

The Origins of Electroconvulsive Therapy (ECT)

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Summary: Prior to the 1930s, the prime mode of treatment for psychiatric outpatients was psychoanalysis. Little could be done for inpatients, other than provide sedation and social support. In the 1930s, four major somatotherapies, all interventionist in technique, were developed: insulin coma therapy, Metrazol convulsive therapy, lobotomy (psychosurgery), and electroconvulsive therapy (ECT), the only one of these therapies still in use today. This paper focuses on the development of ECT by Ugo Cerletti and Lucio Bini at the Clinic for Nervous and Mental Disorders in Rome in 1938. The first electroshock treatment with humans is discussed in detail and the export of ECT to North America is described. Fifty years after the first treatment, ECT remains a controversial method of psychiatric treatment.

Key Words: Electroconvulsive therapy—Electroshock therapy—Somatotherapy—Depression—History.

Until the 1930s, the principal treatment for psychiatric outpatients were "psychodynamic therapies." For inpatients, little could be done, other than provide social support, sedation, and custodial care. In the 1930s, four major somatotherapies were developed: insulin coma therapy, Metrazol convulsive therapy, psychosurgery, and electroconvulsive therapy. Electroconvulsive therapy (ECT) is the only treatment still in use today.

SOMATOTHERAPIES

Kalinowsky (1980) noted that "The only treatment available in the 1920s was malaria therapy of general paresis (resulting from syphilis); . . ." (p. 428). In

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This article is based essentially on the first half of Chapter 1, History of Electroconvulsive Therapy, from the book *Electroconvulsive Therapy: The Myths and the Realities* (1988) by Norman S. Endler and Emmanuel Persad. Toronto: Hans Huber Publishers, Inc. A shorter version of this paper was presented to the Grand Rounds, Department of Psychiatry, Alberta Hospital, Edmonton, Alberta, Canada, on December 1, 1987.

Jesuit missionary in Ethiopia, the electric catfish was used to expel devils from humans in the sixteenth century. A Swiss physician shocked a farmer's hand to rid him of devils in the mid-eighteenth century. Electricity was used in France in 1755 to treat psychogenic blindness (Alexander and Selesnick, 1966); and in England electricity was used to treat depression in 1814. These techniques applied electricity to the hands, neck, spinal column, kidneys, and buttocks; none involved the planned induction of a seizure.

Leduc of Nantes reported that a rectangular electric current with one electrode placed on the animal's head and the other electrode at the base of the animal's spine induced sleep. He described a state of "cerebral inhibition." In 1903, Zimmermann and Dimier replicated Leduc's study and considered cerebral inhibition to be similar to epilepsy. Battelli, also in 1903, used standard city electric currents of Geneva (120 or 240 V, 45 Hz), by placing one electrode in an animal's mouth and another pin-shaped one subcutaneously in the back of the animal's neck, to induce an epileptic attack. He described this method of inducing convulsions as harmless.

Cerletti, while doing postgraduate studies at the University of Genoa, used Battelli's method to induce epileptic attacks in dogs. He examined the glia of the horn of Ammon to determine if the concentration of glia was antecedent or consequent to repeated spontaneous epileptic attacks. The association of electrically induced convulsive attacks and von Meduna's therapeutic hypothesis that mental illness could be treated by inducing convulsive epileptic attacks was initially an abstract idea for Cerletti. He was worried that the use of electric currents with humans could prove fatal. Subsequently, Cerletti was reassured by reports that electric shocks on pigs at the Rome slaughterhouse induced epileptic attacks and a quick recovery, and he considered the possibility that electric shock could be used for therapeutic purposes with humans (Catalano-Nobili and Cerquetelli, 1972).

It is clear that the history of older electrical applications are unrelated to the development of electroshock. Cerletti and Bini rightly denied any effects of the electric current on mental illness. They used electricity only for the induction of therapeutically effective convulsions (Kalinowsky, Hippus, and Klein, 1982). They were led to this modification of seizure therapy after observing both Metrazol-induced seizures and insulin-induced coma. Their studies led to the first systematic application of electricity to induce seizures for treatment of a severe psychosis. They called their method "electroshock treatment."

