

Learning and Problem-Solution in the Marmoset

Comparative studies of the learning and problem-solution ability of the marmoset have been carried out in the light of existing data on the rat and the rhesus monkey. The marmoset is the most primitive of the simian primates. While its brain has typical primate conformation, it is not as developed as that of the rhesus monkey, its cerebral cortex, for example, being virtually smooth. Given the marmoset's intermediate phylogenetic status,

and particularly its intermediate position in neurological development, the experimental question is to determine its relative behavioral capacities. To this end, marmosets were trained to displace the correct one of two or more stimulus-objects to find food. In simple discrimination learning, requiring consistent response to a specific stimulus, the rat, marmoset, and rhesus monkey all perform at about the same level. Where the tests require discrimination on the basis of symbolic process (delayed reaction) or general principle (learning set and oddity problems),

the rat fails almost completely and the rhesus monkey succeeds to a high degree. The marmoset performs at very close to the level of the rhesus monkey. Analysis of errors in these tests shows that the rat is very much stimulus-bound in its behavior whereas the marmoset, like the rhesus monkey, can go beyond simple, stimulus-response habits and solve problems on the basis of symbols and general principles.

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Association Affairs

Programs Planned for the AAAS New York Meeting

Section and society programs in the medical sciences, dentistry, and pharmacy and in the history and philosophy of science to be presented at the New York meeting are given here. Programs in mathematics, physics, chemistry, astronomy, geology and geography, the biological sciences, anthropology, psychology, and the social and economic sciences have been previously announced [*Science* **132**, 1259 (28 Oct. 1960); **132**, 1318 (4 Nov. 1960); **132**, 1403 (11 Nov. 1960)].

Medical Sciences

Section N. Five-session symposium, cosponsored by the American Physiological Society and the Society of General Physiologists: "Biophysics of Physiological and Pharmacological Actions," arranged by Abraham M. Shanes, National Institutes of Health; 26-28 Dec.

Part I: "Elementary Systems," with T. Shedlovsky, Rockefeller Institute, presiding; 26 Dec. After an introduction by Shanes, papers will be presented on mechanisms of active cation transport (Joseph F. Hoffman, National Heart Institute); ion transport across the erythrocyte membrane (R. L. Post, Vanderbilt University School of Medicine); electrogenesis in frog skin (T. Hoshiko, Western Reserve University School of Medicine); the interaction of drugs with model systems (Norman L. Gershfeld, National Institutes of Health).

Part II: "Nerve," with K. S. Cole, National Institutes of Health, presid-

ing; 26 Dec. Papers will be presented on nerve structure (J. D. Robertson, McLean Hospital, Boston); ionic movements in nerve fibers at rest and during recovery (W. P. Hurlbut, Rockefeller Institute); ionic permeability changes underlying nerve excitation (F. A. Dodge, Rockefeller Institute); spike generation and sodium ions (K. Koketsu, University of Illinois College of Medicine); possible mechanisms underlying the production of afterpotentials in nerve fibers (J. M. Ritchie, Albert Einstein School of Medicine); energetics of activity (B. C. Abbott, University of California, Los Angeles); metabolism in relation to function in nerve cells as illustrated by an excised sympathetic ganglion (M. G. Larrabee, Johns Hopkins University).

Part III: "Muscle I: Membrane Properties," with Alexander Sandow, Institute for Muscle Diseases, presiding; 27 Dec. Papers will be presented on the influence of ions on the membrane potential of muscle fibers (P. Horowicz, Washington University School of Medicine); ion fluxes (R. Swan, Cornell University Medical College); potassium movement in muscle membrane — anomalous rectification (W. Freygang, National Institutes of Health); electrical activity of skeletal muscle (Gertrude Falk, University of Washington); calcium movements in striated muscle during contraction, and contractures with or without membrane depolarization (C. Paul Bianchi, Institute for Muscle Disease); the role of extracellular calcium ions in excitation-contraction coupling in skeletal muscle (George B. Frank, University of

Manitoba, Winnipeg, Canada); correlation of calcium uptake and contractility in frog rectus abdominis muscle (Abraham M. Shanes); "relaxation response" of tonic muscle fibers (William G. Van der Kloot, New York University School of Medicine).

