Cornell University

ISE: Who are we?
And how did we get here?

Bruce V. Lewenstein
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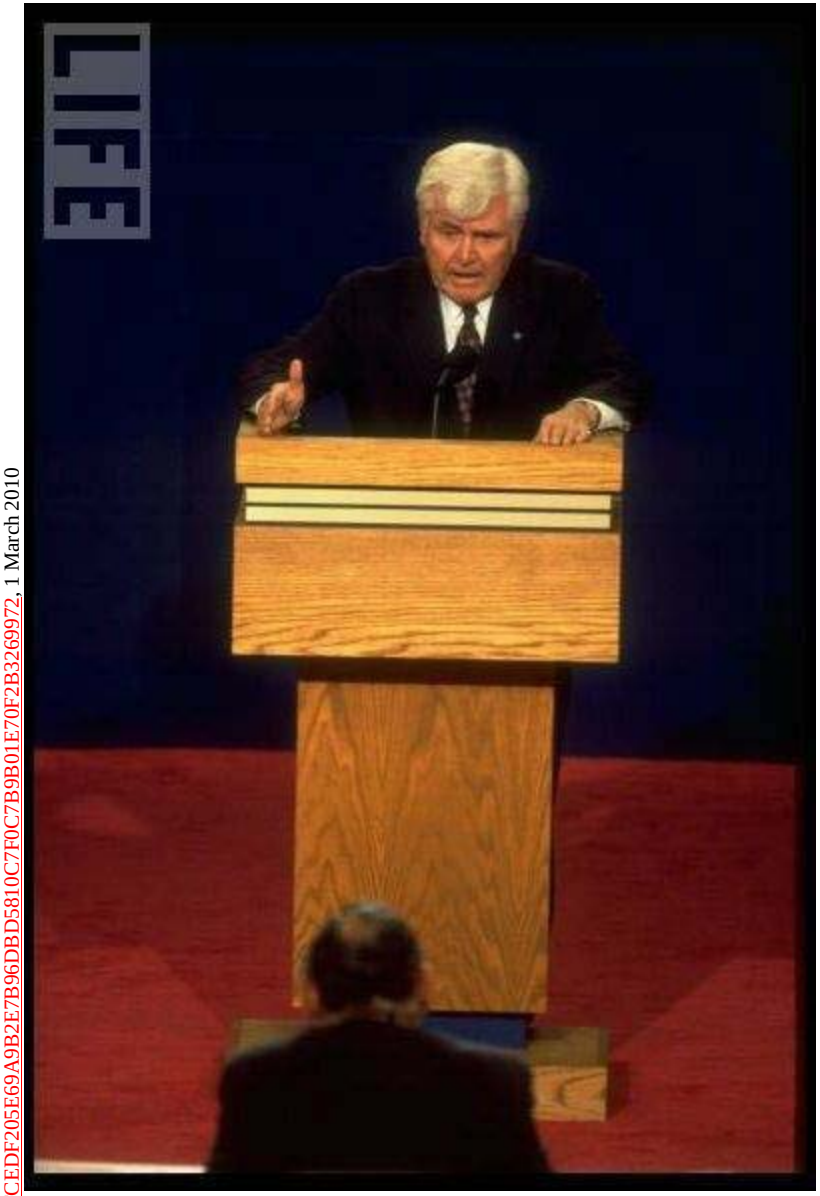
Cornell University
Ithaca, NY 14853
USA
b.lewenstein@cornell.edu

CAISE Summit, Washington DC, 4 March 2010

Credit: Life Magazine
www.life.com/image/50474644
Retrieved from http://cache2.asset-cache.net/xc/50474644.jpg?v=1&c=IWSAsset&k=2&d=E41C9FE5C4AA0A14E0D898E729B62FCEDF205E69A9B2E7B96DBD5810C7F0C7B9B01E70F2B3269972, 1 March 2010



Credit: Life Magazine
www.life.com/image/50474644
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"Who am I? Why am I here?"

Vice Admiral James Stockdale, vice-presidential candidate on Ross Perot's ticket, 1992

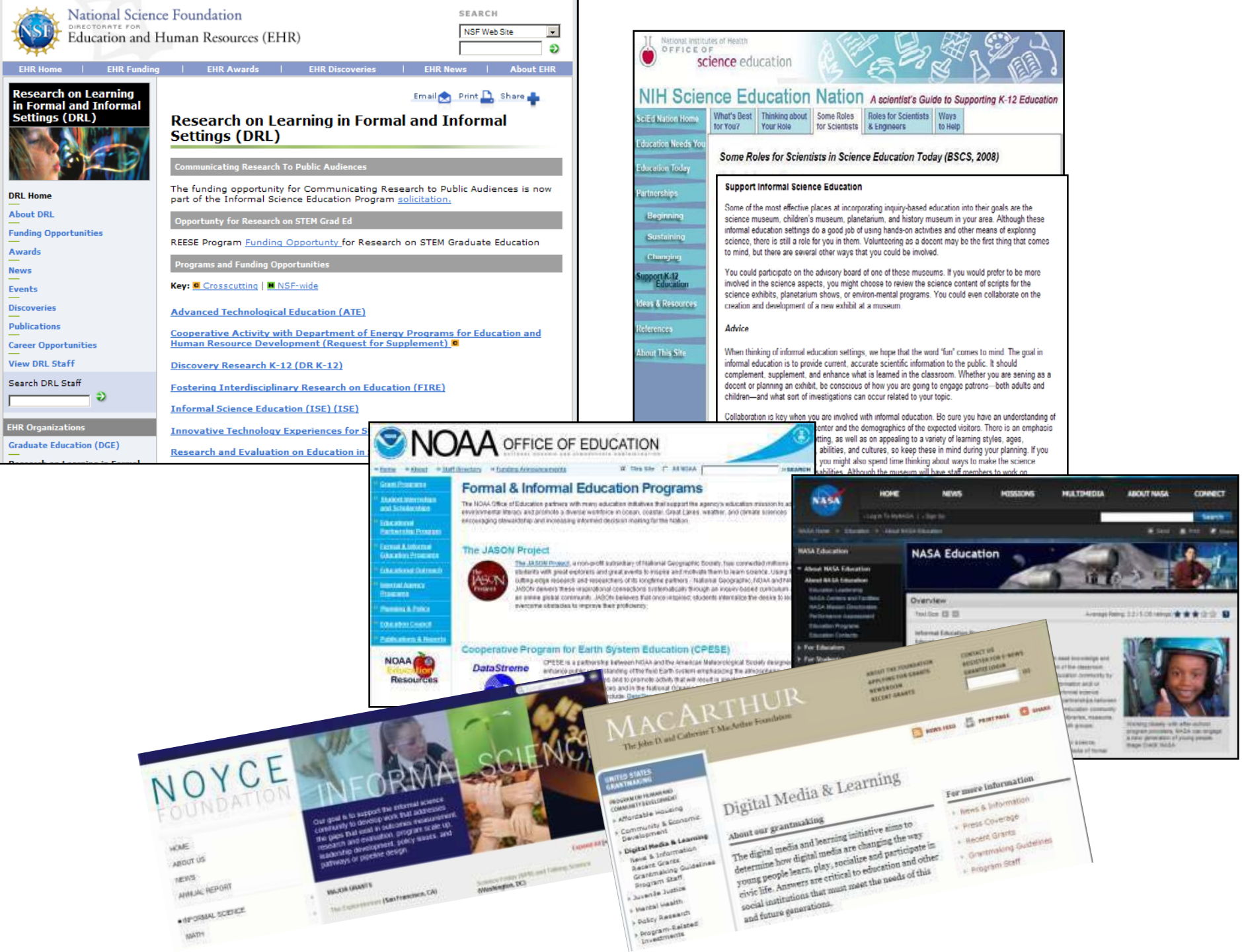
Also 8-year POW in Vietnam, president of Naval War College, one of the most highly-decorated American Navy officers in history

Retrieved 1 March 2010 from:
http://upload.wikimedia.org/wikipedia/commons/4/4f/James_Stockdale_Formal_Portait.jpg

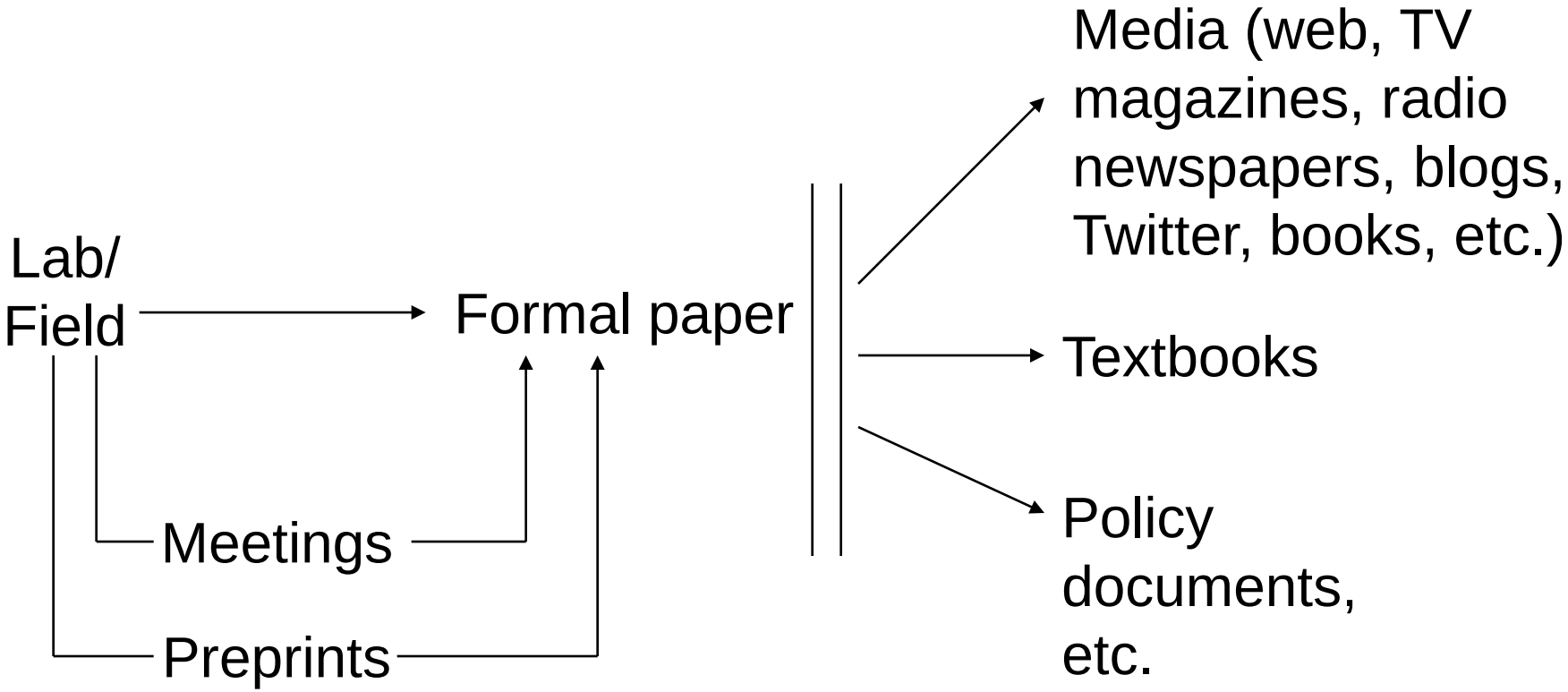
Retrieved 1 Mar 2010 from
http://www.fi.edu/leap/inline/ccdhanger3.JPG