Ugo Cerletti (1877-1963)

Ugo Cerletti was born in Conegliano Veneto, Italy, on September 22, 1877 (Fig. 1). His father was docent in a local oenological (wine) school. Cerletti studied medicine in Turin and then in Rome, receiving his medical degree from the University of Rome in 1901. He subsequently studied neurology with Pierre Marie and Dupre in Paris, and neuropsychiatry with Kraepelin, Nissl, and Alzheimer in Heidelberg and Munich. He published articles on histopathology and the physio-

Cerletti is also known for other accomplishments. As a member of the Alpine Troops in World War I, he developed a plan to encircle the Austrian strongholds, which was immediately put into operation. While in the Ortler section of the Austrian Alps, he was spotted by the enemy in his dark uniform which contrasted sharply with the white snow. Cerletti escaped to Bornio, without being shot, and subsequently developed white coveralls which then served as a camouflage in the snow. In the next year, he developed a delayed time fuse for the rifle. This was tested at the Nettuno firing range, mostly at his own expense. French military authorities were interested in his discovery, so Cerletti adapted the delayed fuse for French munitions. The war soon ended, and the fuse was never put to practical test. Cerletti also built a carillon with a tonal scale using cartridge cases of the Austrian artillery. This became part of the bell tower of a military chapel, which Cerletti designed. It is clear that Cerletti possessed an ingenious and creative mind.

Lucio Bini (1908–1964)

Lucio Bini was born on September 18, 1908. When he began his work with Cerletti, Bini had no training in psychiatry. Cerletti asked him to design and provide technical assistance for the building of the first ECT machine. Bini was not, as he is sometimes described in the literature, an electrotechnician. He was a brilliant psychiatrist who was senior author of a leading Italian textbook on psychiatry (Kalinowsky, 1980). It was Bini who developed the procedures to eliminate the fatalities that had occurred in the ECT experiments with animals.

Bini was married, and had three sons: one son is a psychiatrist, one an orthodontist, and the occupation of the third son is unknown.

In 1938, at the time electroshock was developed, Bini was 30 years of age. After 1955, he moved to the San Camillo Hospital in Rome, as Director of the Clinic (at about the age of 47). It was at this time that Cerletti retired from his Clinic. Bini's role in the development of ECT is documented by Cerletti (1950b). Bini died in 1964, in his 56th year, not having achieved the recognition that Cerletti did. However, Bini was greatly appreciated in Italy and both Lothar Kalinowsky and Ferdinando Accornero considered his original work central to the development of electroshock.

Ferdinando Accornero (1910–1985)

Bini, Ferdinando Accornero, and Mario Felici also assisted in the electroshock treatment project. Accornero was born in 1910, retired in 1975, and died in 1985. He had one son, Neri, who is currently a neuropsychiatrist in the same clinic in Rome. Accornero wrote an eye-witness account of the first ECT treatment (Accornero, 1970). This account is an absorbing, gripping, personal, and exciting record of the events which ushered in that treatment.

Mario Felici (circa 1908–)

Mario Felici was born about 1908. At the end of World War II, Mario Felici went to work in Tunisia, and returned to Rome in 1970, where he now resides.

tric current passing through the heart. Bini suggested that both electrodes be placed on the head. When this procedure was used, no animals died.

When von Meduna conclusively demonstrated that epileptic attacks could be effective in treating various types of psychopathology, Cerletti met with his assistants in October, 1936 (Accornero, 1970). They developed a plan of research into three treatments.

Longhi was asked to study Cardiazol therapy, Accornero was to investigate insulin "shock" therapy, and Bini was assigned to a special research program, for which Cerletti defined the basic goals: "We have seen that, by discharging an electric current of 90 to 120 V for fractions of a second on dogs, we can provoke a kind of epileptic fit; we must improve the circuit and make it as safe as possible, so that we can eventually try this on humans. If we succeed, it is possible that this treatment will be more efficacious than Cardiazol shock therapy" (Accornero, 1970).

But, about half of the dogs died of cardiac arrest because of the placement of the electrodes. Bini tested various circuits, and observed that when the two electrodes were placed on the dog's cranium, one on each temple, epileptic fits were consistently induced, and the animals survived.

Every week during 1936-1937, the dog catcher's truck stopped in front of the clinic and unloaded dogs. Bini, using electroshock, and Accornero using insulin, studied the effects of these treatments on brain structures. It was necessary to perform postmortem autopsies rapidly to separate the direct effects of the treatments from postmortem alterations which might have invalidated their results. Every day, Bini, Felici, and Accornero carefully studied brain specimens, and exchanged ideas and observations late into the night. Cerletti frequently came by to check the material they had collected.

