advantage of this fear by threatening to label whole schools as well as individual citizens - principals, administrators, and teachers - as anti-American communist sympathizers.[24]

Despite the government's best efforts, emphasis on anti-communist education was not universally accepted in America. Some loud criticisms began to develop that the education system was overly biased and propagandistic, many with concerns about the government limiting critical thinking and diverse perspectives. Communist groups (especially university student groups) questioned the pro-capitalist messages that the government was forcibly instilling in students, mostly regarding the methods by which the message was spread, and many dissenters were outspoken and some actually gained significant support, especially in the following decade.[25] Nevertheless, the anti-communist message taught in schools was very effective with

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[22]Harry Ruja, "The Communist Menace, the Supreme Court, and Academic Freedom," *The Western Political Quarterly* 14, no. 3 (1961): 723, https://www.jstor.org/stable/444288.
[23]"Scarsdale Board Bars Censorship: Education Unit Denies Again That Communism Exists in Public Schools System," *New York Times*, April 25, 1952, https://timesmachine.nytimes.com/timesmachine/1952/04/25/84312791.html?pageNumber=8.
[24]Ellen Schrecker, "McCarthyism: Political Repression and the Fear of Communism," *Social Research* 71, no. 4 (2004): 1050, 1059-60, http://www.jstor.org/stable/40971992.
[25]Jerome Skolnick, "Student Protest" (Reproduction of Staff Report to the National Commission

regard to a young generation of Americans with minimal awareness of or concern for their government's motives.

In contrast to Sputnik's acceleration of the Space Race's effects on science education and those on political indoctrination, there were some areas that did not see increased focus, even though the circumstances would suggest that they should have. In a 1959 report called *Education for the Age of Science* by the President's Science Advisory Committee (PSAC) established by Eisenhower, one of the questions addressed was how to make science attractive to Americans, especially in schools, especially given the general public dislike of so-called "eggheads" and "intellectuals."[26] The PSAC report also forcefully supported the idea of women pursuing education and professional careers, based on the pragmatic rationale of using "untapped potential" (as opposed to gender equality). Despite its attention to women, however, the report completely ignored racial inequalities and the untapped potential of minority Americans. The PSAC report, rather than advocating for direct government support of science or suggesting ways to implement its priorities, was most concerned with how to educate the public so as to increase public support of science.[27] In the end, despite the nation's perceived urgent need for more scientists and engineers, the Space Race resulted in no changes in education that would have benefited racially disadvantaged groups and brought them into the effort to advance science, and it likewise achieved relatively little for women in science.[28] Major changes would have to wait

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on the Causes and Prevention of Violence, March 1969), *AAUP Bulletin* 55, no. 3 (1969), 312, https://www.jstor.org/stable/pdf/40223829.pdf?refreqid=fastly-default%3Aeb87912f6c20a5353e2c5b3520d06448&ab_segments=0%2Fbasic_search_gsv2%2Fcontrol&origin=&initiator=search-results.

[26]Wang, *In Sputnik's Shadow*, 165.

[27]Wang, *In Sputnik's Shadow*, 166-167.

[28] Goldsen, "Public Opinion and Social Effects of Space Activity," 11

for the Civil Rights Movement's push for equal access to education for Black citizens, and the Women's Rights Movement's work in promoting career equality for women.

The omission of race considerations was a continuation of a problem that had begun with the GI Bill, which benefited whites far more than Blacks, especially in the South. Major reasons for this were that segregation was still rampant, and historically Black colleges and universities could not accommodate the number of Black service members wishing to enroll.[29] Much more broadly, the return of American veterans from the Second World War had a profound impact on education through the implementation of the GI Bill, which began well before the Space Race and Sputnik. This legislation allowed ex-servicemen to pursue higher education with financial support, leading to a significant increase in enrollment. While school crowding and resource strains emerged as challenges, the GI Bill was widely regarded as a resounding success for American education. The program not only expanded access to higher education but also played a key role in democratizing it. By providing educational opportunities for millions of veterans who might not have otherwise afforded college, it leveled the playing field and contributed to a more inclusive society, helping to bridge socioeconomic gaps and offering avenues for personal and professional advancement. Moreover, the GI Bill transformed the public perception of education and bolstered patriotism, generating a sense of gratitude for the veterans' military service.[30] As a result, the program garnered significant public support and was viewed as an investment in the nation's future. This positive sentiment towards education solidified its importance in American society and contributed to the development of a more educated and

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[29]Hilary Herbold, "Never a Level Playing Field: Blacks and the GI Bill," *The Journal of Blacks in Higher Education*, no. 6 (1994): 108, https://www.jstor.org/stable/2962479

[30]Keith W. Olson, "The G. I. Bill and Higher Education: Success and Surprise," *American Quarterly* 25, no. 5 (1973): 596–610, https://www.jstor.org/stable/2711698.

prosperous nation, emphasizing its importance in American society and contributing to the US's competitive position in the face of the Soviets' space advances.

