GERONTECHNOLOGY

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Growing Old in a Technological Society

Edited by

GARI LESNOFF-CARAVAGLIA, PH.D.

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PREFACE

Awareness of the potential role of technology to extend the independence of older adults has grown significantly in the past decades. As two critical trends converge–the global aging of the older population and the rapid acceleration of technological development–they will have a marked effect upon all spheres of human experiencing. The presence of an increasingly older population calls for a reevaluation of the meaning of life, death, and the quality and nature of human experience. Aging does not occur in isolation but is a reflection of societal attitudes and resulting practical outcomes. Such practical responses are principally the purview of engineering, technology, and the biomedical sciences. The societal attitudes represent the ethical, philosophical, and social bases of the culture. Together they provide the inevitable link between the fields of gerontology and technology: Gerontechnology.

Gerontechnology, as an expression of the practical and the theoretical, forces an examination of the contemporary world, its immediate needs, and future trends. For gerontologists this has meant a conscious assessment of the role of technology in the ameliorating, prolonging, and concluding of human life. For engineers and developers of technologies, the presence of increasing numbers of persons over the age of 65 has forged a new vision of the role of technology in the practical pursuit of healthy and rewarding long life.

The six sections of the book detail this relationship. The first two chapters of Part I describe the multifaceted convergence of technology and aging, as well as the problems and challenges it presents. Part II serves as an introduction to both gerontologists and engineers to the nature of the aging process and potential areas of technological intervention. These four chapters cover the age-related changes due to disease or senescence inherent in human aging and outline specific health issues. The effects of lifestyle and the environment upon gerontechnology are given particular attention.

Part III addresses the problems and processes of invention, particularly ergonomics, which lead to the development of technologies specifically designed for the enhancement of the lives of the older population. The chapter on interventions and modifications of the environment has particular significance for the altering of the human environment in ways that can complement and enrich the experience of growing older.

Major factors in successful aging are the special senses, specifically vision and hearing. Part IV explores the range of sensory interventions currently available, as well as describing those that hold promise for future older populations. Chapters in Part IV explore problematic issues and innovative methods for their resolution.

Part V focuses on automation through the employment of robots and advanced forms of transportation. The utilization of robots to increase the independence of older persons is the subject of Chapter 11; while in Chapter 12, personal mobility, as well as technological assistive mobility devices are given attention. Issues of transportation are discussed from the perspectives of their effects upon lifestyle and well-being. Both chapters delineate areas of future research efforts.

In the closing section, Part VI, Chapter 13 is devoted to discussion of information processing communication, an essential ingredient in the growth and direction of Gerontechnology. The final chapter examines the effects of the constant and continuing interplay between technology and aging. It also analyzes human experience from the perspective of the extraordinary framework for living provided by the growth of an aging population and the advanced technologies which have led to the conceptualization of *Gerontechnology.*

The prevalent belief is that all aspects of human life should be open to their potential realization by all persons, regardless of age. Consequently, age, in and of itself, is not a condition for determining the breadth or scope of life experience. Thus, Gerontechnology may be viewed as directly providing new life and new opportunities to those reaching advanced ages–the herald of a new age for all men and women.

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Gari Lesnoff-Caravaglia, Ph.D.

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GERONTECHNOLOGY

PART I

Chapter 1

GERONTECHNOLOGY: THE LINKING OF GERONTOLOGY AND TECHNOLOGY

GARI LESNOFF-CARAVAGLIA

INTRODUCTION

The application of technology to gerontology is not simply the enlisting of current methods to alleviate existing problems. The response must be a revolutionary conceptual view that takes into account the fact that the coupling of an aging population with the advances of science and technology herald a new frontier.

The designing and marketing of new technologies and assistive devices to enhance the independence of the elderly is, in itself, a radical departure from the long-held position of regarding the elderly as a group that would not be the major target for expensive medical, engineering, environmental, or lifestyle interventions. The old were to continue to grow old and to gradually die. Intervention was not regarded as critical. The illnesses of old age were of natural causation and were to take their course. This stance is well illustrated by the overworked statement: What do you expect at your age? To decline was natural, to experience sensory loss was unavoidable, and to become increasingly dependent upon family and society was an unfortunate inevitability.

The view that older persons could and preferred to remain active and productive, and would actively seek health counsel and aid in order to become advocates on their own behalf, has caught the world by surprise. It appears that a futuristic prediction has come true. Many such futuristic predictions, however, did not take into account an increasingly older and healthier population that would alter the nature of aging.

