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Trending now: Using big data to examine public opinion of space policy

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ABSTRACT

This article addresses a timely and widespread issue, that of public opinion and the rise of "big data." Analysts of US space policy have consistently noted the role that public opinion plays in setting the directions for US space exploration. However, the tools that have been used to measure public opinion suffer from serious shortcomings in terms of timing and lack of available data. This paper introduces two new measures of public opinion, Google Trends and Twitter, and details how they can be used to assist in measuring interest in space policy in the American public.

The role that public opinion plays in space policy has been widely acknowledged by scholars, practitioners, and reporters.[1] This is also evidenced in the number of studies, many published here, which have endeavored to examine the contours of public sentiment for space activities [1–5]. However, new options in tracking public opinion of space policy are emerging out of the trend towards "big data," including the use of social media and search engines to track public sentiment for space. This article will outline how scholars have traditionally tracked and measured public opinion for space and introduce two new measures, Twitter and Google Trends. Finally, I will explore how these new tools may be better able to capture public opinion of space exploration in the United States.

In total, this article sets out to do a number of things, primarily among them introduce a new measure of public opinion that could be better used to track interest in space exploration. In introducing such a concept, this article lays out potential uses, not all of them, and merely begins to scratch the surface of what could be possible. While this article is rather critical of the public opinion studies that have been done to this point, it is not a criticism or an indictment of public polling methodology. To a great extent, the methodology that polling firms use to undertake opinion measurement is quite advanced and sufficient. However, when it comes to secondary policy areas like space exploration, questions are simply not asked consistently enough. Without consistent measuring across the public or even across the type of question being asked, how can we be sure that the polls utilized thus far are consistent in their results? In other words, I am not criticizing the use of such results, merely noting that secondary policy areas often are at a public polling disadvantage and suggesting another data source that could be used to fill in the gaps.

Before deciding whether it is even worth the time to discover new ways to measure public interest in space activities, one must show that it *matters* [for an excellent review of this, [6]]. Of note, public opinion has been shown to be important in areas such as defense spending [7,8] and the war in Vietnam [9]. With respect to multiple policy areas, both Page and Shapiro [10] and Monroe [11] have shown that there are significant correlations between American public opinion and policy responsiveness. And to a larger extent, Stimson, Mackuen, and Erikson [12] present evidence that the public opinion-policy link is not limited to institutions such as Congress but exists across government.

With respect to US space policy in particular, public opinion has always held a particular fascination. Gabriel Almond, in "Public Opinion and the Development of Space Technology" in 1960 [13], identified the roll for public opinion by writing "Popular opinion may be viewed as 'latent policy' and 'latent politics.' It not only

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[1] A bibliography on this topic is available from NASA Headquarters Library at http://www.hq.nasa.gov/office/hqlibrary/pathfinders/opinion.htm.

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indicates potential changes in public policy and the political elite, it is a most significant component of that public policy and must be understood and appreciated if a proper estimate of the meaning of that policy is to be made." Launius [2] introduced his research (detailed further below) into public opinion on space policy by detailing the many times he had heard the phrase "if NASA just had the popular support that it enjoyed during the 1960s all would be well." Regardless of these platitudes, research of the kind undertaken for other policies noted above has been sparing with Whitman Cobb [4] and Nadeau [5] identifying particular issue publics for space policy. Interestingly, Steinberg [3] demonstrates that NASA's funding is particularly responsive to public opinion especially when public opinion that spending for NASA is too high.

For some time, political science and government officials have recognized the link between public opinion and public policy. The rather explicit assumption is that when public concern for an issue is high, policy responsiveness occurs. If this is the case, it is important to know the public's opinion on policies such as space exploration.[2] However, given the traditionally used tools to do so, the task is much tougher for an area such as space.

1. Traditional measures of public opinion

The field of public opinion polling has come a long way since *Readers' Digest* polls in the 1930s. While polling experts will still quibble over the finer points of sampling methodology, most policy experts can be relatively certain in the results gathered from organizations like Gallup or Rasmussen.[3] The data gathered from these periodic polls has become important not only for politicians and policymakers but policy analysts and political scientists alike. Unfortunately for most political scientists, undertaking regular polling operations is far out of theirs or their university's budgets. As such, we must rely on other polling organizations to poll for us, hoping that they ask the questions we're interested in at an often or steady enough interval. For most policy areas like economics or international affairs, this is the rule and not the exception but for secondary and tertiary policy areas like space [14], it is the exception and not the rule. The result is that even though the methods are excellent, the data resulting from the polling can make analyzing public opinion on space a difficult prospect.

