

# Evaluating A.P.H.A. Exhibits

ANDIE KNUTSON, PH.D.

*Chief, Research and Evaluation Section, Office of Health Education,  
U. S. Public Health Service, Washington, D. C.*

THE general purposes of this study were to evaluate the relative effectiveness of the 42 scientific exhibits on display at the Boston A.P.H.A. meetings, November 8-12, 1948, and to investigate some methods for pretesting such exhibits. An attempt was made to measure effectiveness both from the exhibitor's and the observer's points of view.

At times in the past, data on the amount of attention the exhibits attract and the amount of interest they sustain have been submitted as evidence of their effectiveness. Such data were not regarded in this study as evidence of effectiveness, but, rather, as evidence that certain conditions necessary for effectiveness have been satisfied. An exhibit may very well satisfy these conditions while still leaving the observer uninformed, with negative attitudes, or dissatisfied, without any desire to act.

In this study, the measure of effectiveness from the exhibitor's point of view was considered to be its success in accomplishing the specific purpose for

which it was designed, whether that purpose' was to incite curiosity, to inform, to educate, to elicit action of some kind, or to obtain a list of prospective customers.

## THE METHODS

Two separate approaches were used in accomplishing the purposes of this study: (1) Interviews were conducted with a sample of A.P.H.A. members and visitors in a public opinion survey; and (2) a group of members and students participated in an evaluation of the success of the exhibits in achieving their objectives as stated by the exhibitors.

Methods used in earlier museum and health education exhibit studies were considered in planning this investigation. Use was also made of the findings of earlier studies in interpreting the results obtained and in outlining methods of applying the data available on successful exhibits to the improvement of new exhibits.\*

### *The Public Opinion Survey*

In all, 217 A.P.H.A. members and guests were interviewed. About 80 per cent of these interviews were made in the vicinity of the exhibit hall, but out of sight of the exhibits themselves—at the exits, in the meeting rooms, and in the cafeteria. The remainder of the interviews were made at the entrances to the meeting rooms at Hotel Statler. An attempt was made to select persons at random, but the sample cannot be considered a truly random sample of

---

CREDITS: This study was made by the U. S. Public Health Service at the request of the Committee on Scientific Exhibits: Franklin M. Foote, M.D., *Chairman*; Paul H. Brown, M.D., Homer N. Calver, Vivian Drenckhahn, Francis B. Elder, Horace Hughes, S. S. Lifson, Willimina R. Walsh. Frank Kiernan acted as an advisory member.

Grateful acknowledgment is made to the 30 A.P.H.A. members who helped in the evaluation and to Prof. Leslie Irwin of Boston University and Prof. Curtis M. Hilliard of Simmons College and their students who participated in the evaluation and served as interviewers.

\* A discussion of the history of exhibit evaluation and the motivational basis of the present approach has been deleted for lack of space.

A.P.H.A. members attending the meetings: persons who did not attend meetings or view the exhibits on Thursday and persons who said they did not have time to participate were not represented in the sample. A comparison of the sample interviewed with the A.P.H.A. members attending the Boston meetings suggests that the sample was nevertheless fairly representative by Section membership.

The interviews with A.P.H.A. members and guests were conducted after the exhibits had been available for inspection 3½ days.

The interviewing was performed by students of Boston University and Simmons College who volunteered their services. Most of the interviewers were graduate students; many of them had had previous interviewing experience. Although only a brief instruction period was possible, internal analysis of the data suggests a conscientious job of interviewing.

#### *Evaluation of Exhibits in Achieving Objectives*

As a means of determining how well the exhibits were attaining their objectives, a comparison was made between the statements of the objectives made by the exhibitors and similar statements made by 30 A.P.H.A. members and 20 student volunteers. The members who participated in this work were assigned by A.P.H.A. Section chairmen in proportion to Section membership. The student volunteers were juniors, seniors, and graduate students from Boston University and Simmons College.

A comparison of the responses of students and A.P.H.A. members who carried out this work of evaluating the scientific exhibits served as a test of the reliability of students in evaluating such exhibits.

#### THE FINDINGS

##### *The Time Spent at Exhibits*

As one rough measure of the time

spent at exhibits, the sample of A.P.H.A. members was asked the question, "In all, about how much time have you spent so far in going over the exhibits?"