When Ugo Cerletti peered into a microscope he took on a special look: "His eyes, under bushy eyebrows, were already penetrating, and now they took on a new light; they seemed to narrow, so as to be even more searching, ready to grasp the special development of a fibril, the disintegration of a nucleus, the abnormal coloration of a layer" (Accornero, 1970). According to Accornero (1970), Cerletti has a significant influence on his assistants . . . "penetrating" their minds.

By 1937, the investigators were sure that epileptic attacks could be induced in dogs using electrical currents, without causing death in the animals. That year, the first international meeting on "New Therapies for Schizophrenia" was organized in Münsingen, Switzerland, sponsored by the Swiss Psychiatric Association. It was at this meeting that Bini presented the first report on the use of electricity to induce seizures. Two reports were read. Accornero and Bini reviewed the experiences with insulin coma in Rome, and Bini described his first experiments to induce epileptic attacks in dogs using electric currents. These descriptions were the first public discussions of what was to become electroshock therapy.

The doubts and caution of Cerletti and his collaborators may seem surprising to the present day reader, especially since ECT is administered regularly in most psychiatric institutions—even in remote parts of the world. In 1937, however, no

passive behavior, incoherence, hallucinations, neologisms, and disorientation. He frequently spoke in a slang he devised, so that at most times it was difficult to understand what he was saying. He was delirious and his ideas were disordered without any logical connection. The diagnosis was suggestive of schizophrenia, and the illness appeared to be advanced. His prognosis was poor.

The first administration of electroshock to man, basically an experiment, was set to begin one morning in early April, 1938. On the second story of the clinic there was a large room, used as a laboratory for a technician/designer. There was a bed in this room where the technician occasionally rested. It was a safe place to administer ECT, away from curious and prying persons. Figure 3 presents a picture of the room as it appeared in October 1985. Obviously, it has been modernized. The electroshock apparatus (See Fig. 4) (now in the History of Medicine Museum in Rome, a few buildings east of the Clinic) was on a table surrounded by wires, electrodes, and measuring instruments.

Attending for the first electroshock treatment were Cerletti, Bini, Felici, and Accornero; Vittorio Chaliol, a neurologist and Deputy Director of the clinic; Spartaco Mazzanti, a hospital attendant; and Ezio Capelletti, a nurse and orderly.

The patient's head was shaved and he was stretched out on the bed. He was indifferent to what was going on. Capelletti attached two electrodes to the patient's temples (Fig. 5). Mazzanti placed a rubber pipe wrapped in gauze in the patient's mouth as a bite-bloc.

