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MEASURING EMOTION: THE SELF-ASSESSMENT MANIKIN AND THE SEMANTIC DIFFERENTIAL

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Summary — The Self-Assessment Manikin (SAM) is a non-verbal pictorial assessment technique that directly measures the pleasure, arousal, and dominance associated with a person's affective reaction to a wide variety of stimuli. In this experiment, we compare reports of affective experience obtained using SAM, which requires only three simple judgments, to the Semantic Differential scale devised by Mehrabian and Russell (*An approach to environmental psychology*, 1974) which requires 18 different ratings. Subjective reports were measured to a series of pictures that varied in both affective valence and intensity. Correlations across the two rating methods were high both for reports of experienced pleasure and felt arousal. Differences obtained in the dominance dimension of the two instruments suggest that SAM may better track the personal response to an affective stimulus. SAM is an inexpensive, easy method for quickly assessing reports of affective response in many contexts.

Emotional response can be measured in at least three different systems — affective reports, physiological reactivity, and overt behavioral acts (Lang, 1969). Choosing a physiological or behavioral measure can be relatively easy, in that technology or methodology will often dictate a clear preference. Selecting among the available affective report measures is a daunting task, however, as literally dozens of affect inventories exist. A provocative thread running through the history of psychology has interesting implications for the difficult question of what to assess when measuring people's reports of internal feeling states. This thread is the fact that differences in affective meaning among stimuli — words, objects, events — can succinctly be described by three basic dimensions that Wundt (1896) originally labelled lust (pleasure), spannung (tension), and beruhigung (inhibition). Following Wundt's theoretical categories, empirical work has repeatedly confirmed that pleasure, arousal, and dominance are pervasive in organizing human judgments for a wide range of perceptual and symbolic stimuli.

For instance, Osgood and his colleagues (Osgood, 1952; Osgood, Suci, & Tanenbaum, 1957) required subjects to rate verbal stimuli on 50 different bipolar scales (i.e., hot–cold, white–black, fast–slow, etc.). Factor analyses conducted on these data indicated that 50% of the variance in these judgments was accounted for by three factors that they termed evaluation, activity, and potency. Osgood later determined that the same dimensional structure held equally well for verbal items in *non-English* speaking cultures, as well as for judgments of *nonverbal* stimuli as different as sonar signals and aesthetic paintings (Osgood et al., 1957). Mehrabian (1970) found that similar dimensions underly judgments of facial expressions, hand and bodily movements, and postural positions. Finally, Mehrabian and Russell (1974; Russell, 1980) constructed a set of verbal texts describing various situations, and a new semantic differential scale for rating them. Not surprisingly, when applied to

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materials describing common human scenarios, the same three-factor solution was obtained. That the same dimensions account for significant variance among so many different signal stimuli suggests they are primary in organizing human experience, both semantic and affective.

The Semantic Differential Scale devised by Mehrabian and Russell (1974) is a widely used instrument for assessing the 3-dimensional structure of objects, events, and situations. It consists of a set of 18 bipolar adjective pairs (see Table 1) that are each rated along a 9-point scale. Factor analyses of the resulting 18 ratings generate scores on the dimensions of pleasure, arousal, and dominance. Although this method is informative, there are a number of difficulties associated with it. First, it is cumbersome to measure 18 different ratings for each stimulus presented in an experimental session. There is a heavy investment of time and effort, and results in a relatively large database that requires statistical expertise for resolution (i.e., factor analysis). Second, the reliance on a *verbal* rating system makes it difficult to utilize this methodology in non-English speaking cultures (unless there has been translation and validation) and in populations which are not linguistically sophisticated (e.g., children, aphasics, etc.).

To address these issues, Lang (1980; Hodes, Cook, & Lang, 1985) devised a picture-oriented instrument called the Self-Assessment Manikin (SAM) to directly assess the pleasure, arousal, and dominance associated in response to an object or event. SAM was originally implemented as an interactive computer program, and later was expanded to include a paper-and-pencil version for use in groups and mass screenings. Figure 1 depicts the paper-and-pencil version of SAM illustrating its nonverbal, graphic depiction of various points along each of the three major affective dimensions. SAM ranges from a smiling, happy figure to a frowning, unhappy figure when representing the pleasure dimension, and ranges from an excited, wide-eyed figure to a relaxed, sleepy figure for the arousal dimension. The dominance dimension represents changes in control with changes in the size of SAM: a large

Table 1

Factor Loadings of Each of the 18 Bipolar Adjective Pairs in the Semantic Differential for Picture Ratings

