

AMERICAN ASSOCIATION  
FOR THE  
ADVANCEMENT OF SCIENCE

**Board of Directors**

CHAUNCEY D. LEAKE, *Retiring President, Chairman*  
THOMAS PARK, *President*  
PAUL M. GROSS, *President Elect*  
HARRISON BROWN DON K. PRICE  
HENRY EYRING ALFRED S. ROMER  
H. BENTLEY GLASS WILLIAM W. RUBEY  
MARGARET MEAD ALAN T. WATERMAN  
PAUL A. SCHERER, *Treasurer*  
DAEL WOLFLE, *Executive Officer*

**Editorial Board**

KONRAD B. KRAUSKOPF H. BURR STEINBACH  
EDWIN M. LERNER WILLIAM L. STRAUS, JR.  
PHILIP M. MORSE EDWARD L. TATUM

**Editorial Staff**

DAEL WOLFLE HANS NUSSBAUM  
*Publisher Business Manager*

GRAHAM DUSHANE  
*Editor*

JOSEPH TURNER ROBERT V. ORMES  
*Associate Editor Managing Editor*

ELLEN E. MURPHY, *Assistant Editor*

NANCY TEIMOURIAN, *Assistant to the Editor*

*News:* HOWARD MARGOLIS, PATRICIA D. PADDOCK

*Book Reviews:* SARAH S. DEES

*Editorial Assistants:* NANCY S. HAMILTON, OLIVER W. HEATWOLE, EDGAR C. RICH, JOHN E. RINGLE, CONRAD YUNG-KWAI

*Staff Assistants:* GENEVIEVE M. KIRBY, JEAN P. D. PIEKNIK

**Advertising Staff**

EARL J. SCHERAGO, *Director*

BERNICE SCHWARTZ, *Production Manager*

*Sales:* RICHARD L. CHARLES (New York, N.Y., PE 6-1858); C. RICHARD CALLIS (Old Bridge, N.J., CL 4-3680); HERBERT BURKLUND (Chicago, Ill., DE 7-4973); DILLENBECK-GALAVAN (Los Angeles, Calif., DU 5-3991)

SCIENCE, now combined with THE SCIENTIFIC MONTHLY, is published each Friday by the American Association for the Advancement of Science at National Publishing Company, Washington, D.C. SCIENCE is indexed in the *Reader's Guide to Periodical Literature*.

**Editorial correspondence** should be addressed to SCIENCE, 1515 Massachusetts Ave., NW, Washington 5, D.C. Manuscripts should be typed with double spacing and submitted in duplicate. The AAAS assumes no responsibility for the safety of manuscripts. Opinions expressed by authors are their own and do not necessarily reflect the opinions of the AAAS or the institutions with which the authors are affiliated. For detailed suggestions on the preparation of manuscripts, see *Science* 125, 16 (4 Jan. 1957).

**Advertising correspondence** should be addressed to SCIENCE, Room 1740, 11 West 42 St., New York 36, N.Y.

**Change of address notification** should be sent to 1515 Massachusetts Ave., NW, Washington 5, D.C., 4 weeks in advance. Furnish an address label from a recent issue. Give both old and new addresses, including zone numbers.

**Annual subscriptions:** \$8.50; foreign postage, \$1.50; Canadian postage, 75¢. Single copies, 35¢. Cable address: Advancisci, Washington.

Copyright © 1961 by the American Association for the Advancement of Science.

## A Machineless Teaching Machine

Instructions: Cover the items below with a piece of paper, lowering the paper item by item as you read. For each item fill in the blank spaces. The words in parentheses that preface the *next* item give the correct response. Use reasonable judgment in deciding whether your response is synonymous with the printed response. Now, read the items.

To determine whether a student has understood a point, a teacher may \_\_\_\_\_ him a question.

(ask) If the student gives an incorrect answer, the teacher may tell him the \_\_\_\_\_ answer.

(correct) Sometimes a teacher will \_\_\_\_\_ a student a question and then, if necessary, tell him the \_\_\_\_\_ answer.

(ask, correct) Confirmation of success is also a part of pedagogy. If the student gives the correct answer, then he receives \_\_\_\_\_ of success.

(confirmation) If the student answers correctly, his success is \_\_\_\_\_; if he answers incorrectly, the teacher tells him the \_\_\_\_\_ answer.

(confirmed, correct) A fast learner likes to advance rapidly, while a slower learner is happier at a slower rate, each student advancing best at his own \_\_\_\_\_.

(rate) It would require an individual tutor for each student to insure that each student advanced exactly at his \_\_\_\_\_ rate.

(own) The teacher of a classroom is not able to insure that each student advances exactly at his \_\_\_\_\_.

(own rate) A teaching machine presents a sequence of statements, one at a time, to the student. The student writes his responses on a strip of paper accessible through an opening in the machine. Each statement, in effect, \_\_\_\_\_ the student a question.

(asks) The student then operates the machine to make his written response inaccessible, but visible through a window, and to reveal the correct response for comparison. If the student is correct, his success is \_\_\_\_\_; if he is incorrect he is told the \_\_\_\_\_ answer.

(confirmed, correct) A teaching machine is like a teacher in that the student is \_\_\_\_\_ questions, his successes are \_\_\_\_\_, and his mistakes are \_\_\_\_\_.

(asked, confirmed, corrected) A teaching machine has the advantage of an individual tutor in that each student proceeds at exactly his \_\_\_\_\_.

(own rate) An ordinary textbook also allows each student to proceed at his \_\_\_\_\_, insofar as he is able to proceed by himself.

(own rate) But in an ordinary textbook the student is not \_\_\_\_\_ questions, nor are his successes \_\_\_\_\_, nor are his mistakes \_\_\_\_\_.

(asked, confirmed, corrected) James G. Holland and B. F. Skinner in their *The Analysis of Behavior*, published by McGraw-Hill, now offer a new kind of textbook that does offer these features. The book is, in effect, a machineless \_\_\_\_\_.

(teaching machine) The sequence of items that you are now reading is an example of the technique used in either a real teaching machine or in a \_\_\_\_\_ teaching machine.

(machineless) The new book makes for truly unforgettable reading, and we recommend that you \_\_\_\_\_ it.

(read).—J.T.