1987

The Comparison and Convergence of the Structures of Affect and Personality

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THE COMPARISON AND CONVERGENCE OF THE STRUCTURES OF AFFECT AND PERSONALITY

by

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A Thesis Submitted to the Faculty of the Graduate School of Loyola University of Chicago in Partial Fulfilment of the Requirements for the Degree of

Master of Arts

May

1987

ACKNOWLEDGEMENTS

Of primary importance I would like to acknowledge Dr. John Shack, my thesis committee chair, who has shared with me his clinical knowledge of individual differences and has encouraged my exploration of these differences in research. My gratefulness to him extends far beyond the present work. I would also like to thank Dr. James Johnson, the other member of my thesis committee, for his interest in, and careful review of this work.

Additionally, I would like to thank Rhonda Dallas for her patient support as I obsessed over this project. And, finally, I would like to thank those members of my family who said that they would actually like to read this paper.

VITA

Greg Meyer, the son of J. Eugene Meyer and Joan M. (Brennan) Meyer, was born April 8, 1961, in Chicago, Illinois.

His secondary education was completed in 1979 when he graduated from St. Viator High School, Arlington Heights, Illinois. His college education began at St. Louis University, St. Louis, Missouri, which he attended for one year. He next attended Loyola University of Chicago for an additional year. He then attended the University of Illinois, Urbana, Illinois, where he obtained a Bachelor of Science degree in psychology in 1983.

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INTRODUCTION

The current paper will examine the structure of mood (emotional levels which endure over time) and its relation to the structure of personality. Two models, one of mood and one of personality, will be explored in depth and compared. However, before I present in more detail the focus this work will take, I would like to present two rather broad conceptual notions which serve as the backdrop for the major hypotheses of this study.

Scarr (1985), in her recent article entitled Constructing Psychology: Making facts and fables for our time, noted that the field of psychology has a distinct preference for focusing on proximal rather than distal variables when examining human behavior. Proximal variables are those that are temporally near to the variable being measured (ie. mood states as a function of the day's events). Distal variables, on the other hand, are those that occur or exert their influence from a point well removed from the variable under study and are usually of a sociological or genetic nature (ie. personality or intelligence variables that show a high heritability). She argued that because distal variables have temporal priority over proximal variables, their inclusion into psychological research can add clarity to an area that is often clouded

by correlational analyses of proximal variables. In support of her assertions, Scarr presented evidence from an analysis of the IQ's, communication skills, and social adjustments of children. In each case the proximal predictor variables that contributed to these childhood measures were the amount of positive discipline and positive control that mothers were observed giving to their children. Those mothers who interacted more positively with their children had brighter, more communicative, and more socially adjusted children. This was a plausible and seemingly straightforward finding. However, when Scarr analyzed the data on childhood functioning with the inclusion of distal predictor variables, the picture that emerged was very different. It was found in every instance that the mothers' intelligence (estimated by WAIS vocabulary scale scores) became the most significant predictor of the childhood measures. In all cases the mothers' intelligence was the variable that mediated "positive mothering" and, in almost all instances, the inclusion of the distal variable wiped out the significant association that had been observed between the proximal variables and the dependent measures.

Her argument was that researchers wear the "blinders of their cultural time period", and that in the current time period vision is focused most exclusively onto proximal variables so that the contribution of distal variables (like those above) often go unnoticed.

On a further conceptual note, Millon (1981), in his review of the history of personality theories, described how many researchers and theorists "discovered" ideas that were in fact very similar to ideas proposed by theorists from an earlier era, theorists from a different perspective, or even theorists from a different segment of the vast psychological literature. This is often unavoidable and unintended. However, it is unfortunate how often these similarities go unnoticed, leading to unnecessary debate over concepts that are very similar, but which go by deceptively dissimilar names.

In the current paper attention will be focused on research that examines the structure of emotional experience and it will be seen that the thoughts of Scarr and Millon have application in this realm. The 1980's have been referred to as the decade of affect (Tomkins, 1981), and research within this domain has proliferated on many fronts. For example, significant research has been conducted on the influence of affect on cognitive processing (Bower, 1981; Isen, 1984), the affective correlates of personality traits (Costa & McCrea, 1980, 1984; Mehrabian, 1980; Plutchik,1980), the discrete components of emotional experience (Izard, 1972, 1977; Plutchik, 1962, 1980), the broad structure of affect found in ratings of facial expressions (e.g. Abelson & Sermat, 1962; Cliff & Young, 1968; Green & Cliff, 1975), and the broad structure of

affect found in ratings of self-reported mood (e.g. Diener & Emmons, 1984; Russell, 1978, 1979; Watson & Clark, 1984; Watson & Tellegen, 1985).

It is the last category, that of self-reported mood, that has remained the most disarrayed. Only recently have researchers begun to outline the broadest dimensions of affective structure and approach a consensus. Prior to this work (Russell, 1978, 1979; Watson and Tellegen, 1985) various researchers had proposed that anywhere from four to 12 factors were necessary to define the structure of affect (e.g., Borgatta, 1961; Hendrick & Lilly, 1970; Izard, 1972; Lorr, Datson & Smith, 1967; McNair, Lorr & Droppleman, 1971; Nowlis, 1965; Thayer, 1967; Watson & Tellegen, 1985). The above research, which has looked for and found many emotional factors, has generally sought a fine grained analysis of emotional experience in order to accurately define the discrete components of mood variation. Within this realm of analysis, confusion over the number, or the exact nature, of discrete emotional factors still remains.

In contrast to this confusion, the area of greatest disagreement within two-factor models of affect concerns the proper rotation of dimensions within a factor analytic solution. Two-factor models of affect seek to define the broadest aspects of emotional variation, and within a two-factor solution, there is not an <u>a priori</u> correct rotation. Rather, the most sensible rotation is found from the

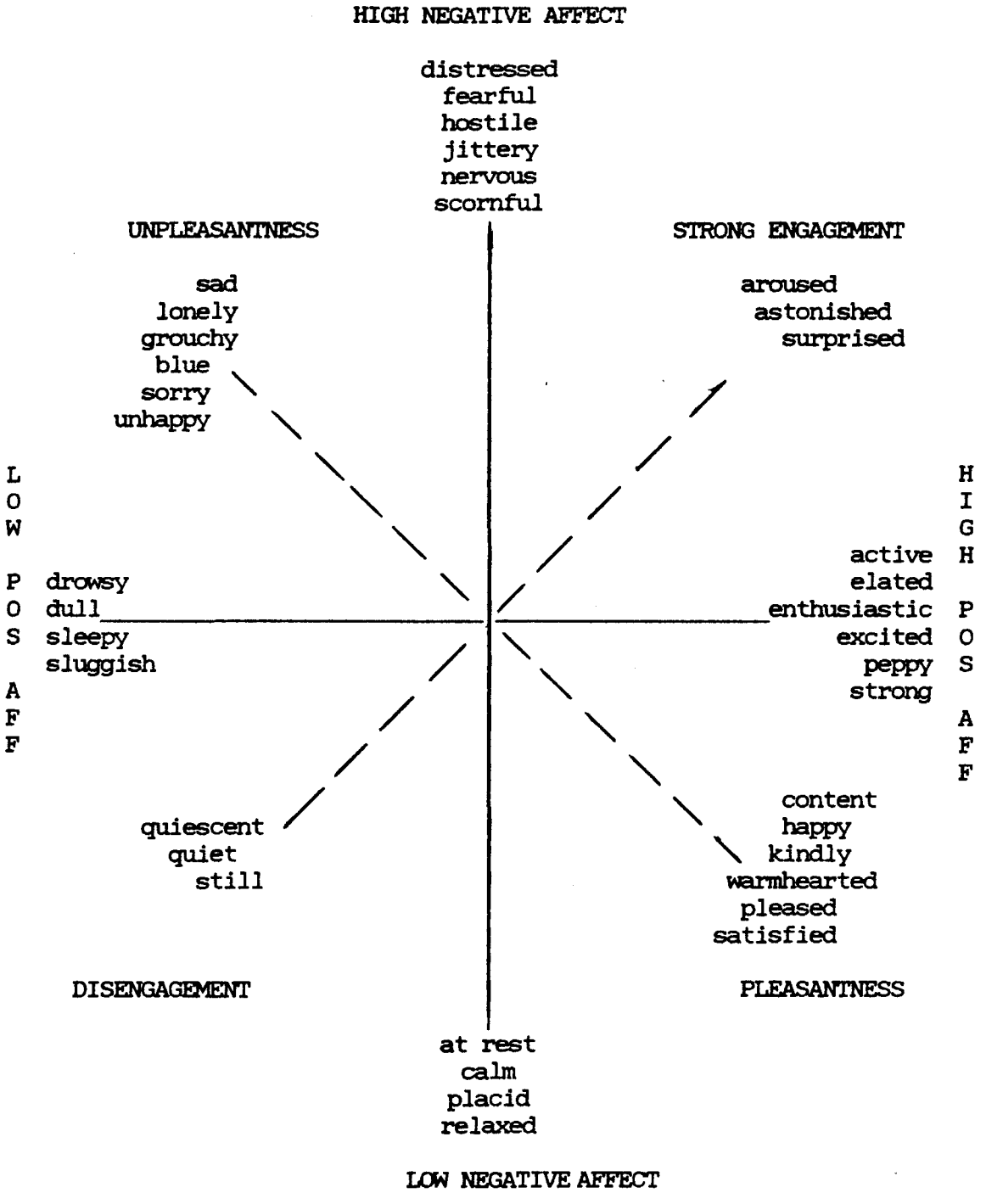
differential pattern of correlates that correspond to the dimensions extracted (Watson, Clark, and Tellegen, 1984; Watson and Tellegen, 1985).

The most promising two-factor model has been one where the broad dimensions of positive affect and negative affect have been delineated. These dimensions have been shown to be independent of each other over time (Bradburn, 1969; Harding, 1982; Warr, Barter, and Brownbridge, 1983), with each dimension showing distinct patterns of association with other measures of personality (Costa and McCrea, 1980, 1984) and well-being (Bradburn, 1969).

Watson and Tellegen (1985) have recently begun to systematize and explicate the dimensions of positive affect and negative affect. Extensive evidence has been presented which delineates the importance of these two particular dimensions (e.g., Watson and Clark, 1984). They have been shown to have cross cultural stability (Watson, Clark, and Tellegen, 1984), and it has been shown that these two dimensions of affect emerge in both nomothetic factor analytic studies of a large numbers of subjects, and idiographic factor analytic studies of fewer subjects assessed repeatedly over time.

The research conducted by Watson and Tellegen resulted in the model of affective structure depicted in Figure 1. Within this model, the dimension of Negative Affect is characterized by emotional distress, fear,

Figure 1. The structure of emotional experience proposed by Watson and Tellegen (1985), showing the major dimensions of Positive Affect (horizontal) and Negative Affect (vertical) and their relationship to the dimensions of pleasantness and arousal (engagement). Adapted from Watson and Tellegen (1985).



nervousness, and hostility at the high end, and the experience of a calm, relaxed serenity at the low end. Positive Affect, on the other hand is characterized by feelings of elation, excitement, and enthusiasm on the high end, and the experience of sluggishness or fatigue on the low end. The dashed lines on the diagonals in Figure 1 represent an alternative two-factor solution, and are conceptualized within the current model to represent combinations of the dimensions of Positive and Negative Affect.

Despite the advances that have been had through the development of this two-factor model of affect, the thesis of the present study is that this model is incomplete in its particulars. Research on this model is relatively new and the same methods of factor analysis have often resulted in the extraction of Positive and Negative Affect factors which show slightly different terms defining the major dimensions. Conceptually, the factors that emerge in any particular sample can be seen as proximal variables because connections to broad sources of variation which may mediate the observed relationship between terms has not been made. Numerous researchers have declared that more work is needed in order to further elucidate what gives rise to these dimensions (e.g., Diener and Emmons, 1984; Watson and Clark, 1984; Watson, Clark, and Tellegen, 1984), and it is argued here that an important conceptual link has been overlooked in this process. It is believed that this

conceptual link will further elucidate what gives rise to these dimensions, and that there will be greater clarity over the precise nature of affective structure when the connection is made.

It is suggested that the model of affective structure presented in Figure 1 is "rediscovering" dimensions of individual differences that were delineated many years ago and that have already been extensively analyzed. Specifically, it is proposed that this two-factor model of affect may be describing, via emotional descriptors, the personality dimensions of introversion-extraversion (E) and neuroticism-stability (N) which have been outlined by Hans Eysenck over the past 30 years. Specifically, the dimension of Positive Affect is believed to be equivalent to the dimension of introversion-extraversion and the dimension of Negative Affect is believed to be equivalent to the dimension of neuroticism-stability.

In addition to exploring how the model of affect presented in Figure 1 may be "rediscovering" the dimensions outlined earlier by Eysenck, it will be argued that the E and N dimensions of personality fit Scarr's definition of distal variables. That is, these dimensions have been shown to be strongly influenced by genetic factors (Eaves and Eysenck, 1985), have strong longitudinal consistency (Conley, 1985), and show stability across all of the 26 countries where cross cultural consistency has been

assessed (Barrett and Eysenck, 1984; Eysenck, Barrett, Spielberger, Evans, & Eysenck, 1986). As distal variables the E and N dimensions of personality will be included in an analysis of emotional structure. It is proposed that the inclusion of these dimensions will then help to clarify the exact nature of the dominant dimensions of emotional experience.

This current paper begins with a selective historical review of the literature that deals with self-reported affect. This review culminates with a discussion of the major two-factor models of affective structure. Following this is a review of the E and N dimensions of personality. Next, research evidence which indicates the convergence of extraversion/Positive Affect and neuroticism/Negative Affect is presented. This review then culminates with a statement of the hypotheses for the present analysis.

REVIEW OF THE LITERATURE

AFFECTIVE STRUCTURE

As noted in the introduction, there has been a marked difference between studies that have analyzed self-report data and studies that have analyzed non-self-report data. Research on non-self-report data has included analyses of vocal and facial expressions of emotion (e.g., Abelson & Sermat, 1962; Cliff & Young, 1968; Green & Cliff, 1975; Russell & Bullock, 1985; Schlosberg, 1952), semantic differential ratings of mood terms (Averill, 1975; Block, 1957), and judged similarities among mood words (Bush, 1973, Russell, 1980, 1983). In almost all cases, this literature has discovered that two large bipolar dimensions of mood adequately describe the observed relationships. Invariably these dimensions have been a pleasure-displeasure dimension and an arousal-sleepy dimension. At times a small and variously named (ie. potency, dominance, aggression or affection-rejection) third dimension has emerged from these studies as well (see Russell & Mehrabian, 1977), but this dimension, unlike the others, has not been readily replicated across studies or cultures (Russell, 1978, 1983).

Historically, studies of self-rated affect have been less clear, less interpretable, and less consistent than the studies mentioned above. As will be discussed

below, various authors have claimed that between four and 12 independent, monopolar factors are necessary to describe emotional structure. However, in recent years, methodological corrections have been made and an approach to consensus is becoming apparent. More recent investigations on self-reported affect have discovered that when response biases are corrected and an adequate, representative sample of mood terms are used, two broad bipolar dimensions emerge from the self-report data. Despite this approach to consensus, there is disagreement over what constitutes the two most basic dimensions of affect.

The two dominant researchers of the two-dimensional structure of self-reported affect are Russell (1978, 1979; Russell & Ridgeway, 1983), who argues that the two basic dimensions of affect are degree of arousal and degree of pleasure; and Watson and his colleagues (Watson & Clark, 1984; Watson, Clark & Tellegen, 1984; Watson & Tellegen, 1985; Zevon & Tellegen, 1982), who argue that the two broadest dimensions are Positive Affect and Negative Affect.

As a side note, some recent research has proposed a circumplex model of affective structure (see Conte & Plutchik, 1981; Daly, Lancee & Polivy, 1983; Fisher, Heise, Bohrnstedt, & Lucke, 1985; Russell, 1980, 1983; Russell & Bullock, 1985). According to this model, affect terms are arranged in an ordered fashion around a circle in two-

dimensional space. In this model the dimensions that are initially used to place terms in this circular space are deemed unimportant because the order and spacing of the terms on the circle defines their structure and "any particular axis is arbitrary and no more basic than any other" (Conte & Plutchik, 1981, p.70). This type of model is not as well researched as the dimensional models, and it is used generally as an indicator of the conceptual relationship between affect terms. Additionally, these researchers disregard the dimensional aspects of their data - which are essential to the hypotheses of this study. For these reasons, circumplex models of affect will not be considered here. Rather, an overview of early self-report research will be presented. Following that, a more detailed examination of the two-dimensional models put forth by Russell and by Watson will be conducted.

Before beginning with a review of early affect research, however, it is important to note that the two-dimensional models to be discussed, which are characterized by a small number of broad factors, are not inconsistent with the body of research that deals with more discrete emotional factors, which are characterized by a large number of narrow dimensions (see Bartlett & Izard, 1972; Watson & Tellegen, 1985). In fact, the discrete, unipolar emotions converge on the bipolar two-dimensional structure in a second order factor analysis (much like all of

Cattell's 16 Personality Factors load on Eysenck's two dimensions of introversion-extraversion and neuroticism-stability after a second order factor analysis).

Early Research

Pioneering work on the factor analytic study of self-reported mood began in the 1950's with Nowlis (Nowlis & Nowlis, 1956) when he developed the Mood Adjective Check List. Nowlis began his work by hypothesizing that four bipolar dimensions (pleasantness-unpleasantness, activation-deactivation, positive-negative social orientation, and control-lack of control) would characterize mood structure. He gathered adjectives to measure each hypothesized dimension and in a series of factor analytic studies (e.g. Green & Nowlis, 1957), found, much to his surprise, that the hypothesized bipolar dimensions tended to separate and form more discrete unipolar factors. This research finding, contrary to expectation, indicated that one could experience emotion along any one of these factors independently.

Subsequently, Nowlis (1965) reviewed 15 factor analytic studies of mood and found six unipolar factors which emerged in nearly every study. He considered these "sure" factors of affect structure. In addition, he found that another six unipolar factors emerged with some regularity across studies. Accordingly, he thought these

could be considered "tentative" independent factors. The six primary factors apparent in almost all studies were labeled aggression, anxiety, surgency, concentration, fatigue, and social affection.

Following the initial work of Nowlis, Borgatta (1961) confirmed the existence of these six "sure" unipolar factors in a self-report study. This study was seen and used as a validation of the earlier work done by Nowlis and it included the same response format proposed by Nowlis and his associates (Green & Nowlis, 1957; Nowlis & Nowlis, 1956). The response format consisted of a four point rating scale after each term (see Table 1). Subjects indicated one of the three options to denote how the affect term best described their current mood, or they indicated "?" which meant that they could not decide, or that the term did not apply to the way they were feeling. The use of this format becomes an important issue in determining factor structure and will be discussed more fully below.

It is worth noting that in four of the six factors extracted by Borgatta, there were terms that loaded oppositely on the factor. This bipolarity was disregarded however, because these loadings were not as high (though in the .5 range) as were the loadings for terms that Borgatta subsequently used to develop factor scales.

During the 1960's Lorr and McNair began developing and validating their Profile Of Moods States (Lorr, Datson

Table 1. The different response formats used by researcher's studying self-reported affect.