*The median time spent as measured by the responses to this question was about 2½ hours or for the 150 exhibits, approximately one minute per exhibit.\**

TABLE 1

"In all, about how much time have you spent so far in going over the exhibits?"

	Per cent *
None at all	6
½ - 1 hour	13½
1½ - 2 hours	25
2½ - 3 hours	21½
3½ - 4 hours	11½
4½ - 5 hours	7½
5½ - 6 hours	6½
More than 6 hours	8½
	100

\* Percentages are based on the responses of 201 persons who answered the question in the opinion survey on Thursday afternoon.

These findings agree in general with the studies previously carried out by Robinson,<sup>19</sup> Derryberry and Weissman,<sup>7</sup> and Nielson,<sup>17</sup> who have made time studies of persons viewing museum and public health exhibits. In the study of exhibits displayed at the World's Fair, it was found that "the time spent in observing each of the 30 exhibits in the Medical and Public Health Building ranged from 20 seconds to 285 seconds—that is, from 1/5 of a minute to 4¾ minutes. In the Hall of Man which contained relatively small exhibits, the average observation time at each exhibit was only about one-fifth as much as would be required to make a complete inspection of it. In the Hall of Medicine which contained larger exhibits the visitor spent on the average little more than one-twentieth of the time required for a complete visit."<sup>7</sup>

\* While the study was concerned with the 42 scientific exhibits, this particular response involved the time spent at all the exhibits present—commercial and scientific. No distinction could be made.

Nielson, who has more recently used a concealed motion picture camera to record visitor behavior in a museum, reports that "statistical analysis of time-of-stay-at-each-exhibit, revealing as it did variations in average time of from 9 seconds to 1 minute, and range of from 5 seconds to 3½ minutes per exhibit, holds great educational implications . . ." 17

### *The Exhibits Most Favorably Remembered*

The interview schedule used in making the survey of A.P.H.A. members contained five questions which yielded a measure of the exhibits which were most favorably remembered by A.P.H.A. members.

1. What exhibit did you like best?
2. What other exhibits did you find most interesting and worthwhile?
3. Since you have been over the exhibits, have you discussed any of them with anyone? (If yes) Which ones did you discuss?
4. This is a list of the scientific exhibits on display. Would you please pick out the one scientific exhibit you found most interesting and worthwhile?
5. Which other 2 of these exhibits did you personally find most interesting and worthwhile?

The first three of the questions used were free answer or direct recall questions in the sense that the A.P.H.A. member was provided with no list from which to make a selection. The last two questions were recognition questions—a list of the scientific exhibits was provided and the subject would select from this list the exhibits he found most interesting and worthwhile.\* From the responses to these five questions a score was obtained for each of the scientific exhibits and a comparison could be made in terms of the total score, the score on the recall questions, and the score on the recognition questions.

\* The exhibits were listed in alphabetical order. Some bias may have resulted from the order in which the exhibits were listed, but the score distribution shows no apparent relation to the order of listing.

Six of the 42 scientific exhibits used at the A.P.H.A. offered an opportunity for all visitors to participate by acting in carrying out a personal purpose.† This was in addition to a number of exhibits which offered consultation services to persons with specific interests. Those offering all visitors an opportunity to act in some way in achieving a personal purpose were:

The American Public Health Association Exhibit—"An Exhibit is an Exhibit is an Exhibit"—offered assistance in planning exhibits.

The Brookline Health Department exhibit gave diabetes tests to persons who were interested.

The Massachusetts Department of Public Health exhibit provided an opportunity for visitors to obtain eye examinations.

The Merit System Service exhibit offered tests to visitors.

The National Publicity Council for Health and Welfare Services exhibit invited visitors to take tests and to discuss and obtain health education materials.

The U. S. Public Health Service exhibit offered an opportunity to take part in demonstrations, to discuss jobs in the service, and to obtain and discuss health materials available through the U. S. Public Health Service.

The six exhibits that offered visitors a chance to act in achieving a personal purpose were heavily represented among the most favorably remembered exhibits.

