

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

**AN EXPLORATORY EVALUATION OF
PSYCHOLOGICAL FACTORS IN THE REJECTION
OF UPPER LIMB PROSTHESES**

STEPHEN FRANCIS BURROUGH
1983

AN EXPLORATORY EVALUATION OF
PSYCHOLOGICAL FACTORS IN THE
REJECTION OF UPPER LIMB PROSTHESES

A thesis presented in partial
fulfilment of the requirements for the degree
of Master of Science
in Psychology at
Massey University.

Stephen Francis Burrough

1983

ABSTRACT

This study investigated the reactions of arm amputees to their prostheses and explored possible reasons for these reactions.

A questionnaire was constructed to determine the use to which the recipients put their prostheses. A preliminary validation study was conducted to determine the final form of the questionnaire. Rather than selecting a sample of prosthesis recipients, a census of the recipient population was attempted with 48.57 per cent responding.

Respondents were asked questions measuring their use of the prosthesis, the nature of their prosthesis, the rehabilitation services they had used, and various demographic variables including age, sex, occupation and so on.

It was found that up to 55.9% of the respondents could be classified as low-users of their prosthesis. A regression analysis showed that 44 per cent of the variance in the use of the prosthesis was due to the two variables of prosthesis type and prosthesis length. No other variables explained significant amounts of the variance.

A lower-user and a high-user were selected to pilot a further study examining psychological factors that may affect prosthesis use. The areas examined were those of training, perceptions of independence and stigma, and perceptions of the prosthesis. A number of modifications were made to the original questions as a result of the pilot study.

The results of the pilot study indicated that the areas of training and expectations of the prosthesis' capabilities prior to receiving it would be most likely

to prove useful in explaining different levels of prosthesis use.

Some issues relating to possible future research, interventions, and the rehabilitation process were also discussed.

ACKNOWLEDGEMENTS

I would like to acknowledge my Supervisor, Judith Brook, for her guidance, perseverance and constructive evaluation of my work throughout the course of this study.

My sincere thanks to the staff of the Rehabilitation Unit at the Palmerston North Hospital and the Artificial Limb Centre in Wellington for the support they have given to this study. Most importantly to the prosthesis recipients who gracefully participated in the study.

A final word of thanks to the typist for her help in making this a readable thesis.

TABLE OF CONTENTS

	<u>Page</u>
ABSTRACT	ii
ACKNOWLEDGEMENTS	iv
Chapter 1. INTRODUCTION	1
Chapter 2. LITERATURE REVIEW	10
- Prior research	11
- Training	13
- Perceptions of Independence and Stigma	17
- Perceptions of the prosthesis	23
Chapter 3. THE QUESTIONNAIRE	28
- Introduction	29
- Questionnaire Development	32
- Introduction	32
- Method	34
- Results	37
- Discussion	42
Chapter 4. THE INTERVIEW	
- Introduction	47
- Research Interviews	47
- Interview Content	49
- Training	49
- Perceptions of Independence and Stigma	51
- Perceptions of the prosthesis	53
Chapter 5. METHODS	
- Questionnaire Administration	57
- Subjects	57
- Apparatus	58
- Procedure	58
- Analysis	59
- Interview Administration	61
- Subjects	61
- Procedure	61

	<u>Page</u>
Chapter 6. QUESTIONNAIRE RESULTS AND DISCUSSION	63
- Results	64
- Discussion	70
Chapter 7. INTERVIEW: PILOT STUDY	73
- Results	
- Case I	74
- Case II	77
- Discussion	80
- Training	80
- Perceptions of the prosthesis	82
- Perceptions of Independence and Stigma	84
- Modified Interview	88
Chapter 8. GENERAL DISCUSSION.	89
- Summary of Findings	90
- Application of Findings	90
- Possible Interventions	91
- Types of prostheses	91
- Education	92
- Rehabilitation Processes	93
- Future Developments	94
- Target population	94
- One handedness	95
Chapter 9. CONCLUSIONS	96
APPENDICES	99
BIBLIOGRAPHY	137

