An Assessment of the "Science in American Life" Exhibition

at the
National Museum of American History

INSTITUTIONAL STUDIES

Smithsonian
Institution

An Assessment of the "Science in American Life" Exhibition at the National Museum of American History

Andrew J. Pekarik
Zahava D. Doering
Adam Bickford

This report was published as:
Pekarik, A. J., & Bielick, S. (1999). Visitors' role in an exhibition debate: *Science in American Life. Curator: The Museum Journal*, 42(2), 117-129.

November 1995

Institutional Studies Office
Smithsonian Institution
900 Jefferson Drive, S.W.
Washington, D.C. 20560
(202) 786-2289

Report 95-5

Abstract

This report presents the results of an assessment of the exhibition *Science in American Life* at the National Museum of American History (NMAH) in Washington, D.C. The study was based on personal interviews and observations of visitors in June and July 1995. Entering and exiting visitors were asked about their demographic characteristics, their decision to visit the exhibition, and their attitudes and opinions regarding science and technology. Exiting visitors were additionally asked about the exhibition's influence, its message and its components. Observations of visitors recorded where they stopped, how long they spent and what they did.

We found that the 16 minutes, on average, that visitors spent in the *Science in American Life* exhibition did not change their strongly positive attitudes towards science and technology nor their opinions on the key issues presented by the exhibition. On average, there was a nearly 75 percent level of agreement between the opinion of visitors and the opinion of the curator on these key issues.

Visitors under age 30 were significantly more likely than those of other ages to report being influenced by this exhibition. In addition, visitors who had made less than four previous visits to NMAH were more likely than other visitors to report being influenced. The Hands On Science Center and the exhibition interactives were primarily responsible for the exhibition's impact on young visitors.

Finally, the study showed conclusively that the visiting public entered the exhibition with a very positive view of science and technology and that their views were reinforced and confirmed by the experience of *Science in American Life*, rather than changed in either a positive or negative direction.

Preface

The *Science in American Life* (SAL) Study at the National Museum of American History (NMAH) was undertaken by the Institutional Studies Office at the request of NMAH's Director, Spencer Crew. This report summarizes the results. Its purpose is to share with the museum community what we learned about visitors to the exhibition and the associated Hands On Scence Center (HOSC). NMAH Director and staff will use the data and observations as part of an effort to improve the visitors' experience in the exhibition as well as to respond to questions about its communication effectiveness.

The study reflects the work, support and cooperation of numerous people over the past six months in several organizations. Spencer Crew's commitment to a scientific study of SAL is very much appreciated. He facilitated our work in the museum and respected our emphasis on careful consideration of the data in the face of pressures for results. Arthur Molella, Assistant Director for History and lead curator for the exhibition, shared design documents with us, familiarized us with the underlying structure of the exhibition, and provided us with succinct statements of the exhibition's aims and goals. Nancy McCoy, Director of Education and Visitor Services, and Carlene Stephens, Deputy Lead Curator of SAL, provided us with background to the educational aspects of the exhibition and the HOSC. Ann Rossilli, the exhibition's designer, reviewed exhibition layouts with us and prepared the map used in the Tracking Study. Howard Morrison, education specialist, provided us with information about interactive elements and Dina Rosenthal, Director of Science Education, facilitated our work in the HOSC.

Members of the Special Board Committee on the *"Science in American Life"* Exhibit, American Chemical Society (ACS), reviewed the data collection protocols. Their comments, communicated by us by Paul H. L. Walter, Chairman of the Board, were extremely helpful.

Professional interviewers -- Melinda Fancher, Dagny Glover, Elena Mayberry, Suzanne McFadden, Kathryn Moore, Holliday Ridge, Henry Rich, Marta Pernas and Michelle Ruddick -- conducted interviews during extremely busy museum visitation periods. They were joined by several interns: Michael Jo and Junghyun Yuh. All of them willingly gave time and energy to ensure accurate and timely data collection. The high participation rates (87.6%) reflect their dedication. We truly appreciate their efforts.

This report reflects the skills and expertise of the Institutional Studies Office staff. Elizabeth K. Ziebarth and Audrey E. Kindlon skillfully managed the interviewing schedules and monitored the data collection and developed the questionnaire and data collection methods with us. Audrey also provided support with the analysis and data interpretation. Steve J Smith expertly oversaw all aspects of data processing and the creation of analysis files.

We would especially like to acknowledge the 811 visitors who took the time, in the midst of a busy summer museum visit, to respond to our questions and offer comments. Without their participation, the study could not have been conducted.

Errors in interpretation are the responsibility of the authors.

Table of Contents

Supporting Tables

Appendices

List of Figures

List of Tables

Introduction

In April 1995, Spencer Crew, Director, National Museum of American History (NMAH) asked us to conduct a study of visitors to the *Science inAmerican Life* (SAL) exhibition. The exhibition had been on view for about a year and, since its opening, had been subject to criticism by the leadership of the American Chemical Society and the American Physical Society. The debate revolved around the content of the exhibition and the presentation and interpretation of its ideas.[1] Some of these critics felt that the selection of materials and case studies in the exhibition did not present a balanced view of the historical development and role of science and technology in America. They argued that both explicitly and implicitly the content and presentation of the exhibition communicated to the visiting public a negative view of the role of science in their daily lives.

The effectiveness (or "success") of an exhibition can be assessed by its visiting audience or by professional experts. When the effect of an exhibition on its audience is the measure of success, scientific studies are the most rigorous and reliable way to determine the "fit" between curatorial goals and public response. Other methods for gauging the audience viewpoint can include informal feedback such as letters and notes in comment books, or casual conversations with visitors. When professional experts (whether subject-matter specialists, designers, education specialists or journalists) assess the effectiveness of exhibitions, they presumably "represent" the viewpoints of specific sub-audiences.

We were asked to conduct a scientific study of the SAL audience. Assessments of exhibition effectiveness, like all evaluative research, must be conducted independently from those with a vested interest in the outcome. We were asked to conduct this study because of our organizational independence from NMAH. We asked NMAH to provide funds for our out-of pocket expenses, e.g., for paying professional interviewers and for key entry of data, and gave them an opportunity to comment on the interpretation. However, they did not have any role in hiring or training of interviewers, and NMAH comments were considered along with those received from other professional colleagues.

In sum, this study is an independently conducted assessment of the visiting public to *Science in American Life*, both the exhibition and the Hands On Science Center. It does not address issues of content, except when the present content affects the visitors' experience. The specific goals of the study, methods, limitations and the contents of this report are elaborated below.

---

[1] By content we mean the selection of topics, images and artifacts in the exhibition. Presentation encompasses written text, audio, lighting, juxtaposition of items, etc.

Goals

The central goals of this study can best be phrased as questions:

1. To what extent are the exhibition's key curatorial messages communicated to visitors?

2. Are visitors' attitudes towards science being changed by the exhibition and, if so, in what ways?

3. What overall ideas are visitors coming away with?

4. To what degree are these responses significantly affected by the specific activities that people undertake in the exhibition or by the time that they spend with them?

Methodology

Data for the study were collected in personal interviews with a systematic scientific sample of visitors at the exhibition entrance (Entrance Survey) and at the exhibition exit (Exit Survey).[2] At the same time that the entrance interviews were being conducted, we observed (unobtrusively tracked) a sample of visitors through the entire exhibition (including trips to, from, and within the Hands On Science Center), noting the overall time they spent in the exhibition as well as the time and location of each stop (Tracking Study).[3] Interviewing was conducted on June 15, 17, 19, and 21 and July 5, 7, 9 and 11.[4]

Our questionnaire for entering visitors (Entrance Survey) ascertained how they felt about the impact of science and technology on their lives, and their degree of agreement or disagreement with the fundamental messages of the exhibition (visitors' level of agreement with nine items that represent the messages derived from statements of the curator's goals), as well as personal background characteristics. These questions establish (prospectively) the framework that visitors brought to the exhibition.

These identical questions were asked of exiting visitors to see if there was a significant difference between the responses of those who entered and those who exited (Exit Survey). This tells us if the exhibition affected people's thinking. We also asked exiting visitors if they felt that the exhibition would influence the way they think about science and technology, to see the degree to which visitors perceive any change, whether or not it can be measured with our instruments. Analytically, we compared responses at entry and exit with statistical models which control for a set of background characteristics.[5]

---

[2] See Appendix B for a complete description of the methodology, including sampling and the purpose of each question.

[3] See Appendix B for a detailed description of the Tracking Study.

[4] We did not interview during the period from June 22 through July 4, as attendance to the museum during that period is uncharacteristically affected by the crowd that comes to the Mall for the Folklife Festival.

[5] We have used such models in several of our other studies with good results. See, for example, Z. D. Doering, A. E. Kindlon and A. Bickford, *The Power of Maps: A Study of an Exhibition at the Cooper-Hewitt National Museum of Design.* (Washington, D. C.: Smithsonian Institution, 1993) and Z. D. Doering, S. J. Smith, A. Pekarik,

We also asked exiting visitors what the exhibition is trying to say about science in America. This question encouraged visitors to think about the exhibition as a whole and to give us their central impression of what it said to them. By asking them what in particular led them to this conclusion we could verify that their response is grounded in the experience of the exhibition and we made connections between the ideas people received from the exhibition and the elements that conveyed those ideas.[6]

Since we wanted to know not only how visitors perceive the exhibition, but how it affects them personally, we asked them what in the exhibition interested them the most and why. Others studies have shown us that there can be a marked difference between a recognized message and personal impact.[7] We also asked exiting visitors what they found most informative and what idea it gave them.

These subjective questions told us what mattered most to visitors and what impression it left on them. We also compared these responses to the observational data to see how responses were affected by behavior in the exhibition.

The interviews relied heavily on open-ended questions because we wished to capture as much of the nuance of people's experience as possible, without prejudging it. We coded these responses for content.

Our Tracking Survey captured the overall length of the visit, the number and order of stops, the length of each stop, and the nature of any social interaction that took place during the stop. We thus were able to determine not only which parts of the exhibition were most engaging, but also how demographic features influenced the types of stops that visitors made, their length, and their frequency.

A. Bickford, and R. D. Manning, *From Reptile Houses to Reptile Discovery Centers. A Study of the Reptile Discovery Centers Project at the National Zoological Park, Zoo Atlanta and the Dallas Zoo.* (Washington, D.C.: Smithsonian Institution, 1994). December 1994.

6 For other examples of this approach, see, for example, Adam Bickford, Z. D. Doering, and A. Pekarik. *Space Fantasy and Social Reality: A Study of the Star Trek Exhibition at the National Air and Space Museum.* (Washington, D. C.: Smithsonian Institution). November 1994.

7 Especially clear in Z. D. Doering, A. Pekarik and A. E. Kindlon, *Different Sites, Different Views:* A Study of *Degenerate Art --The Fate of the Avant Garde in Nazi Germany* Exhibition. (Washington, D.C.: Smithsonian Institution, 1995). Forthcoming.

Constraints and Limitations of the Study

These results may not be representative of an entire year's audience. Our experience has shown clear seasonal differences among the three principal visitor types: New Visitors, Returning Visitors and Frequent Visitors.[8] While data for a full year are not yet available for NMAH, survey results from the National Air and Space Museum and the National Museum of Natural History indicate that summer audiences are dominated by New Visitors, while winter audiences are dominated by Frequent Visitors. New Visitors encounter the museum and its many exhibitions as one of many visit destinations during a visit to Washington and, we believe, aim to take away primarily personal memories. They are less likely, compared to other visitors, to see an exhibition as having an existence independent of the museum's overall orientation. Our studies have also shown that Frequent Visitors can be more sensitive to the content of exhibitions.

This study has no true control. We were not able to conduct interviews at another location in the museum that would have helped us to understand the self-selection of individuals into SAL. We do not know how visitors to NMAH who did not visit SAL would have answered some of the key questions asked in both the Entrance and Exit Surveys. As discussed in the next section, however, we could compare the demographic characteristics of those who elected to visit SAL with a general profile of visitors to NMAH during the summer.

The interviews capture only immediate ("top-of-the-mind") responses after individuals have viewed the exhibition. Some people need more time to reflect about what they have seen and experienced before they can reach conclusions about it. Visitors of that type are not fully represented in the results.

Because museum-based learning is so complex, no one in the field has been able to research the long-term implications of museum experiences. Some important effects invisible in the short-term might reveal themselves much later. Behavioral changes, for example, are far beyond the scope of this study.

Our experience has shown that interviews cannot be any longer than 7-10 minutes. For many, even that is too long. Time constraints limited the number of questions we asked.

We could not ask visitors about specific issues presented in the exhibition, e.g., the issue of pesticides as presented in the Bob's Weekend video, for several reasons. First, such questions would assume that visitors saw and considered elements related to a specific issue. In this large exhibition, with so many different elements and complex interactions between them, the number of people who could respond to the question would be too small for analysis. Second, some respondents do try to please interviewers. Thus, they may give what they think is a "socially acceptable response" rather than what they

[8] By our definitions, New Visitors are at NMAH for the first time. Returning Visitors have been to NMAH between one and three times in the past. Frequent Visitors have been to NMAH four or more times in the past.

think. Third, we could not give visitors the feeling that they were being "tested" on the exhibition, since this, too, would distort their responses. As a result, we questioned them indirectly. There is always a danger, however, that respondents may not understand all the questions in the same way that we intended them to be understood.[9]

It is always possible for an exhibition to have a major impact on visitors that is not captured by our questionnaires. We tried to account for the unexpected by conducting informal discussions with visitors during the pre-test period, and by including open-ended questions in the interview. Yet, we may have missed something that none of us was anticipating.

Finally, despite the thoroughness of our Tracking Study, the results were somewhat constrained by the relatively small sample and by the impossibility of interviewing the people we observed. While we relied on analytic techniques to connect what people said with what they did, the absence of interviews from those tracked is nevertheless a limitation.

Report Contents

Following this Introduction, we present an Overall Interpretation of Results. Here we try to integrate the empirical results with our interpretation of what they mean. This is followed by the major results sections. Section II is based on the Entrance and Exit Surveys. It consists of four parts. Part A deals with visitor responses to the exhibition and its components. Part B presents visitor responses to the exhibition's curatorial aims. Part C is a general description of visitor characteristics. The last section (found just before the Appendices) contains the data tables which support the analysis (Part D). Section III is based on the Tracking Study. The first part discusses visitor behavior in the exhibition. Part B is a detailed description of Tracking Study results. The last part (found just before the Appendices) contains the supporting data tables (Part C).

A set of Appendices provide ancillary information. Appendix A contains the questionnaires, the observation form, and a map of the exhibition. Appendix B is a detailed description of the study methodology.

The report has been structured to contain varying levels of detail. The interpretive section provides an overview of the results. The major supporting analyses are contained in parts II.A, II.B and III.A. With additional information in the remaining parts and appendices.

Finally, we encourage readers interested in additional information or detail to contact the authors.

---

[9] We tried to correct many of these weaknesses through extensive pre-testing; however, some questions might have failed us in unknown ways.

I. Overall Interpretation of Results

The Exhibition

Science in American Life, an exhibition at the National Museum of American History (NMAH), set out to encourage visitors to think comprehensively about the role of science in their lives, both past and present. The exhibition's point of view is described in the introductory panel:

> Like politics, business, or religion, science is right in the thick of American history. Today, science and technology permeate American culture and daily life.
>
> ---
>
> Over the past 125 years, most Americans came to believe that science and technology inevitably brought progress. As the 20th century ends, people are less sure of this. They realize that science can entail hazards as well as benefits. "*Science in American Life*" explores Americans' changing views of science and progress since 1876.
>
> The challenge for the 21st century is to make responsible choices about science and technology. Since science, technology, and society are inseparable, this exhibition does not focus on scientific discoveries in isolation, but on historical episodes in which the American public has grappled with the implications of living in a scientific and technological age.

The historical episodes contained in *Science in American Life* (SAL) are set within a chronological sequence of thematic sections, each of which includes objects on display, explanations, photographs, and interactive stations. There are six thematic sections: 1876-1920, Laboratory Science Comes to America; 1920-1940, Science for Progress; 1940-1960, Mobilizing Science for War; 1950-1970 Better than Nature; 1970- the present, Science in the Public Eye; and Looking Ahead. At the entrance to the exhibition the museum constructed the Hands On Science Center (HOSC), a room in which visitors can conduct their own experiments under the guidance of instructors, use computer interactive stations, explore activity boxes on scientific topics, and review curriculum materials.[1]

---

[1] For a detailed listing of the contents of these sections, see Section III.C, Table III.C.1. In the presentation of the Tracking Study results, visitors to the HOSC are generally discussed separately from visitors to the exhibits. In all other sections of this report the SAL audience is treated as a single entity, since in the personal interviews there were no significant differences between those who visited the HOSC and those who did not.

The Context of the Exhibition

Science in American Life opened to the public on April 26, 1994, on the first floor of the West wing of the museum, opposite a major exhibition on computers called *Information Age*. From the year-long study of the museum that we are currently conducting, we know that during June and July, 1995, the months in which the data for this study was collected, 41.7 percent of all voluntary visitors to NMAH spent some time in SAL during their visit.[2]

The NMAH visitors who stopped in SAL differed significantly in several respects from those who did not stop in SAL. Only one in seven (12.0%) visitors who live in the Washington, D.C. metropolitan area spent any time in the exhibition. Local residents probably saw the exhibition sometime during the first year that it was on display.[3] Local audiences, because they are more responsive to exhibition publicity, and because they tend to visit the museum more frequently than those who live farther away, generally attend exhibitions soon after they open.[4]

In addition, visit groups that included at least one adult and at least one child were more likely than other groups to stop in SAL.[5] We believe that the Hands On Science Center accounts for this difference. From the SAL interview study we know that visitors saw the HOSC as an activity primarily for children. Among those who did not plan to visit the lab area, about one-fifth (18.2%) said that they declined to enter because they considered it to be something for children.[6] The Tracking Study confirmed that visitors saw HOSC as child-oriented, since it found that 70.9 percent of all lab visitors were in groups that included teenagers or children.[7]

---

2 Neither the year-long study nor the SAL study include those who visit with a school group or in organized tour groups, although group members were interviewed if they had separated from their group.

3 According to the year-long study, 89.2 percent of June and July visitors who live in Washington, D.C. had visited the museum previously; 43.6 percent had visited the museum in the six-months prior to being interviewed (i.e., after SAL had opened); 28.2 percent between 7-24 months prior to being interviewed; and 17.4 percent more than 2 years prior to their interview.

4 The supposition that local residents had seen the exhibition already is supported by the fact that repeat visitors to NMAH were also significantly less likely to have stopped in SAL on the day the interviewer questioned them. Since we only asked respondents in the year-long survey about their activities in the museum on the day of the interview, we cannot definitively determine who had seen the exhibition on a previous visit.

5 According to the year-long study, 31.5% of June and July visitor groups included at least one adult and one child compared to 46.7% among those who visited SAL.

6 Lack of time (44.8%) and a preference for other activities (11.4%) were the first and third ranking reasons.

7 Overall, 55.2 percent of tracked visitors were either alone or with other adults and 44.8 percent were in groups that included teenagers or children. In other words, groups which included teenagers or children visited the HOSC 1.5 times more than their representation among all tracked visitors would lead us to expect.

In all other demographic respects, such as gender, racial-ethnic identification, educational attainment, etc., visitors to SAL were representative of visitors to NMAH. Nonetheless, visitors to the exhibition probably differed from the rest of the NMAH audience in ways that we did not measure. When exhibition visiting is voluntary, visitors select themselves to some degree on the basis of their attraction to the subject matter. If we had been able to ask all NMAH visitors about their level of interest in science or their attitude toward science, we might have found other ways of distinguishing between those who went to the exhibition and those who didn't.

Attitudes and Opinions

We asked everyone we interviewed at SAL how they felt about the impact of science and technology on their lives. We had visitors respond by using a scale from one to ten, where one was very negative and ten was very positive. Two out of five visitors (38.6%) scored themselves at the top of this Science Attitude Scale, and only two in a hundred selected a number below six (1.6%). The rest (59.8%) scored themselves between six and nine on the Science Attitude Scale, with "8" being the most common answer.[8] We cannot tell from this study to what extent this very strong positive attitude towards science and technology among SAL visitors reflects the U.S. population as a whole, or the NMAH audience. The study does show, however, that this attitude was unaffected by the exhibition. There was no statistically significant difference between the average score of visitors who were entering the exhibition and those who were leaving it.

We believe that there are two fundamental reasons why the exhibition did not change the attitude of visitors towards science and technology. The first is that an individual's view of science and technology is too basic a value to be changed by the relatively short experience of visiting a museum exhibition. The SAL Tracking Study showed that visitors made an average of less than a dozen stops (11.4 stops $\pm$ 11.3 stops) in the exhibition, each with an average time of one minute. Any attitude that could be changed so quickly would have to be one that was not very deeply felt. More generally, the SAL Tracking Study showed that visitors spent, on average, a total of 15.7 minutes ($\pm$15.6 minutes) in the exhibition spaces, and not even all of their time was spent attending to exhibits or activities.

The second reason why the exhibition did not change visitors' feelings about science is that SAL confirmed or, at least, did not contradict conventional views. In this sense, SAL represents "mainstream" viewpoints. Based on a description of the exhibition's aims given to us by the lead curator, we asked visitors' opinion about nine statements addressing the central issues of SAL. Depending on the statement, between 60.2 percent and 96.7 percent of all interviewed visitors were on the same side of the nine issues as the curator.

---

8 See Figure II.A.15. As the figure shows, 3.6 percent scored themselves at 6, 13.9 percent at 7, 24.6 percent at 8 and 17.7 percent at 9. The average score was 8.7 (standard deviation: 1.4).

We then constructed an Opinion Scale by giving a visitor one point for each answer that was on the same side of the issue as the curator's answer. On this zero-to-nine scale the average score was 6.7 (±1.4). In other words, we can say that, on average, there was a 74.4 percent level of agreement between the opinion of visitors and the opinion of the curator on the key issues presented by the exhibition.

Only when we took into account the intensity of an opinion could we find any substantive difference between the curator and the visitors. In expressing an opinion about two statements, 72.0 to 77.6 percent of visitors, respectively were on the same side as the curator. However, whereas the curator's position was "strongly disagree" or "strongly agree," only a few visitors (8.2% and 14.8%) indicated the same depth of feeling.[9]

There was no significant statistical difference between entering visitors and exiting visitors either on the Opinion Scale as a whole or on any one of its questions. Even when we included the distinctions between agreement and strong agreement and between disagreement and strong disagreement, there was no evidence of a shift caused by the exhibition. As with their overall attitudes toward science, visitors did not show a change of position on any of the key issues presented by the exhibition.

The main reason why no significant change occurred was that the level of agreement was so high in the first place. In order to have significantly changed the overall average, the minority of visitors who disagreed with the curator's stand on the key issues of the exhibition would have had to have made a large shift in opinion as a result of seeing the exhibition. In our experience of studying exhibitions, such major shifts are rare.[10]

However, the data do suggest that one subset of SAL visitors did move their position on the exhibition's key issues. When we consider visitors exiting the exhibition, those who said that they thought the exhibition would influence the way they think about science and technology had an average score on the Opinion Scale that was 4.2 percent (0.38 points) higher than those who did not think that the exhibition would influence the way they think.[11]

In other words, those who admitted being influenced (60.4% of all visitors) tended to be closer in agreement to the curator than those who did not admit influence (39.6% of all visitors). This result simultaneously supports both the reliability of the scale as a measure of the exhibition's aims and the reliability of visitor reports of being influenced.

---

9 See Table II.D.9, statements E. and F.

10 See, for example, Z. D. Doering, A. E. Kindlon and A. Bickford, *The Power of Maps: A Study of an Exhibition at the Cooper-Hewitt National Museum of Design.* (Washington, D. C.: Smithsonian Institution, 1993)

11 When we look at individual questions, we find that those who report influence agree more with the curator on all of the major concerns of the exhibition than do those who do not report influence. In particular, the data implies that these visitors were especially influenced to agree with the curator that "The public has a responsibility to decide the appropriate use of scientific technologies." (Q11E)

Which visitors reported that they were influenced by the exhibition? Visitors under age 30 were significantly more likely than those of other ages to report being influenced.[12] In addition, visitors who had made less than four previous visits to NMAH were more likely than other visitors to report being influenced. We believe that a single factor explains why young visitors and infrequent visitors were more inclined to report influence: they had not given the exhibition themes much thought before they entered SAL. A visitor who is older or who has been to the museum frequently may have already given considerable thought to issues of history and public responsibility.

In our view, the exhibition influenced people in so far as it led them to think about issues of history, ethical responsibility, and the public role of science. The less thought individuals had given to these issues in advance of visiting the exhibition, the more opportunity they had to be influenced by the exhibition.[13]

The exhibition did not change fundamental attitudes towards science, nor did it, on average, change visitors' views on the key issues it presented. The evidence suggests, however, that SAL did lead visitors to think, and if they had not given the issues much thought previously, it may have encouraged them to alter their views, bringing them more in line with the mainstream opinion, the position advanced by the exhibition.

Other Effects

We should not be surprised by the fact that few visitors, if any, changed their attitudes or opinions in the exhibition, since their views tended to fall within a relatively narrow range and they tended to agree in general with the exhibition's position. The effect of the exhibition on its visitors was more subtle than a change of mind. First, it probably served to validate and confirm ideas that visitors brought with them. Nearly one in four (25.3%) visitors said that they already knew everything the exhibition had to say. We believe that this validation function is a key dimension of the museum experience. Part of the satisfaction people find in visiting exhibitions seems to reflect the experience of having one's ideas validated in a serious public forum, since individuals tend to visit the exhibitions that agree with their viewpoint and to express indifference or hostility towards the ones that do not.[14]

---

[12] Compared to all other ages, an individual under age 30 was 7.75 percent more likely to state that he or she was influenced by the exhibition, all else being equal. See Table II.D.7.

[13] When we look only at visitors entering the exhibition, we find that their Opinion Scale scores are significantly affected only by their scores on the Science Attitude Scale. Those who had any hesitations about the impact of science and technology (i.e., those who rated themselves on the Science Attitude Scale as less than 10), were likely to score 0.4 points higher than visitors who rated themselves at 10 on the scale, all else being equal. Visitors under age 30, in turn, were the ones who were significantly more likely to have any hesitations about the impact of science and technology. The average Science Attitude Scale score for all entering visitors was 8.67 (standard deviation: 1.44), for entering visitors under 30 it was 8.39 (standard deviation: 1.47), and for entering visitors 30 or above it was 8.87 (standard deviation: 1.39).

[14] See Z. D. Doering, A. E. Kindlon and A. Bickford, *The Power of Maps: A Study of an Exhibition at the Cooper-Hewitt National Museum of Design.* (Washington, D. C.: Smithsonian Institution, 1993). Because *The*

Second, in the case of SAL there is some additional evidence, as noted above, which suggests that a number of visitors (primarily under age 30) were encouraged to think about issues of science and technology more fully than they had before. Two out of five visitors (39.3%) recognized that the exhibition was about the history of science or the role of science in American history.[15]

Third, a review of visitor responses shows that many of them gained new information in the exhibition, including details on how scientific processes or principles work.[16] Whether or not the information is received accurately, the visitors who report picking up information can be assumed to have raised their level of interest and confidence.

Finally, we believe that some exhibition objects and displays affected visitors emotionally. A number of visitors said that the exhibition caused them to realize more fully what it was like to have lived at a particular time or place represented in the exhibition.[17]

The Visitor Experience

The results of this study clearly illustrate how design can affect the visit experience. In the interview study we asked visitors to identify which components communicated the message of the exhibition, which components were most interesting, and which ones were most informative. Only ten components were cited by more than 4.5 percent of visitors in response to any of these three questions.

In the tracking study we counted how many visitors stopped at each location and we measured the average length of time that visitors stayed there. Interestingly, the popularity of a stop and the time it held visitors could not be used to predict visitor responses. For example, 38.6 percent of visitors stopped at the section describing the social impact of the birth control pill but no more than 2.8 percent of visitors in the interview study mentioned it in response to any question about exhibit components.

Power of Maps presented an unconventional viewpoint in a forceful way, it generated a relatively high volume of both praise and attack in the written comment books that were included in the exhibition. Although comment books do not accurately reflect the visitor experience, they can be used in some cases to signal the degree to which visitors are surprised by an exhibition and disagree with its themes.

15 While the authors of this report were coding visitor statements, they noted that many replies to questions asking the message of the exhibition, and asking why particular components were informative or interesting displayed a higher level of thoughtfulness and abstraction than we usually encounter in such responses. Since the coding system was designed to capture the content of responses, rather than their degree of abstraction, this impression cannot be quantified.

16 See Table II.D.6.

17 These responses were coded as "gave a feeling for the time." See, for example, Table II.D.6.

Similarly, the amount of time visitors spent in front of a component did not predict its impact. A video called Night at the Recombinant Opera was viewed by 11.4 percent of visitors who spent an average of 2.16 minutes there, yet none of the visitors interviewed in the Exit Survey said that it conveyed the message of the exhibition, and less than one percent cited it as being most informative or most interesting. By contrast, the video on Garbage and Landfills was visited by 8.3 percent of visitors who stayed 1.44 minutes there on average. Yet 4.6 percent of those in the Exit Survey said that the video conveyed the exhibition message, 4.8 percent said it was the most informative part of the exhibition, and 2.1 percent said it was the most interesting component in the exhibition. In the overall experience of the exhibition, the Garbage/Landfill video clearly had a greater impact than the Recombinant Opera video, although fewer people saw it and they did not spend as long with it.

Of the top ten sections or components cited by visitors, two were in the Hands On Science Center (the center in general and the lab bench) and eight were located in the exhibition section of SAL. Six of the eight exhibition sections or components dealt directly or indirectly with the atom bomb: The Atomic Age Section, First Reactor, Nagasaki photos, Fallout Shelter, Atom Smasher interactive, and Nuclear Control Rods interactive. The two that did not deal with atomic energy were the Genetic Engineering video and the Garbage/Landfill video. We can conclude from this result that ideas related to nuclear energy dominated public attention.