Part IV: "Muscle II: Contractile Properties," with Wallace O. Fenn, University of Rochester Medical School, presiding; 27 Dec. The first paper will be the vice-presidential address of Section N, "The Mode of Action of Drugs," by Carl F. Schmidt, University of Pennsylvania. After the address, the 16th Theobald Smith Award, given by Eli Lilly and Company, will be presented. Papers will then be presented on structure and function of twitch and slow striated muscle fibers (Lee D. Peachey, Columbia University); general energetics of contraction (Alexander Sandow); the immediate energy source for contraction of muscle (R. E. Davies and D. F. Cain, University of Pennsylvania); the nature of the contractile mechanism in muscle (R. J. Podolsky, Naval Medical Research Institute); general physiology and pharmacology of junctional transmission (Harry Grundfest, Columbia University).

Part V: "Muscle III," with C. Ladd Prosser, University of Illinois, presiding; 28 Dec. Papers will be presented on some current theories and problems in cardiac electrophysiology (B. Hoffman, New York Downstate Medical Center); possible electrochemical factors in heart electrophysiology (J. W. Woodbury, University of Washington School of Medicine); electrolyte metabolism in myocardial tissue (W. C. Holand, University of Mississippi Medical Center); electrochemistry of smooth muscle and its relationship to contraction (L. Hurwitz, Vanderbilt University School of Medicine); potassium and the mechanical responsiveness of artery strips (L. Barr, University of Michigan School of Medicine); electrolytes and contraction in cardiac muscle (Saul Winegrad, National Institutes of Health).

Section N is a cosponsor of the following symposia: "Fundamentals of Keratinization," program of Section Nd-Dentistry, 30 Dec. (see Section Nd), and "Career Opportunities in Medicine and Dentistry," program of Alpha Epsilon Delta, 29 Dec.

Attention is called to the three-session symposium of the New York Academy of Sciences, "Current Problems in Electrobiology," on 30 Dec. (for details, see the program of the Academy).

Alpha Epsilon Delta. Symposium cosponsored by Sections C-Chemistry, F-Zoological Sciences, N-Medical Sciences, Nd-Dentistry, and Beta Beta Beta Biological Society: "Career Opportunities in Medicine and Dentistry," arranged by Maurice L. Moore, national secretary, Alpha Epsilon Delta, with Charles V. Reichart, national treasurer, Alpha Epsilon Delta, presiding; 29 Dec. After introductory remarks by Reichart, papers will be presented on physician needs for the future (William H. Stewart, U.S. Department of Health, Education, and Welfare) and on dentist needs for the future (Shailer Peterson, Council on Dental Education, American Dental Association). There will then be a panel discussion on opportunities in dentistry, with Raymond J. Nagle, New York University College of Dentistry, as moderator, and a panel discussion on opportunities in medicine, with James O. Pinkston, Downstate Medical Center, State University of New York, as moderator.

Luncheon and address: "The Doctors' Dilemma," by I. S. Ravdin, vice-president for Medical Affairs; 29 Dec. Conferences with admissions officials and visits to medical and dental schools will follow the luncheon and address. All persons interested in premedical and predental education are invited to attend the program of 29 Dec. and the luncheon.

American Medical Association, Committee on Cosmetics. Two-session symposium, cosponsored by Section Np-Pharmacy: "The Scientist's Contribution to the Safe Use of Cosmetics," arranged by Joseph B. Jerome, Committee on Cosmetics, with Marion B. Sulzberger, New York University, presiding; 29 Dec.

Part I: After an introductory statement by Marion Sulzberger, papers will be presented on some problems of biological research and their relation to cosmetic development and use (William Montagna, Brown University); new methods for the study of percutaneous absorption (Kenneth M. Wilson, Army Chemical Center); radioisotopes in cosmetic research (William Bousquet, Purdue University); dermatologic research and cosmetic formulation (Allan L. Lorincz, University of

Chicago); the science of safe cosmetic formulation (Glen J. Sperandio, Purdue University). There will be a panel discussion after presentation of the papers.

Part II: Papers will be presented on the clinical dermatologist and cosmetic reactions (Howard T. Behrman, New York Medical College); methods of appraisal for potential hazard (Adolph Rostenberg, University of Illinois); industry's interest and responsibility in cosmetic safety (Willard M. Bright, Lever Brothers Company); the government's role in the control of cosmetics (Irvin Kerlan, Food and Drug Administration). There will be a panel discussion after the presentation of the papers.

American Psychiatric Association. Five-session symposium, program of the Committee on Research of the American Psychiatric Association, cosponsored by Section I-Psychology and the American Psychoanalytic Association: "Expression of the Emotions in Man," arranged by Peter H. Knapp, Boston University School of Medicine; 29 and 30 Dec.

