Audience Responses to Viewing the August 21, 2017 Solar Eclipse

Noel-Storr, Jacob

Published in:
Celebrating the 2017 Great American Eclipse: Lessons Learned from the Path of Totality

Celebrating the 2017 Great American Eclipse: Lessons Learned from the Path of Totality
ASP Conference Series, Vol. 516
Sanlyn Buxner, Linda Shore, and Joseph Jensen, eds.

Audience Responses to Viewing the August 21, 2017 Solar Eclipse

Jacob Noel-Storr
InsightSTEM, Tucson, Arizona 85718

Abstract. The results of a survey representing the reactions and responses of 29,095 individuals across the USA who witnessed the eclipse or participated in eclipse-related events on or around August 21, 2017, are reported. The surveys collect a body of data showing the demographics of these respondents and an analysis of the responses they gave in terms of motivations for participation, learning, future plans as a result of the event, and in summarizing the overall experience. Conclusions show future efforts at similar events could be directed to broaden participation and increase engagement.

1. Survey Data Collection

A survey, available in both paper and online formats, was developed to collect responses and reactions to viewing the Solar Eclipse either at organized events or otherwise. The surveys collected demographic data, viewing location and conditions, and the responses to four questions to determine motivations for observing the eclipse, any learning during the eclipse, what actions they may take in future as a result of the experience, and how would the summarize the experience in a short (Twitter-like) statement.

Respondents could complete the survey individually or as a group (family, class, group of friends, etc.). Some responses were also received from event hosts aggregating information from their entire event. Responses were gathered from 1,679 completed surveys representing a total N = 29,095 people across the United States.

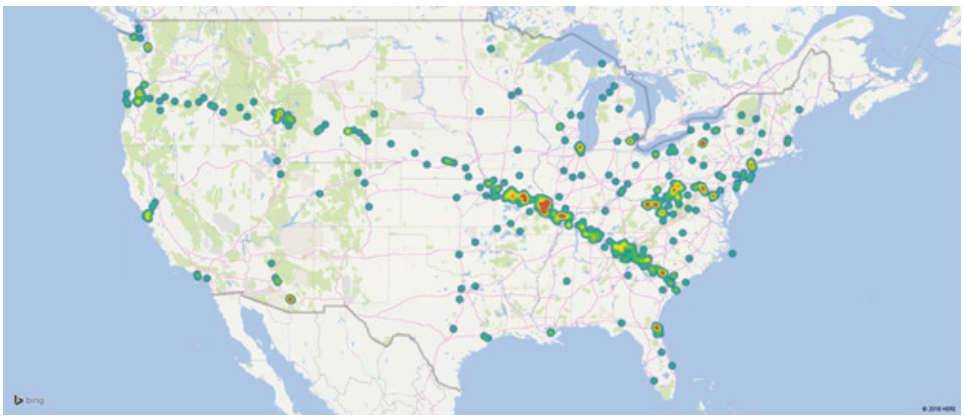

Figure 1. Map of the density of responses received (by zip code). Microsoft Office 365 3D Maps screen shot reprinted with permission from Microsoft Corporation.

Data were returned from across the USA (Figure 1), the path of totality is clear in the submissions. A total of 16 sites registered to participate in the survey and returned data. The registered sites estimated their number of participants at the events. Comparing these numbers to the surveys received we see that on average 29% of participants responded. Other respondents were recruited via social media, other volunteering event hosts who had listed their event on the American Astronomical Society's eclipse website, or by word of mouth.

2. Data Analysis and Results

2.1. Demographics of respondents

Three demographic questions were put to respondents to give a picture of those who watched the eclipse across the country as a part of, or connected to, the community generated by the American Astronomical Societies mini-grants program and the broader networks reached. Those demographics are shown in Table 1.

