The Measurement of Stress, Arousal and Power: Alternate and

Expanded Versions of the Stress Arousal Check List

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of the Stress Arousal Check List

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Submitted in partial fulfillment of the

requirements for the degree of

Master of Science

at Saint Mary's University

Halifax, Nova Scotia

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Date: _August 7, 1987_

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Abstract

The Measurement of Stress, Arousal and Power: Alternate and Expanded
Versions of the Stress Arousal Check List

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July 3, 1987

The Stress Arousal Check List (SACL), a 30-item adjective check list developed
through factor analytical studies (Mackay, Cox, Burrows and Lazzerini, 1978),
offers assessments of two independent mood factors, stress and arousal. In this
study, an alternate form of the SACL, the Check List of Arousal and Stress
(CLAS), is presented. Each item of the CLAS is a short, simple phrase rather
than a synonym for the SACL's somewhat difficult adjectives.

The literature indicates that a two factor theory of stress is inadequate and
suggests a third and independent factor of stress, that is, power or
strength/weakness. A power scale, of fifteen short phrases, is presented which
measures this factor independently of stress and arousal. Combining this scale
with the CLAS items provides a three factor measure of stress, the Check List of
Arousal, Stress and Power (CLASP).

The original SACL, the alternate form, and the power scale were administered to
394 subjects and the data were factor analyzed. Responses to the SACL were

analyzed to determine if Canadian data is consistent with British data (Mackay,

Cox, Burrows and Lazzerini, 1978). The analysis yielded four monopolar factors,

high stress, low stress, high arousal, and low arousal, rather than the two bipolar

factors reported by Mackay et al. Responses to the CLAS were analyzed to

determine whether this check list would produce the same factor structure as the

SACL. Again, four monopolar factors, high stress, low stress, high arousal, and

low arousal, emerged.

In combination with the responses to the CLAS, the power scale responses

were factor analyzed to determine whether the power scale measures a new

and independent factor. This analysis did yield six monopolar factors, high

stress, low stress, high arousal, low arousal, high power, low power, indicating

that the new scale measured power independently of stress and arousal.

SACL and CLAS scores of stress and arousal were obtained and these scores

were significantly correlated ($p < .001$).

Stress, its causes and treatment, has attracted and sustained the attention of the professional and the layman (McGrath, 1970; Selye, 1980a; Cooper, 1983). But, even after years of research, stress remains without a clear-cut definition and the measurement of stress varies from one study to another (Cox, 1978; Selye, 1983). It is the intention of this thesis to review and organize the stress literature and to introduce a new measure of stress. First, the thesis presents three models of stress: (a) stress as a stimulus, (b) stress as a response, and (c) stress as an interaction between stimulus and response. Measures of stress appropriate to each of these models are discussed and one, the Stress Arousal Check List (SACL), is reviewed in detail. The history and development of the SACL are considered as well as the factor structure, reliability and validity of the check list. Next, the underlying dimensions or components of stress are discussed.

The two factor measure of stress developed by the author, the Check List of Arousal and Stress (CLAS) which represents an alternate version of the SACL, is then presented. Responses by 392 subjects were analyzed and the factor analytical results are reported. A second measure, developed by the author, the Check List of Arousal, Stress and Power (CLASP), a three factor measure of stress is presented next. The final section provides the reader with a brief description of factor analysis which was an integral part of the present study's methodology.

1

Stress

The basic sense of the term "stress" can be traced back to at least the fifteenth century when it represented "physical strain or pressure" (Shaffer, 1982, p. 1). While this meaning held in such fields as engineering and architecture for more than a hundred years, other meanings were added. By the year 1704, for example, a human element was included in this concept and "stress" could also refer to "hardship, straits, or adversity" (Shaffer, 1982, p. 1). This definition of stress was broadened again, by the mid 1800's, to include, "strain upon a bodily organ or mental power." Other related meanings continued to surface but none deviated from the central notion that "stress" was some sort of force until Selye published his seminal paper in 1936.

Although Selye initially avoided using the term, "stress," by the mid 1940's he did report his findings on the effect of "stressors" or outside forces (Selye, 1946). Shaffer (1982) points out that the most significant aspect of Selye's work was the reversal of the traditional definition of stress: "stress" was no longer an agent or force but was regarded as the result produced within an organism by the presence of some other agent or force. Today, this interpretation of "stress" has its proponents (Kagan and Levi, 1971), and its opponents (Welford, 1973) who continue to support the original view of "stress" as an agent or force. In addition to joining one or the other interpretations, others have modified Selye's definition making it fundamentally different. For example, McGrath (1976) and Cox (1978) defined stress as a dynamic interaction between stimulus or agent

and response or result.

A review of the scientific literature on stress reveals three schools of thought (McGrath, 1970; Cox, 1978). In the first, stress is viewed as a stimulus; stress is described in terms of the stimulus characteristics of disturbing or noxious environments and would, therefore, be the independent variable in stress studies. In the second, stress is considered to be a response to environments rather than a stimulus in environments. Stress is the dependent variable in these studies. The third approach views stress "as the reflection of a lack of fit between the person and his environment" (Cox, 1978, p. 3). Stress defined in this way is studied as both stimulus and response or as an intervening variable between the stimulus and the response. The three models will be presented in detail in the pages to follow.

Models of Stress

Stress as a Stimulus

Advocates of this model retain the notion, which emerged in centuries past, that stress is some sort of agent or force. In this "engineering" model, external stresses give rise to a reaction within the individual (Cox, 1978). Accordingly, stress is studied as an important independent variable and the interest is in what stimuli are stressful. Perhaps Symonds (1947) expresses the position taken by proponents of this model most clearly in his statement concerning psychological problems of Royal Air Force pilots. He wrote, "it should be understood once

and for all that [flying] stress is that which happens to the man, not that which happens in him; it is a set of causes, not a set of symptoms" (p. 13).

This stimulus-based or engineering model of stress has been compared with Hooke's law of elasticity (Cox, 1978). Hooke's law is concerned with the stress or the load or demand being placed on metal and the strain or deformation which results. The law states that as long as the strain produced by stress falls within the elasticity limit of the metal; the material will return to its original condition once the stress is removed. If, however, the strain exceeds the elasticity limit, then some permanent damage will result. The engineering model would suggest that just as inanimate objects have an elasticity limit so do people possess a built-in toleration of stress; stress can be tolerated but only to a certain point. Once this point is exceeded, permanent damage, physiological and psychological, may result.

There would appear to be great variation among individuals with respect to tolerance of stress, what is tolerable to one being completely intolerable to another. Studies have illuminated the personality characteristics and backgrounds associated with a high tolerance level of, or little deformation as the result of, stress (Korchin & Ruff, 1964; Ruff & Korchin, 1964). Astronauts participated in these studies under training conditions and during simulated space flights. Neither their performance or mood were adversely affected when under stress. When encountering a difficult situation the astronauts would.

(a) stop, (b) appraise the situation, (c) decide on what action should be taken, and (d) follow it through. The astronauts were all between 32 and 37 years of age, were all married with children, had middle-class upbringings, and were all Protestant although not actively religious. They grew up in small communities, received their education in state schools and had all graduated from engineering. Others described them as ambitious, capable, intelligent, successful, self-assured, persevering, highly controlled, and very accurate in their perception of reality. Korchin and Ruff (1964) and Ruff and Korchin (1964) concluded that the backgrounds of these astronauts, which they considered both demanding and stimulating, contributed to the astronauts' high tolerance of stress.

Heredity, early experience, and later learning have been related to tolerance of stress in experimental studies (Levine, 1967, 1975). Levine (1975) indicated that rats subjected to electric shock and other stresses in early life developed normally and could cope well with stress in later life whereas rats not exposed to such stimulation grew up to be timid and deviant. These two groups of animals had markedly different responses to stress as adults. The rats stressed in infancy showed a prompt and effective physiological response to stress while those not so stimulated responded much more slowly and less effectively. More adaptive adult behaviour was clearly associated with infantile experience with stress.

Cox (1978) states that the two important questions for a stimulus-based definition of stress are (a) what conditions can be assumed to be stressful, and (b) what characteristics do they share. Situations involving extremes of sensory stimulation and work load are commonly described as stressful. Such situations may be characterized as being too noisy, too hot, too cold, too isolated or too crowded. In similar fashion, Weitz (1970) described eight types of stress: (a) speeded information processing, (b) noxious environmental stimuli, (c) perceived threat, (d) disrupted physiological function, (e) isolation and confinement, (f) blocking, (g) group pressure, and (h) frustration. Other researchers have seen fit to add to this list. Frankenhaeuser (1975) suggested that "lack of control over events" should be added to Weitz's list. Lazarus (1976), believing that "perceived threat" is the central characteristic of stressful situations, would add "threat to a person's most important values and goals." Still, all of these situations can be viewed in terms of the demands made on the person by his environment.

While the simplicity of this engineering analogy makes it attractive, Cox (1978) points out that it has severe limitations. For example, while an undemanding situation results in maximum well-being in the case of machinery, undemanding or boring situations are as stressful, to many individuals, as situations in which the demand is excessive. Welford (1973) has proposed that man, like most organisms, functions best when moderate demand has been placed upon him. If an individual's performance is not up to par it may be due to

either too high or too low a level of demand. Stress occurs whenever there is a deviation from optimum conditions of demand which the person cannot tolerate or cannot easily correct. According to Welford, then, it is necessary to think in both positive and negative departures from the optimum; for example, an individual may be too isolated or too crowded.

Margetts (1975) defines stress similarly but talks about stimulus input rather than environmental demand. Organisms, normally, are subjected to inputs of stimuli within predictable limits; should the input of stimuli become either excessive or insufficient, that is fall outside those limits, the excess or insufficiency of stimulation can be defined as stress. As the organism can tolerate neither the excessive or insufficient level of stimulus input, it will show a state of disequilibrium; if the extreme level of stimulus input is continued, the organism will eventually show functional or physiological pathology.

Perhaps the major difficulty with the stimulus-based definitions of stress is identifying, with some certainty, what is stressful about particular real-life situations. There being no commonly accepted points of reference, only intuition and consensus appear to guide this decision-making process at present. There is also a need to quantify the degree of stress caused by those different situations. There is also the problem of some stimuli evoking the appropriate stress response from most but not all people. If stress resides in the stimulus, why do not all people show the same effects if subjected to it? Cox (1978, p. 17)

writes, "Possibly the most important question to ask of experiments on stress, which treat it as the independent variable, is, does stress exist in the eye of the subject or in the eye of the experimentor?" Cox contends that, unless the stress-strain relationship in man is both unconscious and automatic, one has to acknowledge that some intervening psychological process mediates the outcome of that relationship. While a machine does not recognize the load or stress put upon it, stress is perceived and recognized by man, and man responds to it."

Stress as a Response

The goal of a response-based definition of stress includes the specification of a class or classes of response which may be taken as evidence that the organism is or recently has been under pressure from a noxious environment (McGrath, 1970; Cox, 1978). Stress is generally treated as the dependent variable in studies governed by this response-based definition. Selye's (1956) definition, credited with giving much of the early momentum to the area of stress research, was essentially a response-based definition. He considered stress to be one of the organism's responses to the demands of its environment.

First, Selye (1983b) insisted that the physiology of the stress response is common across different species and is independent of the nature of the stressor. The stress-response syndrome consists of a universal pattern of defence reactions serving to protect the organism and preserve its integrity. The

specific character of the source of stress does not matter, the non-specific defence reaction is virtually the same for all animals. Second, Selye believed that this defence-reaction changes with continual or repeated exposure to the stressor, through three identifiable stages, collectively described as the General Adaptation Syndrome (GAS) (Selye, 1983b).

The first phase of the GAS is the alarm reaction which is the organism's reaction when it is suddenly exposed to diverse stimuli to which it cannot adapt (Selye, 1983b). The alarm reaction phase is divided into two phases, the shock phase and the countershock phase. The initial and immediate reaction to the noxious agent is shock. Various signs of shock such as tachycardia, loss of muscle tone, decreased temperature, and decreased blood pressure are typical symptoms. The countershock phase is marked by a rebound reaction during which defenses are mobilized. The adrenal cortex is enlarged and secretion of the corticoid hormones is increased. If the agent is so noxious, however, that continued exposure becomes incompatible with life, the organism may die during the alarm reaction within days or even the first few hours. If the organism can survive this initial alarm reaction, however, the phase is followed by (the stage of) resistance.

The stage of resistance is characterized by the organism's full adaptation to the stressor and the consequent improvement or disappearance of the symptoms of shock. The manifestations of this second phase are quite different

from those found in the alarm reaction stage. For example, during the alarm reaction, the cells of the adrenal cortex discharge their secretory granules into the bloodstream and thus become depleted of corticoid-containing lipid storage material. In contrast, during the stage of resistance the cortex becomes particularly rich in secretory granules (Selye, 1983b). But if there is continued exposure to the noxious agent, the acquired adaptation may be lost and the animal will enter a third stage, exhaustion. As adaptability necessarily has its limits, exhaustion will, inevitably, occur if the stressor is sufficiently severe and prolonged. Symptoms will appear once more and, should the stress continue unabated, death will follow.

