SCIENCE

7 July 1972

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

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SCIENCE

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

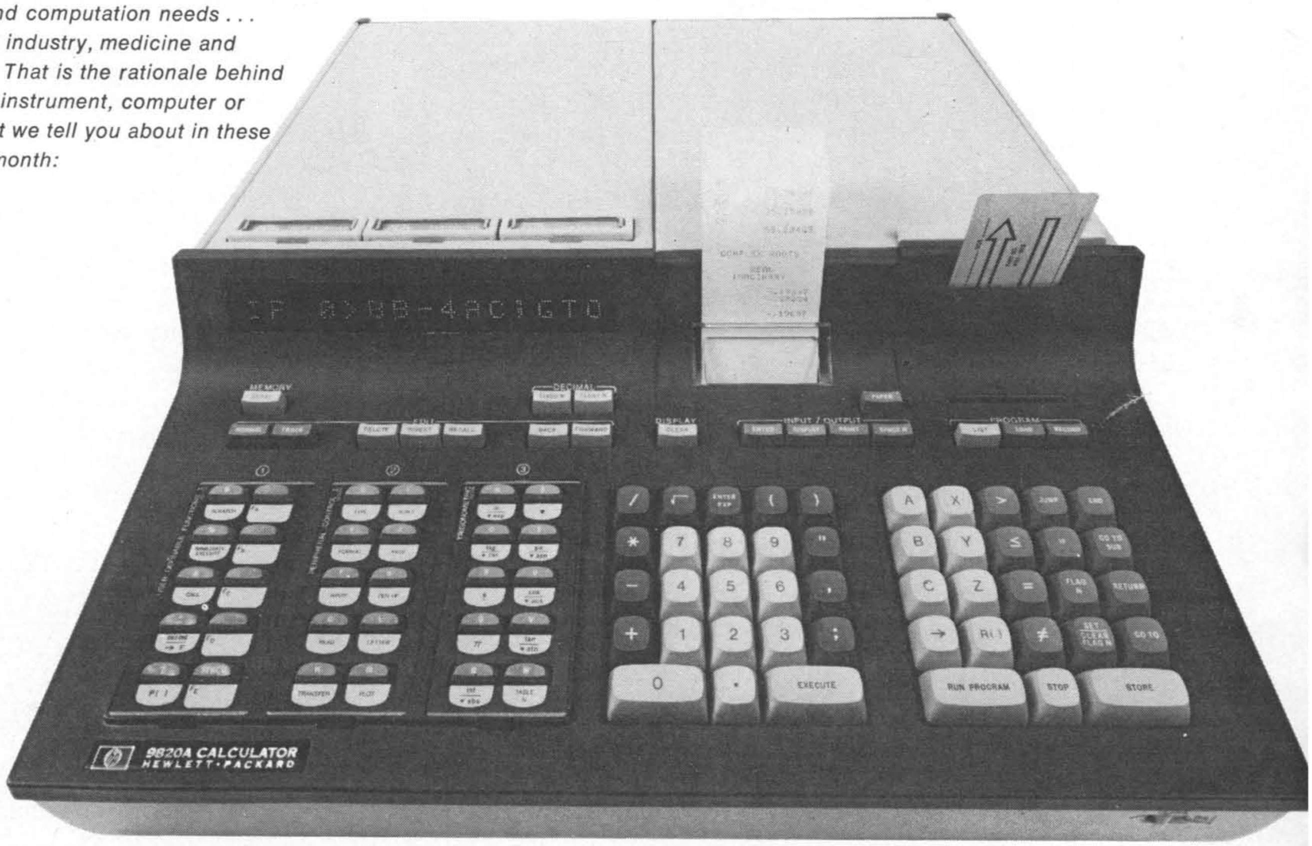
The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

COVER

Jumbled scene used in the experimental investigation of the role of coherence in perception. The same object is more difficult to identify in a scene jumbled in this manner than in the original, coherent scene. See page 77. [Irving Biederman, State University of New York at Buffalo; on leave Stanford University, Stanford, California]

Some things are changing for the better.

Many people know us as an instrument manufacturer: we make more than 2,000 products for measurement, test and analysis. Others know us as a computer company: more than 10,000 own our programmable calculators and computers. We prefer to think that our business is to serve measurement, analysis and computation needs . . . in science, industry, medicine and education. That is the rationale behind every new instrument, computer or system that we tell you about in these ads. This month:



Powerful new programmable calculator converses in simple algebraic language.