The visitors' focus on nuclear energy may have had more to do with conditions outside the museum than with the exhibition itself. This study was conducted just before the 50th anniversary of the detonation of the first atomic bomb and the end of World War II. The widespread media publicity given to the history of the war could easily have made visitors more attentive to this subject matter. We cannot dissociate the ideas and feelings that visitors brought into SAL from their experience of the exhibition's elements. Although the design of the exhibition encouraged more people to stop in front of particular displays and even to spend more time there, it could not have made the experience meaningful to the visitor unless it also struck a resonant chord in the visitor's mind.

Major Results

The *Science in American Life* exhibition stands out from other exhibitions we have studied primarily in its effect on visitors under age 30. Young visitors were significantly more likely than other visitors to express reservations about the impact of science and technology, and also more likely to report that they were influenced by the exhibition. Some of them were influenced to agree more with the exhibition's opinions. Others were undoubtedly influenced in ways that we did not measure.

We believe that the Hands On Science Center and the exhibition interactives were primarily responsible for the exhibition's impact on young visitors. Because of the much longer time that children and teens spent in the lab, their overall average stop time was between 18 percent and 58 percent greater than the average stop time of a single adult.[18] In addition, there were some exhibition elements, such as the Genetic Engineering video and the Garbage/Landfill video, that young visitors found especially informative.[19]

Finally, as noted in the Introduction, considerable discussion has taken place around the content and presentation of the exhibition. The leadership of the American Chemical Society and the American Physical Society faulted the content, claiming that the case studies selected for the exhibition did not present a balanced view of the historical development and role of science and technology in America. They maintained that both the content and presentation of the exhibition communicated to the visiting public a negative view of the role of science in their daily lives. This study cannot address the issue of balance. It has, however, shown conclusively that the visiting public entered the exhibition with a very positive view of science and technology and that their views were reinforced and confirmed by the experience of *Science in American Life*, rather than changed in either a positive or negative direction.

---

18 See Table III.C.6 (Decomposition of Stop Time)) For comparison, see Z.D. Doering, et al. *From Reptile Houses to Reptile Discovery Centers. A Study of the Reptile Discovery Centers Project at the National Zoological Park, Zoo Atlanta and the Dallas Zoo.* (Washington, D.C.: Smithsonian Institution, 1994), Page D-9. The average stop time for adults without children at all three reptile houses in the study was 32.96 seconds, and for visit groups that included children it was 35.32 seconds, an increase of only 7.2 percent for those with children.

19 See Table II.D.6.

Part II.

Entrance and Exit Survey Results

II. A. Visitor Responses to the Exhibition and its Components

The results in this section are drawn primarily from an analysis of the Exit Survey, i.e., personal interviews with people leaving the exhibition area (see Appendix A).[1] In this analysis we use the answers visitors gave to four interview items (Q8, Q9-10, Q12, Q13) and to the follow-up questions that probed for examples and elaboration:

Q8. Do you think this exhibition will influence the way you think about science and technology?
If "Yes" -- Ask: *In what way?*
If "No" -- Ask: *Can you explain why not?*

Q9. What is this exhibition trying to say about science in America?
Q10. Was there anything in the exhibition in particular that makes you say that?
What?

Q12. Which of these exhibition sections or interactive elements did you find the most informative? (SHOW CARD LISTING EXHIBITION SECTIONS/COMPONENTS)
Q12a. What is the main idea it gave you?

Q13. Overall, what in this exhibition interested you the most?
Why?

Except for the naming of exhibition sections or elements in Q12, these questions were completely "open-ended," i.e., interviewers wrote down whatever the visitor said.[2]

The Structure of Visitor Responses

Our review of the open-ended responses showed that visitor replies formed five main categories:

A. Expressions of views/attitudes related to science/technology
B. Statements relating to the complexity/difficulty of science
C. Reports of information/ideas communicated
D. Statements about the experience of the exhibition
E. Other responses

---

1 Copies of the questionnaires used in the study are in Appendix A. A description of the methodology is in Appendix B.

2 In Q12 we showed the visitor a card listing 37 exhibition components and sections, and they chose from this list. As a result, their choices were narrowed. The effect of the card listing probably extended to Q13, as well. Without the card visitors may have given a wider range of examples.

Under each of these major headings we derived a structure of sub-categories to code the contents of each response.[3]

Here is the final coding structure, together with actual examples from the questionnaires of replies that were coded in each category. There are two sets of codes. The first categorizes answers to the questions about the exhibition theme and the exhibition's influence (Q8 and Q9). The second set categorizes answers to the questions on what was most interesting and most informative (Q12 and Q13). For clarity, the question being answered by the respondent is indicated in parentheses after each quotation.

Answers to the questions of how the exhibition will influence thinking about science and what the exhibition is trying to say about science in America:

A. Expressions of views/attitudes related to science/technology

Science is positive

"We saw positive things." (Q8)
"It makes me think more positively about science and technological development." (Q8)
"Presents things optimistically. It is advantageous to move forward." (Q8)
"Science is positive." (Q9)

Problems/dangers/science is negative

"It is just kind of scary to look at it because things are happening so fast and a lot of technology is progressing at a real rapid pace." (Q8)
"We messed up pretty good." (Q9)
"Science is moving too fast." (Q9)

Progress/we've come a long way (positive value)

"In the future it will be better." (Q8)
"Makes you realize there is always something new that hasn't been invented yet." (Q8)
"It showed the evolution of science. Most of the examples were about how science is good." (Q9)
"To inform the common person about the source of the advancement of science over the years." (Q9)

---

[3] Creating and applying a coding structure requires analysts to interpret responses. We used a six-step process to ensure that coding was as objective as possible. First, one analyst proposed a set of codes on the basis of half of all responses; second, this preliminary coding structure was tested independently by three other analysts; third, the structure was revised to account for major discrepancies or difficulties in interpretation; fourth, the final structure was applied by the primary analyst to all answers; fifth, the same process was repeated independently by a second analyst; finally, any differences of interpretation were discussed and mutually resolved.

Science has benefits and risks/is both good and bad

"Pro and con both ways. See the good and the abuses if not regulated. " (Q8)

"From a historical perspective it reminds one of the different sides of research and development. For example, the part on the nuclear bomb, we realize that we didn't really know what we were doing." (Q8)

"Both positive and negative. Mostly positive." (Q9)

"It shows positive and negative sides and it showed controversies surrounding scientific discoveries." (Q9)

Increased my interest in science/science is interesting

"Still amazed by it." (Q8)

"It will help to broaden my interest and my kid's." (Q8)

"It's interesting and you can do a lot with it." (Q9)

No interest in science

"I'm not science oriented." (Q8)

"I have no interest in science." (Q8)

Helped me to understand the role of science in life/increased my awareness/makes you think/sense that science is part of life

"The exhibit made it easier for me to understand science's role in our daily lives." (Q8)

"How it impacts daily life." (Q8)

"That it affects absolutely everything we do." (Q9)

"Has a tremendous impact on the way we live." (Q9)

"Makes you think." (Q9)

Science is helpful/is useful/has improved quality of life (positive value)

"It sends a very strong message of the role of science in bettering our lives. I'm concerned about the lack of public understanding about technology and how it affects their lives. This is a nice way of bringing that message to the public." (Q8)

"Basic science has a direct influence on making our lives better." (Q9)

"How it can advance us." (Q9)

Science is important

"That science is important and helpful." (Q9)

"Science is important in our culture and important for children." (Q9)

"How important the contributions of science are to the development of American society." (Q9)

B. Statements relating to the complexity/difficulty of science

Made science easier/science is easy/science is fun

"It's easy and you can learn it." (Q9)

"Science is fun. It's not boring. There are lots of opportunities for people to become interested in science." (Q9)

Science is difficult/complex
"Seems like it's technically oriented." (Q9)

Made science clearer/science is clear
"Better understanding of science and how things work." (Q8)
"It's pertinent. Science is not a mystery or difficult to understand." (Q9)

I don't understand science
"I don't understand science." (Q8)

C. Reports of information/ideas communicated

Gained information/new ideas/brought up-to-date
"Brings you up-to-date on possibilities." (Q8)
"It's given me ideas on how to better teach my children about science." (Q8)
"It's surprising how many products developed out of accidents and experimentation." (Q9)
"We should learn. We need to catch up to science." (Q9)

Saw no new ideas/knew it already/attitude unaffected/unchanged
"I already formed ideas about science before taking in the exhibit." (Q8)
"Most of it I already knew." (Q8)
"I have well-founded opinions of science and technology." (Q8)
"It didn't say much." (Q9)

Learned about history of science/science and society
"Just gives a history of science and technology." (Q8)
"It's trying to show how science and technology influence America." (Q9)
"I don't think its trying to say anything politically. It's just about the history." (Q9)
"Changes a lot over the years." (Q9)
"Trying to present a chronological history and its impact on society." (Q9)

Learned how things work
"How different things interact." (Q9)

U.S. leads the world in science/science important to national position
"We have had a big impact in science as a nation." (Q9)
"Science is a big reason for the growth of America." (Q9)

D. Statements about the experience of the exhibition

Exhibition communicated effectively about science
"Very interesting. Draws common people's attention. Tries to explain with simple examples how science works." (Q8)
"Explanation of DNA helped kids understand science." (Q8)
"Trying to inform the society, I guess." (Q9)

I didn't look closely enough/long enough
"Just browsed through there." (Q8)
"Didn't spend enough time." (Q8)

Liked experiments/hands-on activities/positive experience of doing
"By people actually getting to do things." (Q8)

Exhibition was too complex/confusing/unclear
"Too complex to take in." (Q8)

E. Other responses

Comments about the wrong exhibition
"Trying to say that the generation is staying together." (Q9)

Don't know/other
"Hope it's not trying to say anything. Just a display." (Q9)

Answers to the questions of what ideas the most informative components gave and why a component was most interesting:

A. Expressions of views/attitudes related to science/technology

Science is positive/powerful/important/useful
"Power of the atom." (Q12)
"How important science is." (Q12)
"All the wonderful possibilities there are for curing disease. My mother has an illness and gene splicing and therapy could be wonderful." (Q12)

Problems/dangers/science is negative
"Where we shouldn't be going." (Q12)
"Very destructive if not used cautiously." (Q12)
"It reminded me of the negative effect that scientific advances can make." (Q12)
"It showed the destructive uses of science." (Q13)

Progress/we've come a long way (positive value)
"Raw progress. To see how far it has developed over centuries." (Q13)
"Progress in scientific discoveries is important for society." (Q13)

Important to teach science to children
"About teaching children about science." (Q12)
"Impact it's having on young people being interested in science." (Q12)

Increased my interest in science
"It gets you more interested in science." (Q12)

Helped me understand the role of science in life

"See the impact on questions." (Q13)
"Different ages. How science affects our lives." (Q13)
"That American movies are influenced by science." (Q12)

B. Statements relating to the complexity/difficulty of science

Made it easy/fun
"That it was a simple concept." (Q12)
"Because it is fun." (Q13)

C. Reports of information/ideas communicated

Gained information/new ideas
"I learned a lot." (Q13)
"There are different ways to get rid of waste. Burning might not be a bad idea. We could find a way to do it right." (Q12)

Got a feeling for the time
"It reminded me of the hysteria of WWII. I remember fallout shelters and bomb drills." (Q12)
"How difficult it must have been for the first group to develop the nuclear reactor." (Q12)
"Insight into the hysteria of that period." (Q12)
"Historical stuff, such as pictures of young Oppenheimer and scientists." (Q13)
"Seeing exactly what happened after the bomb." (Q13)

Learned about historical development
"Historical perspective of the first chain reaction and how it led to future development." (Q12)
"That it was thought it was bad. A century ago it was not acceptable, but now it is advised." (Q12)
"Atomic age -- effects of scientific research on military advancements." (Q13)

Learned how things work
"Got to see how the atom works." (Q13)
"Really neat to see how it worked." (Q13)

Brought to mind social dimensions/social conflicts
"Birth control -- never seen an exhibit like that in a museum -- politics, social issues, physical issues." (Q13)
"A lot of aspects of science have yet to be explored. It will be costly to do if we leave it to communities to decide. It will never get done." (Q12)
"The conflict between science and industry." (Q12)

Showed future directions
"Heavy emphasis on the future, such as gene splicing." (Q12)
"That it's something important for the future." (Q12)

D. Statements about the experience of the exhibition

Exhibition communicated effectively about science

"Photo showed me the powerful impact of nuclear technology." (Q12)
"Liked how the fallout shelter dramatized the effect of science on real life." (Q13)
"Marx brothers made a simple analogy." (Q13)

Liked participatory/hands-on activities/experiments

"The DNA interactive, because my daughter enjoyed it. It was fun and it made noise." (Q13)
"Hands-on section is the best way to understand concepts." (Q13)
"Some of the movies because they were interactive. You could ask them questions." (Q13)
"People helped you understand. You actually got to see it." (Q12)

E. Other responses

Wrong exhibition

"Radios, telegraphs, and computers." (Q13)
"Telegraph -- because it was the first break-through in long-distance communications." (Q13)

Saw the real thing

"First control center for a nuclear reactor -- I thought it was neat." (Q13)
"The fallout shelter. I'd never seen one before. I've only read or heard about them." (Q13)

It's topical/current

"Just glanced at it because of the OJ trial. Accurately can tell where the genetic markers are -- pretty accurate." (Q12)
"DNA -- what's on TV. Simplified how complicated it can get." (Q12)
"Nagasaki. With the 50th anniversary of the bombing, I have an increased interest in it." (Q13)

Personal interest

"1950's house -- my childhood" (Q13)
"It brought back memories of my childhood." (Q13)
"Bio-tech. That's my business." (Q13)
"I have a personal interest in the atomic age." (Q13)

Everything

Don't know/no answer

Components Cited by Visitors

Three questions asked visitors to cite specific components in the exhibition. As mentioned above, Question 9 asked *"What is the exhibition trying to say about science in America?"* After visitors replied, they were then asked (Question 10), *"Was there anything in particular that makes you say that?"* A component cited in this response was something that embodied the message of the exhibition for the visitor. Question 12 asked *"Which of these exhibition sections or interactive elements did you find the most informative?"* Visitors selected their response from a list of sections and components shown on a card. This list is given in Column 2 of Table II.D.1.[4] Finally, Question 13 asked, *"Overall, what in this exhibition interested you the most?"*

Table II.D.1 shows the combined results to these three questions, ordered according to the location of sections and components in the exhibition. In order to facilitate comparisons with the components in the Tracking Study discussed subsequently (Section III), Column 1 lists the tracking code for these items. Column 2 lists the component or section name. Column 3 is the percentage of visitors who gave a particular section or element as their example of what embodied the message of the exhibition (Q10). Column 4 is the percentage of visitors who selected that component as the most informative (Q12). Column 5 is the percentage of visitors who cited a particular part of the exhibition as most interesting (Q13). Finally, In response to the follow-up to Question 10 (*"Was there anything in particular that makes you say that?"*), some respondents gave general answers. These are shown at the end of the table (in Column 3).

Table II.D.2 reorders the core section of Table II.D.1 (leaving out the "Other" responses), according to the percentage of visitors who said that a component embodied the message. Table II.D.3 reorders the data again according to which parts were considered most informative, and Table II.D.4 reorders it yet again according to which parts were considered most interesting. Finally, in Table II.D.5 the top ten components cited by visitors are listed; that is, those that were mentioned by at least 4.5 percent of visitors in response to either Q10, Q12, or Q13.

---

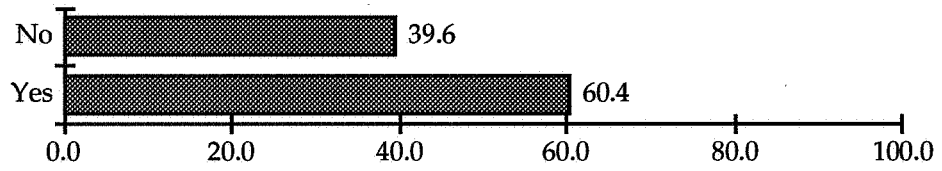
4 All of the data tables discussed in Section II are in subsection II.D, beginning on page 60.

Analysis of Responses

The Influence of the Exhibition

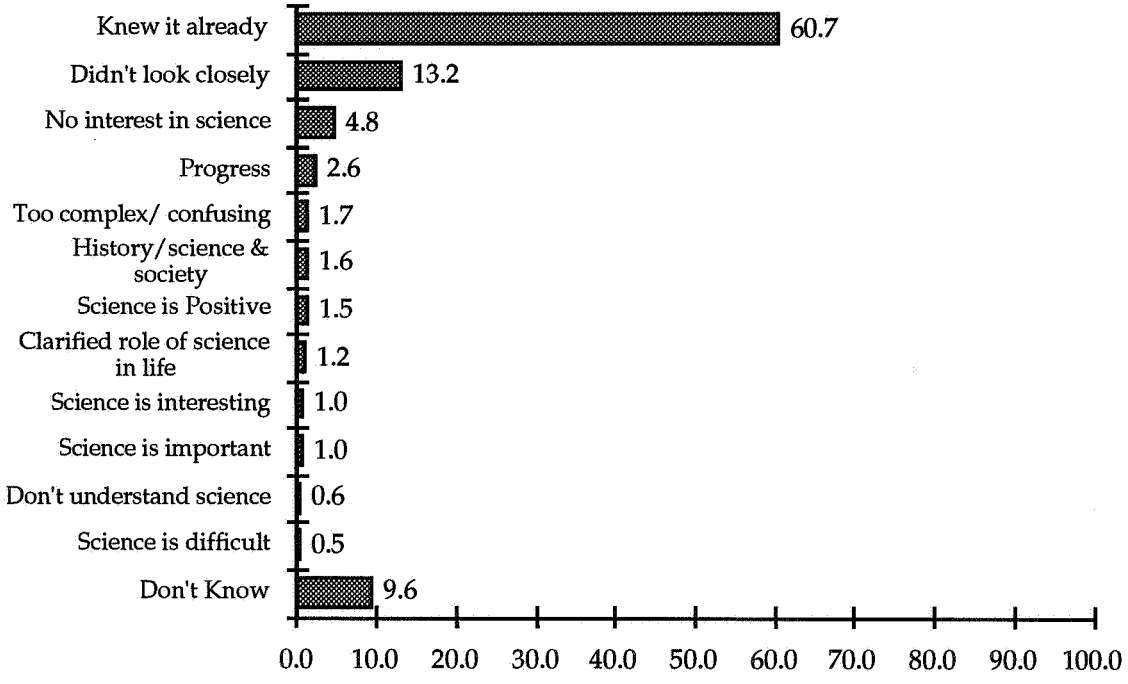
A majority of visitors (60.4%) felt that the exhibition would influence the way they think about science and technology, as shown in Figure II.A.1.

Figure II.A.1
Q.8 *Do you think this exhibition will influence the way you think about science and technology?*
Exit Survey
(in percent)



Those who said that the exhibition would not influence the way they think about science and technology, stated clearly why not. Three-fifths of them (60.7%) said they didn't learn anything that they did not already know. Another one in eight (13.2%) admitted that they did not look closely at the exhibition. One in ten (9.6%) said that they didn't know why not. (See Figure II.A.2.)

Figure II.A.2
Responses Given by the 39.6% of Visitors Who Said That SAL Will Not Influence Them*
Exit Survey
(in percent)**



* Please refer to pages 16-21 above for examples of statements in these response categories.
**Percentages in the figure may not add to 100.0% due to rounding, as all original calculations used two decimal places.

We expected that visitors who reported scientific training would be less likely to say they were influenced. The data confirmed this difference, but not to the degree that we had anticipated. Half (49.5%) of those with training said they were influenced, and half said they were not. Only two factors had a significant bearing on whether or not an individual said that they were influenced by SAL: age and familiarity with NMAH.[5]

As Figure II.A.3 shows, younger visitors were more likely to say that the exhibition would influence them. Three out of four visitors under age 30 said that SAL would influence what they think about science, compared to three out of five in the entire audience.

Figure II.A.3
Visitors Influenced by SAL, by Age and Total
Exit Survey
(in percent)

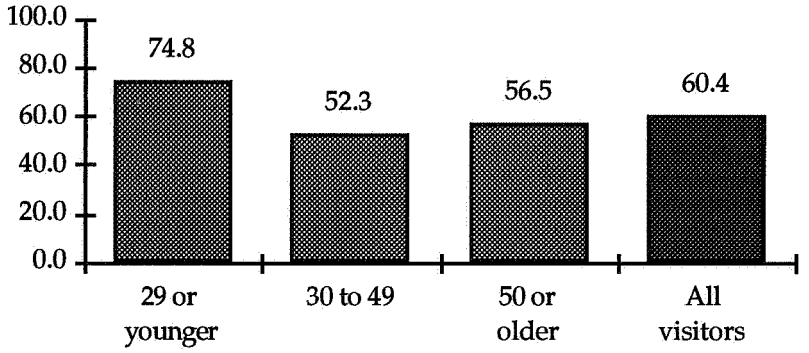
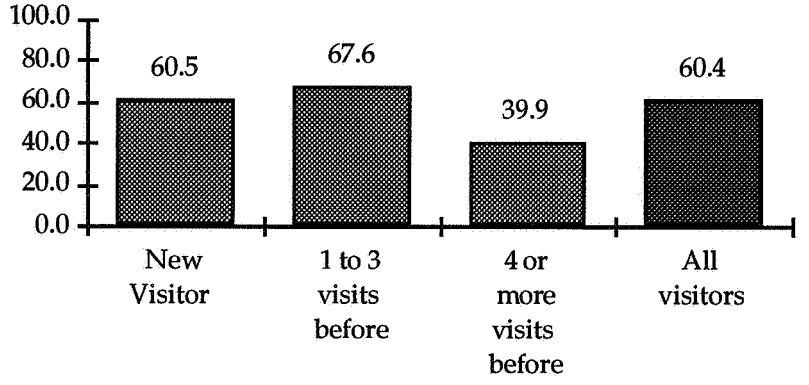


Figure II.A.4 shows that Frequent visitors (who had made four or more previous visits to the museum) were much less likely to say they were influenced by the exhibition. Two out of five frequent visitors said that SAL would influence what they think about science, compared to three out of five in the entire audience.

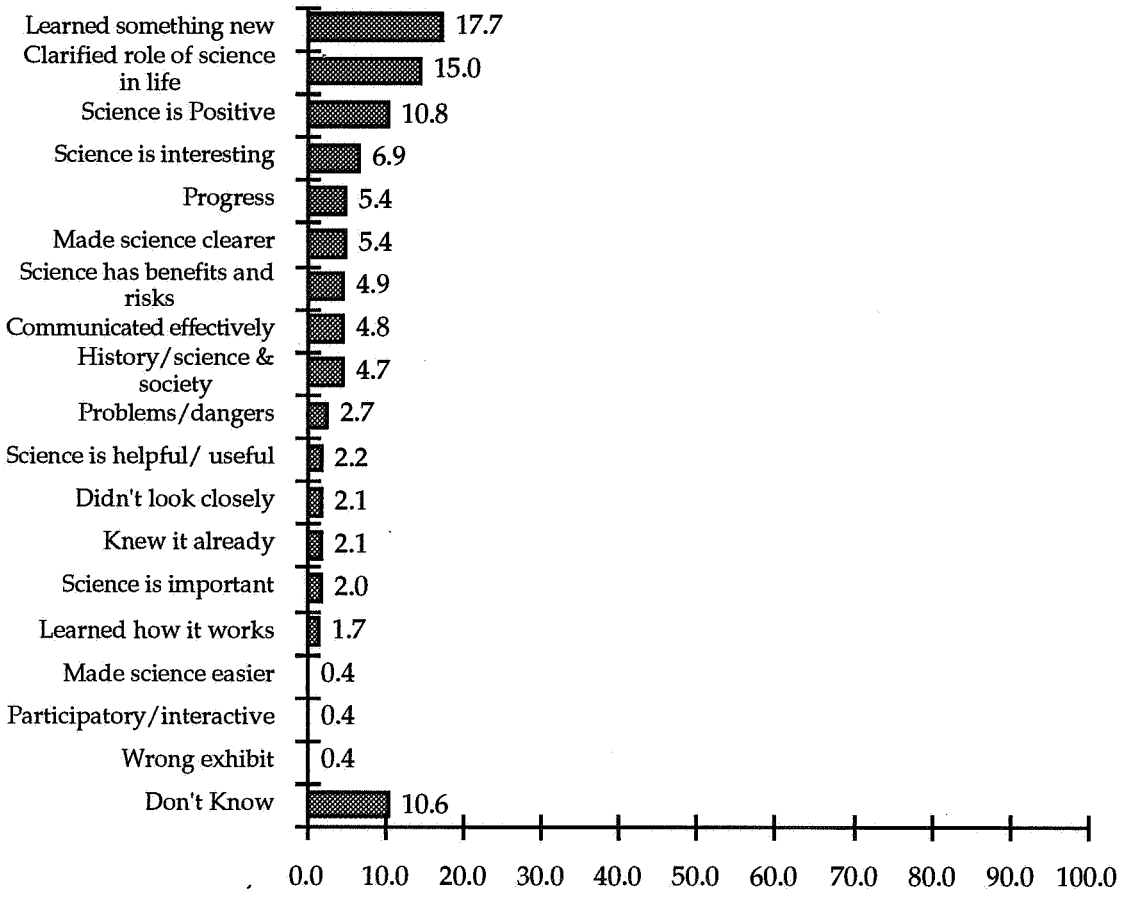
Figure II.A.4
Visitors Influenced by SAL, by Frequency of Visit and Total
Exit Survey
(in percent)



5 The logistic regression model on the probability of a respondent being influenced by the SAL exhibition showed that the effect of age was especially strong for those between 12 and 19. All else being equal, someone between the ages of 12 and 19 was 14.4% more likely to be influenced than visitors of other ages, and a Frequent Visitor (who had been to the museum four or more times previously) was 7.8% less likely to be influenced than other visitors. See Table II.D.7.

As Figure II.A.5 illustrates, there were three principal ways in which people felt that the exhibition would influence their thinking about science and technology. The dominant two answers refer to what visitors learned in the exhibition. Among those who said they would be influenced, over one in six (17.7%) said they had learned something new, and another one in six (15.0%) said the exhibition had helped them understand more about the role of science in daily life or had made them think. One in ten (10.8%) said that science is positive. Six more replies were each given by about five percent of visitors: Science is interesting, Progress, Exhibit made science clearer, Science has benefits and risks, Exhibit communicated effectively, and History.

Figure II.A.5
Responses Given by the 60.4% of Visitors Who Said That SAL Will Influence Them*
Exit Survey (in percent)**



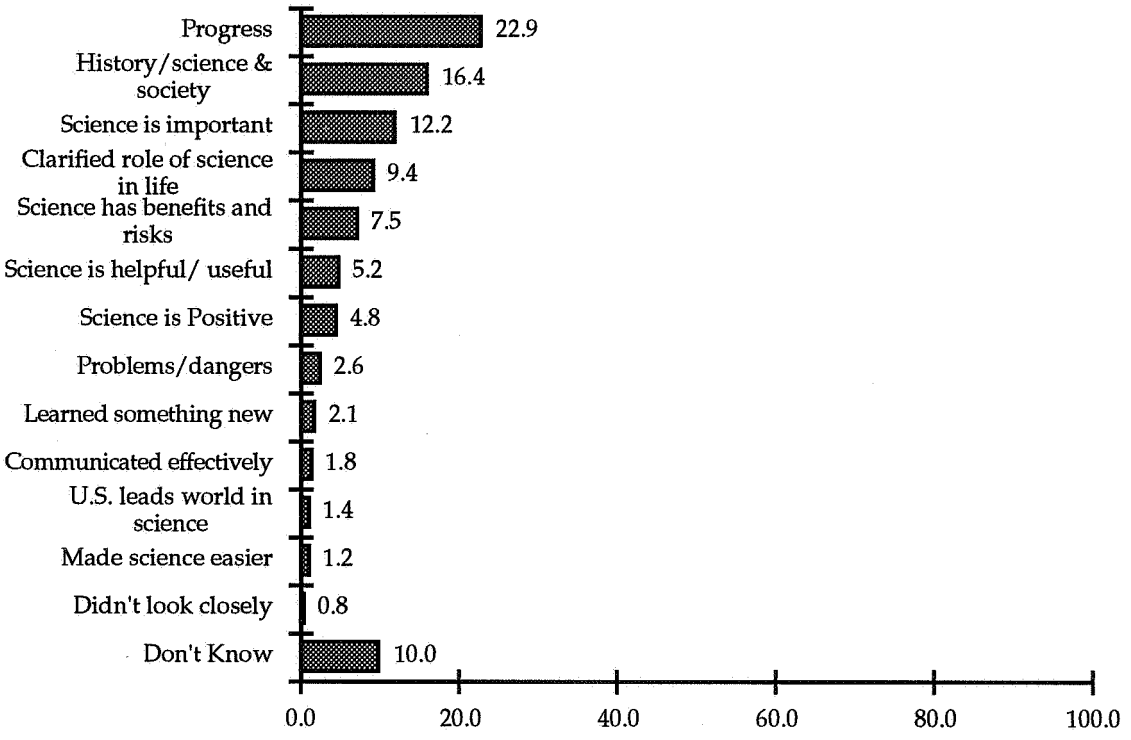
* Please refer to pages 16-21 above for examples of statements in these response categories.
**Percentages in the figure may not add to 100.0% due to rounding, as all original calculations used two decimal places.

Note that only a tiny percentage of these visitors (2.7%) reported that they were influenced by the exhibition to think of dangers or problems, compared to 10.8 percent of visitors who reported that they were influenced by the exhibition to see science as positive.

The Exhibition Message

In most exhibitions, when visitors answer the question of what they think the exhibition is trying to say, they describe their overall impression of the exhibition as an artifact, rather than the way that it affected them. We cannot assume that they personally agree or disagree with what they report as the exhibition message. The results for SAL are shown in Figure II.A.6.

