

needs in bracing. We trust that these two steps in research and education will mark the beginning of a concerted effort to bring orthotics on par with prosthetics by providing a sound basis in biomechanics, scientific prescription rationale, reliable evaluation techniques and a professional educational system.

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## THE PROBLEM OF PREDICTING SUCCESS IN PROSTHETIC REHABILITATION



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Every sincere practitioner in the field of prosthetics has moments of deep satisfaction when his services fulfill a human need and are favorably received. When an amputee is successfully fitted, memories of difficult problems dissolve, periods of anxiety-soaked stress are transformed in the mind and acquire a halo of adventure. A successful conclusion to a difficult case invigorates the clinic personnel, but failure shakes the egos of all who are involved in the rehabilitation process.

Should his counsel fail, the psychologist, who is really a professional parent-image, feels the pangs of rejection. Should the amputee's stump be on the verge of collapse under prosthetic pressure, the physician feels his spirits falling with it. When gait-training deteriorates into aimless shuffling, punctuated by sighs of pain or discomfort, the physical therapist experiences the pangs of a Second Lieutenant leading a green patrol into a maze of booby-traps. But by far the most severe sufferer, when failure occurs, is the prosthetist—for it is the prosthesis, in the construction of which he has spent such great effort, which is regarded as an object of scorn, often unjustifiably. We say "unjustifiably" advisedly. Some failures in prosthetic and vocational rehabilitation stem from errors in professional judgment. Many of the failures, however, are really traceable to the personality difficulties of the amputee clients. For it is well-known that certain amputees "just cannot be fitted," irrespective of the merits of the prosthesis or prosthetist. The



sadness of these cases, however, is that one discovers the difficult people only after much energy and skill have been invested into fabrication, fittings and training. Often, when medical and prosthetic indications seem ideal, it is discovered that unpredictable temperament is not limited to Grand Opera. Amputee stumps can be prima donnas too. Prosthetists can prove this to themselves in the following, unique manner: On meeting an amputee who seemingly discovers pressure points in a prosthetic socket, the prosthetist promises to remove the non-existent bump. He takes the prosthesis into the limb shop and creates the impression of being hard at work. In reality he does nothing to the prosthesis, but returns to his client saying—"Well, let's see how it fits now." And frequently, the client is well satisfied!! The "neurotic" stump has recovered from its temper tantrum and snuggles contentedly into the socket . . . Suggestion is evidently not limited to the psycho-analytic couch or hypnotic spells . . .

We cannot be seduced, however, into premature optimism by such positive results. For sometimes the amputee is happy with the "removal" of the old pressure spot but discovers a new one in a different area . . . Thus, it becomes evident to the worker in prosthetics that the psychology of the amputee cannot be neglected, even in the seemingly purely physical aspects of prosthetic restoration.

Can the science of psychology come to the aid of prosthetics? Can it provide information on the personality factors of amputees so that successful prosthetic rehabilitation will be more predictable and certain? Will a knowledge of the psychology of the amputee invest the rehabilitation team with more self-confidence? Obtaining answers to these questions is the goal of the Amputee Psychology Research Project at New York University.

#### **THE AMPUTEE PSYCHOLOGY RESEARCH PROJECT**

This research was activated with the assistance of a grant from the Office of Vocational Rehabilitation. Its purpose is to investigate the psychology of the amputee in order to minimize incidents which often make prosthetics a frustrating, as well as a challenging vocation. The specific goal of the study is to determine which amputees are psychologically ready to accept the stresses and strains associated with prosthetic restoration, and which are saddled with such problems as to require counseling or psychotherapy before they can benefit from physical restoration. This goal would be accomplished by the development of an objective battery of tests, evaluating basic personality traits of lower extremity amputees, which will predict the degree of readiness for prosthetic rehabilitation. The tests are not merely a grab-bag of evaluation forms thrown together like a patchwork quilt with the pious hope that they will somehow cover the subject. These instruments have been developed, and found useful, at the Prosthetic Devices Studies of New York University, prior to the activation of the research project, as a result of experience with about 240 amputees who participated in various studies.