Response format proposed by Nowlis (1965)

Response	Interpretation	Score
vv	I definitely feel.....	4 points
v	I feel slightly.....	3 points
?	I cannot decide.....	2 points
	or term does not apply...	
no	I am definitely not...	1 point

Response format proposed by McNair & Lorr (1964)

Response	Interpretation	Score
extremely	I feel extremely.....	3 points
quite a bit	I feel quite a bit.....	2 points
a little	I feel a little.....	1 point
not at all	I don't feel at all....	0 points

(The response "moderately" was also included in their later studies and was given the score of 2 points while the response "quite a bit" was scored 3 points and "extremely" was scored 4 points.)

Response format proposed by Meddis (1972)

Response	Interpretation	Score
vv	I definitely feel.....	4 points
v	I feel slightly.....	3 points
x	I do not feel.....	2 points
xx	I definitely do not feel...	1 point

& Smith, 1967; Lorr, McNair, Weinstein, Michaux & Raskin, 1961; McNair & Lorr, 1964; McNair, Lorr & Droppleman, 1971; POMS - originally called the Psychiatric Outpatient Mood Scales). These researchers initially found six replicable unipolar mood factors: tension, anxiety, anger, depression, vigor, and fatigue; and later found evidence for two additional unipolar factors: friendliness and confusion. These factors, taken together, include the dimensions proposed by Nowlis (Nowlis and Nowlis, 1956) and later confirmed by Borgatta (1961).

The final version of the POMS had factorial derived, unipolar scales measuring tension, anger-hostility, fatigue, depression, confusion, friendliness, elation, and vigor. The response format used by Lorr and his colleagues (see Table 1) was different from that used by Nowlis and by Borgatta in that it did not have the "?" response option. However, as will be discussed below, this response format also "pulls" for the extraction of unipolar rather than bipolar factors.

Thayer (1967), using arousal theory as his theoretical base (see Duffy, 1962; Malmo, 1959), set out to measure what he considered to be a large, bipolar, emotional factor of activation. Employing the same response format as Nowlis (1965), he found that rather than one large bipolar dimension, four predominantly unipolar factors emerged in his orthogonal rotation. He termed the four factors as

follows: 1) General Activation, which is comprised of the terms full-of-pep, active, vigorous, energetic, lively, peppy and activated; 2) Deactivation-Sleep, which is comprised of the terms drowsy, sleepy, tired, wide-awake (recoded), and wakeful (recoded); 3) High Activation, which is comprised of the terms tense, jittery, stirred-up, clutched-up, intense, anxious, and fearful; and 4) General Deactivation, which is comprised of the terms placid, leisurely, at-rest, quiescent, calm, still, and quiet.

Again it seemed that common-sense notions of affect were incorrect. Factor analysis had shown over the course of a decade of research that happiness was not the opposite of sadness, anger-hostility was not the opposite of friendliness, and a state of arousal was not the opposite of a state of sleepiness. Rather, it appeared that the evidence was consistently in favor of a large number of discrete emotional states which could vary independently of each other.

In 1969, Bradburn published his monograph The Structure of Psychological Well-Being. In both his pilot work and in his nationwide, cross-sectional sample of respondents, he discovered that two dimensions of affect, positive affect and negative affect, were uncorrelated with each other, and that each dimension correlated independently with other indices of well-being. Both measures were unipolar scales, in the tradition of previous research

(see Appendix A for a complete list of the questions that make up each scale). Commenting on the observed independence of these two scales, Bradburn said:

> within a given period of time, such as a week or two, one may experience many different emotions, both positive and negative, and that in general there is no tendency for the two types to be experienced in any particular relation to one another. This lack of correlation means that information about the extent of positive feelings a person has experienced in the recent past does not give us any information on the extent of his negative feelings (1969, p.225).

It was found that negative affect correlated positively with indices of the number of things people worried about, the intensity with which people worried about these things, the number of physical symptoms reported in the past few weeks, psychological anxiety, and whether or not the respondent had worried about having a "nervous breakdown". Positive affect was uncorrelated with these measures but was positively correlated to indices of sociability and experiences of novelty. It was interesting that the only demographic index that correlated to any degree with these scales was Socio-Economic Status (SES) which had a slight correlation with positive affect. Bradburn contended that SES was related to positive affect by the fact that people with a higher SES live in a "social opportunity structure... (which) would facilitate their having the kinds of experiences that are associated with higher positive affect (1969, p. 227)." As indicated above, Bradburn's analyses found that negative affect was

uncorrelated with the indices that correlated to positive affect, and positive affect was independent from negative affect and the indices which correlated with negative affect.

It was further found that the best index of psychological well-being came through the subtraction of negative affect from positive affect. Bradburn termed this index the Affect Balance Scale and it indicated that well-being was the degree to which positive affective feelings surpassed negative affective feelings over time.

Bradburn's work was significant for several reasons. First, this was the initial work to measure affect on a nationwide scale, rather than with a relatively small sample of students or patients. Second, he clarified that these two dimensions had differential and independent relations with other life experiences. Third, even though his analysis used two independent scales which sound deceptively similar to Watson's proposed bipolar dimensions (Watson & Tellegen, 1985), they were unipolar scales and were seen as further support for the validity of all unipolar factors of emotions.

There is an important issue that needs to be focused further at this point. There is a difference between a small number of broad factors varying independently and a large number of discrete factors varying independently. Bradburn found support for the former (two

factors: positive and negative affect, which are independent of each other over time). Unfortunately, however, because he used unipolar scales, because of the scientific zeitgeist of the time, and because semantically (or by common sense) positive affect should be the opposite of negative affect and this was found not to be the case, his work could easily be seen as further support for the latter (i.e., a large number of unipolar scales that operated independently). Bradburn had begun to clarify affective structure by discovering the independent correlates of his two scales, but had also clouded research by unintentionally fostering the impression that all emotional factors were unipolar. As will be seen later, continued support has been found for the independence of two broad factors of affect; but this result has not been found for discrete unipolar factors. Instead, these factors have tended to converge into a smaller number of broad bipolar factors.

Returning to analyses of discrete emotions, Hendrick and Lilly (1970) attempted to validate the six "sure" and six "tentative" monopolar factors found earlier by Nowlis (1965). In addition, they made the first attempt to replicate factors under two different conditions: a normal wakefulness and a sleep deprived condition. They reported only fair factor congruence between the two conditions. This was not unexpected, given that the structure they attempted to replicate was composed of a

large number of narrowly defined factors. Additionally, it was very likely that they employed an unstable correlation matrix for the factor analysis of the sleep deprived group, as there were only 62 subjects under this condition and they were assessing the intercorrelations among 44 terms.

More pertinent to the present discussion, was the fact that Hendrick and Lilly attempted to directly compare two different response formats in their control condition. For 126 subjects they used the format developed by Nowlis (see Table 1) and for 135 subjects they used their own format which consisted of a nine point rating scale placed below each emotion term and anchored by "very much" on one end and "not at all" on the other end. These authors extracted 10 factors under each response format, eight of which they considered interpretable. They considered all factors to be unipolar, except for a fatigue-activation bipolar factor (their fourth factor). This interpretation was retained even though their first two factors both have items that loaded oppositely on the factor in the .5 range. Given the number of subjects that were used, a loading of .5 was likely a significant loading, however they provided no indication that this was the case.

When comparing response formats, they reported factor congruence coefficients ranging from .65 to .96 (p. 456) across factors under each condition. To assess their results, they used a "general rule of thumb" which was that

coefficients above .75 reflected a "good fit". They contended that their findings demonstrated "a high degree of congruence between the two types of scales in the factor structure that emerged. Such results provide(d) evidence for the generality of the factor structures across variation in scale type (p. 456)". The observed similarity across response styles may reflect one of two possibilities. First, their response format was not well described and it may have been a continuum rating, like the one used by Lorr and McNair (see Table 1). If this was the case, a large number of monopolar factors would still be expected, and they would not be expected to differ much from the factors observed under the Nowlis format (within the constraints of the adjective sampling pool, of course). A second possibility was that the congruence coefficients, of which Hendrick and Lilly state not much was known, give an overly generous estimate of factor congruence. In either case, this was the last time in the reported literature that response style has not greatly affected the outcome of factor analytic solutions to self-reported mood.

It is important to note that at this point it was an established "fact" that emotional experience was comprised of discrete, unipolar factors. This seemed to be true regardless of the response format that was used to assess mood. Many theories of discrete emotions developed from this climate (i.e. Ekman, 1972; Izard, 1972, 1977;

plutchik, 1962, 1980), and it is not the purpose of this study to detract from these theories, as they do have viability. Rather, this is pointed out because after this point in the history of emotional research, response format began to become a more important determinant of factor structure.

Meddis (1972) began to examine the influence of response format on the factor structure of self-rated mood when he was working on his doctoral dissertation and repeatedly failed to find results that were similar to previous research. Meddis realized that he was using a symmetrical response format (see Table 1), where there are as many categories for rejection as there are for acceptance, while others were not. He noted of the Nowlis response format two problems:

> firstly, the query category will present scoring difficulties. If we give one point to 'no', two points to '?', three points to 'v', etc., we have the problem of justifying the scale as ordinal... Secondly, the scale is not symmetrical; we have two categories of acceptance but only one category of rejection (p. 180).

The latter criticism of asymmetry can be applied equally well to the response format of Lorr and McNair, and probably to that of Hendrick and Lilly.

In assessing the effect of a symmetrical response format compared to the format of Nowlis, Meddis carried out three analyses. In the first analysis, he discovered that the Nowlis format resulted in more nonsignificant correlations among terms, and that it selectively depressed

negative correlations. Thus, the Nowlis format inappropriately gave the impression that adjectives which were broadly opposite in meaning did not correlate negatively with each other.

In his second analysis, Meddis factor analyzed (principal components with a Varimax rotation) terms very similar to those used by Thayer (1967). As mentioned above, Thayer was expecting to find a large bipolar factor of emotion that followed the hypotheses of arousal theory, but instead found four smaller monopolar factors. Using the Nowlis format (which Thayer also used), Meddis extracted five almost exclusively monopolar factors, of which the first four are equivalent to those discovered by Thayer. However, when using his own response format, Meddis extracted two large bipolar factors and a smaller unipolar factor. The first two factors under this format were in fact a bipolar combination of Thayer's earlier factors. Thayer's factors of 'General Activation' and 'Deactivation Sleep' merged to form a single bipolar factor. Similarly, the originally monopolar factors of 'High Activation' and 'General Deactivation' merged to form a large bipolar factor. These large bipolar factors (see Table 2) show a strong similarity to the factors of Positive Affect and Negative Affect proposed by Watson and Tellegen (1985) to be the major dimensions of affective structure (compare Table 2 with Figure 1).

Table 2. The first two factors found by Meddis in the reanalysis of Thayer's hypotheses. Taken from Meddis (1972).

Factor 1		Factor 2	
alert	.83	leisurely	.72
sleepy	-.74	carefree	.65
lively	.71	nonchalant	.62
wide-awake	.71	jittery	-.60
drowsy	-.70	calm	.56
concentrating	.68	clutched-up	-.53
tired	-.66		
active	.59		
vigorous	.53		
sluggish	-.51		
warm-hearted	.51		

In his final analysis, Meddis reanalyzed the hypotheses of Green and Nowlis (1967). It may be recalled that Green and Nowlis originally hypothesized four bipolar factors, and were surprised when instead they found a larger number of predominantly unipolar factors. Using a symmetrical response format, Meddis again found bipolar factors emerged from the data, while under the Nowlis format unipolar factors emerged.

Spurred on by the work of Meddis, a number of researchers that had previously found factor analytic support for unipolar emotional factors have reanalyzed their own measures. Thayer (1978) found that when he did not impose an orthogonal solution on his data, his four monopolar factors formed two negatively correlated factors in an oblique rotation. Like Meddis (1972), Thayer found that 'High Activation' and 'General Deactivation' correlated negatively, as did 'General Activation' and 'Deactivation-Sleep'. In addition, these two pairs of factors each formed a distinct bipolar factor in a second order factor analysis. Though this result was not due to response format, it does support a model of affect, like that presented in Figure 1, that is characterized by fewer, more robust factors.

Lorr and his colleagues (Lorr, McNair & Fisher, 1982; Lorr & Shea, 1979) have also reanalyzed the factor structure in their Profile of Mood States (McNair, Lorr &

Droppleman, 1971; POMS). As mentioned previously, this is a frequently used measure of affective experience that yields scores on eight monopolar scales. Their original response format, while not including the '?' option used by Nowlis, was asymmetrical (see Table 1). When they used a balanced response format (Lorr & Shea, 1979) or when they partialed out response bias (Lorr, McNair & Fisher, 1982), a smaller number of more robust and predominantly bipolar factors emerged. In each instance the largest factors were bipolar, while some of the smaller factors were monopolar. The authors do not comment on what this fact may imply for their published questionnaire (POMS), but it is clear that a biased response format will contaminate a factor structure that is broad and bipolar.

Russell (1979) has also tested some of Meddis' hypotheses. He found, in a comparison of the Nowlis (1965), McNair and Lorr (1964), Meddis (1972), and a true-false response format, that the Meddis format was least subject to the effects of response bias.

Current Two-Factor Models

J. A. Russell is an often cited and fairly prolific researcher of affective structure. Since his theory of affective structure has changed over time, an overview of his work will be presented. Additionally, critical comments will be made where they are appropriate to the

goals of the present research. His first work on affect was done in collaboration with Albert Mehrabian (Mehrabian & Russell, 1974) and resulted in a book that was based on a series of studies of affective experience. Their theoretical starting point was to apply the dimensions found with Osgood's (1966) semantic differential to emotional experience. They believed that three dimensions (pleasantness-unpleasantness, arousal-sleepiness, and dominance-submissiveness) would be found in research on affect, and that these dimensions would be analogous to the dimensions of evaluation, activity, and potency, which had been found in a wide variety of studies which employed the semantic differential (Osgood, Suci & Tannenbaum, 1957; Snider & Osgood, 1969).

In their first work (1974), factor analytic scales that directly corresponded to their three proposed factors were developed. Later (Russell & Mehrabian, 1977), they reported that their previously developed scales of pleasantness, arousal, and dominance accounted for almost all of the replicable variance in 42 scales of emotion developed by other authors (e.g. Izard, 1972; Johnson & Myers, 1967; McNair & Lorr, 1964; Nowlis, 1965; Spielberger, Gorsuch & Lushene, 1970; Thayer, 1967; Zuckerman & Lubin, 1965). In addition, they presented <u>beta</u> weights which showed how each of the other 42 scales could be predicted solely from their

three dimensions, and a measure of acquiescence response bias.

Clearly, it would be an impressive finding if all published measures of emotion could be adequately predicted by just three scales. However, a close examination of the process they followed in scale construction leaves questions over the claimed superiority of their dimensions. To develop their emotion scales (Mehrabian & Russell, 1974), they had students rate story vignettes for emotional quality. There is no problem with this procedure in itself; however, the scales which ratings were made upon were developed on primarily a priori grounds, rather than from experimental evidence. Since they hypothesized three dimensions upon which emotion should vary, they proceeded to list pairs of terms that they believed would be contrasts along the dimension of interest. For example, one item on the Pleasure scale is anchored by "happy" on the left, followed by a line with nine spots where a subject can make a check mark and then anchored on the right by "unhappy". In the final form of their measure there were six similar item pairs for each of the three dimensions of pleasure, arousal and dominance. For each story vignette subjects were requested to mark how they felt along the continuum between the two anchor terms. Scores along these continua were then factored by means of a principal components analysis.

There would not be a problem with this procedure if the item pairs were derived through factor analysis or even by means of intercorrelations from a separate sample. However, the item pairs were not, and the authors' presented no evidence which demonstrated that their item pairs actually fall at opposite ends of an emotional continuum. The confused nature of this process is apparent when we see that as part of the Pleasure scale the word pair "relaxed vs. bored" appears. However, as part of the Arousal scale, the word pair "relaxed vs. stimulated" appears (p. 216). Is "relaxed" a marker of Pleasure or a marker of Arousal? Other questionable word pairs which they believed represented a continuum were "contented vs. melancholic" (Pleasure scale), "jittery vs. dull" (Arousal scale), "in control vs. cared for", and "important vs. awed" (both on the Dominance scale). The supposed continua between these word pairs are not readily evident. Further, the haphazard pairing of words which anchor their continua throws doubt on the validity of the entire measure.

In a later study, Russell (1978) employed the above scales and reconfirmed the importance of Pleasure and Arousal as dimensions of affect. In this study he did not find further support for the dimension of Dominance. However, a number of years later (Russell & Steiger, 1982) he again reasserted the importance of this scale. In the 1978 study, he had subjects rate emotional terms on the

semantic differential-like scales described above. Then, by means of a multidimensional scaling technique, extracted three dimensions along which all terms varied. These dimensions were his original three hypothesized dimensions. He then compared the scaling dimensions from his study to the scaling dimensions found by Bush (1972, 1973) and the three semantic differential dimensions found by Averill (1975) in their studies of mood term similarities. Comparisons were made by canonical correlations and the results showed strong support for the dimensions of pleasure and arousal across studies, but there was no clear convergence for the third dimension. In this same study Russell reported the results of a principal components analysis done on 11 scales (not items) that were shared across studies. This analysis resulted in a two-dimensional solution. The two dimensions, consistent with the canonical correlations, were interpreted as Pleasure and Arousal.

The last analysis is discussed because it is easy to get the impression from reading Russell's abstracts, summaries or discussions that he has performed a number of factor analytic studies on emotional terms (Mehrabian & Russell, 1974; Russell, 1978, 1979, 1980). However, there is only one analysis, within one larger study, where factor analytic results for individual terms are reported. In all other cases his reported results are on the factoring of a number of scales, rather than items. In the one case where

a principal components analysis was conducted on individual items, Russell and Ridgeway (1983) presented the results of an analysis conducted on self-reported affect in two samples of children. Initially, for each sample a large factor upon which all items loaded was removed from the analysis. This factor was considered a response bias factor, and was thrown out. However, no evidence was presented to indicate that this was the only meaningful interpretation for this factor. After the first factor was disposed of, it was found in the first sample of children that none of the emotion terms adequately described the second factor. Nevertheless, this factor was retained on a priori grounds, and was later discussed as if it lent experimental support for their two-factor (Arousal and Domminance) model of affect. In their second sample of children, terms did load on the second factor of their extraction. However, the argument that the dominant dimensions of affect in a principal components analysis of self-reported mood were Pleasantness and Arousal was not entirely convincing.

In sum, Russell's methodology, seen in both his original analyses with Mehrabian and in his later work with Ridgeway, appears to be on shaky ground and calls into question the interpretations that he makes regarding the nature of affective structure.

This extended discussion and critique of Russell's work has been done primarily because his two-dimensional structure is in contrast to that of Watson and his colleagues (Watson & Clark, 1984; Watson, Clark & Tellegen, 1984; Watson & Tellegen, 1985; Zevon & Tellegen, 1982). These latter researchers present considerable evidence that the main dimensions of affective structure within a two-dimensional model are in fact at a 45 degree rotation to the dimensions proposed by Russell. It may be that both models are valid, but alternative, two-factor solutions to the same pattern of correlations among emotional terms; as Russell primarily uses scaling techniques (as have other researchers on the dimensions of vocal and facial expression) while Watson and his colleagues rely on the first two main dimensions that emerge from factor analysis (rotated to orthogonal simple structure). However, Russell's dimensions may differ from those found by Watson and Tellegen, at least in part, because of the methodological questions raised above.