Part I: Introductory session, with Henry W. Brosin, University of Pittsburgh, presiding; 29 Dec. After an introduction by Knapp, a paper on the phylogenetic and neurophysiologic aspects will be presented by Paul D. MacLean (National Institute of Mental Health) and discussed by Stewart Wolf (University of Oklahoma Medical Center). A paper on the ontogenetic aspects will be presented by Rene A. Spitz (University of Colorado Medical Center) and discussed by Sibylle K. Escalona (Albert Einstein College of Medicine).

Part II: "Methods of Study," with Robert A. Cohen, National Institute of Mental Health, presiding; 29 Dec. A film, *Entering the Mind through the Sensory Gateways*, will be presented by Felix Deutsch, Boston University School of Medicine and the Boston Psychoanalytic Society and Institute; this will be followed by a panel discussion, "Lexical and Linguistic Levels," in which the main presentation will be by George F. Mahl, Yale University School of Medicine.

Part III: "Methods of Study," with Morton F. Reiser, Albert Einstein College of Medicine, presiding; 29 Dec. There will be a panel discussion, "Kinesic and Visceral Levels," in which the main presentations will be by Ray L. Birdwhistell, Temple University Medical Center, and John I. Lacey, Fels Research Institute, Antioch College.

Part IV: "Synthesis and Critique of Methods"; 30 Dec. Papers presented will be "The Viewpoint of the Social Scientist" (Gregory Bateson, Stanford

University), which will be discussed by Karl H. Pribram, Stanford University; "The Viewpoint of the Experimentalist" (Harry F. Harlow, University of Wisconsin); and "The Viewpoint of the Psychoanalyst" (Kenneth M. Colby, San Francisco Psychoanalytic Society).

Part V: Closing session, 30 Dec. Papers presented will be "Toward a Classification of Affects" (George L. Engel, University of Rochester School of Medicine), which will be discussed by Samuel Novey, Baltimore, and "Emotions in the Perspective of Evolutionary Theory" (David A. Hamburg, National Institute of Mental Health), which will be discussed by Margaret Mead, American Museum of Natural History.

New York Academy of Sciences. Three-session conference on "Current Problems in Electrobiology," with Robert L. Kroc, Section of Biological and Medical Sciences, New York Academy of Sciences, as conference chairman; 30 Dec. The conference will begin with greetings from the Academy by Kroc.

The chairman for Session I will be Abraham M. Shanes, National Institutes of Health. Papers will be presented on ultrastructure of excitable membranes (J. D. Robertson, University College, London, England); macromolecular properties of excitable membranes (L. J. Mullins, Purdue University); ionic mechanisms in electrogenesis (Harry Grundfest, Columbia University).

The chairman for Session II will be Harry Grundfest. Papers will be presented on modes of operation of electric organs (M. V. L. Bennett, Columbia University); activation and inactivation in a nerve ending (W. R. Loewenstein, Columbia University); nervous control of chemical sensitivity in muscle (S. Thesleff, University of Lund, Stockholm); spike potential of spinal motoneurons (C. A. Terzuolo, University of Minnesota).

The chairman for Session III will be H. H. Jasper, Montreal Neurological Institute, McGill University. Papers will be presented on the organization of cortex with respect to its afferent supply (G. H. Bishop, Washington University); electrophysiological properties of an archicortical neuron (E. R. Kandel, Massachusetts Mental Health Center); analysis of cortical axodendritic synaptic organizations (D. P. Purpura, Columbia University).

The Academy will have a luncheon, cocktail hour, and informal subscription dinner on 30 Dec.

Attention is called to the five-session symposium of Section N, "Biophysics of Physiological and Pharmacological Actions," 26-28 Dec. (for details, see Section N, above).

Dentistry

Section Nd. Two-session symposium, cosponsored by Section N—Medical Sciences, the American College of Dentists, the American Dental Association, and the International Association for Dental Research, North American Division: "Fundamentals of Keratinization," arranged by Earl O. Butcher, College of Dentistry, New York University; 30 Dec.

Butcher will preside over Session I, in which papers will be presented on the mechanism of keratinization (A. Gedeon Matoltsy, University of Miami); the histochemical distribution of sulfhydryls and disulfides in vertebrate keratins (R. J. Barnett, Yale University School of Medicine, and Reidar F. Sognaes, School of Dentistry, University of California, Los Angeles); keratinization of whole skin and isolated epidermis in vitro (George Szabo, Harvard Medical School); keratinization as seen with the electron microscope (J. A. Rhodin and E. J. Reith, New York University School of Medicine); the effects of vitamin A on keratinizing epithelia (Howard A. Bern and Donald J. Lawrence, Cancer Research Genetics Laboratory, University of California, Berkeley); effects of vitamin A on keratinization in the vitamin-A-deficient rat (J. P. Parnell and B. Sherman, Downstate Medical Center, State University of New York).