The Space Race, and in particular the Soviet Union's 1957 launch of its Sputnik satellite, served as a powerful accelerant for several aspects of US education that had existed to varying degrees prior to Sputnik. One aspect was an urgency to improve science education at all academic levels, to increase the public's interest in and support for science, and to encourage talented students to pursue careers in science and engineering in the national interest. The resulting funding and legislation gave immense support to scientific endeavor in the US and enhanced America's competitive edge in the Space Race, and has led to an enduring American culture of scientific curiosity and innovations that enrich our lives today - computers, advanced materials, medical progress - and continue to be crucial in addressing complex challenges in our high-tech society. In addition to accelerating science education, Sputnik also fueled efforts to incorporate political ideology into the public schools. Although American education was already influenced by the broader geopolitical context prior to Sputnik's launch, the sense of increased urgency after Sputnik gave added power to efforts to enlist schools as platforms for instilling democratic values, combating the perceived threat of communism, and distributing anti-communist propaganda. The government, through bodies like the NEA, FBI, and HUAC, actively influenced the curriculum to promote pro-capitalist messages and suppress diverse perspectives. The virtues of democracy and patriotism had long been taught in US schools, but fear of communism, prevalent even before World War II, increased even more after Sputnik, leading to formal anti-communism instructional programs as well as anxiety over communist infiltration of school personnel. However, some developments that might have been expected as

a result of Sputnik did not occur. Despite the urgency of the Space Race, no effort was made to make use of the untapped potential of minority students by improving their educational opportunities, or the likewise largely untapped potential of women to contribute to the sciences. Although the GI Bill, which preceded the Space Race, played a vital role in shaping American education - expanding college access and thus democratizing higher education - it was limited to military veterans and was of much greater benefit to white men. Altogether, the Space Race and Sputnik's influence on American education was expansive; it spurred technological advancements, nurtured scientific curiosity, and has cultivated a diverse and skilled workforce. However, these developments are situated within broader historical and societal factors, such as the Cold War and the pursuit of democratic values that had already shaped American education substantially, and residually mold the system today.

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Appendix

(Contract NASW-91)

RESEARCH MEMORANDUM

PUBLIC OPINION AND SOCIAL EFFECTS
OF SPACE ACTIVITY

Joseph M. Goldsen

RM-2417-NASA

July 20, 1959

Assigned to _____

The RAND Corporation
1700 MAIN ST. • SANTA MONICA • CALIFORNIA

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This paper briefly discusses the American public reaction to Soviet success in the space race; the response of Congress in relation to public opinion; the objectives and programs of NASA's information activities; the impact of space activities on education and training; and some of the broad social and economic implications of the space era.

1. American Public Opinion[1]

Judging from the response of the press and spokesmen in many branches of political, scientific and public life, the American public was badly shaken by the sudden Soviet success in being first to launch an earth-circling satellite vehicle. Government officials, executive and congressional, demanded immediate action to offset the Soviet technical and propaganda success.

Despite the concern attributed to the public, there exists only a handful of polls and systematic investigations that analyze and interpret the impact of space activities on the hopes, fears and expectations of the American public.

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[1]The following discussion presents for the most part hypotheses rather than solidly based findings.

One study is based on polls taken just after the successful orbiting of Sputnik I and again in May 1958. It concludes in part that most Americans believe this country is running neck-and-neck with Russia in a race for world scientific supremacy and that each country is better in some areas of science and second best in others. The study also found that "an overwhelming majority" of those polled, if forced to choose between spending money for medical research, for research on juvenile deliquency, for basic sciences like chemistry and physics, or for putting the first man on the moon, "would give doctors the dollars." The percentage of opinions favoring basic research increased with the educational level of those interviewed.[2]

A report of the Jet Propulsion Laboratory summarizes opinions collected from the Central Intelligence Agency, the U.S. Information Agency, the National Academy of Sciences, "and numerous laymen." No description is given of the sample or methods used in this survey, but the "answers" given are suggestive and provide leads for more thorough investigation:[3]

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[2] Satellites, Science and the Public: A Report of a National Survey on the Public Impact of Early Satellite Launchings -- for the National Association of Science Writers and New York University Survey Research Center, University of Michigan, 1959.