Figure II.A.6
Q.9 *What is this exhibition trying to say about science in America?**
Exit Survey
(in percent)**



* Please refer to pages 16-19 above for examples of statements in Q.9 response categories.
**Percentages in the figure may not add to 100.0% due to rounding, as all original calculations used two decimal places.

Nearly one quarter of the visitors (22.9%) thought that the exhibition was about progress in science. Another 16.4 percent saw it as an expression of the history of science or as a record of the influence of science on American history. These views (accounting for two out of five visitors together) emphasize historical progression. Obviously, visitors were very conscious of the chronological arrangement of the exhibition and its historical perspective. Another 12.2 percent thought the exhibition said that science is important in general, and 9.4 percent said that science was important in our daily lives. Together, these very similar answers account for an additional one in five visitors (21.6%).

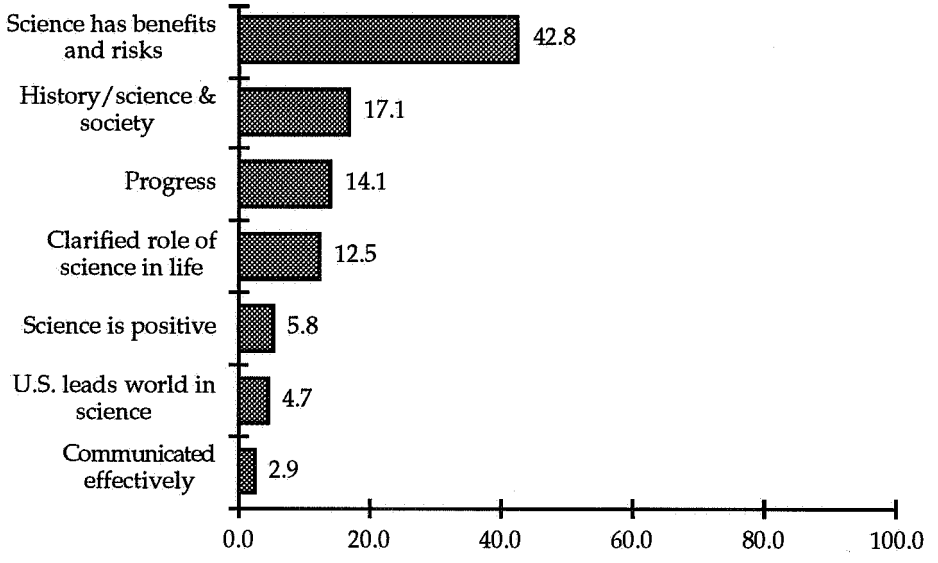
Note that 7.5 percent of visitors thought that the exhibition was trying to say that science had both benefits and risks, and only a marginal 2.6 percent thought that the message was that there are problems or dangers associated with science and technology.

Components Cited by Visitors

Our follow-up question asked visitors what particular element in the exhibition embodied the exhibition message in their opinion. Only three components were cited by about five percent of visitors or more: The Atomic Age section as a whole (cited by 11.7% of visitors), the Hands On Science Center as a whole (cited by 8.8%), and the Garbage/Landfill Video (cited by 4.6%).[6] These three components that can be considered important to visitors' views of what the exhibition was trying to say.

Let us look at the three more closely. Visitors associated the Atomic Age section of the exhibition with seven different messages, as shown in Figure II.A.7.

Figure II.A.7
Messages Reported by 11.7% of Visitors as Embodied by The Atomic Age section*
Exit Survey
(in percent)**



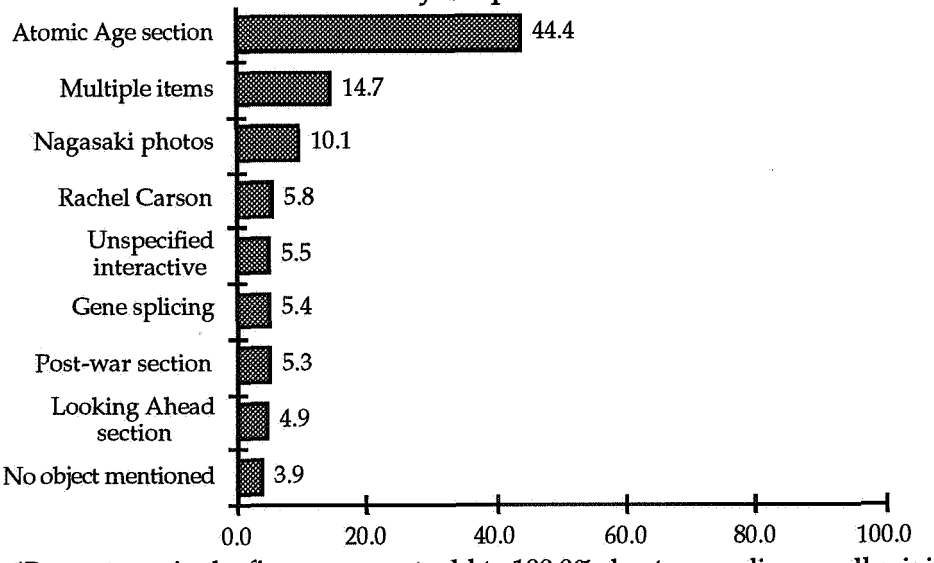
*For a complete list of the components in this section, see Location D, "Mobilizing Science for War" in Table III.C.1, page 87.
**Percentages in the figure may not add to 100.0% due to rounding, as all original calculations used two decimal places.

The outstanding message visitors saw in this section is that science has benefits and risks. Two out of five (42.8%) of the 11.7 percent who cited the Atomic Age saw it that way. Another 31.2 percent saw it as a depiction of history, either with a positive slant (Progress: 14.1%) or a neutral one (History: 17.1%).

6 See Table II.D.2, page 62.

We can approach the Atomic Age another way, by looking at the components cited by the 7.5% of visitors who said that they thought the exhibition was trying to say that science has benefits and risks. Figure II.A.8 shows which components they thought embodied that message.

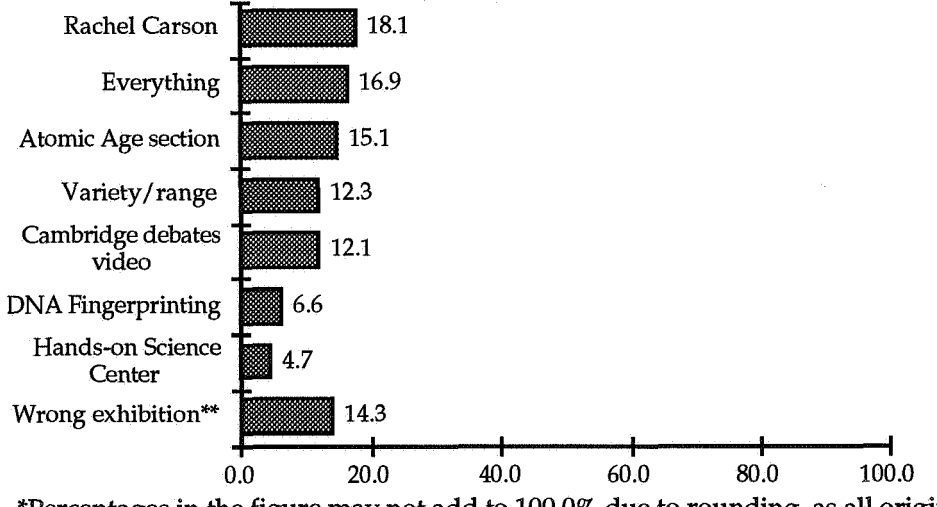
Figure II.A.8
Components that Led 7.5% of Visitors to Cite
"Science has Benefits and Risks" as SAL's Message
Exit Survey (in percent)*



*Percentages in the figure may not add to 100.0% due to rounding, as all original calculations used two decimal places.

The Atomic Age section was also an important influence for the 4.8 percent of visitors who said that the message of the exhibition is that science is positive, as shown in Figure II.A.9.

Figure II.A.9
Components that Led 4.8% of Visitors to Cite
"Science is Positive" as SAL's Message
Exit Survey (in percent)*

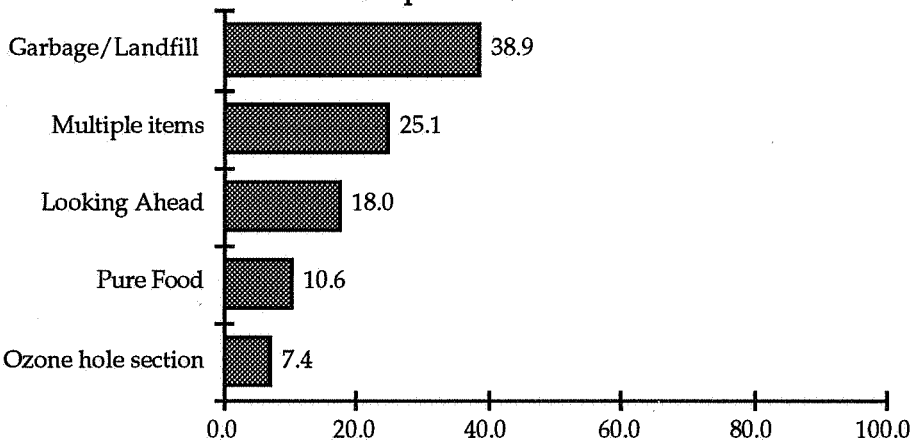


*Percentages in the figure may not add to 100.0% due to rounding, as all original calculations used two decimal places.

**Most of these were references to Information Age

If we turn to the 2.6 percent of visitors who saw the exhibition as saying that there are problems or dangers associated with science, we see that the Atomic Age was not cited at all, as shown in Figure II.A.10.

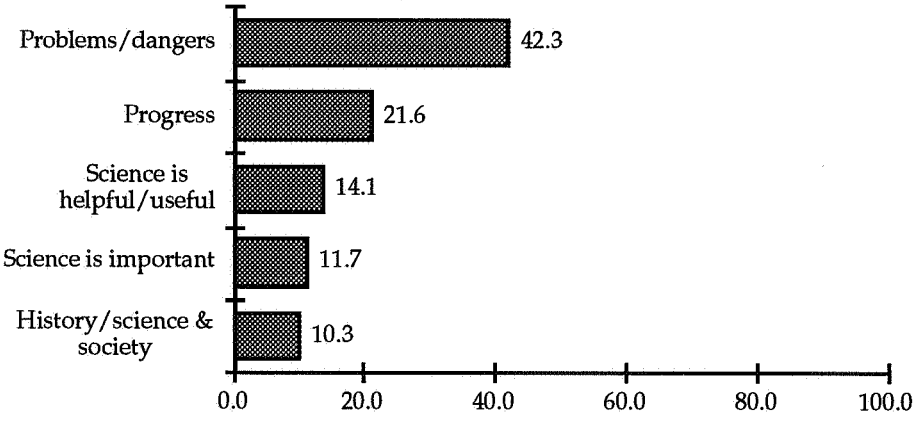
Figure II.A.10
Components that Led 2.6% of Visitors to Cite "Problems or Dangers" as SAL's Message
Exit Survey
(in percent)*



*Percentages in the figure may not add to 100.0% due to rounding, as all original calculations used two decimal places.

The number one item here, the Garbage/Landfill Video, is the single component that most led people to cite problems or dangers as the message of the exhibition. Altogether, 4.6 percent of visitors said that the Garbage/Landfill Video conveyed the message of the exhibition as they saw it, and two-fifths (42.3%) of this group expressed that message in language that emphasized problems and dangers. See Figure II.A.11.

Figure II.A.11
Messages Reported by 4.6% of Visitors as Embodied by the Garbage/Landfill Video
Exit Survey
(in percent)*

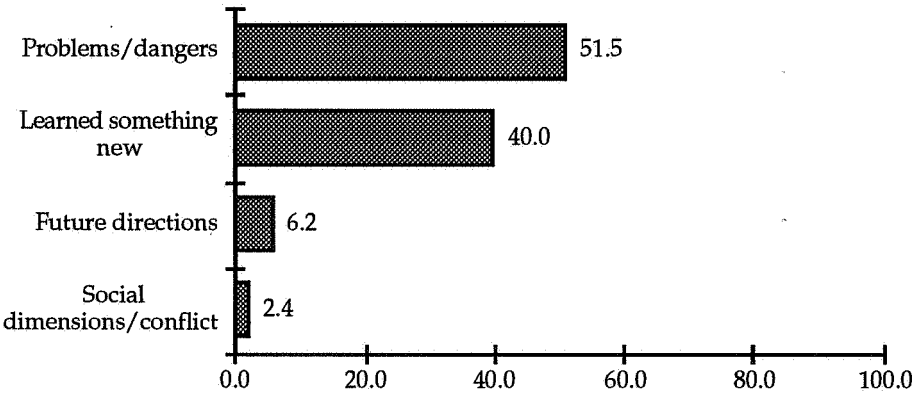


*Percentages in the figure may not add to 100.0% due to rounding, as all original calculations used two decimal places.

As we can infer from the other messages associated with this component, the problems visitors saw when viewing Garbage/Landfill Video were not with science itself, but

with the general situation of too much garbage and trash. They saw science as a solution to the garbage problem, not as a cause of it. Judging by the responses of the 4.8 percent of visitors who found Garbage/Landfill Video most informative, it gave visitors information they hadn't known before. See Figure II.A.12.

Figure II.A.12
Ideas that Garbage/Landfill Video gave to the 4.8% of Visitors
Who Found it Most Informative
Exit Survey
(in percent)*



*Percentages in the figure may not add to 100.0% due to rounding, as all original calculations used two decimal places.

Most (88.4%) of those who thought that the Garbage/Landfill Video carried the message of the exhibition were women. Most (68.4%) of those who found it most informative had no science training and no family members with science training. Age also made a difference. The Garbage/Landfill Video primarily conveyed the exhibition theme for younger visitors (42.3% were ages 12 to 24).[7]

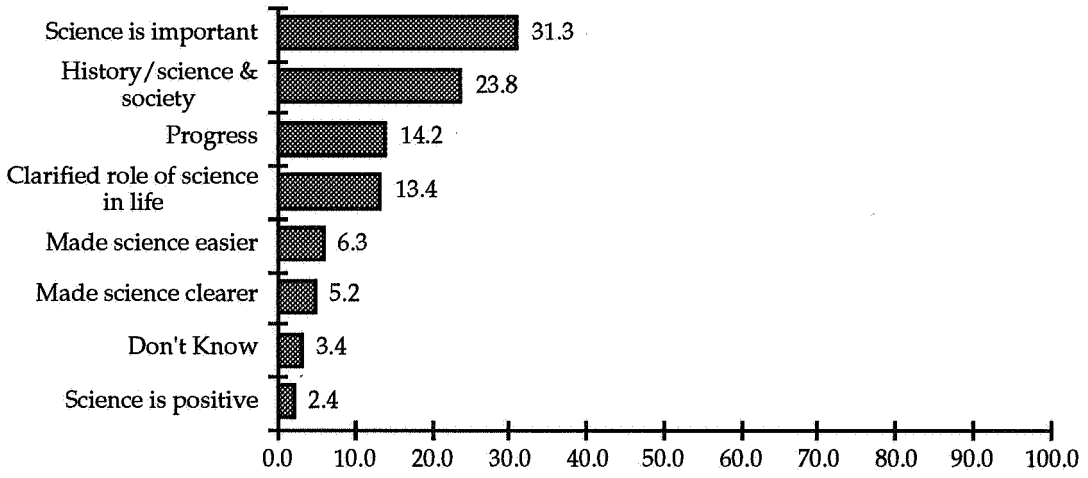
While the Garbage/Landfill Video made its greatest impression on female visitors, the Atomic Age made a comparably strong impression on male visitors. Altogether, 5.8 percent of visitors found the Atomic Age to be the most informative part of the exhibition and four out of five of them (80.2%) were men. Similarly, 11.3 percent of visitors found Atomic Age to be most interesting, and 78.8 percent of them were men. Age also made a difference for those who thought that Atomic Age embodied the message of the exhibition -- 67.3 percent of those who cited Atomic Age as conveying the exhibition theme were ages 25 to 44.

The third element of SAL cited by over 5 percent of all visitors as embodying the exhibition message was the Hands On Science Center. Visitors associated the HOSC with seven different messages, as shown in Figure II.A.13.

---

7 See Table II.D.12, Section II.D for a list of the distribution of the groups cited in this and the next paragraph among all visitors.

Figure II.A.13
Messages Reported by 8.8% of Visitors as Embodied by the Hands On Science Center
Exit Survey
(in percent)*



*Percentages in the figure may not add to 100.0% due to rounding, as all original calculations used two decimal places.

Obviously, the HOSC communicated messages that were very favorable to science, and led visitors to see the specific principles being demonstrated within a larger context. The top four messages (Science is important, History, Progress, Clarified role of science) all reflect a broad view of science and its place in society.

In addition to the three principal components that embodied the exhibition message, there were seven other components that were cited by visitors as either most informative or most interesting. Table II.D.6 lists the impact of the complete set of "top ten" components. These are the only exhibition elements cited by at least 4.5 percent of visitors as either embodying the message, being the most informative, or being the most interesting. We limited the table to these ten because we feel that analyses of responses representing less than about 5 percent of visitors are not reliable.

Attitudes Towards Science and Technology

The responses in Table II.D.6 suggest that visitors left the exhibition favorably disposed to science and technology. To verify this impression for all respondents (i.e., both entering and exiting), we divided the coding structure for all open-ended questions into three meta-categories -- positive, negative, and neutral -- to emphasize the evaluative dimension of visitors' responses to science and technology. As in the creation of the

coding structure itself, two analysts made the division independently and resolved any differences. The final division is as follows:[8]

Implied positive attitudes towards science and technology:

Science is positive
Progress
Science is interesting
Clarified role of science in life
Science is helpful/ useful
Science is important
Made science easier
Made science clearer
U.S. leads world in science
Teach science to children
Made science more interesting
Made science easier

Implied negative attitudes towards science and technology:

Problems/dangers
Science has benefits and risks
Science is difficult
Don't understand science

Implied neutral attitudes towards science and technology:

Learned something new
Knew it already
History/science & society
Historical development
Social dimensions/conflicts
Learned how it works
Future directions
Communicated effectively
Didn't look closely
Participatory/interactive
Too complex/ confusing
Gave feeling for the time
Personal interest
Seeing the real thing
Wrong exhibit
Don't Know

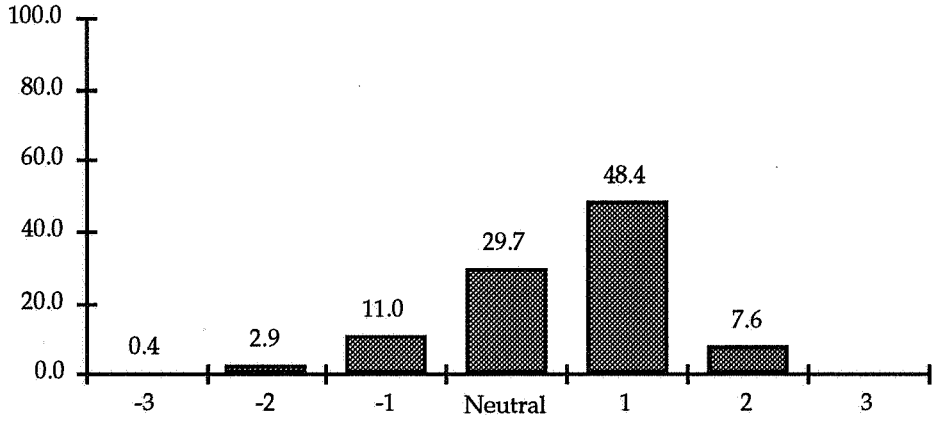
We used this division to create a summary scale that measured the extent to which individuals expressed a positive attitude towards science. Whenever a visitor gave a response to one of the three open-ended questions (Q9 exhibition message, Q12 most informative, Q13 most interesting) that we had classified as "positive," no matter what the question, they were given one point. For every response classified as "negative" they were given -1 point. For every response classified as "neutral," they received 0 points. This attitude scale thus ranges from -3 (most negative) to +3 (most positive).

---

8 This division is a simplified categorization intended to numerically verify the strong positive impression of science implied by the visitor responses to the top ten components. We have defined a negative attitude as broadly as possible, in order to insure that we have not neglected any negative responses. In fact, many of those who cited problems/dangers felt very positive about science, and those who said that science has both benefits and risks could reasonably be considered neutral.

The scale measures the net number of positive or negative responses across all the open-ended questions. The distribution of visitor attitudes according to this summary scale is shown in Figure II.A.14.

Figure II.A.14
Overall Attitudes Toward Science Implied by Open-Ended Responses
Scale Range = -3 to +3
Exit Survey
(in percent)*

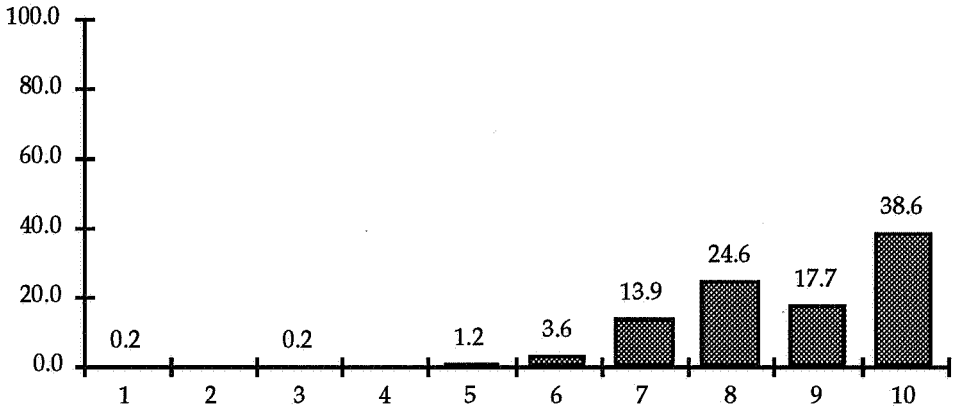


As Figure II.A.14 shows, visitors overwhelmingly expressed net positive attitudes towards science and technology in their replies to questions about the exhibition. We do not believe they were led to this position by the exhibition, however. We think that they entered with it.

We asked visitors how they felt about the impact of science and technology on our lives, using a scale from 1 to 10, where 1 is very negative and 10 is very positive. (Q7. *How do you feel about the impact of science and technology on our lives?)* Two out of five visitors (38.6%) placed themselves at the upper limit of the scale. Most of the remaining three out of five expressed mild reservations (scores 7 to 9). The average score for all visitors was 8.7 (standard deviation: 1.4). As Figure II.A.15 shows, only 5.2 percent of all visitors expressed a less positive attitude.[9]

[9] Since there is no statistically significant difference in these scores between the Entrance Survey and Exit Survey, the data used here are the totals for all visitors. The average score for all visitors was 8.67 (±1.37), for entering visitors 8.67 (±1.44), and for exiting visitors 8.67 (±1.30).

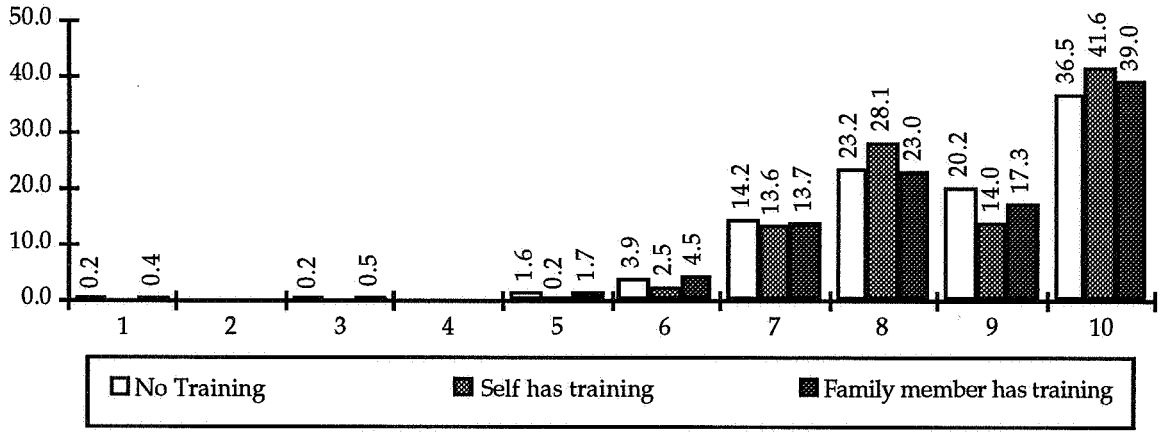
Figure II.A.15
Extent of Positive Feeling towards Impact of Science on a One to Ten Scale
Entrance and Exit Surveys Combined
(in percent)*



Since Entrance and Exit Survey responses do not differ statistically, we know that the extent of positive feeling is unrelated to the experience of the exhibition itself.

Is the extent of visitors' positive feeling toward science related to whether or not an individual is trained in science or has an immediate family member trained in science? (The classification was based on Q6: *Do you and/or anyone in your immediate family have scientific or technical training?*) As Figure II.A.16 illustrates, training does not make a difference.

Figure II.A.16
Effect of Training on Extent of Positive Feeling Towards Impact of Science
One to Ten scale
Entrance and Exit Surveys Combined
(in percent)*



Education, gender, or place of residence do not make a difference either. When we created a statistical model to identify the characteristics most associated with a positive view of the impact of science, we found only one factor that mattered. This was one of the same two factors that affected whether or not an individual felt that SAL would influence their attitude: age. Visitors under the age of 30 were less positive about the

impact of science. They rated themselves on average almost one-half point (0.4) lower on the scale than other visitors.[10]

We can conclude that this exhibition was potentially more important for young visitors. They entered the exhibition with less favorable views of science than other visitors, and they were more likely to feel that the exhibition would influence them.

They did not differ from other visitors, however, in their descriptions of the ways that they would be influenced. A little over half of them (55.3%) gave the same answers that half of all visitors gave. They were influenced, they said, because they learned something new (cited by 20.2% of visitors under age 30 who said they were influenced by SAL), because science is interesting (10.9% of them said this), because science is positive (12.1% of them gave this reply) or because they better understood the role of science in daily life (12.2% gave this reply). (Compare Figure II.A.5).

We can find no evidence in the survey data that the experience of the exhibition or the Hands On Science Center altered the fundamental attitude of young visitors (or anyone else, for that matter), to make them feel either more positive or more negative about science and technology. Presumably, those who were negative stayed negative and those who were positive stayed positive. This result is not surprising since a number of our studies have documented how hard it is to change deeply held beliefs by means of exhibitions. Visitors tend to see what they want to see. If they discover something that strongly disagrees with their well-established views, they may become upset, but they are not likely to change their minds. Our data supports the conclusion that SAL visitors neither changed their attitudes or opinions about science and technology in any dimension that we measured, nor found the exhibition offensive in any way.

10 The regression model for Science Attitude Scale score indicates that, all else being equal, a visitor between the age of 12 and 19 scored 0.46 lower, and one between the age of 20 and 29 scored 0.48 lower. See Table II.D.8.

II.B Visitor Responses to the Exhibition's Curatorial Aims

Arthur Molella, Assistant Director for History at NMAH and the lead curator for Science in American Life, provided us with a concise statement of the exhibition's cognitive, affective and behavioral aims:

Cognitive Aims

1. Demonstrate that science is embedded in everyday life.

1a. Show that the pursuit of science and the public response to science change with the times. [Citizens want more of a say in science today than in the past.][11]

2. Teach scientific concepts, techniques, and applications underlying historical case studies (the main goals of Hands On Science, Looking Ahead, and Chronology interactives.) [Cannot understand history or current events involving science without familiarity with the basic terms and concepts of science.]

3. Illustrate the ethical and risk/benefit aspects of scientific issues, and the history of public response to these issues. [SAL treats both scientists' work and public reactions to science.]

Affective Goals

1. By featuring familiar everyday-life scenes -- homes, worlds fairs, and other aspects of popular culture -- encourage visitors to feel a *personal* relationship to science. [Our sense is that visitors feel estranged from science; it was therefore important to mix laboratory and other science-related scenes with scenarios from ordinary life.]

2. Through hands-on activities, increase comfort with ideas and tools of science.

3. Convey that, over time, America's scientific achievements reflect and respond to America's changing values. [For instance: Science acquired almost religious significance during the depression; Big Science flowered in the 1940s as a response to the national emergency; debates over the SSC were enmeshed in our democratic politics.]

3a. Elicit feelings of concern and citizen responsibility for the social impacts of science. [We have in mind, for instance, many current issues swirling around genetic engineering, e.g., patenting life.]

Motivational/Behavioral Aims

1. Empower citizens to take an active role in current debates involving science. [Voting is one example of an "active role."]

2. Encourage young people to study science and consider scientific careers.

---

[11] The sentences in square brackets are examples provided by the curator.

The visitor responses described in Section II.A confirm that many of these aims were directly reflected in the spontaneous comments that visitors made when describing the exhibition theme or their reactions to its most interesting or informative elements. In particular, the second cognitive goal, *teach scientific concepts, techniques, and applications underlying historical case studies,* resonated with visitors. Nearly one in five visitors (18.7%) said at least once either that they had learned something new or that they had learned how something works.