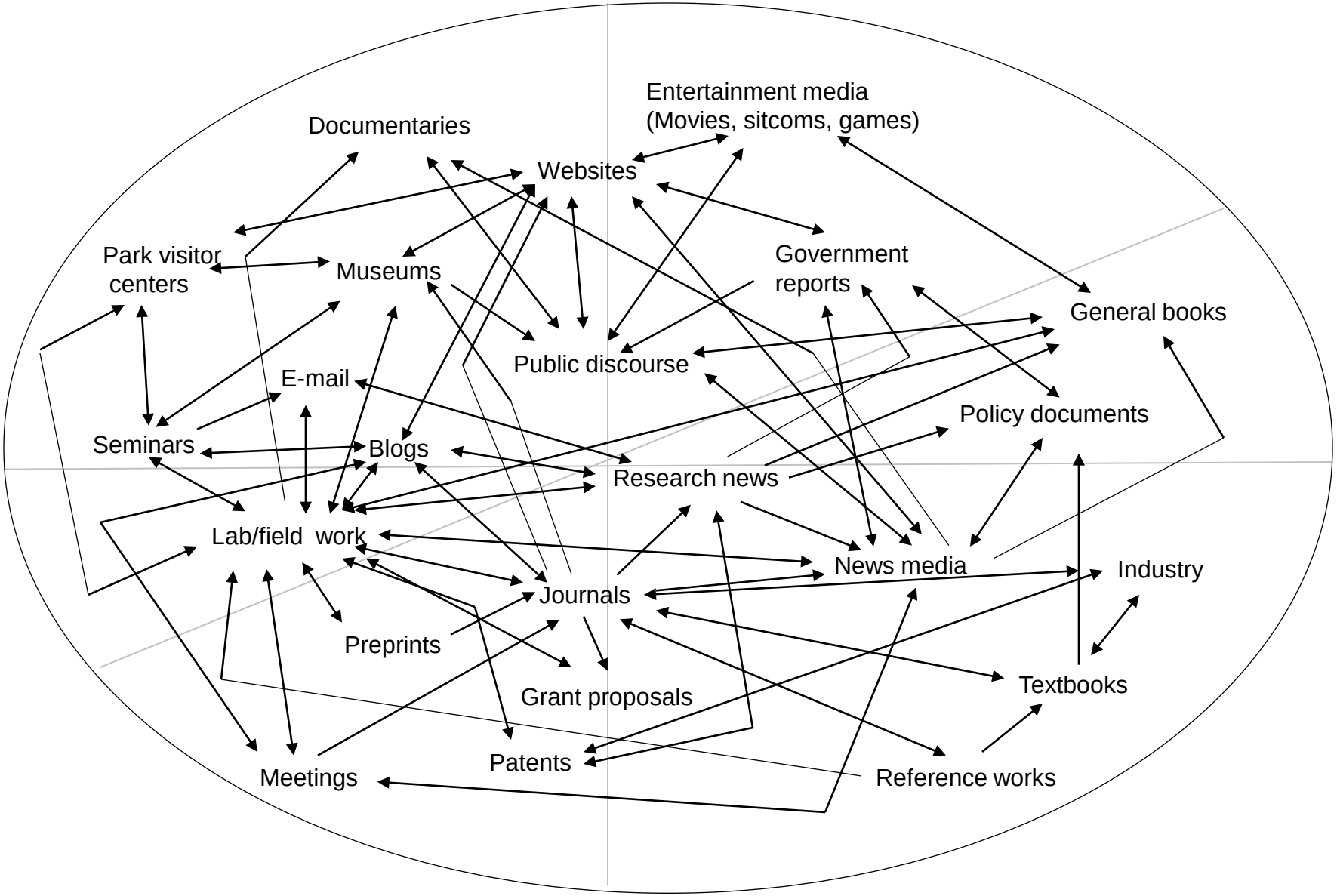
Retrieved 1 March 2010 from:
http://www.nationalrecreationfoundation.org/images/trusteeGrants/19.png

Retrieved 7 Mar 2010 from
http://www.lastrefuge.co.uk/images/photo_articles/gorilla/IMAX_Gorilla16.jpg


National Science Foundation
DIRECTORATE FOR
Education and Human Resources (EHR)
SEARCH
NSF Web Site
EHR Home | EHR Funding | EHR Awards | EHR Discoveries | EHR News | About EHR
Research on Learning in Formal and Informal Settings (DRL)
DRL Home
About DRL
Funding Opportunities
Awards
News
Events
Discoveries
Publications
Career Opportunities
View DRL Staff
Search DRL Staff
EHR Organizations
Graduate Education (DGE)
Email Print Share
Research on Learning in Formal and Informal Settings (DRL)
Communicating Research To Public Audiences
The funding opportunity for Communicating Research to Public Audiences is now part of the Informal Science Education Program solicitation.
Opportunty for Research on STEM Grad Ed
REESE Program Funding Opportunty for Research on STEM Graduate Education
Programs and Funding Opportunities
Key: Crosscutting | NSF-wide
Advanced Technological Education (ATE)
Cooperative Activity with Department of Energy Programs for Education and Human Resource Development (Request for Supplement)
Discovery Research K-12 (DR K-12)
Fostering Interdisciplinary Research on Education (FIRE)
Informal Science Education (ISE) (ISE)
Innovative Technology Experiences for S
Research and Evaluation on Education in
National Institutes of Health
OFFICE OF
science education
NIH Science Education Nation
A scientist's Guide to Supporting K-12 Education
SciEd Nation Home
Education Needs You
Education Today
Partnerships
Beginning
Sustaining
Changing
Support K-12 Education
Ideas & Resources
References
About This Site
What's Best for You?
Thinking about Your Role
Some Roles for Scientists
Roles for Scientists & Engineers
Ways to Help
Some Roles for Scientists in Science Education Today (BSCS, 2008)
Support Informal Science Education
Some of the most effective places at incorporating inquiry-based education into their goals are the science museum, children's museum, planetarium, and history museum in your area. Although these informal education settings do a good job of using hands-on activities and other means of exploring science, there is still a role for you in them. Volunteering as a docent may be the first thing that comes to mind, but there are several other ways that you could be involved.
You could participate on the advisory board of one of these museums. If you would prefer to be more involved in the science aspects, you might choose to review the science content of scripts for the science exhibits, planetarium shows, or environmental programs. You could even collaborate on the creation and development of a new exhibit at a museum.
Advice
When thinking of informal education settings, we hope that the word "fun" comes to mind. The goal in informal education is to provide current, accurate scientific information to the public. It should complement, supplement, and enhance what is learned in the classroom. Whether you are serving as a docent or planning an exhibit, be conscious of how you are going to engage patrons—both adults and children—and what sort of investigations can occur related to your topic.
Collaboration is key when you are involved with informal education. Be sure you have an understanding of
ontor and the demographics of the expected visitors. There is an emphasis
tting, as well as on appealing to a variety of learning styles, ages,
abilities, and cultures, so keep these in mind during your planning. If you
you might also spend time thinking about ways to make the science
abilities. Although the museum will have staff members to work on
NOAA OFFICE OF EDUCATION
Formal & Informal Education Programs
The JASON Project
Cooperative Program for Earth System Education (CPESE)
NOAA Education Resources
DataStreme
NASA
HOME
NEWS
MISSIONS
MULTIMEDIA
ABOUT NASA
CONNECT
NASA Education
Overview
NOYCE FOUNDATION
INFORMAL SCIENCE
HOME
ABOUT US
NEWS
ANNUAL REPORT
INFORMAL SCIENCE
MATH
MACARTHUR
The John D. and Catherine T. MacArthur Foundation
Digital Media & Learning
About our grantmaking
The digital media and learning initiative aims to determine how digital media are changing the way young people learn, play, socialize and participate in civic life. Answers are critical to education and other social institutions that must meet the needs of this and future generations.
For more information
News & Information
Press Coverage
Recent Grants
Grantmaking Guidelines
Program Staff

Where does ISE fit into "science communication"?