[3] Report No. 30-1, Section IV, "Public Reaction."

1. Question: What space experiments intrigue people most?

   Answer: Something leading to the detection of life in some other part of the universe. This problem interests people far and away more than anything else. There is a tendency to confuse this goal with the engineering achievement of putting a man in space.

2. Question: How do people respond to failure in space experiments?

   Answer: It takes some of the surprise element and hence psychological impact out of a later success. The psychological payoff is not as high. However, failures are considered as worth it, if a "first" is obtained. "Firstness" is much more important than avoiding failure.

3. Question: What experiments will possibly offend the world public?

   Answer: Many people would be offended by radioactive contamination, and possibly by the chemical and biological contamination of other planets. This is not something that currently worries the general public. The same groups that are vitally concerned with contamination and conservation on the earth tend to be concerned. One source indicated that an attempt to put a man in space which resulted in his death would seriously disturb the public.

4. Question: What experiments will worry the world public?

   Answer: There is not much to be said here, except that some people have an aversion to earth reconnaissance satellites. This is part of a feeling that "Big Brother" is looking over their shoulders.

5. Question: Should space flights and experiments with military overtones be avoided?

Answer: No! Most people feel that all space experiments have some military connotations. (It was intended that the American IGY and Vanguard programs not be associated with military programs. However, this point was not understood or accepted by the public.) A guidance-development experiment would have clear military implications, yet an American success in this field would be very well received.

6. Question: Co-operation by the United States with other nations is one of the goals of the National Space Act. What geographical areas are most sensitive to their being included or excluded from the Space Program? Where would the political payoff be the greatest?

Answer: (1) India, (2) Egypt, and (3) Japan. Unfortunately, Egypt does not appear to have much to contribute to the space exploration program. The USIA tentatively suggested that tracking stations in the Philippines and in Indonesia would be helpful.

7. Question: What were the principal political gains made by the Soviet Union with Sputnik I, etc.? Did the United States lose face?

Answer: The United States did not lose prestige directly, but Russian statements gained credibility. This has been particularly noticeable in the Near East.

8. Question: How should advance publicity on the nature of space experiments be handled?

Answer: This question is apparently too difficult for most people to answer. The CIA emphasized that suppressing the news on firings was very difficult, and, indeed, rather

precarious. Distinguished scientists generally gave emotional responses to this question, indicating their displeasure with most news reporting. They appear to favor announcing firings or experiments only after the event. However, they were very critical of the one instance where a satellite firing was kept secret until after the launching.

9. Question: Should considerable effort be put into an educational program utilizing mass communication media, such as motion pictures and television?

Answer: The CIA and USIA emphasized that problems of properly informing the public could not be left to Madison Avenue. Scientists must take the initiative and responsibility of learning the techniques of presenting information to the public. Scientists will need the assistance of professional public relations personnel, but the principal responsibility of formulating an educational program must rest with the space scientists themselves.

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12. Question: Should the results of scientific experiments aboard space probes be made available to everyone as soon as it is physically feasible to do so, or should it be released in the traditional way at the scientists' discretion?

Answer: A poll of one hundred engineers and scientists showed a 5-to-1 preference for making the results public as soon as possible.

Samuel Lubell, a thoughtful analyst of U.S. public opinion, has produced an interesting set of observations based on his

own polling shortly after the initial Sputnik launchings.[4] He found little evidence of public hysteria, an underpinning of typical American optimism about future U.S. success, a tendency to view Soviet success in the least threatening light, but a considerable apprehension that the need to increase greatly the national expenditure on space and missile technology might jeopardize the booming economy.

The explanations of the Russian success and what it meant for the future, as reported to Lubell by his small sample of respondents, were direct reiterations of those offered by the President:

> In no community did I find any tendency on the part of the public to look for leadership to anyone else -- to their newspapers or radio commentators, to Congressmen, or to men of science. Nor, with some exceptions, could people be said to be in advance of the President, or to be demanding more action than he was....I would judge that the public will follow the President in whatever he asks to support a greater defense effort -- but that if the President does not ask for enough the public is not likely to demand that more be done....In a democracy a sound state of public opinion requires not only that the public be told the truth but that the government act on the basis of that truth. Words and actions must go together.