The instruments are also grounded in a theory as to the type of behavior shown by maladjusted or "neurotic" individuals. It is felt that the degree of adjustment or maladjustment characterizing an individual depends on his ability to deal with his *anxiety*. All people in our complex and stressful society are often involved in situations where no easy solutions are available. Hence anxiety and insecurity are frequently generated. The distinction between adjusted and maladjusted individuals consists in differential ability to deal with insecurity.

Anxiety is defined (English, H. B. and English, A. C., "A Comprehensive Dictionary of Psychological and Psychoanalytical Terms") as "an un-



pleasant emotional state characterized by a fusion of fear with the anticipation of future evil . . . The individual experiences a feeling of threat, without his being able to say what he thinks threatens him."

Anxiety arising from insecurity may be compared, in a simplified way, to the generation of steam from water and heat. If steam is channeled into the proper piping systems, it becomes *power*; if improperly distributed, it is merely a diffuse, choking haze. Anxiety may be similarly viewed.

Amputees experience insecurity and fears in common with non-amputees. In addition, the problems arising from amputation contribute additional fears. If directed into constructive behavior, these tensions can serve as power and energy to be utilized in overcoming the obstacles and pressures always present in the rehabilitation process. If not, they percolate within an individual, untamed and uncontrolled, to be periodically discharged in hostility and emotionality. The maladjusted amputee is frequently attacked by his fears which envelop him like a steamy mist. He may develop neurotic defenses to keep his anxiety in check. These defenses are "pockets" for the unharnessed neurotic feelings; they may temporarily "siphon" off anxiety and thereby promote an unstable facade, or false front, of adjustment. But this is an unstable neurotic compromise which can only be temporarily maintained. Under pressures from the environment, or as a result of the inner imbalance developing from these bloated pockets of neuroses, frequent explosions or breakdowns occur. In this event, defenses fall, the facade of adjustment crumbles and the neurotic individual is incapable of adjusting to the demands of reality.

The classic failures in the rehabilitation process typically occur, as mentioned, after expensive time and energy have been invested in a problem amputee, whether in fabrication, fitting or training.

Is it possible to detect the problem amputees *before* all people concerned are subjected to frustration and failure? Early detection would allow for the provision of counseling or psychotherapy so as to facilitate adjustment and reduce the number of subsequent failures.

To seek an answer to this question, we have isolated 15 personality factors, or "variables," to which the pockets of neurosis may be attached. These personality variables are measured by means of appropriate psychological tests. These measures determine how many of the 15 factors are operating within a particular individual. Those amputees characterized by few factors may be regarded as comparatively well-adjusted, while those marked by many may be regarded as less well-adjusted individuals. As mentioned, these variables and instruments emerged from work with amputees who were involved in prosthetic and vocational adjustment.

The second step is to relate the scores on this predictor battery (administered before the initiation of the rehabilitation program) to measures of *subsequent* success and failure in prosthetic and vocational rehabilitation (the criterion). This criterion would consist of ratings by knowledgeable people of the adequacy of the amputee's participation in the rehabilitation process and the quality of the rehabilitation results. Accordingly, five rating scales are in the process of development which will evaluate significant aspects of (1) prosthetic, (2) home and (3) vocational adjustment.

Although no final decisions have been made as regards the sources of information for the rating scales, the following professional and knowledgeable individuals are under consideration: prosthetists, physical and occupational therapists, physicians, nurses, rehabilitation counselors, psychologists, social workers, psychiatrists, family members, friends and supervisors, employers and work colleagues.



If it can be demonstrated, by appropriate statistical methods, that those amputees revealing more of the 15 factors are more poorly adjusted than those showing few or none of them, then the psychological battery may be regarded as a good prediction instrument.

Since it is felt that the unique contribution of the Amputee Psychology Research Project is its predictor battery, this article will discuss the personality factors or variables which, we hope, will be detected with the aid of our psychological tests and instruments.

As stated, the development of this battery was based on the general assumption (or "hypothesis") that adjustment depends on ability to deal with anxiety. Every factor or variable detected by the psychological battery reveals the failure of a neurotic defense mechanism and the presence of uncontrolled anxiety. In the following paragraphs, therefore, each variable will be discussed in terms of its effect on the psychological functioning of amputees involved in rehabilitation.