Visitor participation in satisfying a personal purpose was a feature of:

5 of the 6 exhibits receiving the highest recall score

3 of the 6 exhibits receiving the highest recognition score

4 of the 6 exhibits receiving the highest total score (Table 2)

The recall score was considered to be the better of these measures of the success of an exhibit. Recall questions probably yield a truer estimate of what people carry away from the exhibits in their experiences, rather than in their notes

† This conclusion is drawn from an examination of descriptions of the scientific exhibits as published in the Official Program, Seventy-sixth Annual Meeting, American Public Health Association, November 8-12, 1948, pp. 71-75.

TABLE 2

*The Exhibits Most Favorably Remembered**Exhibits with highest recall score*

* U. S. Public Health Service	43
* National Publicity Council	41
* Merit System Service	25
American Cancer Society	25
* Massachusetts Department of Public Health	20
* Brookline Health Department	17

*Exhibits with highest recognition score*

American Cancer Society	68
* U. S. Public Health Service	59
* Brookline Health Department	38
* Massachusetts Department of Public Health	36
American Heart Association	33
World Health Organization	32

*Exhibits with highest total score*

* U. S. Public Health Service	102
American Cancer Society	93
* Massachusetts Department of Public Health	56
* Brookline Health Department	55
* National Publicity Council	52
World Health Organization	44

\* Indicates that this exhibit offered visitors an opportunity to act in some way in achieving a personal purpose.

and literature. They are most like the questions our friends ask us when we have returned from a convention—“What exhibits did you like best?” Our friends do not have a list of the exhibits for us to look at in giving our judgment. Nor do we normally refer to our notes and literature before we reply.

It was observed that a few exhibits tended to obtain relatively higher scores on the recall questions than on the recognition questions whereas a few exhibits obtained relatively higher scores on the recognition questions. The four exhibits in which the recall score was most disproportionately high and those four in which the recognition score was most

disproportionately high were selected for analysis in order to obtain some insight into the features of the exhibits most frequently recalled but not selected from a list as having high merit.

When this comparison is made, it is found that three of the four exhibits having a relatively higher recall score were exhibits in which visitors could participate in satisfying a personal purpose. On the other hand, not one of the four exhibits having a relatively higher recognition score was an exhibit in which visitors participated in this way. There was a tendency for the technically elaborate exhibit to be more often selected from the list and for the exhibit which

	<i>Recall score</i>	<i>Recognition score</i>
* An Exhibit is an Exhibit	8	—
Massachusetts Tuberculosis and Health League	11	2
* Merit System	25	9
* National Publicity Council	41	11
American Academy of Allergy	5	17
American Heart Association	5	33
National Tuberculosis Association	3	16
Research Council on Problems of Alcohol	3	13

provided an opportunity for participation to be more frequently mentioned when no exhibit list was available to stimulate the response.

### *The Exhibits that Were Best Understood*

Each of the 42 exhibitors was asked to complete these statements about his exhibit in no more than 25 words:

"The primary objective of our exhibit is . . ."

"The main points we want to impress upon those who see it are . . ."

The 30 A.P.H.A. members and 20 students participating in the evaluation were provided with data sheets and were asked to complete these same statements for each of the scientific exhibits present. They were advised of the purpose of the study, and were asked not to rate or rank the exhibits, but only to complete these statements to the best of their abilities. No time limit was set for viewing any particular exhibit; the data sheets were returned in about 48 hours.

Three of the A.P.H.A. exhibits (National Publicity Council, Merit System, Vocational Guidance) were not included on the data sheets used for this evaluation because they were considered by the A.P.H.A. to be services rather than exhibits. It is significant, however, that the membership interviewed thought otherwise; the National Publicity Council and Merit System exhibits were among those most favorably remembered, as measured by direct recall questions.

A comparison of the exhibitor's statement of objectives and the observer's statement of objectives has been made for each of the scientific exhibits studied. The findings have been presented individually to the exhibitors for their information. This analysis, however, brought out some relationships pertinent to anyone planning a scientific exhibit:

1. Nearly all the exhibits studied served some purposes different from those planned

by the exhibitor. In some instances, objectives not mentioned by the exhibitor were most frequently stressed by the observers as the primary objectives of the exhibit.

2. Exhibits with simple, clear objectives were better understood. A close relationship existed between the simplicity of the objectives and the frequency with which they were reported by the observers. Difficult vocabulary and statistics lead to poor understanding.