The third assumption underlying Selye's concept of stress is that severe and prolonged defence responses result in disease states, the so-called diseases of adaptation. The "cost" of defence against exposure to stressor agents, then, may be illness. This occurs when the maintenance of defence overextends the resources of the physiological system.

The non-specificity of the stress response has been emphasized by Selye (1946, 1980a, 1980b, 1983a, 1983b). As a medical student Selye observed a general malaise in people who were ill which was present regardless of the specific nature of the sickness. The syndrome was marked by the following: a loss of appetite and associated loss of weight and strength, a loss of ambition, and a recognizable facial expression. Upon closer examination Selye included

the following in his list of indicators: enlargement and dark discolouration of the adrenal glands, intense shrinkage of the thymus, spleen and lymph nodes, and deep bleeding ulcers of the stomach and upper gut. He believed that this general syndrome of illness was superimposed on all individual diseases and was a manifestation of the non-specific general adaptation syndrome.

Although this understanding of the non-specificity of the stress response (illness) has proved useful, there is a growing body of opinion proposing that there is a good deal of specificity in the bodily response to stressors. Mason (1971) has observed, for example, that some noxious physical conditions such as exercise, fasting and heat do not produce the GAS while others do. Even more convincing, exercise may serve to protect the organism even though one would predict, based on its characteristics and the organism's response, that it should produce the GAS. Research has also shown that the pattern of physiological reaction in stress situations is greatly affected by the specific stimulating conditions. Studies of heart rate response by Lacey (1967) and Folkins (1970) provide two examples of such research. The heart rate response appears to be bidirectional, rising when a person is oriented to shut out (stressful) environmental stimuli but dropping when he is looking for a stimulus to minimize (stressful) boredom (Lacey, 1967). And there are other examples of direct contradictions of the GAS model. For example, Folkins (1970) reported that even when the anticipated stimulus is highly stressful, as with electric shock, the heart rate falls sharply rather than rises. These results clearly contradict

Selye's (1946, 1980a, 1980b, 1983a, 1983b) contention that the stress

response is non-specific. Perhaps, generally, the stress response is non-specific

with the exception of a few stressors to which stress or response is specific.

Selye's concept of stress all but ignores psychological processes (Selye,

1946, 1956, 1980a, 1980b). He focused on what occurs biochemically after the

body's defenses have been aroused, not on the physiological and psychological

signalling system which recognizes the noxious stimuli and effects and

distinguishes them from benign events. But others have underscored this part of

the process. It has been proposed (Mason, 1971; Lazarus, 1976) that the

hormonal changes comprising Selye's GAS may come about precisely because

the animal senses that it is in trouble; the psychological processes involved in

this identification may initiate the (hormonal) defensive reaction rather than the

physical injury initiating a series of predictable interlocking biochemical events.

A study by Symington, Currie, Curran, and Davidson (1955) supports this notion.

They discovered that patients dying from injury or disease who were

unconscious after sustaining the injury or disease showed no enlargement of

the adrenals at autopsy. If, however, the patient remained conscious after

sustaining the injury or disease, autopsy revealed enlarged adrenals. Shannon

and Isbell (1963) showed that the anticipation of a dental hypodermic needle

injection resulted in as much stress reaction, as measured by the amount of an

adrenal hormone in the blood, as actually experiencing the needle puncture

itself.

Kagan and Levi (1971) have described the role of psychological factors in physical disease but retained Selye's construct of non-specific responses to noxious forces. Their central hypothesis states that psychosocial stimuli can and do cause such stress disorders. They believe that some life changes, mediated by psychological processes, trigger a physiological stress response which prepares the individual for the physical activity of coping. If this stress response, which continues to be mediated by psychological processes, is prolonged, intense or frequent, there is an increase of wear and tear in the person and structural as well as functional damage results. In the long term, this leads to an increase in the incidence of disease and death.

What is the nature of these psychological processes? In Kagan and Levi's (1971) theoretical model, external influences or psychosocial stimuli are moderated by genetic factors and early experience on the part of the organism. Together, these personal factors, genetics and early experience, form a psychobiological programme or a propensity to react (stress reaction) in accordance with a certain pattern (stress stimuli). Thus the psychosocial stimuli and the psychobiological programme together determine the occurrence of the stress reaction, which in turn might lead to the forerunners of disease, and then to disease itself. Two other important features of the model include (a) intervening variables which can be either intrinsic or extrinsic, mental or physical, and which can modify the effect of the psychosocial stimuli and

psychobiological programme; and (b) continuous feedback which occurs among all of its components. Although this model is definitely a complex one, it originates from a simple response-based definition of stress.

Another popular response-based definition of stress views stress in terms of degradation of performance rather than in terms of physiological indicators (McGrath, 1970; Cox, 1978). But there are problems with the performance degradation model; performance degradation does not always take place according to the model. For example, Davies (1968) has shown that change in the level of performance of psychological tasks may not take place depending on numerous environmental and individual factors. Furthermore, while degradation may occur during certain conditions on one occasion with a particular individual, the same effect may not be reproduced at a different time with the same or different individual.

McGrath (1970) has pointed out several general weaknesses with response-based definitions of stress. According to such definitions, he maintains, any stimulus which produces the stress response must be considered a stressor not stress. This would mean that stimuli such as the various emotions, physical exercise and fasting would all have to be viewed as stressors. But there is clear evidence that some of these events serve to enhance the organism's well-being and do not produce stress. Conversely, some situations not generally accepted as being stressful may trigger a stress reaction.

Stress as an Interaction Between Stimulus and Response

As the inadequacies of the stress as a stimulus and stress as a response models became clear, the two were fused together into an interactional model (McGrath 1976; Lazarus 1976; Cox, 1978; Cox and Mackay, 1981).

Cox and Mackay developed an interactional model which assumes an active role of the person in the occurrence of stress (Cox, 1978; Cox & Mackay, 1981). They believe that stress is best described as part of a complex, dynamic system of transaction between the individual and his environment. While they admit that such a definition borrows parts of both the stimulus-based and response-based models, it includes and emphasizes the ecological and transactional nature of stress. Simply put, this model views stress as an individual perceptual phenomenon that is rooted in psychological processes.

The authors outline five stages in stress. The first is represented by various sources of demand relating to the person. "Demand" refers to a request or requirement for physical or mental action and implies some time restraints. While demand has generally been considered to be a factor of the person's external environment the present model includes both external and internal demands. For example, a person's psychological and physiological needs may constitute internally generated demand. The individual's perception of the demand and of his own ability to cope with it compose the second stage.

According to Cox (1978) and Cox and Mackay (1981), stress may be said to arise when there is an imbalance between the perceived demand and the person's perception of his capability to meet that demand. To reiterate, the important balance or imbalance is between perceived demand and perceived capability not between actual demand and actual capability. For example, an individual will not experience stress in a situation that demands too much of him if he is not aware of his limitations. Once he realizes that he cannot meet the demand, however, the critical imbalance will be accompanied by the emotional experience of stress. This emotional experience of stress is in turn associated with changes in the person's physiological state, and initiates cognitive and behavioural attempts to reduce the stressful nature of the demand. The third stage of this model is comprised of the psychophysiological changes which represent the response to stress. The responses to stress are actually the methods of coping available to the individual. The fourth stage is concerned with the consequences, that is, whether the responses to the demand were adequate and whether the need for success was great or small. Consistent with this description of the fourth stage, Sells (1970) found that stress was experienced only when the individual's failure to meet a demand resulted in important consequences or when adverse consequences were expected. Feedback is designated as the fifth stage in this stress model although it actually occurs continually at all of the other stages, affecting the outcome of each of those stages. Feedback occurs when a physiological response, for example, the release of adrenaline, influences the individual's perception of the stressful

situation, or when a behavioural response, for example, studying for a difficult examination, alters the actual nature of the demand.

Howarth (1978) proposed a model of stress which is similar to Cox and Mackay's (1981) model of stress as perceived imbalance between a demand and capability to respond successfully to the demand, but which also includes some mechanical or simple components. He suggested that there are four theoretical views of stress: the biological, the developmental, the social, and the phenomenplogical. From the biological viewpoint, stress may be said to arise when the individual's life style differs too greatly from the kind of life to which primitive man became evolutionarily adapted. Developmentally, it may result if the individual is not prepared by his upbringing and education for the demands his life style impose upon him. Socially, conflicting pressures or being forced to assume inconsistent roles may cause stress. Failure to live up to one's ideals or to attain one's goals may lead to stress according to the phenomenological point of view.

A model very similar to the one provided by Cox and Mackay (1981), was proposed by McGrath (1976). He stated that an individual may experience stress when a situation is perceived as presenting a demand which threatens to exceed that individual's capabilities and resources for meeting it and when it is important that the person meets the demand. Initially, McGrath (1970) believed that a small discrepancy between perceived demand and perceived capability

would not be experienced as very stressful, at least not unless coping was absolutely vital. Lowe and McGrath (1976) now argue that, given an imbalance, the closer perceived demand is to perceived capability the greater is the stress experienced. But Cox (1978) has criticized McGrath's notion of minimum discrepancy causing maximum stress. While Cox admits that outcomes are less predictable when there are small rather than large imbalances between perceived demand and capability and uncertainty may exaccerbate the stress reaction, he finds it difficult to imagine that overwhelming or disastrous situations could be less stressful than more moderate ones.

Lazarus (1976) has also provided an interactional definition of stress. According to Lazarus, "stress occurs when there are demands on the person which tax or exceed his adjustive resources" (1976, p. 47). The individual's appraisal of his situation is of utmost importance according to Lazarus. For example, conflict may lead to the threat of harm. The intensity of the threat depends on how well the individual feels he can deal with the danger or harm which might ensue. If the individual feels capable, the threat and stress is minimal. If, however, the individual feels helpless and incapable of handling the situation, the threat or stress will be very severe.

In summary, the interactional model is a psychologically based approach which assumes that stress has to do with the individual's perception of and relation to his environment (Cox, 1978). As it deals with these factors and the

interactions among them, it accounts for more of the available data on stress than does either of the two simple approaches which define stress as a stimulus or a response. One problem with the interactional definition is that it does not account for situations where action or coping places such a severe demand on the body that physiological fatigue or damage are caused directly without the involvement of psychological processes. Such situations are best explained by one of the two previously discussed approaches which are more mechanical in nature.

Measures of Stress

Stress as Stimulus Measures

The measure of stress an investigator adopts is determined by his definition of stress. Appropriate measures, according to a stimulus-based model of stress would include measures of conditions or events to which people are subjected such as temperature, noise level, degree of isolation, extent of overwork, and life events such as marriage, divorce, and death of a loved one. The Schedule of Recent Life Experiences (SRE) developed by Holmes and Rahe (1967) consists of 43 possible life events which have been assigned scores for their relative impact on life and the degree of readjustment involved in coping with them. For example, "death of a spouse" was given a value of 100 while "minor violations of the law" was assigned a value of 11. The authors arrived at these values by asking people to evaluate the extent of social readjustment required by life events on a scale of zero to 100, starting with "marriage" which was assigned an

arbitrary value of 50 by the authors.

Stress as Response Measures

Physiological indices, such as the amount of catecholamine found in the urine of an individual, are often the measures utilized by researchers who advocate a response-based definition of stress. Taggart and Caruthers (1971) and Frankenhaeuser (1975) have demonstrated that there is an increase in catecholamine in subjects in response to situations, such as race-car driving. Selye (1983b) has suggested a variety of other physiological indices including the enlargement of the adrenal cortex and an increase in the secretion of the corticoid hormones, as measures of stress.

Interactional Stress Measures

One well-researched measure of stress appropriate for those who support an interactional definition of stress is the Stress Arousal Check List (SACL) which was developed by Mackay, Cox, Burrows and Lazzerini (1978). It consists of 30 adjectives to which each subject responds according to a four point scale: (a) "++" the adjective definitely describes the way you feel at the moment, (b) "+" the adjective only likely applies to your feelings at the moment, (c) "?" the adjective is not clear to you or you cannot decide whether or not it applies to your feelings at the moment, or (d) "-" the adjective definitely does not describe how you feel at the moment.

The check list provides scores for two independent factors, stress and arousal, and obtaining a score for each of the scales of the SACL is relatively simple (Mackay et al., 1978). First, the response scale is split into two parts, (a) "++" and "+," and (b) "?" and "-." Responses of either "++" and "+" or "?" and "-" are scored the same way. Responses are scored as one or zero according to whether the adjective in question is keyed positive or negative. For positively keyed adjectives, like "tense" and "active," a response of "++" or "+" is scored as one. A response of "?" or "-" receives a score of zero. For negatively keyed adjectives, the scoring is reversed. To low stress and low arousal words such as "peaceful" and "drowsy", a score of one is assigned to a "?" or "-" response, while a score of zero is assigned to a "++" or "+" response. The total score for stress is based on the 18 stress adjectives and the total score for arousal is based on the 12 arousal adjectives. In the sections to follow the SACL will be reviewed in detail.

History of the SACL.

