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# A Conical Model for the Taxonomy of Emotional Experience

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Circular models of affective experience have been proposed in which emotional concepts fall around a circle in a systematic manner. In an effort to verify a circular representation and examine the relationship of an intensity factor to emotional experience, a multidimensional scaling technique was used that examined adjective self-ratings and judgments of others' affect. A three-dimensional solution was found to best represent emotional experience. A circular organization of emotions was replicated; however an intensity dimension extended from this circular base to a neutral point in such a manner as to approximate the surface area of a cone. Affective adjectives were arranged on the surface of the cone at heights according to their intensities. Intense adjectives such as *disgusted* or *happy* fell near the base of the cone, whereas less intense adjectives such as *attentive* or *pleasant* fell near the neutral tip. An interpretation, which integrates two major theories, was presented that describes emotions as a number of distinct dimensions anchored at the neutral tip of the cone and extend to form a circular ordering at the base.

The influence of emotion[1] on all aspects of psychological experience is familiar to everyone, yet the nature and phenomenology of emotion remain unresolved scientifically. Even the description of emotion has been and continues to be a difficult task. Describing emotional experience appears to follow a taxonomic system in which terms of emotion are systematically related. Each emotion may not be a discrete entity (Polivy, 1981) but labeled and experienced in relation to other possible emotional reactions. Thus, an adequate understanding of emotion categories requires a structural representation that describes the relationships among different emotion states.

Efforts to describe the structure of emotion began early in the history of psychology with Spencer in 1890, followed by Wundt in 1897. Over the years the study of the structure of emotions has evolved and has addressed such issues as the polarity in emotion, the number of dimensions that best describe the phenomenon of emotion, and how a number of dimensions interrelate to form a structural description of emotional experience.

## Polarity of Affect

Monopolar or discrete descriptions of emotion treat each affective state as a separate dimension (e.g., Gellhorn, 1964; Izard, 1972; Tomkins, 1965), often assuming a unique system of physiology for each emotion, different facial expressions and independent cognitive representations for each discrete emotion. There is no underlying structure hypothesized, but rather an aggregate of independent emotions.

A second view suggests that affective states are related to one another in a systematic manner rather than being independent of one another (e.g., Davitz, 1969; Mehrabian & Russell, 1977; Russell, 1978), such that misery, for example, is inversely related to happiness. This bipolar model of affect offers evidence in support of similarities across affective states, which then vary along dimensions such as pleasant–unpleasant or active–passive.

Early researchers (Nowlis & Nowlis, 1956) failed to find support for bipolarity despite

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[1] Affect and emotion are used interchangeably and are meant to denote the same meaning.

their original objective, which was to measure bipolar dimensions like pleasant–unpleasant, activation–deactivation, and positive–negative social orientation. Further evidence was found supporting monopolar factors (Borgatta, 1961; McNair & Lorr, 1964). Theories espousing monopolar views are advocated by several investigators. Izard (1972) described 10 fundamental emotions more akin to discrete entities that can be differentiated in terms of neurophysiological features, facial expression, and motivational and experiential characteristics. Arnold (1960) described a number of distinct emotions, each with its own unique neurophysiological substrate. Other theorists support a model based on discrete emotional categories (Ekman, Friesen, & Ellsworth, 1972; Tomkins, 1962).

On the other hand, support for bipolarity exists and also has early origins. Schlosberg (1941) found that facial expressions reflect bipolar dimensions of affect, as did subsequent research based on judgments of facial expression (Abelson & Sermat, 1962; Dittmann, 1972; Gladstones, 1962; Osgood, 1966).

Self-reports of emotion (Mehrabian & Russell, 1974, 1977) lend further support for bipolarity. These findings are also consistent with bipolar results based on the Semantic Differential Scale, which uses a paired response format to describe emotion (Osgood, Suci, & Tannenbaum, 1957); these findings also concur with the bipolar results found with Bentler's (1969) single adjective format. Fillenbaum and Rapoport (1971) reanalyzed earlier data (Block, 1957; Ekman, 1955) using a scaling technique and found evidence for bipolar factors, whereas Meddis (1972) and Russell (1979) found that methodological artifacts have led to spurious findings of monopolarity in a number of previous studies. Bush (1973) used a multidimensional scaling technique to examine the relationships among 264 emotion adjectives. Results supported bipolarity, as did a more recent examination of 558 emotion terms (Averill, 1975).

Finally, a number of investigators have examined emotional components of personality traits and found evidence of bipolarity (Anderson, 1968; Conte, 1975; Leary, 1957; Norman, 1967). Russell and Pratt (1980) even found bipolar dimensions in affective attributions made to environments.

In summary, there is considerable empirical support for the concept of bipolar dimensions in emotion regardless of the type of data used (facial ratings, self-report, or judgment on scales like the Semantic Differential) and some evidence that previous failures to find bipolarity may have suffered from methodological problems.

## Dimensions of Affect

Schlosberg (1941) first advocated two dimensions, pleasant–unpleasant and attention–rejection, for labeling affect revealed in facial expression. Later, a third dimension, sleep–tension, was identified (Engen, Levy, & Schlosberg, 1958). Subsequent research on the description of emotion in language revealed three similar dimensions: pleasantness, activity, and potency (Osgood, 1969; Osgood, May, & Miron, 1975; Snider & Osgood, 1969).

Evidence on the structure of affect suggests three specific dimensions. The first two dimensions, pleasantness–unpleasantness and arousal–sleep, are usually supported. Consensus on the label of a third dimension, however, is unclear. Trust (Dittmann, 1972), authoritarianism (Frijda, 1969; Frijda & Philipszoon, 1963), interpersonal readiness (Block, 1957), level of aggressiveness (Bush, 1973), and dominance–submission (Mehrabian & Russell, 1974, 1977) have all been offered as labels to describe a third dimension of affect. Fillenbaum and Rapoport (1971) also found support for three dimensions but concluded that dimensions other than pleasantness were uninterpretable. Averill (1975) studied semantic differential ratings of emotion terms and supported the evaluation (pleasantness–unpleasantness) and activity (active–passive) dimensions but found two dimensions in place of potency: control–lack-of-control and depth of experience.