3. Some exhibits were designed to satisfy purposes of the audience; others were planned to achieve objectives of specific interest to the exhibitor but of secondary interest to the audience. (Example: to promote the name or program of the sponsoring agency.) Exhibits planned to satisfy the purposes of the audience were more successful in achieving their objectives than exhibits aimed toward furthering purposes specific to the exhibitor. Observers tended to interpret the exhibit objectives in the light of their own experiences and wants.

4. The findings of the present investigation suggest that college juniors, seniors, and graduate students can be successfully employed to pretest exhibits designed for professional audiences. Their interpretation of the message imparted by the exhibits were very similar to the interpretations given by A.P.H.A. members.

### *Suggestions of A.P.H.A. Members for Improving Scientific Exhibits*

In the public opinion survey of A.P.H.A. members and guests, the question was asked:

"Do you have any suggestions for making the scientific exhibits more useful and effective so A.P.H.A. members would get more out of them?"

In response, more than half of those interviewed offered suggestions for improvement. (See Table 3.)

About one-fourth of the suggestions offered were concerned with improving the exhibit in some physical way, by putting more life into them through the use of gadgets, visual aids, color, movement, graphs, etc., or by building them to present specific central themes.

Another fourth of the suggestions indicate that many members desire more opportunity for an interaction between the observer and the exhibit. These members ask for better and more active

TABLE 3

*"Do you have any suggestions for making the scientific exhibits more useful and effective so A.P.H.A. members would get more out of them?"*

Suggestions about exhibit makeup	25%
Should put more life into them by using more gadgets, visual aids, color, movement, graphs, etc.	18%
Should have central and specific themes	7
Suggestions concerning greater interaction between observer and exhibit	25%
Should have better and more active attendants	9
Should have more audience participation	9
Should offer more literature, samples	4
Should include demonstrations or lectures	3
Suggestions about location, spacing, grouping, selection	53%
Should have better location, more and better spacing	26%
Some other (specific) organization should have had exhibit	9
Scientific exhibits should be given better and separate location	7
Should reduce number of scientific exhibits and increase standards	6
Should have better grouping and organization	4
Should call them Educational Exhibits	1
Suggestions about guidance and programs	17%
Should have better maps, directions, signs, etc.	9%
Should keep time on program open for exhibits	5
Should have better reception facilities, seats, lounges, etc.	3
Other suggestions	4%
	*
No suggestions	100
Number of cases	217

\* Percentages are based on 117 persons who gave suggestions. Percentages add up to more than 100% because some persons offered more than one suggestion.

attendants more opportunity for audience participation, literature and samples, demonstrations or lectures.

#### APPLICATION OF THE FINDINGS:

##### THE PRETESTING OF EXHIBITS

Pretesting is one means of applying the findings of evaluation to an operating program. It is the positive side of evaluation. It is the one means we have of making immediate use of data collected in earlier evaluation studies.

In the case of exhibits, for example, studies carried out at the New York World's Fair, the study of exhibits at the A.P.H.A. conference in Boston, and the findings obtained in other investigations have provided us with objective data on the characteristics of the more successful exhibits. We can apply these data in testing planned exhibits to determine

whether or not it is possible for new exhibits to be effective.

On the basis of such pretests, concrete recommendations for improvement can be suggested, and desirable revisions made prior to displaying the exhibit—in fact, in large part before building the exhibit. At times some estimates may be made as to the probable effectiveness of the exhibit as related to its cost in time and effort.

It is important that this pretesting or preevaluation be carried out on groups similar to those toward which the educational program is being directed. Persons of different economic, social, and educational levels differ so widely in their experiences and in their goals in life that it is not possible for them to view social situations in the same manner. Professional persons observing an

exhibit designed for a low income group may react in a manner completely different from the non-professional worker for whom the exhibit is planned. Only by testing the exhibit on a group of these lower income persons toward whom it is directed can we be certain that the exhibit is able to put across the message it carries.

Several approaches may be made in evaluating an exhibit prior to using it. The answers to the following questions will yield an operational index to the probable success an exhibit will have in imparting a well understood message to the largest possible audience at a minimum cost per effective exposure.