The SACL is based on two tests of mood states. Nowlis and Nowlis (1956), developed a test of transient mood states, the Mood Adjective Check List (MACL), using Cattell's (1950) list of self-descriptive adjectives. The MACL is probably the most widely used multiple mood inventory (Howarth & Schokman-Gates, 1981) and has appeared in various formats ranging from 40 to 140 items, with all forms allowing self-rating on 12 mood factors. Originally, a list of 130 words were administered to approximately 450 college students who

were asked to indicate whether the adjectives described themselves. Factor

analysis yielded 12 factors which follow: aggression, anxiety, surgency, elation,

fatigue, social affection, sadness, skepticism, egotism, vigor, concentration, and

nonchalance. Nowlis (1971) expected the factors to be bipolar but the analysis

yielded monopolar factors. This finding suggested that moods often thought to

be mutually exclusive could vary independently of each other and could,

therefore, be simultaneously present in the same individual.

Thayer (1967), influenced by this work and interested in measuring basic

factors of mood developed the Activation-Deactivation Check List (AD-ACL). The

AD-ACL instructs subjects to respond to each adjective on the basis of how well

the word describes their feelings at the moment. A four-point scale with symbols

representing the responses of "definitely feel," "feel slightly," "cannot decide,"

and "definitely do not feel" is provided for each adjective. In the AD-ACL, 28

activation/deactivation adjectives like "peppy" and "leisurely" were presented

with 21 other mood adjectives like "blue" and "grouchy" included as a means of

disguising the purpose of the test. Many of these adjectives were drawn from the

list provided by Nowlis (1965). Two hundred and eleven students were

administered the AD-ACL and the resulting data was factor analyzed. The

analysis yielded four monopolar factors: (a) general activation, (b) high

activation, (c) general deactivation, and (d) deactivation-sleep. The general

activation factor showed high loadings for the following adjectives: "lively, active,

full-of-pep, energetic, peppy, vigorous," and "activated." The factor labelled high

activation showed high loadings for the following: "clutched-up, jittery, stirred-up, fearful," and "intense." General deactivation, a third factor, showed high loadings for these adjectives: "at-rest, still, leisurely, quiescent, quiet, calm," and "placid." Last, the deactivation-sleep factor showed high loadings for only three adjectives: "sleepy, tired," and "drowsy." Thayer suggested that these monopolar factors approximate four points on a hypothetical activation or arousal continuum.

The final version of the AD-ACL consists of 50 adjectives (Thayer, 1978a). Two high activation adjectives, "tense" and "anxious," were added to the twenty-two, high-loading activation adjectives listed above. These adjectives are interspersed among 26 other mood-descriptive adjectives, included by Thayer to both disguise the purpose of the test and to provide data on a variety of mood dimensions. Thayer (1978a) also developed a short form of the check list containing 20 activation/deactivation items which showed the highest loadings on the four factors.

Thayer (1967) conducted a number of validation and reliability studies on the AD-ACL. He assessed reliability by dividing subjects into four groups with each of the groups receiving a check list in which two of the activation-deactivation adjectives were repeated a second time. Test-retest reliability coefficients were then computed for these eight activation-deactivation adjectives and a median correlation coefficient of .75 was obtained.

The validity of the check list was indicated by significant correlations between the scores subjects obtained on the AD-ACL and measures of heart rate and skin resistance under various conditions (Thayer, 1967). In other studies, the AD-ACL scores of subjects were correctly predicted in situations differing, according to a priori criteria, in levels of activation (Thayer, 1967).

While Thayer (1967) reported finding monopolar factors in his early studies, subsequent research suggests that the AD-ACL corresponds to two bipolar rather than four monopolar factors (Thayer, 1978a). He (1978a) carried out two extensive studies with large numbers of subjects. The 50-item AD-ACL was administered in the first study while the 20-adjective short form of the check list was completed by subjects in the second study. Results of the factor analyses strongly suggested two bipolar factors rather than four independent factors. The first of these two factors included the adjectives which composed the high activation and general deactivation factors while the second factor combined those adjectives which comprised the general activation and deactivation-sleep factors. These findings led Thayer (1978b) to propose a two-dimensional model of activation: one activation dimension ranged from feelings of energy and vigor to the opposite feelings of sleepiness and tiredness; the second dimension ranged from tension to placidity and quietness.

At the same time, Thayer cautioned that the concept of four separate monopolar activation factors should not be completely abandoned. Based on the finding of bipolar factors, he predicted high negative correlations on the bipolar factors. Instead, Thayer found inconsistent patterns of correlations among these scores. Rather than embrace the monopolar or the bipolar view of mood states, Thayer suggested that a model of two bipolar activation factors might be usefully employed in research but that applied measurement should assume four separate activation factors.

Factor analysis of the SACL yielded two bipolar factors: stress, which Mackay et al. (1978) defined as the internal response to the perceived favourability of the external environment, and arousal, which they defined as a representation of ongoing autonomic and somatic activity. Mackay (1980) has even suggested that stress and arousal might represent the two basic components of self-reported mood states. Stress or negative hedonistic tone, which reflects a lack of well-being or discomfort, and arousal, which reflects activation or vigor. Meddis (1969) also proposed two basic components or factors of mood states: (a) hedonic tone which reflects a general sense of well-being, and (b) vigor which corresponds to the physiological concept of arousal.

Selye (1980) has advocated a two component model of stress, as well: (a) pleasantness/unpleasantness, and (b) low stress/high stress. Contrary to a common sense model, unpleasantness and stress are independent dimensions.

Selye's model allows for the experience of stress in a pleasant situation, and for the absence of stress in an unpleasant one. In addition to these two components or factors of response-based stress, Selye distinguished between situations (stimuli) of overstress and understress. He termed excessive stimulation, hyperstress, and deprivation of stimulation, hypostress, and proposed that both could result in an increase in stress.

Although Mackay et al. (1978) and Selye (1980) both support a two dimensional theory of stress they differ as to the specific dimensions. Mackay et al. distinguish between stress and arousal but make no distinction between stress and unpleasantness. Selye identified unpleasantness and stress as stress factors but did not identify arousal as a stress factor.

Three-factor theories of mood have been proposed by Russell and Mehrabian (1977) and Konopasky (1986). Russell and Mehrabian provide evidence that three independent and bipolar dimensions: (a) pleasure/displeasure, (b) degree of arousal, and (c) dominance/submissiveness, are both necessary and sufficient to define emotional states. After carefully reviewing the literature, Konopasky has proposed a model of stress which would include the following three factors: (a) stress or pleasantness/unpleasantness, (b) arousal, and (c) power or strength/weakness.

There is support for Konopasky's (1986) third factor, power, in the literature. Even Cox (1978) who developed the SACL, a two-factor measure of stress, has suggested that power or strength is an important component of stress. For example, Cox maintains that stress arises when there is an imbalance between the perceived demand and the individual's perception of his ability to meet those demands. Similarly, McGrath (1976) proposed that there is potential for experiencing stress when a situation is perceived as presenting a demand which threatens to exceed the person's capabilities and resources for meeting it. Again Lazarus (1976) has suggested that stress occurs when there are demands on the person which he believes exceed his resources.

Development of the SACL.

Mackay et al. (1978) encountered considerable difficulty interpreting the unclear factor analytic results obtained after administrating Thayer's (1967) AD-ACL. They theorized that the problem might be the result of the particular adjectives Thayer used. Thayer, being American, used words common to the American culture and, perhaps, inappropriate for a British population. Mackay et al. suggested that the frequency of adjectives like "peppy," "full of pep," "clutched-up," and "blue," for example, would be much lower in the United Kingdom than in the United States and might confuse British subjects.

Mackay et al. (1978) used Thayer's original list of words excluding those deemed too American and substituting adjectives more appropriate for a British population. This list of 45 adjectives was administered to 145 British undergraduate students (See Appendix A). A principal components factor analysis with varimax rotation yielded two bipolar factors which were labelled stress and arousal. The stress factor corresponded to a combination of Thayer's high activation and general deactivation factors while the arousal factor corresponded to a combinaton of the general activation and deactivation-sleep factors. A second analysis on data collected from 72 subjects, who had each completed the inventory twice, produced nearly identical results.

As not all adjectives showed high loadings on one or the other factor, Mackay et al. (1978) decided to eliminate some "ambiguous" items. Any adjective which

obtained a loading of less than 0.40 on one of the factors was eliminated. Of the original 45 adjectives 11 were dropped leaving a total of 34 adjectives. Mackay et al.'s stress factor showed high positive loadings for the following high stress adjectives: "tense, worried, apprehensive, bothered, uneasy, dejected, uptight, jittery, nervous, distressed," and "fearful." The stress factor, being bipolar, also showed high negative loadings for the following low stress words: "peaceful, relaxed, cheerful, contented, pleasant, comfortable, calm," and "restful." The arousal factor listed high positive loadings for the following high-arousal adjectives: "active, energetic, vigorous, alert, lively, activated, stimulated," and "aroused." The arousal factor, being bipolar, also showed high negative loadings for the following low arousal words: "drowsy, tired, idle, sluggish, sleepy, somnolent," and "passive." Four more adjectives were dropped from the check list in 1978, "fearful, aroused, somnolent," and "passive." In comparison with the other 30 adjectives, these adjectives showed weak loadings on the declared factors and were felt to be somewhat difficult for subjects.

Mackay et al. (1978) suggest that the thirty adjectives which compose the SACL reflect two fundamental aspects of mood: (a) stress which they define as feeling tense, uncomfortable, unpleasant, and bothered, and (b) arousal which is defined as being alert, awake, attentive, and lively. The model of mood states underlying the SACL is, then, two dimensional: one dimension, stress, relates to feelings of unpleasantness and pleasantness or hedonic tone; the other, arousal, relates to ongoing autonomic and somatic activity.

Reliability and validity of the SACL.

Watts, Cox and Robson (1983) report that the split-half reliability coefficients for the stress and arousal scales are acceptable at 0.80 and 0.82, respectively. Validity has also been demonstrated in a number of different clinical and occupational studies. For example, Burrows, Cox and Simpson (1977) provide evidence of the predictive validity of the SACL in their paper on the measurement of stress in a sales training situation. A physiological instrument, the measurement of capillary blood glucose levels, and a psychological one, the SACL, were utilized by Burrows et al. to measure stress in participants who were required to complete arduous and demanding sales training exercises. The results indicated that both blood glucose and the SACL are useful in describing the nature and operation of stress in this occupational situation. Cox, Thirlaway and Cox (1982) investigated the relationships among physiological measures such as heart rate, heart rate variability, and blood glucose levels, and a psychological measure, the SACL. Their results confirmed the check list as a valid tool for the measurement of stress. Finally, predictive validity of the SACL was reported by Ray and Fitzgibbon (1981). In this study, stress and arousal were assessed pre-operatively by the SACL in a sample of cholecystectomy patients. Measures of post-operative adjustment were taken following surgery. These included post-operative stress which was assessed by administering the SACL on the fifth day following surgery, pain-ratings, number of days to discharge, amount of pain and sleep medication required, and occurrence of negative reactions and complications. Stress before surgery was positively

related to stress and pain experienced post-operatively. Arousal, by contrast, was negatively related to pain, medications, and period before discharge.

Polarity of factors.

While Mackay et al. (1978) reported bipolar factors on analyzing responses to the SACL, others, using the same or similar tests, have not. Indeed, the debate continues as to whether mood states are monopolar or bipolar (Meddis, 1972; Thayer, 1978a; Lorr & Shea, 1979; Lorr, McNair & Fisher, 1982). Initially, Nowlis (1970) was surprised to find that research with his MACL yielded monopolar rather than bipolar results (Nowlis & Nowlis, 1956; Green & Nowlis, 1957). He concluded that mood states often considered to be mutually exclusive actually may vary quite independently of each other and may, therefore, be present with considerable intensity within the same individual. Meddis (1972) suggested that such a factor structure is at odds with common sense pointing out Nowlis' (1965) contention that happiness and sadness are not opposed but vary largely independently of one another. Meddis suggested that results such as those reported by Nowlis and Nowlis (1956) and Green and Nowlis (1957) came about because of the interaction of the particular statistical analysis and the asymmetrical response scales, two categories of acceptance but only one of rejection, used. The scales used by Meddis (1969) in his own version of a mood adjective check list were symmetrical offering as many negative as positive response categories. The resulting factors were clearly bipolar. Meddis assumed that asymmetrical scales suppressed negative correlations and

minimized the likelihood of bipolar factors in the factor analysis. But this assumption is inconsistent with the findings of Mackay et al. They reported bipolar factors even though the SACL utilized an asymmetrical response scale.

Research by Lorr and Shea (1979) offered some support for both Nowlis (1965, 1970) and Meddis (1969, 1972). Lorr and Shea found that some moods appear to be bipolar while others are not. For example, they found that "cheerful" and "dejected" reflect monopolar factors rather than reflecting two poles of one factor. A person who is not cheerful, they contend, need not be dejected. Rather, the person might be grouchy, tired, anxious, or thoughtful. Subsequent research by Lorr, McNair and Fisher (1982) suggests a stronger case for the bipolar model of mood states than for the monopolar model of mood. In this study, psychiatric subjects were administered the Profile of Mood States (POMS) and tested for the presence of five bipolar mood states after the influence of an asymmetrical response format had been removed. Lorr et al. used a five-point symmetrical response scale which offered the following response categories: "not at all," "a little," "moderately," "quite a bit," and "extremely." The predicted factors of affect were: (a) composed versus anxious, (b) agreeable versus hostile, (c) energetic versus fatigued, (d) elated versus depressed, and (e) clear-thinking versus confused. Their results indicated that factors of mood states tend to be bipolar when subjects use symmetrical rating scales.