LIST OF TABLES

		<u>Page</u>
Table 1.	Professions of expert judges in validation sample.	34
Table 2.	Judges ratings for all questions on three point scale of Important, Useful, Irrelevant.	38
Table 3:	C.V.R. score for all questions. Using 'Important' rating.	38
Table 4:	Ratings by judges of activities and ranking of each activity.	39
Table 5:	Ratings by judges of places prosthesis worn and rank scores for each place.	41
Table 6:	Choice of judges between Questions 1 and 2.	42
Table 7:	Independence and help needed when wearing the prosthesis as against when not wearing it for low and high users.	52
Table 8:	Types of prostheses worn by respondents.	66
Table 9:	Length of prostheses worn by respondents.	66
Table 10:	Type of terminal units used by respondents.	67
Table 11:	Scores achieved on 'Level of Use' variable.	68
Table 12:	Selected statistics from regression analysis.	69

LIST OF APPENDICES

	<u>Page</u>
Appendix A: Glossary	99
Appendix B: Questionnaire Validation	103
Appendix C: Questionnaire Information	109
Appendix D: Interview Questions	116
Appendix E: Preliminary Report	122

CHAPTER 1. INTRODUCTION

In order to introduce the concepts and ideas that this Study will be examining, it would be useful to focus attention for a moment on the situation of a young Siamang ape named Sai Buri.

Sai unfortunately had had her arm chewed off by her father. This left her in the predicament of having to live with a severe disability. This was particularly serious in her case because her species' usual mode of transport is by swinging from tree to tree. A unique solution to this problem was attempted when Sai was fitted with a prosthesis, having a hook attachment, to enable her to swing again. Sadly Sai's reaction was somewhat less than total acceptance, ranging from vigorous attempts at removing it to at best, ignoring its presence altogether.

As with Sai there are many individuals who are faced with a disability through a limb deficiency (due to some congenital problem) or having lost a limb (through trauma or surgery). The common practice in rehabilitation is to fit these people with prostheses called artificial limbs. These prostheses range from simple cosmetic attachments through mechanically powered units to complex myoelectric units, the purpose of which is to in some way compensate for the limb deficiency.

Many questions can be asked as to what style or type of prosthesis is most suitable in a given situation. However with the wide range of options and technical expertise available it is more important to start asking the question of how recipients react to their prostheses; questions such as the actual levels of use of the prosthesis, the perceptions of the individual towards their prosthesis, the reactions of other people, and skill levels achieved in the use of the prosthesis. These could be key factors affecting the use of prostheses.

The Thesis will be addressing itself to these questions, with specific reference to the New Zealand

situation. The emphasis of the study will not be a simple examination of how recipients feel towards the prosthesis. It will take the approach of asking, "Are there recipients who, like Sai the ape, have upon receiving a prosthesis tended to reject or ignore it?" Attempts will then be made to ascertain what psychological factors have influenced or caused this reaction. This approach could facilitate the development of rehabilitation approaches to remedy the problem.

Within the realms of limb deficiencies and prostheses this Study will limit itself to the area of upper limb deficiencies. Throughout the study, unless specifically stated otherwise, all references to prostheses or limb deficiencies will be within the framework of arm prostheses and deficiencies.

Restricting the study in this way is a logical approach as the nature of upper and lower limb prostheses are essentially different. Firstly, the lower limb prosthesis can more completely duplicate the basic function of a leg than an upper limb prosthesis can of an arm. This is due to the complex manipulative and grasping functions of a hand. Secondly, the wearing of a lower limb prosthesis can be more completely disguised. Trousers and shoes can completely hide a lower limb prosthesis. The hand of an upper limb prosthesis, while often looking realistic, does not have the continual movement of a natural hand, making it more obvious. These things mean that it is reasonable to assume that the reactions of the recipients of upper limb prostheses will differ substantially from those of lower limb prostheses.