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[4] "Sputnik and American Public Opinion," Columbia University Forum, Winter 1957, pp. 15-21.

2. Congress and the Public

The Congress, closely in touch with the American public as it is presumed to be, does not take at face value the over-simplified expressions and measurements of "public opinion." Each Senator and Representative recognizes that not all of his constituents are equally concerned with every issue. He is responsive both to the views and interests that he senses among his constitutents and to his own sense of responsibility to promote the national welfare as he sees it.

There is no doubt that the 85th and 86th Congresses believed in the national need for a vigorous and sizable program of space activities. The Congress has tended to view the "space issue" as a vital matter affecting the peace of the world and U.S. national security.[5] But there are differences over the best means to achieve shared goals. Resources of money, talent, and scientific knowledge are limited. Other national goals compete for the allocation of these resources. Different evaluations are put on the competing goals as well as on the efficacy of alternative means for reaching them. In the end, compromises rather than a consensus lead to decision --

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[5] See not only the text of the National Aeronautics and Space Act of 1958, but the Reports of the Senate Special Committee and the House Select Committee which shepherded the bill through the 85th Congress, summarized in another of the present series of reports.

or to indecision and inaction. The public is a party to the debate in so far as it expresses its preferences and has the means for convincing the decision-makers in the Congress and in the Executive offices of its desires. It seems to be generally understood that "public opinion" will follow if leadership takes the lead.

At the present time NASA does not have as clear-cut a body of followers and supporters as the military arms. Behind the several armed services are present and former members of the armed forces, their associations, publicists, industrial contractors, and enthusiasts with powerful voices, united on one broad objective despite internecine disputes over budget allocations and assignment of missions.

NASA, in the years to come, will develop a body of support drawn from special sectors of the population -- scientists, engineers, the more adventure-minded youth, industrial suppliers, and others who believe in the contribution that civilian-run space activities can make to the achievement of peace, economic well-being, and scientific discovery. Until there is a wide-spread and firm belief in the contributions which space programs can make to one or another of these objectives, there is likely to be a continuing need to build support for large-scale space programs through a clustering of diverse objectives which are in some degree interdependent and mutually reinforcing.

3. Information Objectives and Programs of NASA

Government-supplied information about space activities and other scientific matters can do much to make people aware of what is happening and what is expected to happen in the future. It is clear that "information" is most effective when used to give context and interpretation to deeds and actions. But words are also acts in themselves and are viewed as such particularly by well-informed segments of the public and by governments abroad in certain circumstances. An absence of self-restraint in our words or a lack of co-ordination among various major expressions of our policy may have varied results: at the time of debate the result may be clarification of purpose and direction; at other times the net effect may be apathy, disappointment, confusion, or opposition.

In dealing with the public-opinion consequences of previous Soviet successes, and in planning for the contingency of future Soviet successes, it is generally recognized that solid technical achievement is a necessary foundation for developing sound political policies and strategies regarding astronautical activities. Stunts and unfulfilled promises rarely carry the same conviction or impact as actual performance.

NASA is obliged to give the widest possible dissemination of information consistent with military security requirements.

It is obliged to keep the Congress and the public informed. The press is constantly alert not only to the withholding of "news" but to the "management" of the news on behalf of broad national objectives. How to square the important set of values condensed in the term "freedom of the press" with the pursuit of other important national goals and values presents great difficulty.

All that can be stated here is that official and unofficial statements not only reach the American public and its representatives in Congress but also register on the world public and governments around the earth. The information policy of the NASA Office of Information Services should give adequate consideration to consequences abroad as well as to the needs of the American public. There may be times when such consideration will indicate that precedence should be given to the international consequences.[6] The co-ordination of information programs toward the furtherance of national objectives is a prime need.

The attitudes held about American intentions and activities in space are influenced not only by technical accomplishments in

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[6]For an earlier discussion of this problem, see J. M. Goldsen and L. Lipson, "Some Implications for U.S. National Security of Activities in Outer Space," Research Memorandum RM-2004, The RAND Corporation, Oct. 1957, SECRET.

space, but also by programs of international co-operation, U.S. diplomatic measures, and dissemination of information. Attention might be given to the development by NASA of close contact with groups of the public through "museums of space," science clubs, amateur hobbyists of a technical bent, assistance to school systems, service to teachers' groups, etc. Such activities might be proposed and evaluated in some detail. There is a possibility that the job both of meeting the public need for information and of achieving helpful effects abroad can be served significantly by such means, and often with greater effectiveness than by publicity alone.