Replication of the factor structure of the SACL.

The factor structure for SACL data reported by Mackay et al. (1978) has been replicated by some and not by others. McCormick, Walkey and Taylor (1985) examined the factor structure of the SACL after collecting data from 203 New Zealand University students. The results presented an almost exact replication of the two bipolar factors reported by Mackay et al. Only one item, "dejected," failed to reach the factor loading cut-off of 0.40 set by Mackay et al. on the appropriate, stress, factor.

In Australia, King, Burrows and Stanley (1983) administered a modified version of the SACL to 126 subjects. The check list was modified in that only 20 of the SACL items were used, ten for each of the scales measuring stress and arousal. The 20 items chosen by King et al. had the highest factor loadings according to Mackay et al.'s (1978) analysis and were considered, by the authors, to be reasonably comprehensible to an Australian population. The authors of this study concluded that although the Australian factor loadings for individual items were often lower than those reported in the British study, the pattern of loadings was similar to the British results.

Cruickshank (1984), on the other hand, failed to replicate the factor structure reported by the authors of the SACL. Analysis of her data, collected from 189 British subjects, yielded monopolar rather than bipolar factors. She argued, consistent with Meddis (1969, 1972) that this was predetermined by the

asymmetrical response format.

Cruickshank (1984) had other criticisms of the SACL in addition to the asymmetry of the response scale. Another problem with the response scale according to Cruickshank is the "?" option; this response category is difficult to interpret because subjects may use it to indicate either that they do not understand the adjective or that they cannot decide if it applies to them or not. It could be that two responses to denote two different reactions to the adjective might change the factor structure. A final criticism offered by Cruickshank is that the stress and arousal scales offer an unequal number of positively and negatively keyed adjectives.

The first point Cox and Mackay (in press) make in defending their check list and factor analytical results is that Cruickshank (1984) did not use the authors' (1978) version of the SACL. Cruickshank included all 45 adjectives used in Mackay et al.'s (1978) initial study rather than the 30-item test which is now considered the SACL. Addressing the criticism of scale imbalance, Cox and Mackay suggest that the difference in number between positive and negative adjectives for each of the scales is trivial. There are ten positive and eight negative stress adjectives, and seven positive and five negative arousal adjectives in the current 30-item SACL. Certainly, there is no evidence that the asymmetry of positively and negatively keyed items diminishes the reliability or the validity of the test or that it changes the factor structure of the test. With

respect to the symmetry of the response scale, Cox and Mackay state that while Cruickshank suggested symmetrical scales are preferable, there is ongoing debate as to the advantages of a symmetrical scale (Jahoda & Warren, 1966). Bohlin and Kjellberg (1973) argue, for example, that the experience of mood is not symmetrical; the strength of feeling as described by an adjective runs from its absence to maximum intensity. The inclusion of several rejection categories in a response scale to balance the acceptable categories implies a grading of the absence of a feeling. If a respondent wants to indicate that an adjective is "not much like them" as opposed to "not at all like them," the proper response might be "+" rather than "-."

In regards to the "?" response, Cox and Mackay (in press) write that in all but the earliest version of the check list, deliberate emphasis has been placed on the response indicating "cannot decide" rather than "not clear." Indeed the authors have laboured to select words which are relatively simple and easy to understand. While Cruickshank's analysis of data collected from British subjects did not produce bipolar factors, Cox (personal communication, May, 1986) has confirmed their original finding of bipolar factors after collecting and analyzing new data from a British sample.

Check List of Arousal and Stress (CLAS).

Mackay et al. (1978) have provided "alternate" forms of the SACL which they labelled A, B, C, and D. However, these forms differ from one another only with

respect to the order in which the adjectives are presented, the same 30 words appearing in each form. Mackay et al. did not provide a true alternate form of the SACL which contains different adjectives. Anastasi (1982) has stated that alternate forms of tests are of considerable value and are useful in follow-up studies or investigations of effects of some intervening experimental factor on test performance. A subject, given the same form of a test more than once, may provide the same responses to items through memory rather than because the subject is in the same state. Utilizing an alternate form eliminates this problem and underscores the value of developing a true alternate form.

In constructing the alternate form of the SACL, the Check List of Arousal and Stress (CLAS) criticisms regarding the difficulty of the SACL adjectives were addressed. After giving the SACL to 189 subjects in an out-patient facility, Cruickshank (1982, 1984) found that she was frequently asked for explanations of the items. She was concerned that this situation could result in subjects ending up with low stress scores because "not clear or cannot decide" responses are scored identically to "definitely do not feel" responses. King, Burrows and Stanley (1983) simply eliminated those adjectives which they understood to be difficult. Unfortunately, reducing the number of adjectives to a total of 20 for the two scales jeopardized the reliability and validity of the test. To ensure that the items composing the CLAS were easy to interpret and that complex emotional states were well represented, the single-word adjectives which appear in the SACL were replaced with short, simple phrases.

Check List of Arousal, Stress and Power (CLASP).

The Check List of Arousal, Stress and Power (CLASP) was developed after a literature review indicated that a scalemeasuring three factors might better measure stress and mood state than two factor tests (Lazarus, 1976; McGrath, 1976; Russell & Mehrabian, 1977; Cox, 1978). To accomplish this end, a 15-item power scale was constructed. Again, to facilitate comprehension of the items, short phrases were used rather than single adjectives. When the 15 power scale items are combined with the items found in the CLAS the result is the CLASP, a 45-item, three factor measure of stress.

Factor analysis: A brief review.

The present study set three goals: (a) the SACL was administered to a Canadian population and the responses were factor analyzed and the results compared with those reported by Mackay et al. (1978); (b) the development of an alternate form of the SACL, the CLAS; and (c) the construction of a scale for measuring a third factor, power, which, when combined with the CLAS would provide a three factor measure of stress, the CLASP. Given that factor analysis was so integral a part of this study, a brief presentation on it is provided below.

According to Norusis (1985) and Kim and Mueller (1978a, 1978b), underlying dimensions or factors, are useful in explaining complex phenomena like stress. Observed correlations among measures of specific variables relating to the

phenomena result from these variables reflecting the same factors. Norusis

offers, as an example, the fact that correlations among test scores can be

attributed to such shared factors as general intelligence, abstract reasoning

skill, and reading comprehension. The goal of factor analysis, then, is to identify

the not-directly observable factors by examining the pattern of correlations

among variables and deciding what common abstract factor the variables reflect.

In the case of the present study the intent was to determine which factors

underlie the mood check list items and, more generally, which factors underlie

stress.

Factor analysis generally proceeds in three steps (Norusis, 1985). First, the

correlation matrix for all of the measured variables is computed. Second, the

number of factors needed to mathematically represent the data are extracted.

Third, the factor loadings are rotated to achieve a simple factor structure.

There are several procedures for determining the number of factors which

should be extracted. One criterion suggests that only factors which have

eigenvalues greater than one, should be considered. Another procedure

considers the cumulative percent of variance accounted for by the factors; it

stipulates that only that number of factors required to account for 60 percent of

the variance should be extracted. A third criterion involves a plot of the total

variance associated with each factor. Typically, this plot shows a distinct break

between the factors which account for a large percentage of the variance and

the rest. This trailing off in the slope of percentages of variance accounted for after the "large" factors has been labelled the scree and experimental evidence indicates that the scree begins after the factor which represents the last of the "true" factors.

The principal components method of factor extraction is commonly employed and was used in the study by Mackay et al. (1978). Norusis (1985, p. 130) provides the following description of such an analysis:

In principal components analysis, linear combinations of the observed variables are formed. The first principal component accounts for the largest amount of variance in the sample. The second principal component accounts for the next largest amount of variance and is uncorrelated with the first. Successive components explain progressively smaller portions of the total sample variance, and all are uncorrelated with each other. Thus, principal components analyses are used whenever uncorrelated linear combinations of the observed variables are desired.

The third phase of factor analysis, the rotation phase, attempts to achieve a simple structure, each factor having maximal loadings for some variables and minimal loadings for the remainder. While rotation does not alter the communalities and the percentage of total variance explained, the percentage of variance accounted for by each factor does, however, change. Rotation redistributes the explained variance for the individual factors. Different rotation

methods, therefore, might actually result in the identification of somewhat different factors.

The varimax method is the most commonly used method of orthogonal rotation of factors (Norusis, 1985). Orthogonal rotation is defined by Kim and Mueller (1978b, p. 85) as "the operation through which a simple structure is sought under the restriction that factors be orthogonal or uncorrelated. Factors which are obtained through this rotation are by definition uncorrelated." The varimax rotation attempts to minimize the number of variables which have high loadings on multiple factors, thereby enhancing the interpretability of factors.

Method

Overview

The goals of the present experiment were threefold. First, results from the factor analysis of data collected through the administration of the SACL, a measure of stress and arousal, to a Canadian population were to be compared to those reported by its authors, Mackay et al. (1978). Secondly, an alternate form of the SACL, The Check List of Arousal and Stress (CLAS), was to be developed and its reliability demonstrated. Finally, a new scale to measure a third and independent factor, power, was to be developed. The combination of this third scale with the CLAS items would provide a three factor measure of stress, the Check List of Arousal, Stress and Power (CLASP). In aid of these goals, subjects were administered three check lists: (a) the SACL; (b) the alternate form of the SACL developed by the author, the CLAS; and (c) a power scale, also developed by the author to measure a power or strength/weakness factor.

First, a pilot study was carried out to help select the items for the CLAS and the power scale. Two check lists were administered to 88 undergraduate subjects. The pilot-study CLAS offered 39 items (see Appendix B) and the pilot-study power scale (see Appendix C) offered 31 items. After factor analysis, the 30 CLAS items which showed the highest factor loadings on the appropriate factors were selected and the remaining nine dropped. Again, after factor analysis, the 15 power items which showed the highest loadings on two

monopolar factors of power were retained and the remaining 16 deleted. In this manner, the 30-item CLAS and the 15-item power scale were developed.

Subjects

Three hundred and ninety four undergraduate psychology students participated as subjects in this study. Three hundred and sixty four of these subjects were freshmen while the remaining 30 were juniors. Two hundred and forty six of the subjects received credit, a small bonus in their course grade, for their participation in this study while the other 148 did not. Two hundred and five of these subjects were female, 165 were male; 24 of the participants did not indicate gender. The average age of the subjects was 20.4 years.

Test Materials

Three checklists were used: the SACL, the CLAS, and the power scale. The SACL, a measure of the experience or the feeling of stress, provides scores for two independent factors, stress and arousal (see Appendix D). It consists of a total of 30 adjectives, 18 of which comprise the stress scale and 12 comprise the arousal scale. Ten of the 18 stress adjectives are described as high stress words while the remaining eight are low stress adjectives. There are seven high arousal adjectives and five low arousal words.

The CLAS, an alternate form of the SACL and a measure of stress, consists of short phrases rather than single adjectives (see Appendix E). The phrases

which compose the CLAS were written by the author after consulting with colleagues, and checking a dictionary (*Webster's New Collegiate*, 1977) and a thesarus (*Roget's II*, 1980). Phrases were substituted for single adjectives in an effort to make the alternate form of the SACL easier for subjects to understand. For example, rather than replace the SACL's "dejected" with another difficult adjective like "disheartened," "heavy-hearted" was used. A second reason for using phrases rather than single adjectives is their greater potential for conveying information. When a phrase is employed instead of a single word a more precise feeling may be expressed. For example, a single SACL adjective, "worried" captures only the feeling of high stress whereas the CLAS item, "carrying the weight of the world" conveys not only a feeling of stress but also suggests a state of inactivity or low arousal.

While phrases have replaced single words in the CLAS, this form offers, overall, the same number of items as the SACL. Furthermore, the number of high stress items, low stress items, high arousal items, and low arousal items are identical to the number found in the original check list. The order of presentation of the items composing the CLAS is also consistent with that found within the SACL. For example, when developing the CLAS the high stress phrase, "on edge," takes the place of the high stress adjective , "jittery."

Like the CLAS, the power scale is comprised of short phrases (see Appendix F). Eight of the phrases were intended to be high power or strength items while

the remaining seven represented low power or weakness. While this scale was administered separately from the CLAS, responses to it were combined with the CLAS. This three factor, stress, arousal, power, measure of stress was entitled the CLASP.

To avoid the possibility that the factor analytical results depend on the particular order of presentation of items used in the study, a second form was developed for each of the three check lists, the SACL (see Appendix G), the CLAS (see Appendix H), and the power scale (see Appendix I). The two forms of the check lists differed only in the order of presentation of the items. For both the SACL and the CLAS the second form was created by ordering items 16 to 30, one to 15 and moving items one to 15 into positions 16 to 30. The second form of the power scale was constructed by moving items in the first eight positions into the last eight positions while moving the last seven items into positions one through seven.