Hardly a month goes by that doesn't signal the introduction of a new calculator with more power, more memory, more output flexibility. But are things really changing for the better when the improvements so complicate the use of a calculator that one must practically become a computer programmer before he can harness its power?

This is precisely where HP's new Model 20 makes its most significant contribution. It is easier to use, by far, than any other calculator. Its language is the most simple: algebra, the kind you learned in high school. Not only does it 'understand' algebra, it also 'speaks' it, using the same numbers, letters and symbols that you do.

You enter an equation just as you write it on paper including implied multiplication and nested parentheses. The Model 20 displays your entry for verification the same way you wrote it. For example:

(-B+r(BB-4AC))/2A

It tells you what to do next (in the program mode):

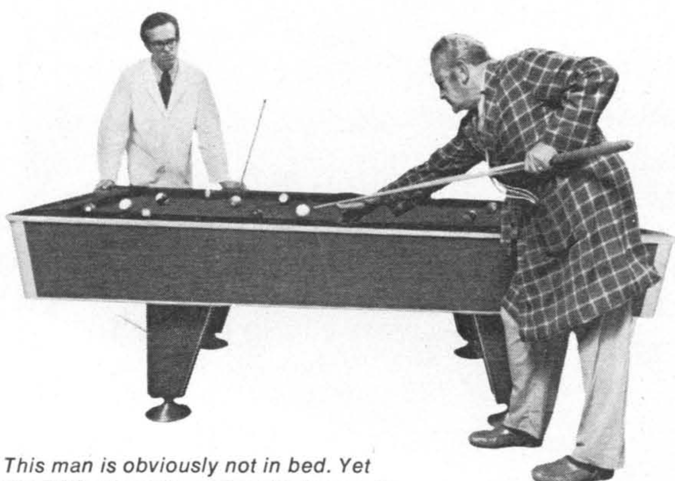
ENTER A

Then you enter the values on the keyboard (for A, B and C in this example) and press a key to execute. The calculator immediately displays and prints the solution to ten significant digits, along with its English label if you desire:

REAL ROOTS

If you make a mistake, the Model 20 tells you so and identifies precisely what the error is . . . lets you correct it without redoing the entire line, let alone the entire program . . . and automatically adjusts program storage to occupy the least possible memory.

In addition to its conversational ability, the Model 20 changes things for the better not only through more power and more memory but through a hardworking line of Series 9800 Peripherals: X-Y Plotter, Typewriter and Card Reader, to name a few. Model 20 costs $5,475.



This man is obviously not in bed. Yet the ECG telemetry system he is wearing enables nurses at a central monitoring station to keep close watch on his heart action.

Freedom with protection for the post-coronary patient.

Once the coronary patient is released from the intensive care unit, his recovery can often be aided by freedom to move about and mild exercise . . . provided his ECG can be continuously monitored.

With the new HP ECG Telemetry System, the post-coronary patient can be ambulatory. Wherever he goes, his heart action is transmitted to a receiver at the nursing station where it can be continuously observed. The transmitter is small enough to be carried comfortably in a bathrobe pocket, has a strong enough signal to reach the nursing station from 200 feet even through several masonry walls, and is rugged enough to operate reliably even if dropped.

At the nursing station, the patient's ECG signal is monitored by a receiver that operates automatically, never requires tuning and accepts only valid signals, minimizing artifacts from patient motion. An automatic warning light alerts the nurse of such inoperative conditions as: patient out of range, dislodged electrode, low battery power. It is completely compatible with HP patient monitoring systems. Because it doesn't require new wiring, the ECG Telemetry System is easily introduced into existing facilities. Price is $1,800 for each patient unit. Write for our new illustrated brochure.

Instrumentation quality tape recording at a bargain price.

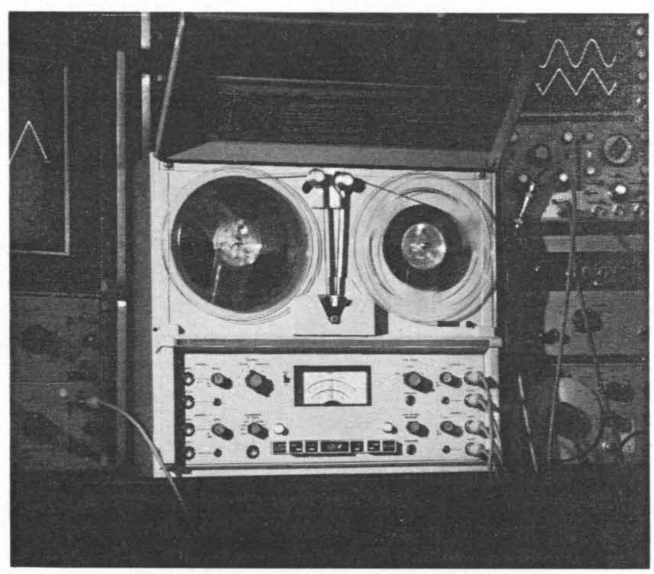
Most scientists would use portable instrumentation tape recorders for analog recording if only they performed as well as the big expensive laboratory machines. Unfortunately, their small size usually meant reduced performance.