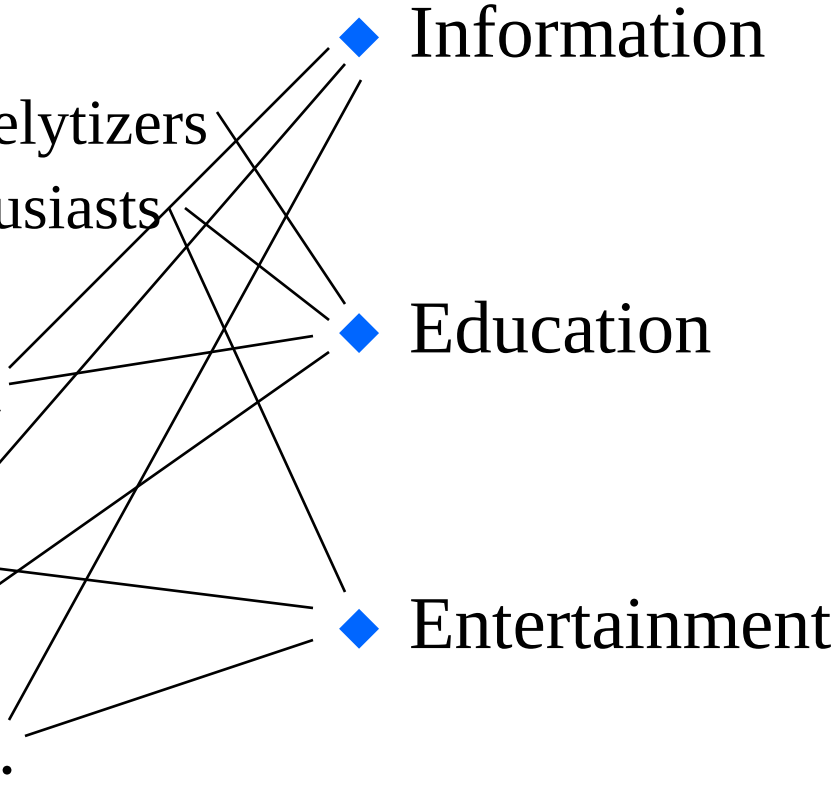




Sphere of Science Communication

People and purposes

- Scientists
  - Science proselytizers
  - Science enthusiasts
- Doctors
  - Public health campaigners
- Journalists
- Educators
- Publishers etc.

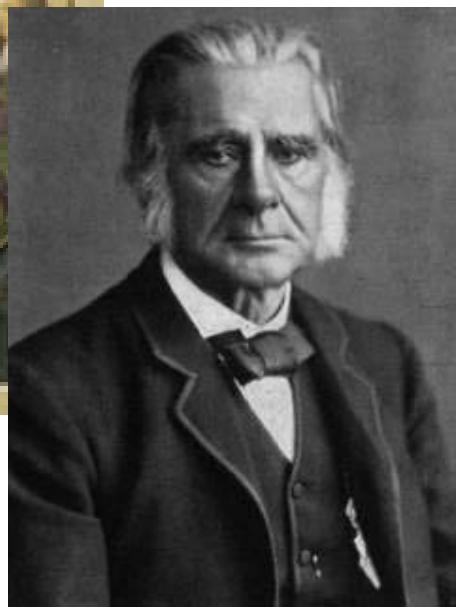


- Information
- Education
- Entertainment

Public communication of S&T, 1

- The 19th Century
  - The “great men”
  - Education for the masses
    - » Adult schools
    - » Itinerant lecturers
  - Natural history museums
  - Exhibitions
  - Science in magazines and newspapers

Michael Faraday, Christmas Lecture, Royal Institution, 1856



Thomas Huxley, “Darwin’s bulldog”

Images retrieved 1 March 2010 from:
http://www.newscientist.com/data/galleries/christmas-lectures/003333e30e1.jpg (Faraday)
http://upload.wikimedia.org/wikipedia/commons/d/d7/Thomas_Henry_Huxley_-_Project_Gutenberg_eText_16935.jpg (Huxley)

A

MEMORANDUM

ON VARIOUS MEANS FOR PROPAGATING SCIENTIFIC AND PRACTICAL KNOWLEDGE AMONG THE WORKING CLASSES, AND FOR THUS PROMOTING THEIR PHYSICAL, TECHNICAL, AND SOCIAL IMPROVEMENT.

ADDRESSED TO

LORD HENRY GORDON LENNOX, M.P.,

Chairman of the Council of

THE SOCIETY OF ARTS,

BY

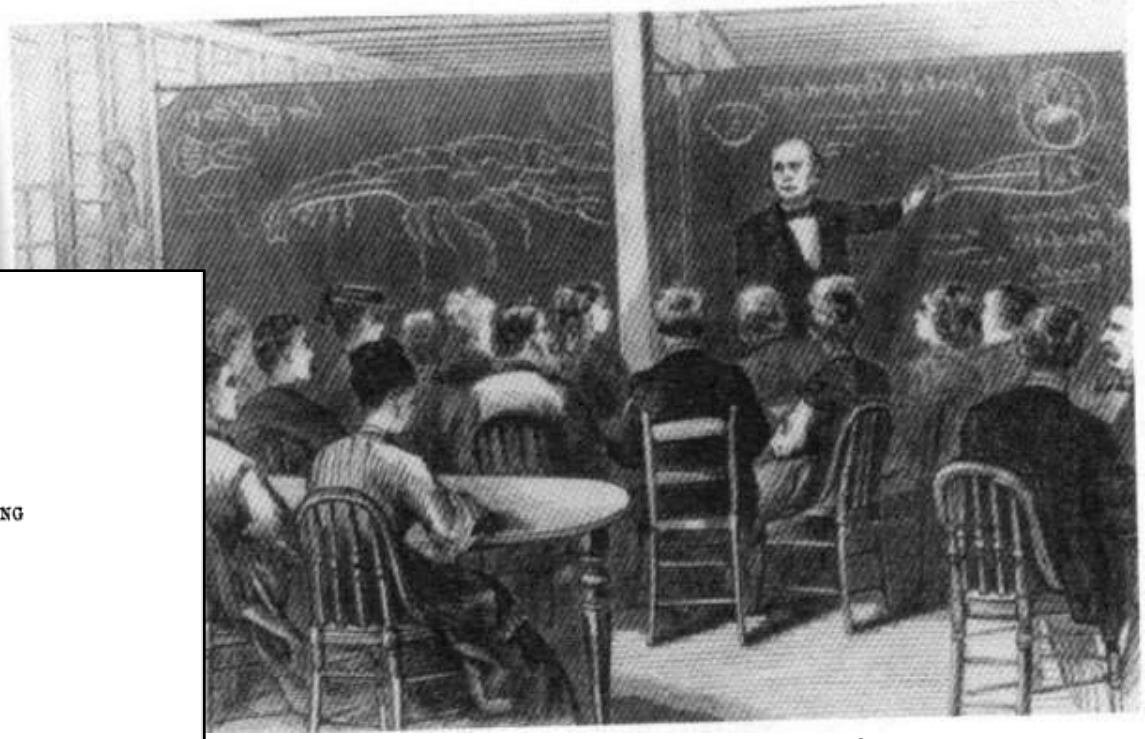
THOMAS TWINING,

One of the Vice-Presidents of the Society.

LONDON:

PUBLISHED BY C. GOODMAN, 407, STRAND, W.C.

1870.

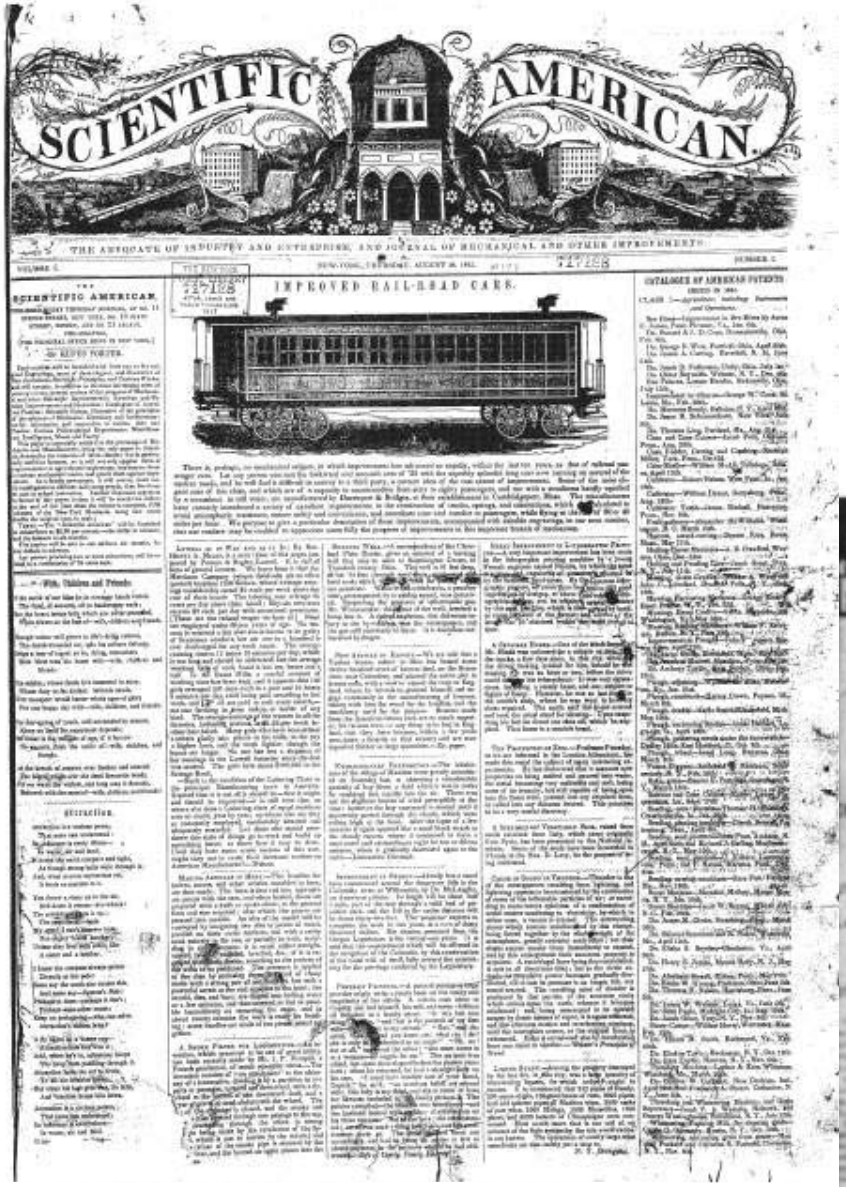


Louis Agassiz lecturing to Anderson School of Natural History, *Leslie's Illustrated Newspaper*, 1873 [from Burnham, J. (1987). *How Superstition Won and Science Lost: Popularizing Science and Health in the United States.* New Brunswick, NJ: Rutgers University Press, p. 117, where it was reprinted courtesy of Carnegie Library of Pittsburgh]

From H. Bancroft, *The Book of the Fair* (1894), reprinted in Rydell, R. W. (1993). *World of Fairs: The Century-of-Progress Expositions*. Chicago: University of Chicago Press, p. 28.