In either case, Watson and Tellegen (1985) contend that Russell's dimensions will emerge as the first two factors in an unrotated principal components analysis of self-rated mood. Alternatively, Russell's dimensions may be seen in a two-factor, orthogonal factor analysis of emotion items by noting the terms that load highly on both Positive and Negative Affect. These are the terms which

fall on the diagonals in Figure 1. It is interesting to note that a similar controversy regarding the appropriate rotation of factors in a two-factor space has emerged in the field of personality (which we will discuss more fully later). Briefly, Gray (1981) has argued that the dominant dimensions of personality are impulsivity and anxiety. He believes that these dimensions lie at a 45 or 47 degree rotation to Eysenck's (1981; Eysenck & Eysenck, 1985) well documented dimensions of introversion-extraversion and neuroticism-stability. The debate over proper rotational solutions in either one of these areas will not be settled (or even addressed directly) by this study, but the similarity of arguments is apparent.

We will turn now to a more detailed discussion of the dimensions of Positive and Negative Affect as put forth by Watson and Tellegen (1985). These authors, building on earlier work (Watson, Clark & Tellegen, 1984; Zevon & Tellegen, 1982) that utilized both intraindividual P-type factor analysis (Cattell, 1952) and traditional across subject R-type factor analysis, put forth the model depicted in Figure 1.

In support of this structure, six of the previously published studies that had argued for a large number of discrete emotional factors (Borgatta, 1961; Hendrick & Lilly, 1970; Lebo & Nesselroade, 1978; McNair et al., 1971; Russell & Ridgeway, 1983; Thayer, 1967) were reanalyzed.

It was the contention of Watson and Tellegen (1985) that there were several reasons for confusion over the basic factors of emotional experience. They stated:

> many self-report studies have a number of methodological problems and biases including poor sampling of affect terms, improper response formats, and acquiescence response bias that attenuate the normally high negative correlations between opposite mood terms, and so preclude the emergence of large bipolar dimensions .... our analyses bear out the critical importance of an additional factor for understanding study outcomes, namely the chosen method of analysis. Investigators of self-rated mood have generally used factor analysis and have used ...[the] Kaiser criterion (which retains all principal components with eigenvalues of 1.00 or greater) [and] tends to result in the extraction of a relatively large number of factors, especially when the number of variables is large....In contrast, our own analyses of self-rated mood...have been geared... to clarify dominant dimensions. In factor analysis these are identifiable by the clear and discontinuous salience of the first few principal components or factors relative to the subsequent ones (p. 220).

The last issue raised in this quote, that of the proper criteria for factor extraction, was seen by Watson and Tellegen as the primary reason that the broad structure of affect had been overlooked for so long.

In the six studies that were reanalyzed, Watson and Tellegen first reconstructed an approximation to the original correlational matrix of items (in addition, they used data from three of their own studies). Each matrix was then subjected to a principal factor analysis (or Principal Axis factoring in SPSSx language). Upon assessing the percentage of common variance that was accounted for by each factor, it became clear that there was a marked "elbow" at the third factor in each solution. Since they

were assessing the dominant dimensions of affect, the traditional Kaiser criterion was not employed and two factors (the two above the "elbow" in the plot of the variance accounted for) were extracted from each solution and rotated to orthogonal simple structure by the Varimax procedure. In every solution the first two factors accounted for between one half to three quarters of the common variance. Upon both a visual comparison across factor solutions, and a quantitative analysis of factor convergence, it was concluded that Positive and Negative Affect were the dimensions being tapped in every case. There were 36 factor convergence correlations between Positive Affect factors across the studies (i.e., the Positive Affect factors from each of the nine studies was paired with the Positive Affect factors across the other eight studies). Out of these 36 congruence coefficients, 29 were above .90 and only one was below .80. Negative Affect fared less well, though still showing clear convergence. Of the 36 intercorrelations, 19 were above .90 and four were below .80. With these results it could be seen that despite the confusion and disagreement between studies which assessed affect at the discrete, many-factor level, there was a clear convergence across the reanalyzed studies at the broad, two-factor level of analysis.

Based on the overall average loading for each of the terms analyzed, Watson and Tellegen selected the terms

presented in Figure 1 as those that most clearly define each of the four dimensions of affect (Positive Affect, Negative Affect, degree of Pleasure, and degree of Engagement) which can be represented in this two-factor space. This positioning was accomplished by assigning "each term to that region in which it fell in the majority of the solutions in which it occurred" (p. 230; italics are added).

Additional reanalyses were then conducted by Watson and Tellegen (1985) on the oblique, many-factorial solutions originally found by several researchers (Lebo & Nesselroade, 1978; McNair et al., 1971; Zevon & Tellegen, 1982). For each of these studies a second order factor analysis was completed using the procedure developed by Hendrickson and White (1966). In each case, two second order factors were extracted and rotated to orthogonal structure. The terms that defined these second order factors indicated they were clearly Positive and Negative Affect dimensions. The second order dimensions from each study were then compared to the two dimensional reanalyzed solutions. In every case the factors between each solution correlated between .920 and .999, which indicated quantitatively that Positive Affect and Negative Affect were clearly the dimensions emerging in each solution. Finally, the ten oblique factor scales from a study (Kotsch, Gerbing, & Schwartz, 1982) employing Izard's Differential Emotions

Scale for Children (Izard, 1979; DES-III) were subjected to a similar second order factor analysis. Positive and Negative Affect dimensions were again readily apparent, despite the fact that disengaged states are not included on the DES-III (i.e., terms reflecting fatigue and relaxation which are considered excellent markers of low Positive Affect and low Negative Affect, respectively). Izard's factor of Interest loaded highly on only the Positive Affect factor. "Enjoyment" loaded highly and positively on Positive Affect and moderately but negatively on Negative Affect. "Surprise" loaded positively on both factors. "Sadness" loaded negatively on Positive Affect and positively on Negative Affect. The factors of "Anger", "Disgust", "Contempt", "Fear", "Shame", and "Guilt" all loaded on Negative Affect but not significantly on Positive Affect. These results are again consistent with the placement of terms in Figure 1.

In describing the nature of Positive and Negative Affect, Watson and Tellegen (1985) note that these factors are descriptively bipolar but affectively, or experientially, they are unipolar dimensions. This definition emphasizes that it is only the high end of each dimension which represents a state of emotional arousal (high affective experience), while the low end of each dimension reflects a "relative absence of affective involvement" (p. 221). Positive Affect (PA) is described (Watson & Clark,

1984) as reflecting the extent to which a person is feeling a zest for life or feeling up versus down. High PA is reflective of states of excitement, enthusiasm and activity, while low PA is seen by these authors as reflecting states of fatigue and sleepiness. On the other hand, Negative Affect (NA) represents the degree to which a person feels upset or unpleasantly aroused versus peaceful (e.g. distressed, hostile and nervous on the high end versus calm and relaxed on the low end).

Watson and Tellegen (1985) contend that since Positive and Negative Affect represent the basic structure of affect, states of pleasure and displeasure can be more reliably interpreted as combined states of the independent dimensions of PA and NA. Pleasure and contentment are states that reflect a mix of high PA and low NA, whereas states of sadness and unhappiness are combinations of high NA and low PA.

The relationship of pleasantness and unpleasantness to PA and NA has produced some continued confusion in analyzing affect structure. The confusion referred to is primarily one of semantics. Many researchers describe the affect terms they investigate as "positive" affect and "negative" affect (e.g. Diener & Emmons, 1984; Diener & Iran-Nejad, 1986; Diener, Larson, Levine, & Emmons, 1985; Emmons & Diener, 1986; Larson & Diener, 1985). However, Diener and his colleagues have consistently studied terms

like happy and contented as "positive" affect items, and terms like unhappy and unpleasant as markers of "negative" affect. It is easy to see how this could happen because "pleasantness" is easily seen as a "positive" affect and "unpleasantness" is easily seen as a "negative" affect. However, studies that assess what are true Pleasantness and Unpleasantness factors (as outlined by Watson and Tellegen) will not find the same factor independence or factor properties that have been found with the factors of PA and NA. By looking at Figure 1 it can be seen that Pleasantness and Unpleasantness should be opposite ends of the same continuum, and not independent of each other, as they represent a mix of PA and NA. As such, the continued use of the same terms ("positive" affect, "negative" affect) to describe different process (Pleasantness, Unpleasantness) across studies, will unnecessarily continue to confuse this area of the literature.

Using the structure of affect developed by Tellegen and described above, Watson and Clark (1984) conducted a massive review of the constructs in the literature which assessed the trait they describe as Negative Affectivity (unfortunately, the same systematic review of Positive Affect constructs has yet to be conducted). A full presentation of the work done by Watson and Clark is beyond the scope of the present review. However, key findings from this review will be presented.

Describing their "trait" construct of Negative Affectivity, which runs along the same dimension as their "state" concept of Negative Affect, they report:

> Taken together, the data reveal a dimension of stable and pervasive individual differences in mood and self-concept. High-NA individuals are more likely to report distress, discomfort, and dissatisfaction over time and regardless of the situation, even in the absence of any overt or objective source of stress. As a result, trait NA scales have a consistently strong relation with state measures of anxiety and general negative affect, even when the state scales are completed after a lapse of several years. High-NA subjects are more introspective and honest with themselves, dwelling particularly on their failures and shortcomings. They also tend to focus on the negative side of others and the world in general. Consequently, they have a less favorable view of self and other people and are less satisfied with themselves and with life (p.483).

They then provide the further description of individuals who are low on the trait of Negative Affectivity:

> They are more content and satisfied with life and eschew the ruthless honesty of high-NA individuals, both with regard to self and others, in favor of smoothing over life's rocky road. They focus on themselves less and, when they do, are more pleased with what they find, enabling them to maintain a better mood, a more favorable self-view, perhaps to the point of glossing over (repressing?) some harsh truths. Similarly, they have a more positive view of others and, in the interest of smooth social intercourse, are more conforming and conventional (p. 484).

As evidence of this construct, Watson and Clark have analyzed the intercorrelations between a large number of published scales from the field of psychological assessment. They note, as did Millon (see the Introduction), that each of these assessment measures have dissimilar names and have distinct literatures built up

around them, yet they are describing the same aspects of people. Watson and Clark contend that all these measures intercorrelate so highly that they must be seen as manifestations of the same underlying construct. Table 3 shows the intercorrelations they obtained between the 12 most highly convergent measures of the 18 measures they reviewed. As can be seen from the table, measures of anxiety and neuroticism lie at the high end of this dimension and contrast strongly with measures of social desirability and repression, which are at the low end of this dimension. To obtain this index of convergence, Watson and Clark combed the literature and averaged the intercorrelations observed between the various measures in the table. As mentioned above, they considered these 12 measures, based on their interrelationship, to be basically alternate measures of the same construct.

After presenting the above evidence which showed how well these constructs converge, the authors cited both reliability and validity data for their construct of Negative Affectivity. The validity data confirmed the summary descriptions quoted above, while the reliability data indicated that the trait of Negative Affectivity remains stable for about six months (*r*'s between .80 and .86), after which there is drop off in reliability. However, even after one to two years the coefficients remain at approximately .60.

Table 3
Intercorrelations between the 12 measures that best define Negative Affectivity (From Watson & Clark, 1984).

Scale	Scale											
	1	2	3	4	5	6	7	8	9	10	11	12
1. TMAS	82[a]											
2. A	85	88[b]										
3. PT	88	87	89[a]									
4. SD	-81	-86	-81	81[a]								
5. R-S	88	87	74	-88	91[b]							
6. ER-O	—	—	-88	87	—	91[a]						
7. Sc	73	77	82	-78	76	—	93[a]					
8. Pn	71	72	74	-76	75	—	71	79[a]				
9. A-Trait	73	—	81	—	80	—	72	—	90[a]			
10. EPI-N	72	81	—	-60	81	—	—	—	73	82[c]		
11. MPI-N	72	—	62	—	75	—	42	—	—	71	84[a]	
12. IPAT	74	44	44	—	76	—	—	—	76	76	75	81[b]

Note. Decimals have been omitted. TMAS =Taylor Manifest Anxiety Scale (Taylor, 1953); A = Anxiety (Welsh, 1956, 1965); Pt = Psychasthenia (McKinley & Hathaway, 1942); SD = Social Desirability (Edwards, 1957); R-S = Repression-Sensitization (Byrne, 1961; Byrne, Barry, & Nelson, 1963); ER-O = Ego Resiliency-Obvious (Block, 1965); Sc = Schizophrenia (Hathaway, 1956); Pn = Psychoneurosis (Block, cited in Dahlstrom, Welsh, & Dahlstrom, 1975); A-Trait = State-Trait Anxiety Inventory A-Trait Scale (Spielberger et al., 1970); EPI-N = Eysenck Personality Inventory Neuroticism Scale (Eysenck & Eysenck, 1968); MPI-N Maudsley Personality Inventory Neuroticism Scale (Eysenck, 1962); IPAT = IPAT Anxiety Scale (Krug, Scheier, & Cattell, 1976).

[a]coefficient alpha or Kuder-Richardson estimate of internal consistency.

[b]Split-half reliability. [c]Parallel forms reliability.

Further indications of Negative Affectivity can be seen in a recent study by Tanaka-Matsumi and Kamoeka (1986). These authors administered 11 measures of depression, anxiety and social desirability to almost 400 subjects. The measures that they used were: the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961); the Zung Self-Rating Depression Scale (Zung, 1965); the Lubin Depression Adjective Checklist - Form B (Lubin, 1967); the Zung Self-Rating Anxiety Scale (Zung, 1971); the Spielberger State-Trait Anxiety Inventory (Speilberger, Gorsuch, & Lushene, 1970); the Taylor Manifest Anxiety Scale (Taylor, 1953); the S-R Inventory of Anxiousness (Endler, Hunt & Rosenstein, 1962); the Edwards Social Desirability Scale (Edwards, 1957); and the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960). It can be seen that many of these scales are the same as those assessed by Watson and Clark (1984) and listed in Table 3. Paralleling the findings of Watson and Clark, the later study found that for all of the anxiety and depression measures (except the S-R Inventory of Anxiousness, which assesses anxiety in response to 14 specific anxiety provoking situations), the convergent correlations between similar measures were of the same high magnitude as the divergent correlations across measures of anxiety and depression. That is, as measurable constructs, depression and anxiety were not distinct entities. In addition, the

Edwards Social Desirability Scale was found to correlate negatively and strongly with all of the anxiety and depression measures (r's between -.49 and -.85). This is also consistent with the finding of Watson and Clark.

Additional support for viewing Negative Affectivity as a unitary construct comes from a study by Meites, Lovallo, & Pishkin (1980). These authors reported that measures of anxiety, depression, and neuroticism (using the Beck Depression Inventory, the Zung Self-Rating Depression Scale, the Taylor Manifest Anxiety Scale and the Neuroticism scale of the Eysenck Personality Inventory [Eysenck & Eysenck, 1975]) correlated so highly with each other that they could not be considered assessments of distinct constructs.

An additional source of evidence for the robust nature of Positive and Negative Affect is found in a study by Gotlib and Meyer (1986) who conducted a factor analysis of the Multiple Affect Adjective Check List (Zuckerman & Lubin, 1965; MAACL). The MAACL was designed to provide valid and differential measurement of anxiety, depression, and hostility. However, using 475 students as subjects, it was found that two large dimensions emerged in a principal components analysis. The first factor defined all of the negative affect items while the second factor contained all of the positive affect items from the scale. Once again, depression, anxiety, and hostility were not differentiated.

Watson and Clark (1984) discussed the similarity of Negative Affectivity with the work done by Eysenck (e.g. 1981) on the dimension of Neuroticism. However, they did not equate their construct with his, even though neuroticism is one of the best measures of Negative Affectivity. Watson and Tellegen (1985) also noted the similarity between the dimensions of Negative Affect and neuroticism, as well as Positive Affect with extraversion. However, they did not equate their dimensions with Eysenck's dimension.

As noted in the Introduction, it is the thesis of the present study that the same dimensions of human experience have been tapped twice - earlier by Eysenck in factor analytic studies of personality, and currently by Tellegen and his students in factor analytic studies of emotions. Consistent with this thesis, Plutchik (1980) has cogently argued that emotions, especially one's general moods, are nothing distinct from that which makes up personality. In other words, an individual's personality character is indistinguishable from his or her emotional character, when they are both assessed over the course of time.

To examine the degree to which Watson and Tellegen (1985) and Eysenck (1981) are assessing the same individual differences, the results of a number of studies that have explored the interface of personality and emotions will be

discussed. However, before this is done an overview of Eysenck's extensive work on personality will be presented.

REVIEW OF PERSONALITY DIMENSIONS

Beginning in the 1950's Eysenck (1952, 1962) set out on a long program of research to assess the dominant dimensions of personality. He originally identified two independent dimensions of personality; one, the continuum from introversion to extraversion (E), and the other, the continuum from emotional stability to neuroticism (N). Later, Eysenck (Eysenck & Eysenck, 1975) proposed a further dimension of personality, psychoticism (P), which was thought to reflect a predisposition to experience psychotic behavior. Additionally, in the last three versions of Eysenck's measure of personality, a fourth scale has been used (Eysenck & Eysenck, 1968, 1975; Eysenck, Eysenck, & Barrett, 1985). The fourth scale was originally intended as an indication of dissimulation, hence its designation as the lie scale (L). The L scale has subsequently been interpreted as another stable dimension of personality (see McCrea & Costa, 1985) that apparently reflects a naive view of self and of one's interactions with others. There have been conflicting reports over what the P scale measures (see Claridge, 1981) with many reports indicating that it taps a dimension of "toughmindedness" or sociopathic tendencies, rather than psychotic behavior. Since the

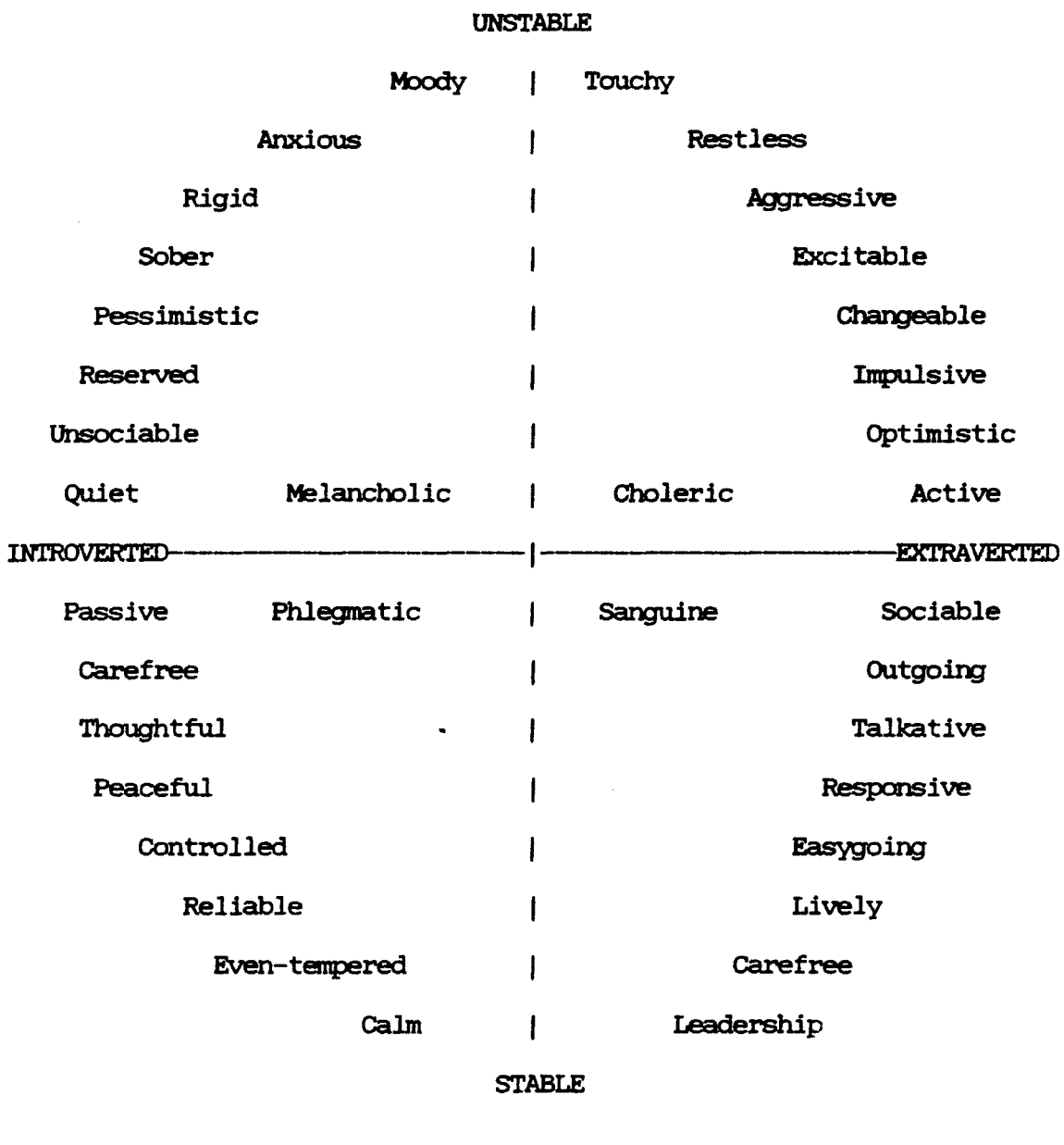
latter two dimensions (P and L) are not of central concern here, attention will be focused on the more concise and well validated measures of E and N.