Thus, there is agreement among investigators on several issues. All but Averill (1975) agree on a three-dimensional description. All agree on the pleasant dimension represented as a continuum ranging from extreme unhappiness to extreme happiness or ecstasy.

The second dimension, activity, ranges from sleep or relaxation to agitation or frenzy. Engen et al. (1958) identified this as sleep–tension, whereas others label it degree of arousal or activation (Dittmann, 1972; Frijda, 1969; Mehrabian & Russell, 1974, 1977; Russell, 1979). Russell (1978) examined these similarly named dimensions using a variety of scaling techniques and factor analyses and confirmed the unpleasant–pleasant dimension as well as level of arousal or an active–passive dimension. Russell did not find a third common dimension but instead found evidence for three additional dimensions beyond pleasure and arousal, which he interpreted as referring to (beliefs about) the antecedents or consequences of the emotion described rather than referring to the emotion itself.

In summary, three dimensions of affect are generally supported. The next question concerns the manner in which these dimensions are related to one another.

## Affective Maps

Attempts to create a multidimensional picture of emotion allow for various configurations. Some researchers developed circular conceptions following the circular organization of personality traits (Allport & Odbert, 1936; Anderson, 1968; Conte, 1975; Leary, 1957; Norman, 1967). Emotions or traits are organized in a circular manner around two perpendicular axes such that emotions occupy distinct positions around the circle. For example, in a circular structure organized around bipolar dimensions of pleasure and activity, dominant or active traits might occupy a position around 0° at the top of the circular structure. Passive traits or emotions would be found directly opposite this, at 180°. Positive warm emotions and traits would fall around 90°, whereas negative, unpleasant traits or emotions would be found directly opposite this at 270°.

Affective dimensions appear to be interrelated in a highly systematic manner forming a circular organization, rather than covarying independently. Support for this circular model is available in recent research. Affect as represented by an individual's cognitive maps and by self-report of affective states is described as a circumplex by Russell (1980). Two dimensions, pleasure and arousal, account for 45.8% of the variance in the self-report data. In an effort to account for the remaining variance, Russell suggests various errors in measurement, one of which is conceptual overlap in adjectives.

Intensity of affect, a variable difficult to investigate and thus often ignored, is graphically represented in Plutchik's (1980) circular model. This circular structure is based on eight primary emotions that are conceptualized as bipolar opposites. Primary emotions blend to create mixed or derivative states analogous to the blending of colors on a color wheel. Affective intensity is graphically represented on a circular emotion profile by the proportion of the circle consumed. Thus, the greater the intensity of an emotional trait or affect displayed, the larger the wedge-shaped area.

In summary, the majority of evidence suggests that the dimensions descriptive of affect are bipolar with convergence across methods on pleasure and activity dimensions. Although findings point to a third dimension, agreement on the label of this third dimension has not yet been reached. Models limited to a two-dimensional or flat surface may not adequately represent affective experience given the evidence cited above for a third dimension. The model currently gaining support, however, is a two-dimensional circular representation akin to that originally proposed by Schlosberg (1941).

Ironically, theory and methodological tradition may have limited investigation of the intensity or depth-of-experience factor. A third continuum, labeled depth of experience, may range from no report of emotion to an extremely emotional experience. Theory suggests that some emotion is felt at all times (Schachtel, 1959). It certainly seems possible, though, that there may be times, however brief, when individuals do not experience emotion or are not able to identify or describe an emotional state. Empirical investigation of neutral states, then, may provide a mechanism for further elucidation of the dynamics of emotional experience and offer some insight into affective dimensions by showing that affective adjectives vary along a dimension of intensity, with one end

anchored by neutrality. The inclusion of a neutral adjective in the present research provided the possibility of new organizational formulations because neutrality has not been included in past research on the structure of emotional experience.

The present report is based on data obtained in an investigation designed to examine emotional reactions. The first step was to examine the underlying dimensions of the cognitive processes that allow individuals to label their own affective experience or to label the emotion of others. Thus, the purpose of the present study was to examine the assignment of adjectives (a) chosen by subjects to describe their own experience of emotion, and (b) chosen by raters judging written transcripts of subjects' verbalizations during emotional reactions. Examination of subjective and observational judgments provided access to the dimensions used to label one's own emotions and the emotions of others.

In the latter case, clinical psychologists were chosen to act as judges with the intent of maximizing the ability of the raters in a task of this sort. Clinical psychologists are trained to read written reports or transcripts from projective tasks that contain affect-related information in order to detect and label emotions, thought disorders, and related functioning.

In addition, female subjects only were employed. Hall's (1979) summary of the nonverbal literature and Maccoby and Jacklin's (1974) summary of sex differences indicated that females are, in general, more facially and verbally expressive. Because the methodology employed here was being used for the first time and sex differences were not to be addressed at this time, females were chosen to maximize verbal and facial responsivity.

## Method

### *Overview and Experimental Design*

The method employed was designed to examine a number of issues concerning the experience of emotion. An overview of the design is presented, although only the data pertaining to subjects' ratings and clinical judgments are reported. The present report is based on descriptive evidence, and therefore design features that might normally affect hypothesis testing are not relevant.

In order to obtain self-descriptions and accompanying cognitions during emotional reactions, 34 female undergraduates were videotaped while observing five different types of emotionally laden slides. In a counterbalanced design using two equivalent sets of slides, subjects were asked to verbalize thoughts, feelings, and images that each slide elicited in one condition, whereas in the other condition, the same subjects were asked to remain silent. After viewing the slides, subjects completed an adjective checklist to describe their emotional response to each slide and the intensity of each affective reaction.

In a second phase, clinicians were asked to rate the verbal transcripts of each subject in order to examine the underlying dimensions used to judge others' affect as well as to assess the correspondence between subjective ratings and objective appraisals of cognitions accompanying affect. The judges were asked to choose adjectives and rate the intensity on the same adjective checklist in order to measure the affect displayed in the transcribed verbal data.