#### **Personality Variables**

As discussed, anxiety may be viewed as "psychological steam" which must be converted into power and channelized into constructive activity if the individual is to be effective and emotionally balanced. When not channeled properly, anxiety seeks other outlets, usually destructive.

#### **The Undisciplined Personalities**

Some individuals cannot tolerate the accumulation of any anxiety. They never allow themselves to become involved with unpleasant feelings or to struggle with fears. They do not seem to be burdened by a "conscience" or "superego" which might prevent their dumping their anxiety on others. By discharging tension immediately in *action* (Sociopathic Impulsivity) they maintain a relatively pleasant or neutral, inner emotional tone. These undisciplined people also seem to lack the mechanism of converting "steam" into "power." It may be said that they experience anxiety as raw, scalding steam which must be quickly discharged. Otherwise the pounding within their soul or "psyche" makes them feel on the verge of disintegration. They may be compared to boiling kettles on fire, in which steam pounds brutally on the walls, the lids of which must be hastily removed lest an eruption take place.

Sociopaths therefore are frequently shallow and empty. Their "inner being" remains isolated from genuine, positive emotion or feeling. They are often insensitive persons who seldom learn from experience. Some sociopaths can assume a falsely friendly manner which helps them manipulate and control people and situations to their own advantage.

In a physical rehabilitation setting these are unreliable individuals who agree to cooperation, only to disregard their obligations once they possess the prosthesis. Their "breezy" and overconfident manner becomes more evident when they feel secure. They then show little hesitation in disregarding both the instructions of the professional personnel and the general rehabilitation routine. These amputees tend to discharge their anxiety against the environment in the form of crude aggression. They disregard instructions, tamper with prostheses, and personify the "know-it-alls" or "wise guys" who attempt to dominate clinic personnel with hostile advice. Although the proportion in the population of such individuals is small, just a few of them absorb much energy.

#### **The Emotional Neurotics**

In contrast to the described sociopaths or undisciplined individuals, who cannot exercise control but must "act out" their impulses immediately, some neurotics have the ability to keep their insecurities in check for a limited



period of time. Eventually, however, the dam bursts and the suppressed emotionality escapes—(Neurotic or Emotional Impulsivity). In these amputees anxiety is first associated with deep feeling because of their persistent and frantic struggle to deal with anxiety. Sociopaths “take out” their anxieties on others immediately, while the emotional neurotics go through a period of stressful self-punishment before their defenses fall. Emotional neurotics are not as manipulative and callous as the sociopaths, but their emotionality and instability may nevertheless involve them in emotional exchanges with clinic personnel. An impulsive individual finds it difficult to adjust to new and threatening conditions. Fitting procedures, wear, training, vocational and social orientation involve tension and discomfort. If emotional, rather than intellectual, judgment dominates an amputee, the impulsive neurotic will constantly face frustrating obstacles.

The two variables discussed represent anxiety eliminated, immediately or after delay, through discharge in impulsivity or action. In these reactions the neurotic drops his anxiety load on the environment, against anyone who is “in the way,” without necessarily selecting specific objects or people to be his victims.

### The Blamers

Some individuals do not discharge their tensions in a “wholesale,” impulsive manner. They have accumulated tensions which cannot safely be expressed against the true source of frustrations, such as an employer, spouse, child, or mother-in-law. Specific scapegoats must therefore be found to be the substitute targets for the explosion, a process in which their unconscious mind plays a major role. Hitler found these scapegoats in minority groups; maladjusted amputees may find them in clinic personnel or in the prostheses supplied by the latter. This is the mechanism of “Displacement”—from the true source of irritation to innocent victim.

In the process of victimizing innocent personnel, a maladjusted individual may later rationalize his behavior in a false belief that the rehabilitation personnel are really responsible for his prosthetic and vocational adjustment problem. (Paranoid Reaction). Thus, some “paranoid” amputees believe that non-amputees are discriminating against a “helpless” amputee. If the latter is a veteran, he may flaunt self-sacrifice and patriotism as further support for his unjustified feelings. He may unconsciously reason that his suffering in war entitles him to make others suffer too. Since he has lost a live, flesh and blood leg, no artificial limb can ever be accepted as a substitute.