In an extensive review of the relevant literature, Eysenck (1970) found support for conceptualizing personality in terms of the two broad dimensions of extraversion and emotionality (which is what Eysenck and Eysenck [1975] now prefer to call the neuroticism dimension). Support for these dimensions dates back to the fourth century B.C. when Hippocrates discussed the four basic temperaments. The four temperament types - choleric, sanguine, melancholic, and phlegmatic - were further described and elaborated upon by Galen, Kant, and more recently by Wundt (see Eysenck, 1970, for a more complete discussion). An examination of Figure 2 reveals the connection between the four temperament types, and the two dimensions of E and N, for which extensive factor analytic support has been found (see Eysenck, 1981; Eysenck, & Eysenck, 1985).

In describing the phenotypic expression of these dimensions of personality, Eysenck and Eysenck (1975) note:

> The typical extravert is sociable, likes parties, has many friends, needs to have people to talk to, and does not like reading or studying by himself. He craves excitement, takes chances, often sticks his neck out, acts on the spur of the moment, and is generally an impulsive individual. He is fond of practical jokes, always has a ready answer, and generally likes change: he is carefree, easy-going, optimistic, and likes to 'laugh and be merry.' He prefers to keep moving and doing things, tends to be aggressive and lose his temper quickly; altogether his feelings are

Figure 2. The structure of personality traits showing the dimensions of introversion-extraversion (horizontal) and neuroticism-stability (vertical) and their relation to the four personality types proposed by Hippocrates, Galen, and Wundt (see text for more complete description). From Eysenck and Eysenck (1975).



> not kept under tight control, and he is not always a reliable person.
>
> The typical introvert is a quiet, retiring sort of person, introspective, fond of books rather than people; he is reserved and distant except to intimate friends. He tends to plan ahead, 'looks before he leaps' and distrusts the impulse of the moment. He does not like excitement, takes matters of everyday life with proper seriousness, and likes a well ordered mode of life. He keeps his feelings under close control, seldom behaves in an aggressive manner, and does not lose his temper easily. He is reliable, somewhat pessimistic, and places great value on ethical standards.
>
> (W)e may describe the typical high N scorer as being an anxious, worrying individual, moody and frequently depressed. He is likely to sleep badly, and to suffer from various psychosomatic disorders. He is overly emotional, reacting too strongly to all sorts of stimuli, and finds it difficult to get back on an even keel after each emotionally arousing experience. His strong emotional reactions interfere with his proper adjustment, making him react in irrational, sometimes rigid ways...If the high N individual has to be described in one word, one might say that he is a worrier; his main characteristic is a constant pre-occupation with things that might go wrong, and a strong emotional reaction of anxiety to these thoughts. The stable individual, on the other hand, tends to respond emotionally only slowly and generally weakly, and to return to baseline quickly after emotional arousal; he is usually calm, even-tempered, controlled and unworried (p. 5).

Eysenck (1967, 1981) theorizes that the basis for the above two dimensions of personality in large part resides in individual differences in physiology. According to theory, the introversion-extraversion dimension is predisposed by differences in the central nervous system while the neuroticism-stability dimension is related to differences in the lability of the autonomic nervous system. Briefly, introverts are seen as having a greater resting level of cortical arousal than extroverts. This is

due to the greater amount of stimulation that is given to the introvert by the reticular arousal system (RAS) of the brain stem. The RAS is an evolutionarily primitive component of the nervous system and appears to act as a type of relay and screening station for a wide assortment of internal and external sources of stimulation. Due to the already high degree of stimulation received by the introverted person, they tend to shy away from further sources of arousal and excitation. Extraverted individuals, on the other hand, tend to seek stimulation, variety, and social excitation to achieve the same optimum level of cortical stimulation as that already had by the introvert.

It is further theorized that the limbic system or "visceral brain", which is the seat of emotional experience, differs across individuals in its tendency to become activated, and is proposed as the basis for the Neuroticism dimension of personality. Highly emotional people (ie. high N) have a more easily activated limbic system and are therefore more emotionally labile than low N people. Low N people, on the other hand, are less likely to become emotionally engaged across situations and more easily return to baseline levels after an emotional arousal. The limbic system sits just above the RAS on the brainstem and has excitatory neural connections to the RAS. As a result, when the limbic system becomes activated the RAS also becomes more stimulated and, as a final result, there is a

further increase in cortical activity. In general then, in addition to having greater emotional activation, high N individuals respond to stimulation much like introverted people because they have greater reticular arousal system activation as well. Conversely, low N individuals are less likely to become emotionally engaged across a wide range of situations and, correspondingly, they will respond to stimulation on the basis of where they fall on the E dimension of personality.

Research on these dimensions of personality have shown them to be stable traits that remain constant over time periods ranging from one to 50 years (Conley, 1985; Giuganino & Hindley, 1982; Hindley & Giuganino, 1982; Schuerger, Tait, & Tavernelli, 1982). This consistency has been observed in self report studies like those listed above, and also in ratings done by significant others (McCrea, 1982). Additionally, it has been found that the factor structure of the Eysenck Personality Questionnaire (Eysenck & Eysenck, 1975, EPQ) is equivalent across a diverse sample of 26 countries from all parts of the world (Barrett & Eysenck, 1984; Eysenck, Barrett, & Eysenck, 1985; Eysenck, S.B.G. et al., 1986).

Extensive studies based on these factors of personality have been carried out (in 1981 Eysenck reported that over 5000 had been done). Across studies significant hypothesized differences have been observed in learning and

memory (Eysenck, M.W., 1981), conditionability (Levey and Martin, 1981), pain tolerance (Barnes, 1975), social behavior (Wilson, 1981), and in physiology (Gale, 1983; Robinson, 1982; Stelmack, 1981).

These two factors of personality are incorporated into other prominent theories of personality (Guilford, 1975, cited in Campbell & Reynolds, 1984; McCrea & Costa, 1985) and emerge as second order factors from the 16 Personality Factor Questionnaire (Cattell, Eber, & Tatsuoka, 1970, 16PF) and the California Personality Inventory (see Loehlin, 1985). In a recent factor analysis of the scales on the Millon Clinical Multiaxial Inventory (Millon, 1982; MCMI), Choca, Peterson, & Shanley (1986) found that three factors emerged in a principal components analysis. Though interpretation of scales rather than items is difficult (especially on the MCMI where an item may be on more than one scale), the three factors were reasonably interpreted as factors of introversion-extraversion, neuroticism, and psychoticism.

Perhaps most significantly, the factors of introversion-extraversion and emotionality-stability have a higher genetic heritability than other personality traits (Loehlin, 1985). Almost all adoption, twin, and cross generational studies of heredity note that these traits have a heritability of about 50 percent (Fulker, 1981; Loehlin, 1985; Young, Eaves & Eysenck, 1980). In other

words, about half of the phenotypic expression of these traits appears to be due to genetic factors (although Scarr, Webber, Weinberg, & Wittig, 1981, found heritability coefficients to be about 25 percent). It is clear then that these dimensions of personality can be considered robust, distal variables that fit Buss's (1984) criteria for a true within-species individual difference.

REVIEW OF PERSONALITY AND MOOD STUDIES WHICH CONVERGE

We turn now to a comparison of E and N with PA and NA. A visual comparison of Figure 1 with Figure 2, which come from two separate bodies of literature separated in time by more than ten years, shows a clear similarity among constructs. Additionally, a comparison between the verbal descriptions given to extraversion and Positive Affect and neuroticism and Negative Affect, as elaborated previously, reveals a striking similarity between the two models. It may also be seen by looking again at Table 3 that neuroticism, as measured by two of Eysenck's early scales of this dimension, are considered by Watson and Clark (1984) to be excellent measures of their dimension of Negative Affectivity. Negative Affectivity, it may be recalled, describes trait aspects of the mood dimension of Negative Affect.

Further indications that PA and E and NA and N vary together can be seen in the literature of well-being (Diener, 1984), in the literature of social cognition where

studies examining the influence of mood on cognitive processing have been conducted, and in a number of less easily classified studies.

Bradburn (1969) in the U. S., and Harding (1982) in Great Britain, report that negative affect, as measured by the Bradburn well-being scale (which measures recent positive and negative affect, see Appendix A), is higher in women than in men; while scores for positive affect are equivalent across the sexes. The same phenomenon is found with Eysenck's measures, as N is higher in women, while E is equal for both sexes (see Eysenck S.B.G., et al., 1986). In addition, it may be recalled that when Bradburn (1969) first reported his results on psychological well-being, positive affect was correlated with sociability and experiences of novelty, while negative affect was associated with the number of worries people had, the intensity with which they worried, the number of recent physical symptoms they experienced, "psychological anxiety", and reported concern over having a nervous breakdown. Given the descriptions of E and N above, these are just the types of correlates that would be expected if negative affect was related to neuroticism and positive affect was related to extraversion.

Following this line of reasoning, researchers (Costa & McCrea, 1980, 1984; Warr et al., 1983) have assessed the personality dimensions of E and N in relation

to measures of emotional and psychological well-being. Using the Affect Balance Scale (Bradburn, 1969), they have found that extraversion correlates strongly with positive affect but not with negative affect, while neuroticism correlates strongly with negative affect, but not with positive affect. Although Bradburn's measures of positive and negative affect are not equivalent to the dimensions of Positive and Negative Affect as proposed by Watson and Tellegen (1984), they are similar.

The correlations in these studies have been significant but not sufficiently high to warrant considering the E and PA dimensions and the N and NA dimensions as equivalent to each other. However, there are three factors which may explain why the correlates were lower than what would be expected if the thesis of this study was correct. First, the Bradburn measure is only a ten item scale (five questions for each type of affect), which may decrease its efficacy as a reliable measure. Second, and more importantly, the items on Bradburn's scales are not "pure" markers of PA and NA as but forth by Watson and Tellegen. Bradburn's items which assess positive affect are in fact combinations of the Watson and Tellegen high PA and Pleasantness items. Similarly, Bradburn's negative affect items are a combination of high NA and Displeasure items. The third factor that may attenuate correlations, is that the Bradburn measure asks for positive and negative affect

over "the past few weeks". This time frame, while tapping general feeling states, may not give as stable an estimate of general, or "trait" mood, as a questionnaire that asked specifically for people to report how they "generally" feel.

Neuroticism has been shown to be a significant predictor of mood states over time. For example, Williams (1981) found that N was more strongly related to subjects' average mood over twelve days than to mood on any single day. Further, N accounted for 40% of the variance in averaged depression states and 36.6% of the variance in averaged tension/anxiety states. Overall, subjects with high neuroticism scores had poorer mood and showed greater variation in mood pattern from one occasion to another, than did more stable individuals.

In line with this research, Hill (1985) used a Velten-type depressed mood induction procedure (Velten, 1968) to assess the influence of mood on personality. In the Velten procedure, subjects are given a list of approximately 50 statements and are asked to read them aloud while attempting to enter into the mood created by the statements. In this study all of the mood statements were of a depressive nature. Hill found that high N individual were more susceptible to the effects of this procedure (i.e. they reported greater feelings of depression). The E dimension was not influenced differentially by this

procedure, indicating that those individuals who are high in N may be particularly subject to depressed or negative mood states and that this is independent from introversion-extraversion.

Boyle (1985), using a Velten mood induction procedure, assessed the differential effects of mood induction between premenstrual and non-premenstrual women. Using Izard's Differential Emotions Scale (DES-IV), he found that premenstrual women were more susceptible to the effects of a depressed mood induction procedure than were non-premenstrual women (N=154). The only DES-IV scales that significantly differentiated the two groups of women were Sadness, Hostility, Fear, and Shame; which were all shown above to load on the dimension of Negative Affect in a second order factor analysis.

In the same area of research, and consistent with the hypotheses of this study, it was found (Mohan & Chopra, 1986) that neuroticism scores also increased significantly when women were in their premenstrual period as compared to their postmenstrual period.

Isen (1984) has recently reviewed the literature dealing with the influence of affect on behavior and cognitive processes (i.e. social cognition). She notes that there is a difference between the results of studies that have induced positive affect and those that have induced negative affect. She notes that part of this

difference may be due to subjects resorting to "pleasantness restorative" functions when negative affect is induced. That is, attempts at positive affect-like behaviors or thoughts are used in order to change the induced negative affective state or to eliminate the unpleasantness that it brings. Another possibility Isen points out, is that there is increasing evidence that the assumed symmetry between positive affect and negative affect is an illusory result of semantics, and that in reality positive and negative affect may be two distinct processes. These comments point out that researchers in this field have been expecting positive and negative affect to be opposite ends of the same continuum, and not making use of recent models of affective experience (eg. Bradburn, 1969; Watson & Tellegen, 1985). Despite this, a meaningful comparison can still be made between studies of E and N and studies that have assessed the effects of induced mood on cognition and social behavior.

Positive affect has been induced in a variety of ways and, despite the variety of procedures, the results of these mood inductions on social behavior and on cognition have been fairly consistent (see Isen, 1984, for a thorough review of this literature). It appears that induced positive affect increases helping behavior, as long as engaging in a behavior will not threaten this positive mood or interfere with personal freedom and independence. In

addition, an induced good mood results in a greater tendency for self reward, a greater preference for positive self-relevant information and a general increase in sociability and talkativeness. In line with the hypotheses of this study, these are the behaviors that are characteristic of an extraverted individual (see Wilson, 1981; or Morris, 1979; for a review of the behavioral correlates of extraversion).

Positive affect has also been shown to influence cognitive processes. In terms of memory, induced good moods have resulted in subjects recalling positive trait words or positive past experiences more frequently and/or faster than control subjects (Bower, 1981; Isen, Shalker, Clark, & Karp, 1978; Teasdale & Fogarty, 1979, Teasdale & Russell, 1983). In addition, subjects with induced positive moods were more likely to rate ambiguous pictures (scenes and faces) as more pleasant, had a lower tachistoscopic threshold for success related words, expressed expectations of future success more, and rated their household products as better than did controls. Finally, individuals with induced positive affect tended to rely on simplifying (generalizing), intuitive or heuristic thought styles in problem solving tasks (see Isen, 1984).

Similar to the results of induced positive affect, Lishman (1972) found that subjects who were high in extraversion recalled more positive material in a delayed

incidental recall study. He also found (1974) that high E subjects recalled pleasant experiences faster than other subjects. Mayo (1983) extended this finding by showing that high E subjects still recalled more pleasant memories after current mood states were controlled for. Graziano, Feldesman, & Rahe (1985) found that individuals high in extraversion rated faces from unknown individuals more positively than did individuals low on this dimension. Additionally, a number of authors have found that extroverts process information differently than introverts. Introverts are more attentive to details and linear in their thinking, learning best in a structure didactic format, while extroverts tend to be more generalizing or global in their approach to a problem and learn best in an unstructured, informal teaching environment (see Morris, 1979; Riding & Dyer, 1980; Wilson, 1981). Thus, the cognitive processing that occurs as one moves along the extraversion dimension mirrors the cognitive processing one finds during positive affect induction.

As mentioned above, the general picture that emerges from studies that have induced negative affect is less clear than the picture that emerges from studies which induced positive affect. A good number of studies have shown that negative feeling states reduce helping behavior or increase aggressive behavior. However, a number of

studies have also found the opposite effect or found no effect at all.

Results of studies looking at neuroticism and cognitive processing have been less ambiguous and more consistent than those looking at negative affect and cognition (Martin, 1985). In light of the hypotheses of this present study, it is important to discuss briefly why results from negative affect induction procedures may reasonably be different and less consistent than studies examining N and cognitive processing.

Isen (1984) discussed how the field is attempting to study "feelings" which are defined as pervasive and mild affective states. This focus is in contrast to studying "emotions" which are conceived as being more intense, specific and goal directed affective states (pp. 185 - 187). It appears then that this field is attempting to examine emotional "traits" rather than emotional "states". This is an important distinction to make because it is very likely that some individuals will be more responsive to emotional induction procedures if the emotion being induced is consistent with their particular emotional "traits". In other words, it is likely that in the above studies where emotional states were induced, the emotional induction procedure interacts with the general emotional level that an individual brings to the experimental setting (i.e. their degree of E or "trait" PA, and their degree of N or

Negative Affectivity). The mixed results found with the induction of negative affect are then likely to be due to "pleasantness restorative" functions. However, if the hypotheses of the present study are correct, it would be predicted that the efforts to restore states of pleasant emotions would only occur with individuals low on the personality dimension of N. Individuals high in neuroticism are believed to experience more negative affect and, as such, would not be averse to its induction (see Hill, 1985). A similar phenomenon is hypothesized to occur with PA induction along the E dimension.

If this framework and two factor model of personality/affect structure were adopted by researchers who are attempting to assess the influence of mood on cognition and behavior, greater clarity would likely be obtained in results across studies. That is, if one looked for individual differences in emotional "traits" and then designed studies with these groups in mind, greater statistical power for finding group differences could be had. If this was done, the random heterogeneity of respondents would not "wash-out" the effects of treatment which are really there for some groups.