The future has traditionally always belonged to the young. That societies should concern themselves in creating a future for the old is unprecedented, not only in thought, but is a reversal of the entire Western tradition which is built upon a youthful future-time orientation.

The linkage of gerontology, the multidisciplinary scientific study of aging, with technology has led to a new focus within education and research: Gerontechnology. The current demographic and technological explosion is closely linked to scientific information on the aging process. The quality of health care, housing, the environment, employment, transportation, information services, and recreational activities will continue to be heavily influenced by scientific and technological advances. Many of these developments have already demonstrated a potential to enhance the quality of life of older persons, but the application of scientific findings to the development of specific technological products is yet largely unexplored and underdeveloped.

Health

Health is a major determinant of well-being. Delivery of health services, technological advances in biomedical research and engineering, and advances in understanding the importance of nutrition in the later years have each contributed to the increasing longevity of men and women. As people live longer, the quality of life becomes a pressing issue. Technological innovations must not simply delay death but must facilitate daily activities and the enjoyment of life (Bang, Bien, & Stefanov, 2004). Areas of concern that call for continued attention include advances that allow individuals with arthritis, vision and hearing loss, cardiovascular disease, or amputations to remain in the community in an independent and productive capacity.

Home Health Care

There is a growing and persistent interest on the part of the elderly in maintaining control over their lives and in selecting lifestyles built upon personal choice. Further, expectations have increased with respect to the number and types of technological interventions that people are willing to have introduced into their homes (Hughes, 2004). While lower health care costs can be one deciding factor in favor of such

home health care interventions, what is equally significant is the fact that older individuals increasingly balk at admission to health care facilities such as hospitals and nursing homes which deprive them of personal control.

While the experience of a life long lived alters older individuals' needs and wishes, their increasing sophistication and knowledge of their own health status and the health care system convinces them that most traditional health care settings are inappropriate. The changes in health care alternatives over which societies slowly and painfully deliberate, have led older individuals to opt for systems based on personal choice. As the educational level, political acumen, and economic status of the elderly continue to rise, the demand by the elderly for health care within the home setting or within the community also rises. At the same time, their conventional fear of authority figures such as doctors, lawyers, bureaucrats, and overbearing adult children has diminished. For many, appropriate health care and the home environment have become synonymous.

Housing and Environment

Housing and the larger environment constitute critical determinants of the lifestyle of an older person. Many individuals perceive their visual world with less clarity while others have difficulty with mobility when climbing stairs, rising out of chairs or tubs, reaching for objects, or carrying out many routine, but important tasks. Often these changes are due to irreversible physiological processes, but the environment may either exaggerate or minimize the functional limitations commonly associated with old age (National Research Council, 2003).

An important component of adapting environments to older persons is the implementation of technological innovations. Bathroom devices increase safety, while kitchen modifications may encourage preparation of food and ultimately better nutrition. Large print may allow more communication with the outside world, and clearly demarcated steps and curbs may promote a greater willingness to venture beyond the confines of one's home. Transportation systems encourage access to the larger community and support continuation of a network of social relations. A supportive environment which removes or minimizes barriers allows older persons to live with greater independence, security, and dignity ("Rocket Science," 2004).

Employment

Employment of older workers will become increasingly frequent as the work force itself ages. Technological innovations designed for older employees not only increase productivity and safety in the workplace but also provide the community with valuable resources. Whether older people work full-time or part-time at a new or continued career, they represent a potentially significant consumer group. Older workers can benefit from technological advancements both by their meaningful involvement in the work-force and by their capacity to consume products and services.

Learning and Recreation

Learning is often defined as comprising four categories of skill: surviving (learning for economic sufficiency); coping (learning for practical life skills); giving (learning for community contribution), and growing (learning as part of life span development). Recreation, in many respects, is an important aspect of personal growth and frequently involves an investment in both innovative products as well as services, such as those offered through travel or continuing education. Technological innovations designed to advance learning are sophisticated and readily available. However, the needs of the older learner must remain a central focus in the design and development of such products.

In general, the role of technology will become increasingly important in the lives of older persons. Research efforts must be broadened to examine the needs of the well elderly in addition to those who suffer from impairments (Lesnoff-Caravaglia, 1999). Underlying the development of new products and services is the opportunity to facilitate and to enrich life in the later years and to promote the interactions between two major revolutions ongoing in the United States and the world at large: the aging of the population and the advancement of technology. The four basic concerns of older persons encompass: health care, housing and the environment, employment, and recreational and educational opportunities.

Global Aging

At the initiation of the twenty-first century, it became quite clear that one of the major and preeminent worldwide phenomena was that of