Printed instructions were attached to each of the check lists. The instructions provided for the SACL were identical to those developed by Mackay et al. (1978) (see Appendix J). The instructions attached to the CLAS (see Appendix K) and the power scale (see Appendix L) were the same as those accompanying the SACL with two slight modifications. First, the term "phrase" or "phrases" was substituted on any occasion that "word" or "words" appeared in the original SACL instructions. Second, one item from the SACL, "relaxed,"

appears in the instructions in examples of the possible responses a subject may provide. For the CLAS, "on edge" replaces "relaxed" while "in control" appears in the examples for the power scale.

The instructions advised the subject to respond to each item in one of four ways: (a) if the item definitely describes how the subject feels at that moment, he is to circle the double plus which is indicated, "++"; (b) if the item is likely to apply to but is not necessarily applicable to the subject's feelings at the moment, he is to circle the single plus mark "+"; (c) if the item is not clear to the subject or he cannot decide whether or not it applies to his feelings at the moment, he is to circle the question mark "?"; and (d) if the subject decides that the item does not apply to his feelings at the moment, he is to circle the minus sign "-."

In addition to these written instructions, subjects also received brief oral instructions before being given the check lists. Subjects were told they were about to receive three short check lists and were asked to complete them in the order in which they were presented. Subjects were also instructed to respond to every item on each of the check lists. Finally, each subject was asked to indicate his or her age and gender on the top of the first page.

Procedure

The original SACL, the CLAS, and the power scale were administered to groups of subjects. Half, or 197, of the subjects received the SACL first and then

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completed the CLAS, while the other half were administered the check lists in the reverse order. The power scale was administered last to all subjects. One hundred and ninety eight subjects received check lists with the original order of presentation of items (Mackay et al., 1978) while the remaining 196 subjects received the check lists with the alternate ordering of items.

The time required for administration of the three check lists was approximately fifteen minutes, including instructions, completion, and handling of the check lists.

Results

The data were the responses to the three check lists, the SACL, CLAS and CLASP. Data from check lists with missing responses were not used in the analyses: (a) there was one incomplete SACL yielding a sample of 393; (b) there were two incomplete CLAS check lists providing a sample of 392; and (c) there was one incomplete power scale which, in combination with the completed CLAS check lists, provided a sample of 391 CLASPs.

Each data set was factor analyzed. The number of factors extracted by principal components was determined by the Kaiser criterion which includes only those factors which have eigenvalues greater than one. Once extracted, these factors were submitted to varimax rotation.

Factor Analysis of SACL Data

The results of the factor analysis of the SACL data collected from 393 subjects is presented in Table 1. In addition, Table 1 compares these results with the findings of Mackay et al. (1978).

Four monopolar factors, which accounted for 56 percent of the variance of SACL responses were extracted: Factor 1 was labelled high stress, Factor 2, high arousal, Factor 3, low stress, and Factor 4, low arousal. As reported in Table 1, Mackay et al. (1978) obtained two bipolar factors: stress as Factor 1 and arousal as Factor 2. The fact that Mackay's analysis yielded bipolar factors while

the present analysis provided monopolar factors accounts for both the difference in the number of factors extracted and the difference in the sign of the loadings for some of the items. In Mackay's analysis, high stress and low stress adjectives loaded on the same factor as did high arousal and low arousal items. High stress and high arousal items have positive loadings on their respective factors while low stress and low arousal words show negative loadings on the stress and arousal factors, respectively. In the present study high stress and low stress items showed high positive loadings on separate factors and did not show high negative loadings on any factor. Similarly, high arousal and low arousal adjectives showed high positive loadings on two separate factors.

TABLE 1

Factor Loadings of SACL Items

SACL Adjective	Mackay et al's Loadings	Factor	Present Loadings	Factor
tense	0.75	1	0.81	1
worried	0.69	1	0.75	1
apprehensive	0.54	1	0.58	1
bothered	0.71	1	0.63	1
uneasy	0.72	1	0.78	1
dejected	0.59	1	0.57	1
uptight	0.70	1	0.76	1
jittery	0.64	1	0.72	1
nervous	0.64	1	0.75	1
distressed	0.73	1	0.72	1
peaceful	-0.68	1	0.71	3
relaxed	-0.77	1	0.61	3
cheerful	-0.64	1	0.66	3
contented	-0.73	1	0.55	3
pleasant	-0.68	1	0.74	3
comfortable	-0.56	1	0.60	3
calm	-0.68	1	0.43	3
restful	-0.55	1	0.32	3
active	0.71	2	0.67	2
energetic	0.75	2	0.73	2
vigorous	0.69	2	0.84	2
alert	0.63	2	0.40	2
lively	0.77	2	0.73	2
activated	0.66	2	0.76	2
stimulated	0.60	2	0.59	2

drowsy	-0.71	2	0.77	4
tired	-0.61	2	0.80	4
idle	-0.54	2	0.11	4
sluggish	-0.65	2	0.59	4
sleepy	-0.75	2	0,85	4

Factor loadings for individual items showed small differences in the two studies.

Mean factor loadings proved even more consistent and are presented in

Table 2.

TABLE 2

Mean Factor Loadings of the High Stress, Low Stress, High

Arousal, and Low Arousal Items of the SACL

Factor	Mackay et al.	Present
High Stress	0.67	0.71
Low Stress	0.66	0.58
High Arousal	0.69	0.67
Low Arousal	0.65	0.62

Mackay et al's two bipolar factors stress and arousal, have been divided into

four parts, that is, high stress adjectives, low stress adjectives, high arousal

adjectives and low arousal adjectives, to facilitate the comparison with the

monopolar factors reported in the present study.

In their study, Mackay et al. (1978) set a factor loading of 0.40 as the minimum

loading for an adjective to be included in the scale measuring that factor. In the

current study, two of the items failed to meet this criterion: "restful" showed no

factor loadings higher than 0.32; "idle" did not load appropriately on any of the

four factors although it did show a high loading, 0.76, on a fifth factor which was

not interpreted since it was considered a statistically trivial factor. According to

Gorsuch (1974), factors which do not have at least two or three high loadings by

items which show high loadings on that factor only, are poorly defined and

should not be interpreted.

Factor Analysis of CLAS Data

Results of the factor analysis of the CLAS data collected from 392 subjects

are presented in Table 3. Again, four monopolar factors, accounting for 53

percent of the variance of responses to the CLAS were extracted: Factor 1 was

labelled high stress, Factor 2, high arousal, Factor 3, low arousal, and Factor 4,

low stress.

TABLE 3

Factor Loadings of the CLAS and CLASP Items

Phrase	CLAS Loading	Factor	CLASP Loading	Factor
under a great strain	0.78	1	0.69	2
in a panic	0.72	1	0.70	2
on edge	0.71	1	0.72	2
a bundle of nerves	0.69	1	0.71	2
carrying the weight of the world	0.65	1	0.62	2
in over my head	0.65	1	0.54	2
down in the dumps	0.61	1	0.63	2
at the end of my rope	0.59	1	0.56	2
a lot on my mind	0.52	1	0.40	2
heavy-hearted	0.28	1	0.22	2
full of energy	0.85	2	0.80	3
full of pep	0.82	2	0.77	3
full of life	0.78	2	0.74	3
full of vim and vigor	0.78	2	0.81	3
raring to go	0.59	2	0.81	3
wide awake	0.59	2	0.40	3
excited by life	0.24	2	0.21	3
wound down	0.65	3	0.46	4
really tired	0.60	3	0.81	4
worn-out	0.55	3	0.68	4
no get-up-and-go	0.51	3	0.51	4
half asleep	0.49	3	0.76	4
easy-going	0.70	4	0.68	6
light-hearted	0.70	4	0.71	6
happy-go-lucky	0.64	4	0.60	6
taking it easy	0.55	4	0.48	6
at peace	0.54	4	0.48	6
satisfied with life	0.25	4	0.22	6
even-tempered	0.18	4	0.18	6
life is good	0.15	4	0.15	6

self-confident	--	--	0.77	1
sure of myself	--	--	0.76	1
self-assured	--	--	0.73	1
able to hold my own	--	--	0.71	1
in control	--	--	0.68	1
on top of things	--	--	0.65	1
likely to succeed	--	--	0.64	1
a go-getter	--	--	0.60	1
going no where fast	--	--	0.68	5
not making any progress	--	--	0.60	5
like a failure	--	--	0.58	5
can't make up my mind	--	--	0.40	5
unsure of myself	--	--	0.33	5
like a lightweight	--	--	0.08	5
meek and mild	--	--	-.06	5

The mean factor loading for the high stress factor was 0.62, 0.46 for the low stress factor, 0.69 for the high arousal factor, and 0.56 for the low arousal factor. A comparison of the average factor loadings of CLAS items with the SACL items, either those reported by Mackay et al. (1978) or those reported in the present study, reveals lower factor loadings for the CLAS items.

Four of the items comprising the alternate form of the SACL, the CLAS, failed to reach the loading cut-off criterion of 0.40 set by Mackay et al. (1978). "Excited by life" showed a 0.24 loading on Factor 2, high arousal, while "satisfied with life" and "life is good" showed 0.25 and 0.15 loadings, respectively, on Factor 4, low stress. These three phrases, "excited by life", "satisfied with life", and "life is good" did load highly on a fifth factor, with loadings of 0.77, 0.68, and 0.82, respectively. "Even-tempered," included to reflect low stress, showed a loading of 0.18 on Factor 4, the low stress factor, but did show a loading of 0.81 on Factor 6. As this was the single high loading for this factor, it was not interpreted. "Heavy-hearted" was intended to reflect high stress but the factor analytical results indicate that subjects responded to this phrase in the same way as low arousal items. "Heavy-hearted" showed a loading of 0.68 on the low arousal factor and only 0.28 on the high stress factor. Overall, the results indicate that five new phrases should be substituted for these five phrases which do not, apparently, clearly reflect the factors they were intended to measure.

Factor Analysis of CLASP Data

The factor loadings for the analysis of the combined CLAS and power scale or CLASP data are displayed in Table 3. This data was collected from 391 subjects. Six monopolar factors, which accounted for 53 percent of the variance, were extracted in the following order: Factor 1 was labelled high power, Factor 2, high stress, Factor 3, high arousal, Factor 4, low arousal, Factor 5, low power, and Factor 6, low stress.

Table 3 shows the changes in the factor loadings of the CLAS items when additional items, power scale items, were included in the analysis. While this difference is readily apparent for individual check list items, the mean loadings of items, displayed in Table 4, for each of the stress and arousal factors are similar whether or not power items are included in the analysis.

TABLE 4

Mean Factor Loadings of the High Stress, Low Stress, High Arousal and Low Arousal Items of the CLAS and CLASP

Factor	CLAS	CLASP
High Stress	0.62	0.58
Low Stress	0.46	0.44
High Arousal	0.69	0.65
Low Arousal	0.56	0.64

Seven of the items comprising the 45-item CLASP did not meet Mackay et.
al's 0.40 loading cut-off criterion on any factor or on appropriate factors: As
reported above, four of these items failed to meet this same criterion when the
CLAS data were analyzed alone. "Meek and mild" and "unsure of myself" did not
load highly on any of the factors. Should additional CLASP factors be
interpreted? High factor loadings on a seventh factor were found for "excited by
life," 0.72, "satisfied with life," 0.66, and "life is good," 0.76. "Like a lightweight"
showed a high loading, 0.78, on the eighth factor which was the only loading of
any magnitude for this factor while the same was true for "even-tempered,"
which loaded highly, 0.77, on Factor 10. Again, these factors were judged to be
trivial and were not interpreted.

The CLASP results indicate that the seven items discussed above need to be
replaced with more appropriate phrases: a high arousal item should be
substituted for "excited by life," three low stress phrases should be substituted for
"satisfied with life," "life is good," and "even-tempered," and finally, three low
power items should be substituted for "like a lightweight," "meek and mild," and
"unsure of myself." Also, the factor analysis revealed that "heavy-hearted,"
showing only a 0.22 loading on the high stress factor, is not a high stress
phrase. Instead "heavy-hearted" seems to be a low power phrase showing a
loading of 0.48 on the low power factor. This means that this item could be used
in place of one of the three items, intended to be low power items but which

failed to show high loadings on the low power factor. At the same time, a high

stress phrase is required to replace "heavy-hearted."

Reliability Coefficients for the Scales

Scales for measuring stress and arousal by the CLAS and CLASP were

developed to be parallel to the SACL. The high stress and low stress items were

combined to form a stress scale, and the high arousal and low arousal items

were combined to form an arousal scale. The high power and low power items

were combined to form a power scale. Cronbach's Alpha was calculated for the

stress and arousal scales of the SACL, the stress and arousal scales of the

CLAS, and the stress, arousal and power scales of the CLASP. After scoring

each of the check lists, the responses were analyzed by estimating the

consistency of responses to items comprising each of the scales. The reliability

coefficients for the scales of the SACL, CLAS, and CLASP are shown in Table 5.