Then came the HP 3960. Truly portable in size (50 pounds) and low in price ($4,270 for a fully-equipped four-channel instrument), the 3960 actually outperforms most laboratory machines costing five times more.

If this sounds too good to be true, listen to some of the 3960's capabilities. At 15/16 ips, its FM signal-to-noise ratio of better than 200:1 lets you play back signals that would be buried in noise (ECG's for example) on many lab machines as well as on any other portable.

The 3960 lets you mix and interchange four FM direct record/reproduce channels at will. You have a choice of three electrically-switched speeds, for a time-base expansion of 16:1 or 10:1 . . . without signal degradation. Tape drive is bidirectional so that you don't have to rewind either to continue recording or to play back.

Built-in facilities let you calibrate the 3960's FM electronics without external equipment. And an integral peak-reading meter lets you optimize record level without using a scope. Options include a 5 to 30 foot loop adaptor, an interrupting voice channel, and an inverter for 12 or 28 VDC . . . all integrally mounted.



Write for Application Note 89, a tape recording handbook useful to scientists interested in tape recording techniques for vibration and test analysis, research and clinical medicine, acoustics, oceanography and other environmentally difficult research projects.

For complete information, write Hewlett-Packard, 1507 Page Mill Road, Palo Alto, California 94304. In Europe: 1217 Meyrin-Geneva, Switzerland; Japan: YHP, 1-59-1, Yoyogi, Shibuya-Ku, Tokyo, 151.

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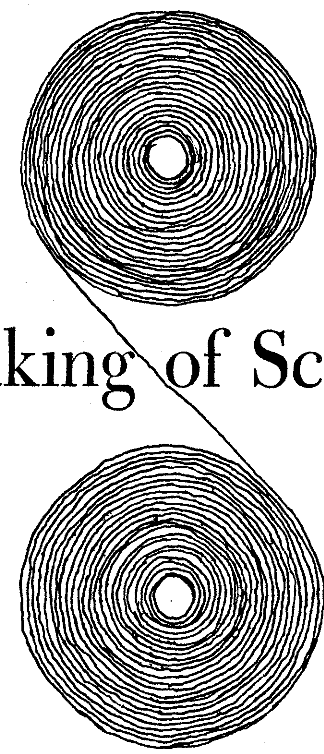
Conversations With Outstanding Scientists



Speaking of Science

The American Association for the Advancement of Science is pleased to announce a new educational resource for libraries and teachers of science. This provocative audiotape series should also be of interest to the general public and to scientists who want to remain up-to-date on advances being made in other fields of science.

The first offering in this continuing series features 12 informal conversations with more than 20 of America's leading scientists. These well-known men and women of science discuss The Mars Probe, Evolution and the Descent of Man, Advances in the Physical Sciences, Advances in Astronomy, Peace, and seven other timely and important subjects.

The 12 recordings are on six cassettes (one complete 30-minute conversation on each side) for playback on standard machines. They are packaged in a compact binder that will fit easily into a bookshelf.

The conversations are narrated by Mr. Edward Edelson, science writer for the *New York Daily News,* and Mr. Mitchell Krauss of *WNET-TV* in New York.

You are invited to purchase this new AAAS educational service at the low price of **$39.95**—AAAS member's price **$34.95.**