4. Education

NASA's rate of growth may have a substantial effect on the capacity and direction of American education and technical training. NASA's growth could be slowed down by shortages of skilled manpower and by inadequate quality of scientific and engineering manpower.

The existence of a large space program provides many incentives for young people to adapt their vocational choices and preparation for such careers. The sense of adventure, drama, curiosity, and novelty in space activity, though hard to measure, is probably a powerful predisposing factor. When

combined with job opportunities, the motivations are formidable. Yet these are not enough in themselves to assure NASA or the nation of an adequate pool of scientific talent.[7]

The school system, from primary to postgraduate levels, is besieged with problems: the pressure of population upon understaffed schools, poorly trained and underpaid teaching staffs, outdated or misguided curricula, obsolete facilities, and the like. The spokesmen for organized education are vocal, influential, but far from uniform in their recommendations of what needs to be done. The magnitude of the space program inevitably will call upon the school systems to adapt their curricula in the direction of better scientific training. Scientists with broad outlook are well aware of the need for better liberal education; they are aware that a good general education provides a good foundation for specialized scientific training.[8] NASA might well give thought to the problem of to what extent, if at all, it ought to join in the great debate or revamping our educational system. The existence of the space

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[7] NASA testified to its need for better trained scientists in a statement submitted to the Senate Authorization Subcommittee, printed in Part II of the Hearings on the NASA Authorization for the Fiscal Year 1960, p. 797.

[8] See the provocative article by Caryl P. Haskins, "Scienc in Our National Life," Foreign Affairs, October 1958, pp. 19-30.

program itself has already set in motion certain new educational imperatives. Very possibly NASA might best provide a service to education through information and interest-building activities rather than through direct participation in the debate itself.

American youth does not need to be "sold" on space. Already, according to the American Rocket Society, there are some 10,000 amateur builders of rockets (of whom 162 were injured in a recent six-month period).[9] The important problem, as some see it, is that this enthusiasm and spirit of adventure be developed in a context fostering an appreciation for the basic goals of science, the meaning of a scientific attitude and career, and the relation of science to our cultural and political heritage.

NASA must necessarily be selective in its activities on behalf of educational objectives in view of its great need for high-quality staff. Programs of fellowships, in-house apprenticeships, co-operative activities with such agencies as the National Science Foundation, the National Academy of Sciences, and private foundations and universities, are among the many avenues worth continuous exploration. NASA, as part of its

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[9] A detail in NASA's program would be to assist amateurs -- and to help them stay alive.

program of international co-operation, may want to establish "international schools" like those of the AEC.

NASA is not a "Department of Science" and probably will never become one. But it does offer one important means of release and expression for man's deep yearning to understand the universe and to explore the frontiers of knowledge. This intangible opportunity is one of NASA's great assets. It is hard to translate such a function into budget justifications and itemized programs, but the value of responding to such an important psychological need should not be dismissed merely because it cannot be "costed."

5. Social and Economic Implications

Scientific and technological achievements in space will raise certain "non-scientific" problems in human society. The advent of manned space flight and the gathering of evidence of some forms of life in existence outside the earth (if such should be the case) will have a profound impact on the immemorial questions asked by man of himself, his philosophers, and his gods.

There may be upsetting psychological and social reactions to observation satellites if people believe that they or their nation are under constant surveillance. A complex of problems

might ensue from a barrage of audio-visual communication from visible space vehicles; from even partial weather control; and from the mundane but significant impact of space industry, with its by-products, new industrial processes, and new materials.

NASA might find it fitting to encourage serious interest in the study of such questions. Imaginatively designed social research projects could be started. NASA's Committee on Long-Range Studies (authorized in Section 102 [C-4] of the National Space Act) has a unique opportunity to promote an understanding of the world we are re-making. It can help to unite social scientists and physical scientists in a concerted and continuing effort to assess the political, social, and cultural implications of the rapidly changing technological environment.

Such research would serve not solely as a contribution to better long-term understanding on the part of the nation's intellectuals and as a means of enlisting their interest and support. Many of these studies, if well conceived and carried out, will offer valuable insights and suggestions for NASA's guidance on international co-operation, information policy, economic consequences, the role of other countries in "space politics," and many other problems.