### *Subjects*

Subjects were 34 female undergraduates from the University of Toronto between 20 and 30 years of age.[2] All but four of the subjects participated in the study to obtain credit for an introductory psychology class. The remaining four subjects were undergraduate volunteers from the same university population.

*Clinical raters.* One female psychologist with 8 years of clinical experience and one male psychologist with 6 years of clinical experience rated the verbal transcripts.

### *Stimulus Slides*

Stimuli were slides prerated by undergraduates (Daly, Abramovitch, & Pliner, 1980; Khalsa & Polivy, Note 1) and selected so as to evoke five different categories of emotion: humor, warmth/tenderness, neutral, sadness, and disgust. For each of these slides, subjects were asked to rate the emotion category and degree of pleasantness or unpleasantness. Slides were found to elicit the affect intended and to vary according to the appropriate category along a pleasant–unpleasant continuum.

Each of the five categories of slides contained four slides. The humorous slides depicted people engaging in amusing situations; the neutral slides depicted pieces of furniture on a blank background; the warm/tender slides depicted a smiling infant or infants playing together; the sad slides depicted individuals from Third World countries in states of despair; and the disgusting slides depicted accident victims and autopsies. Thus, a balance between positive, neutral, and negative emotions was maintained, and the positive and negative states were each represented by two emotions. In addition, two pairs of scenic slides were included at the beginning of each slide presentation in order to allow subjects to adapt themselves to the procedure.

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[2] Data from two subjects were excluded because of technical problems with the video recorder, so in all, 36 subjects actually participated.

### *Procedure*

When the subject arrived she was told that, in order to aid in the understanding of individuals' emotional reactions, she would be viewing slides of scenes, people, and objects that might evoke different feelings. The subject was also told that while she was viewing the slides she would be video- and audiotaped and these tapes would be shown, without identifying information, to undergraduates in other psychology classes who would be asked to judge subjects' facial expressions. After signing a consent form that included this information, subjects were taken into the experimental room and seated. If the subjects were in the talk condition first, the experimenter gave the following directions:

> I'm going to show you some slides and in order for us to more fully understand your reactions, I would like you to share the feelings and thoughts that you have while watching each slide. When the slide is presented, could you describe how you feel in your own words. Don't worry about what you say—you may use sentences, incomplete thoughts, or just words. Try and tell me as much as you can about what you are thinking or feeling at that time. Or just tell me what comes into your mind, any images or thoughts. Try and look at the slide for the whole time. After it is removed from the screen, there will be a short period of time before the next slide when you will see only a dot on the screen. This will give you some breathing space and time to relax between slides. Do you have any questions?

If the subjects were in the no-talk condition first, the experimenter gave the following directions:

> I'm going to show you some slides and while each slide is being presented it would be helpful if you would attend to your thoughts, feelings, images, or anything else that comes into your mind. Try and look at the slide for the whole time. After it is removed from the screen there will be a short period of time before the next slide when you will see only a dot on the screen. This will give you some breathing space and time to relax between slides. Do you have any questions?

The subject was then shown 10 stimulus slides, each for 30 sec with a 10-sec interstimulus period between each slide.

Following each of the talk and the no-talk conditions, the experimenter returned with the adjective checklist and intensity-rating forms and delivered the following instructions:

> Now I would like you to rate the slides you have just seen. I will show you the same slides once again. This time I would like you to rate each slide on the following forms. For each slide there is one page on which I would like you to make two ratings. Look at each slide again and then read off of the adjectives on the top of the page. After you have read them all, go back and pick the adjective which best describes how you felt the first time you saw the slide. If you feel that more than one adjective describes how you felt, you may check off up to three adjectives. If you do this, put a 1 beside the one which describes your strongest feeling, a 2 beside the next strongest and, if you choose a third one, put a 3 beside it. On the bottom of each page there is a 9-point scale identical to the following one. After each slide make a mark on the scale which approximates how intense your main feeling was for this slide. For example, if you choose the adjective *pleasant* to describe how you felt and this slide made you feel very pleasant, then rate your intensity 7–9. However, if you felt only moderately pleasant, then rate your intensity 4–6. If you felt only very little pleasantness, then rate your intensity 1–3. Do you have any questions about these forms? Now, please relax and we will begin.

The subject was then reshown the slides in the set she had just viewed for 10 sec each, followed by a 20-sec interstimulus period to allow for sufficient time to complete her ratings. This was done because pilot research indicated that subjects who rated while verbalizing incorporated the adjectives on the checklist into their verbalizations, whereas those who did not have access to it until later did not. Having subjects rate their affective responses after seeing slides a second time approximates cue-based memory retrieval. However, this seemed reasonable in order to avoid the bias introduced by viewing the checklist before the slides, especially given that only a few minutes had elapsed.

The order of directions pertaining to the talk and the no-talk conditions was counterbalanced according to the cell to which each subject was randomly assigned. During the presentation of the slides in both the talk and the no-talk conditions, the head and shoulders of the subject were video and audiotaped. Data obtained from the facial expressions are discussed in a separate paper.

### *Verbal Transcripts*

Two clinicians were given the typewritten verbalization transcripts of the audio portion of the talk condition. Verbalizations for each slide were numbered 1 through 10 (10 stimulus slides) and separated by a triple space. The procedure used in the study and instructions given to the subjects were conveyed verbally and in writing to the clinicians. The clinical judges were asked to read the transcripts carefully and choose the adjective or adjectives they felt would match the affect the subjects expressed for each slide. Using the same rating forms as employed by the subjects, they were instructed to choose up to three adjectives to describe the affect displayed in the printed transcripts and to number their choices. Finally, they were instructed to rate the intensity of the affect evident in the verbal data using the 9-point scale employed by subjects viewing the slides.