Table 1. Demographics of respondents

Class	Responses N =	Categories
Age	27393	0-4 2%; 5-9 11%; 10-13 32%; 14-17 13%; 18-25 13%; 26-45 11%; 46-65 13%; >65 5%
Gender	18191	Female 50%; Male 45%; Other 4%; NA 1%
Ethnicity	13516	Black / African American 6%; Asian 2%; Native American 0.3%; White 72%; Hispanic 4%; Other 2%; NA 14%

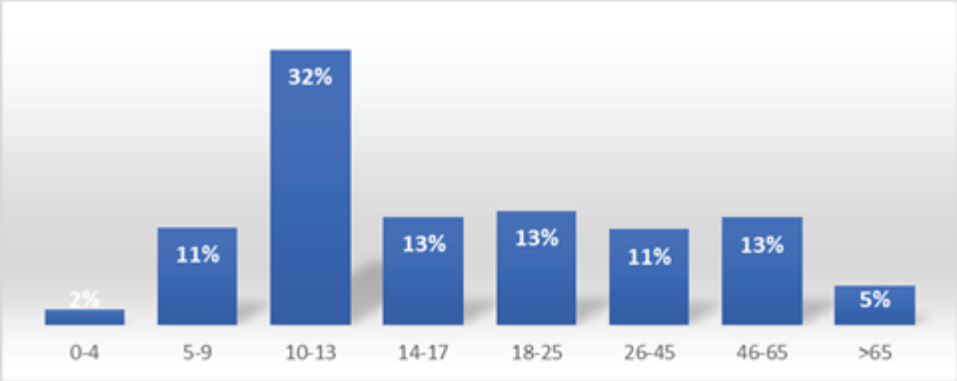

Figure 2. The age distribution of reported participants in eclipse activities.

The ethnicity demographics are consistent with those seen in US museum visitorship (e.g. Smithsonian Institution Office of Policy and Analysis, 2004). The age distribution, shown in Figure 2 shows a spike in the 10-13 yr old age group which

stems from reports made by schools participating with their students, predominantly including that age range.

2.2. Enjoyment of Events

Respondents were asked to rate their enjoyment of the eclipse events on a 5-star scale representing their level of enjoyment. Overall only 7% of responses rated the events less than 5 stars. For total eclipse events 2.7% of respondents rated the event less than 5 stars, and 9.2% of those at partial eclipse events – indicating both Partial and Total eclipse events were highly popular. Negative responses primarily reflected unmet unreasonable expectations (e.g. not being able to see the eclipse through clouds despite being at an organized event).

2.3. Text Based Responses

Written responses were analyzed using Amazon Web Services "Comprehend" natural language analysis tools (Amazon Web Services, 2018). The tools were fed the 1434 survey responses, each representing one record. The tool identified up to five key themes present in the responses in each case and weighted each response's match to those themes. These were then summed and divided by the number of responses to indicate the strength to which each theme was present in the data set. In this way, every response is both coded and weighted to the strength that it matches any of the codings,

Table 2 shows the identified categories of responses, examples of the type of response from that category, and the weights of each category found in the data. (Only three distinct categories were identified in the motivation to attend the event).

Finally, a word cloud was created, scaling by the frequency of different terms found in the tweet-style summary comments. The word cloud is shown in Figure 3. The word cloud generated reflects the overwhelmingly positive response to all of the eclipse events across the board.

Figure 3. Word cloud generated from responses to tweet-style reaction survey item.