The treatment group must handle this package very gingerly. Unpleasant interpersonal clashes sometimes occur, since the treatment group is human, too. This leads to greater feelings of hostility in the amputee. These dangerous thoughts must be “put out of mind” or repressed, especially when unconscious guilt is felt. To defend his “I hate them” the client resorts to the belief of “they hate me, therefore I’m entitled to hate them.” This is a form of *paranoid projection*—the amputee’s own feelings toward personnel are projected on the personnel’s feeling toward him.

The more arrogant amputee will blame personnel directly; the less brave one will express dissatisfaction with the prosthetic appliance, an indirect form of aggression against the innocent rehabilitation group. By means of these processes temporary release, although ultimately self-defeating, may be obtained.

### The Fearful

Some neurotic individuals cannot verbalize hostile feelings against people, even indirectly, but choose an indirect and subtle form of anxiety-expression which is powered by unreasonable and deeper unconscious



defenses. Expression of indirect hostility, in the form of criticizing a prosthetist's product, still requires a degree of bravery or "ego-strength" which some people do not possess. These people must convert hostility into a less obviously offensive form, a *phobia* or senseless fear which is a more complete attempt at disguise. In the rehabilitation setting, inner anxiety is transformed into a phobia when it is attached to the prosthesis which then turns into a disliked object. This process operates as follows: Highly charged anxiety must find an outlet. Not wishing to express the anxiety directly against people, and yet incapable of keeping these feelings within, the individual must find a compromise outlet. This is accomplished by a "phobic" reaction wherein a neutral object such as a prosthesis is feared to such an extent as to make an amputee feel "sick" when seeing it or thinking about it. To the objective observer the tremendous fear of the prosthesis is extreme and illogical, but the unconscious has its own reasoning: the anxiety must become attached to *something* in order to lose its disturbing quality. In the dark world of the unconscious, it is easier to face a clear, definite, concrete and visible object in the outer environment than to face an unclear situation of *inner* chaos.

The amputee fears the prosthesis just as some individuals have an abnormal fear of snakes, cats or other animals. When the prosthesis "absorbs" the anxiety it is soon associated with discomfort and pain.

Thus, instead of accepting the "breaking in" period as necessary, some individuals develop a highly charged fear of the prosthetic device until the very sight of it generates a phobic reaction.

#### The Isolated

Anxiety felt within an individual may be attached to an object in the environment, as seen in the described phobic reactions. Some individuals, however, do not attach their anxiety to specific people or objects, but to the whole environment. They feel, unconsciously, that the *process* of living in the world is threatening and therefore they surround themselves with barriers or fences against the outside, supposedly dangerous, environment (Encapsulation or Constriction.) These people would insist on wearing a knight's armor in a snowball fight. They constrict themselves in psychological corsets and cover their eyes with helmets. (In extreme cases of psychosis the body is rolled up in a ball, shielded by the arms against the world.) Their defenses are so heavy they cannot move to meet the world. This prevents an amputee from facing the challenges involved in radical adjustment to prosthetic and vocational goals since he locks himself in virtual solitary confinement. Usually, the passivity and constriction are defenses against taking risks which may lead to failure.

#### The Depressed

When intense anxiety overwhelms an individual, it is not always possible for him to be entirely rid of it by attaching it to an outer object in the form of a phobia. Also, when anxiety is combined with guilt feelings, in an individual with a strong conscience or "superego," it cannot be readily turned outward in blaming people or in behaving impulsively. Yet, something must be done with the free-floating anxiety or "steam" which wanders about like a displaced person or "dybbuk" within the "psyche" or soul. Therefore, when anxiety is blended with guilt feelings, it may be turned *against oneself* as a form of punishment. Anxiety turned-inward is often associated with hostility and aggression turned-inward leading to "Depression" which slows down the amputee, who then experiences sadness, helplessness and inadequacy. As distasteful and incapacitating as depression is, it is usually less painful and distressing than "wild" anxiety. The state of near "paralysis" resulting from



depression prevents the underlying aggression from being expressed dangerously against others. In the rehabilitation setting depression robs the amputee of the necessary initiative and vigor. The passivity and listlessness associated with depression produces a lifeless, passive amputee who personifies a spiritless body rather than an individual eager to be returned to normal functioning.