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Dr. Theodosius Dobzhansky, Dr. Ernst Mayr, Dr. Elwin Simons
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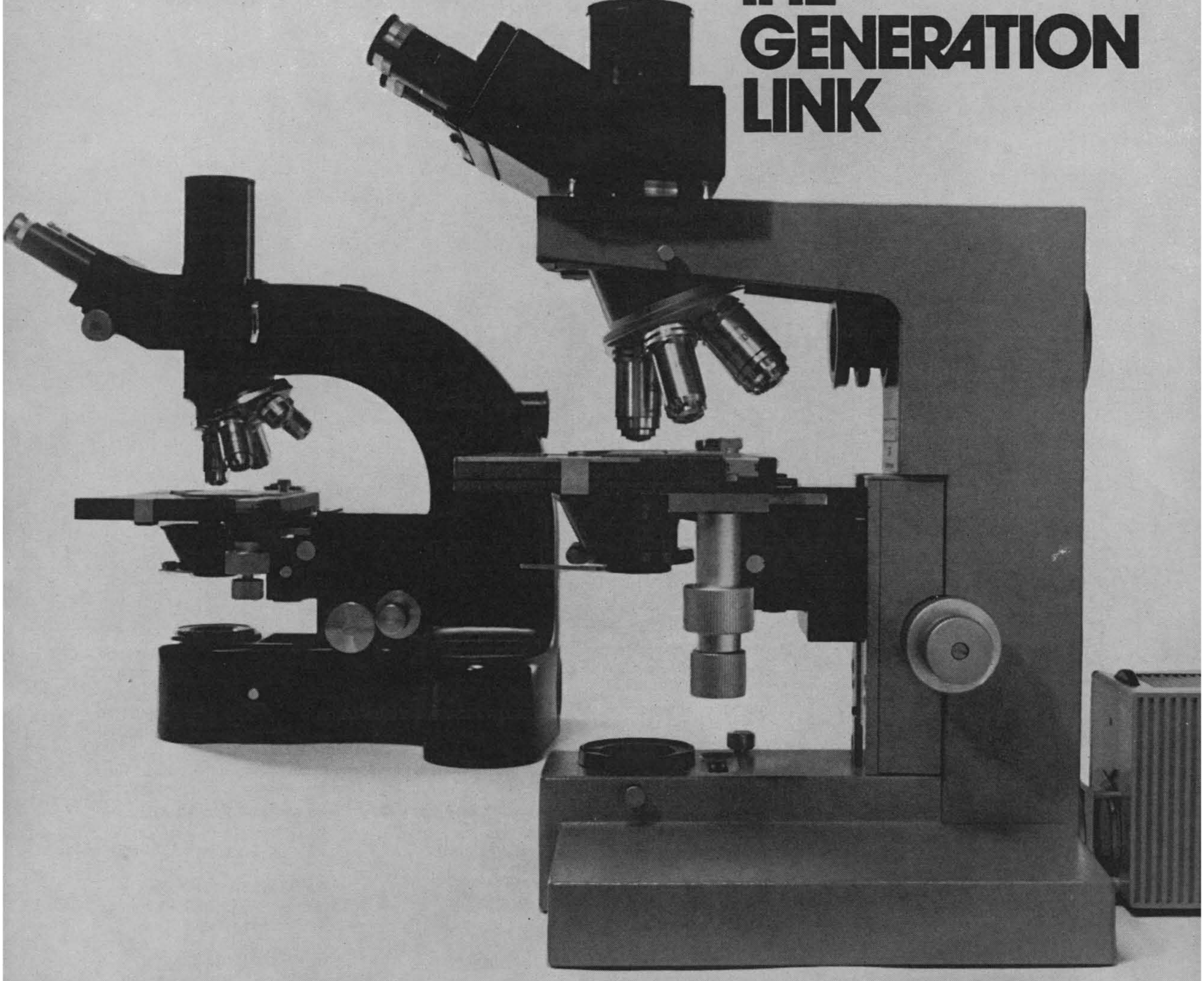

ORTHOLUX II

The introduction of the Leitz® Ortholux 35 years ago started a revolution in microscope design. Leitz scientists working in close rapport with every discipline of the scientific community developed a microscope so appreciably ahead of its time that new standards were set for the entire industry. Standards often copied but never matched.

Ortholux microscopes helped open exciting new areas of scientific inquiry. Areas that grew in complexity and sophistication to such proportions that a new instrument, as revolutionary in 1972 as was the original Ortholux in 1937, was clearly indicated. In tribute to its predecessor, we are calling our new microscope the Ortholux II.

The clean-cut modern lines, a new series of Plan Apochromatic objectives, new, more powerful light sources, a nosepiece that keeps conveniently out of the way, a mechanical perfection of optimum smoothness, an adaptability to a full assortment of modern accessories created for specific needs, all separate this microscope from any competition.

Yes, we are somewhat sorry to see the original Ortholux go, but the reputation it built and the trends it set are being reflected and magnified in the "new generation" Ortholux II, an instrument beyond comparison.

Please write for our detailed brochure describing this truly modern microscope. 125672

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Behind the President's Message

Reactions to President Nixon's 16 March message to Congress on science and technology have ranged from damnation to high praise, with several intermediate critics complaining that it fell far short of the advance billing of the New Technology Opportunities Program or that it added little to what had already been said in the 1973 budget or the State of the Union message. Generally, the critics have treated the special message (or the special message and related statements from the White House) as an isolated event.