Ball Pettigrew Museum, Univ. of St Andrews , retrieved 25 Feb 2010 from http://biology.st-andrews.ac.uk/bellpet/index.aspx, Ball Pettigrew Museum, Univ. of St Andrews

NhM Naturhistorisches Museum Wien, photo by Bruce V. Lewenstein, 2007


SCIENTIFIC AMERICAN.

THE ARTICLES OF INDUSTRY AND ENTERPRISE, AND JOURNAL OF MECHANICAL AND OTHER IMPROVEMENTS.

IMPROVED RAIL-ROAD CARS.

Retrieved 7 March 2010 from proquest.umi.com

New York Evening Post, reprinted from Burnham, J. (1987). *How Superstition Won and Science Lost: Popularizing Science and Health in the United States.* New Brunswick, NJ: Rutgers University Press, p. 119.


THE NEW YORK EVENING JOURNAL, TUESDAY, AUGUST 8, 1899

CIGARETTES KILLING A BAD BOY.

IT CURES AS NATURE CURES

PADEREWSKI CAN PLAY NO MORE.

DISCOVERY A BOON TO MANKIND.

Public communication of S&T, 2

- The 20th Century
  - Scientific societies and health associations
  - Specialization in science, journalism, and education
  - New media -- radio, TV, movies, industrial museums, science centers … the WWW
  - Public interest and concern about implications of science progress

The Century Books of Useful Science

CREATIVE CHEMISTRY

DESCRIPTIVE OF RECENT ACHIEVEMENTS IN THE CHEMICAL INDUSTRIES

BY

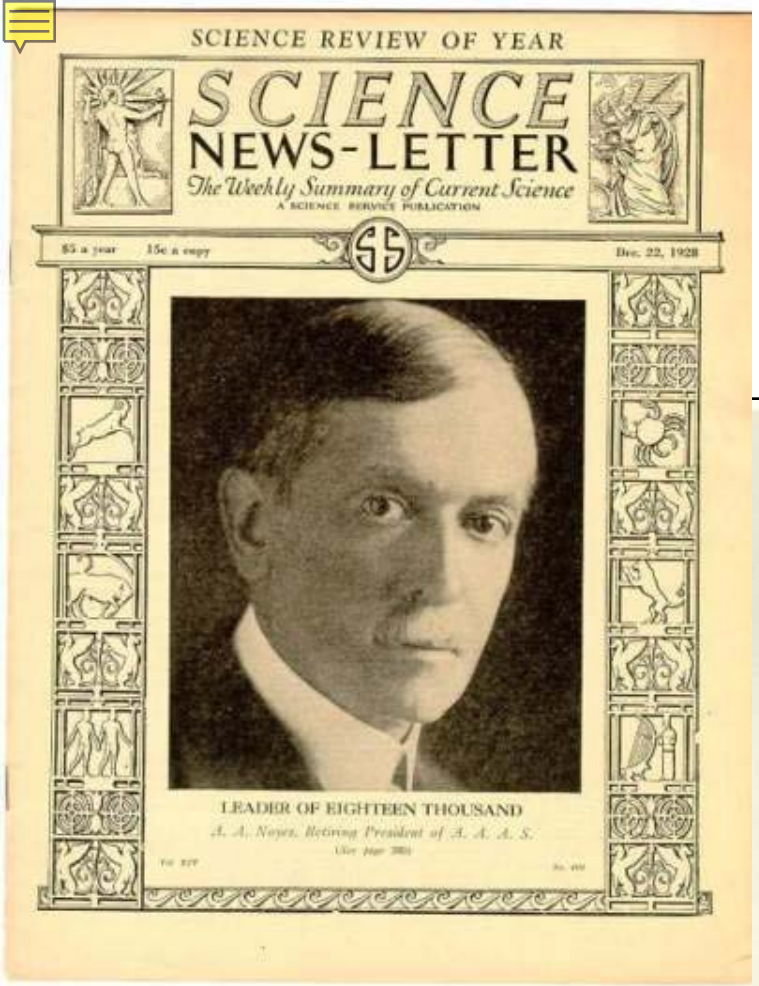
EDWIN E. SLOSSON, M.S., PH.D.

LITERARY EDITOR OF *THE INDEPENDENT*, ASSOCIATE IN COLUMBIA SCHOOL OF JOURNALISM

Author of "Great American Universities," "Major Prophets of Today," "Six Major Prophets," "On Acylhalogenamine Derivatives and the Beckmann Rearrangement," "Composition of Wyoming Petroleum," etc.

WITH MANY ILLUSTRATIONS

NEW YORK
THE CENTURY CO.
1920


SCIENCE REVIEW OF YEAR

SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

A SCIENCE SERVICE PUBLICATION

$5 a year 15c a copy Dec. 22, 1928

LEADER OF EIGHTEEN THOUSAND

A. A. Noyes, Retiring President of A. A. A. S.

Jane Stafford, 1937

Emma Red Stevenson, 1935

http://siarchives.si.edu/images/findingaids/Stafford1937.jpg, retrieved 1 March 2010

http://siarchives.si.edu/images/findingaids/Reh1935.jpg, retrieved 1 March 2010

Retrieved 1 March 2010 from
http://ecg.mit.edu/george/tos/
1943-09-Cork-Products-35/box.jpg

Tick-Tack-Toe brain is invention of 18-year-old Noel Elliott, finalist in the Westinghouse science talent search. After three years' work, involving a study of the 362,882 possible variations, he perfected the machine so that it either wins or ties every game. It responds with a light flash when you pull a switch in any square. Sometimes it's caught cheating a little.

Retrieved 1 March 2010 from
http://blog.modernmechanix.com/mags/
MechanixIllustrated/8-1950/tick_tack_toe.jpg

590 NATURE NOVEMBER 15, 1941, VOL. 148

NEWS AND VIEWS

Science Clubs of America

A NATIONAL science activity, Science Clubs of America, is being sponsored by Science Service, the American science news service. In every locality throughout the country there will be groups active in various fields of science. Science clubs in high schools will be encouraged and given the opportunity of joining in the national movement and entering into national activities. Groups of enthusiastic amateurs in science—grinding telescope mirrors, collecting insects, breeding new plants, collecting minerals, or pursuing scores of other interesting avocations—will join in this important development. As the nucleus of Science Clubs of America, there are more than eight hundred junior clubs which have been organized during the past fourteen years by the American Institute of the City of New York. These clubs

have been found before in the graves of these mystery people, but what their significance was for a future life remains one of the unsolved puzzles of the arctic.

Reproduced from Burnham, J. (1987). *How Superstition Won and Science Lost: Popularizing Science and Health in the United States*. New Brunswick, NJ: Rutgers University Press, p. 123, where it was reprinted courtesy of the Smithsonian Institution Archives, Science Service Papers.

Deutsches Museum, Munich

Chicago Museum of Science & Industry

Franklin Institute, Philadelphia

Waldemar Kaempffert

New York Times, 28 November 1956

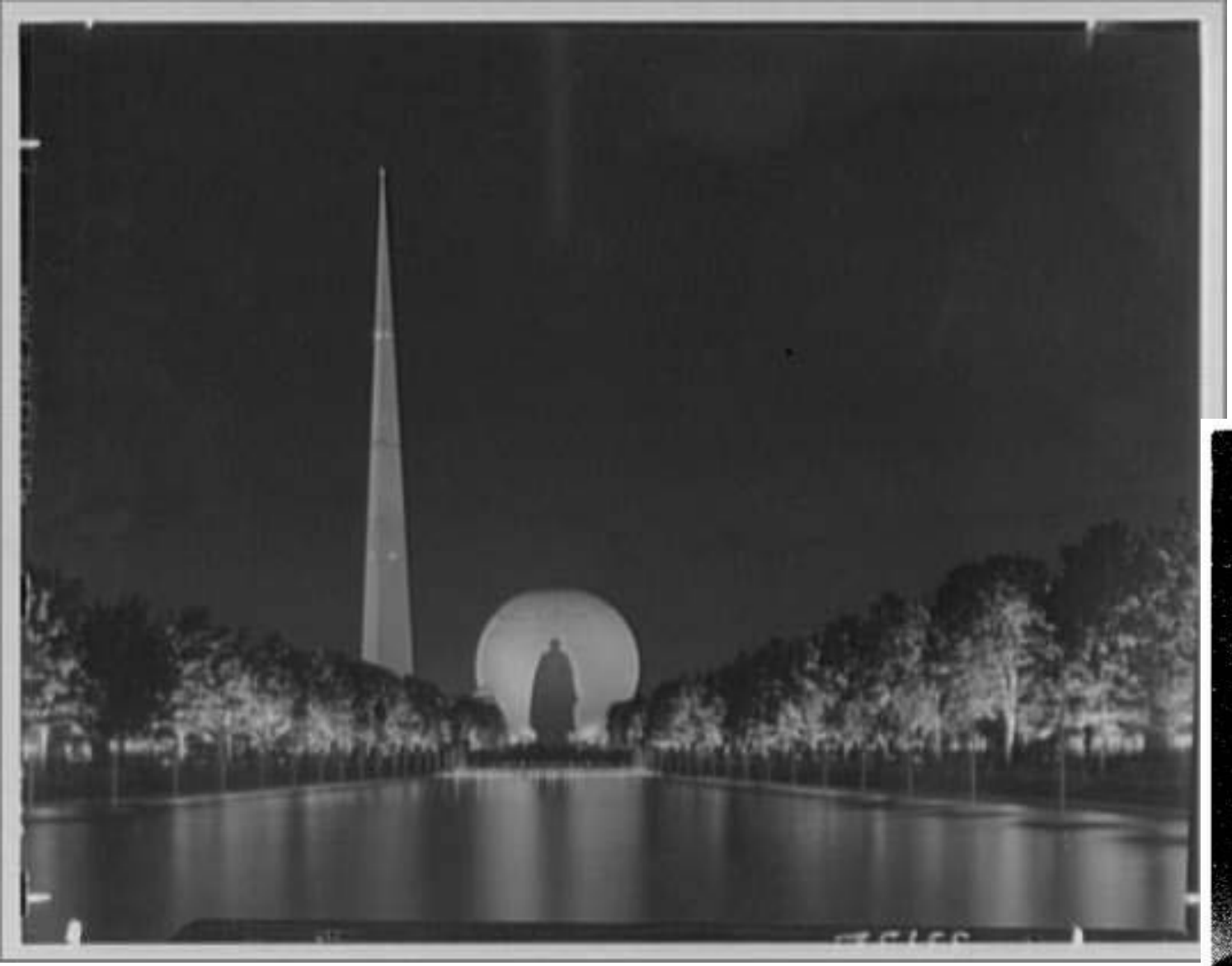


Photo by Gottscho-Schleisner, Inc.
Retrieved from Library of Congress, 7 Mar 2010
http://hdl.loc.gov/loc.pnp/gsc.5a29419