### **The Hypochondriacs**

The hypochondriacs, also, are individuals who choose to direct anxiety inward, rather than outward, against the environment. In contrast to what occurs in "Depression" however, the anxiety does not spread in a paralyzing effect over the entire personality but becomes attached to *specific* aspects, such as body or "somatic" complaints. By "binding" anxiety in somatic symptoms, anxiety is, to an extent, controlled. These neurotics place all their neurotic eggs in one basket. They change the *psychological* experience of anxiety into a physical symptom. By transforming unpleasant psychological experiences into physical ills, the anxiety is not experienced directly, and accounts for the "indifference" which some of these people feel. The physical symptoms become a substitute or "equivalent" for the original anxiety and are therefore not felt.

If a very great quantity of anxiety is converted into a physical symptom, organic tissue changes may occur, such as colitis, stomach and skin disorders, etc. These physical symptoms are termed "psychosomatic" symptoms and are very persistent. They serve as a penance or atonement for "sins" and as a sympathy-gaining device, as well as being a "blind alley" for feelings of anxiety.

Other manifestations of this form of transformed anxiety are "conversion symptoms." The latter "symbolize" the unconscious conflict. A specific organ or body site is chosen to be the "scapegoat equivalent" of the psychological problem. For example, the leg may be chosen as a symptom site because it represents a childhood incident where the leg was used to kick a brother, sister or parent. This has aroused guilt and is atoned for by pain in the "guilty" leg.

The common denominator of these two mechanisms is the "Somatic Preoccupation or Somatization" which characterizes the individual. Anxiety has been turned inward and considerable attention is focused on the physical symptoms or the entire body.

Somatization or somatic preoccupation is very relevant to rehabilitation, since many of the experiences of pain and discomfort are especially prominent in individuals who have over-sensitized their bodies.

### **Uneven Functioning and Primitive Behavior**

The success of Somatic Preoccupation or other mechanisms in absorbing and neutralizing anxiety is often temporary, since the latter must constantly be controlled and modulated. In a very anxious person this is not easy. Some neurotics are able to exercise control over anxiety only periodically. They may be compared to an automobile driver who cannot maintain a constant, smooth rate of speed, but shifts nervously from gas pedal to brake. This type of inadequate control of anxiety leads to an uneven functioning of personality and, consequently, to swings in mood. The rise and fall in the level of anxiety may lead to feelings of being "high" and "low." A constantly changing inner balance does not encourage consistent behavior or attitudes in the course of rehabilitation. The fluctuating level of disturbance may also lead to reduced tolerance for stressful situations.

Whenever an individual cannot deal adequately with a problem, his defenses fail and he may regress, temporarily or permanently, to a more



childish, primitive, and less organized form of behavior. The stress in the rehabilitation process may bring on this lowering in efficiency and productivity. In this case, functioning will be impaired until the amputee musters his energies, re-integrates his forces and raises himself again to his former level.

### **Impoverishment of Role and Loss of Ambition**

An individual who is constantly pushed from pillar to post by his insecurities and crumbling defenses will develop uncertainty about his personal adequacy to deal with life.

In pronounced cases of insecurity a male amputee's identification with the *masculine role* will be poor. In our society, where a degree of aggressiveness is necessary for success and accomplishment, poor identification with the male role is a serious problem. Our society stresses a vigorous and active approach toward overcoming obstacles and poor role identification leads to passivity and lethargy. Amputation creates the necessity for an amputee to muster additional effort in order to overcome his physical limitations. A passive and constricted individual will fail to show *compensatory ambition*—that extra burst of energy which must be utilized by an amputee to attain normal functioning. In brief, a reasonably high level of aspiration can turn obstacles into stepping stones toward greater success; a low level of ambition focuses attention on one's limitations and magnifies prosthetic and vocational difficulties.

It is very easy to develop rationalizations for one's inadequacies. An individual drained of energy by his conflicts may develop a philosophy of *pessimism* which masquerades as "realism." This "pseudo-realism" is, in reality, just another neurotic defense against a world which is viewed as threatening. The philosophy of pessimism is employed as a rationalization against the effort and initiative demanded by rehabilitation. "Professional pessimists" like to regard themselves as "realistic," "tough-minded" and mature people. More often, however, their low expectations reveal attempts to hide their overwhelming and underlying fear of failure: "If failure is inevitable, why try?"