We needed to establish a precise reading of where visitors stood on the issues addressed by the exhibition and to determine whether or not their opinions were being affected by the exhibition. We asked visitors to give us their opinions on nine questions that embodied the cognitive and emotional aims of SAL. For each question, visitors could say either that they strongly agreed, agreed, disagreed, or strongly disagreed. (Responses in parentheses are the position of the exhibition, as determined by the curator, Arthur Molella):[12]

A. The basic ideas of science are too complex for most people to understand. **(Disagree)**
B. In the past, scientific research was independent of public attitudes. **(Agree)**
C. Decisions about the directions of scientific research should be left to scientists. **(Disagree)**
D. Scientific research does not affect the lives of most people. **(Strongly Disagree)**
E. The public has a responsibility to decide the appropriate use of scientific technologies. **(Strongly Agree)**
F. Today, scientific research is independent of public attitudes. **(Strongly Disagree)**
G. Scientists should conduct research without concern for the consequences of their discoveries. **(Strongly Disagree)**
H. Most people can understand the potential risks and benefits of scientific discoveries. **(Agree)**
I. The public should expect scientists to be responsible for the effects of their discoveries. **(Agree)**

Visitor Opinion and SAL's Position

How closely did the opinion of the visitors match the position of the exhibition? Did the experience of the exhibition lead visitors to change their minds? In answering these questions let us first consider only whether a respondent is on the same side of an issue as the exhibition (i.e., set aside distinctions between Strongly Agree and Agree and between Strongly Disagree and Disagree).

Most visitors (96.7%) agreed, along with the exhibition curator, that scientific research affects the lives of most people (Question D). A high percentage of them (84.3%) also

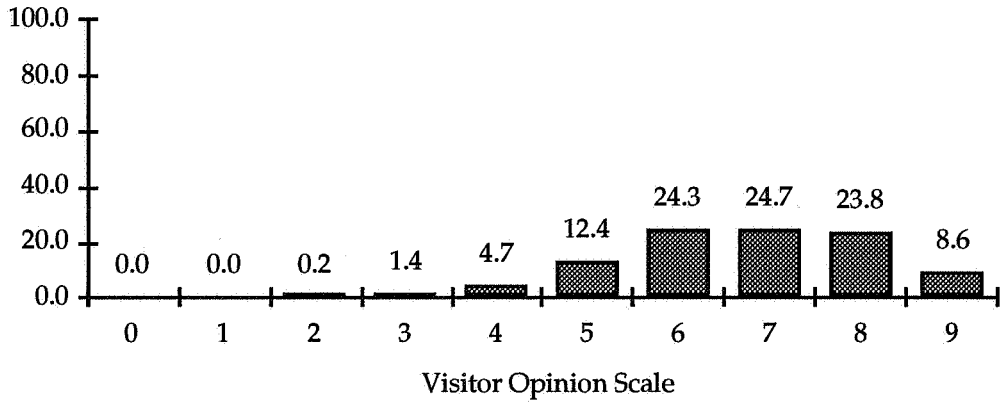
---

[12] The questions were constructed in pairs where A and H address complexity, B and F deal with change from past to present, C and E inquire about public responsibility, and G and I ask about the ethical responsibility of scientists. D, the question of science's role in everyday life, was a solitary item. Results clustered in accordance with these pairings.

agreed with the exhibition that scientists should conduct research with concern for the consequences of their discoveries (Question G). On the remaining statements visitors were more evenly divided, as shown in Table II.D.9, Section II.D.[13]

To see how closely an individual's opinions corresponded to those of the exhibition we assigned an individual one point for every time the respondent agreed with the exhibition position. The opinion scale thus ranges from zero to nine. Except for a tiny percentage on the low end of the scale (1.6%), scores extended from four to nine. Individuals were fairly close in opinion to the exhibition's position. The mean score for this scale was 6.7 (with a standard deviation of 1.4). In other words, on average, visitors concurred with the side of an issue taken by the exhibition on almost seven out of nine items. The distribution of scores is shown in Figure II.B.1.

Figure II.B.1
Scale of Agreement of Visitor Opinion with SAL Opinion
Entrance and Exit Surveys Combined
(in percent)



As Figure II.B.1 shows, the audience tended to agree with the position of the exhibition. When we compared entering visitors to exiting visitors, we found no statistically significant differences on either the overall scale score or any individual question.[14] In other words, on average, visitors felt the same degree of agreement or disagreement on these issues whether they saw SAL or not.

[13] These percents are based only on respondents who answered all of the items in Q.11. Basing them on all individual who answered a particular question, increases the percentages reported here very slightly. For example, while 96.7% of respondents with complete data agree with Question D, 95.0% of all respondents agree.

[14] Data on file, Institutional Studies Office.

Are there any other factors that could be influencing an individual's position on these issues? The results of a statistical model for Visitor Opinion Scale score, including all respondents, shows that three things mattered in how closely an individual agreed with the position of the exhibition:[15]

Men were slightly less likely to agree with the position of the exhibition, compared to women. Compared to women, men were likely to score 0.2 points lower, all else being equal.

Those who had not visited NMAH before were slightly less likely to agree with the position of the exhibition, compared to repeat visitors. New visitors scored 0.3 points lower than repeat or frequent visitors, all else being equal.

As visitors expressed a more enthusiastic opinion about the impact of science on their lives (as measured by Q7 of the survey), their score fell. For each point on the Science Attitude Scale, a respondent's opinion scale score fell an average of 0.1 points, all else being equal.

In other words, if we imagine two individuals who are identical in <u>all</u> respects except that one is on a first visit and the other has visited on one or more previous occasions, the first-time visitor is likely to score 0.3 points lower. If the first one is a man and the second a woman, the first-time visiting male is likely to score 0.5 points lower than the woman who has been to the museum before.[16]

We also constructed a statistical model to check whether or not the exhibition had an effect on the scale score. In this case, we looked only at those interviewed in the Exit Survey. Only one factor was important:[17]

Those who said they were influenced by the exhibition (i.e., answered "yes" to Q8: *Do you think this exhibition will influence the way you think about science and technology?*) were likely to score 0.4 <u>higher</u> on average than the rest of the respondents, all else being equal.

In other words, let us imagine two individuals who are identical in <u>all</u> respects except that one said "yes, the exhibition will influence the way I think," and the other said "no, it will not influence my thinking." The one who said "yes" will have a score that is 0.4 points higher than the one who said "no."

This means that the scale is, in fact, an accurate measure of the position of the exhibition. If an individual thought that he or she had been influenced by the exhibition, that individual was likely to score higher on the scale. Conversely, it also means that respondents reliably answered the question on whether or not they were influenced.

---

15 See Table II.D.10.

16 These results are based on an OLS regression model. The population includes <u>all</u> respondents with complete data. A variable was included for study design (Entrance Survey vs. Exit Survey) but was not significant. Aside from gender, none of the other background characteristics were significant.

17 See Table II.D.11.

If we look more precisely at the exhibition's position, as expressed by the curator, taking into account the distinctions between Strongly Disagree and Disagree and between Strongly Agree and Agree, we note that, for all but two questions, around half or more of all visitors chose exactly the same response as stated by the curator. See Table II.D.9.

On two questions the strength of visitor opinion diverged from the SAL position, as stated by the curator. For the item "The public has a responsibility to decide the appropriate use of scientific technologies, "the curatorial position was to "Strongly Agree." While 62.8 percent of people said they "Agree," only 14.8 percent said they "Strongly Agree." Similarly, the exhibition disagreed strongly that "Today, scientific research is independent of public attitudes." Over three-out-of-five visitors (63.8%) said they "Disagreed," while only 8.2 percent said they "Strongly Disagreed."

In general, visitors preferred not to take strong positions except on the matter of whether scientific research affects the lives of most people.

Only on the intensity of feeling about public responsibility and involvement, then, was there a gap between the opinion of visitors and the position of the exhibition. Despite this difference, the data show no signs that attitudes on this matter were significantly affected by the experience of the exhibition.

II.C. Description of Visitors

In order to interpret visitor responses to questions about *Science in American Life* and the effectiveness with which the exhibition communicated its messages, we collected information about the demographic and social characteristics of respondents, their prior experience with the National Museum of American History, and their sources of information about the exhibition.

Our research has shown that individual responses to exhibitions are shaped and formed by visitors' prior experiences.

In order to understand the experience in the exhibition and its measurable impact on visitors, our overall approach was to interview individuals entering and exiting the exhibition and the Hands-on Science Center. As described in Appendix B, the structure of the questionnaire allowed for comparison of responses on a broad range of characteristics, attitudes and opinions.

Demographic Characteristics[18]

The ability to compare entering and exiting visitors was predicated on selecting samples with similar characteristics. In fact, there were no significant differences between visitors interviewed in the Entrance Survey and those interviewed in the Exit Survey. The discussion below, therefore, is based on the total number of visitors interviewed.

Local residents were a minority of visitors, with less than one in ten (8.5%) from the Washington Metropolitan Area. About four out of five visitors (82.0%) came from other parts of the United States and about ten percent (9.5%) from other countries.

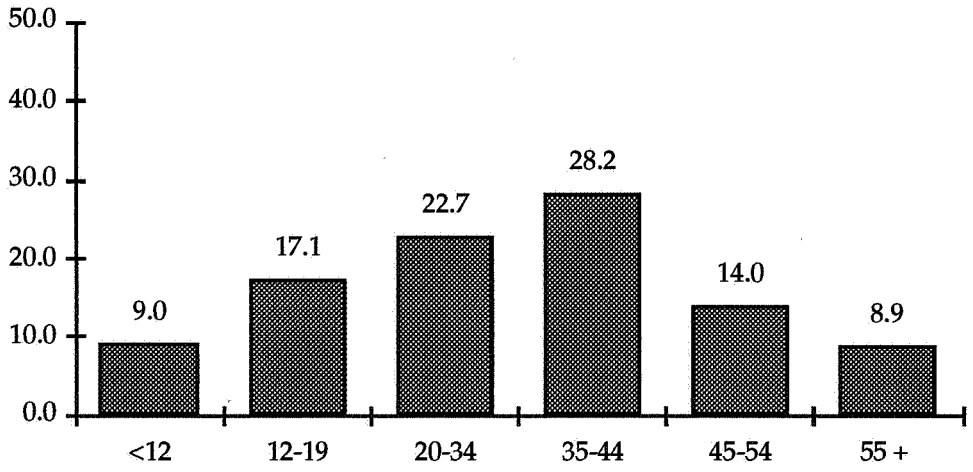
More men came to the exhibition than women (55.4% men and 44.6% women). The majority of visitors were Caucasian (88.8%). Among U.S. residents, 91.5 percent were Caucasian and 9.5 percent members of racial/ethnic minority groups.

Museum attendance, especially in the summer months, is a social activity. When we look at the social composition of visiting groups, adults visiting alone comprised only 11.7 percent of visitors compared to those visiting as couples (22.8%) or in adult groups (10.2%). Adults accompanying children were nearly half of the visiting groups (46.7%). The remainder were either individual who have separated from school or tour groups (6.6%) or groups of teens (2.0%) The median age was 35. The age distribution, is shown in Figure II.C.1.

---

18 See Table II.D.12, page 81.

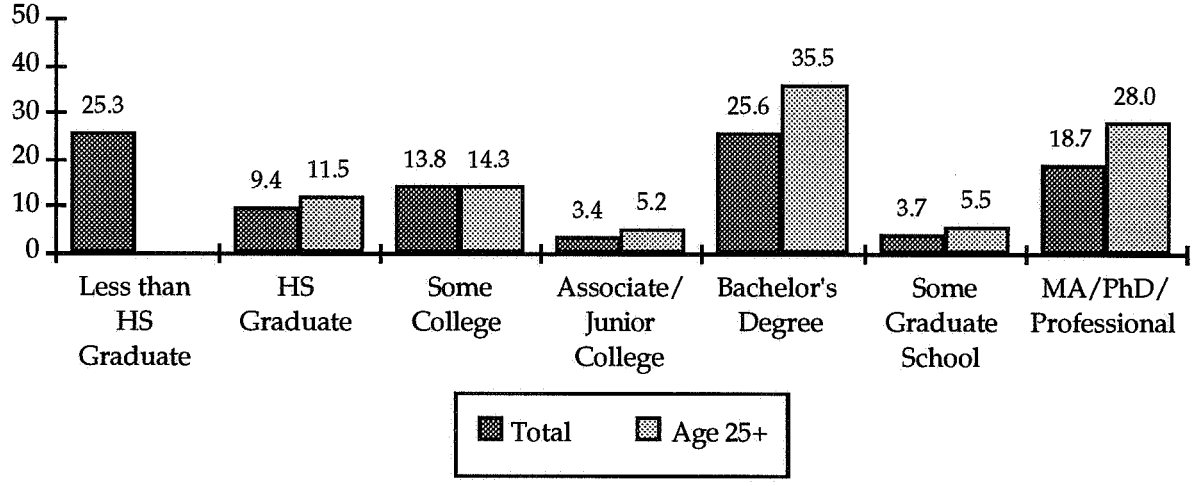
Figure II.C.1
Age Distribution of All Visitors
Exit and Entrance Surveys Combined
(in percent)*



*Percentages in the figure may not add up to 100.0% due to rounding, as all origional calculations used two decimal places.

Educational attainment among museum attendees is a function of age. The differences are shown in Figure II.C.2, where the educational attainment of all visitors is shown, as well as the attainment of those 25 years old or above (when most are assumed to have completed formal education).

Figure II.C.2
Educational Distribution of All Visitors and Visitors Age 25 or Above
Exit and Entrance Surveys Combined
(in percent)*



*Percentages in the figure may not add up to 100.0% due to rounding, as all origional calculations used two decimal places.

Consistent with their high educational attainment, the majority of visitors reported professional occupations. Looking first at visitors age 18 or above, 9.2 percent were students and an additional 4.7 percent were not in the labor force (including those who elect not to work and the unemployed). Those in professional occupations formed the largest category, about half (51.8%), and those in non-professional occupations comprised one-third (34.3%).[19] Clearly, when we limit the population to those age 25 or older, fewer are students (1.9%), a similar proportion is not in the labor force (5.2%) and the proportion of those in professional occupations and non-professional occupations rises (55.7% and 37.2%, respectively). (Examination of Table II.D.12 shows some of the major occupational categories included as both professional and non-professional occupations.)

Visitors were also asked if they, or members of their immediate family, had scientific or technical training. About half (47.7%) reported that they did not have any scientific training. The remainder were nearly evenly divided between those who indicated that they had scientific or technical training (27.5%) and those who said that a member of their family did (24.9%).

Visit Characteristics[20]

Given that most visitors came from outside the Washington Metropolitan Area, it is not surprising that most were making a first visit (61.1%). A substantial percentage (29.9%) had previously visited NMAH on one to three occasions, while about one in ten was a frequent visitor (four or more previous visits, 9.1%). Local visitors were most likely to be frequent visitors (30.5%), foreign residents the least (2.5%).

About one in ten (11.4%) respondents had heard about the exhibition prior to their visit. Of these, about one-quarter (27.2%) heard about the exhibition from friends or family. The rest had learned about it from a variety of sources including newspapers (*Washington Post* and other papers), magazines (including Smithsonian Magazine), visitor information desks, brochures, tour guides, etc.

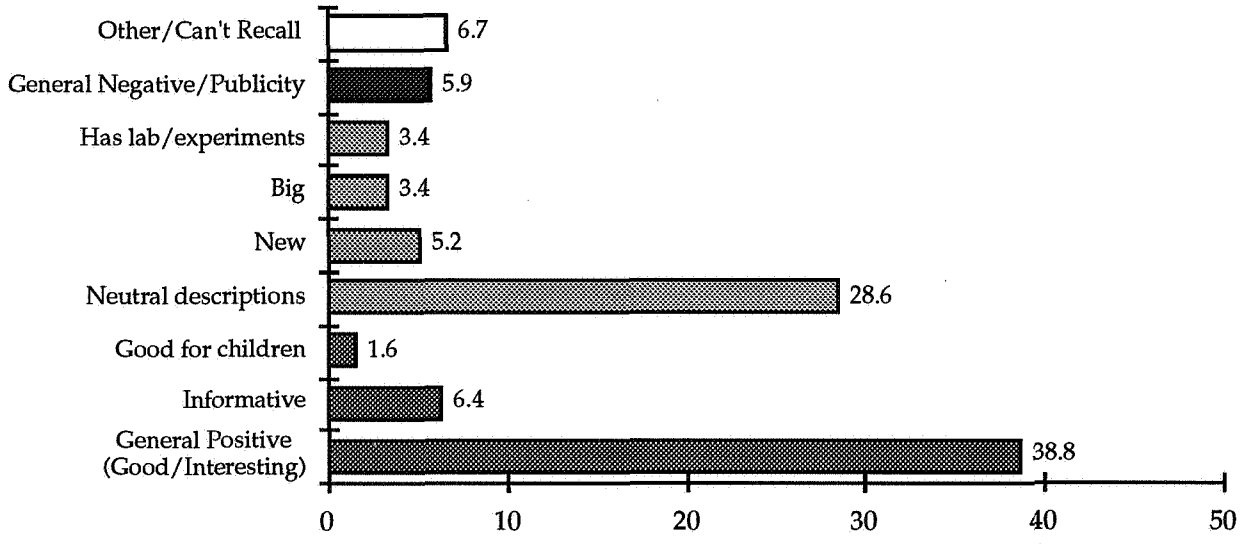
When asked what they had heard, almost half (46.8%) reported favorable comments (good, interesting, informative, good for children) and another two-fifths (40.6%) gave neutral descriptions (e.g., includes laboratory, big, new, about chemistry, etc.). Some (5.9%) recalled negative reviews or publicity related to discussions about the exhibition. A somewhat similar group (6.7%) could not recall what they had heard. Figure II.C.3 shows the response categories.

---

19 These percentages are based on U.S. Bureau of the Census classifications.

20 See Table II.D.13, page 84

Figure II.C.3
Responses Given by the 11.4% of Visitors Who Had Heard about SAL Prior to their Visit
Exit and Entrance Surveys Combined
(in percent)*



*Percentages in the figure may not add up to 100.0% due to rounding, as all origional calculations used two decimal places.

By definition, respondents in the Entrance Survey had not visited the HOSC or the exhibition itself. Among those interviewed in the Exit Survey, in response to a question about HOSC, we find that 68.5 percent had not visited HOSC at all, 30.1 percent had visited the HOSC on the day of interview and 1.5 percent on a previous visit. When asked specifically about visiting the exhibition, 6.4 percent of all exiting visitors indicated that they had not seen it, 88.2 percent told us that they had visited on the day of the interview and 5.4 percent on a previous visit (i.e., they had returned). When the answers to these two questions are combined, we find that two-thirds (68.5%) of the total audience were exhibition-only visitors, one-fourth (25.1%) had visited both the HOSC and the exhibition, and a small number (6.4%) had only visited the HOSC (see Table II.D.13).

Part III.

Tracking Study Results

III.A Visitor Behavior in the Exhibition

The results in this section are taken from the Tracking Study, i.e., the unobtrusive observation of visitors in the exhibition proper and the Hands On Science Center (HOSC). (For a fuller description, see the following section.)

Where Visitors Stopped

The places where visitors stopped shaped their experience of SAL. Some elements of the exhibition went virtually unnoticed while others drew almost half of all visitors.[1]

A section-by-section look at the tracking results shows that there were a few elements in each section that drew a significant number of visitors. Altogether 21 of the 106 separate exhibition elements in the exhibition and the HOSC each attracted at least one-fifth of the visitors who passed by them.[2] The first prominent element was the Remsen Lab Diorama near the entrance of the exhibition section, where over one-quarter (27.3%) of all visitors stopped. As we looked for distinguishing features in these key elements, there seemed to be three basic reasons why a particular exhibition element attracted a substantial number of viewers: (1) Design of the exhibition element, (2) Position of the element within the exhibition, (3) Content of the element.

Design of the Exhibition Element

The influence of exhibition element design upon visitors is clearest in the case of interactives. Only five interactives appear among the 21 most attractive elements, as shown in Table III.1. For four of these five, their high level of attractiveness seems to be influenced by the fact that they incorporate more sound and movement than most other interactives. (We could call this the "pin-ball effect.")

Table III.A.1
Visitor Stops at Interactives and Design Features
Stops that Drew at least One-fifth of Visitors Who Passed It
Tracking Study
(in percent)

Element	% of Visitors	Sound	Movement
Atom Smasher Interactive	28.8	√	√
Chain Reaction Interactive	28.0	√	√
Laser (in HOSC)	27.3		
DNA Xylophone	24.2	√	
Radioactivity (in HOSC)	20.0	√	

1 See Table III.C.1.
2 Sixteen were in the exhibition; five were in the HOSC. See Table III.C.1 and Table III.C.2.

Position of the Element

The position of an element within the exhibition space seems to have had an even stronger influence than its design. Only three elements drew forty percent of visitors: Nagasaki Photos (46.2%), Lab Bench (40.0%), and Public Reaction to the Birth Control Pill (38.6%). All three of these were placed at locations that blocked the flow of movement and virtually forced visitors to pay attention. Visitors strolling through the space were led up to these elements and then forced to turn a full ninety degrees to move past them. No other elements in the exhibition were placed in such a way as to restrict the smooth flow of visitors.

Five more of the twenty-one most attractive elements were probably effective because of a combination of object design and placement. (See Table III.2.)

Table III.A.2
Exhibition Elements whose Design/Position Drew Visitors
Stops that Drew at least One-fifth of Visitors Who Passed It
Tracking Study, (in percent)

Element	% of Visitors	Prominent Position	Prominent Design
Lab Entry Station	76.4/25.8*	√	
Nagasaki Photos	46.2	√	
Lab Bench	40.0	√	
Public Reaction to the Pill	38.6	√	
Remsen Lab Diorama	27.3	√	√(Sound)
Nylon Manufacture	24.2		
Lawn Pesticides	22.0	√	
Fermi Video	20.5		√(Sound)
Super-Collider	20.5		√(Size)

*While 76.4% of those entering HOSC stopped in the Entry area, 25.8% of all visitors stopped in the HOSC Entry area.

Content of the Element

Visitors arrive at an exhibition with background experiences and interests that make some elements inherently more interesting than others. Elements in SAL with particularly attractive content formed two groups: popular culture objects and topical subject matter. Popular culture objects are things associated with everyday life. When elevated and implicitly celebrated in a museum context, they acquire a particular aura that visitors find compelling.[3] As Table III.3 shows, one-third of the top twenty-one elements can be seen as content-driven.

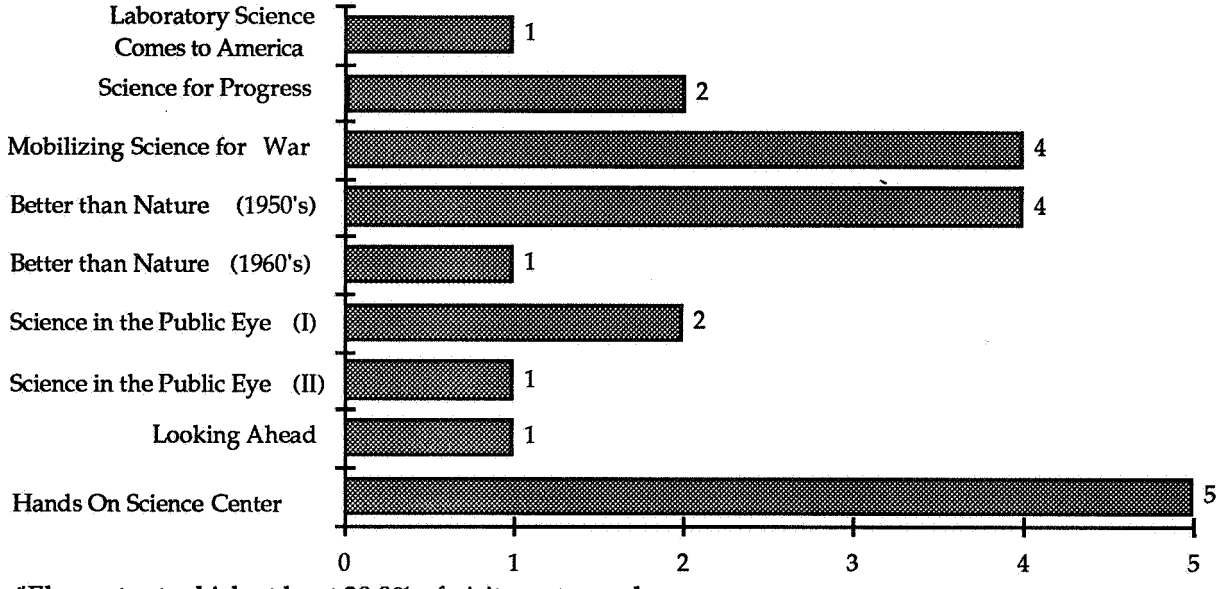
[3] The implications of this phenomenon in an exhibition context are explored in detail in Adam Bickford, Z. D. Doering, and A. Pekarik. *Space Fantasy and Social Reality: A Study of the Star Trek Exhibition at the National Air and Space Museum.* (Washington, D. C.: Smithsonian Institution).

Table III.A.3
Content-driven Visitor Stops and Content Features
Stops that Drew at least One-fifth of Visitors
Tracking Study
(in percent)

Location	Element	% of Visitors	Pop Culture Object	Topical
J80	Global Warming Computer	34.5		√
G12	Science Fiction	30,3	√	
E10	Atomic Popular Culture	29.5	√	
E01	Bomb Shelter	28.8	√	
G50	Cold Fusion	26.5		√
C11	World's Fair Toys	22.7	√	
E12	Tract House	22.0	√	

As we try to imagine the visitor experience based on their observed behavior, we see people attracted by movement, sound, and subject-matter familiarity, especially when those objects are prominently placed. Because these particularly attractive exhibits are found in every section of the exhibition except the entrance area (no more than one in twenty visitors stopped anywhere in the introductory room, other than at the HOSC entrance), the view that these visitors received would have touched on every part of the exhibition. But, either by intention or accident, these most compelling elements were not evenly distributed, as shown in Figure III.A.1.

Figure III.A.1
Twenty-one Most Attractive Elements,* by Exhibition Section
All visitors, Tracking Study
(in number of elements)



*Elements at which at least 20.0% of visitors stopped.

If you exclude the Hands On Science Center, which was experienced by a minority of visitors, half of the most attractive elements were contained in two thematic sections and dealt primarily with the atom bomb. We would expect from this data alone that ideas about the bomb would play major roles in the visitor experience.

Involvement with Exhibition Elements

Social composition of the visit group

For many visitors the exhibition experience is primarily social, an opportunity to share time with friends and family. Their movement through the exhibition will be affected by their interaction with their companions. In *Science in American Life*, for example, groups that included children made most of the stops (76.4%) in the Hands On Science Center.[4] Although groups with children made the same average number of stops as groups without children, they spent more time at each stop. Groups consisting entirely of children or teens made the longest stops of all. (See following section and Table III.C.6.)

On average, women spent as much time engaged with exhibition elements as men did, but they spent it differently than men did. No matter whether women visitors were alone, in an adult group, with children, or in a group of children or teens, they spent slightly more time using interactives than men did. And no matter what the size or composition of their visit group, women were more likely than men to do their looking together with other members of their group. (See following section, Table III.B.1.)

These differences in behavior may have affected responses. We might expect, for example, that the messages of the laboratory experience in the Hands On Science Center would particularly affect young visitors, and that interactives would be more effective with women.

---

4 This includes groups of at least one adult and one child, as well as groups of teens and children.

III.B. Description of Visitor Behavior: Tracking Survey

Interviewing visitors about their experiences in an exhibition, eliciting their recollections of elements that impressed them or were especially meaningful to them, and recording their responses to specific questions about the exhibition, provides one source of information about the communication of curatorial aims. Such data, by definition, are influenced by the ability of individuals to articulate their thoughts or their willingness to be forthcoming about their feelings.

An alternative method of data collection is to directly observe the behavior of visitors in an exhibition. Systematic observations can provide a different level of insight into the link between curatorial aims and the exhibition experience. To cite a simple example, if key information about an exhibition is contained in an introductory panel, its communication is dependent on visitors noticing it. If we find, through observation, that few visitors attend to the panel, we can assume that the communication of that information is limited. Or, while there is no direct evidence that time spent in an exhibition or at a particular element is directly related to the comprehension of its contents, an individual who quickly strolled through a space can be reasonably assumed to have had a different experience from one who spent considerable time in it.

We conducted a Tracking Study as part of our effort to understand the visitor experience in both the exhibition portion of *Science in American Life* and in the associated Hands On Science Center (HOSC). The movements and activities of 163 visitors through the exhibition space were recorded unobtrusively. These visitors were systematically selected as part of the Entrance Survey, but they were not interviewed about their experience of the exhibition. If we had not been limited by available resources, we would have interviewed tracked visitors as they left SAL in order to directly relate their observed behavior with their subjective reporting of the experience.

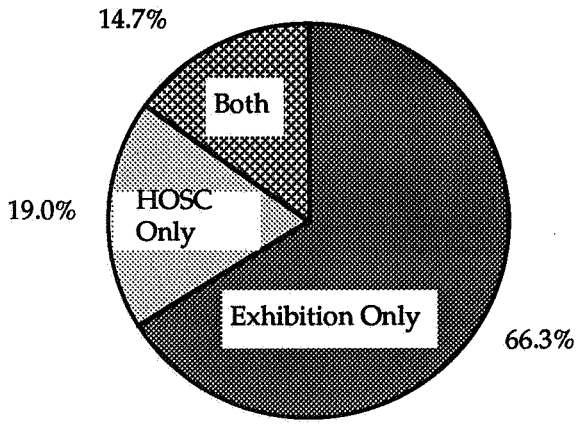
Tracked visitors made a total of 1,863 stops in the exhibition space and the Hands On Science Center.[5] A stop was recorded whenever a visitor stopped moving and focused on an exhibition component for three seconds or more. Pauses of less than three seconds were not recorded. On average, these visitors spent 15.7 minutes (±15.6 minutes) altogether in SAL (i.e., including HOSC). Half of the visitors spent 10.7 minutes (the median) or less in the exhibition spaces; the other half spent more time. Visitors made an average of 11.4 stops (±11.3 stops), each of which had an average length of 1.00 minute (±2.22 minutes). The median number of stops was eight. The median time spent at a stop was 0.45 minutes.