In the cognitive realm, research has confirmed that people in a negative mood will rate ambiguous slides as less pleasant, have lower tachistoscopic thresholds for failure related words, have a more negative conception of

others and have an increased expectation for aversive events to occur, when compared to controls (see Isen, 1984). Additionally, it has been shown that people with induced negative affect are slower at recalling, or recall fewer pleasant experiences (Teasdale & Fogarty, 1979), and manifest a greater recall of unpleasant or unhappy experiences (Teasdale, Taylor, & Fogarty, 1980).

In studies of neuroticism and cognitive processing, Lishman (1974) found high N individuals to be slower at recalling pleasant experiences. In addition, he (Lloyd & Lishman, 1975) found this to be the case with depressed inpatients, even after the effects of current depressed mood states, as measured by the Beck Depression Inventory (Beck et al., 1961; BDI) were partialed out. Mayo (1983) in a free recall of memories to stimulus words, also found that high N individuals recalled fewer pleasant experiences and more unpleasant or unhappy experiences. This again was the case even when the effects of current despondent and anxious mood states were partialed out.

Similar to the above findings, Young & Martin (1981) found in a recall task of self-relevant trait terms from a word list, that increasing levels of N correlated with a greater recall of negative self-relevant terms. Martin, Ward, & Clark (1983) found that this type of cognitive processing occurred only with self-relevant information and was not the case when information was

processed about others. It was also found that others were not necessarily seen in a more positive light, indicating that high N individuals selectively process negative information about the self and do not necessarily see the world from a negative framework.

Thus, while there is not total agreement between studies of negative affect induction and studies of neuroticism, there is mounting evidence that these two processes are tapping the same dimensions within people.

A further indication that N and NA are the same constructs can be seen in a study by Wilkinson and Blackburn (1981; see Martin, 1985). These authors found that individuals high on neuroticism gave negative interpretations and non-self-attributions for positive events occurring, while they gave negative interpretations and self-attributions for the occurrence of negative events. This was the case even when the effects of current depressed mood were partialed out. However, more significantly, they found that the same attributional relationships held when neuroticism was partialed out of the current state of depressed mood. It then appears that both N and NA contribute to, as well as sustain independently, a similar attributional process (within, of course, the parameters of the reliability and validity of the measurement instruments used).

There are internal validity threats inherent in studies that look at the E and N dimensions of personality as independent variables and then use the retrieval of positive and negative life event memories as the dependent measure of cognitive processing (i.e., Lishman, 1974; Lloyd and Lishman, 1975; Mayo, 1983). Because the Eysenck Personality Questionnaire in many respects asks for cognitions about one's life (i.e., "would you consider yourself 'happy-go-lucky'", or "are you an irritable person?"), there is a threat to causality due to the bi-directional nature of the correlational results. That is, there is really no way to say what causes what. It could be that high N causes a greater recall of negative life events, but, just as likely, greater recall of negative life events could cause high N (or, of course, there could be a third moderator variable). Fortunately, the methodology in this realm is sophisticated and diverse enough in its dependent measures to indicate that N influences cognitive processing independent of the above overlap (see Martin, 1985).

Table 4 summarizes the lines of convergence discussed above. By referring to Table 4, it can be seen that, in general, the cognitive processing and the social behavior that occurs after induced positive affect is very similar to the cognitive processing and social behavior of extraverted individuals. Similarly, the cognitive process-

Table 4. Evidence for the congruence of Positive Affect (PA) with extraversion (E) and of Negative Affect(NA) with Neuroticism.

DESCRIPTIVE SIMILARITIES	
N and NA	E and PA
Higher in women.	No sex differences.
Significantly correlated.	Significantly correlated.
NA is more easily induced in high N individuals.	

INTERACTIONS WITH A THIRD VARIABLE[a]	
N and NA	E and PA
Greater induction of NA in premenstrual women.	Greater helping behavior.
N is higher in premenstrual women.	Greater self reward.
Negative interpretations and non-self-attributions for positive events.	Greater sociability and talkativeness.
Negative interpretations and self-attributions for negative events.	Greater recall of positive trait terms (faster and more frequent).
Slower recall of pleasant life experiences.	Ambiguous faces rated as more pleasant.
Greater recall of unpleasant or unhappy life events.	Simplifying or intuitive thought style.

Note: reference sources for these statements are given in the text. [a]All statements are descriptive of behavior at the high end of each dimension.

ing that occurs when negative affect is induced, and strategies to overcome this affect are not employed, is very similar to the cognitive processing found with individuals high in Neuroticism. Thus, it appears that positive affect and extraversion share a common source, as do negative affect and neuroticism.

STATEMENT OF HYPOTHESES

Preliminary hypotheses

1) Data will be collected from two campuses and need to be pooled for analysis. As such, it is predicted that extraversion and neuroticism scores on the EPQ will not differ across campuses. Confirmation of this hypotheses allows for a pooled sample base without biases.

2) The measures of personality (extraversion and neuroticism scores from the EPQ; Eysenck and Eysenck, 1975) will be the only standardized and previously validated measures this study will employ. Since this is the case, it is proposed that the obtained sample of subjects will show scoring equivalent to normative samples (Eysenck, S.B.G., et al., 1986) on the E and N scale of the EPQ (Eysenck and Eysenck, 1975). Nested within this hypothesis is the expectation that females will show higher N scores than males.

3) It is hypothesized that a confirmatory factor analysis of the extraversion and neuroticism items from

Eysenck's measure of personality, will show a clear differentiation and discrimination of the two proposed dimensions.

4) Using the model put forth by Watson and Tellegen (1985), it is hypothesized that a confirmatory principal axes factor analysis (with R-squares on the diagonal and rotated to orthogonal structure) of the "general" emotions questionnaire (explained fully below) will show the dimensions they term PA and NA emerging as the first two dominant dimensions. That is, based on the "elbow" seen in the plot of the eigen values, a two-factor solution will be the most appropriate one. Within this two-factor solution High and Low Negative Affect terms will load significantly on only one dimension and will be the terms which define this dimension. Additionally, the terms of High and Low Positive Affect will load significantly only on the other dimension and will be the terms which define this dimension. Terms of Unpleasantness, Disengagement, Pleasantness, and Strong Engagement will show significant loadings on both of the dimensions and will fall in the appropriate quadrants within this two-dimensional space.

5) The factor structure of self-rated emotion will be the same, regardless of whether subjects are asked to rate how they have felt in the past day (a state measure) or if they are asked to rate how they generally feel (a

trait measure). This hypothesis will be quantitatively analyzed by correlating the factor loadings of emotional terms across the "state" and "trait" response formats. It is expected that correlations near unity will be found for both PA and NA.

Hypotheses of convergence

6) Based on the hypothesis that NA is equivalent to neuroticism, and consistent with earlier findings (Bradburn, 1969; Harding, 1982;), it is expected that the NA scale will show a sex difference, with females reporting significantly higher levels of NA than males.

7) As a preliminary indication that PA and NA are equivalent to E and N, respectively, a multitrait-multimethod matrix will be developed (Campbell & Fiske, 1959). Although both methods will be self-report, they differ in the fact that the affect questionnaire is a Likert-type rating scale in response to single affect terms, while the EPQ employs a forced choice response format to descriptive sentences. It is expected that all of the convergent validity correlations will be significant and their magnitude will be higher than previous studies which employed the Bradburn measure (Costa & McCrea, 1980, 1984; Warr et al., 1983), because of the problems noted with that particular measure. The discriminant validity coefficients are expected to be appropriately low (non-significant), and

approximately equivalent in their magnitude between E and N and between PA and NA (i.e. PA and NA are expected to correlate to the same degree as E and N).

8) As a final step, the NA and PA terms will be combined with the N and E items in a confirmatory principal axes factor analysis rotated to orthogonal structure. As it is expected from hypothesis 4 and hypothesis 6 that two factors will emerge in each case, it is deemed appropriate to use a confirmatory procedure for this last analysis. As we are concerned with the most dominant dimensions in this analysis, the number of factors to be extracted will be determined by the visual "elbow" seen in a plot of the eigenvalues. It is expected that this "elbow" will indicate a two-factor solution as the most appropriate solution for characterizing the data at the broadest level of analysis. Within this two-factor solution the NA terms of affect and the N items from the EPQ will load together to define a single dimension. The PA terms of affect and the E items from the EPQ will also load together and will define the other dimension in this solution.

Though not a strict hypothesis, a final prediction can be made at this point. Since the E and N dimensions are conceptualized here as stable and "distal" variables, it is expected that if there are discrepancies between the hypothesized structure of the emotions questionnaire and the observed structure of the emotions questionnaire, the

inclusion of these distal variables will aid in interpreting the discrepancies. In other words, it is expected that the structure of E and N will help to clarify the dominant dimensions of affect if the dimensions of affect that emerge under hypothesis 4 are not exactly as Watson and Tellegen have predicted.

Method

Subjects and Procedures

Subjects were 231 undergraduates at Loyola University of Chicago (99 males, 121 females, and 11 who did not indicate their gender). All subjects participated in this study for course credit. However, participants were drawn from two different campuses. One hundred and twenty three subjects were drawn from the Psychology Department's subject pool at Loyola's Lake Shore Campus (LSC). An additional 98 subjects were recruited from psychology classes at Loyola's Water Tower Campus (WTC). The LSC has both dormitory facilities and a commuter population of students, while the WTC has no dormitory housing and all students are commuters.

Students at the LSC were tested in small groups of between four and 20 students. They completed the Eysenck Personality Questionnaire - Revised edition (Eysenck, S.B.G., et al., 1985) and two emotion questionnaires based on the work of Watson and Tellegen (1985). All measures will be discussed more fully below. This packet of questionnaires took students approximately 15 minutes to complete.

Students at the WTC were tested differently. These students were assessed three times as part of a longitudinal study. However, the data from the first assessment is all that will be explored here. Subjects from this campus

were given the same packet of materials given students from the LSC. In addition, they were given a human figure drawing test. The drawings, again part of a different study, came after the packet of personality and affect materials and should not have affected the results in any way. Students were given all materials and asked to fill them out at home in one sitting. Subjects then returned their packets of data to their class professor within two weeks of when they were first received (although a good portion returned them almost immediately).

Measures

Affect. The emotion questionnaires used are displayed in Appendix B. The first 38 terms on each questionnaire are the terms presented by Watson and Tellegen (1985) as the terms that best mark each of the major dimensions of affect. Their order of presentation is random. However, different forms of the questionnaires were not used to counter position effects. The last two terms on each questionnaire (impulsive and anxious) were added by the experimenter to see if they would fall between the dimensions of PA and NA, as would be expected by the thesis of this study and the arguments of Gray (1981). Gray, it may be recalled, argues that the dominant dimensions of personality are impulsivity and anxiety. He proposes that these dimensions fall at approximately 45 degree angles to

Eysenck's dimensions of E and N. Because their position in a two dimensional affect space was not addressed by Watson and Tellegen, these terms were not included in any of the confirmatory factor analyses, and consequently their position was not addressed in this research. Further, these terms were purposely placed at the end of the questionnaire to prevent them biasing any of the other terms.

The response format used in the emotions questionnaires was based on the work of Meddis (1972) and Russell (1979). The response options (very unlike me; unlike me; like me; and very like me; scored 0, 1, 2, 3 respectively) are symmetrical and do not leave open the possibility of subjects replying that they cannot decide. As was reported earlier, this response format is less subject to bias than other response formats.

The two emotion questionnaires in Appendix B were given to all subjects. One was termed a "General" emotions questionnaire and the other was termed a "Current" emotions questionnaire. The only difference between these two questionnaires was the way the introduction was worded. On the "General" questionnaire, subjects were asked to indicate how they "generally feel" with regards to the emotion terms presented, while on the "Current" questionnaire, subjects were asked to indicate how they had felt "in the past day" with regards to the terms presented. The

"General" questionnaire was used as an index of "trait" affect, while the "Current" questionnaire was used as a "state" index. Based on the Watson and Clark (1984) concept of Negative Affectivity, it was thought that the "trait" index would provide the best comparison measure for extraversion and neuroticism.

Personality. For assessing the personality traits of E and N, the 100-item, forced choice Eysenck Personality Questionnaire - Revised version (Eysenck, S.B.G., et al., 1985; EPQ-R) was used. This measure is the most recent revision by the Eysencks' for assessing the personality dimensions of extraversion, neuroticism (emotionality), psychoticism (toughmindedness - P), and lie (naivety - L). The greatest change in this scale from its predecessor, the Eysenck Personality Questionnaire (Eysenck & Eysenck, 1975; EPQ), was in revisions made to the psychoticism scale. The P scale on the EPQ had a low reliability, a low range of scoring and a very skewed distribution of scores. The new scale on the EPQ-R corrected these faults by taking out six old P items and adding 13 new P items. These changes are not of great concern for the present study. However, some minor changes were made to the old N and E scales as well. On the EPQ-R scale of neuroticism, one additional item was added: "When your temper rises do you find it difficult to control?". Thus, the new scale has 24 items rather than the former 23. The added N item does not appear to change

the content of the scale much; however, the same may not be able to be said for the extraversion scale.

Two new items were added to the E scale ("Have people said that sometimes you act too rashly?" and "Do you often make decisions on the spur of the moment?"), making it a 23 item scale. These changes were not discussed by the authors (Eysenck, S.B.G., et al., 1985), but it is apparent that the added items are impulsivity items. Impulsivity had been a large component of the E scale in the Eysenck Personality Inventory (Eysenck & Eysenck, 1968; EPI), but had been removed, in large part, from the E scale on the EPQ (see Rocklin & Revelle, 1981), leaving the EPQ E scale as predominantly a measure of sociability and activity. There has been some debate as to whether impulsivity should be considered a component of extraversion or a component of neuroticism (see McCrea & Costa, 1985). However, a number of researchers have noted that impulsivity, as a component of extraversion, was responsible for a number of the physiological correlates of extraversion (see Rocklin & Revelle, 1981; Revelle, Humphreys, Simon, & Gilliland, 1980). It was not clear how these two new items would affect the extraversion scale of the EPQ-R, though it should make this scale more compatible with results found by the E scale of the EPI. However, it would also probably function differently than the E scale

on the EPQ - possibly by increasing the correlation between E and N.

As a result of the uncertainty regarding the EPQ-R, all results from this study were conducted with the EPQ's N and E scales. The E and N scale was formed by simply dropping the items that were added to these scales in the latest version (EPQ-R) of the personality scale.

RESULTS

PRELIMINARY ANALYSES

Across both student populations (campuses), there were no significant differences on the EPQ extraversion and neuroticism scales. For the Lake Shore subjects the mean E score was 14.67, while for the Water Tower subjects the mean E score was 14.41 ($t_{(218)}= 0.44$, $p= .66$). For neuroticism scores, the mean at the Lake Shore campus was 12.33, while at the Lewis Towers campus the mean N score was 13.53 ($t_{(218)}= 1.65$, $p=.101$). While the last statistic indicates a trend for neuroticism scores to be higher at the Lewis Towers campus, the difference does not appear extreme enough to question the pooling of the sample data from both campuses. Additionally, even though there was a statistically significant difference in the average age between both campuses (mean at Lewis Towers = 20.36, range from 16 to 41; mean at Lake Shore = 19.07, range from 18 to 34; $t = 3.63$, $p < .001$) the actual difference was slight and was not considered great enough to prevent pooling the data. The age difference should not have been a factor in the trend for N to be greater at the Lewis Towers Campus, as N decreases with age (Eysenck, S.B.G., et al., 1986).

The mean extraversion and neuroticism scores from this study were compared to the means that were found in a non-quota sample of 879 American students (Eysenck, S.B.G.,

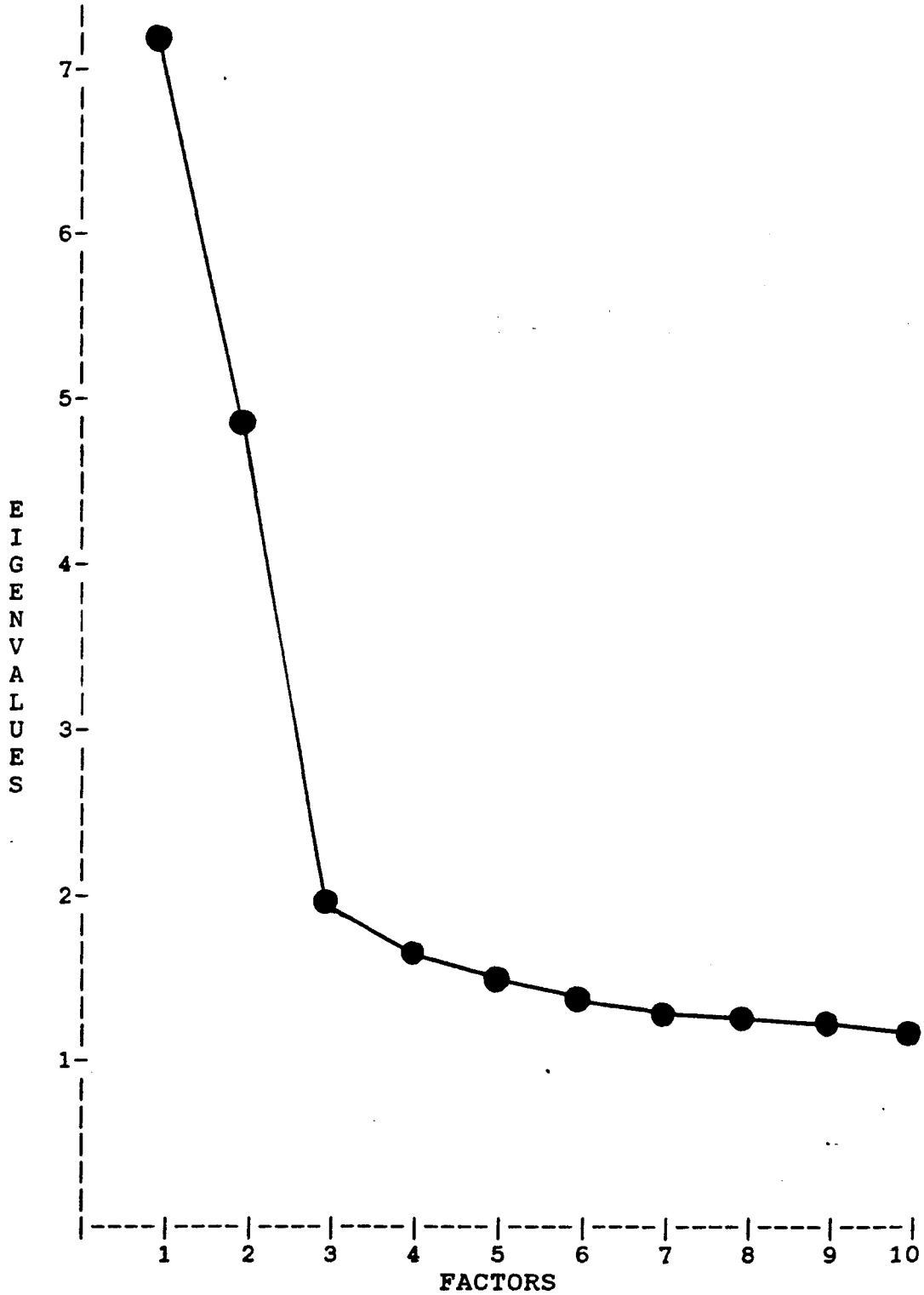
et al., 1986). This was as close to an appropriate standardization sample as could be obtained, and the average age for this population was 20. Sexes were analyzed separately and there were no significant differences among the two scales for females (sample mean for E = 14.62, SD = 4.57, standardization sample mean = 15.3, SD = 4.35, $t_{(665)} = 1.536$, $p > .12$; sample mean for N = 13.06, SD = 5.63, standardization sample mean = 12.75, SD = 5.04, $t_{(665)} = .322$, $p > .6$). For males there was no difference between the sample and the standardization group in terms of extraversion (sample mean = 14.59, SD = 4.17, standardization mean = 14.83, SD = 4.15, $t_{(429)} = .502$, $p > .3$). However, there was a significant difference in neuroticism scores; with the male sample subjects showing a significantly higher mean level of neuroticism (sample mean = 12.64, SD = 5.13, standardization sample = 10.55, SD = 5.41, $t_{(429)} = 3.385$, $p < .001$).