	Factor 1 "Pleasure"	Factor 2 "Arousal"	Factor 3 "Dominance"
Unhappy–Happy	*0.914*	0.063	0.148
Annoyed–Pleased	*0.883*	0.068	0.158
Unsatisfied–Satisfied	*0.868*	0.144	0.114
Melancholic–Contented	*0.725*	0.095	0.056
Despairing–Hopeful	*0.858*	0.063	0.078
Bored–Relaxed	*0.580*	0.372	0.234
Relaxed–Stimulated	–0.211	*0.774*	0.052
Calm–Excited	–0.181	*0.793*	0.056
Sluggish–Frenzied	0.268	*0.771*	0.005
Dull–Jittery	–0.211	*0.793*	0.121
Sleepy–Wide awake	–0.046	*0.810*	0.047
Unaroused–Aroused	0.051	*0.827*	0.127
Controlled–Controlling	0.262	0.192	*–0.673*
Influenced–Influential	0.292	0.089	*–0.618*
Cared for–In control	–0.090	0.198	*–0.626*
Awed–Important	0.199	–0.040	*–0.301*
Submissive–Dominant	0.195	0.306	*–0.695*
Guided–Autonomous	0.161	–0.100	*–0.479*
Amount of variance accounted for:	24.6	23.12	12.18

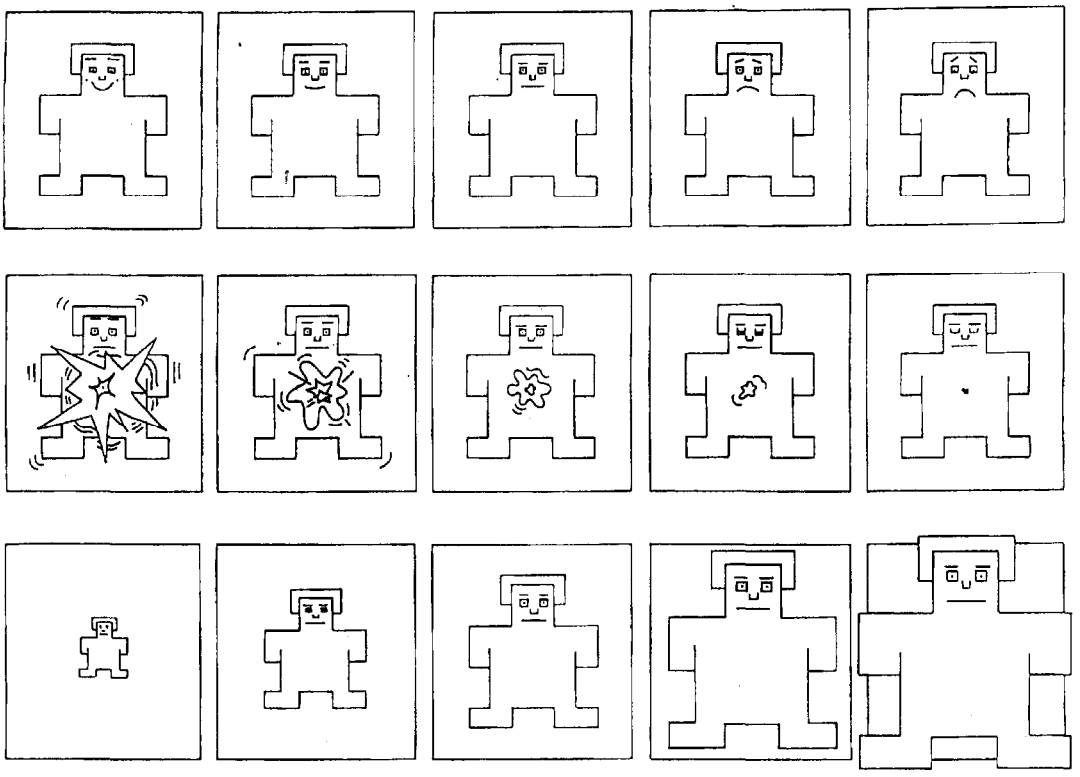

Figure 1. The Self-Assessment Manikin (SAM) used to rate the affective dimensions of valence (top panel), arousal (middle panel), and dominance (bottom panel).

figure indicates maximum control in the situation. In this version of SAM, the subject can place an 'x' over any of the five figures in each scale, or between any two figures, which results in a 9-point rating scale for each dimension. A current computer version of SAM is available on the IBM* (Cook, Atkinson, & Lang, 1987), in which the SAM figure dynamically changes along a 20-point scale for each of the three dimensions.