About two-thirds (66.3%) of the tracked visitors went only to the exhibition and not to the HOSC. Of the one-third (33.7%) who went to HOSC, about half of them also went to the exhibition. In other words, of the 163 visitors, 108 people (66.3%) went only to the exhibition, 31 people (19.0%) went only to the HOSC, and 24 people (14.7%) went to both the exhibition and HOSC (Figure III.B.1).

---

[5] This total includes cases where the same visitor returned to a previous stop, i.e., it includes both unique and "return" stops.

Figure III.B.1
Visitor Stops in the Exhibition and the Hands On Science Center
Tracking Survey
(in Percent)



Characteristics of Tracked Visitors

The visitors selected for tracking were mostly male (58.3%), predominantly white (87.7%), and over age 20 (79.1%).[6] Many of the individuals selected for tracking were in groups that included teenagers or children; 44.8 percent of all tracked visitors were observed in groups that included children.[7] The high proportion of family groups is characteristic of the Summer season at the museum.

Visits to the Hands On Science Center

As mentioned above, about one-third of all tracked visitors visited the Hands On Science Center (HOSC). Women were almost twice as likely to visit HOSC as men (45.6% of tracked women visited HOSC compared to 25.3% of tracked men). About two-fifths of teenagers and children and about two-fifths of adults between the age 35 and 54 visited the lab (44.1% and 42.4% respectively), compared to less than 30 percent of visitors in other age groups. In other words, the laboratory visitors were individuals in "parenting" ages, teenagers and children.

It is not surprising then, that among the tracked groups that visited the lab, 70.9 percent included children or teenagers. As noted above, among the total sample of tracked visitors, 44.8 percent included children or teenagers.

---

6 Because tracked visitors were not interviewed, we don't know the true age distribution of this sample. Ages and other demographic characteristics were estimated by observation.

7 These statistics reflect visitors to the exhibition quite closely. Overall, in the Entrance and Exit Surveys, we encountered 55.4% men, 88.8% non-minorities, and 46.7% of the visitors in groups which included children.

Characteristics of Visitor Stops

On average, those who visited only HOSC spent less total time there than those who visited only the exhibition (11.8 minutes vs. 14.7 minutes), but they spent virtually the same amount of total time engaged in stops (9.4 minutes vs. 9.6 minutes). Those who visited both the lab and the exhibition moved at the same pace as everyone else. Their average visit time (25.4 minutes) was nearly the same as the average lab time plus the average exhibition time. Their average time engaged in stops (19.0 minutes) was exactly the sum of the average total stop time in the lab plus the average total stop time in the exhibition. The overall average of 15.7 minutes is thus distorted by the long visits made by individuals who take time to be in both HOSC and the exhibition. It appears then that visitors saw the exhibition space and HOSC as two distinct experiences in the museum. Those who began in the HOSC did not hurry through the exhibition space; conversely, those who first visited the exhibition space did not spend a shorter amount of time in the HOSC than other visitors there.

The data on overall times describe only one part of the behavior of visitors. Since an overall visit is composed of time attending to individual elements as well as to other activities (e.g. taking care of a child's needs, examining a map, etc.), we now turn to time spent at individual elements (stop time). The average stop time was one minute. The total time engaged in viewing (sum of the stops), on average 11.0 minutes, was considerably less than the 15.7 minutes that visitors spent in the exhibition on average. The remaining time (nearly one-third of the time in the exhibition) was spent walking, pausing less than three seconds, talking to companions, tending to children, etc.[8] Although one visitor spent 91.6 minutes in the exhibition space, most visitors moved through the space rather quickly. This swift-moving behavior is typical for museum-goers, especially in the large museums.

Men made 64.9 percent of the stops in the main exhibition area while women made 54.2 percent of the stops in the Hands On Science Center. In other words, men made a disproportionate number of stops in the exhibition area and women in the HOSC. Adults ages 35 to 54 made 57.9 percent of the stops in the HOSC, while teen-agers and children made 17.1 percent of the stops. Groups that included children made 76.4 percent of all stops in the HOSC.

Visitors to an exhibition typically move through a gallery space freely. Visitors may return to a given element, and this repeat visitation was reflected in the above data. Overall, the tracked visitors made 144 "return stops" within the exhibition space; i.e., 7.7 percent of the stops were "return stops." We were able to find no pattern, however, in these repeat stops.

---

8 We did not find differences in the amount of "down time," among different types of visitors. For example, individuals viewing the exhibition alone spent as much "down time" as those with children.

Stops by Exhibition Location

Table III.C.1, in the next section, lists all of the exhibition elements included in the tracking protocol, the percentage of visitors who stopped at each element, and summary statistics for the amount of time visitors spent viewing the element.[9] The elements are ordered by exhibition section. [A map of the exhibition is in Appendix A, page A-9.]

Table III.C.2 contains the same information, but ordered on the basis of the percentage of visitors who stopped at each location rather than by spatial location. Thus, we see that more visitors stopped to see the photographs of the bombing of Nagasaki than stopped at any other exhibition element. Altogether, 46.2 percent of visitors to the exhibition spent three seconds or more examining the Nagasaki photos. The average stop at the Nagasaki photos was 0.96 minutes long (approximately 58 seconds) and the longest stop was 3.1 minutes.

The element that received the longest single stop time and the longest average stop time was the Lab Bench in the Hands On Science Center. The average stop time, for the 40.0 percent of Hands On Science Center visitors who stopped at the Lab Bench, was 7.8 minutes; at least one visitor spent almost half an hour (27.4 minutes) there. Table III.C.3 presents the same stop data ordered by the time spent at each location. Note that all of the elements in the exhibition with average stops of 1.5 minutes or more are videos.

The distribution of unique and repeat stops to the elements visited by at least one-fifth of visitors is shown in Table III.C.4 (next section). For these 21 elements, 83 out of 773 stops (10.7 percent) were repeats; i.e., a slightly higher number of repeats were made to these elements than were made, on average, to all stops in the exhibition. Only one of the top 21 elements, the Lab Bench in the Hands On Science Center, received more than 6 repeat stops. This element received the most number of repeat visits in the entire study (17). The element that received the most number of stops, the Nagasaki Photographs, was revisited only twice. The distributions of unique and repeat stops for all the other elements in Table III.C.3 show almost no evidence of visitors returning to an element once they passed it.[10]

Table III.C.5 (next section) presents the time data for the stops made by at least 20 percent of visitors. With the exception of stops made to the Lab Bench, these statistics show that average stop times range between thirty seconds and three minutes.

---

9 "Return stops" have been excluded from this table. The exclusion allows us to discuss the percentage of different visitors who made each stop. In this and the subsequent table, Column 1 is the location, as shown on the map used in tracking. Column 2 is a description. Column 3 shows the percentage of visitors who stopped there. Column 4 is the average length of those stops. Column 5 is the Standard Deviation for the average stop time. Column 6 is the length of the longest stop.

10 When all stops visitors made are compiled, the average stop time was 1.00 minutes. As noted, approximately eight percent of all stops were repeat stops, i.e., visitors returning to an exhibition element. For the unique stop data, the average length of stop was 0.92 minutes (55 seconds) (± 1.79 minutes) . The shortest stop was .05 minutes (3 seconds) and the longest stop was 27.45 minutes long. The median length stop was 0.45 minutes (27 seconds).

For the top 21 elements, the average stop time is 1.09 minutes (±2.41). But this statistic is misleading. Because of the extended amount of time visitors spent at the Lab Bench (an average of 7.75 minutes with at least one person spending 27.45 minutes at the bench), the average stop time statistic is biased towards the longer stop time. Consequently, the median is a more appropriate measure of the stop time distribution. This statistic indicates that half of the visitors spent just over one-half a minute at the elements visited by at least 20 percent of visitors, while just under half spent less than half a minute (the median is 0.45 minutes or approximately 27 seconds).

Variations in Stop Time

The characteristics of individuals, as well as of exhibition elements, influence stop time. Table III.C.6 shows the variables which displayed considerable variation.

Among the background characteristics available for the tracked visitors, stop time varied significantly by age and group composition.[11] Visitors whose age was estimated to be between 40 and 49 had the longest average visit time (1.16 minutes per stop), followed by visitors age 19 or younger (0.99 minutes per stop). Visitors older than 50 had the shortest average stop time (0.5 minutes). Visitors age 19 or younger visiting the exhibition with groups of their peers had the longest average stop time (1.41 minutes) among all visit groups. Adult visitors in groups of adults had the shortest average stop time (0.66 minutes).

Stop time also varied significantly by three characteristics of the exhibition visit: the overall type of visit (whether all stops were made in the exhibition, whether all stops were made in the lab, or whether stops were made in both areas), by the type of each stop (at the lab bench, at another lab installation, at an exhibition interactive, or at another exhibition installation), and by the type of element visited at each stop (interactive [including the lab bench], interactive [excluding the lab bench], video, object, photo, or text).

Those visitors who only stopped in the HOSC had the longest stop times (2.22 minutes). The shortest average stop time was for visitors who did not visit the lab at all (0.76 minutes); i.e., those who went only to the exhibition. The longest average stops were at the HOSC lab bench (7.75 minutes). Stops at other locations in the lab were second (1.85 minutes), followed by stops at interactives in the exhibition (0.98 minutes) and other stops in the exhibition (0.70 minutes). The longest stop in the entire Tracking Study was recorded at the lab bench (27.4 minutes) and this clearly inflates the value of the mean stop time for these stops. However, the median stop time at the lab bench is 2.10 minutes, which is over twice as long as the next closest median for other stops in the lab.

Stop times also vary by element types. Stops at interactives (which include the Lab Bench) have the longest average time (1.56 minutes), followed by stops at non-

---

11 Stop time did not vary significantly by either gender or by observed racial and ethnic identification.

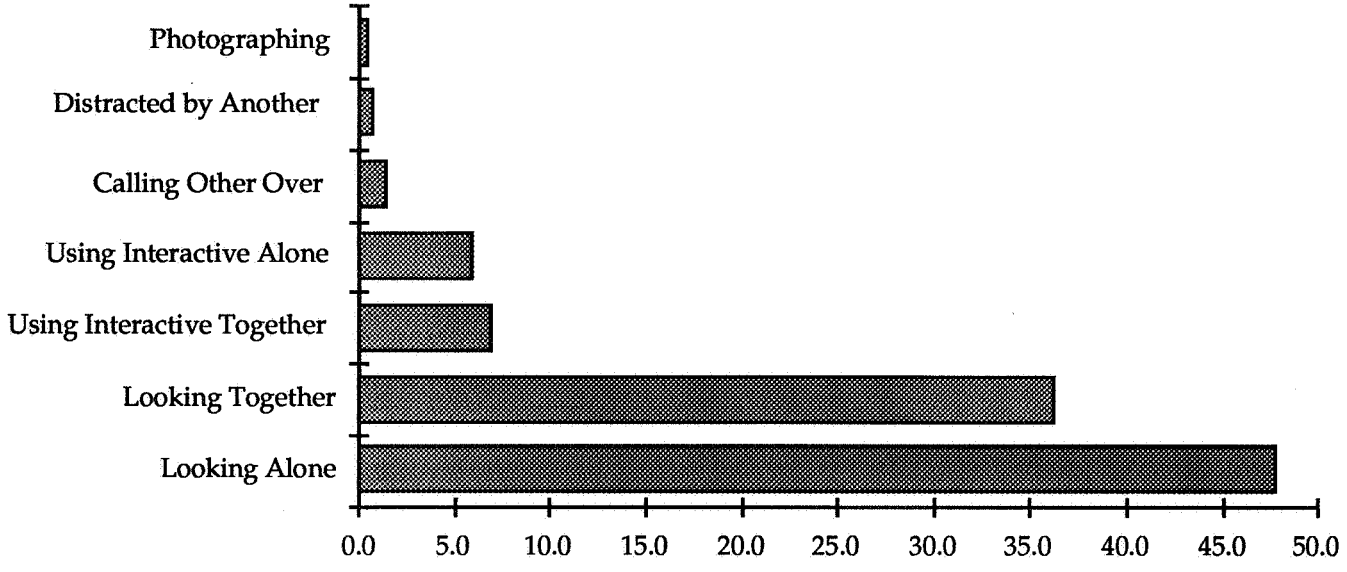
interactive video installations (1.51 minutes). When the Lab Bench is excluded, the average time drops to 1.24 minutes. For the other types of elements, displays featuring objects, photographs and texts, average and median stop times are all under one-minute. These data clearly demonstrate the holding power of interactive and video installations. (Recall that Table III.C.3, listing stops in rank order by time/stop, shows that all of the elements with stops of 1.5 minutes or more are videos.)

Social Interaction at SAL Stops

At each stop, a limited number of visitor activities were recorded. These activities included looking at something in SAL, stopping together with a group member, using an interactive, calling a group member over to their location, being beckoned by a group member to another location, and photographing at the stop location. Up to four activities were recorded at each stop, although in 90.8 percent of the stops the tracked visitor engaged in only one of these activities. Given the brevity of most stops, no attempt was made to gauge how much time at a given stop was allocated to any particular activity.

Two general types of social interaction account for 97.3 percent of all stops, looking at an installation and using an interactive (see Figure II.B.2). The most common activity was looking at an installation alone (47.9%), followed by visitors looking at an installation together (36.4%).

Figure III.B.2
Social Activity at Exhibition and HOSC Stops
Tracking Study
(in Percent)



The least common activity was taking pictures of the exhibition (0.5%). By our classification, interactives were 22.1 percent of the elements in the exhibition and 90.9 percent of those in the HOSC or 29.2 percent in total. As Table III.B.1 shows, tracked

visitors used interactives 13.0 percent of the time. Therefore, visitors do not appear to have used interactives proportionate to their presence in the SAL spaces.[12] But altogether, visitors spent 25.3 percent of their stops at interactives, which is fairly close to their overall representation in the exhibition. This means that while visitors were drawn to interactives to the same degree that they were drawn to other kinds of displays, they were as likely to look at them or to watch other people using them as they were to using them themselves.

In the analysis that follows, the three smallest categories of social interaction are considered as varieties of "looking" and subsumed under that classification. Consequently, four types of activity are discussed: looking at an element alone, looking at an element together with a group member, using an interactive alone, and using an interactive together with a group member.

Most of the significant differences in the social interaction codes are between stops where individuals simply looked at an installation alone and where they looked at an installation together with another member of their party. For example, Table III.B.1 shows the distribution of activities by gender. The proportions of each gender looking at an installation alone versus performing an activity with a group member are virtually mirror images of one another. Women looked at an installation alone 39.5 percent of the time and looked at something with a companion 44.5 percent of the time. Men, on the other hand looked at something alone in 57.3 percent of their stops and looked together with a companion 31.5 percent of the time. Women generally used interactives more often than men (in 15.9% of their stops compared to 11.2% for men), regardless of whether they used them alone or with a group member.

Table III.B.1
Social Interaction at Unique Stops, by Gender
Tracking Study
(in Percent)

	Female	Male	Total
Looking	84.1	88.8	87.0
Alone	*39.5*	*57.3*	*50.7*
Together	*44.5*	*31.5*	*36.4*
Using Interactives	15.9	11.2	13.0
Alone	*6.4*	*5.7*	*6.0*
Together	*9.5*	*5.5*	*7.0*
Total	100.0	100.0	100.0

Table III.B.2 shows the distribution of activities by age. Generally, in all age categories more visitors looked at an item alone than with a companion; and in most age categories more visitors also used interactive stations alone than with a companion. The use of interactives was much more evenly divided between those who used them alone and those who used them along with another member of their group. Overall, visitors under 30 used interactives most frequently (17.2% of stops made by children and

[12] If they were used proportionately, usage would be about double, i.e., 29 percent rather than 13 percent.

teenagers, and 15.7% of stops made by those between 20 and 19 years of age), while visitors age 50 and older used interactives least (in only 4.7% of their stops).

Table III.B.2
Social Interaction at Unique Stops by Age
Tracking Study
(in Percent)

	12 to 19	20 to 29	30 to 39	40 to 49	50 and Older	Total
Looking	82.8	84.3	88.5	87.0	95.3	87.0
Alone	*42.6*	*57.3*	*49.0*	*58.1*	*50.7*	*50.7*
Together	*40.2*	*27.0*	*39.5*	*28.9*	*44.6*	*36.4*
Using Interactives	17.2	15.7	11.5	13.0	4.7	13.0
Alone	*9.1*	*8.0*	*4.5*	*6.5*	*1.4*	*6.0*
Together	*8.2*	*7.7*	*7.1*	*6.5*	*3.4*	*7.0*
Total	100.0	100.0	100.0	100.0	100.0	100.0

Independently of the type of elements in the exhibition, most tracked visitors preferred to spend their time just looking, whether alone or with other members of their group. The percentage of stops where the tracked visitor looked at an element varied between 99.4 percent for installations consisting of objects to 52.2 percent for interactives (see Table III.B.3).

Table III.B.3
Social Interaction by Type of Stop
Tracking Study
(in Percent)

	Interactive	Video	Object	Photos	Text	Total
Looking	52.2	97.2	99.4	96.7	98.6	87.0
Alone	*25.5*	*66.4*	*57.7*	*56.2*	*66.0*	*50.7*
Together	*26.7*	*30.8*	*41.7*	*40.5*	*32.7*	*36.4*
Using Interactives	47.8	2.8*	0.6*	3.3*	1.4*	13.0
Alone	*21.6*	*0.9*	*0.2*	*3.3*	*0.7*	*6.0*
Together	*26.2*	*1.9*	*0.3*	*0.0*	*0.7*	*7.0*
Total	100.0	100.0	100.0	100.0	100.0	100.0

*These were visitors who handled or touched a display. In total, this involved 15 stops of the 223 interactive stops.

Use of Interactives

Table III.C.7 (in the next section) shows the distribution of unique stops at all interactive stations. Among stops made at interactive stations in the main exhibition, Low-Tech Interactives were used most often (53.5 percent of the stops). This is in contrast to stops made at the Flip-Slide Interactives (47.4% of the stops made at these stations) and stops made at the Computer Interactives (35.2% of the stops). Among all of the interactive

stations in the main exhibition, the Chilly Tomato Slide Panel was used most frequently (in 70.8% of the stops) while Pesticide Cubes and the Garbage/Landfill Video were used least frequently (in 18.2% of the stops). The effectiveness of the Garbage/Landfill Video in communicating a message to exhibition visitors (as determined by the exit interviews) was remarkably disproportionate to its drawing power in comparison with other interactives.

In the Hands On Science Center, the Computer Interactive stations were used most frequently (66.7 percent of the stops made to the two stations) followed by the Low-Tech Interactive materials (58.3% of the stops) and the two demonstration sections (37.8% of the stops).[13] The interactive station used most often was the Radioactivity activity (in 81.8% of the stops) and the station used least was the Lab Bench (in 22.7% of the stops). This makes some sense since the Lab Bench activities were constrained by the availability of a docent to operate the lab equipment, as well as by the limited number of seats available at a given time.

[13] Although the Laser demonstration is an interactive station, the activities one can perform are limited by the physical arrangement of the installation. In this sense, the Laser is more like the guided activities available at the Lab Bench. In the other Low-Tech Interactive stations, visitors were relatively free to experiment with the materials. For this reason, the Laser has been classified as a "Demonstration" rather than a "Low-Tech Interactive".

II.D.

Supporting Tables: Entrance and Exit Surveys

Table II.D.1
Visitor Mention of Exhibition Components: Spatial Order

1	2	3	4	5
	Component	Q10. Percent who thought it conveyed SAL message	Q12. Percent who found it most informative	Q13. Percent who found it most interesting
B&C	**Pre-War Science (general)**	1.7	1.0	2.3
B10	Remsen Lab	1.3	2.3	0.3
C70	Pure Food	0.5	1.8	1.2
C50	Hampton Institute		1.5	
C90	World's Fair Video		1.2	0.5
D	**The Atomic Age (general)**	11.7	5.8	11.3
D12	First Reactor	2.4	6.7	4.2
D70	Atom Smasher		6.1	3.4
D80	Minorities interactive		1.5	0.2
D71	Nuclear control rods		4.5	0.9
D21	Nagasaki photos	1.5	8.7	5.4
E	**Post-War (general)**	3.9	2.4	3.5
E01	Fallout Shelter	0.9	4.1	4.8
E80	Bob's Weekend Video	0.5	0.9	0.7
E12	Post-war House	1.7	2.0	2.2
F	**Birth Control section (general)**	1.1	2.8	0.9
G30/90	**Rachel Carson section**	2.3	0.3	0.9
G12	Ninja Turtle display	1.9	1.3	2.1
H	**Modern Issues (general)**	1.1	2.5	2.5
H81	Genetic Engineering Video	2.3	7.9	5.5
H91	Cambridge debates video	0.5	1.7	1.4
H03/10/30	**Ozone hole section**	2.0	2.0	1.8
H11	Supercollider	0.5	1.8	0.9
H80	Women in science interactive		0.5	1.1
I	**Looking Ahead (general)**	2.3	1.4	3.1
I60	Chilly Tomato		1.7	1.0
I70	Blue Jeans		0.5	0.2
I80	Garbage/Landfill video	4.6	4.8	2.1
I82	Gene Splicing	1.6	2.7	2.5
I71	DNA Xylophone		2.5	1.3
I90	Night at the opera video		0.5	0.6

Source: Institutional Studies Office (ISO)

Table II.D.1
Visitor Mention of Exhibition Components: Spatial Order

1	2	3	4	5
	Component	Q10. Percent who thought it conveyed SAL message	Q12. Percent who found it most informative	Q13. Percent who found it most interesting
	(cont.)			
J	**Hands-on Science Center (general)**	8.8	2.0	3.6
J80	Global Warming	0.3	1.5	0.5
J81	Teacher's resource center	0.4	1.9	0.3
J61	Lab bench experiments	0.4	6.0	3.0
J75	Intelligence tests		0.4	0.4
J60	Laser demo	0.8	0.5	0.6
	Other			
	Unspecified interactive	1.8		0.9
	Everything	5.6		2.2
	"progress/ history"	10.8		1.0
	Variety, range	2.8		2.0
	Multiple items	11.4		0.8
	Wrong exhibition	5.5		0.9
	No object mentioned	4.3		12.2
	Don't know/ blank	0.7	2.5	3.3
	Total	100.0	100.0	100.0

Source: Institutional Studies Office (ISO)

Table II.D.2
Visitor Mention of Exhibition Components: In Order of Component that Communicated Main Idea

1	2	3	4	5	6
	Component	Q10. Percent who thought it conveyed SAL message	Q12. Percent who found it most informative	Q13. Percent who found it most interesting	Rank
D	**The Atomic Age (general)**	*11.7*	5.8	11.3	*1*
J	**Hands-on Science Center (general)**	*8.8*	2.0	3.6	*2*
I80	Garbage/Landfill video	*4.6*	4.8	2.1	*3*
E	**Post-War (general)**	*3.9*	2.4	3.5	*4*
D12	First Reactor	*2.4*	6.7	4.2	*5*
H81	Genetic Engineering Video	*2.3*	7.9	5.5	*6*
G30/90	**Rachel Carson section**	*2.3*	0.3	0.9	*7*
I	**Looking Ahead (general)**	*2.3*	1.4	3.1	*8*
H03/10/30	**Ozone hole section**	*2.0*	2.0	1.8	*9*
G12	Ninja Turtle display	*1.9*	1.3	2.1	*10*
B&C	**Pre-War Science (general)**	*1.7*	1.0	2.3	*11*
E12	Post-war House	*1.7*	2.0	2.2	*12*
I82	Gene Splicing	*1.6*	2.7	2.5	*13*
D21	Nagasaki photos	*1.5*	8.7	5.4	*14*
B10	Remsen Lab	*1.3*	2.3	0.3	*15*
F	**Birth Control section (general)**	*1.1*	2.8	0.9	*16*
H	**Modern Issues (general)**	*1.1*	2.5	2.5	*17*
E01	Fallout Shelter	*0.9*	4.1	4.8	*18*
J60	Laser demo	*0.8*	0.5	0.6	*19*
H91	Cambridge debates video	*0.5*	1.7	1.4	*20*
C70	Pure Food	*0.5*	1.8	1.2	*21*
E80	Bob's Weekend Video	*0.5*	0.9	0.7	*22*
H11	Supercollider	*0.5*	1.8	0.9	*23*
J81	Teacher's resource center	*0.4*	1.9	0.3	*24*
J61	Lab bench experiments	*0.4*	6.0	3.0	*25*
J80	Global Warming	*0.3*	1.5	0.5	*26*
D70	Atom Smasher		6.1	3.4	
D71	Nuclear control rods		4.5	0.9	
I71	DNA Xylophone		2.5	1.3	
I60	Chilly Tomato		1.7	1.0	
D80	Minorities interactive		1.5	0.2	
C50	Hampton Institute		1.5		
C90	World's Fair Video		1.2	0.5	
I70	Blue Jeans		0.5	0.2	
H80	Women in science interactive		0.5	1.1	
I90	Night at the opera video		0.5	0.6	
J75	Intelligence tests		0.4	0.4	

Source: Institutional Studies Office (ISO)

Table II.D.3

Visitor Mention of Exhibition Components: In Order of Component that Visitors Found Most Informative

1	2	3	4	5	6
	Component	Q10. Percent who thought it conveyed SAL message	Q12. Percent who found it most informative	Q13. Percent who found it most interesting	Rank
D21	Nagasaki photos	1.5	*8.7*	5.4	*1*
H81	Genetic Engineering Video	2.3	*7.9*	5.5	*2*
D12	First Reactor	2.4	*6.7*	4.2	*3*
D70	Atom Smasher		*6.1*	3.4	*4*
J61	Lab bench experiments	0.4	*6.0*	3.0	*5*
D	**The Atomic Age (general)**	11.7	*5.8*	11.3	*6*
I80	Garbage/Landfill video	4.6	*4.8*	2.1	*7*
D71	Nuclear control rods		*4.5*	0.9	*8*
E01	Fallout Shelter	0.9	*4.1*	4.8	*9*
F	**Birth Control section (general)**	1.1	*2.8*	0.9	*10*
I82	Gene Splicing	1.6	*2.7*	2.5	*11*
I71	DNA Xylophone		*2.5*	1.3	*12*
H	**Modern Issues (general)**	1.1	*2.5*	2.5	*13*
E	**Post-War (general)**	3.9	*2.4*	3.5	*14*
B10	Remsen Lab	1.3	*2.3*	0.3	*15*
J	**Hands-on Science Center (general)**	8.8	*2.0*	3.6	*16*
H03/10/30	**Ozone hole section**	2.0	*2.0*	1.8	*17*
E12	Post-war House	1.7	*2.0*	2.2	*18*
J81	Teacher's resource center	0.4	*1.9*	0.3	*19*
C70	Pure Food	0.5	*1.8*	1.2	*20*
H11	Supercollider	0.5	*1.8*	0.9	*21*
H91	Cambridge debates video	0.5	*1.7*	1.4	*22*
I60	Chilly Tomato		*1.7*	1.0	*23*
D80	Minorities interactive		*1.5*	0.2	*24*
C50	Hampton Institute		*1.5*		*25*
J80	Global Warming	0.3	*1.5*	0.5	*26*
I	**Looking Ahead (general)**	2.3	*1.4*	3.1	*27*
G12	Ninja Turtle display	1.9	*1.3*	2.1	*28*
C90	World's Fair Video		*1.2*	0.5	*29*
B&C	**Pre-War Science (general)**	1.7	*1.0*	2.3	*30*
E80	Bob's Weekend Video	0.5	*0.9*	0.7	*31*
J60	Laser demo	0.8	*0.5*	0.6	*32*
I70	Blue Jeans		*0.5*	0.2	*33*
H80	Women in science interactive		*0.5*	1.1	*34*
I90	Night at the opera video		*0.5*	0.6	*35*
J75	Intelligence tests		*0.4*	0.4	*36*
G30/90	**Rachel Carson section**	2.3	*0.3*	0.9	*37*

Source: Institutional Studies Office (ISO)

Table II.D.4

Visitor Mention of Exhibition Components: In Order of Component that Visitors Found Most Interesting

1	2	3	4	5	6
	Component	Q10. Percent who thought it conveyed SAL message	Q12. Percent who found it most informative	Q13. Percent who found it most interesting	Rank
D	**The Atomic Age (general)**	11.7	5.8	*11.3*	*1*
H81		2.3	7.9	*5.5*	*2*
D21	Nagasaki photos	1.5	8.7	*5.4*	*3*
E01	Fallout Shelter	0.9	4.1	*4.8*	*4*
D12	First Reactor	2.4	6.7	*4.2*	*5*
J	**Hands-on Science Center (general)**	8.8	2.0	*3.6*	*6*
E	**Post-War (general)**	3.9	2.4	*3.5*	*7*
D70	Atom Smasher		6.1	*3.4*	*8*
I	**Looking Ahead (general)**	2.3	1.4	*3.1*	*9*
J61	Lab bench experiments	0.4	6.0	*3.0*	*10*
H	**Modern Issues (general)**	1.1	2.5	*2.5*	*11*
I82	Gene Splicing	1.6	2.7	*2.5*	*12*
B&C	**Pre-War Science (general)**	1.7	1.0	*2.3*	*13*
E12	Post-war House	1.7	2.0	*2.2*	*14*
I80	Garbage/Landfill video	4.6	4.8	*2.1*	*15*
G12	Ninja Turtle display	1.9	1.3	*2.1*	*16*
H03/10/30	**Ozone hole section**	2.0	2.0	*1.8*	*17*
H91	Cambridge debates video	0.5	1.7	*1.4*	*18*
I71	DNA Xylophone		2.5	*1.3*	*19*
C70	Pure Food	0.5	1.8	*1.2*	*20*
H80	Women in science interactive		0.5	*1.1*	*21*
I60	Chilly Tomato		1.7	*1.0*	*22*
G30/90	**Rachel Carson section**	2.3	0.3	*0.9*	*23*
F	**Birth Control section (general)**	1.1	2.8	*0.9*	*24*
D71	Nuclear control rods		4.5	*0.9*	*25*
H11	Supercollider	0.5	1.8	*0.9*	*26*
E80	Bob's Weekend Video	0.5	0.9	*0.7*	*27*
J60	Laser demo	0.8	0.5	*0.6*	*28*
I90	Night at the opera video		0.5	*0.6*	*29*
J80	Global Warming	0.3	1.5	*0.5*	*30*
C90	World's Fair Video		1.2	*0.5*	*31*
J75	Intelligence tests		0.4	*0.4*	*32*
B10	Remsen Lab	1.3	2.3	*0.3*	*33*
J81	Teacher's resource center	0.4	1.9	*0.3*	*34*
I70	Blue Jeans		0.5	*0.2*	*35*
D80	Minorities interactive		1.5	*0.2*	*36*
C50	Hampton Institute		1.5		*37*

Source: Institutional Studies Office (ISO)

Table II.D.5

Visitor Mention of Exhibition Components: Top 10 Mentioned in Response to Q10,Q12 or Q13

1	2	3	4	5	6
	Component	Q10. Percent who thought it conveyed SAL message	Q12. Percent who found it most informative	Q13. Percent who found it most interesting	Overall Rank
D	**The Atomic Age (general)**	11.7	5.8	11.0	*1*
H81	DNA Fingerprinting	2.3	7.9	5.3	*2*
D12	First Reactor	2.4	6.7	4.1	*3*
D21	Nagasaki photos	1.5	8.7	5.2	*4*
I80	Garbage/Landfill	4.6	4.8	2.1	*5*
J	**Hands-on Science Center (general)**	8.8	2.0	2.6	*6*
E01	Fallout Shelter	0.9	4.1	4.6	*7*
J61	Lab bench experiments	0.4	6.0	2.9	*8*
D70	Atom Smasher		6.1	3.3	*9*
D71	Nuclear control rods		4.5	0.9	*10*

Source: Institutional Studies Office (ISO)

Table II.D.6

Impact of the Top Ten Components

How to read Table II.D.6

Each of the following ten pages describes responses to one of the components cited by at least 5 percent of visitors as either embodying the message of SAL, being most interesting, or being most informative.