The concern over possible reactions by recipients was first raised during discussions with specific staff members at the Rehabilitation Unit of the Palmerston North Public Hospital. They perceived that patients fitted with prostheses would wear and utilise them while in the supervised environment of the Centre. However,

in the words of one staff member, "They took them off as they went out the door." These perceptions point to the specificity of the problem to upper limb prostheses and indicate that there is a very real problem worthy of investigation.

Prior to discussing the details of the issue it would be useful to examine the services available to the limb deficient person. The main organisation in the southern North Island of New Zealand would be the Artificial Limb Centre attached to the Wellington Hospital. This unit is the main assembly and construction centre for prostheses in New Zealand with fitting centres in Auckland and Christchurch being served by the Wellington workshop.

The usual procedure is for a person requiring a prosthesis to be referred to the Limb Centre by their orthopedic surgeon. Following this a series of visits to the Centre would accommodate the measurement for and fitting of the prosthesis. This procedure would include the training of the recipient in the use of the prosthesis. In some cases, where the necessary services are available, follow up rehabilitation is exercised through a rehabilitation unit attached to a hospital in the person's home district.

In determining the possible psychological factors involved in the reaction of recipients to their prostheses it must, of course, be first shown that a problem exists. It is important to clearly determine known levels of use. Unfortunately there is an extremely limited amount of information available regarding this question. One study, while not centrally concerned with this question, took a measure of the number of recipients who were still using the prosthesis after a given period of time. That study found that with certain types of prostheses there was a marked decrease in use over time (this and other studies are covered more fully in the Literature Review.) This dearth of information has meant that the present study faces a dual difficulty.

The first is the need to establish the nature and extent of the problem; that is, to measure the reactions of recipients to their prostheses, in particular to examine whether 'rejection' of the prosthesis occurs (operationalisation of 'rejection' will be discussed later in the study). This leads into the second concern that because the question of 'rejection' has not been examined appropriate means of measuring it have not been developed. This means that an initial requirement of the study is to develop a criterion for 'rejection' and to operationalise that criterion in the form of usable quantitative measures. This prerequisite must be fulfilled if the question of the factors contributing to the different reactions to prostheses can be examined.

In examining the psychological factors relating to the rejection of prostheses there are a large number of avenues which could be explored. This study will therefore first of all need to establish the areas of interest. An initial consideration suggests that there are three divergent areas that could usefully be examined for their relevance.

The first of these areas is training, the effect of training, or perceptions of adequacy of training, on use. Secondly there is the area loosely called 'body image'. This relates to the recipients' perceptions of themselves, the effect that the prosthesis has on that self image, and the recipients' perceptions of how others see them. The final area is how the recipient views the prosthesis and its function. The nature of this latter perception, especially among recipients whose limb deficiency is due to trauma, and its relation to the role of a natural arm could have major effects on levels of use. (The details of these different possible contributing factors will be expounded both in the Literature Review and at further appropriate points in the Study).

Knowing the general aims that need to be achieved

by the study, the next step is to decide upon a specific design that consistently follows them through. Before fully developing this design there are a number of different factors, beyond those already discussed, that limit the design choice.

The first concern is related to the population of prosthesis recipients. The available population are those recipients who have been serviced directly by the Artificial Limb Centre. Two characteristics of this population are likely to affect the chosen design. The first of these is its size. There are approximately ten recipients of prostheses a year. These small numbers, mostly of amputees, and the low need for followup by the Limb Centre will make the contacting of recipients from earlier years difficult. It also places limitations on the sampling schemes that can be adopted. The other characteristic is the geographical distribution of the population. Because the recipients are scattered over six regions there would be a great time and expenditure cost in physically interviewing them all.

The design used is a form that will circumvent these limiting factors while still maintaining the ability to provide adequate answers to the questions raised for study.