SAM has been used effectively to measure emotional responses in a variety of situations, including reactions to pictures (Greenwald, Cook, & Lang, 1989; Lang, Greenwald, Bradley, & Hamm, 1993), images (Miller, Levin, Kozak, Cook, McLean, & Lang, 1987), sounds (Bradley, 1994), advertisements (Morris, Bradley, Waine, & Lang, in press), painful stimuli (McNeil & Brunetti, 1992) and more. In addition, SAM has been used with children (Greenbaum, Turner, Cook, & Melamed, 1990), anxiety patients (Cook, Melamed, Cuthbert, McNeil, & Lang, 1988), analogue phobics (Hamm, Globisch, Cuthbert, & Vaitl, 1991), psychopaths (Patrick, Bradley, & Lang, 1993), and other clinical populations. Knowing the relationship between reports of feeling states using SAM and the semantic differential methodology would clearly assist in validating SAM as an easy, nonverbal method for quickly assessing people's reports of affective experience.

In the current study, a set of affective pictures drawn from the International Affective Picture System (IAPS; Lang, Öhman, & Vaitl, 1988) were rated on each of the 18 bipolar dimensions in the semantic differential. Factor analyses were conducted on these judgments to produce scores

*Information about acquiring and using SAM is available on request from the authors.

on each of the derived pleasure, arousal, and dominance dimensions. These scores were then compared to SAM ratings — both pencil and paper and computer SAM — made on the same pictures by different groups of subjects in other studies to determine the relationship between the different rating methodologies.

Method

Subjects

Subjects were 78 members (45 male) of an Introductory Psychology course at the University of Florida who participated for course credit.

Materials

Twenty-one pictures that varied in pleasantness were selected from the International Affective Picture System (IAPS, Lang et al., 1988). The IAPS is a large collection of color photographs, normatively rated using SAM, and designed for distribution and research use around the world as standardized affective materials. IAPS numbers for the stimuli used here are: 109, 124, 150, 204, 211, 220, 250, 301, 315, 416, 500, 560, 623, 700, 727, 803, 909, 914, 916, and 2 opposite-sex erotic pictures, 450 and 452 for women, and 418 and 422 for men. Contents included pictures of a snake, spider, gun, mutilated face, rolling pin, soldier, flowers, mountains, cake, baby, and others. Two separate orders of these slides were constructed to balance order of presentation. Each subject was randomly assigned to view pictures in one of these orders.

The semantic differential rating system was administered as described in Mehrabian and Russell (1974, Appendix B) and consisted of the 18 bipolar pairs listed in Table 1. The 9-point rating scale ranged from −4 to +4, with 0 representing the center segment of the scale. Positively weighted adjectives are those listed on the left side of each pair presented in Table 1; negatively weighted adjectives are the right hand members of each pair. Booklets were arranged which consisted of 22 pages (one practice trial and 21 picture trials) on which each of the 18 scales appeared, anchored by an adjective on the left and right hand side of the page. Between the two words was a continuous line segmented into nine bins (the appearance of the 18 scales on each page was identical to that depicted in Mehrabian & Russell [1974]). Scales were randomly ordered on each page. Three scales from each of the six scales contributing to each factor were inverted so that the positively weighted adjective was on the right side of the page. Thus, of the 18 scales on each page, nine of the adjectives on each side were weighted positively and half were weighted negatively.

Procedure

Each subject was run individually in a small laboratory room. After filling out a consent form, the subject participated in a memory experiment not described here. Following this, the subject was seated at a table with a slide projector that projected each picture onto a clean white surface. The subject was instructed that a series of pictures would be presented, and that several ratings of his reaction to each picture would be made using the booklet in front of him.

The subject was instructed to make the ratings using the "emotional state" instructions used by Mehrabian and Russell (1974, Appendix B), which are:

> Each line on the page contains an adjective pair which you will use to rate your feelings about the slide. Some of the pairs may seem unusual, but you'll probably feel more one way about one slide than another. So, for each pair, place a check mark close to the adjective which you believe describes your reaction to the picture better. The more appropriate the adjective seems, the closer you should put your check mark to it.