## Results

### *Proximity Matrices*

Proximity matrices were computed for each subject individually and for each clinical rater's judgments of each individual subject's transcript. This was done in order to examine the pattern assignment of adjectives across the five stimulus categories. Cells of each matrix were based on subjects' ordered choice

of adjectives across the five stimulus categories. Adjectives were weighted by assigning a value of 3 to adjectives chosen first, a value of 2 to adjectives chosen second, and a value of 1 to adjectives chosen last; all unchosen adjectives assumed a value of 0. Thus, when $X = \{3, 2, 1, 0\}$ are values assigned to the adjectives, $b = \{1 \text{ or } 2\}$ are the slides within each set, $c = \{1 \text{ to } 5\}$ are the stimulus categories, and $i$ and $j = \{1 \text{ to } 14\}$ are the adjectives, then the distance ($d$) between the two adjectives, $i$ and $j$, is

$$d_{ij} = \sqrt{\sum_{c} [(\sum_{b} X_{ibc} - X_{jbc})]^2}.$$

This equation represents the proximity value between two adjective comparisons. These proximities reflect the dissimilarities among adjectives; the larger the value the more dissimilar the adjectives are as applied by the subjects or the judges across the five stimulus categories. Using this metric, 14 × 14 proximity matrices were then computed to examine possible response differences due to design factors. These matrices also served as the input for multidimensional scaling. Two overall proximity matrices were constructed by computing an arithmetic average matrix over all subjects for the talk condition and one for the no-talk condition. In addition, two overall proximity matrices were computed for each clinical rater's judgments of each of the 34 subjects. In all, there were four matrices; one for subjects' responses during the talk condition, one for subjects' responses during the no-talk condition, one for the first clinical rater (Clinical Rater 1), and one for the second clinical rater (Clinical Rater 2). In all, four multidimensional scaling solutions were produced and described. These four solutions are referred to as four conditions throughout.

Pearson product–moment correlations were computed among the four matrices to test for similarities in response style between the two conditions, between the two clinical raters, and between the clinical raters and the subjects' responses in the two conditions. A significant correlation emerged, $r(89) = .85$, $p < .001$, between the no-talk and the talk conditions, indicating that subjects assigned adjectives in the same manner regardless of the talk manipulation. The correlation between the proximity matrices of the two clinical raters was used to estimate reliability between them. The resulting correlation based on assignment of up to three adjectives in judgments of all five stimulus categories, across all 34 subjects, reflected a highly significant level of agreement, $r(89) = .78$, $p < .001$, between the two clinical raters. The correlations between the proximity matrices of the two clinical raters and the talk condition were also high and significant, $r(89) = .82$ and $r(89) = .79$, $ps < .001$. It is important to note that only in a few instances did subjects use any of the adjectives in the adjective checklist when they talked aloud. Therefore, clinical ratings were not a reflection of obvious labeling procedures. In fact, a significant correlation was found between clinical ratings and the no-talk condition, $r(89) = .74$ and $r(89) = .73$, $ps < .001$. These significant correlations between clinical ratings and subjects' ratings indicate that affective information obtained from the content of the verbal data concurs with subjective affective ratings. Further, this consensus across informational sources suggests a consistency in underlying understanding and labeling of emotion pertaining to either oneself or others.

### *Multidimensional Scaling Procedures*

The two proximity matrices from the no-talk and the talk conditions and the two matrices derived from each clinical rater were analyzed by the Takane, Young, and De Leeuw (1976; Young, Takane, & Lewycki, 1980) alternating least-squares scaling (ALSCAL) procedure. This multidimensional scaling procedure provides a spatial representation consisting of a geometric configuration of points, as on a map. The geometric configuration of points is derived from the dissimilarity between adjectives. The larger the dissimilarity between two adjectives, as shown by their proximity value, the further apart they are on the spatial map. Solutions for two and three dimensions were obtained for each of the four proximity matrices.

The decision, however, about the "correct" dimensionality of a given set of data is as much a substantive question as a statistical one. Multidimensional scaling is used as a

descriptive model for representing data. Thus, factors such as interpretability, ease of use, stability, stress, and amount of variance accounted for in each successive dimension are used in deciding the appropriate number of organizational dimensions for representing the data. The stress values and $R^2$ values for two- and three-dimensional solutions of the four matrices, including improvement of the three-dimensional solution, are presented in Table 1.

Stress values, which are the square root of a normalized "residual sum of squares," result from an iterative computational procedure in which the configuration is modified step by step to bring it into closer agreement with the data. Therefore stress values (badness of fit) must decline or remain virtually constant with increasing dimensionality. $R^2$ values indicate the amount of variance accounted for by the distances plotted in each dimensional model compared to the actual distances in the proximity matrices. As the fit of the dimensional model improves, the stress value decreases, whereas, inversely, the variance accounted for increases. All four matrices evidence this pattern, and the additional variance accounted for in the three-dimensional solution ranges from 6% to 10%.

Interpretation of the resulting two-dimensional configuration was difficult because neutral was not represented in a consistent manner across all four conditions. In three dimensions, however, neutral remained in a consistent perspective across all four conditions, thus providing a meaningful concept. The resulting three-dimensional configuration could be readily interpreted as extended from a model based on previous empirical circular models of emotion. Therefore, a three-dimensional solution was found to be the best fit for the data in the talk condition and the no-talk condition as well as for both clinical raters. Three dimensions were chosen as the best fit because of their improvement over the two-dimensional solution by decreased stress, increased variance accounted for, consistency in configurations, and ease of interpretation.

In the present research, adjectives were found to be organized in a circular formation. Beginning at the top of the circle at 0°, adjectives were identified as representing active emotions; around 90°, adjectives were identified by their pleasant qualities; around 180°, adjectives were identified by more passive qualities, and finally, around 270°, adjectives were identified by unpleasant qualities. A monopolar dimension, which was identified as intensity, was found and extended from this circular ordering in such a manner as to represent the surface structure of a cone. Figure 1 represents the relationship of the three-dimensional model in space. Adjectives fall on the conical surface according to their intensity. Less intense adjectives fall near the neutral tip of the cone, and very intense adjectives fall near the base of the cone. In order to verify the intensity label, additional information regarding the intensity of affective experience was analyzed. Subjects estimated the intensity of their affect for each slide on a 9-point scale, where the higher the number, the more intense the emotion experienced. Clinical raters also estimated the intensity of subjects' responses from the verbal transcripts. In each of the four conditions (no-talk, talk, Clinical Rater 1, and Clinical Rater 2), Pearson product-moment correlations were computed between the intensity rating obtained for each of the 14 adjectives across both slides in each