The study is separated into two stages that will deal successively with the dimensions of the problem that have been discussed. The first stage will examine the question of the reactions of recipients to prostheses for the purpose of exploring the possibility of there being a sector of the population who actively 'reject' the prosthesis to some degree. The first step in this will be the development of the concept of rejection. This will particularly involve the exploration of measures of rejection that can be used in a quantitative way. Because of the limiting factors mentioned earlier, direct behavioural measures and interviewing could not be used as data collection methods. The method that seemed the most

practical under the circumstances was a postal questionnaire. This format will therefore be adopted for the first stage.

The content of the questionnaire will, in general terms, be comprised of the following kinds of items; items designed to act as measures of the concept of rejection; items covering the kind of prosthesis that the recipient has been fitted with, and the health services involved in the fitting and rehabilitation processes; items relating to relevant biographical variables.

This questionnaire content will enable a number of things to be achieved. The rejection measures will allow all respondents to be rated on that dimension, thus giving an immediate answer to the questions regarding how recipients are reacting to their prostheses. The measures of types of prostheses, services used, and biographical variables can be compared to the measures of rejection. This will help to determine how much of the variance in reactions can be explained directly by these variables.

Apart from these primary objectives the questionnaire will enable the collection of data on the make up of the recipient population, especially in terms of different groups of people and the kinds of prostheses they use. This kind of data may be of value to services such as the Artificial Limb Centre in the continuing development of their role in assisting Limb deficient people.

The final requirement that the questionnaire will achieve is that it will enable the selection of subjects for the second stage of the Study. The rating of each respondent on the 'rejection' dimension will mean that high scorers on that dimension (high-users) and low scorers on that dimension (low-users) can be selected so that their responses in stage two can be compared with each other.

The second stage in this Study will deal with the

possible psychological factors that may be contributing to the types of reactions that will have been identified in the first stage.

Due to the type of material being explored in this stage the use of a postal questionnaire was rejected. The personal type of responses required may have biased subjects against completing such a questionnaire. Moreover the areas of interest would not lend themselves easily to presentation in such a format. This means that the most appropriate methodology is the interview. Research interviewing allows the respondent the freedom to give full and complex responses that are very useful in the evaluation of psychological factors. Also the fact that only a small proportion of recipients would be involved means that the time and finance involved would not prove prohibitive as was the case with the first stage of the study.

The content of the interviews will of course be related to such things as training in the use of the prosthesis, the perceptions of the recipients of the purpose and nature of the prosthesis, the recipients perceptions of how the prosthesis affects their self-image and how it affects the way that other people act towards them. The questions relating to each of these areas will be structured to allow the individual the maximum possible freedom of response while still ensuring that useable data is obtained.

By interviewing both rejectors and non-rejectors, of prostheses, the differences in response patterns between the two groups can be used to indicate which of the psychological factors are relevant, in explaining reactions of recipients to their prostheses.

Due to the time commitment required in both stages of the proposed research, this report will present only a pilot study used to refine the measures for use in the second stage.

The major academic relevance of these results will be in the provision of indications of the most fruitful direction for future comprehensive research into recipients' reactions to prostheses. There may also be some basis to suggest a generalisation to other specific rehabilitation aids. An immediate practical result will be that the findings may be of use to workers in the helping professions when they are dealing with individuals who seem to be rejecting their prostheses.

In summary it is hoped that this study will be able to demonstrate clearly the nature of the situation that is present among the recipient population; to supply future research with the tools to evaluate other populations of recipients, and to provide some clues as to psychological factors that could be usefully explored in attempts to fully understand the causes of reactions to prostheses. It is also aimed at giving helping professionals some tentative basis for the development of services to assist the rehabilitation of prosthesis recipients.

Furthermore this study should demonstrate that the examination of reactions to rehabilitation aids is a fruitful avenue for applied research, not only to answer academic questions but also to contribute towards the continuing development and growth of rehabilitation medicine and services.