### **Physical Aspects of Personality**

Lower extremity amputees frequently complain of stump discomfort and pain. Moreover, some of these amputees are apt to suffer distress more often than others and to reject a prosthesis if the discomfort becomes sufficiently intense. The considerable distress experienced by some clients is detrimental to the entire process of rehabilitation. It is therefore reasonable to expect that measures of pain and tactile (touch) sensitivity would be significant in the development of the psychological battery.

Three psychophysiological variables have therefore been included in the study. These involve the study of *touch or tactile sensitivity* as well as *surface and deep-tissue pain sensitivity*. These variables seem to be related to the personality variables of somatization, neurotic impulsivity, phobic reactions and stress intolerance which are greatly affected by stump experiences of pain, discomfort and sensitivity during prosthetic adjustment. Also, many studies have suggested a relationship and interaction between the experience of anxiety and pain.

It is expected that significant relationships between prosthetic adjustment and pain experience will be found. Perhaps measures of stump pain could be utilized in anticipating prosthetic adjustment problems and providing prosthetists with information as to the pain tolerance level of different regions of the stump.

On the basis of preliminary studies and a survey of the relevant litera-



ture, several hypotheses have been advanced. It is expected that:

- 1) Measures of pain threshold in the stump will be lower in the amputee who persistently complains of the painful experience of wearing a prosthesis, than in the non-complaining amputee; and 2) The pain threshold scores will be related to the personality variables of somatic preoccupation, neurotic impulsivity, phobic reactions and stress intolerance scores.

### OVERVIEW

The Amputee Psychology Research Project of New York University was activated with the view of developing psychological instruments predicting success and failure in prosthetic and vocational rehabilitation. This involves the development of a predictor battery comprising instruments and techniques assessing personality and psychophysiological variables. These variables would be related to a criterion of success consisting of ratings by knowledgeable people of the adequacy of an amputee's participation in the rehabilitation process and the nature of the rehabilitation results.

The battery is grounded in a theory as to the type of behavior shown by maladjusted or "neurotic" individuals in which anxiety plays a central role.

In order to handle anxiety arising from conflict, a number of neurotic solutions may be utilized. Some amputees cannot tolerate any accumulation of anxiety. They must discharge it on the environment even if it involves impulsive action in the form of undisciplined (sociopathic) or emotional (neurotic) behavior. Innocent individuals or objects may become the scapegoats for aggression (displacement). Also, people may be blamed and held personally responsible for the neurotic's own shortcomings (paranoid reactions). These mechanisms are active hostility reactions where anger predominates. In phobic reactions an object, such as a prosthesis, is feared and avoided, rather than directly hated. This is a more irrational and unconscious form of aggression. In these maladaptive solutions, anxiety is discharged against the environment.

When guilt is associated with anxiety the individual may turn aggression inward. Depression may result, which operates as a means of self-punishment and immobilization, in order to prevent the emergence of aggression. Or, the neurotic may cut himself off from the "dangerous" environment by constricting his activities and thought.

Sometimes anxiety is channelized to a particular area of the body in the form of somatic preoccupation. The unconscious aim of somatization is to find a scapegoat in the form of a concrete, recognized, and respectable ailment which will absorb and serve as a pocket for the otherwise "wild" anxiety. Generalized psychological suffering is replaced by a physical substitute in the form of psychosomatic symptoms which cause physical changes in an organ, or in conversion symptoms symbolizing the conflict. Since these neurotic defenses are often unstable, the anxiety may break loose, resulting in uneven functioning as a result of its inadequate control.

These neurotic outlets often rob an individual of his constructive energies. Because he is devitalized, he reveals limited ambition and poor role identification. Such a person regresses to a more primitive and childish behavior in the face of stress. A "pseudo-philosophy of pessimism" or low expectations may develop as a rationalization against failure. The presence of these neurotic traits may be reflected in more pronounced pain experiences, both surface and deep, and in impaired tactile sensitivity.

Our battery is a global approach measuring numerous basic and vital dimensions of personality. It traces the undulating pattern of anxiety as it assumes different forms in different neuroses and impairments. In reality, all these masquerades represent the same culprit—*anxiety in disguise*.