Table 1
*Stress and $R^2$ Values for Multidimentional Scaling Solutions*

| Condition | Two-dimensional solution | | Three-dimensional solution | | Improvement | |
|---|---|---|---|---|---|---|
| | Stress | $R^2$ | Stress | $R^2$ | Stress | $R^2$ |
| No-Talk | .249 | .758 | .163 | .860 | .086 | .102 |
| Talk | .194 | .852 | .130 | .909 | .064 | .057 |
| Clinical rater 1 | .206 | .857 | .114 | .935 | .092 | .078 |
| Clinical rater 2 | .199 | .815 | .128 | .913 | .071 | .098 |

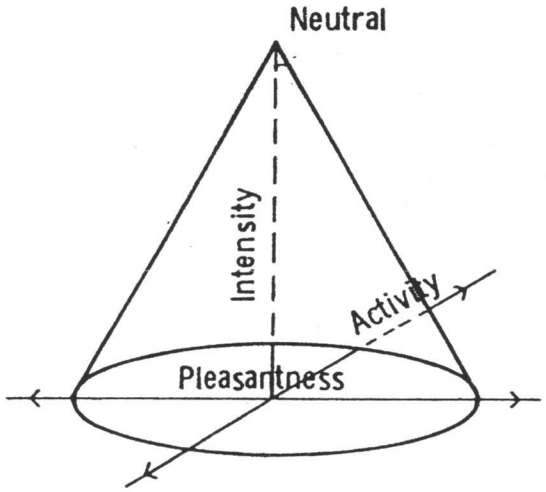


*Figure 1.* Conical model formed by unpleasant–pleasant, active–passive, and intensity dimensions.

condition and averaged across all 34 subjects to the scaled distances of adjectives from neutral. The resulting correlations for the no-talk condition, $r(13) = .64, p < .001$, the talk condition, $r(13) = .89, p < .001$, Clinical Rater 1, $r(13) = .76, p < .001$, and Clinical Rater 2, $r(13) = .83, p < .001$, indicated a positive relationship between scaled distances of adjectives from neutral and both self-rated intensity of affect and judgments of others' affect. Thus, adjectives fall along a continuum related to subjective ratings of emotional intensity and judgments of others' emotional intensity.

Adjectives were then examined in order to verify this overall conical representation. The three-dimensional figure was standardized such that the neutral point of the cone was at the coordinate points (0, 0, 0); the pleasant–unpleasant continuum fell approximately along the *X* axis, and the active–passive continuum fell approximately along the *Y* axis. The coordinate points of each adjective were then examined to determine if they fell on the conical surface. This procedure was done by comparing the distance of adjectives (as located by their coordinate points) from the center core of the cone to their distance from neutral. Because the cone had an equal width-to-height ratio, adjective points falling close to the conical surface had a radius-over-height ratio of between .25 and .50. Ratios falling below .25 indicate that adjective coordinates are located at the center core, whereas ratios above .50 indicate that adjective points fall outside the cone surface. Table 2 presents the ratios obtained for all adjectives and indicates those not falling on the cone surface. A conical model was seen as the best representation of the data because most pure affect terms rested on the cone surface, and no adjectives fell outside of the cone. Those adjectives falling nearer to the cone core are addressed in the discussion.

### *Isomorphic Representation*

For purposes of displaying this conical model on a flat surface and for making comparisons across maps of different conditions, a transformation was made. The following transformation based on a conical representation was applied to the proximity matrices in order to proportion the distances to a two-dimensional representation:

$$\text{new distance} = \sqrt{(\text{old distance})^2 - (\text{difference in height or vertical}^2 \text{ distance of adjectives from neutral})}$$

The multidimensional scaling procedure was then repeated using the transformed proximity matrices. In this case the two-dimensional solutions were good fits for the data.

Table 2
*Width to Height Ratios*

| Adjective | Ratio |
|---|---|
| Adjectives on cone surface | |
| Neutral | .000[1] |
| Disgust | .473 |
| Amused | .294 |
| Scared | .312 |
| Pleasant | .250 |
| Pity | .383 |
| Happy | .429 |
| Tender | .445 |
| Sad | .473 |
| Adjectives below cone surface | |
| Nice | .158 |
| Angry | .101 |
| Disdainful | .134 |
| Bad | .132 |
| Attentive | .081 |

[1] This adjective fell on the tip of the cone—no ratio.

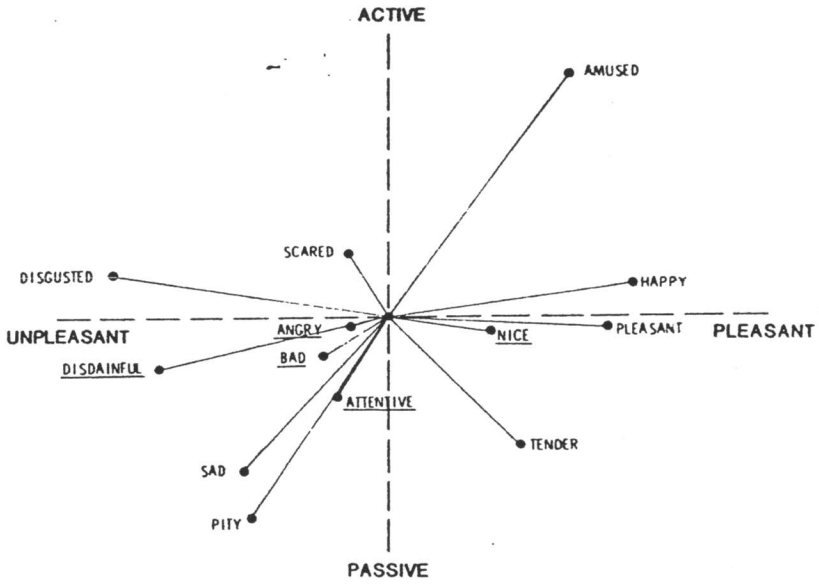


*Figure 2.* Collapsed, two-dimensional solution—talk. (Adjectives not falling on conical surface are underlined.)