Previous studies of public opinion on space have utilized various different polling organizations. Launius [1,2] uses data compiled from Yankelovich, Gallup, ABC/Washington Post, CBS/New York Times, and Media General to detail importance of the space program to the American public from the 1960s to late 1990s. While the data demonstrate lackluster American support that is rather dependent on which way the pop cultural winds blow, there are several potential drawbacks to data of this sort. First, the data is not consistently generated using the same question over multiple years. Rather, certain questions are asked at irregular intervals; for example, figure 5 in Launius's 2003 paper, displays the percentage of Americans who favor or oppose government funding for human trips to Mars. This question was asked in June 1961, February 1965, October 1965, July 1967, April 1970, July 1979, July 1994, and July 1995.

This specific problem is representative of the more general issue that space policy analysts have when examining public opinion data on space: space as a policy area is simply not salient or relevant enough to cause major polling organizations to ask questions on the topic regularly. If we truly wish to get a handle on the contours of public opinion on space, questions must be asked at a regular interval, regardless of whether it is salient or not.

A second major problem is Launius' need to compile data from several polling organizations. For example, in exploring whether Americans support human or robotic spaceflight, Launius utilizes data from Yankelovich, ABC/Washington Post, and Gallup (figure 9 and footnote 13 in the Launius paper). It is highly unlikely that all three of those groups asked the exact same question regarding support for human or robotic spaceflight. Further, polling techniques used by the organizations were also likely different with varying margins of error perhaps leading to flawed conclusions on what Americans are saying. However, despite these pitfalls and because of the holes in public opinion tracking for space, Launius and others are forced to put together questions asked by different organizations at different times. This potentially leads to questions of internal validity, let alone questions of external validity.

Another option for public opinion on NASA and US space policy is time series data provided by the General Social Survey (GSS). Utilized by Steinberg [3], Whitman Cobb [4], and Nadeau [5], the GSS asks respondents whether they believe we are spending too little, about right, or too much on the space exploration program. This question was asked every year from 1973 to 1978, and then in 1980, 1982 to 1991, 1993 to 1994, and every two years from 1996 to 2012. This yields a fairly consistent measure of support for space exploration.

Even this question and its answers suffer from the timing in which it is administered. Given the relatively short periods of time in which a policy like space may come to be salient and then recede, asking the question once every two years may simply not be often enough to capture small scale, yet important changes in support for the program. For example, imagine if the question had been asked in the spring of 2003, shortly after the *Columbia* accident. It's possible that a larger number of respondents would have said that the US was not spending enough on space exploration. However, the question was not asked then, but only in 2002 and 2004. By the time the question was asked in 2004, it's likely that the salience of space policy following *Columbia* had declined substantially.

In sum, traditional measures of salience or support for US space policy suffer from a number of problems. Questions are not asked regularly enough by the same polling organizations to give reliable data over a large period of time. Second, even with the GSS, small (or even major) changes in salience are not detectable at the time the issue is at the top of the political agenda. Given these drawbacks, how can newer measures of salience assist analysts and policymakers in gauging the public's interest in space policy?

2. New measures of public opinion

With the rise of "big data" [15], political scientists and others are encountering new sources of data to consider using when it comes to representing public opinion. Two of these, Google Trends and social media (Twitter and Facebook, for example), have already made waves, being used in economic studies tracking macroeconomic indicators such as inflation [16], labor and housing markets [17], consumer behavior [18] and private consumption forecasting [19].

Google Trends offers a panoply of potential data resources broken down by country, state, region, and time. When using the Google Trends tool, researchers can enter a search term of interest (for example, "economy") and Google will report back, on a scale of

[2] While budgets for space activities related to NOAA, national security, Earth-sensing, and other science related activities are often much higher, these types of activities generally have a far lower profile towards the American public. As such, when space policy is usually discussed, it is with a heavy leaning towards the exploration endeavors that are most publicly accessible.

[3] Following the 2012 presidential elections, Gallup conducted a review of their polling methodology in response to the rather wide difference between its poll results predicting presidential votes and the actual votes on Election Day.