Sognaes will preside over Session II. Papers will be presented on the effect of environment on the physical characteristics of the cornified epithelium (Irvin H. Blank, Harvard Medical School); keratinization of the oral mucosa (Julia Meyer, College of Dentistry, University of Illinois); keratinization in dental cysts (Jens J. Pindborg, Royal Dental College, Copenhagen); the extracellular position of enamel (M. L. Watson, University of Rochester); the chemistry of the protein matrix of enamel (K. A. Piez, National Institutes of Health).

Pharmacy

Section Np. There will be opening remarks by John E. Christian, secretary of Section Np, and this will be followed by greetings from the American Society of Hospital Pharmacists, the American Pharmaceutical Association, the New York State Council of Hospital Pharmacists, and the American Hospital Association.

There will be two sessions for contributed papers in hospital pharmacy, arranged by George F. Archambault, Division of Hospitals, U.S. Public Health Service, and Joseph A. Oddis, American Society of Hospital Pharmacists and American Pharmaceutical Association; 27 Dec. Oddis will preside

over Session I; Archambault, over Session II.

On the same day there will be a luncheon, arranged by E. R. Squibb and Sons, New York (coordinated by P. A. Freeman), and the vice-presidential address of Section Np, "Dedication to Pharmacy," given by Joseph V. Swintosky.

On 27 Dec. there will also be programs arranged by Wyeth Laboratories, Philadelphia (coordinated by H. L. Ferrier), and by McKesson and Robbins, Inc., New York (coordinated by Milton N. Stamatos).

There will be two sessions for contributed papers, arranged by John E. Christian. John Autian (University of Texas) will preside over one of these, on 29 Dec.; Lee H. MacDonald (Upjohn Company, Kalamazoo, Mich.) will preside over the other, on 30 Dec.

The entire program of Section Np is cosponsored by the American Association of Colleges of Pharmacy, the American College of Apothecaries, the American Pharmaceutical Association, the American Society of Hospital Pharmacists, and the National Association of Boards of Pharmacy.

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History and Philosophy of Science

Section L. Commemorative two-session symposium honoring Robert C. Watson, commissioner, U.S. Patent Office, cosponsored by the Society for the History of Technology: "Patents in the Advancement of Knowledge," arranged by John W. Streeter, secretary of Section L; 30 Dec. J. William Hinckley, president, Research Corporation, New York, will preside over Part I. Speakers will be Jacob Rabinow, president, Rabinow Engineering Company, Richard P. McGrail, American Cancer Society, and Johan Bjorksten, Bjorksten Research Laboratories. Robert L. Johnson, Temple University, will preside over Part II. Speakers will be Fritz Machlup, Princeton University, Berj Hagopian, Transval Electronics Corporation, and Charles C. Price, University of Pennsylvania. Rudolph F. Bannow, National Association of Manufacturers, will introduce Watson.

The vice-presidential address of Section L will be given on 30 Dec., with Melvin Kranzberg, Case Institute of Technology, presiding. The address will be "The Evils of Secrecy" by Harry Woolf, Section L vice president.

Conference on Science Manuscripts. There will be a session for a report on organization and future plans, arranged by Derek J. de Solla Price (Yale University), program chairman, and Carolyn Eisele (Hunter College), local chairman, with Nathan Reingold, Yale University, presiding; 29 Dec.

There will be a meeting of the Council of the Conference on Science Manuscripts and a meeting of the George Sarton Memorial Foundation on 27 Dec.

History of Science Society. Invited papers, joint program of the History of Science Society and the Society for the History of Technology: "Fairly Recent Science and Technology," with Lynn T. White, University of California, Los Angeles, as chairman; 27 Dec. Papers will be presented on Abraham Gottlob Werner's ideas on science and education (Alexander M. Ospovat, University of Oklahoma); the engineering gap between Faraday's discovery of electromagnetic induction and the electric dynamo (Harold I. Sharlin, Polytechnic Institute of Brooklyn); Pierre Gassendi and the physics of Galileo (Joseph T. Clark, Canisius College).

The Society will have its annual dinner, with presentation of the George Sarton medal, on 27 Dec. The dinner will be open to Section L and to members of the Society for the History of Technology.

The first George Sarton memorial lecture will be held 27 Dec., with Henry Guerlac, retiring president of the History of Science Society, presid-

ing and Rene Dubos, Rockefeller Institute, as the speaker. The lecture will be open to the general public.