It was expected that females in the sample would have shown significantly greater neuroticism scores than males. However, this was not the case. The mean neuroticism score for males was 12.64 and for females it was 13.06 ($t_{(218)} = .57$, $p = .57$). Apparently, because the males scored significantly higher on this dimension than the norm, the typical sex difference was not found. As expected, there was no difference between males and females on extraversion scores for this sample (mean for males =

14.59, mean for females = 14.62). It is unclear why the males in this sample had higher than normal levels of neuroticism. However, because of this finding, it was deemed appropriate to assess whether the N scores combined across both sexes were higher for this sample than for the standardization sample. The overall mean N score for this sample was 12.87 ($\underline{S}$ = 29.82) while for the standardization sample the pooled N score was 11.9 ($\underline{S}$ = 27.01). This resulted in a significant difference between both groups ($\underline{t}_{(1099)}$= 2.41, $\underline{p}$< .02). It is unclear if or how this result will affect the subsequent factor structure of the EPQ.

To assess the factor structure of the EPQ, a principal axes factor analysis was performed (with $\underline{R}$ squares on the diagonal) on all of the items from the E scale of the EPQ and all of the items on the N scale of the EPQ. The first step in this analysis was an assessment of a plot of the eigen values. As can be seen in Figure 3, a clear elbow formed at the third factor indicating that a two factor solution was appropriate. A two factor solution accounted for 58.22% of the common variance. When this was further broken down, the first factor accounted for 31.01% of the common variance and the second factor accounted for 27.21% of the common variance. The extraction of a third factor would have resulted in a minimal increase (6.33%) in the amount of common variance that was explainable.

Figure 3. Plot of the factors and corresponding eigenvalues in a principal factor analysis of the EPQ E and N items.



A Varimax rotation to simple structure was performed on the two factor solution. This process resulted in a clear discrimination of items. By looking at Table 5, it can be seen that all of the N items loaded most strongly on the first factor, while all of the E items loaded most strongly on the second factor, confirming the hypothesized EPQ factor structure.

The next stage of this analysis was to conduct a principal axes factor analysis of the emotion questionnaire. However, before an adequate factor analysis of the "general" emotions questionnaire could be performed, three of the emotional terms had to be dropped. These three terms - dull, placid, and quiescent - were producing an ill-conditioned correlation matrix, which is an indication that subjects responded to these items inconsistently. Significantly, while subjects were filling out the questionnaires, placid and quiescent were the only terms that people were unsure of, and subjects frequently asked for the definition of these terms (especially quiescent). If it is assumed that many subjects did not ask for clarification, yet were also confused by these terms, there is fairly good evidence that these terms were often misunderstood. The meaning of dull, on the other hand, was never questioned. This is reasonable, given its common usage. However, the connotations to this term are certainly variable (e.g. boring, unintelligent, blunted, and tired),

Table 5. Loadings of Neuroticism (N) and extraversion (E) items in a principal axes factor analysis of the EPQ (Eysenck and Eysenck, 1975) rotated to Varimax simple structure.

Item	Factor 1	Factor 2	Item	Factor 1	Factor 2
N6	.63	.12	E13	-.11	.66
N19	.62	-.19	E23	.04	.63
N7	.62	.10	E21	-.09	.62
N9	.61	-.18	E3	-.04	.60
N1	.56	-.03	E6	-.18	.59
N11	.55	-.14	E2	-.00	.58
N14	.54	-.12	E12	-.17	.55
N8	.53	-.18	E11	.06	.55
N10	.52	-.01	E15	.00	.53
N20	.51	-.18	E4	-.15	.52
N2	.49	.04	E9	-.10	.46
N5	.48	-.12	E22	.01	.42
N16	.47	.03	E8	-.00	.41
N4	.46	-.11	E5	.05	.39
N21	.46	-.11	E7	.04	.35
N18	.45	-.09	E20	.24	.33
N13	.43	-.06	E10	-.13	.30
N3	.41	.15	E1	-.12	.26
N17	.41	-.17	E18	-.23	.24
N15	.41	-.21	E14	-.01	.23
N22	.28	.15	E17	-.02	.09
N23	.26	.02			
N12	.12	.06			

(Note: the items are numbered by how they appear in the EPQ-R [Eysenck, S.B.G., et al., 1985] and items that were added to the E and N scale in this revised version have been omitted from the analyses [eg. E16, E19, and N24]. All items have been coded positively.)

which again is an indication that this term may have been responded to inconsistently.

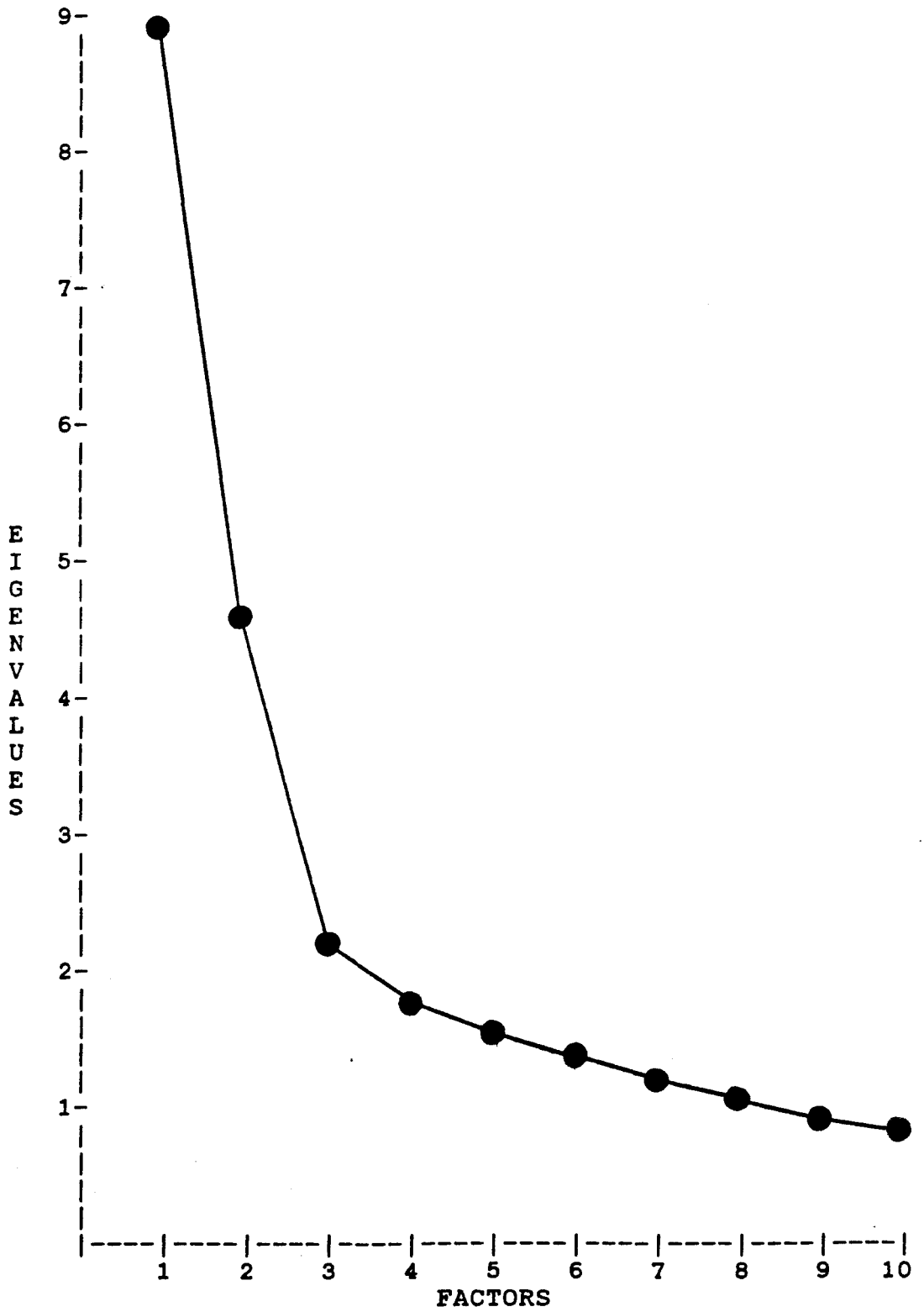
It is worth noting that each of the three terms which caused confusion in this study were used infrequently by other authors who examined affect structure. Of the nine studies that Watson and Tellegen (1985) reanalyzed while developing the model shown in Figure 1, the term dull was only used twice while the terms quiescent and placid were only used in a single study.

With quiescent, placid, and dull, eliminated from further analysis, the factor model proposed by Watson and Tellegen was assessed in the present data.

In the principal factor analysis, a plot of the eigen values again revealed a distinct "elbow" at the third factor, indicating that the first two factors accounted for the greatest proportion of explainable variance (see Figure 4). Combined, the first two factors accounted for 64% of the common variance. When this was broken down, the first factor accounted for 38.7% of the common variance, while the second factor accounted for an additional 25.7% of the common variance.

Following the traditional eigen-value-greater-than-one criteria for factor extraction would have resulted in the extraction of eight small and unipolar factors. Because of the small amount of common variance that could be explained with these additional factors (e.g., the third

Figure 4. Plot of the factors and corresponding eigenvalues in a principle factor analysis of the trait emotions questionnaire.



factor only accounted for 5.2% of the common variance), and because our focus is on the broadest dimensions of affective structure, this solution would have been inappropriate for present purposes. Thus, the analysis proceeded with a two factor solution.

A Varimax rotation to simple structure revealed the factor loadings displayed in Table 6. It can be seen that the terms loading most strongly on factor 1 clearly defines it as a dimension of negative affect. Factor 2, on the other hand, is strongly defined by positive affect terms.

The factor loadings given in Table 6 did not exactly replicate the proposed factor structure put forth by Watson and Tellegen, and call into question whether this analysis actually confirmed their model. Of the 35 affect terms included in this analysis, 19 terms loaded exactly where they were hypothesized to fall within this two dimensional structure. These terms were distressed, fearful, hostile, jittery, nervous, scornful, elated, enthusiastic, excited, peppy, strong, lonely, unhappy, content, happy, pleased, satisfied, astonished, and surprised. Thus, it can be seen that the terms which were proposed to define high Negative Affect, Strong Engagement, high Positive Affect, and Pleasantness all fell were they were expected to. Only seven of the 35 terms fell more than 45 degrees from where they were hypothesized to fall. These terms were sorry, drowsy, sleepy, sluggish, quiet,

Table 6. Terms and factor loadings on the two-factor solution of "general" emotion terms proposed by Watson and Tellegen (1985), rotated to Varimax simple structure and listed by decreasing magnitude of loading.

TERMS	FACTOR 1	FACTOR 2
distressed	.779	-.088
sad	.753	-.058
blue	.730	-.156
unhappy	.710	-.242
lonely	.696	-.209
sluggish	.648	-.160
drowsy	.623	-.051
grouchy	.606	-.195
jittery	.596	.044
sorry	.587	.157
fearful	.586	.003
sleepy	.569	-.063
nervous	.559	.094
hostile	.539	-.077
scornful	.467	-.049
relaxed	-.413	.339
calm	.353	.254
still	.211	-.117
excited	.078	.713
elated	.031	.647
enthusiastic	-.067	.635
happy	-.365	.625
peppy	.031	.595
active	-.293	.594
pleased	-.349	.546
content	-.443	.529
surprised	.277	.520
aroused	.168	.520
satisfied	-.411	.503
warmhearted	-.100	.420
strong	-.117	.402
astonished	.299	.324
kindly	-.099	.322
quiet	.255	-.256
at rest	-.065	.251

Note: Loadings of .201 or greater are significant at the .05 level, loadings of .234 or greater are significant at the .01 level. Both significance levels are Bonferroni corrected to account for the large number of loadings analyzed.

still, and at rest. It can be seen by a look at Figure 1 that, with the exception of sorry, all of these terms were expected to define either low Positive Affect, low Negative Affect, or Disengagement.

The apparent collapse of the low end of these dimensions may have been, in part, due to the exclusion of dull, placid, and quiescent - all of which are terms that would have helped to define the low affect domains within this model. Watson and Tellegen (1985) indicate that it is essential to include terms of low affective states in order to obtain an adequate definition of mood structure. Therefore, it is possible that the failure to replicate the Watson and Tellegen model in this analysis was due to the exclusion of the above terms.

Watson and Tellegen (1985) also note that it is particularly important to include terms which denote disengaged states in order to obtain the bipolar factors which are expected to occur within a two factor solution. It can be seen that both factors in the present analysis were primarily unipolar rather than bipolar. Again, it may be that the results found in the present analysis suffer because three of the eleven terms (27 percent) which denote low affective states have been removed.

An additional area of concern, potentially related to the collapse of the low ends of the dimensions discussed above, is the questionable differentiation of terms

hypothesized to define Unpleasantness from terms hypothesized to define high Negative Affect. As expected, unhappy and lonely loaded significantly and positively on the dimension of negative affect and significantly and negatively on the dimension of positive affect. The terms grouchy and blue showed a similar placement, though their negative loadings on the positive affect dimension did not reach statistical significance. The term sad had a negative, though nonsignificant and negligible, loading on the positive affect dimension. The term sorry also had a nonsignificant loading on the dimension of positive affect, however, it loaded positively on this dimension, which was unexpected.

Given the ambiguities that were found in the present results, it still needed to be determined if the emergent positive and negative affect dimensions were equivalent to the dimensions of Positive and Negative Affect described by Watson and Tellegen.

In order to assess this question accurately, it must be recalled that the model presented in Figure 1 is a schematic representation of the proposed model. The factor structure that would correspond to Figure 1 has never been found in any single study. In fact, there is only one published study (Zevon and Tellegen, 1982) which reported factor loadings for each emotion term on the dimensions of Positive and Negative Affect. Unfortunately, this study

used many terms which were not part of the proposed model, and did not include all of the terms which were proposed to define the model. Despite these limitations, comparing the factor structure found in this study with the factor structure reported by Zevon and Tellegen would give a rough quantitative assessment of similarity.

Using the procedure suggested by Rummel (1970), a simple correlation of factor loadings across terms common to both studies was conducted. There were 18 terms from the current study which overlapped with terms in the Zevon and Tellegen (1982) study. These terms were enthusiastic, excited, strong, active, happy, warmhearted, sleepy, sluggish, distressed, hostile, scornful, nervous, jittery, sad, blue, lonely, content, and calm. It can be seen that the overlapping terms included markers of high and low Negative Affect, high and low Positive Affect, Unpleasantness, and Pleasantness. The loadings of all 18 common terms on the positive affect dimension across both studies correlated .95. The same correlation, .95, was found between both studies when all terms were correlated across the dimension of negative affect. Thus, despite the fact that the results of the current analysis do not exactly conform to the schematic model presented in Figure 1, it is clear that factor 1 in the present study is essentially the same as the dimension of Negative Affect in the Zevon and Tellegen study. Likewise, factor 2 in the current study is

essentially the same as the dimension of Positive Affect in the Zevon and Tellegen study.

Since both a "state" and "trait" questionnaire were used to assess the emotions of each subject, a comparison between each of these response conditions was deemed appropriate. If the factor structure was equivalent across both questionnaires, it would provide additional support for the validity of the factor structure listed in Table 6. As such, it was expected that the correlation of factor loadings across an orthogonal two-factor solution for trait affect and an orthogonal two-factor solution for state affect would be near unity. In strong support of this hypothesis, it was found that the loadings of all terms on the dimensions of Positive Affect correlated .972 across the two questionnaires. The procedure for this analysis was to correlate the factor loadings of all 35 terms on both the dimension of Positive Affect from the trait analysis and the dimension of Positive Affect from the state analysis. Using the same procedure, the loadings of terms on the dimensions of Negative Affect showed a slightly stronger correlation of .985 across the two questionnaires. Therefore, it appears clear that the two-factor model is robust across both state and trait measures.

Further evidence of the robust nature of these two dimensions can be seen by comparing the factors that

emerged in the principal axes factor analysis with the first two factors in a principal components analysis rotated to orthogonal simple structure. Because these two procedures analyze the data through different processes, convergence across both types of analyses would again argue for the validity of the factors outlined above. By using the same correlational procedure described above, it was found that the factor of Positive Affect (using the trait questionnaire) from the principle axes analysis correlated .999 with the Positive Affect factor (again trait) from the principal components analysis. In similar fashion, the Negative Affect dimension from the principal axes analysis correlated .9998 with the Negative Affect dimension from the principal components analysis.

In summary then, even though the factors that emerged in this analysis were not identical to the schematic diagram presented by Watson and Tellegen (1985), there are several lines of evidence which indicate that the observed factor structure is robust and stable. In addition, the dimensions of Positive and Negative Affect found here are almost identical to the dimensions of Positive and Negative Affect reported by Zevon and Tellegen (1982). Therefore, despite the fact that these results do not exactly conform to the model put forth in Figure 1, the resultant factor structure is a viable one. An explanation of why the present factor structure is the best two-factor

description of emotional experience will be presented in the Discussion.

Because the results found here provided substantial support for the two factor model of affect, but only partial support for the model proposed in Figure 1, there was ambiguity over how to proceed with the two additional hypotheses for which a scale of Positive Affect or Negative Affect was necessary. These two hypotheses involved the assessment of Negative Affect across sexes, and the development of a multitrait-multimethod matrix to assess the convergence and discrimination of dimensions of affect and personality. Four options were available for scale development. The first option would have been to compose a scale of all the terms in Figure 1 which were proposed to define Positive and Negative Affect. However, this was not a viable option because it was seen earlier that the low ends of each proposed dimension of affect did not emerge. The second option was to develop a scale based solely on the terms which emerged in the current analysis to define each dimension. This appeared to be a suitable option, though the use of this procedure makes the eventual results dependent upon the biases that may be inherent in the current sample population. A third option would have been to develop scales of PA and NA that are based only upon the terms that have been found in the current analysis to define high PA and high NA. This option would take into

account the ambiguities and apparent difficulties with the terms that are markers of low affective states. Eleven of the 12 terms which mark high PA and high NA in the Watson and Tellegen model were found to define high PA and high NA in the current analysis. The only exception was the term active which loaded significantly on both PA and NA; when it was hypothesized to load significantly only on PA. It may have been that the term active loaded significantly on NA because of an idiosyncracy in the present sample. If this were the case, the third option would not be a viable one, especially since it could compound the errors that may be present in the use of the second option. To guard against this possibility, a fourth and final option for scale development, and one that could be used in combination with the second option, was to develop scales of PA and NA by using the terms that define high PA and high NA in Figure 1, without regard to where these terms place in the current sample.