*Is it physically possible to read the exhibit from the point of observation?*

It seems obvious that the size of print, adequate contrast of light and dark, the possible obstacles to easy reading or easy observation, the location of pamphlets or other reading materials in the normal focus of attention, etc., can be determined prior to using an exhibit. In practice however, this simple requirement of the possible success of an exhibit is not always met. As a result, exhibits are sometimes displayed in such a way that the audiences cannot successfully follow them even though they might otherwise be inclined to do so.<sup>5, 6</sup>

As a test, the exhibit can be given a trial exposure to a group of laymen. If they indicate in response to a series of questions that they have had difficulty seeing any part of the exhibit clearly, or that they have had to get into awkward positions to view the entire exhibit, revisions should be made.

Attendants should be advised of this problem so they do not permit vases, hats, coats, seated visitors, etc., to obscure the exhibit. If materials are available for distribution they should be placed where they can easily be seen. Materials placed on racks below the exhibit are frequently overlooked.

*Does the exhibit sustain interest long enough to be read completely?*

Previous studies already cited have shown that few people spend much more than 1 minute at any single exhibit unless the exhibit is especially successful in sustaining interest. An exhibit that does not involve the visitor in some purposive activity is not likely to impart a complete message unless that message can be read within 1 minute.

Prior to completing an exhibit, a test can be made of the time required to observe the exhibit and to read the complete message. A number of lay persons can be timed while they read through the entire exhibit at their normal reading pace.

*Is the vocabulary and style of writing used such that the intended audience can comfortably follow and understand the exhibit?*

Frequently the terminology and style of writing used in an exhibit is such that only a small proportion of the intended audience can understand the text or labeling. Experts tend to forget that the most frequently used terms in their area of specialty may be completely foreign to persons having a different pattern of education and experience. They may err in attempting to rely on their personal estimates of the level of understanding of audiences of lay persons or persons in other areas of specialization.<sup>2, 5, 6</sup>

Before an exhibit is completed, objective measures can be employed to determine what level of reading ability is required to understand the labels, text. One of several available scales of readability, such as the Flesch Scales<sup>8</sup> may be used for this purpose. The Thorndike word list<sup>22</sup> or some other word list based on the frequency of popular usage or understanding can be employed to locate specific words or terms that may not be fully understood.

*Will all graphs, charts, and diagrams be clearly understood by the intended audience?*

There is need for more data on the capacity of adult populations to understand graphic techniques used in exhibits. Studies made of school children suggest that children leave grade schools without adequate training in the interpretation of graphs and charts. Since little emphasis is placed upon the interpretation of such media during the high school years, it is possible that even simple graphic techniques may be misunderstood.

Charts, graphs, or diagrams which seem simple to persons with one pattern of experience may have no meaning at all to persons without such experience. This may account in part for the low interest shown by many adults in the graphic health exhibits displayed at the World's Fair.<sup>6</sup>

Diagrams, pictures, charts, figures, objects, instruments, and other materials which are self-explanatory to the exhibitor are sometimes completely unfamiliar to the layman. Failure of exhibitors to realize this has sometimes resulted in inadequate labeling and the use of unexplained materials. Serious errors in interpretation result.

Calver,<sup>2</sup> Cummings,<sup>5</sup> and Derryberry<sup>6</sup> have all emphasized the need for getting the responses of lay persons to charts, graphs, or other visual materials used. This may be done by having a number of laymen view the exhibit and respond to some direct questions about the meanings of different parts of the exhibit. This will assure that all parts of the exhibit will be clearly understandable to the intended audiences.

*Does the exhibit tie in with the interests of the visitor and offer him a chance to participate in satisfying a personal purpose?*

Findings from a number of investigations indicate that when people have a

chance to participate actively in the learning process they learn more quickly. This is especially true when the goal to be achieved is one in which they are personally involved. The needs, values, and purposes people have serve them as filters in sifting out of the environment certain things to see and hear, to remember and to act upon. New information is accepted and new attitudes are assumed when these fit in with and serve personal needs, values and purposes.<sup>2, 4, 10, 16</sup>

These findings are as applicable to exhibits as to other educational media and techniques. The exhibits that attract most attention, sustain interest, and are remembered most favorably tend to be those that provide an opportunity to talk, to discuss problems, ask questions, obtain literature, take tests, or act in some other way in satisfying a personal purpose.

*Will the exhibit impart a message that it is desired to impart?*

In the present investigation, as in the study of health exhibits at the World's Fair,<sup>6</sup> it was found that the exhibits with a single, clear theme were better understood than those that attempted to cover too much ground. An attempt to present too many or too difficult objectives leads to confusion on the part of some of the observers and indifference on the part of others.