Bini and Felici stood next to the electroshock apparatus; Cerletti and Accor-

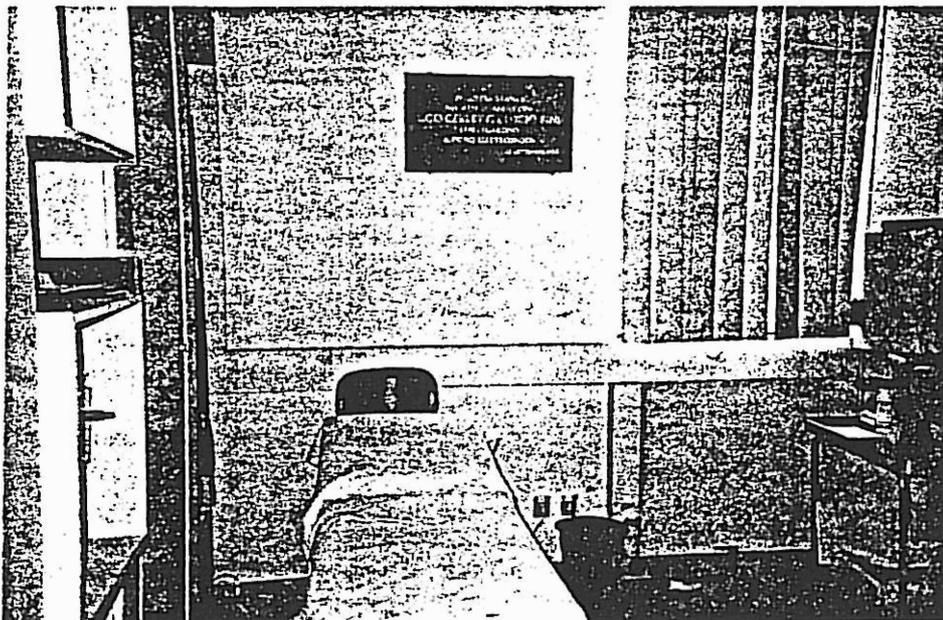
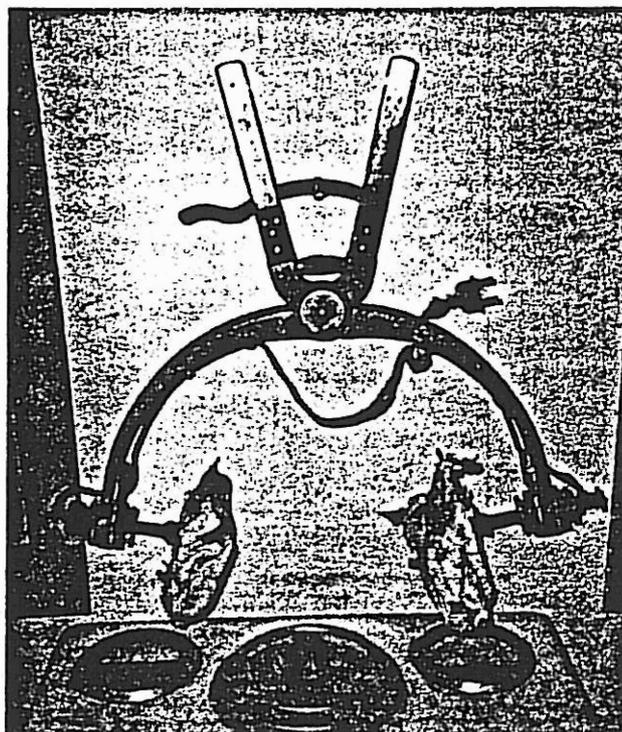


FIG. 3. The Room where Electroshock Therapy was first administered in 1938 at the Clinic in Rome. (Photographed by Norman S. Endler, October, 1985)

FIG. 5. Electrodes used in First Electroshock Treatment in 1938. (Now in the History of Medicine Museum in Rome. Photographed by Norman S. Endler, October, 1985)



Bini adjusted the equipment to 110 V and $\frac{2}{10}$ of a second, and Felici clicked the switch. The patient again showed a tonic phase, followed by the clonic phase of an epileptic attack. "The patient's respiration was arrested, his face became pale and then took on a blue tinge, his jaws were clenched in trismus, as in lockjaw, the reflection of the cornea was lacking. I listened to his heart rate with the stethoscope and it continued to increase. Bini counted the seconds since respiratory arrest: '5 . . . 10 . . . 15 . . .'. The patient's face was violet and the clonic movements continued."

"The staff continued counting—20, 25, 30, 35, 40. The patient's heart rate continued to increase, and then the pulse decreased to between 35–40. The body muscles then relaxed and the movements started to diminish.

"At the 48th s, the patient emitted a deep stertorous sigh, cyanosis diminished, and his pulse became normal. We all breathed sighs of relief; it was not hot, but our foreheads were covered with sweat" (Accornero, 1970). S.E. then breathed normally, was calm, and his cardiovascular system was back to normal.

Cerletti said: "The fact that we can cause epileptic attacks in humans by means of electrical currents, without any danger, seems to be an acceptable fact" (Accornero, 1970).

The patient had eleven electroshock treatments and was discharged from the Clinic on June 17, 1938, in good condition and well-oriented. Prior to his dis-



FIG. 6. Plaque commemorating the First Electroshock Treatment, in April, 1938, at the Clinic in Rome. (Dedicated on the 100th Anniversary of the Birth of Cerletti. Photographed by Norman S. Endler, October, 1985)

assessed, circulation in the retina examined, and the cardiovascular system investigated.

Much of this research was published in a special issue of the *Rivista Sperimentale Di Freniatria* (Journal of Experimental Psychiatry) in December, 1940. Over 500 pages in length, it described their extensive physiologic and clinical studies of the first patients to receive electroshock.