TABLE 5

Reliability Coefficients for the Stress and Arousal Scales of the SACL, CLAS, and CLASP and the CLASP Power Scale

Scale	SACL	CLAS	CLASP
Stress	0.88*	0.84*	0.84*
Arousal	0.86*	0.86*	0.86*
Power	--	--.	0.82*

* denotes significance at the .001 level

Pearson Product-Moment Correlation Coefficients

To demonstrate that the CLAS is an alternate form of the SACL, Pearson product-moment correlation coefficients between responses by subjects to the SACL items and the CLAS items were calculated. These significant coefficients, which are presented below in Table 6, indicate that the SACL and the CLAS measure the same variables and are alternate forms of each other.

TABLE 6

Pearson Product-Moment Correlation Coefficients Calculated Between

Responses to the Items Comprising the Stress and Arousal Scales

of the SACL and the CLAS

Scale	Coefficient
Stress	0.79*
Arousal	0.81*

* denotes significance at the .001 level

Summary of Results

Mackay et al.'s (1978) finding of two bipolar factors was not replicated in this study. Rather, the analysis of the present SACL data indicated four monopolar factors: Factor 1 was labelled high stress, Factor 2, high arousal, Factor 3, low stress, and Factor 4, low arousal. Consistent with the results of the SACL analysis, analysis of the CLAS data, an alternate form of the SACL, also yielded the same four monopolar factors. Four of the items written for this new check list failed to show appropriate loadings on the factors and should, therefore, be replaced. Consistent with the findings for the SACL and the CLAS, analysis of the CLASP data also revealed monopolar factors: Factor 1 was labelled high power, Factor 2, high stress, Factor 3, high arousal, Factor 4, low arousal, Factor

5, low power, and Factor 6, low stress. Seven of the phrases written for the CLASP failed to show appropriate loadings on the factors and, therefore, new phrases should be substituted in their place.

Cronbach'a alpha was calculated for the stress and arousal scales of the SACL, the stress and arousal scales of the CLAS, and the stress, arousal and power scales of the CLASP. All of the coefficients were significant, indicating internal consistency. Finally, significant Pearson product-moment correlation coefficients were calculated between subject scores on the stress and arousal scales of the SACL and the CLAS, indicating that the CLAS is an alternate form of the SACL.
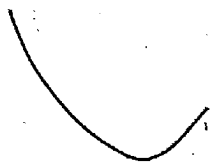
Discussion

The goals of the study were threefold: (a) replicating Mackay et al.'s (19.78) SACL factor analytical results; (b) the development of an alternate version of the SACL, the CLAS; and (c) the development of a three factor measure of stress, the CLASP.

First, the likelihood of replicating Mackay et al.'s (1978) factor analytical results will be considered with respect to size of the communalities of the variables, the number of high loading variables per factor, and number of subjects per analysis.

The polarity of the SACL factors will then be discussed. The differences between the loadings for SACL items in the Mackay et al. (1978) study and the current study will also be examined. An appropriate cut-off point for significant factor loadings will be suggested next. The number of factors which should be interpreted from among all of those extracted during the analysis of SACL data will be considered.

The polarity of the CLAS factors will be considered as well as those CLAS items which failed to load highly on the appropriate factors. The number of factors that should be interpreted from among all of the factors extracted during the analysis of the CLAS data will be discussed. The order in which the factors of the SACL and the CLAS were extracted will then be presented.

The polarity of the CLASP factors will be considered as well as the low loading CLASP items. Again, the number of factors that need be interpreted for the CLASP data will be discussed as will the order in which these factors were extracted.

The reliability of the CLAS will be discussed before turning to a discussion of the three factor model of stress including implications for assessment and treatment. Ideas for future research will then be presented before concluding with a brief summary.

Replicability of the SACL

A series of factor analytical studies of English subjects by Mackay et al. (1978) led to the development of the SACL which provides scores for two independent factors, stress and arousal. The first objective in the present study was to determine whether the same factors of stress and arousal would be found in a Canadian sample of responses to the same test. The SACL was administered to a Canadian sample of 393 students and the data factor analyzed. The present analysis yielded four monopolar factors, high stress, low stress, high arousal, and low arousal rather than the two bipolar factors, stress and arousal produced by Mackay et al.'s analysis although the factor loadings for the adjectives in the two studies were similar.

Size of communalities and replicability.

Gorsuch (1974, p. 292) defines replication in factor analysis as "the finding of the same factors across random samples." The parameters which determine the likelihood of replicability include accuracy of measurement, the strength of the phenomena, the number of variables, and the number of individuals on which the statistic is based. The accuracy of measurement and the strength of the phenomena may be ascertained in factor analysis by examining the communalities of the variables. The communality of a variable is the proportion of its variance accounted for by the common factors (Kim & Mueller, 1978a). According to Gorsuch, communalities indicate how well the data fit the model. High communalities suggest that the model is appropriate while low communalities imply the model is less appropriate and would not replicate as well. Gorsuch cites studies which found that not only factors but also factor loadings became more stable and replicable as the communalities increased. Since Mackay et al.'s (1978) factor analytical results were not presented in great detail the size of the communalities of the variables is not known. The communalities for most of the variables in the present study are at least moderately high, at 0.6, which suggests that these results are replicable.

High-loading variables and replicability.

Gorsuch (1974) states that the strength of a factor is also influenced by the number of salient variables loading on that factor. It would appear that it is difficult to replicate factors which contain fewer than five or six high-loading

variables. Replication should generally be attempted only when there are at least four salient variables per factor. Mackay et al.'s (1978) study met this condition with 18 variables loading significantly on the stress factor and 12 variables on the arousal factor. According to Gorsuch, however, Mackay et al. failed to meet the final condition which concerns the number of subjects on which the analysis is based.

Number of subjects and replicability.

It appears that the greater the number of subjects the better the chance that there will be replicability of factors. Gorsuch (1974) admits that there is not yet any standard ratio of the number of subjects to variables but suggests that the absolute minimum ratio is five individuals to every variable and not less than one hundred subjects for any analysis. Cliff (1970) found that the number of subjects influenced the number of factors which could be identified in an analysis. He factored 12 and 20 variables in a Monte Carlo study and found four factors to be recoverable when there were 600 subjects, but only two to three were identifiable with 200 subjects. Mackay et al. (1978), in administering 45 adjectives to 145 subjects in their initial study, failed to meet the minimum ratio of five individuals to every variable. In a subsequent analysis, Mackay et al. administered 34 of these adjectives to 72 subjects and, therefore, not only failed to meet the subject to variable ratio but also the stipulation that there must be at least 100 individuals for any analysis. Given the fact that Mackay et al. did not use a sufficient number of subjects and considering Cliff's findings, one might

wonder whether the SACL results would have been the same had Mackay et al. used a larger sample. The results from the present study with its larger sample size suggest that the results would indeed have been the same. With the exception of finding monopolar rather than bipolar factors, the results obtained here were very similar to those obtained by Mackay et al.

Factors and Factor Loadings of the SACL

The polarity of the SACL factors.

The critical difference between the present findings and those reported by Mackay et al. (1978) is the polarity of factors. In the present study monopolar factors were obtained while Mackay et al. found bipolar factors. While Nowlis (1970) believes that mood states once considered to be mutually exclusive actually vary independently of each other and may be present in the same individual at the same time, Meddis (1972) argues that this model is at odds with common sense. He would suggest that the finding of monopolar factors for the SACL, such as those obtained here, was determined by the asymmetrical response scale used. As stated above, the response scale is asymmetrical, because it contains two categories of acceptance but only one of rejection. When Meddis (1969) employed symmetrical scales, he found mood factors which were clearly bipolar. But, when he utilized an asymmetrical response scale monopolar mood factors emerged. Since asymmetrical response scales were used in the present study, it could be that this accounts for the finding of four monopolar factors in this study.

After considering Meddis' argument, it was decided that the data collected in this study should be recoded and made symmetrical. The data was recoded by scoring both the "++" and "+" responses as two, while the "?" and "-" responses remained as they had been scored as one and zero, respectively. The result was a symmetrical scoring system, with one score for agreeing the item was a description of oneself, one score for uncertainty and one score for rejection of the adjective as self-descriptive. Again, the factor analysis yielded monopolar factors. Different results may have been obtained, however, had the response format been altered at the time of, rather than, after, data collection.

Even if Meddis' (1972) contention concerning asymmetry and polarity is true, it does not provide any explanation as to why the results from the present study differ, with respect to the polarity of factors, from Mackay et al.'s (1978) findings. Mackay et al. used the identical response format and commented that "it is interesting to note that in the present study bipolar rather than monopolar factors emerged even when an asymmetrical scale was used" (p. 284). Cox has suggested that the reason for the discrepancy between the present findings and their results has to do with some inherent difference between British and Canadian subjects (Cox, personal communication, May, 1986).

Low-loading SACL items.

While the polarity of the factor stucture of the SACL reported by Mackay et al. (1978) was not replicated in this study, the factor loadings of the variables in the

two studies were strikingly similar. Only two adjectives proved exceptions to this general finding, "restful" and "idle." Mackay et al. set a factor loading of 0.40 as the criterion by which adjectives were to be retained or dropped from the test, any adjective with a loading below 0.40 on either the stress or arousal factors was eliminated. In the present study, "restful" showed a 0.32 loading on the appropriate, low stress, factor while "idle" had only a 0.11 loading on the low arousal factor. These findings are consistent with one study which tried to replicate Mackay et al.'s findings. Cruickshank (1984) reported that "restful" had a 0.60 loading on the low stress factor but found that "idle" failed to load significantly on any of the factors. But, it should be noted that Cruickshank administered the 45 item pilot SACL which Mackay et al. eventually used to create the 30 item SACL. It was the data of this test, not the 45 item version, which Mackay et al. reported. One study did replicate the finding of appropriate loadings for these items. McCormick, Walkey and Taylor (1985) did report similar loadings for the two items on the appropriate factors.

The factor loading cut-off point.

While it is the case that two items failed to meet the factor loading criterion set by Mackay et al. (1978), one of them did show a significant loading on the appropriate factor. Gorsuch (1974) and Hair, Anderson, Tatham and Grablowsky (1979) have suggested that an absolute value of 0.30 represents a significant (p <.05) loading. Indeed, Mackay et al. (1978) offered no explanation for their choice of the 0.40 cut-off point in their brief paper. Perhaps Mackay et al. chose

the 0.40 criterion because of their small sample size. Indeed, Gorsuch cautions that in order for loadings as low as 0.30 to be significant, a minimum number of 175 subjects would be necessary while an absolute value of 0.40 would be an appropriate criterion for a sample size of 100. Since the size of the sample in the present study is sufficient to adopt a criterion of 0.30 rather than 0.40, one can argue that the 0.32 loading for "restful" is significant and retain the item on the stress scale. This adjective seems appropriate, then, for a Canadian culture. "Idle," however, would still fail to reach the criterion on the intended factor and may not be useful for use on a scale measuring arousal within a Canadian culture.

Number of factors to be interpreted for SACL data.

Although "idle" did not load highly on the expected factor, it did so on a fifth factor, 0.76, which had an eigenvalue greater than one and was, therefore, extracted by the factor analysis in the present study. Since "idle" was the only variable with a factor loading of any magnitude on this fifth factor Gorsuch (1974) would label the fifth factor a trivial one. "Trivial factors are...factors which do not have at least two or three loadings above a certain specified level...but it might better be defined as those factors without a unique set of defining variables (p. 156). According to him, a second point to consider when deciding how many of the factors should be interpreted is the increased variance which is accounted for when an additional factor is extracted. This fifth factor only accounted for an additional 3.6 percent of the variance. Finally, the cost of interpreting another

factor consists of increased complexity of factor structure and greater difficulty in replicating such results. It would seem that there is little advantage and considerable disadvantage in interpreting five rather than the four factors extracted during the factor analysis of the SACL data.

Factors and Factor Loadings of CLAS Items

The polarity of the CLAS factors:

The second objective of this thesis was the development of an alternate and parallel version of the SACL, the CLAS. The CLAS was intended to be a two component measure of stress providing scores for two independent factors, stress and arousal. The CLAS, which consists of short phrases rather than single adjectives, was administered to 392 subjects and the data factor analyzed. Again, similar to the SACL results four monopolar factors, high stress, low stress, high arousal and low arousal, emerged instead of bipolar factors of stress and arousal.

Low-loading CLAS items.

Four of the items composing the CLAS failed to reach Mackay et al.'s 0.40 criterion for loading on a factor, nor would any of these items meet the criterion of 0.30 suggested by Gorsuch (1974). "Excited by life" had a loading of only 0.24 on the high arousal factor, while "satisfied with life," "even-tempered," and "life is good" had factor loadings of 0.25, 0.18, and 0.15, respectively, on the low stress factor. These four items should be removed from the check list and replaced with

phrases which show higher loadings on the appropriate factors.

"Heavy-hearted," written to reflect high stress, showed a loading of only 0.28 on

the high stress factor but did load significantly, 0.68, on the low arousal factor.

One item is needed to replace "heavy-hearted" on the stress scale of the CLAS.

Number of factors to be interpreted for CLAS data.