Given the above options to address the two remaining hypotheses which needed a scale of PA and NA for their quantitative assessment, two different scales of each dimension of affect were developed. The first scale to assess each dimension consisted of all terms that were found to clearly define each dimension in the current analyses. These scales were termed PA1 and NA1. PA1 was composed of the terms elated, enthusiastic, excited, peppy,

strong, aroused, warmhearted, kindly, and at rest. NA1 was composed of the terms distressed, fearful, hostile, jittery, nervous, scornful, sad, blue, sluggish, drowsy, grouchy, sorry, sleepy and still. The second scale to assess each dimension consisted of the terms proposed by Watson and Tellegen to define the high ends of PA and NA. These scales were termed PA2 and NA2. PA2 was composed of the terms elated, enthusiastic, excited, peppy, strong, and active. NA2 was composed of the terms distressed, fearful, hostile, jittery, nervous, and scornful. It was hoped that the use of both scales would balance any potential biases that may have been present in either the Watson and Tellegen model or in the current sample.

CONVERGENT ANALYSES

It was initially hypothesized that NA, mirroring neuroticism, would show a significant sex difference, with females displaying higher levels of NA. However, since N did not differ across sexes, it could be anticipated that NA should also not show a significant difference across sexes. For the scale NA1 there was not a significant sex difference (mean for males = 16.6, mean for females = 15.8, $t_{(218)} = .87$, $p = .39$). Likewise, for the NA2 scale there was not a significant sex difference (mean for males = 6.7, mean for females = 6.22, $t_{(218)} = 1.01$, $p = .31$). Thus, even though these results would not be consistent with

expectations for a normative population, they are consistent with expectations for the current sample.

The multitrait-multimethod matrix is shown in Table 7. It can be seen that there is evidence for both convergent and discriminant validity. As would be expected, the affect scales, which share the same method of data collection as well as some of the same affect terms, show significant and very high convergence correlations (PA1 with PA2, NA1 with NA2). The other convergent correlations, which use different methods of assessing the same construct, show the significant and strong positive correlations that were expected (E with the Positive Affect scales, N with the Negative Affect scales). Overall, it is clear that the magnitude of the convergent correlations exceed the magnitude of the divergent measures of association by a large margin. The divergent validity coefficients are generally nonsignificant, and all are negative. It can be seen that extraversion showed a significant and negative relationship with the neuroticism and Negative Affect scales. Ideally, the Positive Affect scales would have shown the same significant relationship as E across all of these divergent measures. The fact that the Positive Affect scales did not show the same magnitude of relationship to N and NA as did E may be solely the consequence of a PA being assessed by a different methodology than E. However, this may also be a preliminary indication that PA, as measured here, is

Table 7. The multitrait-multimethod correlation matrix of summed scores on extraversion (E), neuroticism (N), Positive Affect 1 (PA1), Positive Affect 2 (PA2), Negative Affect 1 (NA1), and Negative Affect 2 (NA2). See text for a description of the affect scales.

	E	PA1	PA2	N	NA1	NA2
E	---					
PA1	.57***	---				
PA2	.48***	.92***	---			
N	-.20**	-.13	-.08	---		
NA1	-.22**	-.09	-.05	.62***	---	
NA2	-.30***	-.18**	-.12	.66***	.91***	---

*** $p < .001$
** $p < .01$
* $p < .05$

somewhat distinct from extraversion, suggesting that the dimensions of affect may have a greater independence from each other than do the dimensions of personality.

Previously, the Bradburn scales have been used to assess the degree of convergence between positive affect/-extraversion and negative affect/neuroticism. Several reasons were pointed out earlier which explained why the Bradburn measures have not shown the degree of convergence with E and N that would be expected if the hypotheses of this study were correct. Among other reasons, it was noted that the Bradburn scales of positive and negative affect included assessments of Pleasantness and Displeasure, which were believed to attenuate the expected high correlations with extraversion and neuroticism. As such, it was hypothesized that the magnitude of convergence found in this study would exceed the magnitude of convergence reported in any of the previously published studies which assessed the same convergence. Table 8 displays the convergence measures found in the present study with previous studies, and provides strong support for the expectations described above. It is clear that the present measures of Positive Affect show a greater magnitude of association with extraversion than do the Bradburn measures of positive affect. The same is true for Negative Affect as measured in the present fashion, where the magnitude of association with measures of neuroticism are clearly higher in the present

Table 8. Comparison of measures of convergence between Positive Affect and extraversion and Negative Affect and neuroticism among the present study and previously published results.

	Personality Measures			
Affect Measures	E	N	E	N
Present Study				
PA1	.57	-.13	NA1 -.22	.62
PA2	.48	-.08	NA2 -.30	.66
Costa and McCrea (1980)[a]				
Bradburn's PA	.20	-.13	Bradburn's NA -.03	.39
Costa and McCrea (1984)[b]				
Bradburn's PA	.36	-.15	Bradburn's NA -.15	.45
Warr et al. (1983)[c]				
Bradburn's PA	.31	-.13	Bradburn's NA -.05	.51

[a]Correlations reported are the average correlation across four times of testing between the Bradburn measures and the E and N scales from the Eysenck Personality Inventory (Eysenck and Eysenck, 1968).
[b]Correlations are between the Bradburn measures and the E and N scales of the Neuroticism-Extraversion-Openness (NEO) Inventory (McCrea and Costa, 1983).
[c]Correlations are between the Bradburn measures and the E and N scales from the EPQ (Eysenck and Eysenck, 1975).

study than in previous studies. The comparatively high degree of association found in the present analysis provides greater support than has ever been reported before for conceptualizing PA and E and NA and N as two reflections of the same phenomenon.

The final and most important analysis for assessing the central hypothesis of this study consisted of a principal factor analysis where the EPQ E and EPQ N items were analyzed together with the Positive Affect and Negative affect terms. A plot of the eigen values again showed that there was a clear elbow after the second factor (see Figure 5). With this in mind, it was found that a two-factor solution accounted for 41.27% of the common variance. After a Varimax rotation, the first factor was found to account for 23.8% of the common variance. Conversely, the second factor accounted for 17.47% of the common variance. If a third factor was included in this solution it would have only accounted for 5.55% of the common variance.

Table 9 shows the factor loadings to this two factor solution. Terms and items are shown in decreasing magnitude of factor loading. At first glance, it can be seen that the orthogonal two factor solution showed a clean break where all of the NA and N items loaded most strongly on the first factor and all of the PA and E items loaded most strongly on the second factor. Thus, in terms of individual differences at the most general level, it is

Figure 5. Plot of the factors and corresponding eigenvalues in a principal factor analysis of the emotion terms and the E and N items.

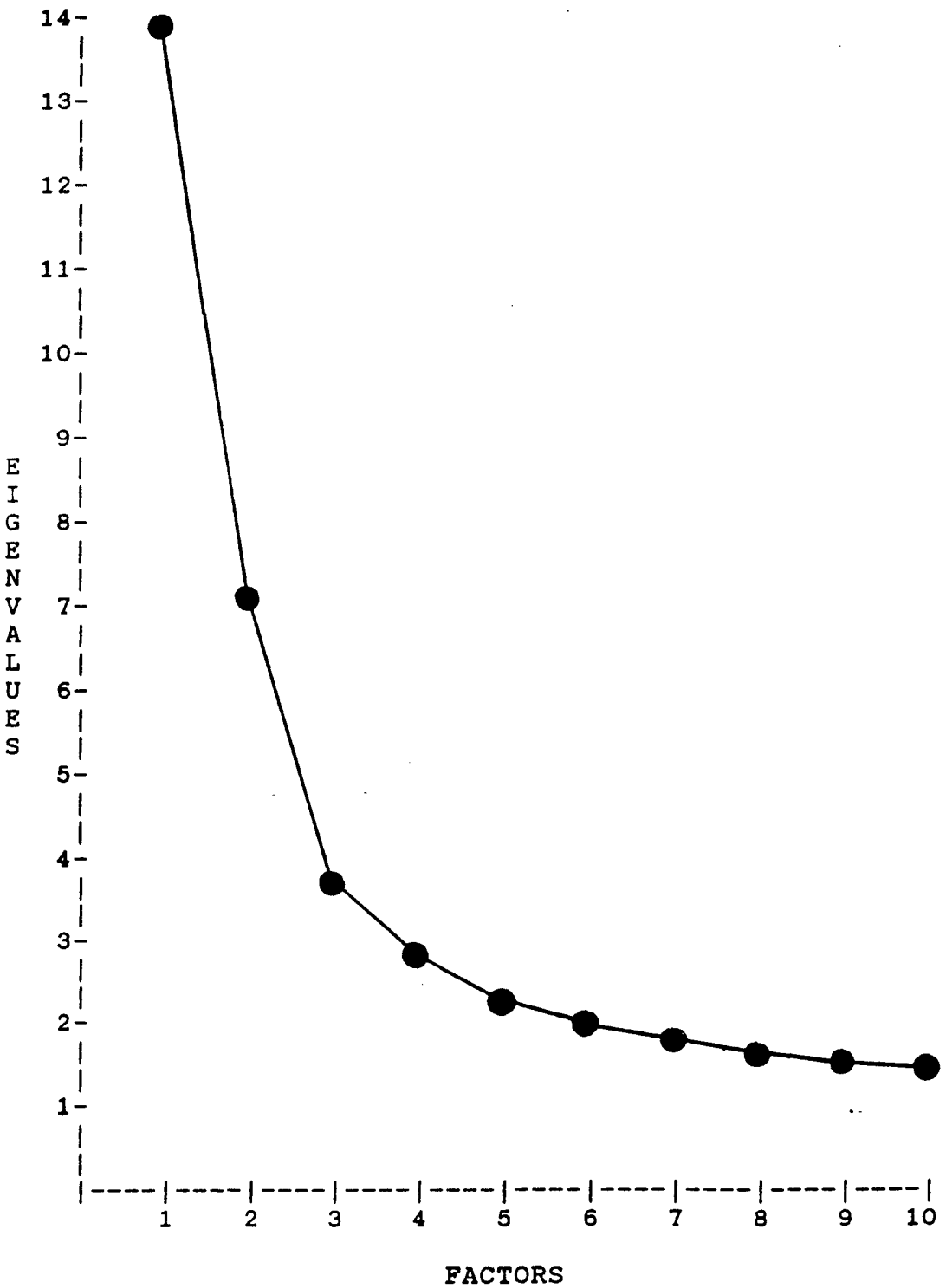


Table 9. Factor loadings of Extraversion (E) items, Neuroticism (N) items, Positive Affect terms, and Negative Affect terms on the two factor solution to a principal factor analysis. Terms or items are listed in order of their decreasing magnitude of loading and are rounded of to the second decimal place.

Term or Item	Factor 1	Factor 2
distressed	.72***	-.15
sad	.68***	-.16
blue	.65***	-.22*
unhappy	.64***	-.26**
lonely	.64***	-.27**
sluggish	.62***	-.19
nervous	.61***	.01
jittery	.60***	-.05
N6	.59***	.09
drowsy	.57***	-.09
grouchy	.57***	-.23*
sorry	.57***	.05
fearful	.56***	-.08
N11	.55***	-.12
N20	.55***	-.20
sleepy	.55***	-.05
N14	.54***	-.13
N7	.53***	.15
N19	.53***	-.11
N2	.52***	.07
N8	.51***	-.14
N9	.50***	-.12
N1	.49***	-.06
hostile	.49***	-.07
N15	.47***	-.19
N10	.47***	.06
N17	.46***	-.12
relaxed	-.44***	.21*
content	-.42***	.37***
scornful	.42***	-.10
N4	.42***	-.18
N13	.41***	-.08
N16	.39***	.06
N18	.38***	-.01
N5	.37***	-.03
calm	-.37***	.18
N21	.36***	-.03
N3	.34***	.19
N22	.25**	.13
astonished	.25**	.20
N23	.22*	.05
at rest	-.12	.11

Table 9 (cont.)

Term or Item	Factor 1	Factor 2
peppy	.06	.66***
excited	.07	.65***
enthusiastic	-.04	.64***
active	-.26**	.62***
E3	-.04	.59***
E13	-.10	.59***
E23	-.00	.55***
E21	-.11	.55***
E11	.02	.52***
happy	-.36***	.51***
aroused	.16	.49***
E2	-.01	.48***
E6	-.21*	.48***
quiet	.17	-.48***
elated	.01	.47***
E15	-.03	.45***
E9	-.14	.45***
E12	-.12	.44***
E4	-.18	.42***
E22	-.04	.42***
pleased	-.32***	.41***
strong	-.09	.40***
satisfied	-.38***	.40***
E5	.02	.37***
E8	.02	.37***
E10	-.15	.35***
surprised	.20	.34***
warmhearted	-.09	.33***
still	.16	-.32***
E1	-.17	.30***
E7	.01	.30***
E20	.16	.29***
E18	-.23*	.23*
kindly	-.06	.21*
E14	-.05	.20*
E12	.06	.07
E17	-.02	.03

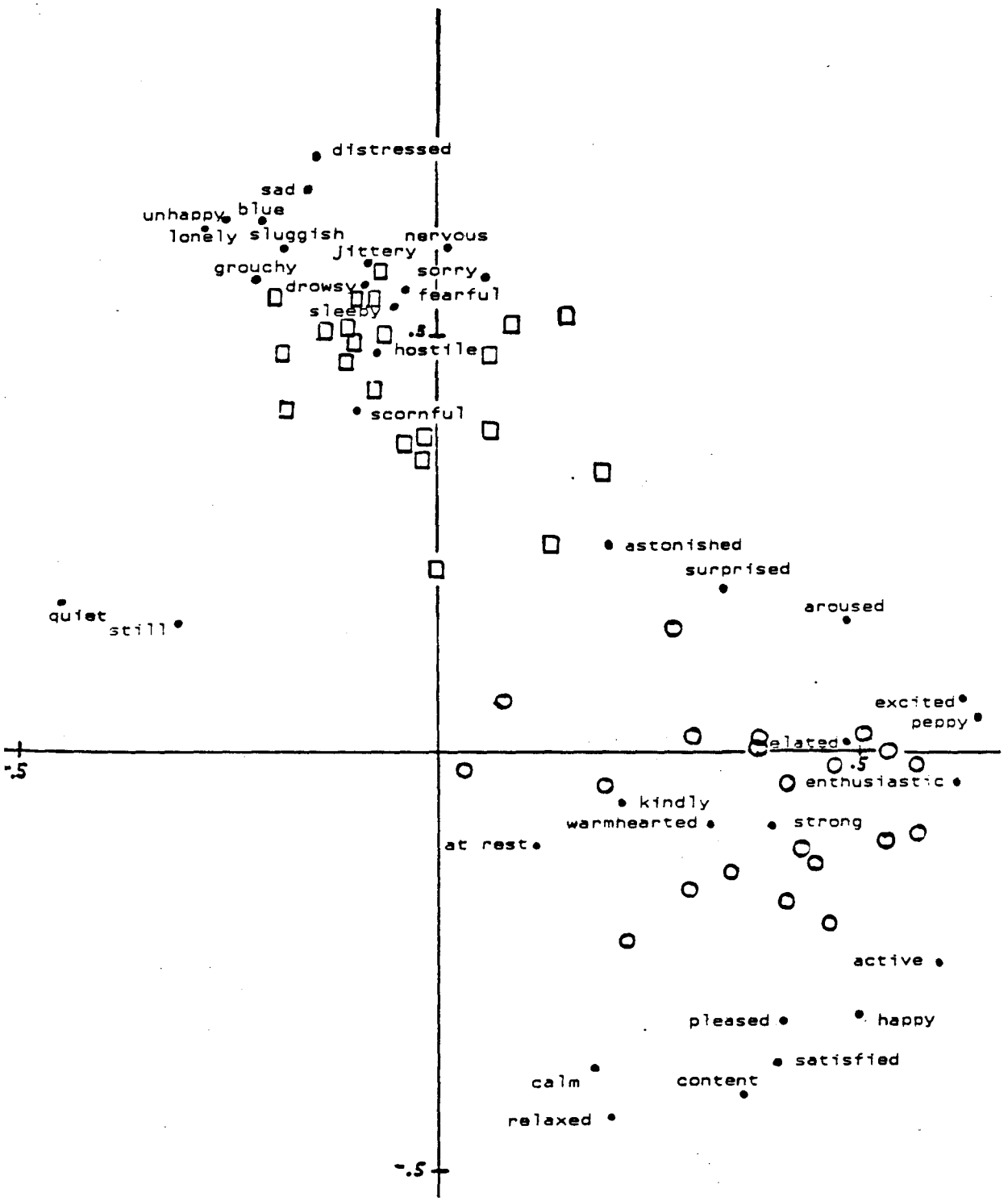
Note: The items are numbered by how they appear in the EPQ-R (Eysenck, et al., 1986) and items that were added to the E and N scale in this revised version have been omitted from the analyses (eg. E16, E19, and N24). *** $p < .001$. ** $p < .01$. * $p < .05$.

(All significance levels are Bonferroni corrected to reduce the probability of Type I error.)

indicated that the dimension of Negative Affect is equivalent to the dimension of neuroticism, while Positive Affect is equivalent to the dimension of extraversion.

Figure 6 is a plot of the emotion terms and the E and N items, and helps to clarify the results of the final hypothesis. The neuroticism items cluster with terms which denote high Negative Affect and Unpleasantness. As such the personality construct of neuroticism incorporates emotional components of high Negative Affect and Unpleasantness. However, it is the terms of high Negative Affect and neuroticism which most cleanly define the vertical dimension in this solution and, therefore, as hypothesized, it is high Negative Affect which is most intertwined with neuroticism. Extraversion can be seen to be a broader construct than neuroticism (judging from the spread of item loadings), and it incorporates emotional components of Pleasantness and high Positive Affect. However, it is the extraversion items and the high Positive Affect terms which most cleanly load on the second dimension, and, as hypothesized, it is they that serve to define the horizontal dimension within this solution. Emotional terms of Strong Engagement are components of both extraversion/high Positive Affect and neuroticism/high Negative Affect. In like fashion, emotional terms of Pleasantness were found to be a combination of extraversion/high Positive Affect and low neuroticism/low Negative Affect.

Figure 6. Plot of the emotion terms and the EPQ E and N items on the first two orthogonal dimensions from a principal factor analysis. • denotes an emotion term; O denotes an extraversion item; □ denotes a neuroticism item.



By including the dimension of personality into the analysis, the relationship between some of the emotional terms was further clarified. For example, while terms that denote Unpleasantness continued to cluster with the dimension of neuroticism/Negative Affect, the terms grouchy and blue now significantly loaded in a negative direction on the extraversion/Positive Affect dimension. Thus, the Unpleasantness terms became more differentiated from the high Negative Affect terms by the inclusion of the personality dimensions. In addition, the terms relaxed and at rest no longer loaded significantly on the dimension of extraversion/Positive Affect, and it appeared more clear that calm, relaxed, and at rest denoted pure states of low neuroticism (stability)/low Negative Affect. It can be seen then that low Negative Affect and Unpleasantness in the final analysis fall more in line with the Watson and Tellegen model of affect.

It may reasonably be argued that the content overlap between the EPQ items and the emotion terms significantly altered the placement of emotion terms when they were placed in the combined analysis, thereby invalidating the conclusion that was drawn above. However, a quantitative analysis of where the emotional terms were placed on the two dimensions across both the combined factor analysis (EPQ items and emotional terms) and the individual factor analysis (only the "General" emotion

questionnaire), showed that this was not the case. It was found that the correlation between factor loadings for each of the 35 terms across both analyses correlated .997 on the Negative Affect dimension, and .978 on the Positive Affect dimension. Thus, even though the factor structure was clarified by the inclusion of the personality dimensions, it was not distorted.