Invited papers, joint program of the History of Science Society and Section L: "Sociology and Psychology of Scientists," with Thomas S. Kuhn, University of California, Berkeley, as chairman; 28 Dec. Papers will be presented on the scientist's resistance to scientific innovation (Bernard Barber, Columbia University); sources of scientific manpower and competence—some issues for historical and political research (Karl W. Deutsch, Yale University); the psychology of scientists (Anne Roe, Harvard University).

There will be an address by Henry Guerlac and presentation of the Pfizer and Schuman prizes on 28 Dec.

Invited papers: "The Scientific Mainstream," with Duane H. D. Roller, University of Oklahoma, as chairman; 28 Dec. Papers will be presented on the development of analytic methods in chemistry prior to Robert Boyle (Allen G. Debus, Harvard University); a kaleidoscope of appraisals of the importance of Tycho and Kepler (C. Doris Hellman, Pratt Institute); Galen's experiments and clinical observations on circulation and respiration (Rudolph Siegel, University of Buffalo).

A meeting of the editorial board of *Isis*, official journal of the History of Science Society, will be held 28 Dec.

There will be a session for reports on work in progress, with Marshall Claggett, University of Wisconsin, as chairman, on 29 Dec. Papers will be presented on the oral history of contemporary American science (Saul Benison, Columbia University); Galileo's attempt to prove that the earth moves (Harold L. Burstyn, Harvard University); medical alchemy—a study in comparative history (Gerald J. Gruman, Johns Hopkins University); application of the digital computer to the analysis of variant readings of medieval texts (Thomas M. Smith, University of Oklahoma); the role of measurement in the natural philosophy of Galileo and Huygens (W. James King, Smithsonian Institution); the growth of modern science in Japan (Eri Yagi Shizume, Yale University); the teaching of history of science in American colleges (Duane H. D. Roller); the development of atomic models, Kelvin to Bohr (Allan B. Robinson, Harvard University); the impact of mathematics on Goethe and Novalis (Martin Dyck, University of Michigan). The annual business meeting will be held 29 Dec.

Philosophy of Science Association. There will be a report of the secretary-treasurer, Richard L. Meier, University of Michigan, followed by a session entitled "The Boundaries of Systems," with Richard L. Meier as chairman; 29

Dec. Papers will be presented as follows: "The real and the more real: the problem of concrete and analytic systems in the social sciences" (Charles A. McClelland, San Francisco State College) and "Three answers to Pilate: the boundaries of truth" (Garrett Hardin, University of California, Santa Barbara). Karl W. Deutsch, Yale University, will comment on these papers, and there will be a discussion.

Panel, cosponsored by Section L: "Formal Simplicity as a Weight in the Acceptability of Scientific Theories," arranged by Lewis K. Zerby, Michigan State University, with Richard S. Rudner, Michigan State University, as chairman; 30 Dec.

Society for General Systems Research. There will be a session for contributed papers, with Charles A. McClelland, San Francisco State University, as chairman, on 30 Dec.

Invited papers, joint program of the Society for the History of Technology, Section L, and Section M—Engineering: "Nineteenth Century Technology"; 28 Dec. Papers will be presented as follows: "New evaluations in the history of the petroleum industry in the 19th century" (Arnold R. Daum, Northwestern University) and "The British electrical industry in the 19th century: a case of retarded growth" (Thomas P. Hughes, Washington and Lee University). After presentation of the papers, Bern Dibner, Burndy Library, will act as commentator.

An Executive Council meeting and the annual business meeting of the Society will be held on 29 Dec. On the same date there will be a luncheon and presidential address by Lynn T. White, University of California, Los Angeles.

Symposium, joint program of the Society for the History of Technology and Section L: "Automation," with Preston R. Bassett, Ridgefield, Conn., as chairman; 29 Dec. Speakers will be James R. Bright, Harvard University, and John Diebold, New York; A. J. Jaffe, Columbia University, will act as commentator.

Joint session with the American Historical Association: "Technology as Cause in History," with Stanley Pargellis, Newberry Library, Chicago, as chairman; 28 Dec. Papers will be presented as follows: "Technology—neglected clue to historical change" (Roger Burlingame, West Redding, Conn.) and "History—neglected clue to technological change" (Lewis Mumford, University of Pennsylvania). After presentation of the papers, H. Stuart Hughes, Harvard University, will act as commentator.

The Society is also a cosponsor of the two-session symposium, "Patents in the Advancement of Knowledge," sponsored by Section L (see Section L).