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Autumn 1958

Artificial Limbs

*A Review of
Current Developments*

PROSTHETICS RESEARCH BOARD

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Artificial Limbs

VOLUME 5, 1958

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2101 Constitution Ave. Washington 25, D. C.

Artificial Limbs is a publication of the Prosthetics Research Board, National Academy of Sciences—National Research Council, issued twice a year, in the spring and in the autumn, in partial fulfillment of Veterans Administration Contract VAm-21223, Office of Vocational Rehabilitation Contract SAV-1-58, and National Institutes of Health Grant RG-5057. Copyright 1961 by the National Academy of Sciences—National Research Council. Quoting and reprinting are freely permitted, providing appropriate credit is given. The opinions expressed by contributors are their own and are not necessarily those of the Prosthetics Research Board. Library of Congress Catalog Card No. 55-7710.

Editorial Board: Eugene F. Murphy, Prosthetic and Sensory Aids Service, Veterans Administration, New York City; Herbert Eftman, College of Physicians and Surgeons, Columbia University, New York City.

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P R O S T H E T I C S R E S E A R C H B O A R D

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The NYU Field Studies—A Postscript

EUGENE F. MURPHY, Ph.D.¹

Well, one of the two (who will soon be here)—
But *which* of the two it is not quite clear—
Is the Royal Prince you married!
Search in and out and round about
And you'll discover never
A tale so free from every doubt—
All probable, possible shadow of doubt—
All possible doubt whatever!

—*W. S. Gilbert, 1889*

IN PREPARING a report on extensive research, a modern investigator faces the same problems as the Grand Inquisitor. He may be able to furnish explicit answers to all the minor questions and to delimit the possible solutions of major problems. Only in fortunate circumstances can he provide final answers to all the questions originally posed.

This, the second of two issues of *ARTIFICIAL LIMBS* to be devoted to the NYU Field Studies of 1953–55 (see issue for Spring 1958), offers a wealth of censuslike information on fascinating problems revealed in the course of studying extraordinarily large samples of upper-extremity amputees and their prostheses. It answers with overwhelming affirmation a critical and highly pertinent question: *Do* modern concepts of upper-extremity prosthetics truly represent substantial improvement over previous practices? But this favorable broad conclusion demands by virtue of its own importance respect for certain essential qualifications more or less obvious from the circumstances of study if not from the nature of the study itself.

Largely because the samples in the NYU Field Studies included such high percentages of veterans of World War II and Korea, many of the amputees treated had already received organized care and training in military amputation centers. Moreover, many had already reaped some early benefits of the Artificial Limb Program. New and supposedly improved devices and techniques had already been developed and applied progressively over a period of half a dozen years, and the U. S. Veterans Administration was already operating Orthopedic and Prosthetic Appliance Clinic Teams in some 30 key cities. Though at the time members of these clinic teams were concerned largely

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with the suction-socket program and with lower-extremity problems generally, they were so stimulated by the special courses at UCLA, and so encouraged by the monthly visits of NYU field representatives, as to tackle problems in upper-extremity prosthetics and to expand their perspective from simple application of mechanical gadgets to genuine concern for all aspects of the resulting man-machine system. And consequently the results here given are clearly weighted by disproportionate inclusion of the comparatively young and otherwise healthy adult male with special advantages not ordinarily then to be had by the amputee population at large.

The nature of the subject matter is something else again. In any investigation so intimately associated with the individual proclivities of human beings, and particularly one of the magnitude indicated, the variables to be controlled are many and diverse, and the data to be had are especially voluminous. Although census counts may provide clues to major influences, and although modern electronic computers may furnish effective correlations and satisfying proof of statistical significance, prosthetics problems in clinical practice are not apt thus to be fully solved because, as in polio, cancer, and numerous other kinds of human disorder, there is generally no single "necessary and sufficient condition" but instead a rather large number of interrelated factors which, added or subtracted in proportions variously weighted, may easily tip the balance for or against clinical usefulness and research success. Thus effective application of the present findings calls for the exercise of keen discrimination over and above that required by the limitations of the sample studied.

Despite the existing correlations, therefore, the NYU Field Studies leave unsolved, or at best still subject to serious debate, some disquieting major questions. Why, for example, did a few amputees prefer their old arms over the newer ones? How well did the new prostheses pass the comfort aspects of the checkout tests required? Are the checkout standards adequate? Were complaints about terminal devices heavily correlated with mechanical failure? Of many such puzzlers, some might be resolved by further analysis and correlation of the mountainous data now embalmed in the form of 29 punched cards for each of several hundred amputees. Others indicate the need for further research in the social sciences, while still others constitute a continuing challenge for designers of devices, developers of techniques, and sponsors of research.

Perhaps even more fascinating than the yet unsolved questions of physical and mechanical significance are the hints at the nature of amputee psychology. Still needed are thoughtful studies of the problems of realistic acceptance of amputation losses, of objective appraisal of the possibilities for rehabilitation, of the influence of amputee expectations on success in restoration, and of the potentialities for improvement through counseling and guidance both for the patient and for the public as regards attitudes toward what is still called