The resulting maps of the four conditions presented in Figures 2, 3, 4, and 5 are isomorphic displays in which neutral is centrally located. The diagram can be viewed as if one is shining a light through the top of a clear cone on which black dots represent the location of the adjectives. These adjectives are then reflected on a flat circular area around a neutral nucleus. The intensity dimension is represented by the distance of each adjective from the centrally located neutral pole. The further the distance from neutral, the more intense the affective content of the adjective. The horizontal axis is represented by the bipolar scale ranging from unpleasant emotions such as disgusted and scared to

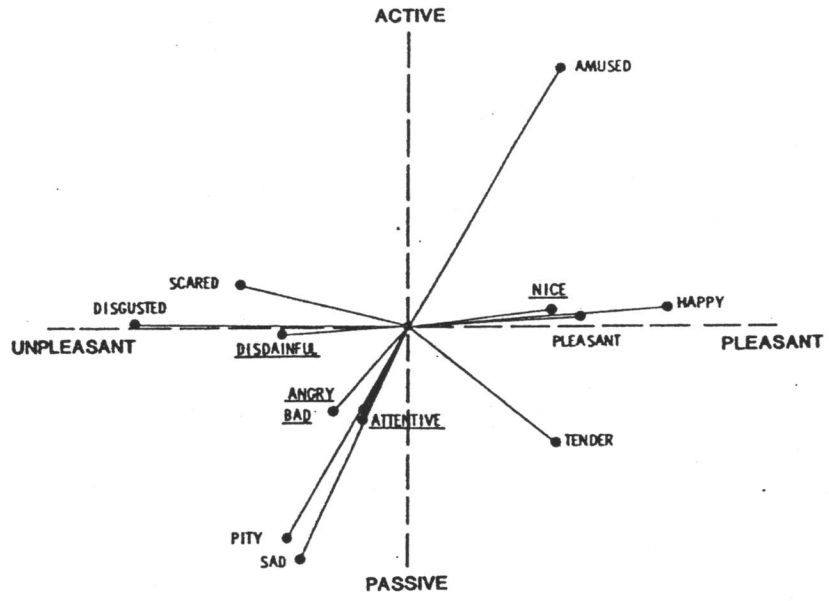


*Figure 3.* Collapsed, two-dimensional solution—no talk. (Adjectives not falling on conical surface are underlined.)

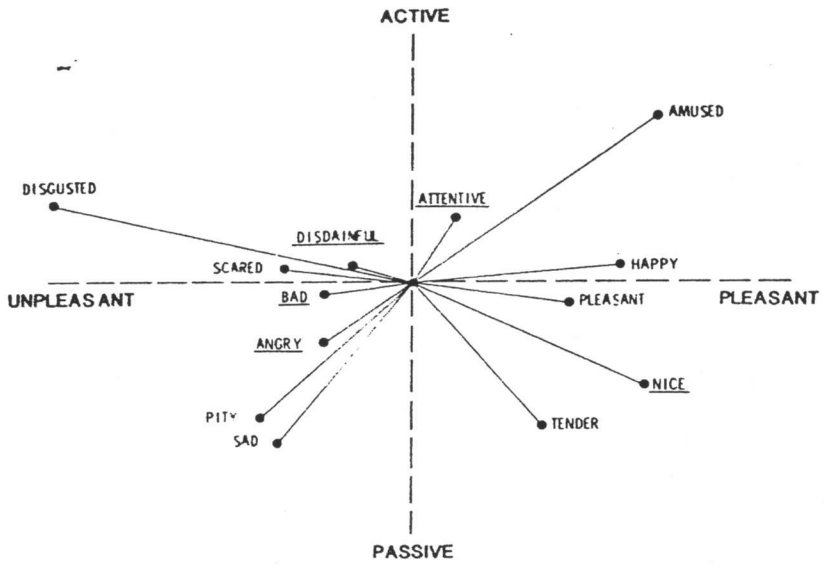


*Figure 4.* Collapsed, two-dimensional solution—Clinical Rater 1. (Adjectives not falling on conical surface are underlined.)

pleasant emotions such as happy. The bipolarity of the active–passive vertical continuum is less obvious because the adjectives representing these states are a mix between the two dimensions. Thus, passive emotions such as sad and pity are a mix of passive and unpleasant affect, whereas amused is a mix of active and pleasant affect. The four maps are similar although some differences emerge. The ordering of those adjectives not on the cone surface vary from condition to condition. *Attentive, bad, nice,* and *disdainful* will be somewhat distorted when reflected on a flat surface in that they will appear closer to neutral than they really are, as they are not on the cone surface but rather nearer to the

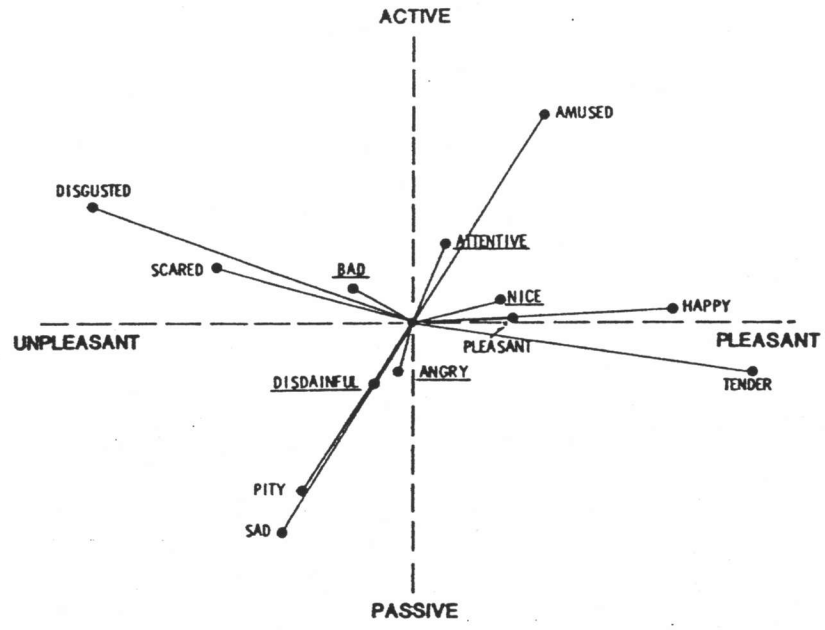


*Figure 5.* Collapsed, two-dimensional solution—Clinical Rater 2. (Adjectives not falling on conical surface are underlined.)

core of the cone. The remaining nine adjectives fall similarly in all cases, which suggests more consistency when terms are more closely related to pure affect.

