This seems a little thin; the differences in response to anxiety could well affect what is made of the results of these thought processes, given the need for extensive development of the ideas following this stage, but need not necessarily imply a major difference in the actual processes.

The principal evidence for a concrete distinction lies in a word-association study Rothenberg conducted with a group of 12 Nobel laureates, using a control group of 18 psychiatric in-patients with a wide range of diagnoses. Since only three of the latter had a history of psychosis, his report that the experiment

> "sharply distinguished between mental illness and tendencies to creative thinking through the Janusian process"

seems a shade optimistic.

Rothenberg interprets his title very loosely. He starts by discussing the thought processes involved with the creative process, and the mystique that has grown up around creativity; this is followed by a look at poetry produced by schizophrenic patients; and that by a section on self-destruction and self-creation. He takes a close look at the specific instances of August Strindberg, Emily Dickinson, Sylvia Plath, and Eugene O'Neill; discusses the links between creativity and both alcoholism and homosexuality; puts forward his views on creativity and mental illness; and finally assesses the implications of psychoanalysis of creative people. Sadly, these various threads are not drawn together as well as they could be. Some of the chapters have been published previously in other forms, and show signs of inadequate adaptation. The chapter on Dickinson, for example, reads largely as a review of J. Cody's study of the poet (*After Great Pain: The Inner Life of Emily Dickinson*, Belknap Press, 1971), and would have benefited from an analysis directed more at her life and work and less at trading points with Cody.

Creativity and Madness raises many fascinating questions relating to both creativity and mental illness, and is an easily digestible and thought-provoking read. There is still a long way to go before these issues are fully understood, but Rothenberg has taken us a few steps further down the path.

MAN AND MACHINE

Eric Crouch

Medical Technology and Society: An Interdisciplinary Perspective is published by the MIT Press, Cambridge, Massachusetts (£15.95 (pb), £26.95 (hb), 571 pp., 1990). Its publication is sponsored by the Alfred P. Sloan Foundation as part of a New Liberal Arts Program for undergraduates. The authors, Joseph D. Bronzino, Vincent H. Smith and Maurice L. Wade, are university teachers–Bronzino and Wade at Trinity College, Hartford Connecticut, and Vincent Smith is Professor at Montana State University.

WHEN MY DAUGHTER Matilda was born seven weeks prematurely in 1978 she was transferred straight away to an incubator in a special-care baby unit. A brief period of apnoea led to multiple investigations, including arterial blood sampling and a lumbar puncture. Because she was unable to suck, a nasogastric tube was installed and instead of the breast, she experienced the plastic syringe. Eighty years earlier her great-grandmother, also Matilda and also premature, was wrapped in cotton wool and fed through a quill. Did the younger Matilda benefit from her early exposure to medical technology or did her great-grandmother get a better deal from the close contact with her mother, who nursed her with such care?

Certainly the baby down the aisle in the special-care baby unit, a boy born at 24 weeks, benefited from the available medical technology. Or did he? Without it he would not have survived. But what was the likely quality of his survival? Would he grow up a normal individual, or would such early prematurity leave him permanently damaged? In any case, how should we decide, firstly about the ethics of providing or withholding such a lifesaving form of care, and secondly whether we can afford the resources necessary to provide that level of care to the individual?

As we know, these are modern dilemmas. The authors of this book suggest that the discovery of X-rays in 1895 by Röntgen dates the start of the modern age in medicine, but that only in the last 50 years have medical technology and modern therapeutics begun to take hold. This is exemplified by the introduction of the heart-lung bypass machine in 1939 and of penicillin in the 1940s. The introduction of computerisation in the 1970s was a further step and brings us to where we are today.

Of course the introduction of medical technology parallels the general development of technology in modern societies. We seem to react to new technology by fairly quickly taking it for granted (after the initial phase of bafflement) and, as consumers of health care, we begin to take it for granted that there will be an available technological solution to each health problem. This ranges from the common assumption that there will be a test or X-ray to give a definite cause for every ache or pain to the almost routine acceptance that there will be a machine to take over failing functions or an operation to mend or replace a failing organ.

At the same time, technologically sophisticated devices have become the modern equivalent of wizardry. The black-box works a magic spell to give the answer needed or mysteriously sustains life when we had seen it ebbing away. On the whole the readers of this review will know how these devices work, but the majority of even our well educated patients may not.

Does this in fact matter? The answer is that it does. The dilemmas

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faced in the special-care baby unit are the dilemmas of all high-technology medicine and they should not be faced by the high priests of medical technology alone. It is surely an issue for society at large to judge whether the benefits conferred by medical technology justify the costs incurred and to judge how the ethical dilemmas should be resolved.