It is a mistake to consider the 16 March message by itself, for that message constitutes presidential affirmation of some proposals for change in science policy that have been brewing for several years. The President's concern for innovation and some of his proposals for encouraging innovation parallel closely recommendations contained in *Technological Innovation: Its Environment and Management*, the 1967 report of an external advisory committee to the Secretary of Commerce.

Or again, the President called for "a new partnership in science and technology—one which brings together the federal government, private enterprise, state and local governments, and our universities and research centers in a coordinated, cooperative effort to serve the national interest." The statement that "A more effective use of these resources can be made by combining the talents of industry, government, and universities in a new type of research organization" sounds as if it came directly from the President's message; in fact, it came from the 1971 report of the National Science Board (NSB). Similarly, some of the recommendations of the 1972 NSB report, *The Role of Engineers and Scientists in a National Policy for Technology*, are repeated in the President's message. This support, be it noted, came from the 25 members of the NSB, 20 of whom must be classed as academics rather than as industrialists or government managers.

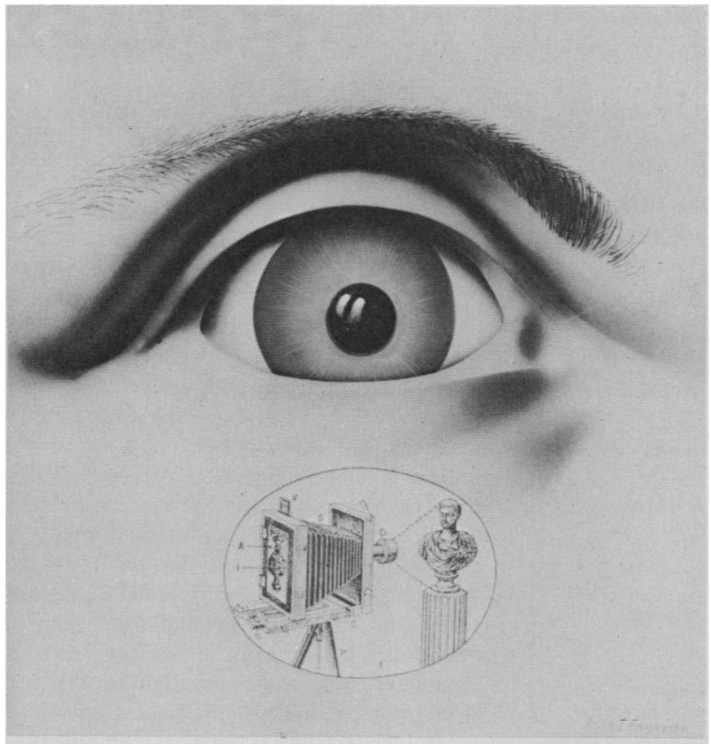
None of these documents presents a fully worked out program; all recognize the need for more detailed planning. The President says, "We must define our goals carefully," and the NSB calls for the careful establishment of priorities. This hard work remains to be done; we have an outline of new policy, but not yet the working drawings.

A similar situation existed from 1945 to 1950, when the basic science policies of the next quarter century were being formulated. The federal government then outlined broad scientific and technological goals, and it decided to support the private sector instead of using governmental institutions as the major performers of research and development. But details of planning and emphasis were left to evolve.

Now the President has announced a new turn in national policy for research and development: more central planning and "directed" research; more multidisciplinary team studies; more emphasis on social goals; and more university-government-industry cooperation. Presidential support for these changes is in itself important, but the ideas are what call for primary attention. Their objectives are social and economic, and hence inherently political, a fact that has important implications for all the scientists and institutions of higher education involved. The specific proposals therefore deserve searching debate, for, if they are adopted, the current period will be remembered as the time of the most significant turning point in national science policy since the late 1940's.—DAEL WOLFLE, *Graduate School of Public Affairs, University of Washington, Seattle 98105*

The ideal

We must teach our children not only what to see but *how* to see.



artist: herbert bayer (1934)

The real

Too often we try to educate by preaching orthodoxies. But orthodox solutions are no longer enough.

Our world is changing faster than ever before while many of our educational premises remain static, mired in the past.

But the past no longer has enough of the answers. In the years ahead, problems will arise for which there are no precedents. To keep the future open we must teach our children not only what to learn but *how* to learn, *how* to see, *how* to analyze.

Only then will they be able to recognize and cope with problems which our generation cannot even foresee.

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artist: jasper johns