Table 2. Demographics of respondents

	Weight	Category	Descriptive text
Motivation to participate in the event			
A	53%	Opportunity	Opportunity to view the phenomenon
B	24%	Curiosity & Interest	Curiosity and interest to experience event
C	23%	Once in a Lifetime	Wanted the once in a lifetime experience
Things that were learned			
A	41%	Practical & Mechanical	Safe viewing & difference between eclipses
B	33%	Solar Astronomy	Other features of the Sun: Spots and Storms, or how to view the Sun
C	7%	Eclipse Event Features	Value of the experience and difference between Partial and Total Experience
D	6%	Eclipse Specific Features	Features of Eclipses—Banding, Diamond Ring, Crescent Shapes
E	12%	Logistical	Features of Events—Safety, Motivations, Travelling to events, People in Town
Plans for the future			
A	55%	Generalized	In general, learn more about eclipses or other opportunities
B	32%	Extend Knowledge Actively	Google more information, or take a class to extend love of science/astronomy interest.
C	2%	Specifically Attend Events	Attend other events such as planetarium shows, or public astronomy events
D	6%	Extend Knowledge Passively	Learn more by watching TV, or watching things online about phenomena in space
E	5%	Gain Knowledge & Engage	Learn more about the science of predicting eclipses, how to photograph the next one, or more actively participate
Tweet-style Summary			
A	32%	Awed and Inspired	Awe-Inspiring Event at Totality
B	35%	Not the Max Experience	Witnessed a Partial Eclipse or Rainy, Cloudy Weather
C	8%	Practical Experience	Enjoying an interesting viewing experience, fortunate to see it.
D	18%	Practical Event	Attended a free event in town, at an observatory, or at a planetarium
E	7%	Superlative Experience	Experienced an absolutely awesome, breathtaking, incredible, once in a lifetime

3. Conclusions

From the data, we see very positive responses to all eclipse events from which we received data, including those that didn't include an eclipse or the total eclipse. The few negative responses were primarily related to expectations not being met—and generally not at the fault of the event (e.g., individuals attending the event in clouds, with

the expectation that the event hosts would somehow have resources or methods to allow them to see the eclipse through the clouds). Those who had chosen to participate overwhelmingly valued their participation, and so future efforts to broaden participation in such events (for example the eclipse of 2024) should have potential to excite and engage broader audiences in science.

Conclusions from visitor demographics: The data indicated a good gender mix in the responses received which we anticipate would be replicated in any future events.

The ethnicity demographics, while matching those seen in museum visitorship in the United States, indicate that there is room for improvement in broadening the participation in this type of activity as compared to the diversity of the US population. It is also important to gain the reactions and responses from those more diverse audiences, and their motivations for attending this type of event.

The age demographic data showed participation across age ranges, other than, as is reasonable, from the very youngest and very oldest groups. A peak in the 10-13 year age group is seen due to school groups organizing events for whole classes and schools in that age range. This could be revisited in future to (1) expand on that positive effort for this age group; and (2) to work to extend to younger classrooms (where safety concerns may have been a hindrance) and to older classrooms (where only the most scientifically engaged students/classes were engaged in organized activities).

Conclusions from visitor written responses: The data showed that most attendance was planned for simply the opportunity of witnessing this phenomenon—once those individuals are at the events, opportunities exist for further engagement.

Could there be opportunities for more learning? A lot of the learning that took place was practical in nature or a 'reminder' of the basic properties of the Sun-Earth-Moon system. More learning could take place, though attendees were not, in general, motivated to attend with learning outcomes or expectations in mind.

Could there be opportunities for future engagement? Most respondents left with no clear plans for extending the experience further, the majority responding just they would learn more. A small fraction indicated ways in which they would like to take direct steps to participate more in future (e.g., learn photography techniques or join in citizen science projects)—it would be a worthwhile effort to seek ways to increase that fraction during future events.

Overall, as shown in the summary tweet word cloud participation across the board indeed provided an "Awesome Amazing, Eclipse Experience."

Acknowledgments. This work was funded in part by a subaward from the American Astronomical Society under Grant No. DUE-1564535 from the National Science Foundation. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the National Science Foundation or the American Astronomical Society.

References

Amazon Web Services, 2018, (amazon.com: Seattle, WA) Amazon Comprehend—Developer Guide.

Smithsonian Institution Office of Policy and Analysis, 2004, (Smithsonian: Washington, DC) Results of the 2004 Smithsonian-wide Survey of Museum Visitors