The procedure was as follows: A pre-recorded voice (stored digitally on computer media and controlled by an Apple IIe computer) instructed the subject to 'Get Ready'. Two seconds later, the

vocal cue emitted the instruction "Slide on", at which point the subject pressed the button on the projector's remote control advance button which projected the slide. The picture was displayed for 6 seconds, and the subject had been instructed to look at the slide the entire period it was displayed. After 6 seconds, the vocal cue instructed "Slide off", and the subject again advanced the projector, which moved to an empty slot and projected no image. Then, the subject made all 18 ratings for each picture within a constant 45-second rating interval. After the rating interval was over, the vocal cue again emitted the instruction "Get ready" and the next trial began. This continued until all 21 slides were viewed and rated. At the end of this session, the subject was debriefed, thanked, and given course credit.

SAM Ratings

Paper-and-pencil SAM ratings for the 21 pictures presented here were obtained from the IAPS norms (Lang, Greenwald, & Bradley, 1988). In the norming study, each of 60 pictures was presented for 6 seconds, followed by a 15 second interval in which the subject used the paper-and-pencil version of SAM to rate experienced pleasure, arousal, and dominance while viewing the picture. Computer SAM ratings for these pictures were obtained from 60 subjects participating in a psychophysiological investigation of reactions conducted by Lang et al. (1993). In this study, each picture was viewed for 6 seconds, and immediately rated for pleasure, arousal, and dominance using a computerized version of SAM. In all administrations involving SAM, the subject was instructed to rate his personal reaction to the picture. Standard SAM instructions included the list of words from the pertinent end of each the Semantic Differential scales in order to identify the anchors of each dimension to the subject. Thus, the subject was instructed, for example, to use the extreme happy SAM rating if the reaction was one of feeling "happy, pleased, satisfied, contented, hopeful, relaxed", and to use the other extreme if he felt "unhappy, annoyed, unsatisfied, melancholic, despairing, or bored". Similar instructions accompanied all three scales.

Results

Factor Analysis of Adjective Ratings

Ratings on each of the 18 semantic differential scales for each of the 21 pictures for each subject were submitted to a correlational analysis. The resulting 18 × 18 matrix of correlations (based on 1404 observations) was factor analyzed using a principal components analysis. Only three factors with eigenvalues greater than unity were obtained, and the loadings for each of the 18 adjective pairs on each factor are presented in Table 1. These data are completely consistent with the Mehrabian and Russell (1974) solution, in that each of the six scales identified as associated with each dimension by Mehrabian & Russell had its maximum loading on the expected factor in our data.* The three factors of pleasure, arousal, and dominance in the current study accounted for 24%, 23%, and 12% of the variance, respectively, compared to Mehrabian and Russell's (1974) reports of 27%, 23%, and 14% of the total variance, respectively. Thus, despite widely different stimuli (e.g., pictures vs connected text), judgments of pleasure, arousal, and dominance accounted for the same amount of variability in reports of affective reactions.

SAM Ratings and Semantic Differential Factor Scores.

Mean factor scores for each picture (averaged over subjects) on each of the three factors resulting from analysis of the semantic differential rating data were correlated with the mean SAM ratings on the dimensions of pleasure, arousal, and

*In Mehrabian and Russell's (1974) factor analysis, an oblique rotation of the matrix produced the factor scores. In our data, non-rotated and rotated solutions produced the identical factor structure and patterns of loadings, suggesting rotation was unnecessary.

dominance. Two forms of SAM administration were compared to the semantic differential factor scores: Paper-and-pencil SAM ratings and computer SAM ratings. Table 2 lists the correlation matrix for these data.

The two major affective dimensions — pleasure and arousal — showed almost complete agreement in all comparisons involving the semantic differential factor scores and the ratings resulting from either of the SAM administration formats. Semantic differential pleasure scores were correlated .97 and .96 with pencil-and-paper SAM and computer SAM pleasure dimensions, respectively. For arousal, the correlations between the semantic differential arousal factor and SAM arousal were .94 and .95 for the pencil-and-paper and computer formats, respectively. Within-instrument correlations between pleasure and arousal were also similar and low, producing correlations of –.09, –.20, and .02, for the semantic differential factors, paper-and-pencil SAM and computer SAM, respectively. Less agreement was found for the dominance dimension, with nonsignificant correlations of .23 and .18 between the semantic differential factor and the paper-and-pencil SAM or computer SAM dominance dimensions, respectively. Furthermore, whereas the correlation between pleasure and dominance was low for the semantic differential instrument (.07), the correlation was high and significant for the SAM method, .86 and .79 for paper-and-pencil and computer versions, respectively.