To whom does the credit for the discovery of electroshock therapy belong? Accornero (1970) believes that both Cerletti and Bini should get equal credit. He notes "that if there were ever two names which should be linked to a scientific discovery, the case is most justified by the names of Ugo Cerletti and Lucio Bini. Cerletti's name must always take precedence because with understandable impediments and uncertainties, it is undoubtedly from him that the spark which led to the conception of electroshock came. . . ." (Accornero, 1970). Furthermore, he took the most responsibility. Nevertheless, "without Lucio Bini's intelligence, perspicaciousness, work discipline, and especially his conscientious insistence, electroshock might have remained at the level of a theoretical hypothesis rather than becoming a concrete reality" (Accornero, 1970).

ORIGINS OF ELECTROCONVULSIVE THERAPY IN AMERICA

The psychiatrists who initially administered electroconvulsive therapy (ECT, as it came to be known in North America; in Italy it was called EST) in North America, were for the most part connected, at one time or another, with the Clinic at the University of Rome.

Before discussing the origins of ECT in America, let me briefly note how the name electroshock was selected. After much discussion and uncertainty, Cerletti decided on the term electroshock or its abbreviation E.S. However, he never much liked the term, nor was he ever quite convinced that it was the proper term to use (Catalano-Nobili and Cerquetelli, 1972). Putti, a colleague, had suggested the term electric shock. Cerletti, however, rejected this because this term was already in use to refer to muscular contractions caused by direct action of electricity. The term electroconvulsions was rejected by Cerletti because he believed

in the U.S.A. in March, 1940. "The Psychiatric Institute in New York was the first research institute where we built a machine of our own and started treatment in September 1940" (Kalinowsky, personal communication, January 27, 1986).

A second thread is provided by Renato J. Almansi (whom I interviewed on August 16, 1985, April 4, 1986, and again on April 9, 1987; as well as corresponding with him). He was born in Northern Italy on September 2, 1909 and was trained as a neuropsychiatrist in Rome. (He later received analytical training in New York and has limited himself to the practice of psychoanalysis ever since). Almansi took a 3-year postgraduate course in neuropsychiatry in Rome, which included observing and carefully studying EST procedures.

Almansi migrated to the U.S.A. in September 1939 for "racial" reasons, and took an EST machine with him. In New York, he teamed up with David J. Impastato (January 8, 1903–February 28, 1986). On February 6, 1940, they administered their first ECT at Columbus Hospital in New York City (Almansi and Impastato, 1940). They thought of calling it electrofit therapy—but this term never caught on. Almansi notes that "Before February 6, 1940, the date of our first treatment in humans, Impastato and I gave the treatment to some dogs. Impastato, very reasonably, wanted to be sure that it was safe" (Personal communication, September 25, 1986). Almansi believes that the first administration of ECT to humans in the U.S.A. was on February 6, 1940 (Personal communication, August 16, 1985).

A third thread is provided by Pulver (1961). He writes that the first treatment in the U.S.A. was administered in Chicago by Victor E. Gonda at the Parkway Sanitarium just prior to January 20, 1940, using a machine built in Genoa, Italy. Gonda's son, Thomas A. Gonda, wrote to Pulver (1961): "In midsummer, 1939, Dad was in communication with Cerletti, and in November of that year he received delivery of an Italian machine. . . . For the first 2 months Dad did not begin treatments, while in his cautious and methodological manner he tested out the apparatus (on experimental animals, producing convulsions). I recall vividly also, just before Christmas of 1939, his placing the electrodes on his own thigh, experiencing a violent contraction of his muscles and injuring his leg which hit the table. Subsequently, he was concerned about the possible pain patients might experience were they not immediately rendered unconscious. This delayed giving of the first treatment until late January of 1940 at the Parkway Sanitarium in Chicago."

In Victor Gonda's first published paper on electroshock therapy he notes: "Since March 1940, I have treated 40 patients with a total of 612 electrically induced convulsions" (Gonda, 1941). While Gonda never claimed priority, and because Gonda's first ECT publication refers to March, 1940, Renato J. Almansi claims priority in the USA for the first ECT that Dr. David J. Impastato and he administered on February 6, 1940 (Personal Communication, December 6, 1986 and December 26, 1986). We should also note that Douglas Goldman, as superintendent at Longview Hospital in Cincinnati, demonstrated electroshock to psychiatrists attending the May, 1940 meetings of the American Psychiatric Association. Assessing these threads, we can agree that the first administration of ECT in

strated some anxiety reduction and improvement in affect. This injection method lapsed because it was ineffective.