## Discussion

The results of this research confirm that a three-dimensional solution best represents the structure of affective experience as identified by multidimensional scaling. This technique produces a representation but does not provide an interpretation. Interpretation occurs through the identification of some underlying organization in the data, which in turn depends on the completeness of the sampling of the concept. The addition of a neutral state in this study provides an essential element not often examined in the past. Incorporating neutrality allows a conical representation to emerge in which intensity of affective experience can be meaningfully represented. This rather simple innovation results in findings that may allow for integration of many of the incompatible conclusions of past research.

Figures 2, 3, 4, and 5 reveal circular organization of adjectives strikingly similar to circular formations identified by Russell (1980). Axes representing the dimensions of pleasantness and activity can be placed at right angles, creating a structure around which adjectives fall in a circular manner. Adjectives fall meaningfully in the quadrants as well as near the axes. For instance, *amusement* has active and pleasant qualities, whereas *sad* is directly the opposite and is both unpleasant and passive. The placement of *amused* and *happy* is identical to Russell's (1980) circumplex models. *Afraid* or *scared* consistently fall in the unpleasant–active quadrant, both here and in Russell's data. The location of *anger* in this case appears to be discordant with Russell's findings, though; in the present study, anger is seen as having passive and unpleasant qualities, whereas Russell's results reveal that anger has unpleasant–active qualities. A brief comment in response to this difference is that slides meant specifically to elicit anger were not used. Many subjects employed *anger* concurrent with *pity* or *sad* in response to "sad" slides. Thus the distance between these words is shortened, and the placement of *anger* is pulled into the passive quadrant. Given a fuller range of adjectives and emotional stimuli, circular orderings may evidence greater similarity. This hypothesis is in need of further empirical inquiry.

Moreover, if the circular ordering is examined across conditions in the present study, adjectives are found to be organized around the circle in similar orders. Beginning with *disgusted* and proceeding in a clockwise manner, these adjectives follow: scared, amused, happy, pleasant, tender, sad, pity, disdainful, and angry. There is some variation across conditions in the position of adjectives located in close proximity such as *pity* and *sad* or *disdainful* and *angry*. Russell's (1980) circular results also follow this similar ordering, beginning with *annoyed* and following with these adjectives: *afraid, delighted, happy, pleased, calm, sad, miserable,* and *angry*.

Overall, similar circular orderings across all data were observed, which suggests remarkable consistency, especially given the few restrictions placed by exploratory methods such as multidimensional scaling. The stability of these findings indicates that emotional states are organized in a circular manner. The intensity variable, however, has not been incorporated into affective models prior to the present study. In the present research, the third dimension extended from a circular base in such a manner as to create a conical configuration. This intensity dimension was seen as monopolar. Intensity, by definition, can only be experienced as a some or none phenomenon, and thus a neutral state seemed an appropriate anchor. Inclusion of a neutral adjective on the adjective checklist provided the opportunity for subjects to label their state as having no emotional quality. Results of the multidimensional scaling solution revealed a dimension anchored by this state of neutrality or no affectivity. Adjectives descriptive of increasing amounts of affect extended from neutral along the dimension of intensity in the following order: *attentive, pleasant, sad, happy, disgusted, tender,* and *amused*. For example, *pleasant* is not an intense affective state; *sad* and *happy,* which follow approximately at the same level, are more intense than pleasant. *Disgusted* and *amused* fall at similar distances from neutral

and are seen as fairly intense states falling near the end of the continuum as identified here. Previous investigators (Osgood, 1969; Osgood et al., 1975; Snider & Osgood, 1969) found evidence for a similar third dimension that they labeled potency. Russell (1980) did not identify a third dimension but noted that affective states of moderate intensity fell toward the middle in his circular model, whereas intense affective states fell toward the outer edge.

Evidence to suggest that the intensity dimension was appropriately labeled was found here in two separate types of correlational findings. First, a significant positive correlation was found between subjects' intensity ratings and each adjective's distance from neutral on the intensity dimension. For example, selection of the adjectives *attentive* and *pleasant* was generally paired with a low-intensity rating. Conversely, selection of the adjectives *disgusted* and *tender* was paired with high-intensity ratings. Second, a significant positive correlation between each adjective's distance from neutral on the intensity dimension for the clinical raters and judgment of intensity by the same clinical rater was obtained. Thus, both subjects and clinical raters paired high-intensity ratings with adjectives furthest from neutral and low-intensity ratings with adjectives closest to neutral.

It is the intensity dimension that creates a new and meaningful model by extension from the circular base to form a conical configuration. Adjectives do not follow along the dimension in a random fashion but fall on the surface of the cone at different heights according to the intensity of emotion they describe. Adjectives around the base of the cone are the most intense, whereas those near the tip are much less intense. Descending from the tip to the base of the cone in a narrow line, intensity increases, whereas the other two dimensions remain constant. For example, this is easily demonstrated by examining the band of affect along the positive portion of the cone's surface. Beginning near the neutral tip and descending, the first adjective encountered is *pleasant*, the next is *happy*, and finally, *amused* is encountered.