Table 3 lists the correlation between the mean ratings for each of the six adjective pairs associated with the pleasure, arousal, and dominance semantic differential factors with the relevant factor score and with SAM scores on these dimensions. For pleasure, most of the individual adjective-pairs showed a high correlation with dimensional scores resulting from using either SAM or the semantic differential, except for 'bored/relaxed', which was somewhat less related to the pleasure scores than the other adjective pairs. For arousal, all six adjective pairs showed very good agreement with the arousal score measured either by SAM or the derived semantic differential factor score. For dominance, the adjective pairs had generally lower correlations with either dimensional score, although the pairs showing the best agreement with dominance scores were the same for each instrument, and included 'controlling/controlled', 'influenced/influential', and 'cared for/in control', although the direction of the relationship for the latter pair was reversed using the SAM methodology.

Taking a closer look at the dominance ratings,

Table 2

Correlations Between SAM Ratings for Pleasure, Arousal, and Dominance, and the Factor Scores Derived from the Semantic Differential for Pleasure, Arousal, and Dominance

	Pleasure			Arousal			Dominance	
	SemDiff	PP SAM	CS SAM	SemDiff	PP SAM	CS SAM	SemDiff	PP SAM
SemDiff pleasure								
PP SAM pleasure	.96							
CS SAM pleasure	.97	.99						
SemDiff arousal	–.09	–.20	–.20					
PP SAM arousal	–.09	–.20	–.20	.95				
CS SAM arousal	.09	.01	.02	.94	.94			
SemDiff dominance	.07	.20	.21	–.16	–.26	–.14		
PP SAM dominance	.73	.79	.78	–.31	–.37	–.19	.23	
CS SAM dominance	.81	.87	.86	–.57	–.57	–.39	.18	.79

Note: PP = Paper-and-Pencil version of SAM dimensions. CS = computerized version of SAM dimension. SemDiff = semantic differential method of dimensional ratings.

Table 3

Correlations for SAM Ratings and the Relevant Semantic Differential Factor Score with each of the six Adjective Pairs Associated with the Pleasure, Arousal, and Dominance Dimensions

	SemDiff	PP SAM	CS SAM
Pleasure			
Unhappy–Happy	.99	.99	.98
Annoyed–Pleased	.98	.99	.99
Unsatisfied–Satisfied	.99	.97	.96
Melancholic–Contented	.98	.97	.96
Despairing–Hopeful	.98	.98	.97
Bored–Relaxed	.82	.68	.68
Arousal			
Relaxed–Stimulated	.97	.92	.91
Calm–Excited	.96	.90	.92
Sluggish–Frenzied	.96	.91	.88
Dull–Jittery	.97	.94	.88
Sleepy–Wideawake	.97	.92	.93
Unaroused–Aroused	.95	.90	.93
Dominance			
Controlled–Controlling	.81	.56	.44
Influenced–Influential	.70	.54	.64
Cared for–In control	.65	–.37	–.53
Awed–Important	.64	.35	.41
Submissive–Dominant	.39	.08	.00
Guided–Autonomous	.12	.32	.39

the four pictures rated as highest in dominance using the semantic differential were a skier, a spider, an angry face, and a snake, and the four pictures with the lowest dominance ratings were of a mutilated face, a dead animal, an aimed gun, and a baby. The lack of a correlation with pleasure using this instrument is evident, in that both pleasant and unpleasant stimuli were associated with, for example, low dominance. For SAM, on the other hand, a picture of a baby received the highest dominance ratings, along with pictures of flowers, a dog, and a chocolate dessert, whereas a gun, two mutilated bodies, and a snake were rated as very low in dominance. These examples illustrate the positive correlation obtained between pleasure and dominance using SAM. One hypothesis for this pattern of results is that SAM reflects the *subject's* feelings of control in the situation, whereas the semantic differential scale may index whether the *pictured object* is perceived to be low or high in control. Thus, a baby was rated 'not in control' using the semantic differential, whereas, using SAM, the subject rated himself as 'in control'.

Discussion

Affective reports of the amount of pleasure, arousal, and dominance experienced while processing emotional stimuli — in this case, pictures — can be directly assessed using SAM, a non-verbal, graphic representation of the three fundamental emotional dimensions. In particular, near perfect agreement was obtained in ratings of pleasure and arousal for a set of pictures using the semantic differential scale — which requires 12 bipolar verbal judgments — and SAM, which requires only two judgments. The pleasure and arousal dimensions are primary, and they typically account for most of the variance in emotional judgments, including when the semantic differential is the measuring instrument. Confining attention for the moment to the dimensions of

pleasure and arousal, SAM ratings can be used to plot directly any object or event into a 2-dimensional 'affective space' (Lang et al., 1993), making location in space one operational method for defining emotion and differentiating among affective categories. Some of the 360 pictures currently comprising the International Affective Picture System* (Lang et al., 1988) are plotted in this 2-dimensional space in Figure 2, which illustrates that, for pictorial stimuli, pleasure and arousal are not linearly correlated, but that increases in either pleasure or displeasure tend to produce increases in ratings of arousal (or intensity) as well.