> "Some have become sufficiently impressed with modern medicine's capabilities to argue that the old medical ethic, 'Above all, do no harm,' should be replaced by 'The patient deserves the best'."

This American book seems dedicated to this view. It is written as a textbook for liberal arts students and is therefore, I assume, aimed at getting the educated American-in-the-street to be able to participate in the debate about medical care. It begins with a brief account of the evolution of the modern (American) health-care system. Then there is a chapter on the economics of health care that takes in a wide range of issues such as cost escalation in an insurance-based system and the effect on costs of the Medicare and Medicaid programmes. This chapter includes a brief account of some of the mathematical aspects of health economics.

> "economists have long argued . . . that only commodities whose benefits exceed their costs should be provided and that this principle applies no more or less to health care technologies than to any other commodity."

The next chapter is entitled "The ethics of medical technology", but is in fact a potted introduction to ethical principles and how they can be applied to medical issues. The authors discuss issues surrounding the definition of death and the morality of euthanasia. They make use of recent cases that may be known to the readers because of coverage in the news media, to illustrate dilemmas such as the autonomy of individuals in relation to their own death. Other issues such as the sale of donor organs and the allocation of scarce medical resources are also covered.

The book goes on to deal in separate chapters with particular important medical technologies – cardiac technology, critical-care medicine, computers in health care, and medical imaging. In each of these chapters the reader is shown how the technological devices work; then the authors use the particular technology to illustrate further economic and ethical issues. For example, the development of the artificial heart is used to take a look at the ethics of medical research. The question is also raised whether the use of the artificial heart in human subjects is research or not. The authors conclude that it is not, and that it is unjustified use of non-validated treatment, and that the consent obtained from the few subjects who have had artificial hearts implanted was in fact unsound. There is surprisingly sharp criticism of individual doctors involved in this work.

The last chapter, somewhat in summary, raises a number of major social and ethical issues relating to modern medical technology. Why is it that the majority of medical resources are devoted to acute-care 'rescue medicine', whereas preventive medicine is poorly resourced? Largely, it is suggested, because we can identify individual people helped by rescue medicine, but those saved by preventive medicine are only identified as anonymous figures. But also because we like to be free to make unwise choices about lifestyle knowing that we may be 'rescued' from the effects of these choices by medical technology.

Another question concerns whether it is appropriate to spend so much on 'halfway' technology, that is devices which support function rather than repairing the basic defects that cause illness? The argument here is that efforts should be directed at basic research to find definitive cures. However, this is seen as a flawed argument as, very often, partial solutions to medical problems point the way towards more fundamental cures. Curiously this section omits any discussion of the duty to relieve suffering. As we know, the relief of suffering is one of the major benefits of technological medicine – for example the relief of cardiac symptoms by coronary bypass surgery.

Is there a connection between medical technology and the notion that "many patients feel alienated and dehumanised by contemporary medical care"? The focus on specific disease rather than the whole person, the increase in medical specialisation (again leading the focus away from the whole person), the greater detachment and impersonality of the scientific physician, the mechanistic view of the body inherent in scientific medicine, and the willingness of medics to use 'aggressive' forms of treatment are all seen as factors in the 'dehumanisation' of medicine, yet they are the same factors that lead to the success of scientific medicine.

Lastly, how can we justify the fact that access to medical technologies is far from equitable? This is seen as a failure of American society, in which there is, generally speaking, a commitment to equality of opportunity. Of course this is very much an issue within our own society and for other Western societies, with the further dimension that there are societies where technological medicine for the few coexists with poverty for the many.

The book fulfils three basic aims. It shows readers how medical technology works, it helps them evaluate how its costs match up to its benefits, and it helps them clarify the moral and ethical issues surrounding its use. If it is a feature of American liberal arts education that the citizen becomes thus empowered to participate in the health-care debate, then this is to be applauded. I wonder if these issues would be treated in such depth anywhere in the British educational system in which the pattern of specialisation can still, it seems to me, produce educated people who know little of science and technology.

As a postscript, the chapter on ethics drew my attention to a curiosity of the English language, the lack of a gender-neutral third-person singular personal pronoun. Conventionally, 'his' is shorthand for 'his or hers', but is there any reason why 'hers' should not be used instead? I thought that the author of this chapter had indeed made this substitution until I came across "his patient" (referring to a physician). I then realised that, in this author's eyes, a physician is "he", but a health-care worker or a patient is "she". Perhaps the liberal arts students he teaches would see this also as a valid issue for debate?

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