Dr. Gerald Wendt

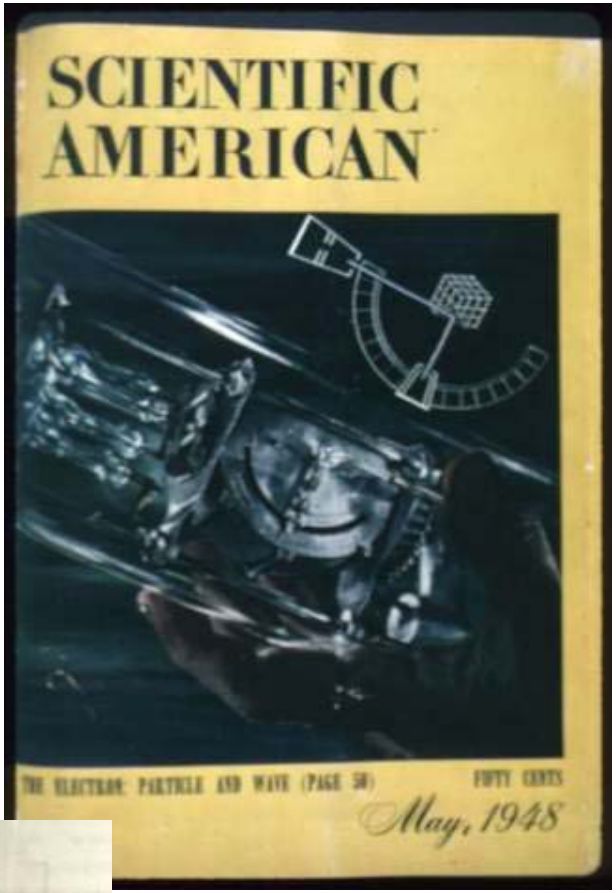
Retrieved 1 Mar 2010 from *New York Times*, 2 Dec 1951

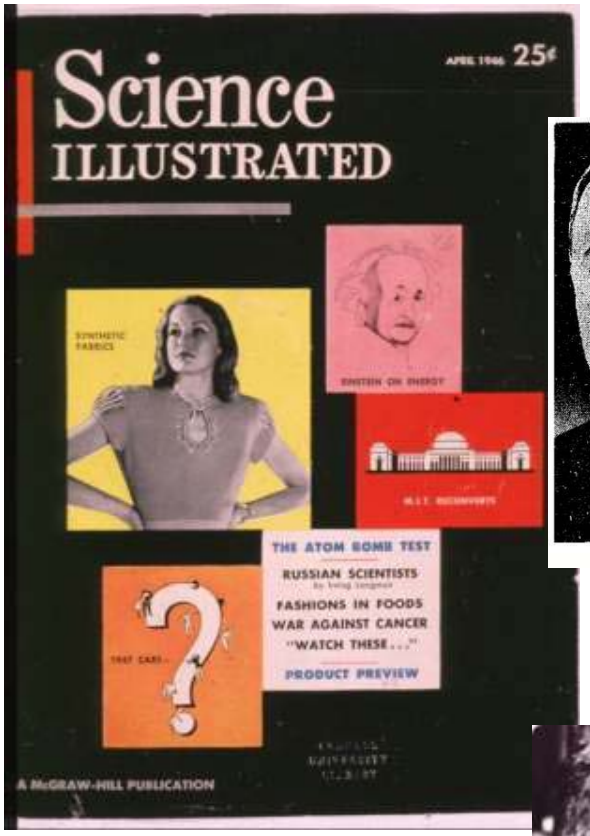
Warren Weaver

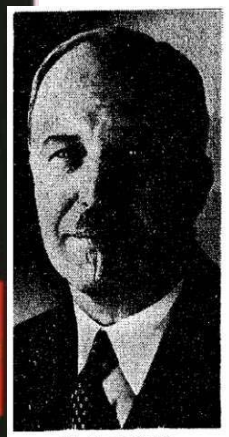
Lewis Carroll: Mathematician

Many people who have read "Alice's Adventures in Wonderland" and "Through the Looking-Glass" are aware that the author was a mathematician. Exactly what was his work in mathematics?

by Warren Weaver

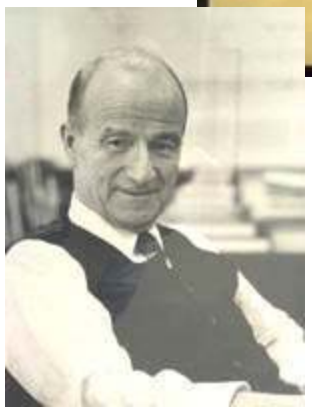






Dr. Gerald Wendt

Retrieved 1 Mar 2010 from *New York Times*, 2 Dec 1951



Gerard Piel

Barry Commoner

Retrieved 1 Mar 2010 from http://www.aaas.org/news/releases/2004/images/0908piel.jpg

Retrieved 1 Mar 2010 from http://c250.columbia.edu/c250_celebrates/remarkable_columbians/barry_commoner.html

Figure 7.2. The opening to "The World Has Just Begun," Waldemar Kaempffert's predictive article in the January 1940 *American*, shows many of the common visual images of scientific research: test tubes and beakers, a scientist in white coat and glasses, and a cornucopia of new products emerging from the research lab. Drawing by Robert Fawcett.

Reproduced from LaFollette, M. C. (1990). *Making Science Our Own: Public Images of Science, 1910-1955.* Chicago: University of Chicago Press, pp. 114-115.

Origins of field of "PUS/ISE/ PCST/PEST/PLUS"

- 1930s: First academic publications about science literacy and public communication of science
- 1945: "Public understanding of science"
- 1982: "Informal Science Education" (NSF)
- 1989: "Public communication of S&T"
- Late 1990s: "Public engagement in S&T"
- Mid-2000s: "Public Learning and Understanding of Science"

SCIENCE

VOL. 85 FRIDAY, JANUARY 29, 1937 No. 2196

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. MCKEEN CATTELL and published every Friday by

THE SCIENCE PRESS

New York City: Grand Central Terminal
Lancaster, Pa. Garrison, N. Y.
Annual Subscription, $6.00 Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary, in the Smithsonian Institution Building, Washington, D. C.

SCIENCE AND THE AMERICAN PRESS[1]

By DAVID DIETZ

SCIENCE EDITOR OF THE SCRIPPS-HOWARD NEWSPAPERS

THERE was a time when a speaker at a session of the American Association for the Advancement of Science spoke only to those within the sound of his voice. To-day, he may speak to the entire nation.

Even as he stands upon the platform, his words may be going over the telegraph wires to newspapers in every part of the country. In the case of the address of the president or one of the vice-presidents or in the case of an address containing some discovery of outstanding importance, the telegraphed account may run to several thousand words.

Each day of the meeting, the larger metropolitan newspapers of the nation devote from one to five columns to reports of the papers presented. The total amount of space devoted by the newspapers of the nation to the meeting is in excess of a thousand columns per day.

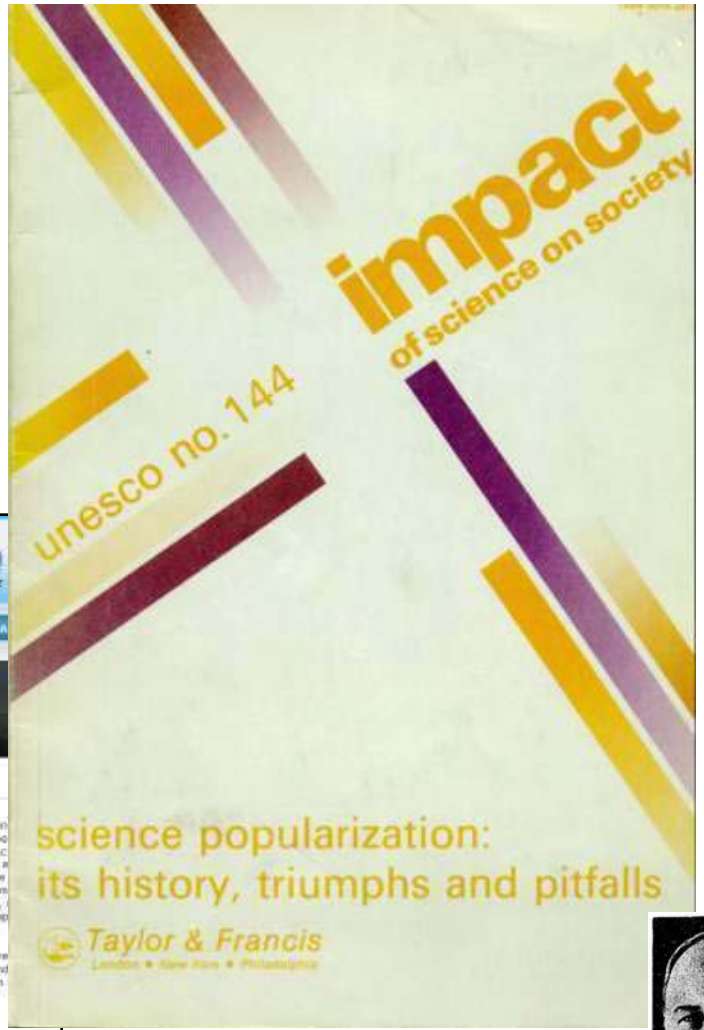
This is a fact of major significance in American life. It represents a change of the first order in the character and meaning of these annual meetings. It possesses profound importance for the progress of science, the conduct of journalism and the future of the nation.

The fine and friendly relations which now exist between the scientists and the press is symbolized by the fact that you have invited me to be the speaker of this general session to-day. As the former president of the National Association of Science Writers, I think that I may say that the growth of this accord has been the source of great pride and satisfaction to all its members.

There was a day when the newspapers had no interest in the reporting of science. Those were the days

[1] Address given at the general session of the American Association for the Advancement of Science, Atlantic City, December 29, 1936.