Each page is divided into three parts, one for each of these three responses. The top section, for example, lists the percentage of visitors who cited this component as the one that conveyed the exhibition message to them. This is immediately followed by a list of the messages these people thought it conveyed, along with percentages.

When a particular group of visitors is heavily over-represented among those who cited a component, we identify that group and their percentage among those who cited the component.

We have only cited over-representation when the percentage of those who cited the component equals or exceeds 5 percent of the total population and when the instance of over-representation is particularly strong. For comparisons you may wish to consult the last page of Table II.D.6 (page 77) which gives the distribution of gender, age, social composition of visit group, education, and training among all respondents to the Exit Survey. (This data is also contained in Table II.D.12 (pages 81-83), the supplementary table to the discussion of all demographic characteristics.)

Table II.D.6

Impact of the Top Ten Components

D	**The Atomic Age (general)**		Percent
		Percent of visitors who thought it conveyed SAL message	11.7
		Messages they thought it embodied:	
		Science has benefits and risks	5.0
		History/science & society	2.0
		Progress	1.7
		Clarified role of science in life	1.5
		Science is positive	0.7
		U.S. leads world in science	0.5
		Communicated effectively	0.3
		Total	11.7
		Who said that Atomic Age conveyed the message:	
		67.3% of them were ages 25 to 44	
		Percent of visitors who found it most informative	5.8
		Ideas it gave them:	
		Problems/dangers	1.6
		Learned how it works	0.8
		Social dimensions/conflicts	0.7
		Personal interest	0.6
		Progress	0.5
		Science is positive	0.5
		Gave feeling for the time	0.4
		Learned something new	0.3
		Don't know	0.4
		Total	5.8
		Who said that Atomic Age was most informative:	
		80.2% of them were men	
		40.8% were groups of two adults	
		Percent of visitors who found it most interesting	11.3
		Reasons why:	
		Historical development	3.0
		Personal interest	2.3
		Problems/dangers	1.7
		Gave feeling for the time	1.3
		Made science easier	0.4
		Social issues	0.3
		Future directions	0.3
		Communicated effectively	0.2
		Progress	0.2
		Don't know	1.7
		Total	11.3
		Who said that Atomic Age was most interesting:	
		78.8% of them were men	

Source: Institutional Studies Office (ISO)

Table II.D.6

D12 First Reactor

Percent of visitors who thought it conveyed SAL message		2.4
Messages they thought it embodied:		
	Science is important	1.1
	History/science & society	1.0
	Progress	0.4
	Total	2.4

Percent of visitors who found it most informative		6.7
Ideas it gave them:		
	Historical development	2.2
	Learned something new	1.0
	Learned how it works	0.8
	Science is positive	0.6
	Seeing the real thing	0.5
	Gave feeling for the time	0.2
	Made science easier	0.2
	Don't Know	1.1
	Total	6.7

Who said that First Reactor was most informative:
72.5% of them had a Bachelor's or MA/PhD/Professional
48.4% of them have scientific training

Percent of visitors who found it most interesting		4.2
Reasons why:		
	Learned something new	2.1
	Historical development	0.6
	Seeing the real thing	0.5
	Gave feeling for the time	0.3
	Power/potential of science	0.3
	Made science easier	0.2
	Don't Know	0.3
	Total	4.2

Source: Institutional Studies Office (ISO)

Table II.D.6

D70 Atom Smasher

Percent of visitors who thought it conveyed SAL message	0.0
Percent of visitors who found it most informative	6.1
Ideas it gave them:	
Learned how it works	1.9
Learned something new	1.6
Historical development	0.5
Future directions	0.4
Social issues	0.3
Problems/dangers	0.3
Communicated effectively	0.3
Made science easier	0.1
Don't Know	0.8
Total	6.1
Who said that Atom Smasher was most informative:	
58.7% of them were adults and children visiting together	
73.2% of them were men	
47.5% of them have science training	
Percent of visitors who found it most interesting	3.4
Reasons why:	
Learned how it works	1.0
Made science easier	1.0
Participatory/interactive	0.3
Historical development	0.3
Learned something new	0.2
Personal Interest	0.2
Don't Know	0.4
Total	3.4

Source: Institutional Studies Office (ISO)

Table II.D.6

D71 Nuclear control rods

Percent of visitors who thought it conveyed SAL message		0.0
Percent of visitors who found it most informative		4.5
Ideas it gave them:		
Learned how it works		2.8
Historical development		0.3
Don't Know		1.4
	Total	4.5
Who said that Control Rods were most informative:		
64.7% of them were adults and children visiting together		
61.6% of them had a bachelor's or graduate degree		
86.2% of them were men		
Percent of visitors who found it most interesting		0.9
Reasons why:		
Personal Interest		0.6
Learned how it works		0.3
	Total	0.9

Source: Institutional Studies Office (ISO)

Table II.D.6

D21 Nagasaki photos

Percent of visitors who thought it conveyed SAL message		1.5
Messages they thought it embodied:		
	Science has benefits and risks	1.1
	Progress	0.4
	Total	1.5

Percent of visitors who found it most informative		8.7
Ideas it gave them:		
	Gave feeling for the time	3.4
	Problems/dangers	2.6
	Clarified role of science in life	1.0
	Personal Interest	0.7
	Science is positive	0.5
	Communicated effectively	0.3
	Don't Know	0.3
	Total	8.7

Who said that Nagasaki photos were most informative:
41.5% of them have had some college but not a bachelor's degree

Percent of visitors who found it most interesting		5.4
Reasons why:		
	Gave feeling for the time	1.9
	Personal Interest	1.1
	Communicated effectively	0.5
	It is topical/ current	0.4
	Problems/dangers	0.3
	Learned something new	0.3
	Historical development	0.2
	Clarified role of science in life	0.2
	Don't Know	0.5
	Total	5.4

Who said that:
66.2% of them were ages 25 - 54

Source: Institutional Studies Office (ISO)

Table II.D.6

E01 Fallout Shelter

Percent of visitors who thought it conveyed SAL message		0.9
Message they thought it embodied:		
Science is positive		0.9

Percent of visitors who found it most informative		4.1
Ideas it gave them:		
Gave feeling for the time		2.7
Historical development		0.5
Problems/dangers		0.3
Don't Know		0.5
	Total	4.1

Percent of visitors who found it most interesting		4.8
Reasons why:		
Personal Interest		2.2
Learned something new		1.0
Seeing the real thing		0.5
Gave feeling for the time		0.4
Communicated effectively		0.1
Don't Know		0.6
	Total	4.8

Who said that Fallout Shelter was most interesting:
72.1% of them were ages 25 - 44

Source: Institutional Studies Office (ISO)

Table II.D.6

H81 DNA Fingerprinting

Percent of visitors who thought it conveyed SAL message		2.3
Messages they thought it embodied:		
Learned something new		0.7
History/science & society		0.5
Progress		0.5
Science is important		0.4
Science is positive		0.3
	Total	2.3

Percent of visitors who found it most informative		7.9
Ideas it gave them:		
Learned something new		3.2
Learned how it works		1.5
It is topical/ current		0.9
Personal interest		0.9
Progress		0.6
Science is positive		0.5
Don't Know		0.4
	Total	7.9

Who said that DNA was most informative:
- 32.6% of them were ages 12 to 19
- 69.8% of them were men

Percent of visitors who found it most interesting		5.5
Reasons why:		
Science is positive		0.3
Learned something new		0.3
Learned how it works		0.7
Future directions		0.8
It is topical/ current		0.7
Personal interest		1.7
Don't Know		1.0
	Total	5.5

Who said that DNA was most interesting:
- 55.9% of them were under age 25
- 79.9 % of them were men
- 54.6% of them have family members with science training

Source: Institutional Studies Office (ISO)

Table II.D.6

I80 Garbage/Landfill video

Percent of visitors who thought it conveyed SAL message		4.6
Messages they thought it embodied:		
	Problems/dangers	2.0
	Progress	1.0
	Science is helpful/useful	0.7
	Science is important	0.5
	History/science & society	0.5
	Total	4.6
Who said that Garbage/Landfill conveyed the message:		
	88.4% of them were women	
	42.3% of them were ages 12 to 24	
Percent of visitors who found it most informative		4.8
Ideas it gave them:		
	Problems/dangers	2.5
	Learned something new	1.9
	Future directions	0.3
	Social dimensions/conflicts	0.1
	Total	4.8
Who said that Garbage/Landfill was most informative:		
	69.2% of them have no science training and no family members with science training	
Percent of visitors who found it most interesting		2.1
Reasons why:		
	Personal Interest	0.6
	Learned something new	0.5
	Social dimensions/conflicts	0.5
	Don't Know	0.6
	Total	100.0

Source: Institutional Studies Office (ISO)

Table II.D.6

J **Hands-on Science Center (general)**

Percent of visitors who thought it conveyed SAL message		8.8
Messages they thought it embodied:		
	Science is important	2.8
	History/science & society	2.1
	Progress	1.3
	Clarified role of science in life	1.2
	Made science easier	0.6
	Made science clearer	0.5
	Science is positive	0.2
	Don't Know	0.3
	Total	8.8

Who said that HOSC conveyed the message:
78.2% of them were ages 35 to 54

Percent of visitors who found it most informative		2.0
Ideas it gave them:		
	Science is interesting	0.4
	Clarified role of science in life	0.4
	Science is positive	0.4
	Made science easier	0.3
	Communicated effectively	0.2
	Historical development	0.2
	Don't Know	0.2
	Total	2.0

Percent of visitors who found it most interesting		3.6
Reasons why:		
	Participatory/interactive	1.6
	Personal interest	0.8
	Learned something new	0.3
	Historical development	0.3
	Science is positive	0.3
	Communicated effectively	0.3
	Total	3.6

Source: Institutional Studies Office (ISO)

Table II.D.6

J61 Lab bench experiments

Percent of visitors who thought it conveyed SAL message		0.4
Message they thought it embodied:		
Science is important		0.4
Percent of visitors who found it most informative		6.0
Ideas it gave them:		
Participatory/interactive		1.4
Learned how it works		1.3
Learned something new		1.0
Problems/dangers		0.5
Teach science to children		0.4
Communicated effectively		0.3
Made science easier		0.2
Clarified role of science in life		0.2
Personal interest		0.2
Don't Know		0.5
	Total	6.0
Who said that Lab Bench was most informative:		
76.1% of them were in groups of adults and chilc		
42.9% of all visitors under age 12		
Percent of visitors who found it most interesting		3.0
Reasons why:		
Learned something new		0.5
Learned how it works		0.6
Participatory/interactive		1.1
Personal interest		0.6
Don't know		0.2
	Total	3.0

Source: Institutional Studies Office (ISO)

Table II.D.6

Supplemental Information

Distribution of Selected Characteristics of Respondents

Exit Survey

Age	%
Less than 12	6.5
12 to 19	16.4
20 to 24	6.7
25 to 34	15.5
35 to 44	30.9
45 to 54	14.8
55 to 64	6.6
65 or older	2.7
Total	100.0
Gender	
Men	56.6
Women	43.4
Total	100.0
Social Composition of Visit Group	
Alone	10.8
Pair of adults	21.7
Group of adults	12.8
Adult(s) and child(ren)	48.7
School group/tour group	6.0
Total	100.0
Education (all ages)	
High School graduate or less	32.1
Some College/AA/Jr College	17.5
Bachelor's Degree/Some Grad	31.0
MA/PhD/Professional	19.4
Total	100.0
Scientific Training	
Respondent has no training	44.9
Respondent has training	27.2
Family member has training	27.9
Total	100.0

Source: Institutional Studies Office (ISO)

Table II.D.7

Logistic Regression in Probability of
a Respondent Being Influenced by SAL Exhibition
Exit Survey, All Respondents Age 12 and Over

	Coefficient	P-Value	% Change
Intercept	-0.2473	0.0698	58.61
Age			
12 to 29	-0.7065	0.0035	7.75
(30 and Older)	*		
Previous Visits to NMAH			
Frequent Visits to NMAH	0.9611	0.0047	-7.32
(New/Repeat Visits to NMAH)	*		
Gamma	.3800	0.0001	
N Cases	360		

*Omitted category

Table II.D.8

OLS Regression on Science Attitude Scale
Combined Entry and Exit Samples,
All Respondents Age 12 and Older

	Coefficient	P-Value	Standardized Coefficient
Intercept	8.8373	0.0001	0000
Age			
12 to 19	-0.4641	0.0005	-0.1324
20 to 29	-0.4752	0.0007	-0.1280
(30 and Older)	*		
R-Square	0.0268	0.0001	
N Cases	716		

*Omitted category

Source: Institutional Studies Office (ISO)

Table II.D.9
Curatorial and Visitor Responses to Items Measuring SAL's Goals

1	2	3	4	5	6	7	8	9
		Public Response						
Statements	Curatorial Response	Strongly Disagree	Disagree	Total Disagree	Agree	Strongly Agree	Total Agree	Total Cols. (3+4+6+7)
A. The basic ideas of science are too complex for most people to understand.	Disagree	7.4	**56.5**	**63.9**	33.0	3.1	36.1	100.0
B. In the past, scientific research was independent of public attitudes.	Agree	2.0	30.0	32.1	**60.8**	7.2	**67.9**	100.0
C. Decisions about the directions of scientific research should be left to scientists.	Disagree	15.2	**55.2**	70.4	23.7	5.9	29.6	100.0
D. Scientific research does not affect the lives of most people. (strongly disagree)	Strongly Disagree	**65.5**	31.2	**96.7**	2.0	1.3	3.3	100.0
E. The public has a responsibility to decide the appropriate use of scientific technologies	Strongly Agree	2.3	20.1	22.4	62.8	**14.8**	**77.6**	100.0
F. Today, scientific research is independent of public attitudes.	Strongly Disagree	**8.2**	63.8	**72.0**	25.8	2.2	28.0	100.0
G. Scientists should conduct research without concern for the consequences of their discoveries.	Strongly Disagree	**46.6**	37.6	**84.3**	12.0	3.7	15.7	100.0
H. Most people can understand the potential risks and benefits of scientific	Agree	5.3	34.5	39.8	**54.9**	5.3	**60.2**	100.0
I. The public should expect scientists to be responsible for the effects of their discoveries.	Agree	3.0	19.5	22.5	**52.5**	25.0	**77.5**	100.0

*Columns 5 and 8, the sums of Columns 3 and 4 and 6 and 7, respectively, have been rounded to one decimal place; the original calculations were done using two decimal places.

Source: Institutional Studies Office (ISO)

Table II.D.10
OLS Regression on Visitor Opinion Scale
Combined Entry and Exit Samples,
All Respondents Age 12 and Older

	Coefficient	P-Value	Standardized Coefficient
Intercept	7.9088	0.0001	0.0000
Gender			
Male	-0.2192	0.0454	-0.0785
(Female)	*		
Previous Visits to NMAH			
New Visitor to NMAH	-0.3302	0.0030	-0.1170
(Repeat/Frequent Visitor to NMAH)	*		
Science Attitude Scale	-0.1011	0.0113	-0.1000
R-Square	0.0280	0.0004	
N Cases	639		

*Omitted category

Table II.D.11
OLS Regression on Visitor Opinion Scale
Exit Sample, All Respondents Age 12 and Older

	Coefficient	P-Value	Standardized Coefficient
Intercept	6.4922	0.0001	-----
Exhibition influenced Respondent's Opinion			
Yes	0.3783	0.0145	-----
(No)	*		
R-Square	0.0186	0.0145	
N Cases	320		

*Omitted category

Source: Institutional Studies Office (ISO)

Table II.D.12
Demographic Characteristics of Visitors

Characteristics	Survey Entrance	Exit	Total
Gender			
Female	46.0	43.4	44.7
Male	54.0	56.6	55.4
Total	100.0	100.0	100.0
Age			
Less than 12	11.8	6.5	9.0
12-19	18.0	16.4	17.1
20-24	7.8	6.7	7.2
25-34	15.5	15.5	15.5
35-44	25.3	30.9	28.2
45-54	13.2	14.8	14.0
55-64	5.3	6.6	5.9
65 and over	3.2	2.7	3.0
Total	100.0	100.0	100.0
Racial/Ethnic Identification			
African American/Black	2.8	1.2	1.9
Asian/Pacific Islander	5.8	4.7	5.2
Hispanic/Latino	3.5	3.6	3.6
Native American/Other	0.8	0.2	0.5
Caucasian	87.1	90.3	88.8
Total	100.0	100.0	100.0
Residence			
Washington, D.C.	2.5	1.8	2.1
MD/VA Suburbs	7.2	5.7	6.4
Other United States	79.0	84.7	82.0
Foreign	11.4	7.8	9.5
Total	100.0	100.0	100.0
Social Composition of Group			
Alone	12.7	10.8	11.7
Two adults	23.9	21.7	22.8
Adults (3+)	9.4	10.9	10.2
Adults w/ Children	28.6	30.1	29.3
Adult w/ Children	13.4	16.2	14.8
Children	2.6	2.5	2.5
School or Tour Group	7.3	6.0	6.6
Friends/Peers	2.2	1.8	2.0
Total	100.0	100.0	100.0

(cont.)

Source: Institutional Studies Office (ISO)

Table II.D.12
Demographic Characteristics of Visitors

(cont.)

Characteristics	Survey Entrance	Exit	Total
Education - Total			
Pre/Grade School	21.1	12.8	16.8
Some HS	8.6	8.5	8.5
HS Graduate	8.0	10.8	9.4
Some College	12.2	15.4	13.8
Associate/ Junior College	4.8	2.1	3.4
Bachelor's Degree	23.2	27.9	25.6
Some Graduate School	4.4	3.1	3.7
MA/PhD/Professional	17.8	19.4	18.7
	100.0	100.0	100.0
Education - Age 25 or Above			
HS Graduate	9.8	13.0	11.5
Some College	14.0	14.6	14.3
Associate/ Junior College	7.8	3.1	5.2
Bachelor's Degree	33.4	37.3	35.5
Some Graduate School	7.1	4.2	5.5
MA/PhD/Professional	28.0	28.0	28.0
	100.0	100.0	100.0
Occupational Groups (Total)			
Executive/Management	8.8	8.8	8.8
Professional Specialities	27.8	31.2	29.5
Sales/Technical/Admin. Support	15.2	16.7	16.0
Service	1.6	3.3	2.5
Farming/Forestry/Fishing	0.0	0.5	0.3
Skilled Labor	4.0	2.7	3.3
Semi-skilled Labor	2.0	2.4	2.2
Active Military	1.0	1.6	1.3
Not in labor force	3.8	3.1	3.5
Student	35.9	29.7	32.7
	100.0	100.0	100.0

(cont.)

Source: Institutional Studies Office (ISO)

Table II.D.12
Demographic Characteristics of Visitors

(cont.)

Characteristics	Survey Entrance	Exit	Total
Occupational Groups - Age 18 and above			
Executive/Management	12.6	11.3	11.9
Professional Specialities	39.7	40.1	39.9
Sales/Technical/Admin. Support	21.3	21.4	21.4
Service	2.2	4.3	3.4
Farming/Forestry/Fishing	0.0	0.7	0.4
Skilled Labor	5.7	3.5	4.5
Semi-skilled Labor	2.7	3.0	2.9
Active Military	1.5	2.1	1.8
Not in labor force	5.5	4.0	4.7
Student	8.8	9.6	9.2
Total	100.0	100.0	100.0
Occupational Groups - Age 25 and above			
Executive/Management	14.0	12.6	13.2
Professional Specialities	41.2	43.6	42.5
Sales/Technical/Admin. Support	22.2	23.7	23.0
Service	2.4	4.4	3.5
Farming/Forestry/Fishing	0.0	0.8	0.4
Skilled Labor	6.6	3.7	5.0
Semi-skilled Labor	3.1	3.5	3.3
Active Military	1.7	2.4	2.1
Not in labor force	6.3	4.2	5.2
Student	2.6	1.4	1.9
Total	100.0	100.0	100.0
Training			
No Training	50.5	44.9	47.7
Self Training	27.7	27.2	27.5
Family Training	21.7	27.9	24.9
Total	100.0	100.0	100.0

Source: Institutional Studies Office (ISO)

Table II.D.13
Characteristics of the Visit

Characteristic	Survey Entrance	Exit	Total
Visit			
First Visit	63.8	58.5	61.1
Returning Visit (1-3 previous visits)	28.9	30.8	29.9
Frequent Visit (4 + previous visits)	7.3	10.8	9.1
Total	100.0	100.0	100.0
Heard About SAL Before Today			
No	89.4	87.7	88.6
Yes	10.6	12.3	11.4
Total	100.0	100.0	100.0
Visited Hands on Science Center			
No	100.0	68.5	-
Yes, Today	0.0	30.0	-
Yes, Before Today	0.0	1.5	-
Total	100.0	100.0	-
Visited Exhibition			
No	100.0	6.4	-
Yes, Today	0.0	88.2	-
Yes, Before Today	0.0	5.4	-
Total	100.0	100.0	-
Exhibition and Hands-on Science Center			
Exhibition Only	-	68.5	-
HOSC Only	-	6.4	-
Exhibition and HOSC	-	25.1	-
Total	-	100.0	-

Source: Institutional Studies Office (ISO)

III.C.

Supporting Tables: Tracking Study

Table III.C.1
Stops in the Exhibition and the HOSC: Spatial Order

1	2	3	4	5	6
			Unique Stops: Statistics		
Location	Description	Percent Who Stopped at Each Exhibit	Average Stop Time (Minutes)	Standard Deviation	Longest Stop
	Exhibition = 132 Visitors				
A	**Entrance**				
A30	Introductory Panel	5.3	0.32	0.30	0.95
A40	Scientist Bio Flip Book	2.3	0.38	0.25	0.65
A90	Scientist Bio Video	3.8	0.49	0.34	0.95
B	**Laboratory Science Comes to America**				
B10	Remsen Lab Diorama	27.3	0.43	0.37	1.85
B11	Remsen Lab Equipment	5.3	0.45	0.35	1.15
B30	Lab Science Text	1.5	0.30	0.21	0.45
B31	What is a Research Lab	18.9	0.54	0.40	1.55
B40	Remsen Lab Text	5.3	0.49	0.25	0.85
B41	Pure Science Ideal	6.1	0.64	0.49	1.45
B90	Close-Caption Video	6.8	1.97	1.50	4.45
C	**Science For Progress**				
C01	Coal Tar Products	10.6	0.52	0.35	1.15
C02	Coal Tar in WW I	7.6	0.56	0.35	1.25
C10	Nylon Manufacture	24.2	0.55	0.47	1.75
C11	World's Fair Toys	22.7	0.36	0.25	1.05
C20	Scripps Science Service	6.8	0.81	0.97	3.25
C30	Introductory Panel	1.5	0.20	0.07	0.25
C32	Scopes Trial	12.9	1.07	0.78	2.85
C40	Host/Cynthia Friend	11.4	0.30	0.19	0.75
C41	Host/S B Woo	3.8	0.29	0.13	0.45
C50	Hampton Institute	19.7	0.39	0.25	1.05
C51	Tools of Scientific Reform	19.7	0.48	0.33	1.45
C52	Measuring Minds Display	10.6	0.77	0.95	3.75
C53	Scientific Toys	15.9	0.33	0.23	0.95
C61	Coal Tar Interactive	6.1	0.44	0.27	0.85
C70	Pure Food Microscope	18.2	1.04	0.92	4.55
C90	World's Fair Video	18.9	1.36	1.66	8.35

(cont.)

Source: Institutional Studies Office (ISO)

Table III.C.1
Stops in the Exhibition and the HOSC: Spatial Order

1	2	3	4	5	6
			Unique Stops: Statistics		
Location	Description	Percent Who Stopped at Each Exhibit	Average Stop Time (Minutes)	Standard Deviation	Longest Stop
D	**Mobilizing Science For War**				
D01	Chain Reaction Materials	12.1	0.51	0.60	2.65
D10	Nuclear Workers	15.9	0.41	0.47	2.15
D11	Atom Smasher	9.8	0.90	1.48	4.75
D12	Stagg Field	4.5	0.42	0.29	0.95
D13	Plutonium Processing Board	13.6	0.32	0.22	0.75
D20	Manhattan Project	9.1	1.21	1.15	3.65
D21	Nagasaki Photos	46.2	0.96	0.67	3.05
D30	Introductory Text	1.5	0.25	0.28	0.45
D31	Towards Big Science	12.1	0.71	0.60	2.25
D32	Concerned Scientist Petition	6.8	0.79	0.41	1.25
D33	Nagasaki Headlines	8.3	0.49	0.59	2.15
D40	Host/Jose V. Martinez	6.1	0.49	0.33	1.15
D50	World War II Science 1	16.7	0.58	0.64	2.65
D51	World War II Science 2	12.1	0.93	0.94	3.35
D52	Plutonium Production	15.2	0.71	0.45	2.05
D60	Hanford Diary Interactive	4.5	0.42	0.19	0.65
D70	Atom Smasher Interactive	28.8	1.16	0.68	2.95
D71	Chain Reaction Interactive	28.0	1.05	0.81	3.35
D80	Women and Minorities in WW II Video	11.4	1.66	1.69	4.95
D90	Fermi Video	20.5	1.72	2.78	12.65
E	**Better Than Nature (1950's)**				
E01	Bomb Shelter	28.8	0.66	0.53	3.05
E02	Atomic Testing	15.9	0.94	1.53	6.95
E10	Atomic Popular Culture	29.5	0.45	0.48	2.55
E11	Lawn Pesticides	22.0	0.48	0.34	1.45
E12	Tract House	22.0	0.56	0.62	3.25
E50	New Subdivisions Display	14.4	0.80	0.73	3.15
E51	Civil Defense	6.8	0.55	0.27	1.05
E60	Nuclear Nevada Flip Book	9.1	0.80	0.72	2.55
E61	Bomb Shelter Flip Book	8.3	1.02	1.20	4.25
E62	Plastics Cubes	18.9	0.72	0.55	2.05
E63	Pesticide Cubes	8.3	0.42	0.36	1.15
E80	Bob's Weekend Video	10.6	1.81	2.16	6.95

(cont.)

Source: Institutional Studies Office (ISO)

Table III.C.1
Stops in the Exhibition and the HOSC: Spatial Order

1	2	3	4	5	6
			Unique Stops: Statistics		
Location	Description	Percent Who Stopped at Each Exhibit	Average Stop Time (Minutes)	Standard Deviation	Longest Stop
F	**Better Than Nature (1960's)**				
F10	Progesterone Yam	18.9	0.47	0.26	1.25
F11	Refining Equipment	6.1	0.83	0.47	1.65
F20	Margaret Sanger Photos	7.6	0.46	0.40	1.55
F40	Host/Viajaya L. Melnick	3.0	0.48	0.05	0.55
F50	Public reaction to Pill	38.6	0.92	0.78	3.35
F60	Menstrual Cycle Panel	12.9	0.86	0.64	2.05
G	**Science in the Public Eye (I)**				
G10	Three Mile Island	4.5	0.25	0.35	0.95
G11	Science in the Media	16.7	0.56	0.79	3.95
G12	Science Fiction	30.3	0.51	0.51	2.65
G13	DNA Model	8.3	0.81	1.33	4.15
G30	Rachel Carson Bio	9.8	0.37	0.18	0.75
G50	Cold Fusion	26.5	0.76	0.85	4.65
G90	Rachel Carson Video	13.6	1.23	1.33	4.35
H	**Science in the Public Eye (II)**				
H01	DNA Figures	7.6	0.55	0.39	1.15
H02	Recombinant DNA Lab	4.5	0.45	0.37	1.15
H03	CFC Displays	9.1	0.43	0.37	1.35
H10	Ozone Hole Diorama	3.8	0.61	0.56	1.35
H11	Super-Collider	20.5	0.73	0.56	2.05
H30	Ozone and CFCs	14.4	0.91	0.99	3.55
H40	Host/Matthew George	4.5	1.32	2.37	6.15
H50	Ozone Hole Discovery	8.3	0.55	0.52	1.45
H80	Women in Contemporary Science Videc	3.8	1.93	3.31	7.85
H81	Genetic Engineering Video	3.8	3.39	2.86	6.65
H91	Cambridge DNA Debates	5.3	0.71	0.51	1.65

(cont.)