Six factors, having eigenvalues greater than one, were extracted during the

analysis of the CLAS data. Again, the additional factors were closely examined

to determine whether or not they should be interpreted. The "life" phrases,

"excited by life," "satisfied with life," and "life is good," all loaded significantly on

the fifth factor with loadings of 0.77, 0.68, and 0.82, respectively. But these

variables were the only ones which loaded significantly on this fifth factor. Unlike

the fifth factor extracted for the SACL data, this factor cannot be considered

trivial since it contains three salient loadings by variables which load highly only

on it and it did account for 4.1 percent of the variance. Should we interpret this

factor as an additional stress factor? A content analysis of the phrases loading

highly on this fifth factor would indicate that the factor reflects low stress or high

arousal which are already represented by factors 4 and 2, respectively. While it

is not clear why these items did not load significantly on the low stress and high

arousal factors, these items do not seem to identify a new factor and for this

reason one might choose not to include this factor. In addition, a satisfaction with

life factor has not been identified by researchers in the area of mood factors

(Nowlis & Nowlis, 1956; Green & Nowlis, 1957; Thayer, 1967; Mackay et al.,
1978).

The sixth factor, accounting for 3.4 percent of the variance, can be considered
trivial or poorly defined. "Even-tempered" was the sole variable to load
significantly, 0.81, on this factor alone and including this factor would account for
only an additional 3.4 percent of the variance.

Order of extraction of factors of the SACL and CLAS:

The order in which the CLAS factors were extracted was different than the
order in which factors were extracted for the SACL. Analysis of the SACL data
yielded high stress items as Factor 1, high arousal items as Factor 2, low stress
items as Factor 3, and low arousal items as Factor 4. The order was slightly
different for the CLAS data, high stress items loaded on the first factor and high
arousal items on the second but low arousal items loaded on the third factor and
low stress items on the fourth. The difference in the order of extraction between
the low stress and the low arousal factors for the two check lists can be
explained. In principal components analysis factors are extracted according to
the amount of variance for which each accounts. The first principal component
accounts for the largest amount of variance in the sample while successive
factors explain progressively smaller portions of the total sample variance
(Norusis, 1985). The low stress factor accounts for more of the variance than
does the low arousal factor in the SACL analysis while the reverse is true for the

analysis of the CLAS data. Why is this the case? Gorsuch (1974) says that the strength of a factor is determined by the number of variables with significant loadings on that factor. In the SACL analysis the low stress factor showed seven salient loadings compared to only four on the low arousal factor. For the CLAS data, there were six variables with significant loadings on the low arousal factor while only five had salient loadings on the low stress factor.

Factors and Factor Loadings of CLASP Items

The polarity of the CLASP factors.

The third objective of this study was the development of a three factor measure of stress, the CLASP, which would provide scores for three independent mood factors, stress, arousal and power. The CLASP was created by combining the 30-item CLAS with a 15-item power scale, identical to the CLAS in format. Analysis of the CLASP data yielded six monopolar factors: high stress, low stress, high arousal, low arousal, high power, and low power.

Low-loading CLASP items.

Seven of the items composing the 45-item CLASP failed to reach Mackay et al.'s (1978) cut-off point of 0.40. If the 0.30 criterion suggested by Gorsuch (1974) is adopted "unsure of myself," with a loading of 0.33 on high stress, would be retained. The other six items include: "excited by life," with a 0.21 loading on high arousal, "like a lightweight" and "meek and mild" with loadings of 0.08 and -0.06, respectively, on the low power factor, and "satisfied with life,"

"even-tempered," and "life is good" with loadings of 0.22, 0.18, and 0.15, respectively, on the low stress factor. These items should be replaced with phrases which load significantly on the appropriate factors. Although "heavy-hearted" did not show a high loading, at 0.22 on the high stress factor, it did load highly, 0.48, on the low power factor. This phrase, then, could be substituted for one of the items which failed to load significantly on the low power factor. A new high stress item should be added to complete the stress scale of the CLASP.

Number of factors to be interpreted for CLASP data.

In addition to the six factors discussed above, four factors with eigenvalues greater than one were also extracted during analysis of the CLASP data. The three "life" phrases, "excited by life," "satisfied with life," and "life is good" loaded significantly on a seventh factor which accounted for 2.6 percent of the variance with loadings of 0.71, 0.66, and 0.76, respectively. Statistically, this factor cannot be considered trivial since it contains three salient loadings by variables which do not load highly on any other factor. Again, the question arises as to whether this factor should be interpreted and, again, the answer seems to be negative. These items do not appear to identify a new stress factor but, rather, represent low stress or high arousal. Nor has such a factor been reported by others working in the mood factor field (Nowlis & Nowlis, 1956; Green & Nowlis, 1957; Thayer, 1967; Mackay et al., 1978).

Factors eight, nine, and ten are statistically trivial, accounting for only a small amount of variance, 2.4 percent, 2.3 percent, and 2.2 percent, respectively. "Meek and mild" was the only item to load significantly on Factor 8 while none of the CLASP items showed significant loadings on Factor 9. "Even-tempered" was the only variable to load significantly on the tenth factor.

Order of extraction of factors of the CLASP.

As stated earlier, factors are extracted in the order of the percent of variance for which they account. The order in which the factors of the CLASP were extracted proved interesting and was as follows: high power items on Factor 1, high stress items on Factor 2, high arousal items on Factor 3, low arousal items on Factor 4, low power items on Factor 5, and low stress items on Factor 6. The newly devised high power factor accounted for the greatest amount of variance in the sample, 24.4 percent. This proves interesting from both a statistical and a theoretical viewpoint.

One might have expected the stress factor to be extracted first since this was the case for the SACL and the CLAS. But, the high stress factor accounted for only 10.2 percent of the variance whereas the high power factor accounted for 24.4 percent of the variance.

The importance of power, as a component of stress, has been well discussed in the literature. Cox (1978) has stated, for example, that stress arises when

there is an imbalance between the perceived demand and the individual's perception of his ability to meet those demands. McGrath (1976) has proposed that there is a potential for experiencing stress when a situation is perceived as presenting a demand which threatens to exceed the person's capabilities. Lazarus (1976) has suggested that stress occurs when there are demands on the person which, he believes, exceed his resources. The empirical results of the present study confirm that, indeed, power is an important component of stress.

Reliability

Demonstrating the reliability of the CLAS was another objective of this study. According to Anastasi (1982) reliability is concerned with the consistency of scores provided for the same individuals when administered the same test on different occasions, or when given different sets of equivalent items, or when tested under variable testing conditions. It is important to estimate reliability because it allows the computation of the error of measurement of a single score, and the prediction of the range of fluctuation likely to occur in a single individual's score over time. Two different methods of estimating reliability were employed: (a) similarity in scores on the stress and arousal scales of the SACL and the CLAS was measured; and (b) internal consistency of the stress, arousal, and power scales of the CLASP was measured.

Significantly large Pearson correlation coefficients, based on subject's scores

on the stress and arousal scales of the SACL and the CLAS, demonstrated that the CLAS is, indeed, an alternate form of the SACL. Since the two forms were administered in immediate succession, the coefficients represent only the consistency of response to different item samples or test forms and are not also measures of temporal stability of these scales. These significant coefficients indicate that scores on either test are not dependent on the specific items comprising the tests.

Cronbach's alpha analyzes content homogeneity within a test. The highly significant coefficients obtained for the stress and arousal scales of the SACL, the stress and arousal scales of the CLAS, and the stress, arousal and power scales of the CLASP indicate that each of these scales was comprised of homogenous items.

In summary, the correlation coefficients observed for the data in the present study then, indicate that: (a) the items within each scale, stress, arousal and power, are homogenous, that is, the items within each scale produced similar patterns of responding; and (b) there was consistency of response to different test forms, specifically, the SACL and the CLAS.

A Three Factor Model of Stress

Although most interactional measures of stress provide scores reflecting only two factors, and none measure the subject's sense of power, the importance of

assessing strength or power is professed in the literature. Cox (1978), for example, maintains that stress occurs when there is an imbalance between the the perceived demand and the individual's perception of his ability to meet those demands. Cox and Mackay (1981) report that a feeling of a lack of control or powerlessness in the work place leads to the experience of stress. Similarly, McGrath (1976) has suggested and demonstrated the importance of uncertainty in stress. Clearly, when there is uncertainty as to whether the demand can be met, stress arises. Again, Lazarus (1976) has suggested that stress occurs when there are demands on the person which he believes exceed his resources, "the more people have a sense of power over the potentially harmful agent, the less vulnerable they are to threat" (p. 58).

Since the perception of one's own power seems to influence the experience of stress, this factor should be considered when assessing an individual for stress. An individual in a situation which would generally be considered as stress-inducing, for example, someone who is faced with a severe backlog of work, in actuality may not experience stress as long as that individual feels he is able to respond successfully to or cope with the situation. On the other hand, another employee, feeling incapable of mastering the tasks required of him, might experience more stress even though he faced a less "stressful" situation. Lazarus (1976) remarks on the fact that individuals react to stressors in fundamentally different ways. Even in disasters, he writes, in which many are killed or rendered homeless and in which the whole structure of the community

is destroyed, there are still some individuals who appear comparatively undisturbed and who act in an effective fashion. In contrast, others become disorganized, dazed, and panicky. Perhaps, these various people experience the same level of stress and discomfort, but differ in power. Some, able to respond successfully, may even experience enhanced self-esteem as a result of coping and helping others.

Valuable information is lost when a test assesses only two factors, stress and arousal. The scores a respondent obtains on the power scale would provide the assessor with some indication of which situations are threatening to the individual and which he feels incapable of handling. As a result, treatment could be better tailored to suit the individual's needs.

Implications of a Three Factor Model of Stress for Assessment and Treatment

By administering the CLASP, a three factor test, to an individual the assessor could determine if the individual felt incapable of meeting demands in general, or if he experienced a loss of a sense of control only in specific situations. This could be accomplished by simply modifying the instructions and requesting the individual to indicate how he feels in specific situations. If a general inability to cope, is indicated the individual should benefit from developing more realistic appraisals of situations, building or rebuilding self-confidence, and changing attitudes and priorities (Cox, 1978). If an inability to cope in a specific situation is

indicated, specific attitudes, experience and skill may be developed. If an individual was experiencing stress on the job, then, the therapist might recommend that he seek additional training until he feels capable of performing adequately. Superiors in businesses and organizations should expect competence in their workers but, at the same time, provide some avenue for those workers who are in need of assistance. Employees who feel able to handle their positions should experience less stress and, therefore, be an asset rather than a liability to the company.

Ideas for Future Research

The research which is most required concerns the selection of new items for the CLAS and CLASP to replace the phrases which failed to load appropriately on the relevant factors. Particular attention should be given to the low stress and low power scales since each of these factors had three items which failed to meet the 0.40 criterion. In retrospect, it may have been judicious to administer more items than were needed to construct the test. In this way a sufficient number of items for each of the factors might have been salvaged after items which failed to load appropriately were dropped. Indeed, this was the method employed by Mackay et al. (1978) in their series of factor analytical studies. Originally, the SACL consisted of 45 adjectives. By gradually omitting those items with the lowest factor loadings their check list was reduced to only 30 adjectives. This was also the method employed in the pilot work of the present study; eighty-eight subjects were given 39 CLAS items and 31 power scale

items. After factor analyzing the data those items which showed the highest factor loadings were retained to comprise the CLAS and power scale. Still, an excess number of items could have been administered to the large group in order to gain a clear picture of the value of the various items.

There would be some value in the development of a power scale consisting of single adjectives which could be combined with the SACL. This expanded SACL would, then, be an alternate form of the CLASP. While such adjectives like "strong," "driven," "powerful," "helpless," and "cautious," seem appropriate for such a scale, factor analytical studies are required to identify the appropriate items.

Another possible area for research was addressed earlier in the section and is related to Cliff's (1970) finding that the number of subjects influences the number of factors that can be identified in an analysis. According to Gorsuch (1974), Mackay et al. (1978) did not adhere to the proper ratio of subjects to variables and it was speculated that, had they used a larger sample size, a greater number of factors might have been extracted. It would be interesting, then, to administer the SACL and perhaps the CLAS and CLASP to a large British sample and analyze the data to discover how many factors would emerge. The author predicts that Mackay et al.'s findings would replicate, and the discrepancy between their findings of bipolar factors and the current findings of monopolar factors, would have to be attributed to some difference between

the two cultures sampled, the British and Canadian, rather than the fact that the British sample was small and the Canadian, large.

In addition to collecting data from a British population it would also be interesting to obtain data from other cultures, for example, from a non-Western or non-industrialized society, and to compare the results. To date the SACL has only been administered to subjects from Britain, Canada, Australia, and New Zealand while the CLAS and CLASP have only been given to Canadian subjects. Should the current findings replicate across cultures, the universal value of the check lists would be demonstrated. On the other hand it would be interesting if additional or different factors emerged when the tests were administered to other cultures. This outcome would suggest that the experience of stress differs across cultures and would add to the present understanding of stress by identifying new factors and, perhaps, discovering "new" treatments.