As an additional note, it is worth pointing out that the emotion terms in both factor analyses tended to cluster together rather than to spread themselves out evenly across the two dimensional space. This finding argues against the theories which attempt to define emotional structure on a circumplex model.

DISCUSSION

Results from the present analysis supported the major hypotheses of this study. It was shown over a wide range of emotional terms that the structure of mood at the broadest level is best represented by two dimensions. These two dimensions accounted for the majority of the replicable variance and were clearly seen as dimensions of Positive Affect and Negative Affect. These two dimensions of affect showed a high level of convergence with the personality dimensions of extraversion and neuroticism (respectively) when assessed in a multitrait-multimethod matrix. Finally, it was demonstrated through a factor analysis which combined both the emotional terms and the personality items that this convergence was due to the fact that Positive Affect and extraversion define a common dimension of individual differences, as do Negative Affect and neuroticism.

While all of the major hypotheses received support from the data, one unresolved issue at this point is the fact that a number of emotional terms were in a position that was significantly different from that which was expected on the basis of the Watson and Tellegen model. In particular, the terms that were proposed to define low Positive Affect (drowsy, sleepy, and sluggish, in addition to dull which was not used in this analysis) and Disengage-

ment (quiet and still, and quiescent which was also excluded from this analysis) did not fall in line with hypotheses.

It could conceivably be argued that the number of subjects for this analysis was less than ideal or that there were idiosyncracies within the sample population (ie. higher than expected neuroticism scores, especially for males; the terms dull, placid, and quiescent needing to be dropped) which caused the observed structure of affect to differ from the hypothesized structure. If these criticisms were valid, it would limit the generalities that can be drawn from the present study. To counter these potential criticisms further evidence from other sources would be needed if it was to be argued that the observed structure of affect is more correct than the hypothesized structure of affect.

It was stated earlier that the N and E dimensions, as distal variables, could help explain the emotional structure that emerged in the present analysis if this structure was not consistent with the Watson and Tellegen model. In order to explain the observed results, it is necessary to examine more closely the dimensions of E and N, as well as the evidence that Watson and Tellegen used when determining the placement of emotional terms in their model.

To begin, the loadings for the terms quiet and still could not be assessed quantitatively between this analysis and any other two-factor solution of emotional space. In the Watson and Tellegen (1985) study, factor loadings across the nine reanalyzed studies were not provided. However, it was reported that still was a significant marker of low Negative Affect in one study. Quiet, on the other hand, was reported to be a significant marker of low Positive Affect in two studies. Quiescent, the other term hypothesized to define Disengagement, was reported to be a significant marker of low Negative Affect in one study and a significant marker of low Positive Affect in another study. It is apparent then that the placement of these terms as markers of Disengagement was made with some ambiguity present, and may have reflected the authors' best guess, given the available evidence.

However, if evidence from the distal personality dimensions of E and N is included, a different picture emerges. A look at Figure 2 reveals that Eysenck and Eysenck (1975) had placed the label quiet at precisely the place it was found in the current analysis (see Figure 6), on the dimensions that are now seen to be extraversion/Positive Affect and neuroticism/Negative Affect. In describing the dimension of extraversion, Eysenck and Eysenck (1975) state that the "typical introvert (or low extraversion/low Positive Affect person) is a quiet, retiring sort

of person, introspective,...reserved...does not like excitement...keeps his feelings under close control.... (p. 5, italics added)." Obviously the terms quiet and still fit with this description more than the terms dull, drowsy, sleepy, or sluggish. In fact, one of the items from the EPQ assesses this aspect of extraversion directly by asking "Are you mostly quiet when you are with other people?" An individual's extraversion score increases if this item is answered "No". In sum, the term quiet (and probably still) would be expected to define low extraversion/low Positive Affect when we turn to the E and N dimensions for clarification.

If the affective terms quiet and still can be expected to define introversion/low Positive Affect, the next question that needs to be addressed is where the terms drowsy, sleepy, sluggish and dull should have been expected to fall. Returning to the nine studies reanalyzed by Watson and Tellegen (1985) it was found that the term sluggish significantly defined low Positive Affect in six studies, sleepy defined low Positive Affect in five studies, drowsy defined low Positive Affect in three studies, and dull defined low Positive Affect in two studies. These terms were not found to significantly define any other dimension across the nine studies. However, it should also be noted that the terms blue, sad, grouchy, sorry, and unhappy were all also reported to define low Positive Affect (in up to

five studies). These latter terms, which were hypothesized by Watson and Tellegen to be Unpleasantness terms, were never reported to load significantly on high Negative Affect, as would have been expected from their position in Figure 1. It is unclear why terms of Unpleasantness and low Positive Affect showed the same pattern of placement across the reanalyzed studies, yet were placed at different positions in the final Watson and Tellegen model.

In the Zevon and Tellegen (1982) R-type factor analysis, which is the only published study that included factor loadings for terms of Positive and Negative Affect, the terms sleepy and sluggish loaded on Positive Affect (-.40 and -.50, respectively) which is consistent with their placement. However, they also showed a sizable loading on Negative Affect (.23 and .30, respectively). Thus, it appears that in at least one instance, these terms showed a positive relationship with the neuroticism/Negative Affect dimension. This is an indication that they may have been reasonably placed in the Unpleasantness quadrant of the Watson and Tellegen model.

Additional indications that these terms have a significant association, and possibly their most important association, with the neuroticism/Negative Affect dimension, comes from the descriptions of E and N. It was indicated above that these terms do not fit with the picture that the Eysencks portray of the introvert.

However, these terms do appear to describe the typical neurotic or high emotional individual. The high N individual is characterized as one who "is likely to sleep badly" (Eysenck and Eysenck, p. 5), presumably as he or she anxiously worries about things done, or things that may go wrong. In fact, when an analysis of the EPQ N items was conducted, it was found that several of the N items tap directly into the emotional terms of drowsy, dull, sleepy, and sluggish. All of the following items, when answered "Yes" serve to increase the total neuroticism score: "Do you suffer from sleeplessness?"; "Have you often felt listless and tired for no reason?"; "Are you sometimes bubbling over with energy and sometimes very sluggish?"; and, "Do you often feel life is very dull?". (The above questions are denoted N13, N14, N22, and N15, respectively in Table 9.)

Given this evidence, it appears that the inclusion of these distal dimensions of personality has again served to clarify the relationships that should be observed in a two factor model of emotional structure. Rather than expecting these terms to reflect only low PA/introversion, it appears clear that they should show a strong relationship to neuroticism/high NA - as they did in this analysis.

Following just the factor analysis of the terms on the emotion questionnaire(s), it may have been concluded that there were significant biases in the present sample of

subjects, which in turn biased the results to the point that they were not in line with the Watson and Tellegen hypotheses. In contrast to this conclusion, the descriptive analysis given above, which extends the convergent lines of research discussed earlier and builds upon the results of the present factor analysis, shows that the observed emotional structure is in fact a sensible and meaningful one. The work of Watson and Tellegen did much to systematize mood research at the broad factor level, and allowed for the conceptual connection with the E and N dimensions of personality to be made. This conceptual connection was, in turn, another step in the process of clarifying mood structure and helped to further clarify the particulars of a two-factor model of emotional structure.

Watson, Clark, and Tellegen (1984) recently declared:

> research is needed to explicate the meaning of these basic mood factors...to determine whether Positive and Negative Affect reflect causally potent, biologically based processes, or whether they are merely descriptive summaries of the observed covariations among facial expressions and mood terms (p. 128).

The present research has responded to this call and has found evidence that the dimensions of Positive and Negative Affect reflect causally potent and biologically determined forces, though by a much different route than has previously been taken.

To summarize: all of the major hypotheses of this study were confirmed. First, it was again found that the two dominant dimensions of affect in an orthogonal simple structure factor analytic solution were Positive Affect and Negative Affect. Second, it was shown that PA and NA had a stronger convergent relationship with extraversion and neuroticism, respectively, than had been reported previously with Bradburn's measure of positive affect and negative affect. Third, it was revealed that the strong convergence observed between the dimensions of PA and E and NA and N was due to both the affect measures and the personality measures tapping the same individual differences. As discussed in the Introduction, the model of affect put forth by Watson and Tellegen (1985) was "rediscovering" the dimensions previously outlined by Eysenck. Finally, by employing the well validated and extensively researched dimensions of E and N as distal variables, the model of affective structure put forth by Watson and Tellegen (1985) was further clarified. It was shown that the characteristic emotions of quiet and still disengagement are more fruitfully conceived of as moods that denote low E/low PA; while characteristic feelings of sluggishness, drowsiness, and sleepiness are best seen as manifestations of high N/high NA.

The findings from this study are important because they once again display the salience and prominence of

these two particular dimensions of human nature, first described by the Ancient Greeks. Eysenck's dimensions of E and N hardly need further experimental support for their viability as broad and replicable individual differences. However, it is encouraging to see that these same two dimensions began to emerge from a discrete field of study (that of affective structure) when there were no a priori hypotheses about their existence.

Of primary importance, this study made a conceptual link which bridges the previously existing gap between the literatures of affect and personality. Researchers simplify and bring clarity to their field of study through a process of refining categories that represent phenomena in the "real world". One traditional distinction that has been made in the study of adults is the distinction between emotion and personality. Personality is generally considered the long-standing and stable traits that make up a person's character. Emotions, on the other hand, are generally considered variable and transient fluctuations in character which are more responsive to external events than personality. This is a reasonable distinction to be made and one that should continue to be made. However, it is important to be aware that these categories are simplifications imposed upon the "real world" of experience. For example, research on children generally does not make the same distinction between emotions and personality that

research on adults does. Rather, a child's character is discussed as temperament, a term which merges the above dichotomy, as temperament describes the long-standing emotional responses which typify the child's interaction with the world.

The current research indicates that the same merger of concepts can be made for adults, as the broad dimensions which give rise to the personality traits of E and N also give rise to the emotional factors of Positive Affect and Negative Affect. This merger of concepts is obviously easiest to make when a person's general, or trait, emotion is examined. At this level of analysis, one would be hard pressed in an attempt to sort out what is "personality" and what is a person's "typical mood". However, it was also shown in this study that the same emotional structure emerged both under response conditions where subjects rated their "general" emotional character and under response conditions where subjects rated their recent, or "current" emotional state. The equivalence of structure under both state and trait conditions can be seen as an indication that there are two primary modes which organize, or predispose, experiences to fall along a positive or negative affective valence.

At the "state" level of analysis, experiences are more variable and transient, yet still differ along these two dimensions. It is likely that at the "state" level of

analysis one would not feel both the emotions of high Positive Affect and high Negative Affect at the same time. Thus, the dimensions would be less independent at this level of analysis.

At the "trait" level of analysis, the two dimensions remain constant. However, what changes at this level is the percentage of time that a person spends at a particular point on the two dimensions. There is a tendency for individuals to adopt a characteristic position on each of these two dimensions, and this position is seen by both their "general emotional traits" and by their "personality". Further, the trait position that is adopted on each dimension is likely to be mediated by individual differences in the reticular arousal system (for extraversion/Positive Affect) and the limbic system (for neuroticism/Negative Affect). Additionally, at the "trait" level of analysis, these dimensions would be expected to be independent of each other (ie., whether or not a large proportion of time is spent experiencing high Positive Affect, says nothing about whether one also experiences a large proportion of high Negative Affect).

SUMMARY

The psychological literature on affective structure, since its inception in the 1950's, has been characterized by confusion and disagreement over the number and nature of factors that are basic to emotional experience. Recently, however, a two-factor model of Positive and Negative Affect has emerged in this literature which has been repeatedly found to accurately describe the dimensions of affect at the broadest level of analysis. Despite the advances that have been made with this model, the precise delineation of emotional terms to define each of the two independent dimensions (eg. Watson and Tellegen, 1985) was believed to be incomplete. Rather, it was believed that the two-factor model of affect was "rediscovering" the extraversion (E) and neuroticism (N) dimensions of personality detailed by Eysenck (1981), and if this hypothesis is correct, it was believed that the personality dimensions of E and N could further clarify the terms which should be expected to define the dimensions of Positive and Negative Affect.

The analysis of this contention proceeded by several means. First, many studies which assessed the interface of mood and personality were systematically organized. Through this procedure it was shown that the dimensions of Positive Affect and extraversion and Negative

Affect and neuroticism had similar patterns of influence on other variables. Second, it was hypothesized that, experimentally, two dimensions, one of Positive Affect (PA) and one of Negative Affect (NA), should emerge in a factor analysis of 35 mood terms. Additionally, it was predicted that a scale of PA should show a high association with E and little association with N and NA. In like fashion, a scale of NA was predicted to show a high association with N and little association with E and PA.

Two hundred and thirty one subjects filled out a questionnaire which assessed their general emotional character, as well as the Eysenck Personality Questionnaire (EPQ, Eysenck and Eysenck, 1975), which assess the dimensions of E and N. Both of these questionnaires were factored by a principal factor analysis and it was found that a two-factor solution accurately accounted for the replicable variance within each analysis. These two-factor solutions were then rotated to orthogonal simple structure. The E and N dimensions clearly emerged from the analysis of the EPQ. Additionally, a dimension of positive affect and a dimension of negative affect clearly emerged from the emotion questionnaire. Even though these dimensions did not exactly conform to the Watson and Tellegen model, they were shown to be stable, robust, and replicable dimensions of Positive and Negative Affect. By correlating all four scales (E, PA, N, NA) in a multitrait-multimethod matrix,

it was found that there was a stronger convergence between E and PA, and N and NA, than had ever been reported in the literature previously. Additionally, there was little association across constructs, which indicated strong divergent validity.

The next step in the analysis was to factor the emotional terms and personality items together. Since it was argued that the two-dimensional structure of mood was "rediscovering" the dimensions of E and N, it was predicted that two large factors should emerge in this analysis, with one factor defined by N items and NA terms and the other factor defined by E items and PA terms. An orthogonal two-factor solution showed the expected pattern of results, and supported the major hypothesis of the present study.

Finally, the salience of E and N, as distal variables (Scarr, 1985), helped to explain the precise terms which should be expected to define a two-dimensional model of affect. It was argued that the Watson and Tellegen model of affect was correct in its essentials, but erred in the placement of a number of specific emotional terms. In particular, the use of the E and N dimensions clarified the terms which denote low Positive Affect, as well as the terms which denote Unpleasantness.

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APPENDIX A

Bradburn's (1969) Affect Balance Scale
(Note: items on the actual questionnaire were intermixed)

During the past few weeks did you ever feel.....

(Positive feelings:)

1. Pleased about having accomplished something?
2. That things were going your way?
3. Proud because someone complimented you on something you had done?
4. Particularly excited or interested in something?
5. On top of the world?

(Negative feelings:)

1. So restless that you couldn't sit long in a chair?
2. Bored?
3. Depressed or very unhappy?
4. Very lonely or remote from other people?
5. Upset because someone criticized you?

APPENDIX B

EMOTIONS - GENERAL CODE #_____

Listed below are various ways that we all feel. This questionnaire is simply designed to see how you generally feel with regards to the terms listed below. There are no "right" or "wrong" ways to feel, rather, we all experience emotions in different ways and to different degrees. Please rate as honestly as possible the degree to which each of the following terms describes how you generally feel. To do this use the following scale.

0 = very unlike me (VUM)
1 = unlike me (UM)
2 = like me (LM)
3 = very like me (VLM)

Please complete all of the items. Thank you.

	VUM	UM	LM	VLM		VUM	UM	LM	VLM
1) calm	0	1	2	3	21) warmhearted	0	1	2	3
2) distressed	0	1	2	3	22) active	0	1	2	3
3) astonished	0	1	2	3	23) scornful	0	1	2	3
4) surprised	0	1	2	3	24) lonely	0	1	2	3
5) elated	0	1	2	3	25) satisfied	0	1	2	3
6) quiet	0	1	2	3	26) hostile	0	1	2	3
7) unhappy	0	1	2	3	27) kindly	0	1	2	3
8) sluggish	0	1	2	3	28) enthusiastic	0	1	2	3
9) at rest	0	1	2	3	29) quiescent	0	1	2	3
10) aroused	0	1	2	3	30) drowsy	0	1	2	3
11) dull	0	1	2	3	31) happy	0	1	2	3
12) still	0	1	2	3	32) content	0	1	2	3
13) fearful	0	1	2	3	33) pleased	0	1	2	3
14) sorry	0	1	2	3	34) sad	0	1	2	3
15) jittery	0	1	2	3	35) placid	0	1	2	3
16) relaxed	0	1	2	3	36) sleepy	0	1	2	3
17) grouchy	0	1	2	3	37) blue	0	1	2	3
18) excited	0	1	2	3	38) strong	0	1	2	3
19) nervous	0	1	2	3	39) impulsive	0	1	2	3
20) peppy	0	1	2	3	40) anxious	0	1	2	3

EMOTIONS - CURRENT CODE #_____

Listed below are various ways that we all feel. This questionnaire is simply designed to see how you have felt in the past day with regards to the terms listed below. There are no "right" or "wrong" ways to feel, rather, we all experience emotions in different ways and to different degrees. Please rate as honestly as possible the degree to which each of the following terms describes how you have felt in the past day feel. To do this use the following scale.

0 = very unlike me (VUM)
1 = unlike me (UM)
2 = like me (LM)
3 = very like me (VLM)

Please complete all of the items. Thank you.

	VUM	UM	LM	VLM		VUM	UM	LM	VLM
1) calm	0	1	2	3	21) warmhearted	0	1	2	3
2) distressed	0	1	2	3	22) active	0	1	2	3
3) astonished	0	1	2	3	23) scornful	0	1	2	3
4) surprised	0	1	2	3	24) lonely	0	1	2	3
5) elated	0	1	2	3	25) satisfied	0	1	2	3
6) quiet	0	1	2	3	26) hostile	0	1	2	3
7) unhappy	0	1	2	3	27) kindly	0	1	2	3
8) sluggish	0	1	2	3	28) enthusiastic	0	1	2	3
9) at rest	0	1	2	3	29) quiescent	0	1	2	3
10) aroused	0	1	2	3	30) drowsy	0	1	2	3
11) dull	0	1	2	3	31) happy	0	1	2	3
12) still	0	1	2	3	32) content	0	1	2	3
13) fearful	0	1	2	3	33) pleased	0	1	2	3
14) sorry	0	1	2	3	34) sad	0	1	2	3
15) jittery	0	1	2	3	35) placid	0	1	2	3
16) relaxed	0	1	2	3	36) sleepy	0	1	2	3
17) grouchy	0	1	2	3	37) blue	0	1	2	3
18) excited	0	1	2	3	38) strong	0	1	2	3
19) nervous	0	1	2	3	39) impulsive	0	1	2	3
20) peppy	0	1	2	3	40) anxious	0	1	2	3

APPROVAL SHEET

The thesis submitted by Gregory J. Meyer has been read and approved by the following committee:

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The final copies have been examined by the director of the thesis and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the thesis is now given final approval by the Committee with reference to content and form.

The thesis is therefore accepted in partial fulfillment of the requirements for the degree of Master of Arts.

3/9/87
Date

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