Source: Institutional Studies Office (ISO)

Table III.C.1
Stops in the Exhibition and the HOSC: Spatial Order

1	2	3	4	5	6
			Unique Stops: Statistics		
Location	Description	Percent Who Stopped at Each Exhibit	Average Stop Time (Minutes)	Standard Deviation	Longest Stop
I	**Looking Ahead**				
I10	Gene Splicing	10.6	0.59	0.61	2.15
I30	Growing Plastics	3.8	0.27	0.11	0.45
I31	Bioremediation	11.4	0.83	1.17	4.85
I32	Cafe Biotech	1.5	0.45	0.42	0.75
I33	Creating New Genes	6.1	0.59	0.43	1.45
I60	Chilly Tomato	18.2	0.80	1.12	5.25
I61	Genetic Traits Interactive	14.4	0.69	0.81	3.65
I70	Blue Jeans Microscope	19.7	0.45	0.36	1.35
I71	DNA Xylophone	24.2	0.81	0.75	2.95
I80	Garbage/Landfill Video Interactive	8.3	1.44	3.20	11.05
I82	Gene Splicer	7.6	0.90	1.02	3.55
I83	Opinion Poll Station	8.3	1.11	0.78	2.55
I90	Night at the Recombinant Opera Video	11.4	2.16	1.83	5.65
J	**Hands On Science Center = 55 Visitors**				
J00	Lab Entry Station	76.4	0.66	0.56	2.45
J60	Laser	27.3	1.70	1.47	4.85
J61	Lab Bench	40.0	7.75	9.79	27.45
J70	Genetic Puzzles	10.9	2.38	4.00	10.35
J71	Stereoisomers	10.9	2.48	3.06	7.65
J72	Inspector Forensic	3.6	7.60	3.75	10.25
J73	Fibers	7.3	0.78	0.93	2.15
J74	Radioactivity	20.0	2.44	3.41	9.65
J75	Measuring Minds Demo	12.7	2.88	4.84	13.55
J80	Global Warming Computer	34.5	3.15	3.54	12.55
J81	Teachers Resource Center	3.6	1.80	1.20	2.65
	Total Stops, without "Returns"	1719			
	Total Visitors Tracked	163			
	Visitors in Exhibition	132			
	Visitors in Hands On Science Center	55			

Source: Institutional Studies Office (ISO)

Table III.C.2
Stops in theExhibition and HOSC: Rank Order
(% of Visitors)

1	2	3	4	5	6
			Unique Stops: Statistics		
Location	Description	Percent Who Stopped at Each Exhibit	Average Stop Time (Minutes)	Standard Deviation	Longest Stop
		Exhibition = 132 Visitors			
D21	Nagasaki Photos	46.2	0.96	0.67	3.05
F50	Public reaction to Pill	38.6	0.92	0.78	3.35
G12	Science Fiction	30.3	0.51	0.51	2.65
E10	Atomic Popular Culture	29.5	0.45	0.48	2.55
D70	Atom Smasher Interactive	28.8	1.16	0.68	2.95
E01	Bomb Shelter	28.8	0.66	0.53	3.05
D71	Chain Reaction Interactive	28.0	1.05	0.81	3.35
B10	Remsen Lab Diorama	27.3	0.43	0.37	1.85
G50	Cold Fusion	26.5	0.76	0.85	4.65
C10	Nylon Manufacture	24.2	0.55	0.47	1.75
I71	DNA Xylophone	24.2	0.81	0.75	2.95
C11	World's Fair Toys	22.7	0.36	0.25	1.05
E11	Lawn Pesticides	22.0	0.48	0.34	1.45
E12	Tract House	22.0	0.56	0.62	3.25
D90	Fermi Video	20.5	1.72	2.78	12.65
H11	Super-Collider	20.5	0.73	0.56	2.05
C50	Hampton Institute	19.7	0.39	0.25	1.05
C51	Tools of Scientific Reform	19.7	0.48	0.33	1.45
I70	Blue Jeans Microscope	19.7	0.45	0.36	1.35
B31	What is a Research Lab	18.9	0.54	0.40	1.55
C90	World's Fair Video	18.9	1.36	1.66	8.35
E62	Plastics Cubes	18.9	0.72	0.55	2.05
F10	Progesterone Yam	18.9	0.47	0.26	1.25
C70	Pure Food Microscope	18.2	1.04	0.92	4.55
I60	Chilly Tomato	18.2	0.80	1.12	5.25
D50	World War II Science 1	16.7	0.58	0.64	2.65
G11	Science in the Media	16.7	0.56	0.79	3.95
C53	Scientific Toys	15.9	0.33	0.23	0.95
D10	Nuclear Workers	15.9	0.41	0.47	2.15
E02	Atomic Testing	15.9	0.94	1.53	6.95
D52	Plutonium Production	15.2	0.71	0.45	2.05
E50	New Subdivisions Display	14.4	0.80	0.73	3.15
H30	Ozone and CFCs	14.4	0.91	0.99	3.55
I61	Genetic Traits Interactive	14.4	0.69	0.81	3.65

Source: Institutional Studies Office (ISO)

Table III.C.2
Stops in theExhibition and HOSC: Rank Order
(% of Visitors)

1	2	3	4	5	6
			Unique Stops: Statistics		
Location	Description	Percent Who Stopped at Each Exhibit	Average Stop Time (Minutes)	Standard Deviation	Longest Stop
D13	Plutonium Processing Board	13.6	0.32	0.22	0.75
G90	Rachel Carson Video	13.6	1.23	1.33	4.35
C32	Scopes Trial	12.9	1.07	0.78	2.85
F60	Menstrual Cycle Panel	12.9	0.86	0.64	2.05
D01	Chain Reaction Materials	12.1	0.51	0.60	2.65
D31	Towards Big Science	12.1	0.71	0.60	2.25
D51	World War II Science 2	12.1	0.93	0.94	3.35
C40	Host/Cynthia Friend	11.4	0.30	0.19	0.75
D80	Women and Minorities in WW II Video	11.4	1.66	1.69	4.95
I31	Bioremediation	11.4	0.83	1.17	4.85
I90	Night at the Recombinant Opera Video	11.4	2.16	1.83	5.65
C01	Coal Tar Products	10.6	0.52	0.35	1.15
C52	Measuring Minds Display	10.6	0.77	0.95	3.75
E80	Bob's Weekend Video	10.6	1.81	2.16	6.95
I10	Gene Splicing	10.6	0.59	0.61	2.15
D11	Atom Smasher	9.8	0.90	1.48	4.75
G30	Rachel Carson Bio	9.8	0.37	0.18	0.75
D20	Manhattan Project	9.1	1.21	1.15	3.65
E60	Nuclear Nevada Flip Book	9.1	0.80	0.72	2.55
H03	CFC Displays	9.1	0.43	0.37	1.35
D33	Nagasaki Headlines	8.3	0.49	0.59	2.15
E61	Bomb Shelter Flip Book	8.3	1.02	1.20	4.25
E63	Pesticide Cubes	8.3	0.42	0.36	1.15
G13	DNA Model	8.3	0.81	1.33	4.15
H50	Ozone Hole Discovery	8.3	0.55	0.52	1.45
I80	Garbage/Landfill Video Interactive	8.3	1.44	3.20	11.05
I83	Opinion Poll Station	8.3	1.11	0.78	2.55
C02	Coal Tar in WW I	7.6	0.56	0.35	1.25
F20	Margaret Sanger Photos	7.6	0.46	0.40	1.55
H01	DNA Figures	7.6	0.55	0.39	1.15
I82	Gene Splicer	7.6	0.90	1.02	3.55
B90	Close-Caption Video	6.8	1.97	1.50	4.45
C20	Scripps Science Service	6.8	0.81	0.97	3.25
D32	Concerned Scientist Petition	6.8	0.79	0.41	1.25
E51	Civil Defense	6.8	0.55	0.27	1.05
B41	Pure Science Ideal	6.1	0.64	0.49	1.45

Source: Institutional Studies Office (ISO)

Table III.C.2
Stops in theExhibition and HOSC: Rank Order
(% of Visitors)

1	2	3	4	5	6
			Unique Stops: Statistics		
Location	Description	Percent Who Stopped at Each Exhibit	Average Stop Time (Minutes)	Standard Deviation	Longest Stop
C61	Coal Tar Interactive	6.1	0.44	0.27	0.85
D40	Host/Jose V. Martinez	6.1	0.49	0.33	1.15
F11	Refining Equipment	6.1	0.83	0.47	1.65
I33	Creating New Genes	6.1	0.59	0.43	1.45
A30	Introductory Panel	5.3	0.32	0.30	0.95
B11	Remsen Lab Equipment	5.3	0.45	0.35	1.15
B40	Remsen Lab Text	5.3	0.49	0.25	0.85
H91	Cambridge DNA Debates	5.3	0.71	0.51	1.65
D12	Stagg Field	4.5	0.42	0.29	0.95
D60	Hanford Diary Interactive	4.5	0.42	0.19	0.65
G10	Three Mile Island	4.5	0.25	0.35	0.95
H02	Recombinant DNA Lab	4.5	0.45	0.37	1.15
H40	Host/Matthew George	4.5	1.32	2.37	6.15
A90	Scientist Bio Video	3.8	0.49	0.34	0.95
C41	Host/S B Woo	3.8	0.29	0.13	0.45
H10	Ozone Hole Diorama	3.8	0.61	0.56	1.35
H80	Women in Contemporary Science Vide	3.8	1.93	3.31	7.85
H81	Genetic Engineering Video	3.8	3.39	2.86	6.65
I30	Growing Plastics	3.8	0.27	0.11	0.45
F40	Host/Viajaya L. Melnick	3.0	0.48	0.05	0.55
A40	Scientist Bio Flip Book	2.3	0.38	0.25	0.65
B30	Lab Science Text	1.5	0.30	0.21	0.45
C30	Introductory Panel	1.5	0.20	0.07	0.25
D30	Introductory Text	1.5	0.25	0.28	0.45
I32	Cafe Biotech	1.5	0.45	0.42	0.75

Source: Institutional Studies Office (ISO)

Table III.C.2
Stops in theExhibition and HOSC: Rank Order
(% of Visitors)

1	2	3	4	5	6
			Unique Stops: Statistics		
Location	Description	Percent Who Stopped at Each Exhibit	Average Stop Time (Minutes)	Standard Deviation	Longest Stop
J	**Hands On Science Center = 55 Visitors**				
J00	Lab Entry Station	76.4	0.66	0.56	2.45
J61	Lab Bench	40.0	7.75	9.79	27.45
J80	Global Warming Computer	34.5	3.15	3.54	12.55
J60	Laser	27.3	1.70	1.47	4.85
J74	Radioactivity	20.0	2.44	3.41	9.65
J75	Measuring Minds Demo	12.7	2.88	4.84	13.55
J70	Genetic Puzzles	10.9	2.38	4.00	10.35
J71	Stereoisomers	10.9	2.48	3.06	7.65
J73	Fibers	7.3	0.78	0.93	2.15
J72	Inspector Forensic	3.6	7.60	3.75	10.25
J81	Teachers Resource Center	3.6	1.80	1.20	2.65
	Total Stops, without "Returns"	1719			
	Total Visitors Tracked	163			
	Visitors in Exhibition	132			
	Visitors in Hands On Science Center	55			

Source: Institutional Studies Office (ISO)

Table III.C.3
Stops in Rank Order:
Average Time/Stop

1	2	3	4	5	6
			Unique Stops: Statistics		
Location	Description	Percent Who Stopped at Each Exhibit	Average Stop Time (Minutes)	Standard Deviation	Longest Stop
		Exhibition = 132 Visitors			
H81	Genetic Engineering Video	3.8	3.39	2.86	6.65
I90	Night at the Recombinant Opera Video	11.4	2.16	1.83	5.65
B90	Close-Caption Video	6.8	1.97	1.50	4.45
H80	Women in Contemporary Science Video	3.8	1.93	3.31	7.85
E80	Bob's Weekend Video	10.6	1.81	2.16	6.95
D90	Fermi Video	20.5	1.72	2.78	12.65
D80	Women and Minorities in WW II Video	11.4	1.66	1.69	4.95
I80	Garbage/Landfill Video Interactive	8.3	1.44	3.20	11.05
C90	World's Fair Video	18.9	1.36	1.66	8.35
H40	Host/Matthew George	4.5	1.32	2.37	6.15
G90	Rachel Carson Video	13.6	1.23	1.33	4.35
D20	Manhattan Project	9.1	1.21	1.15	3.65
D70	Atom Smasher Interactive	28.8	1.16	0.68	2.95
I83	Opinion Poll Station	8.3	1.11	0.78	2.55
C32	Scopes Trial	12.9	1.07	0.78	2.85
D71	Chain Reaction Interactive	28.0	1.05	0.81	3.35
C70	Pure Food Microscope	18.2	1.04	0.92	4.55
E61	Bomb Shelter Flip Book	8.3	1.02	1.20	4.25
D21	Nagasaki Photos	46.2	0.96	0.67	3.05
E02	Atomic Testing	15.9	0.94	1.53	6.95
D51	World War II Science 2	12.1	0.93	0.94	3.35
F50	Public reaction to Pill	38.6	0.92	0.78	3.35
H30	Ozone and CFCs	14.4	0.91	0.99	3.55
I82	Gene Splicer	7.6	0.90	1.02	3.55
D11	Atom Smasher	9.8	0.90	1.48	4.75
F60	Menstrual Cycle Panel	12.9	0.86	0.64	2.05
I31	Bioremediation	11.4	0.83	1.17	4.85
F11	Refining Equipment	6.1	0.83	0.47	1.65
G13	DNA Model	8.3	0.81	1.33	4.15
I71	DNA Xylophone	24.2	0.81	0.75	2.95
C20	Scripps Science Service	6.8	0.81	0.97	3.25
I60	Chilly Tomato	18.2	0.80	1.12	5.25
E60	Nuclear Nevada Flip Book	9.1	0.80	0.72	2.55
E50	New Subdivisions Display	14.4	0.80	0.73	3.15

Source: Institutional Studies Office (ISO)

Table III.C.3
Stops in Rank Order:
Average Time/Stop

1	2	3	4	5	6
			Unique Stops: Statistics		
Location	Description	Percent Who Stopped at Each Exhibit	Average Stop Time (Minutes)	Standard Deviation	Longest Stop
D32	Concerned Scientist Petition	6.8	0.79	0.41	1.25
C52	Measuring Minds Display	10.6	0.77	0.95	3.75
G50	Cold Fusion	26.5	0.76	0.85	4.65
H11	Super-Collider	20.5	0.73	0.56	2.05
E62	Plastics Cubes	18.9	0.72	0.55	2.05
D52	Plutonium Production	15.2	0.71	0.45	2.05
H91	Cambridge DNA Debates	5.3	0.71	0.51	1.65
D31	Towards Big Science	12.1	0.71	0.60	2.25
I61	Genetic Traits Interactive	14.4	0.69	0.81	3.65
E01	Bomb Shelter	28.8	0.66	0.53	3.05
B41	Pure Science Ideal	6.1	0.64	0.49	1.45
H10	Ozone Hole Diorama	3.8	0.61	0.56	1.35
I10	Gene Splicing	10.6	0.59	0.61	2.15
I33	Creating New Genes	6.1	0.59	0.43	1.45
D50	World War II Science 1	16.7	0.58	0.64	2.65
C02	Coal Tar in WW I	7.6	0.56	0.35	1.25
E12	Tract House	22.0	0.56	0.62	3.25
G11	Science in the Media	16.7	0.56	0.79	3.95
H50	Ozone Hole Discovery	8.3	0.55	0.52	1.45
H01	DNA Figures	7.6	0.55	0.39	1.15
E51	Civil Defense	6.8	0.55	0.27	1.05
C10	Nylon Manufacture	24.2	0.55	0.47	1.75
B31	What is a Research Lab	18.9	0.54	0.40	1.55
C01	Coal Tar Products	10.6	0.52	0.35	1.15
G12	Science Fiction	30.3	0.51	0.51	2.65
D01	Chain Reaction Materials	12.1	0.51	0.60	2.65
B40	Remsen Lab Text	5.3	0.49	0.25	0.85
A90	Scientist Bio Video	3.8	0.49	0.34	0.95
D40	Host/Jose V. Martinez	6.1	0.49	0.33	1.15
D33	Nagasaki Headlines	8.3	0.49	0.59	2.15
E11	Lawn Pesticides	22.0	0.48	0.34	1.45
C51	Tools of Scientific Reform	19.7	0.48	0.33	1.45
F40	Host/Viajaya L. Melnick	3.0	0.48	0.05	0.55
F10	Progesterone Yam	18.9	0.47	0.26	1.25
F20	Margaret Sanger Photos	7.6	0.46	0.40	1.55
B11	Remsen Lab Equipment	5.3	0.45	0.35	1.15

Source: Institutional Studies Office (ISO)

Table III.C.3
Stops in Rank Order:
Average Time/Stop

1	2	3	4	5	6
			Unique Stops: Statistics		
Location	Description	Percent Who Stopped at Each Exhibit	Average Stop Time (Minutes)	Standard Deviation	Longest Stop
H02	Recombinant DNA Lab	4.5	0.45	0.37	1.15
I32	Cafe Biotech	1.5	0.45	0.42	0.75
E10	Atomic Popular Culture	29.5	0.45	0.48	2.55
I70	Blue Jeans Microscope	19.7	0.45	0.36	1.35
C61	Coal Tar Interactive	6.1	0.44	0.27	0.85
B10	Remsen Lab Diorama	27.3	0.43	0.37	1.85
H03	CFC Displays	9.1	0.43	0.37	1.35
E63	Pesticide Cubes	8.3	0.42	0.36	1.15
D12	Stagg Field	4.5	0.42	0.29	0.95
D60	Hanford Diary Interactive	4.5	0.42	0.19	0.65
D10	Nuclear Workers	15.9	0.41	0.47	2.15
C50	Hampton Institute	19.7	0.39	0.25	1.05
A40	Scientist Bio Flip Book	2.3	0.38	0.25	0.65
G30	Rachel Carson Bio	9.8	0.37	0.18	0.75
C11	World's Fair Toys	22.7	0.36	0.25	1.05
C53	Scientific Toys	15.9	0.33	0.23	0.95
D13	Plutonium Processing Board	13.6	0.32	0.22	0.75
A30	Introductory Panel	5.3	0.32	0.30	0.95
B30	Lab Science Text	1.5	0.30	0.21	0.45
C40	Host/Cynthia Friend	11.4	0.30	0.19	0.75
C41	Host/S B Woo	3.8	0.29	0.13	0.45
I30	Growing Plastics	3.8	0.27	0.11	0.45
G10	Three Mile Island	4.5	0.25	0.35	0.95
D30	Introductory Text	1.5	0.25	0.28	0.45
C30	Introductory Panel	1.5	0.20	0.07	0.25
	(cont.)				

Source: Institutional Studies Office (ISO)

Table III.C.3
Stops in Rank Order:
Average Time/Stop

1	2	3	4	5	6
			Unique Stops: Statistics		
Location	Description	Percent Who Stopped at Each Exhibit	Average Stop Time (Minutes)	Standard Deviation	Longest Stop
J	**Hands On Science Center = 55 Visitors**				
J61	Lab Bench	40.0	7.75	9.79	27.45
J72	Inspector Forensic	3.6	7.60	3.75	10.25
J80	Global Warming Computer	34.5	3.15	3.54	12.55
J75	Measuring Minds Demo	12.7	2.88	4.84	13.55
J71	Stereoisomers	10.9	2.48	3.06	7.65
J74	Radioactivity	20.0	2.44	3.41	9.65
J70	Genetic Puzzles	10.9	2.38	4.00	10.35
J81	Teachers Resource Center	3.6	1.80	1.20	2.65
J60	Laser	27.3	1.70	1.47	4.85
J73	Fibers	7.3	0.78	0.93	2.15
J00	Lab Entry Station	76.4	0.66	0.56	2.45
	Total Stops, without "Returns"	1719			
	Total Visitors Tracked	163			
	Visitors in Exhibition	132			
	Visitors in Hands On Science Center	55			

Source: Institutional Studies Office (ISO)

Table III.C.4

Unique and "Return" Stop Data for Exhibition Elements at Which at Least 20.0% of All Visitors Stopped

Exhibition Element	Percent of Visitors	Unique Stops*	Return Stops**	All Stops
Exhibition = 132 Visitors				
Nagasaki Photos	46.2	61	2	63
Public reaction to Pill	38.6	51	5	56
Science Fiction	30.3	40	0	40
Atomic Popular Culture	29.5	39	0	39
Atom Smasher Interactive	28.8	38	3	41
Bomb Shelter	28.8	38	1	39
Chain Reaction Interactive	28.0	37	1	38
Remsen Lab Diorama	27.3	36	0	36
Cold Fusion	26.5	35	4	39
Nylon Manufacture	24.2	32	6	38
DNA Xylophone	24.2	32	3	35
World's Fair Toys	22.7	30	4	34
Lawn Pesticides	22.0	29	1	30
Tract House	22.0	29	5	34
Fermi Video	20.5	27	3	30
Super-Collider	20.5	27	6	33
Hands On Science Center = 55 Visitors				
Lab Entry Station	76.4	42	4	46
Lab Bench	40.0	22	17	39
Global Warming Computer	34.5	19	9	28
Laser	27.3	15	7	22
Radioactivity	20.0	11	2	13
Total for Table	40.1	690	83	773
All Stops		1719	144	1863

*Stops made by different visitors.

**Return stops by visitors who stopped previously.

Source: Institutional Studies Office (ISO)

Table III.C.5

Time Data for Stops Made by at Least 20% of Visitors

Exhibition Element	Unique Stops	Mean	Standard Deviation	Median	Mini-mum	Maxi-mum
Exhibition = 132 Visitors						
Nagasaki Photos	61	0.96	0.67	0.85	0.05	3.05
Public reaction to Pill	51	0.91	0.78	0.65	0.15	3.35
Science Fiction	40	0.51	0.51	0.35	0.05	2.65
Atomic Popular Culture	39	0.45	0.48	0.25	0.05	2.55
Atom Smasher Interactive	38	1.16	0.68	1.05	0.05	2.95
Bomb Shelter	38	0.66	0.53	0.55	0.05	3.05
Chain Reaction Interactive	37	1.05	0.81	0.65	0.05	3.35
Remsen Lab Diorama	36	0.43	0.37	0.3	0.05	1.85
Cold Fusion	35	0.76	0.85	0.45	0.05	4.65
Nylon Manufacture	32	0.55	0.47	0.35	0.05	1.75
DNA Xylophone	32	0.81	0.75	0.45	0.05	2.95
Worlds Fair Toys	30	0.36	0.25	0.3	0.05	1.05
Lawn Pesticides	29	0.48	0.34	0.45	0.15	1.45
Tract House	29	0.56	0.62	0.35	0.15	3.25
Fermi Video	27	1.72	2.78	0.65	0.05	12.65
Super-Collider	27	0.73	0.56	0.65	0.05	2.05
Hands On Science Center = 55 Visitors						
Lab Entry Station	42	0.66	0.56	0.45	0.15	2.45
Lab Bench	22	7.75	9.79	2.1	0.15	27.45
Global Warming Computer	19	3.14	3.54	1.25	0.15	12.55
Laser	15	1.7	1.47	1.05	0.25	4.85
Radioactivity	11	2.44	3.41	0.75	0.15	9.65
Total for Table	690	1.09	2.41	0.55	0.05	27.45
All Unique Stops	1719	0.92	1.79	0.45	0.05	27.45

Source: Institutional Studies Office (ISO)

Table III.C.6
Decomposition of Stop Time

	Unique Stops	Mean	Standard Deviation	Median	Maximum
Age					
19 and Younger	331	0.99	1.91	0.45	27.45
20 to 29	300	0.79	1.26	0.45	12.65
30 to 39	694	0.95	1.86	0.45	26.75
40 to 49	246	1.16	2.37	0.55	24.55
50 and Older	148	0.52	0.49	0.35	2.85
Social Composition					
Alone	359	0.89	1.29	0.55	12.65
Adult Group	593	0.66	0.89	0.45	12.55
Adults and Children	567	1.05	2.18	0.45	26.75
Child/Teen Group	200	1.41	2.09	0.55	27.45
Type of Visit					
All Exhibition	1333	0.76	0.99	0.45	12.65
All Lab	86	2.22	3.85	0.85	21.45
Mixed	300	1.29	3.04	0.55	27.45
Type of Stop					
Lab Bench	22	7.75	9.79	2.10	27.45
Other Lab	114	1.85	2.74	0.75	13.55
Exhibit Interactive	361	0.98	1.21	0.55	11.05
Other Exhibit	1222	0.70	0.89	0.45	12.65
Type of Element					
Interactive (with Lab Bench)	455	1.56	3.08	0.65	27.45
Interactive (without Lab Bench)	433	1.24	1.81	0.65	13.55
Video	106	1.51	1.92	1.30	12.65
Object	857	0.59	0.64	0.35	6.95
Photo	148	0.77	0.81	0.45	6.15
Text	153	0.66	0.69	0.45	4.85
All Stops	1719	0.92	1.79	0.45	27.45

Source: Institutional Studies Office (ISO)

Table III.C.7

Interactive and Video Use by Interaction Category

(in Percent)

Exhibition Element	Looking	Using Interactive	Total	Number of Stops
Exhibition = 132 Visitors				
Flip/Slide Interactive	52.6	47.4	100.0	133
Chilly Tomato	29.2	70.8	100.0	24
Bomb Shelter Flip Book	45.5	54.5	100.0	11
Coal Tar Interactive	50.0	50.0	100.0	8
Menstrual Cycle Panel	52.9	47.1	100.0	17
Plastics Cubes	56.0	44.0	100.0	25
Genetic Traits Interactive	57.9	42.1	100.0	19
Nuclear Nevada Flip Book	58.3	41.7	100.0	12
Hanford Diary Interactive	66.7	33.3	100.0	6
Pesticide Cubes	81.8	18.2	100.0	11
Low-Tech Interactive	46.5	53.5	100.0	157
Pure Food Microscope	41.7	58.3	100.0	24
Atom Smasher Interactive	42.1	57.9	100.0	38
Chain Reaction Interactive	45.9	54.1	100.0	37
Blue Jeans Microscope	46.2	53.8	100.0	26
DNA Xylophone	56.3	43.8	100.0	32
Computer Interactive	64.8	35.2	100.0	71
Women and Minorities in WW II	46.7	53.3	100.0	15
Opinion Poll Station	54.5	45.5	100.0	11
Women in Contemporary Science	60.0	40.0	100.0	5
DNA Fingerprinting Video	60.0	40.0	100.0	5
Gene Splicer	70.0	30.0	100.0	10
Bobs Weekend Video	78.6	21.4	100.0	14
Garbage/Landfill Video Interacti	81.8	18.2	100.0	11
All Stops at Exhibition Interactive	52.4	47.6	100.0	361
All Stops in Exhibition	88.0	12.0	100.0	1556
All Stops at Interactives	51.4	48.6	100.0	455
All Stops	86.3	13.7	100.0	1719

(Continued.)

Source: Institutional Studies Office (ISO)

Table III.C.7 (continued)
Interactive and Video Use by Interactive Category
(in Percent)

Exhibition Element	Looking	Using Interactive	Total	Number of Stops
Hands-On Science Center = 55 Visitors				
Demonstration	62.2	37.8	100.0	37
Laser	40.0	60.0	100.0	15
Lab Bench	77.3	22.7	100.0	22
Low-Tech Interactive	41.7	58.3	100.0	36
Radioactivity	18.2	81.8	100.0	11
Stereoisomers	33.3	66.7	100.0	6
Inspector Forensic	50.0	50.0	100.0	2
Fibers	50.0	50.0	100.0	4
Measuring Minds Activity Box	57.1	42.9	100.0	7
Genetic Puzzles	66.7	33.3	100.0	6
Computer Interactive	33.3	66.7	100.0	21
Global Warming Computer	31.6	68.4	100.0	19
Teachers Resource Center	50.0	50.0	100.0	2
All Stops at HOSC Interactives	47.9	52.1	100.0	94
All Stops in HOSC	64.0	36.0	100.0	136
All Stops at Interactives	51.4	48.6	100.0	455
All Stops	86.3	13.7	100.0	1719

Source: Institutional Studies Office (ISO)

Appendices

Appendix A.

Data Collection Forms: *Science in American Life* Study

This appendix contains copies of the questionnaires used in the Entrance Survey and the Exit Survey, the associated cards shown to visitors, and the form used in the Tracking Study. A map of the exhibition, showing the codes used in the Tracking Study is on page A-9.

Entrance and Exit Survey Materials

By Institutional Studies Office convention, questions read to respondents are shown in **bold**. Response categories are not read to visitors. In some instances, interviewers circle a pre-printed response category. In others, they record the visitors comments verbatim. Finally, some questions require both circling a pre-printed response and recording a response. For example, a response of "Germany" to Q.1. **Where do you live?,** would require the interviewer to circle "1" (Foreign) as well as record "Germany" for subsequent coding in the office. From the perspective of the interviewee, all of the questions are open-ended. For additional information about the questionnaires, see Appendix B.

Tracking Survey Materials

The exhibition space was divided into ten discrete areas from A (the orientation/entry area) to J (the Hands On Science Center). Within a given area, each exhibition element was given a specific numeric code based on content (see the code in the right-hand margin of the Tracking Survey Form).

When a visitor was selected for tracking, the tracker recorded the demographic and administrative data on the bottom of the form. At each stop the visitor made, four items of data were recorded:

(a) the location of the stop (expressed as a combination of the area and the element codes, e.g., a stop at the video display in the entry area is recorded as "A90"),
(b) the time at the beginning of the stop.
(c) the visitor's activity during the stop. The "Social Interaction Code" ("Soc. Int." on the Tracking Form) gives an indication of visitor and group activity and allows us to relate time stopped in front of an exhibition element to what the visitor was doing.
(d) the time at the end of the stop.