Kalinowsky (1986) recently recalled: "Lately, the use of ECT has increased considerably and, at the same time, clinical evaluation as well as studies regarding the mode of action have become more extensive . . ." "The antipsychiatry movement also contributed to an increase of studies on ECT. Criticism that we are still treating psychiatric disorders of which we do not know the causes with treatments whose mechanism we do not understand led to greater efforts to increase our knowledge. It is more and more realized that convulsive therapy is, in its clinical efficacy, one of the most predictable treatments in medicine" (Kalinowsky, 1986). Antidepressant drugs and other psychopharmacological medications have not, at present, replaced electroconvulsive therapy in the treatment of depressive illnesses. "Electroshock therapy, in fact, is still the most efficient, efficacious, and quick treatment available and, in some cases, the only one capable of controlling the patient's condition" (Catalano-Nobili and Cerquetelli, 1972). The controversy about ECT is fueled by "the nature of the treatment itself, its history of abuse, unfavourable media presentation, compelling testimony of former patients, special attention by the legal system, uneven distribution of ECT use among practitioners and facilities and uneven access by patients" (Consensus Conference, 1985). In effect, a half-century after its inception in 1938, ECT is still a "hot" and controversial issue whose origins remain an interesting and exciting chapter in the history of treating mental illness.

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We also met with Dr. Renato Almansi, a psychiatrist in New York City who studied in Italy during this period.

Many have read and commented on the initial draft of the chapter on which this article is based: Richard Abrams, Neri Accornero, Renato Almansi, Elisabeth Cole, Kurt Danziger, Morris Eagle, Ray Fancher, Max Fink, Lothar Kalinowsky, Doug McCann, and Emmanuel Persad. We would like to thank them for their helpful suggestions and criticisms, many of which we have taken into account in revising this paper.

In addition we would like to thank James Parker for his bibliographic assistance, and Barbara Thurston Devlin for her secretarial assistance.

I would like to thank the Social Sciences and Humanities Research Council of Canada (SSHRC) which provided me with a leave fellowship, so that I might spend some time in Italy contacting persons and sources relevant to the original electroshock treatment. I would also like to thank SSHRC for a small Research Grant to help in my collection of bibliographic and archival material related to the history of ECT. The final draft of this paper was completed while the author held a Killam Research Fellowship from the Canada Council.

An expanded and modified version of this article will appear as Chapter I in Endler, N. S. and Persad, E. (Eds.): *Electroconvulsive Therapy: The Myths and the Realities*. Hans Huber Publishers, Inc, Toronto, 1988.

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1. GENERAL ASPECTS

1. Medical and graduate education in behavioral medicine and the evolution of health care - White N.F. - Behavioural Medicine Clinic, McMaster University Faculty of Health Sciences HSC-3G20, Hamilton, ON L8N 3Z5 CAN - *ANN. BEHAV. MED.* 1988 10/1 (23-29)

This article reviews the conceptual evolution of modern health care, and the implications of this evolution for the future directions in education and training in behavioral medicine. It is suggested that the characteristics of behavioral medicine correspond closely to the main features of what, in a Kuhnian sense, is a new health care paradigm. These include a revised model of morbidity, a central role of the behavioral and social sciences in health care, and an ecological/interactional view of causality. They differ from the tripartite linear causal biomedical disease model, which revolves around both real lesions and hypothetical psychopathology. A socio-ecological model of morbidity, distinguishing between the disease process and the illness state, and regarding all types of morbidity as emergent properties of human ecosystems will have profound effect on health practice, planning, research, and teaching. Behavioral medicine's collaboration with, or inclusion in, the health care system will depend on how it manages the transition to the next set of conceptual models. This will call for some counterintuitive development strategies, one of which is the deliberate preparation of students to promote, rather than simply to survive in, this transformation process. Thus, behavioral medicine training programs will have to emphasize the conceptual basis of health care strategies, the conceptual/structural evolution of the health care system, and the collaboration of different but complementary approaches to health care and research.