UNESCO




Dr. Gerald Wendt

NEWS LETTER

National Association of Science Writers

Mailing Address: 5 Longview Road, Port Washington, N. Y.

Vol. 3, #1 March 1, 1955

TABLE OF CONTENTS

NASW ANNUAL MEETING

The annual meeting of the National Association of Science Writers will be held at Atlantic City during the week of June 6, in conjunction with the sessions of the American Medical Association. See the June issue of the Newsletter for further information.

THANK YOU

The NASW wishes to express special gratitude to the Program Committee for the Berkeley meeting. We deeply appreciate the time, thought and effort that went into the preparations for this most successful and pleasant occasion. The NASW extends thanks to the chairman, Daniel M. Wilkes, and to his able committee members, John F. Allen and George Dusheck.

BERKELEY MEETING -- Roland H. Berg

Those of us who were fortunate enough to attend the meeting once again owe thanks to Sid Negus who master-minded the press room. With the help of Dan Wilkes and John Osmundsen, Sid magically produced non-existent copies of papers and, with the expertness of a bird dog, flushed coveys of furtive scientists under the guns of the waiting science writers.

SUMMER 1962

understanding

REPORTS • EVENTS • ACTIVITIES *for the improvement of the public understanding of science*

A Statement of Purpose

The exponential curve shown above represents the increase in scientific knowledge with time—an increase that will result in the doubling of scientific knowledge [illegible] redoubling

The spe[illegible] equally rapi[illegible] affecting ev[illegible] life, and m[illegible] better publi[illegible] both for na[illegible] vidual satisf[illegible] of scientific[illegible] means that [illegible] have the be[illegible] but that he [illegible] and unders[illegible] ments in sc[illegible] that will t[illegible] schooling.

Even th[illegible] known for [illegible] until recent[illegible] done about [illegible] there has b[illegible] aimed at gi[illegible] more realist[illegible] activities u[illegible] society rath[illegible] special inter[illegible]

The incr[illegible] many diver[illegible] ties, governm[illegible] tional institu[illegible] munication, [illegible] education, [illegible] tists, writer[illegible] tively engag[illegible] under the [illegible] provement [illegible] science.

The varie[illegible] tion of the [illegible] effort. However, this multi-faceted approach has a drawback. Many people working for the same ends are either completely unaware of, or have limited knowledge of, what others are doing.

NSF Program for Public Understanding of Science

In July 1959, the National Science Foundation inaugurated a grant pro-

WINTER 1962-63

understanding

REPORTS • EVENTS • ACTIVITIES *for the improvement of the public understanding of science*

The Tele-Lecture

by Margaret Mead

The "tele-lecture" or telephone lecture seems to me to be a genuinely new "invention", and I think that much more should be done with it, including applying it in activities directed toward improving the public understanding of science.

Pioneered by the University of Omaha, the tele-lecture is a technique whereby the voice of a speaker at a distance is piped into the loudspeaker system of a lecture hall using a telephone hookup, so that the audience can hear the speaker and the speaker can hear questions from a panel or the audience.

The most dramatic use of this technique of which I know was the participation of Bertrand Russell in a two-way closed circuit conversation for a panel discussion of "The Future of Man", at the lunch given for the opening of the new Seagram building, September 29, 1959. On a platform there was an empty chair, and after a showing of a special film of Bertrand Russell, his voice came in at the appropriate points.

An earlier precursor form was "Answering You", which linked live radio panels of American and English speakers across the Atlantic in World War II. A single later version of this form was a program in which a panel in New York talked with a panel in Edinburgh during the meeting of the World Federation of Mental Health in Edinburgh on August 12, 1960. In this case, large

Scientists' Institute for Public Information

A Scientists' Institute for Public Information has been formed to assist local scientists' information groups to provide the public with objective and understandable scientific information on public policy issues.

"Scientists' information groups" are volunteer groups of scientists organized on a local basis to provide scientific information to the public through lectures, appearances on television and radio, and written materials.

The creation of the Institute marked the close of a two-day national conference for scientific information held in New York City, and attended by more than 100 scientists representing 19 scientists' information groups throughout the country.

The conference approved the adoption of a resolution that the Institute be formed to establish activities which can serve the common needs of the independent groups of scientists in each community. The Institute will undertake to handle technical information and publication services among existing and newly formed scientific information groups, personnel to facilitate liaison among these groups, efficient financing, and periodic conferences.

The conferees agreed on the following guiding principles:

1. Information is presented unencumbered by political or moral judgments. "which judgments are the

Exploring the Universe

Exploring the Universe is a three-part adult education program on the issues and problems of modern science, utilizing study-discussion, a book, and a television series. Initiated by the American Foundation for Continuing Education, it was produced in collaboration with the National Educational Television and Radio Center and the McGraw-Hill Book Company, under grants from the National Science Foundation.

The program is the first unit in a long-range project of the AFCE, titled "The Citizen in a New Age of Science." The present unit concentrates on fundamental questions arising from a study of astronomy, cosmology, and physics. Later units will take up the nature of matter, the evolution of man, and the relationship between science and society.

The undertaking is unusual in that the materials were developed so as to permit either integrated or independent use. Thus, the book may be read by itself or used as a reference for the study-discussion program, and the TV series may be viewed independently or also as a part of the study-discussion activities.

Exploring the Universe (Louise Young, editor, McGraw-Hill, New York, 1963, 457 pp., $6.95) is a set of readings selected by Mrs. Young (a member of the AFCE staff) and an advisory committee of scientists. The selections are from the writings of Plato, Aristotle, Galileo, Pascal, Newton, Hux-

NOVA ends first season; plans 23-week run for fall

Second only in audience pulling-power to *Masterpiece Theatre* on many public television stations for the past three months has been NOVA, the new series of one-hour science films produced by WGBH in Boston with the advice and cooperation of AAAS.

One of the many TV critics to be favorably impressed by NOVA is Arthur Ungar of the *Christian Science Monitor*, who summed up the series' appeal this way: "Watching NOVA, you may be lulled into believing that you are watching 'mere' entertainment. However, almost despite yourself, you will find that a new awareness of certain scientific theories and concepts is creeping into your consciousness as NOVA transports the thrill of discovery from the laboratory to your own living room."

With its first season behind and with funding in hand (from Carnegie Corporation of New York, Corporation for Public Broadcasting, National Science Foundation, Polaroid) for a 23-week run beginning in the fall, NOVA's widespread acclaim is impressive.

Time magazine pointed out that at the beginning of the 1972-73 TV season, science accounted for less than 0.5 percent of prime time network hours (and many of the "science" programs were really "adventure-wildlife travelogues"). Then *Time* called NOVA "a series of innovative, hour-long shows aimed at filling the void between deadly dull 'educational' lecturing and pop-science trivia."

Jerry Bishop of the *Wall Street Journal* said NOVA "is rapidly becoming one of the most versatile series of science programs found on television, public or commercial."

For such reviews please James Butler of AAAS, which has cooperated with NOVA from the outset. "Our intention has been not simply to get more science on television," he says, "but to experiment with new and innovative ways of communicating science, and to demonstrate the vitality and importance of science as program content."

The NOVA Science Program Group, under its executive producer, Michael Ambrosino, is now well ahead with planning for its fall series of 23 programs. The intention is that they be as wide-ranging in subject and style as those in the first season—which reached from intergalactic space with a film on the Crab Nebula to the neighborhood stream and the private life of a stickleback. Other programs reported such topics as chimpanzees and language, the origin of life, fusion power, and the discovery of anesthesia.

Already filmed for the fall is a show on San Francisco Bay, revolving around a team of biologists from the U.S. Geological Survey, which is trying to understand the complex ecological relationships of this highly managed estuarine system so that future decisions as to the fate of the Bay may rest on at least some hard scientific data.

In the planning stages are programs on bombers and bombing (which will discuss, inter alia, the escalating technology of warfare) and—by way of contrast—bird song (in which will be shown research into the deceptively simple question of "why do birds sing?"). Films on artificial intelligence and the world food situation are also under consideration.

NOVA is produced with the advice and cooperation of the American Association for the Advancement of Science

"You do not have to be a scientist to enjoy NOVA," wrote Tom Riste of the *Arizona Daily Star*. "You may even be one of those people who tune out at the very thought of a scientific anything. But if you love mysteries, unraveling a hard puzzle, the excitement of thinking along with a brilliant mind—then the chances are you're going to like NOVA."

Concluded the *Christian Science Monitor*: "[NOVA] is probably one of the most intellectually stimulating entertainments in the annals—and chronicles—of public education."

Oppenheimer: Profile of a man and his museum

(Continued from page 13)

an animal behavior exhibit with fish that follow stripes and shadows.

The concept of total experiential learning at the museum is a unique one. So is Oppenheimer's motivating theme of perception. "We used perception because it was a good starting point, from which we could then branch out into areas like optics, and wave motion and other kinds of motion. It very naturally ties together things artists have done about nature with more didactic things." There are works of art in the museum from which related didactic exhibits have been built.

"Perception is a very human thing in itself, and very interesting," explains Oppenheimer. "None of us is bored with learning about it, and it is easy to show these effects visually."

Oppenheimer is a man with unusual energy, almost all of which he has invested in the museum over the past five years. Because of that he has lent a good deal of his personality to his creation.

He finds time to talk to visitors, and spends as much time as possible (which is growing to be less and less) working on the exhibits himself. In his characteristic hunched posture, he can often be seen leaning over an exhibit, usually holding a cigarette as he tries to explain this mechanism or that, speaking softly, yet in a measured manner. The intent glare from his baggy eyes is mixed with seriousness, playfulness, and excitement as he talks of his museum.

"So many other museums I saw were very good, but very tightly structured. Most were operated by push button, with the exhibits behind glass. Museums should have more freedom and having push buttons to make things go isn't as good as doing things by hand, where the person can see exactly what is happening. A few of the museums I saw had some exhibits that visitors could work themselves, but in most museums there was an awful lot that you looked at with your hands behind your back."

To supplement the experiential aspects of the Exploratorium, Oppenheimer uses high school students to talk to the public about the exhibits. In this "explainer program," an idea borrowed from other science museums, three groups of 20 high school students a year are trained and hired to work part time.