Another issue which warrants investigation involves the response scale of the SACL, the CLAS, and the CLASP. It would be worthwhile to replace the asymmetrical response scale with a symmetrical one, collect data from a sample similar to the one which participated in the present study, and compare the factor analytical results obtained for the two studies. If bipolar factors were extracted when a symmetrical response scale was used, Meddis' (1972) and Lorr, McNair and Fisher's (1982) theory would seem to be accurate. If, on the other hand, monopolar factors were found, one would be encouraged to imagine that, at

least some moods, are monopolar.

In addition to making the response scale symmetrical, the mood scales might be made symmetrical. Each of the scales might offer the same number of items, perhaps 20. Half of these 20 items would be positively keyed, for example, high stress items, while the remaining 10 items might be negatively keyed, for example, low stress items. In the present study, as the goal was to provide an alternate form of the SACL, the asymmetrical number of positively keyed and negatively keyed items was maintained. While longer, symmetrical scales would require more time to complete, avoiding possible problems of interpretation of scores justifies the change.

A possible limitation of the CLAS and CLASP is that they may be too Canadian or, perhaps, too North American in content to be appropriate for use in other cultures. Just as Mackay et al. (1978) found Thayer's (1967) AD-ACL "too American," the CLAS and CLASP items may prove ambiguous for subjects outside the North American culture. But, in defense of the CLAS and the CLASP, this is a concern common to all tests. Further research could illuminate the usefulness of this test off the North American continent.

Conclusion

To conclude, the SACL, a two factor measure of stress developed by Mackay et al. (1978), was administered to a Canadian sample and the data was factor

analyzed. The results of the analysis of the data obtained from the Canadian sample were similar to Mackay et al.'s (1978) findings with the exception of the polarity of the factors. Mackay et al. found two bipolar factors, stress and arousal, while four monopolar factors, high stress, low stress, high arousal, and low arousal were extracted in the present study.

A new measure of stress, the CLAS, which presents subjects with short phrases rather than adjectives, was developed as an alternate form of the SACL. The factor analytical results of responses by 392 subjects to the CLAS, indicated that the CLAS reflects four monopolar factors: high stress, low stress, high arousal, and low arousal.

At this time the reason for this discrepancy between the finding of bipolar factors (Mackay et al., 1978), and the current finding of monopolar factors, remains unclear. The author has proposed research which should answer the question.

Perhaps the most important contribution of this thesis was the development of the CLASP, a three factor measure of stress. The factor analytical results obtained here indicate that the CLASP measures six monopolar factors: high stress, low stress, high arousal, low arousal, high power, and low power. Two of these, the power factors, have not been measured previously. The significance of a three component measure of stress with respect to development of a model,

assessment, and treatment were discussed.

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Appendix A

List of 45 adjectives administered by Mackay et al. (1978)

tense	peaceful
relaxed	activated
vigorous	tired
stirred-up	idle
restful	up-tight
active	alert
apprehensive	lively
expectant	stimulated
worried	aroused
energetic	at rest
drowsy	somnolent
insensitive	cheerful
bothered	passive
uneasy	contented
intense	jittery
dejected	sluggish
leisurely	still
quiet	pleasant
nervous	sleepy
placid	comfortable
quiescent	calm
distressed	excited
fearful	

39 items comprising the pilot CLAS

half asleep	++ + ? -
on edge	++ + ? -
full of energy	++ + ? -
at peace	++ + ? -
really tired	++ + ? -
in a daze	++ + ? -
full of life	++ + ? -
don't feel like doing anything	++ + ? -
a bundle of nerves	++ + ? -
taking it easy	++ + ? -
satisfied with life	++ + ? -
under a great strain	++ + ? -
a lot on my mind	++ + ? -
full of vim and vigour	++ + ? -
on the go	++ + ? -
at the end of my rope	++ + ? -
easy-going	++ + ? -
wide awake	++ + ? -
light-hearted	++ + ? -

full of pep	++	+	?	-
heavy-hearted	++	+	?	-
nodding off a lot	++	+	?	-
happy-go-lucky	++	+	?	-
down in the dumps	++	+	?	-
in a panic	++	+	?	-
in over my head	++	+	?	-
even-tempered	++	+	?	-
carrying the weight of the world	++	+ıf	?	-
turned on by life	++	+	?	-
worn-out	++	+	?	-
walking on air	++	+	?	-
like nothing's worth the effort	++	-+	?	-
raring to go	++	+	?	-
wound down	++	+	?	-
happy to be alive	++	+	?	-
excited by life	++	+	?	-
no energy	++	+	?	-
life is good	++	+	?	-
no get up and go	++	+	?	-

Appendix C

31 items comprising the pilot power scale.

strong-willed	++	+	?	-
meek and mild	++	+	?	-
able to hold my own	++	+	?	-
like to achieve	++	+	?	-
sometimes afraid of my own shadow	++	+	?	-
a go-getter	++	+	?	-
likely to succeed	++	+	?	-
easily led	++	+	?	-
in over my head	++	+	?	-
a born leader	++	+	?	-
going no where fast	++	+	?	-
self-confident	++	+	?	-
playing it safe	++	+	?	-
in control	++	+	?	-
like a failure	++	+	?	-
self-assured	++	+	?	-
easily persuaded	++	+	?	-
on top of things	++	+	?	-
like to succeed	++	+	?	-

not making any progress	++	+	?	-
like a lightweight	++	+	?	-
sure of myself	++	+	?	-
outspoken	++	+	?	-
often taken advantage of	++	+	?	-
able to take it	++	+	?	-
have a strong backbone	++	+	?	
sometimes my best isn't good enough	++	+	?	-
sharp as a tack	++	+	?	-
unsure of myself	++	+	?	-
calm under pressure	++	+	?	-
can't make up my mind	++	+	?	-

Appendix D

The SACL

sleepy	++ + ? -	uptight	++ + ? -
jittery	++ + ? -	restful	++ + ? -
energetic	++ + ? -	alert	++ + ? -
calm	++ + ? -	cheerful	++ + ? -
tired	++ + ? -	active	++ + ? -
drowsy	++ + ? -	apprehensive	++ + ? -
lively	++ + ? -	sluggish	++ + ? -
idle	++ + ? -	peaceful	++ + ? -
distressed	++ + ? -	dejected	++ + ? -
relaxed	++ + ? -	nervous	++ + ? -
contented	++ + ? -	bothered	++ + ? -
tense	++ + ? -	pleasant	++ + ? -
uneasy	++ + ? -	worried	++ + ? -
vigorous	++ + ? -	comfortable	++ + ? -
activated	++ + ? -	stimulated	++ + ? -

The CLAS

half asleep	++	+	?	-
on edge	++	+	?	-
full of energy	++	+	?	-
at peace	++	+	?	-
really tired	++	+	?	
worn-out	++	+	?	-
full of life	++	+	?	-
wound down	++	+	?	-
a bundle of nerves	++	+	?	-
taking it easy	++	+	?	-
satisfied with life	++	+	?	-
under a great strain	++	+	?	-
a lot on my mind	++	+	?	-
full of vim and vigour	++	+	?	-
raring to go	++	+	?	-
at the end of my rope	++	+	?	-
easy-going	++	+	?	-
wide awake	++	+	?	-
light-hearted	++	+	?	-

Appendix E (continued)

full of pep	++	+	?	-
heavy-hearted	++	+	?	-
no get up and go	++	+	?	-
happy-go-lucky	++	+	?	-
down in the dumps	++	+	?	-
in a panic	++	+	?	-
in over my head	++	+	?	-
even-tempered	++	+	?	-
carrying the weight of the world	++	+	?	-
life is good	++	+	?	-
excited by life	++	+	?	-

Appendix F

The Power Scale

able to hold my own	++	+	?	-
likely to succeed	++	+	?	-
unsure of myself	++	+	?	-
going no where fast	++	+	?	-
self-confident	++	+	?	-
meek and mild	++	+	?	-
in control	++	+	?	-
like a failure	++	+	?	-
self-assured	++	+	?	-
on top of things	++	+	?	-
not making any progress	++	+	?	-
can't make up my mind	++	+	?	-
sure of myself	++	+	?	-
a go-getter	++	+	?	-
like a lightweight	++	+	?	-

Appendix G

The SACL with alternate ordering of items

uptight	++ + ? -	sleepy	++ + ? -
restful	++ + ? -	jittery	++ + ? -
alert	++ + ? -	energetic	++ + ? -
cheerful	++ + ? -	calm	++ + ? -
active	++ + ? -	tired	++ + ? -
apprehensive	++ + ? -	drowsy	++ + ? -
sluggish	++ + ? -	lively	++ + ? -
peaceful	++ + ? -	idle	++ + ? -
dejected	++ + ? -	distressed	++ + ? -
nervous	++ + ? -	relaxed	++ + ? -
bothered	++ + ? -	contented	++ + ? -
pleasant	++ + ? -	tense	++ + ? -
worried	++ + ? -	uneasy	++ + ? -
comfortable	++ + ? -	vigorous	++ + ? -
stimulated	++ + ? -	activated	++ + ? -

The CLAS with alternate ordering of items

at the end of my rope	++	+	?	-
easy-going	++	+	?	-
wide awake	++	+	?	-
light-hearted	++	+	?	-
full of pep	++	+	?	-
heavy-hearted	++	+	?	-
no get up and go	++	+	?	-
happy-go-lucky	++	+	?	-
down in the dumps	++	+	?	-
in a panic	++	+	?	-
in over my head	++	+	?	-
even-tempered	++	+	?	-
carrying the weight of the world	++	+	?	-
life is good	++	+	?	-
excited by life	++	+	?	-
half asleep	++	+	?	-
on edge	++	+	?	-
full of energy	++	+	?	-
at peace	++	+	?	-

Appendix H (continued)

really tired	++	+	? -
worn-out	++	+	?-
full of life	++	+	? -
wound down	++	+	? --
a bundle of nerves	++	+	? -
taking it easy	++	+	? -
satisfied with life	++	+	? -
under a great strain	++	+	? -
a lot on my mind	++	+	? -
full of vim and vigour	++	+	? -
raring to go	++	+	? -

Appendix I

The power scale with alternate ordering of items

self-assured	++	+	?	-
on top of things	++	+	?	-
not making any progress	++	+	?	-
can't make up my mind	++	+	?	-
sure of myself	++	+	?	-
a go-getter	++	+	?	-
like a lightweight	++	+	?	-
able to hold my own	++	+	?	-
likely to succeed	++	+	?	-
unsure of myself	++	+	?	-
going no where fast	++	+	?	-
self-confident	++	+	?	-
meek and mild	++	+	?	-
in control	++	+	?	-
like a failure	++	+	?	-

Appendix J

Instructions for the SACL

Each of the following words describe feelings or moods. Please use the list to describe your feelings *at this moment.*

If the word definitely describes how you feel at the moment you read it, circle the double plus that is indicated as a ++ mark to the right of the word. For example, if the word is "relaxed" and you are definitely feeling in relaxed at the moment circle the ++ as follows: (relaxed ++ + ? -).

If the word only likely applies to your feelings at this moment circle the single plus indicated as a + mark as follows: (relaxed ++ + ? -).

If the word is not clear to you or you cannot decide whether or not it applies to your feelings at the moment, circle the question mark ? as follows: (relaxed ++ + ? -).

If you clearly decide the word does not apply to your feelings at the moment circle the minus sign - as follows: (relaxed ++ + ? -).

First reactions are usually the most reliable. Therefore do not spend long considering each word. However, try to be as accurate as possible.

Appendix K

Instructions for the CLAS

Each of the following phrases describe feelings or moods. Please use the list to describe your feelings *at this moment.*

If the phrase definitely describes how you feel at the moment you read it, circle the double plus that is indicated as a ++ mark to the right of the phrase. For example, if the phrase is "on edge" and you are definitely feeling on edge at the moment circle the ++ as follows: (on edge ++ + ? -).

If the phrase only likely applies to your feelings at this moment circle the single plus indicated as a + mark as follows: (on edge ++ + ? -).

If the phrase is not clear to you or you cannot decide whether or not it applies to your feelings at the moment, circle the question mark ? as follows: (on edge ++ + ? -).

If you clearly decide the phrase does not apply to your feelings at the moment circle the minus sign - as follows: (on edge ++ + ? -).

First reactions are usually the most reliable. Therefore do not spend long considering each phrase. However, try to be as accurate as possible.

Appendix L

Instructions for the power scale

Each of the following phrases describe feelings or moods. Please use the list to describe your feelings *at this moment.*

If the phrase definitely describes how you feel at the moment you read it, circle the double plus that is indicated as a ++ mark to the right of the phrase. For example, if the phrase is "in control" and you are definitely feeling in control at the moment circle the ++ as follows: (in control   ++   +   ?   -).

If the phrase only likely applies to your feelings at this moment circle the single plus indicated as a + mark as follows: (in control   ++   +   ?   -).

If the phrase is not clear to you or you cannot decide whether or not it applies to your feelings at the moment, circle the question mark   ?   as follows:
(in control   ++ +   ?   -).

If you clearly decide the phrase does not apply to your feelings at the moment circle the minus sign   -   as follows: (in control   ++   +   ?   -).

First reactions are usually the most reliable. Therefore do not spend long considering each phrase. However, try to be as accurate as possible.