2. Psychiatrists and mental health in philately - Van Alphen P.J.M. - Department of Psychiatry, General Hospital, 6131 BK Sittard NLD - *ACTA PSYCHIATR. SCAND.* 1988 77/2 (225-227)

Can it be said that history's most outstanding psychiatrists and the various interrelated fields of mental health are to any extent realistically represented within the framework of thematic philately? With regard to the latter theme, five main categories can be distinguished: the mentally handicapped; psychiatric institutions, founders, nursing staff, etc.; prevention of alcohol and drug abuse; congresses and, finally, famous psychiatric patients. This article is a summary based on the brochure of the same name (32 pages in colour) published by CIBA-GEIGY B.V., Arnhem, The Netherlands.

3. The psychology of personal information management - Lansdale M. - Department of Human Sciences, University of Technology, Loughborough GBR - *APPL. ERGON.* 1988 19/1 (55-66)

A requirement of 'The Office of the Future' is that it provides us with an effective way of storing and retrieving information. But existing IT products go nowhere near supporting the variety of activities which can be observed in paper-based offices, and it is not surprising that concepts of the 'paperless office' are as far off as they were when the idea was first mooted. This paper illustrates how many of the issues involved in the automation of information management are essentially psychological in nature. These principally devolve upon the processes of recall, recognition and categorisation. Examples of existing information management techniques show how there is a trend to automate with a view to simulating office practices, or to develop according to

the availability of technological solutions. Both of these are inefficient with respect to the user's psychological needs. A framework for developing user-oriented information management systems is discussed and relevant research issues presented.

4. DSM-III axis IV revisited - Rey J.M., Stewart G.W., Plapp J.M. et al. - Rivendell Adolescent Unit, Royal Prince Alfred Hospital, Concord, NSW 2138 AUS - *AM. J. PSYCHIATRY* 1988 145/3 (286-292)

Clinicians have traditionally inquired about stressful life events preceding the onset of a psychiatric disorder. Axis IV of DMS-III attempted to improve on this by suggesting that a wide range of events be considered and that the information obtained be integrated into a global rating of severity. After reviewing recent evidence, the authors suggest that this process might result in ratings with lower reliability than expected. They also discuss some of the methodological difficulties in this field and explore directions for further research.

5. Functional abdominal pain, psychiatric illness, and life events - Creed F., Craig T. and Farmer R. - Department of Psychiatry, University of Manchester, Manchester GBR - *GUT* 1988 29/2 (235-242)

Patients undergoing appendicectomy, attending a gastroenterology clinic or admitted to hospital after self-poisoning have been examined using the same reliable measures to establish whether life events and psychiatric illness preceded abdominal pain. Life events involving threat were experienced more commonly by those with organic and functional abdominal illness, compared with community comparison subjects. The greatest difference was with severe events, especially those involving the break-up of close relationships, which preceded the development of functional abdominal pain as often as they occurred before self-poisoning, and significantly more frequently than before the onset of organic gastrointestinal illness. Abdominal pain of recent onset, for which no organic cause is found, is often preceded by environmental stress, whether it presents to the surgeon or the physician. Those presenting in the clinic were older than those undergoing appendicectomy and had experienced more long lasting interpersonal difficulties. Many had psychiatric illness, but for the remainder the stress might either have caused colonic pain directly or led to consultation for abdominal pains that had not previously presented to a gastroenterologist.

6. Defining rational prescribing of psychoactive drugs - Sellers E.M. - Department of Pharmacology and Medicine, Faculty of Medicine, University of Toronto, Toronto, Ont. M5S 2S1 CAN - *BR. J. ADDICT.* 1988 83/1 (31-34)

A universal or simple definition of rational prescribing does not exist since what is rational or reasonable is determined by many factors and can be interpreted in various ways. However, a transcultural definition can be achieved when the components of the process are identified. Rational prescribing is operationally described in this paper by a systems approach involving the individual physician and the health care system.

7. An eyewitness account of the discovery of electroshock - Accornero F. - Department of Nervous and Mental Diseases, University of Rome, Rome ITA - *CONVULSIVE THER.* 1988 4/1 (40-49)

The author was one of the pupils of U. Cerletti and his assistant for almost 20 years. He worked with his master in the discovery of electroshock and in its first application in man in 1938. The author has thought it useful to