The explainer program has worked very well, Oppenheimer says—the red-jacketed students are easy to spot, and are always asking visitors if they can be of any help. They are especially helpful as an alternative to using tape recordings, says Oppenheimer. "If you are going to appeal to a wide audience you can't use tapes, because topics are the same thing to everybody."

The museum tries to involve the entire community. Many exhibits are made by local people, volunteers help keep them in working order, and college students run tours for school children.

The museum also conducts seminars and concerts for the community, both of which involve audience participation. The concerts got started "because we wanted to do something with sound that wasn't just the physics of sound," says Oppenheimer, "but that involved the perception and study of sound. You can't do that in an interactive way with a tape recorder."

Musicians "come and talk about their music, they take their instruments apart and show how they work, and describe the structure of the piece they are playing. People can ask questions; they can interact more fully with the music. We consider the concert an exhibit."

The museum has been criticized because of its rough construction and environment, characterized by some as "old warehouse." "What bothers a lot of people, and bothers us, is that the space is so primitive," Oppenheimer says. "I wish the floor and walls were smoother and more inviting, and I have to rectify that eventually. But we've decided to get the exhibits built first, then hopefully someone will give us some money to build a better environment."

Oppenheimer is very discouraged about raising money. He has spent about $1 million over four years to run the museum and to develop new ex-

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GRANT REQUEST

American Association for the Advancement of Science
1776 Massachusetts Avenue NW, Washington, DC 20036

PROJECT: CORE PROGRAMS TO PROMOTE A CRITICAL AWARENESS OF SCIENCE AND TECHNOLOGY IN AMERICAN SOCIETY

Project Director	Dr. William A. Blanpied Director of Communications American Association for the Advancement of Science Social Security #522-38-5871
THIS IS A NEW REQUEST	
Proposed Starting Date:	September 1, 1975
Proposed Duration:	Three (3) Years
Amount Requested:	First Year $197,897
	Second Year $215,405
	Third Year $204,860
	Total $618,162

Endorsements:

William A. Blanpied

William A. Blanpied
Director of Communications

William D. Carey

William D. Carey
Executive Officer

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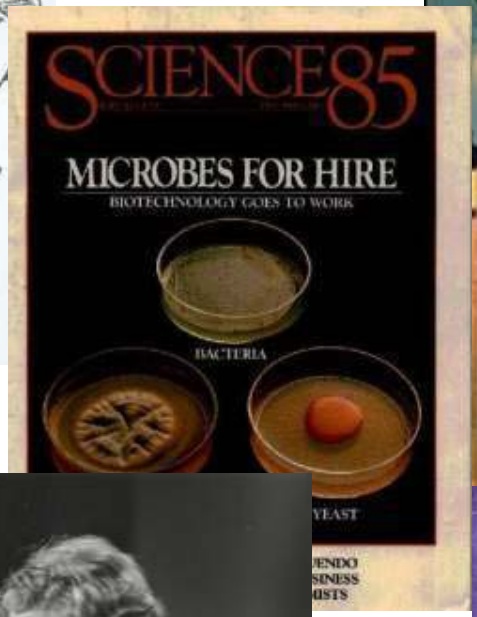

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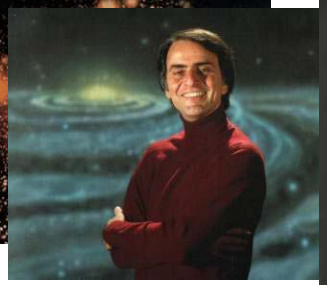

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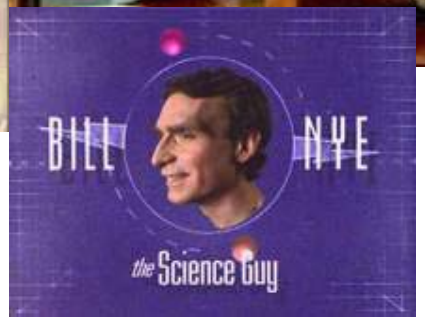

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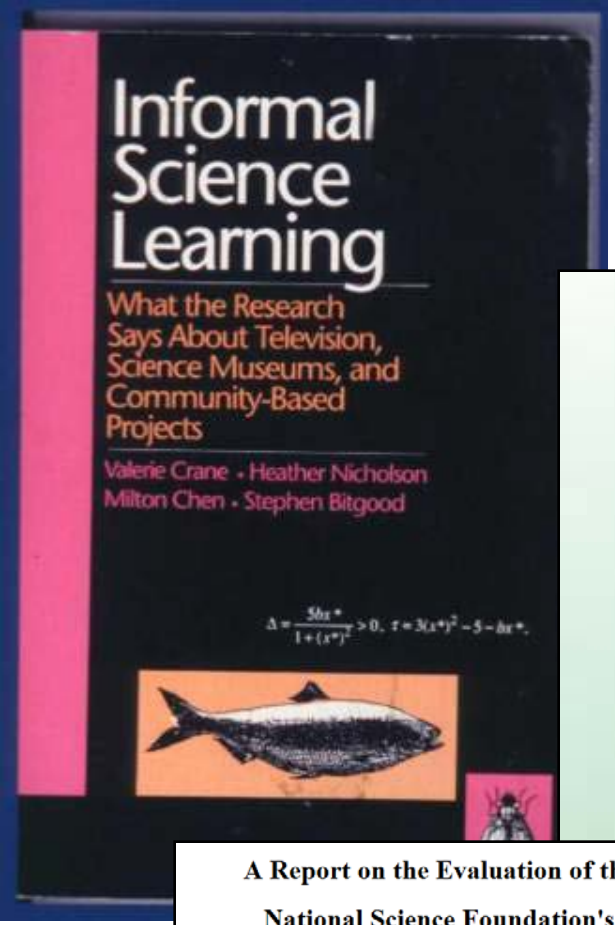

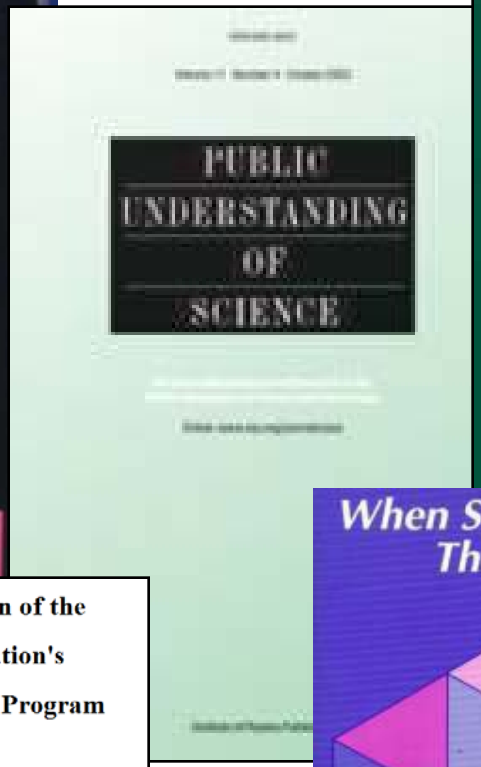

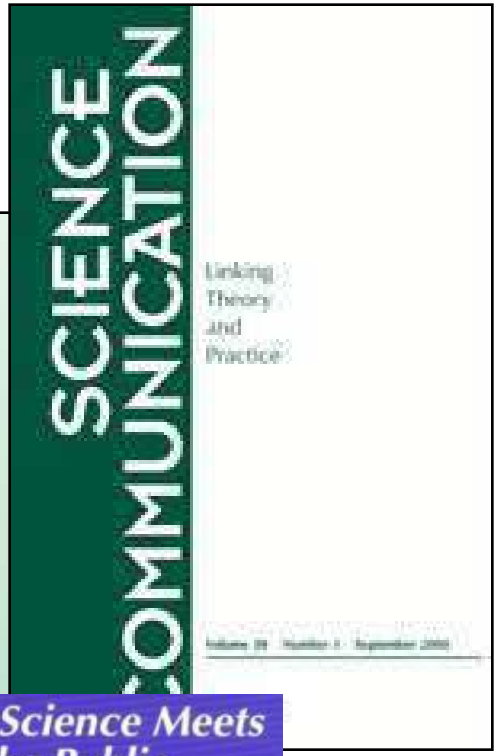

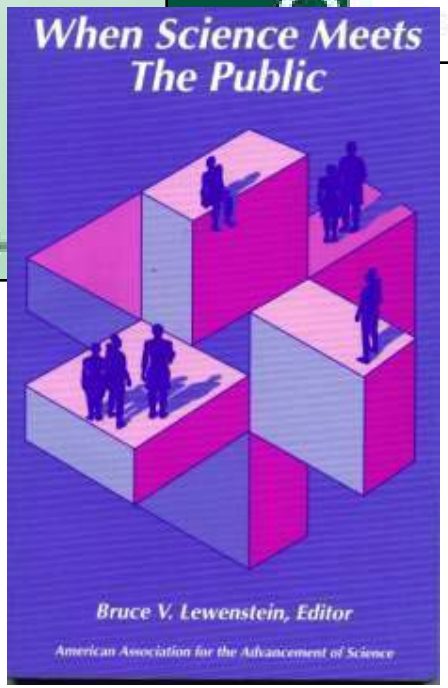

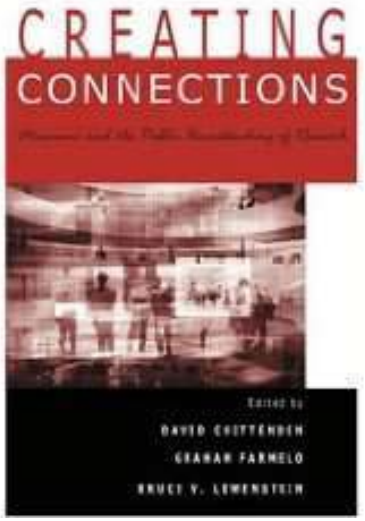

A Report on the Evaluation of the

National Science Foundation's

Informal Science Education Program

Prepared under Contract RED 94-52970
by
COSMOS Corporation

March 1998

Mary Sladek
Contracting Officer's Technical Representative

Any opinions, findings, conclusions, or recommendations expressed in this report are those of the participants, and do not necessarily represent the official views, opinions, or policy of the National Science Foundation.