A student or lay group can be used to test the effectiveness of an exhibit in imparting a fully understood message. Observers can be asked to write a statement of the primary objective and main points impressed by the exhibit. These can then be compared with the exhibitor's statement of objectives and main points as in the present study. Care should be taken to assure that the observers arrive at their conclusions independently without direction or influence. Lack of agreement between the exhibitor's and observers' statements



will suggest steps which may be taken to improve the effectiveness of the exhibit in getting its message across.

## BIBLIOGRAPHY

1. Bloomberg, Marguerite. *An Experiment in Museum Instruction*. American Association of Museums, New Series, No. 8. Washington, D. C. 1929.
2. Calver, Homer N. Exhibits for the Laity. *Journal of Technical Methods and Bulletin of the International Association of Medical Museums*. No. XVIII. 1938.
3. Calver, Homer N., Derryberry, Mayhew, and Mensh, Ivan N. Use of Ratings in the Evaluation of Exhibits. *A.J.P.H.* 33, 6:709-714 (June), 1943.
4. Cantril, Hadley. The Nature of Social Perception. *Tr. New York Acad. Sci.* Series II, 10, 4: 142-153 (Feb.), 1948.
5. Cummings, Carlos E. *East Is East and West Is West*. East Aurora, N. Y.: The Roycrofters, 1940.
6. Derryberry, Mayhew. Exhibits. *A.J.P.H.* 31, 3:257 (Mar.), 1941.
7. Derryberry, Mayhew, and Weissman, Arthur. Techniques for Evaluating Exhibit Material. Read before Science Museums Section of the American Association of Museums, Columbus, Ohio. May 15, 1941.
8. Flesch, Rudolf. A New Readability Yardstick. *J. Applied Psychology* 32, 3:221-233 (June), 1948.
9. Gebhard, Bruno. Exhibit Planning and Analysis. *J. Am. Dietet. A.* 24, 5 (May), 1948.
10. Hastorf, A. H., and Knutson, A. L. Motivation, Perception, and Attitude Change. *Psychol. Rev.* 56, 2:221-233 (Mar.), 1949.
11. Howard, Richard F. Some Ideas About Labels. *Museum News*. Oct. 1, 1939.
12. Kearns, William E. Studies of Visitor Behavior at the Peabody Museum of Natural History, Yale University. *Museum News*. Jan. 14, 1940.
13. Lane, Janet, and Tolleris, Beatrice K. *Planning Your Exhibit*. New York: National Publicity Council for Health and Welfare Services, Inc., 1948.
14. Melton, Arthur W. *Problems of Installations in Museums of Art*. Washington: American Association of Museums, New Series, No. 14, 1935.
15. Melton, Arthur W., Feldman, Nita G., and Mason, Charles W. *Experimental Studies of the Education of Children in a Museum of Science*. Washington: American Association of Museums, New Series, No. 14, 1935.
16. Murphy, Gardner. *Personality*. New York: Harper & Bros., 1947. Ch. 14-15.
17. Neilson, L. C. A Technique for Studying the Behavior of Museum Visitors. *J. Educ. Psychology*, Feb. 1946, pp. 103-110.
18. Porter, Mildred C. B. *Behavior of the Average Visitor in the Peabody Museum of Natural History, Yale University*. Washington: American Association of Museums, New Series, No. 16, 1938.
19. Robinson, Edward S. *The Behavior of the Museum Visitor*. Washington: American Association of Museums, New Series, No. 5, 1928.
20. Robinson, Edward S. Psychological Studies of the Public Museum. *School and Society* XXXIII:121-125 (Jan.), 1931.
21. Shaw, Robert P. New Developments in Science Museum Techniques and Procedures. *Scient. Monthly* May, 1939, pp. 443-449.
22. Thorndike, Edward L. *Teacher's Word Book of 20,000 Words*. New York: Bureau of Publications, Teachers College, Columbia University, 1932.

## Bibliography on Refuse Collection and Disposal

A bibliography of references dealing with refuse collection and disposal is now available free of charge through the Division of Sanitation, U. S. Public Health Service, Washington 25, D. C.

The bibliography contains references arranged alphabetically by author, to material published during the years 1940-1948, and is based on a review of 12 indexes, readers' guides, and services.