ID # _____ 1-4/ **Science in American Life** COUNT: ____

Entrance Survey

Hello, my name is _____, and I would like to ask you a few questions about your visit today...

Q0. 1 SI Staff/Cont. : STOP -GO TO END
2 Ineligible: STOP -GO TO END 5/

+*Q1. **Where do you live?** 6/
1 Foreign _____
2 Other U.S. _____ 7-9/
3 DC
4 MD/VA Suburbs

+Q2. **Is today your first visit to this American History Museum?**
0 Yes 10/
No: **How many times have you been here before today?** _____ 11/

+Q3. **Did you visit the Science in American Life exhibition?**
1 No 12/
2 Yes
[TERMINATE IF "YES" -GO TO END]

Q4. **Did you hear about this exhibition before today?**
1 No 14/
2 Yes -- **Where? Anywhere else?**
1 From friends/family 15/
1 Washington Post 16/
1 Other newspapers_____17/
1 Other sources _____ 18-21/

Q4a. **What did you hear about it?**
_____
_____
_____
_____
_____
_____22-23/

+Q5. **Did you visit the Hands-On Science Lab?** [CLARIFY: **Today ?**]
1 No [GO TO Q5] 24/
2 Yes
[TERMINATE IF "YES" -GO TO END]

(COLS 13/ AND 25/- 27/ ARE BLANK)

+Q6. **Do you and/or anyone in your immediate family have scientific or technical training?**
1 No (GO TO Q7) 28/
2 Yes, **Who? What Kind? Anyone else?**
1 I do. _____ 29-31/
1 Spouse._____ 32-34/
1 Child. _____ 35-37/
1 Child. _____ 38-40/
1 _____. _____ 41-43/
1 _____. _____ 44-46/
1 _____. _____ 47-49/

Q7. **How do <u>you</u> feel about the impact of science and technology on our lives? Please use Scale #1 on the card.**
_____ 11 50-51/

(COLS 52/- 59/ ARE BLANK)

Q11. **For each sentence that I will read please tell me the number that comes closest to how you feel. There are no right or wrong answers. Please use Scale #2 on the card.**

A. **The basic ideas of science are too complex for most people to understand.**
1 2 3 4 9 60/

B. **In the past, scientific research was independent of public attitudes.**
1 2 3 4 9 61/

C. **Decisions about the directions of scientific research should be left to scientists.**
1 2 3 4 9 62/

D. **Scientific research does not affect the lives of most people.**
1 2 3 4 9 63/

E. **The public has a responsibility to decide the appropriate use of scientific technologies.**
1 2 3 4 9 64/

F. **Today, scientific research is independent of public attitudes.**
1 2 3 4 9 65/

G. **Scientists should conduct research without concern for the consequences of their discoveries.**
1 2 3 4 9 66/

H. **Most people can understand the potential risks and benefits of scientific discoveries.**
1 2 3 4 9 67/

I. **The public should expect scientists to be responsible for the effects of their discoveries.**
1 2 3 4 9 68/

(COLS 69/- 75/ ARE BLANK)

Now a few final questions about you:

+*Q14. **Who are you here with today?**

1 School trip	6 Group of teens
2 Tour group	7 Several adults
3 Adult w/child(ren)	8 Child(ren)
4 Adults w/ child(ren)	9 Alone
5 One other adult	76/

Q15. **What kind of work do you do?**
_____ 77-78/
1 Retired

+*Q16. **What is your age?** _____ 79-80/

+Q17. **What is the highest level of education you have completed?**

1 Pre/grade sch.	5 Assoc./Jr. Coll
2 Some high sch.	6 Bachelor's Degree
3 HS graduate	7 Some graduate
4 Some college	8 MA/Ph.D./Profess. 81/

+*Q18. **What is your cultural/racial/ethnic identity?**

1 Afr Amer/Black	4 Hispanic/Latino
2 Asian/Pac. Is	5 Nat Amer./Ak Native
3 Caucasian/White	6 Other _____ 82/

+*Q19. Gender (CIRCLE)
1 Male 2 Female 83/

Administrative :		0	Enrance	84/
Status: 1	SI Cont./Staff	4	Interview:< 12 yrs.	
2	Ineligible	5	Refusal: Lang	
3	Interview: 12+	6	Refusal: Other	85/
Shift : 1 2 3 4				86/
Segment: 1 2 3 4 5 6				87/
Session: _____				88-89/
Office only: WEIGHT: _____/_____				90-94/

ID # _____ 1-4/ **Science in American Life** COUNT: ____

Exit Survey

Hello, my name is _____, and I would like to ask you a few questions about your visit today...

Q0. 1 SI Staff/Cont. : STOP -GO TO END
2 Ineligible: STOP -GO TO END 5/

+*Q1. **Where do you live?** 6/
1 Foreign _____
2 Other U.S. _____ 7-9/
3 DC
4 MD/VA Suburbs

+Q2. **Is today your first visit to this American History Museum?**
0 Yes 10-11/
No: **How many times have you been here before today?** _____

+Q3. **Did you visit the Science in American Life exhibition?** [CLARIFY: **Today?**]
1 No 12/
2 Yes, Today
3 Yes, Before today. **Number of times?** _____ 13/

Q4. **Did you hear about this exhibition before today?**
1 No 14/
2 Yes -- **Where? Anywhere else?**
1 From friends/family 15/
1 Washington Post 16/
1 Other newspapers_____17/
1 Other sources _____ 18-21/

STOP

Q4a. **What did you hear about it?**
_____
_____
_____
_____
_____
_____22-23/

+Q5. **Did you visit the Hands-On Science Lab?** [CLARIFY: **Today ?**]
1 No 24/
2 Yes, Today (GO TO Q6)
3 Yes, Before today. **Number of times?** _____ 25/
(GO TO Q6)

Q5a. **Do you plan to visit the Hands-On Science Lab today?**
1 Yes 2 No, **Why Not?** 26/
_____
_____
_____27/

+Q6. **Do you and/or anyone in your immediate family have scientific or technical training?**
1 No (GO TO Q7) 28/
2 Yes, **Who? What Kind? Anyone else?**
1 I do. _____ 29-31/
1 Spouse._____ 32-34/
1 Child. _____ 35-37/
1 Child. _____ 38-40/
1 _____. _____ 41-43/
1 _____. _____ 44-46/
1 _____. _____ 47-49/

Q7. **How do <u>you</u> feel about the impact of science and technology on our lives? Please use Scale #1 on the card.**
_____ 11 50-51/

Q8. **Do you think this exhibition will influence the way you think about science and technology?**
1 Yes -- **In what way?**
2 No -- **Can you explain why not?** 52/
_____
_____
_____ 53-54/

Q9. **What is this exhibition trying to say about science in America?**
_____
_____
_____
_____
_____55-56/

Q10. **Was there anything in the exhibition <u>in particular</u> that makes you say that?**
1 Yes: **What?** 2 No 57/
_____
_____
_____
_____58-59/

Q11. **For each sentence that I will read please tell me the number that comes closest to how you feel. There are no right or wrong answers. Please use Scale #2 on the card.**

A. **The basic ideas of science are too complex for most people to understand.**
1 2 3 4 9 60/

B. **In the past, scientific research was independent of public attitudes.**
1 2 3 4 9 61/

C. **Decisions about the directions of scientific research should be left to scientists.**
1 2 3 4 9 62/

D. **Scientific research does not affect the lives of most people.**
1 2 3 4 9 63/

E. **The public has a responsibility to decide the appropriate use of scientific technologies.**
1 2 3 4 9 64/

F. **Today, scientific research is independent of public attitudes.**
1 2 3 4 9 65/

G. **Scientists should conduct research without concern for the consequences of their discoveries.**
1 2 3 4 9 66/

H. **Most people can understand the potential risks and benefits of scientific discoveries.**
1 2 3 4 9 67/

I. **The public should expect scientists to be responsible for the effects of their discoveries.**
1 2 3 4 9 68/

Q12. **Which of these exhibition sections or interactive elements did you find the <u>most informative</u>?** (SHOW CARD)

RECORD LETTER/NO. _____ 69/

Q12a. **What is the <u>main</u> idea it gave you?**

_____
_____
_____
_____
_____ 70-71/

Q13. **Overall, what in this exhibition interested you the most? Why?** 72-73/

_____
_____
_____
_____ 74-75/

Now a few final questions about you:

+*Q14. **Who are you here with today?**

1 School trip
2 Tour group
3 Adult w/child(ren)
4 Adults w/ child(ren)
5 One other adult
6 Group of teens
7 Several adults
8 Child(ren)
9 Alone
76/

Q15. **What kind of work do you do?**

_____ 77-78/
1 Retired

+*Q16. **What is your age?** _____ 79-80/

+Q17. **What is the highest level of education you have completed?**

1 Pre/grade sch.
2 Some high sch.
3 HS graduate
4 Some college
5 Assoc./Jr. Coll
6 Bachelor's Degree
7 Some graduate
8 MA/Ph.D./Profess. 81/

+*Q18. **What is your cultural/racial/ethnic identity?**

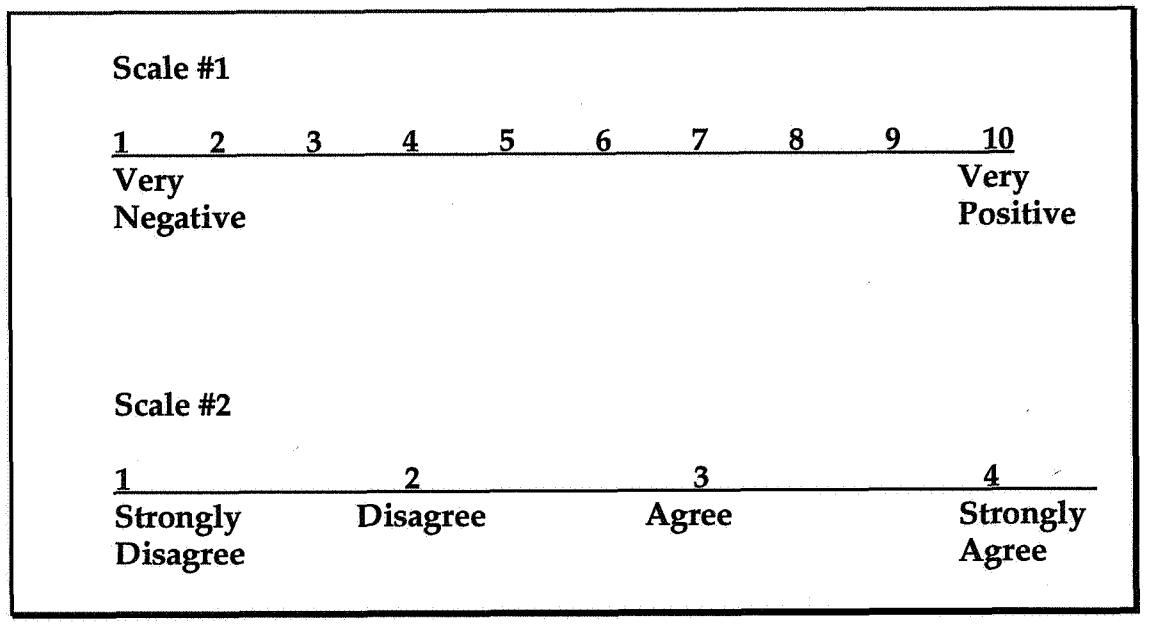
1 Afr Amer/Black
2 Asian/Pac. Is
3 Caucasian/White
4 Hispanic/Latino
5 Nat Amer./Ak Native
6 Other _____ 82/

+*Q19. Gender (CIRCLE)
1 Male 2 Female 83/

Administrative :		1	Exit	84/
Status: 1	SI Cont./Staff	4	Interview:< 12 yrs.	
2	Ineligible	5	Refusal: Lang	
3	Interview: 12+	6	Refusal: Other	85/
Shift : 1 2 3 4				86/
Segment: 1 2 3 4 5 6				87/
Session: _____				88-89/
Office only: WEIGHT: _____/_____				90-94/

Card #1

This card was shown to respondents when asked Q.7 and Q.11. The printing on the actual card was considerably larger.



SELECTED SECTIONS AND INTERACTIVES
[In Order of the Display]

PRE-WAR SCIENCE

A) Remson's Lab (Talking Diorama)
B) Pure Food (Microscope)
C) Hampton Institute/Science in City
D) World's Fair (Video)

THE ATOMIC AGE

E) First Nuclear Reactor/Fermi Section
F) Atom Smasher (Rotating Steel Balls Interactive)
G) Minorities In W.W.II Science (Computer Interactive)
H) Nuclear Control Rods (Interactive)
I) Nagasaki Photo Section

POST-WAR

J) Fallout Shelter
K) Bob's Weekend (Computer Video)
L) Post-war House (Kitchen/Living Room)
M) Birth Control Section
N) Rachel Carson Section (DDT)
O) Ninja Turtle Display

MODERN ISSUES

P) DNA Fingerprinting
Q) Cambridge DNA Debates (Video)
R) Ozone Hole Section
S) Supercollider Section
T) Women In Contemporary Science (Computer Interactive)

LOOKING AHEAD ROOM

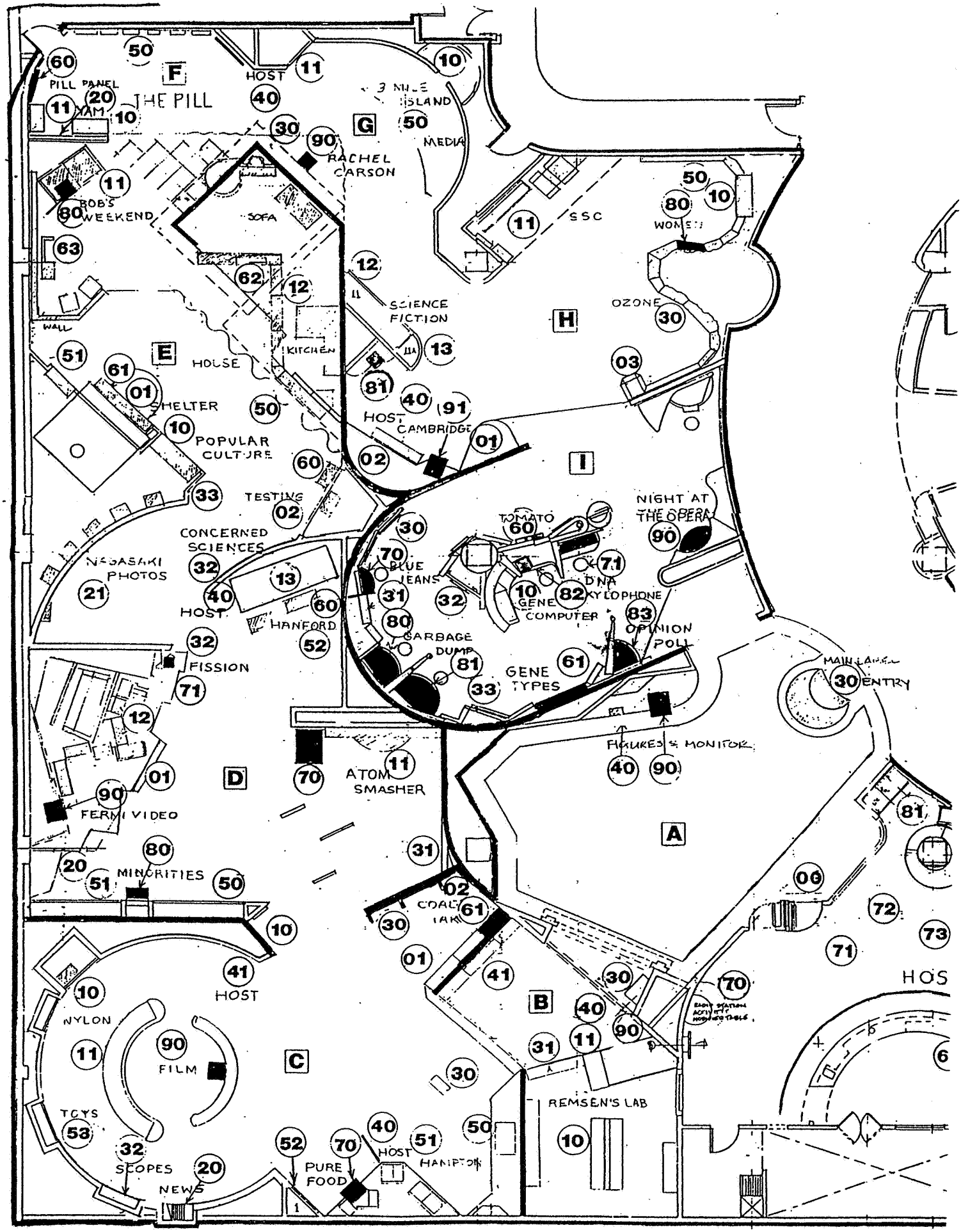
U) Chilly Tomato (Interactive)
V) Blue Jeans (Microscope)
W) Garbage Dump (Video)
X) Gene Splicing (Computer)
Y) DNA Xylophone
Z) Night At The Opera (Video)

HANDS-ON SCIENCE CENTER

1) Global Warming
2) Teacher's Resource Center
3) Lab Bench Experiments
4) Intelligence Tests
5) Laser Demo

TRACKING SURVEY FORM

TRACKER ____						**COUNT:**					**Admin Box**	
START TIME:				Soc.						Soc.	ID:	
#	Start	Location	Stop	Int.		#	Start	Location	Stop	Int.	**Shift:**	1 2 3 4
1						26					**Segment**	1 2 3 4 5 6
2						27					**Session:**	_____
3						28						
4						29						
5						30					Location Code	
6						31					0	Lab
7						32					01 to 09	Objects & Texts
8						33					10 to 19	Objects
9						34					20 to 29	Photos
10						35					30 to 39	Text
11						36					40 to 49	Photos & Text
12						37					50 to 59	Objects, Photos, Text
13						38					60 to 69	Flip/slide Interactive
14						39					70 to 79	Low-tech Interactive
15						40					80 to 89	Computer Interactive
16						41					90 to 99	Film/Video
17						42						
18						43					Soc Int Key	
19						44					T	Together (doing it with
20						45						another group member)
21						46						
22						47					C	Calling something to
23						48						the attention of another
24						49						not at exhibit
25						50					D	Distracted or
Gender:												interrupted by
Age:												a group member
Group size:												
Group Composition:											P	Photographing
Racial/Ethnic:											U	Using interactive
END TIME:												


F
G
H
I
E
D
C
B
A
THE PILL
PILL PANEL
HOST
3 MILE ISLAND
MEDIA
RACHEL CARSON
BOB'S WEEKEND
SOFA
SSC
WOMEN
OZONE
SCIENCE FICTION
WALL
KITCHEN
HOUSE
SHELTER
POPULAR CULTURE
HOST CAMBRIDGE
TESTING
CONCERNED SCIENCES
NAGASAKI PHOTOS
HOST HANFORD
TOMATO
NIGHT AT THE OPERA
BLUE JEANS
GENE COMPUTER
DNA XYLOPHONE
GARBAGE DUMP
OPINION POLL
GENE TYPES
FISSION
MAIN LAWN ENTRY
FIGURES & MONITOR
ATOM SMASHER
FERMI VIDEO
MINORITIES
COAL TAR
NYLON
FILM
HOST
TOYS
SCOPES
NEWS
PURE FOOD
HOST HANFORD
REMSEN'S LAB
HOS

Appendix B.

Study Methodology: *Science in American Life*

The *Science in American Life* Study is one of a series conducted by the Institutional Studies Office to profile visitors to Smithsonian museums, to increase our knowledge of the visit experience and to provide information for future exhibition planning. Each study is tailored to the particular needs of the sponsor and the resources available for the study. This appendix contains the rationale for the sample design, a discussion of the questionnaires, and information about the study's implementation.[1]

Goals

The central goals of this study can best be phrased as questions:

1. To what extent are the exhibition's key curatorial messages communicated to visitors?

2. Are visitors' attitudes towards science being changed by the exhibition; and if so, in what ways?

3. What overall ideas are visitors coming away with?

4. To what degree are these responses significantly affected by the specific activities that people undertake in the exhibition or by the time that they spend with them?

Overall Design

Data for the study were collected in personal interviews with a systematic scientific sample of visitors at the exhibition entrance (Entrance Survey) and at the exhibition exit (Exit Survey). At the same time as the entrance interviews were conducted, we observed (unobtrusively tracked) a sample of visitors through the entire exhibition (including trips to, from, and within the Hands On Science Center (HOSC)) and noted the overall time they spent in the exhibition as well as the time and location of each stop (Tracking Study). Interviewing was conducted on June 15, 17, 19, and 21 and July 5, 7, 9 and 11.[2]

For this project we used a "continuous sampling" technique, a special procedure developed for sampling a mobile population.[3] This allowed us to maximize resources

---

1 For additional background about the study, see the Introduction to this report.

2 We did not interview during the period from June 22 through July 4, as attendance to the museum during that period is affected by the audience that comes to the Mall for the Folklife Festival.

3 The procedure and its rationale are described in Z. D. Doering, A. E. Kindlon and A. Bickford, *The Power of Maps: A Study of an Exhibition at the Cooper-Hewitt National Museum of Design.* Report 93-5. (Washington, D. C.: Smithsonian Institution, 1993).

by selecting individuals whenever interviewers were available and then adjusting the sampling weights for every fifteen-minute period, according to the number of people who passed the interviewing location during that period.

We used teams of three (one counter plus two interviewers) at the exit, and four (one counter plus two interviewers and one or two observer s(trackers)) at the entry. Individuals were selected for the Tracking Study in the same way that respondents were selected for interviews, although they were not interviewed.

There were four interviewing sessions within each day (10:30-12:00, 12:30-2:00, 2:30-4:00, 4:30-5:30). Interviews were conducted on each day of the week. Exit and Entrance Surveys were coordinated so that the same people could not be selected for both, and so that Exit and Entrance Surveys were conducted during all periods of the day.

Visitor cooperation with the study was high, 90.4 percent of eligible respondents completed interviews in the Entrance Survey and 84.7 percent in the Exit Survey, for an overall response rate of 87.6%.[4] A total of 413 interviews were completed in the Entrance Survey, 398 interviews in the Exit Survey, and 163 individuals were observed in the Tracking Study. The intercepted individuals represent a population of over 15,200 visitors to the exhibition during the survey period. In appreciation for their cooperation, respondents were given a booklet about the exhibition.

Questionnaire Development

The primary objective of the study was to collect data with which to address the exhibition's communication effectiveness and, if possible, to detect changes resulting from a visit to the exhibition. A secondary objective was to relate the visitors' experience to specific objects and display strategies. In addition, we needed a profile of visitors to the exhibition to determine if the exhibition's audience differed from the overall visitorship to the National Museum of American History. The questionnaires for the study, then, had to collect information with which to assess the extent to which the exhibition successfully communicated its messages, what changes resulted in visitor perspectives as a result of a visit, as well as to assess exhibition components and address the audience profile issue.

The initial portion of the questionnaire collected general information about the visit. Aside from asking for residence (Q1) and prior visits to the museum (Q2), we asked for the visitors' sources of information, if any, about the exhibition and what they had heard (Q4). We also verified if the respondent had visited the HOSC and, if not, whether there were plans for doing so (and reasons, if not) (Q5 and Q5a). After establishing some rapport with visitors, we asked about the scientific or technical background of the respondent or their immediate family (Q6). These questions (Q1-Q6) were identical on both the Entrance and Exit Surveys.

---

4 See below for a discussion of these response rates and the response bias in the study.

Two other questions were also asked of both entering and exiting visitors. The Science Attitude Scale, Q7, asked how the respondent felt about the impact of science and technology on their lives. The Visitor Opinion Scale, Q11, was based on a concise statement of the exhibition's cognitive, affective and behavioral aims provided by Arthur Molella, Assistant Director for History at NMAH. (Both of these are discussed in Section II above.)

The remaining substantive questions, asked of exiting visitors only, focused on the exhibition. Finding a way to assess the respondents' understanding of the curator's point of view was the most challenging part of developing the questionnaire. After exploring several measurement options, the approach we settled on relied primarily on open-ended items. First, however, we asked for respondents' interpretation of the main message and a report of what in the exhibition conveyed this message (Q9 and Q10). We also asked what in the exhibition they found most informative (Q12) and the main idea it gave them (Q12a). To see if anything had a personal meaning for visitors, we also asked what in the exhibition interested them the most and why (Q13).

The interview ended with a set of standard ISO demographic questions: residence, who accompanied the respondent to the museum, occupation, age, educational attainment, racial/ethnic identification and gender. These were asked in both Entrance and Exit Surveys.

The questionnaire also included a section for recording administrative information that is necessary for empirical analysis. This included the time, date and location of the interview, and the reason, if applicable, that an interview was not completed (e.g., Smithsonian employee). Interviewers were trained to administer the survey with the aid of a manual developed for the study.[5]

Questionnaire development included experimentation with the order of the exhibition items. That is, we tried not only different items but also different orders.[6] The order used in the final questionnaire asks several subjective, open-ended questions about the exhibition before objective forced choice items. In determining the final order of the items in the questionnaire, we sought to maximize the internal consistency of responses, while minimizing respondent fatigue and the respondents' feeling that they were being tested.

Sample Design and Selection

Survey Schedule. Resource and schedule constraints restricted the data collection to eight days during late June and early July. Within each day, the schedule covered only

---

5 General interviewing instructions were based on Institutional Studies, *A Manual for Interviewers.* Prepared for the 1988 National Air and Space Survey. Report 88-3. (Washington, D. C. : Smithsonian Institution, 1988). The general instructions and question-by-question specifications for this study are available from the Institutional Studies office.

6 Approximately 50 preliminary questionnaires were administered by Institutional Studies staff as part of questionnaire development.

six hours instead of the 8.5 hours in which the museum was open. (Summer hours were from 10:00 AM to 6:30 PM). The actual schedule takes into account resource limitations as well as hypothesized variations in visitor types during different days of the week and times of the day.[7] During the eight days of the study, the schedule translates into approximately a 25.0 percent sample of hours.

Sample Selection.[8] Within each time interval selected for the survey, a team of three (or four) interviewers were assigned to the exhibition exit (or entrance). A team leader, or "counter," used a mechanical counter and a stop watch to keep track of the number of persons exiting (or entering) the exhibition and maintained a record of the number of people exiting within 15 minute intervals. The counter also identified the visitors to be intercepted, whenever an interviewer had completed one interview and was ready to begin the next. (This method of selecting a sample keeps the interviewers fully occupied, compared to an equal interval selection method; the counter is essentially incorporating a self-adjusting selection interval.)

Everyone, except those in escorted groups, was counted and the information recorded on a Sample Selection Form. In addition, when intercepts were made, the number on the mechanical counter ("count number") was recorded on both the Sample Selection Form and by the interviewer on the questionnaire.

Office Procedures. The questionnaires were reviewed in the office and prepared for data entry. The main purpose of this review was to ensure that the data file included the appropriate information for weighting the data. The weight for each questionnaire was defined as: the number of visitors counted in a specific 15 minute interviewing segment divided by the number of intercepts in the segment. For example, each of 4 questionnaires filled out in a given 15 minutes during which 40 visitors exited would be assigned a weight of 10, irrespective of when it was conducted during the 15 minutes (e.g., if the "count numbers" were 5, 12, 28 and 40). In the analysis, these weights were assigned to individual records, since respondents were not selected with equal probability throughout the survey.

---

[7] Schedule on file in the Institutional Studies Office.

[8] The discussion is restricted to the mechanics of sample selection, rather than the rationale. See Z. D. Doering, A. E. Kindlon and A. Bickford, *The Power of Maps: A Study of an Exhibition at the Cooper-Hewitt National Museum of Design.* Report 93-5. (Washington, D. C.: Smithsonian Institution, 1993)..

Table B.1
Results of Data Collection: *Science in American Life*
(in percent)

Type	Entrance		Exit		Total	
	N	%	N	%	N	%
A. Disposition, All Eligible Visitors						
Interviews	413	90.37	398	84.86	811	87.58
Non-Interviews	44	9.63	71	15.14	115	12.42
Total	457	100.00	469	100.00	926	100.00
B. Disposition of Non-Interviews						
Refusal, Language Difficulty	11	25.00	10	14.08	21	18.26
Refusal, Other Reason	33	75.00	61	85.92	94	81.74
Total Non-Interviews	44	100.00	71	100.00	115	100.00
C. Response Rates						
All Eligible Visitors	90.37		84.86			87.58

Completion Rates and Response Bias

As shown in Table B.1, 9.63 percent of all persons intercepted in the Entrance Survey and 15.14 percent in the Exit Survey refused to participate in the survey. The overall refusal rate was 12.42 percent. While a few refusals were due to language difficulties (21), the majority of refusals (94) were for "other" reasons (e.g., visitors in a hurry, not wanting to detain companions, etc.).

We compared separate demographic characteristics of visitors between those who completed interviews and those who refused for any reason. There were statistically significant differences between those who completed and those who refused in three variables: type of interview (more refusals in the Exit Survey), residence (more refusals among Foreign residents), and racial/ethnic identification (more refusals among non-White group members). Among those who refused due to language difficulty, there were statistically significant differences in residence (more refusals among Foreign residents) and social composition (those alone were more likely to refuse).[9]

However, when we look at characteristics together, i.e., in a multivariate statistical model, we find the following: overall, all else being equal, individuals exiting the exhibition were 3 percent more likely to refuse when compared to those entering. In addition, all else being equal, foreign residents were 5 percent more likely to refuse due to language difficulties in comparison to visitors who live elsewhere.[10]

The high response rate and the results of these logistic regression models suggest that there is no need to weight for non-response.

---

9 Data on file, ISO.
10 Data on file, ISO.