The National Science Foundation

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The Public Understanding of Science

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The ESRC PUS New Opportunities Programme

PUS

The **Public Understanding** **Science** was an ESRC New Opportunities Programme Opportunities Programme resources to build on prev investments in the social where ESRC believes ther both policy needs for knowledge and a knowledge base that can usefully enha a short-term concentration of effort.

- Full Programme report, Decemb
- The Public Understanding of Sci

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Introduction Design Practice What else?

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Frequently Asked Questions (FAQ)

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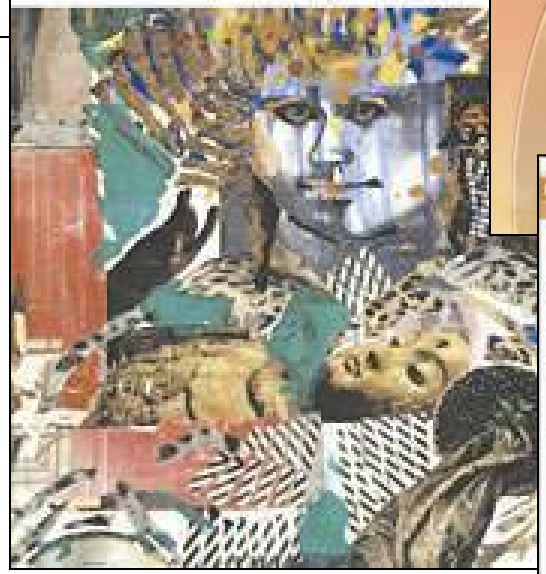

PUBLICATIONS & RECORDS

House of Lords

Session 1999-2000

Science and Technology - Third Report

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REPORT

SUMMARY

CHAPTER 1: INTRODUCTION

The task is to make visible the invisible, to expose to public scrutiny the assumptions, values and visions that drive science

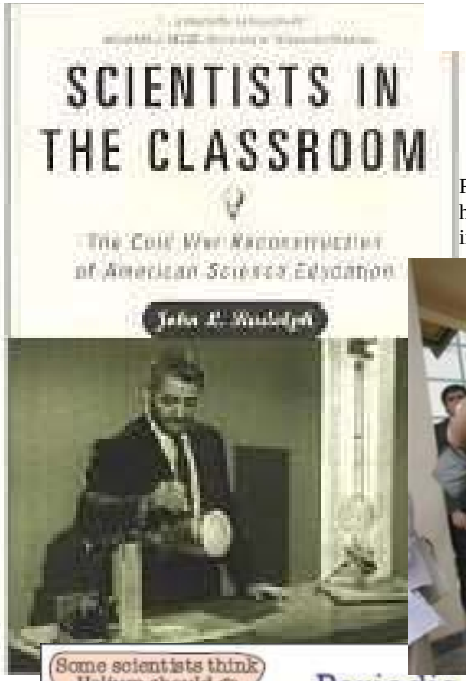
DEMOS

See-through Science

Why public engagement needs to move upstream

James Wilsdon
Rebecca Willis

- But…



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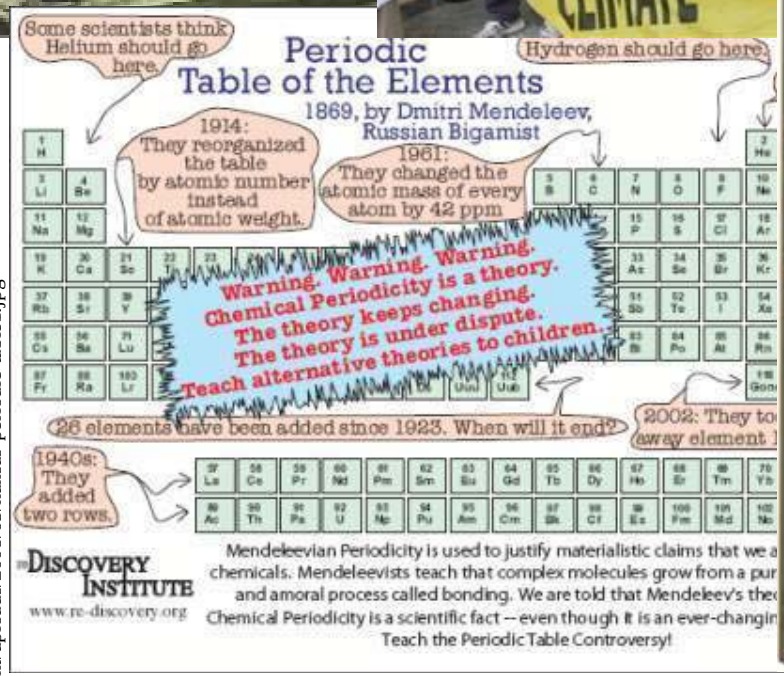

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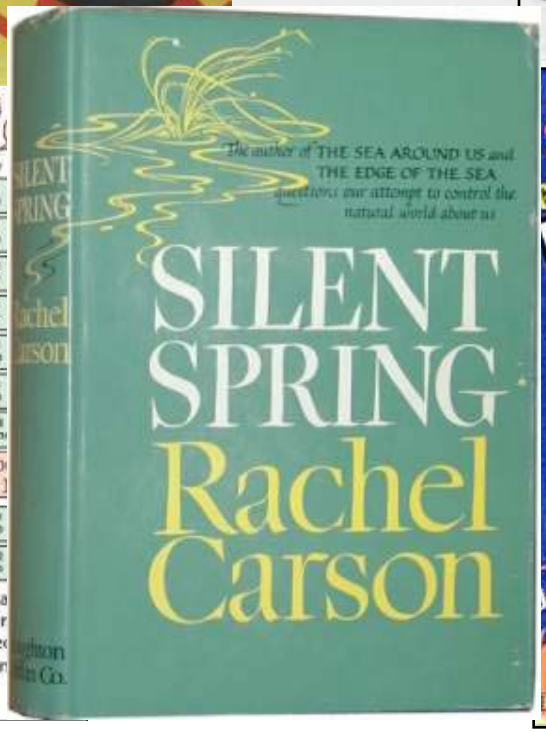

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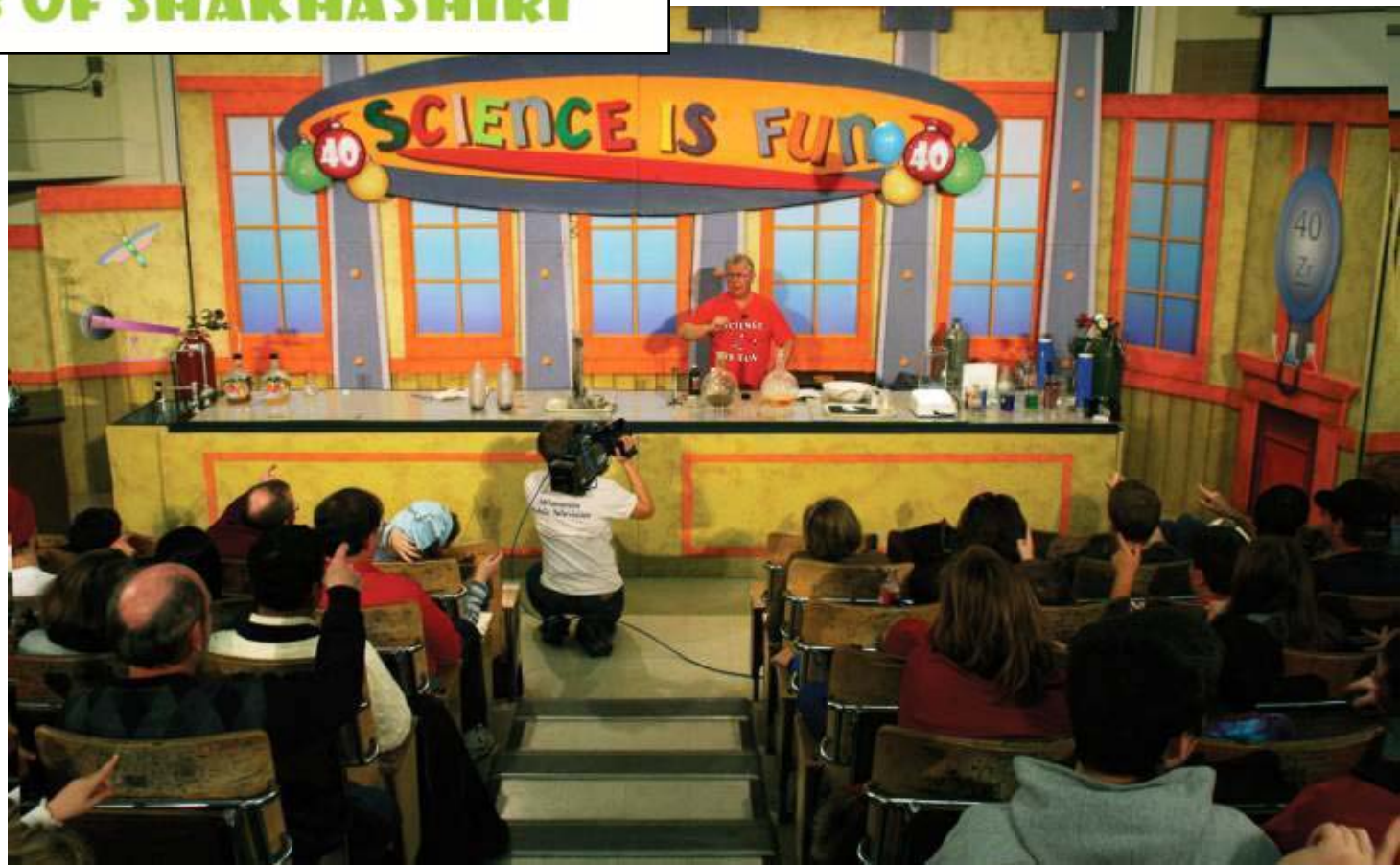

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LORIKEET

So…

- Lots of ISE activities for a long time
- Real growth in many areas in last 50 years
- Leads to growing scholarship *about* ISE
- Leads to self-identity within field
- ISE people find each other and each other's work interesting…so people move around

Some questions to ponder

- What's the gender balance of ISE people…and does that matter?
- What's the relation of ISE to "Science"?
- What's the relation of ISE to "Education"?
- What's the relation of ISE to "Informal"?

- And: In what part of ISE will *your* next job be?


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