Based on this conical representation, a second interpretation is proposed. In agreement with previous writings (Averill, 1975; Block, 1957; Bush, 1973; Dittmann, 1972; Fillenbaum & Rapoport, 1971; Frijda & Philipszoon, 1963; Mehrabian & Russell, 1974; Osgood, 1969), three dimensions are proposed as the best solution for describing affective space. The conical structure, however, can also be adequately described by two dimensions. Intensity of affect represents one monopolar dimension, whereas the circular base could represent a second circular dimension that begins and ends at any arbitrary point on the circle. Each emotion is represented at a stationary and distinct point around the circumference of the circle. For example, pleasant emotions occupy a space opposite unpleasant emotions. This continuum, however, does not require a bipolar dimension with gradual change from pleasant to unpleasant states across the base of the cone. Rather, the present model suggests that emotions may change either by moving across adjacent emotional states or by alterations in intensity. A change from an unpleasant state such as *disgusted* to a pleasant state such as *happy* might involve movement from one adjacent emotion to another in a pattern on the surface area of the cone. Another possible path would involve a decrease in intensity of an unpleasant state ascending up the cone through the neutral tip and descending to an unrelated pleasant (or any other) emotional state. Based on the present findings, a variety of distinct emotions are proposed to be anchored by a single neutral point in which each emotion increases intensity in descent along the conical structure. The ordering of each of these emotions is not arbitrary, but if active states occupy a position at 0° around the circular base, then passive states would be opposite this at 180°, pleasant states would be at 90° and unpleasant states would be at 270°. This model supports the views of Izard (1972), Ekman et al. (1972), and Tomkins (1962), who proposed distinct emotional states or entities while retaining the organizational properties of circular models proposed by Schlosberg (1941), Plutchik (1980), and Russell (1980).

It may well be that because of various sampling and measurement procedures, evidence for opposing models has accumulated. Evidence supporting bipolar dimensions of

emotions, which form a circular model of affect (Russell, 1980; Schlosberg, 1941), may simply have accessed the circular base of the cone. Other results that have supported monopolarity (Borgatta, 1961; Ekman et al., 1972; Izard, 1972; McNair & Lore, 1964) may reflect the concept of separate monopolar entities that extend from the neutral tip of the cone. A conical representation draws the data into a more uniform picture and integrates incompatible theoretical views into an integrative model.

In order to support the view that emotion states are represented by the surface structure of a cone, it is important to discuss the position in space of the adjectives. Nine of the adjectives fall on or close to the hypothetical surface of the cone rather than being distributed randomly throughout the conical structure. By imagining a cone sitting on its base the affect terms would then fall along the vertical sides of the cone. Those five adjectives that deviated from the cone surface fall close together inside the conical structure, whereas none fall outside. In an attempt to explain why five adjectives are grouped together at the center core, the semantic meanings of all adjectives were examined. One possible explanation for the discrepancy could be based on the distinguishing features of three of the five adjectives that fall near the core of the cone; it appears that three of the five adjectives that fall near the core of the cone can be distinguished from those on the cone's surface by their evaluative nature. Each of these three terms evaluate emotion rather than describe it. *Bad, nice,* and *disdainful* are not descriptors of emotional states but are labels for evaluating the type or category of emotion, situation, or object encountered. One does not feel nice, but pleasant or happy, which in turn is evaluated as a nice feeling.

*Attentiveness,* the fourth adjective not falling on the cone's surface, is also not clearly indicative of an emotional state but rather a perceptual readiness or state of awareness. *Angry,* the last adjective that does not fall on the conical surface, however, is clearly a descriptor for feelings of rage, wrath, or indignation. A (speculative) comment on the failure of this adjective to fall on the conical surface with the other emotion words addresses the cultural inhibitions surrounding this response. Anger may well be an emotion one is not supposed to feel and certainly not with any degree of intensity. Clinical research on anger has indicated that the inability to express anger results in various psychopathologies as well as in cognitive distortions around anger as a concept (Holt, 1970). In all four conditions, but especially in subjects' responses in the talk and the no-talk conditions, the distance on the map between *bad* and *angry* is short. This short distance reflects subjects' tendency to associate *anger* with *bad* or employ these adjectives concomitantly. If an angry response is often paired with the evaluation of being "bad," it will be more closely associated on the map with the evaluative terms near the center core. This is in fact the case. Thus, the grouping of *angry* with evaluative terms near the center core may represent a cognitive distortion that identifies anger in an evaluative context.

An additional significant result is that similar conical structures were found across all four conditions. That is, when subjects rate their emotional state, whether they talked aloud or remained silent, and when two independent clinical raters judged their verbal transcripts, the same conical model emerged. This remarkable consistency enhances the confidence that can be placed in the introspective procedures used here to elicit cognitions during affective experience and the use of such content (that is, the talk data) for external interpretation. Earlier research has also indicated that there are similar dimensional properties in (a) the recognition of facial expressions (e.g., Abelson & Sermat, 1962; Gladstones, 1962), (b) evidence from self-report of emotional experience (e.g., Mehrabian & Russell, 1974, 1977), and (c) adjective-sorting tasks that rely on individuals' understanding of emotional experience (Russell, 1980). Previous researchers, however, have distinguished between these differential types of data and maintained that judgments of others' emotional experience or impersonal judgments of emotion reveal semantic structuring, whereas introspective evidence reveals actual affective experience.

The present study, however, utilized a multimethod approach for depicting emotion. The data obtained were influenced by three separate factors: (a) subjects' cognitive rep-

resentations of affective experience that allowed them to determine and label their emotions, (b) subjects' overt cognitive styles that are evidenced in the manner in which they reveal their emotions in the talk data, and (c) the clinical raters' cognitive representation of affective experience that enabled them to judge the affective component of the written transcripts. In spite of these different routes to the labeling of affective experience, the resulting conical model of affect obtained here was virtually identical across all four conditions. The multidimensional scaling solutions that are bound by few restrictions were nonetheless similar. In addition, correlational evidence relating to the third dimension of intensity was congruent across conditions. In addition to this similarity across conditions, it may be mentioned parenthetically that when the data from each individual subject is scaled, similar conical structures emerge. However, individual variations in the height and circular base of the cones appear. In defense of the utility of structural models of affect, it appears possible that not only can an understanding among emotion states be revealed, but individual maps of "emotional space" can be generated. Present research is currently examining perceptive, cognitive, and emotional styles related to various types of these individual conical variations.

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