Differences in the nature of this affective space have been obtained as a function of variables related to age, psychopathology, and brain damage. For instance, recent data from our laboratory indicate that anxiety patients show a negative correlation between SAM pleasure and arousal ratings, so that highly arousing stimuli tend to be rated as unpleasant. Arousing pictures that are *pleasant* do not seem to be a relevant category for these patients. A similar type of relationship was obtained for mature (i.e. 40–60-year-old) women, compared to college-aged women (Cuthbert, Bradley, & Lang, 1988). These data suggest that age and psychopathology may

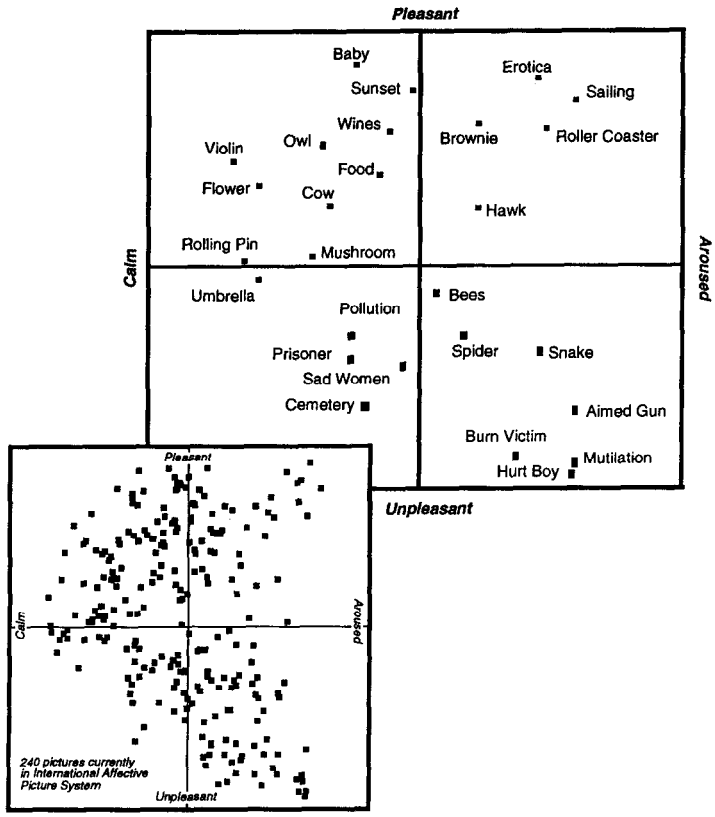

Figure 2. Illustration of the placement of several pictures in a 2-dimensional affective space defined by SAM pleasure and arousal ratings (upper plot), and 240 pictures currently comprising the International Affective Picture System (IAPS, Lang et al., 1988) plotted in affective space (lower plot).

*The International Affective Picture System (Lang et al., 1988) is available on request from the authors.

both impact on how one views the affective world. On the other hand, a patient who had undergone a right temporal lobectomy, including the amygdala, produced a distorted affective space in which unpleasant pictures were generally rated as quite calm (Morris, Bradley, Bowers, Heilman, & Lang, 1991). These examples demonstrate that measurement of pleasure and arousal using SAM results in not only a quick assessment of a subject's personal response, but also allows one to determine whether these dimensions covary in normal or atypical ways by assessing the dimensional correlation between pleasure and arousal.

If pleasure and arousal are pervasive organizers of human judgments, as these and other data indicate, almost parallel dimensions of *direction* — towards or away from — and *vigor* (intensity) were earlier advocated as fundamental in organizing behavior as well (Hebb, 1949). To the extent that language has developed to describe important parameters of behavior, it is reasonable that its primary dimensions are related to those that control action. Ratings of pleasure reflect one's tendency to approach a stimulus, whereas displeasure reflects a tendency to withdraw, escape, or otherwise terminate the encounter. Similarly, judgments of arousal index the amount of vigor associated with a given behavioral choice, and increase with stimulus intensity.

This analysis suggests that affective reports of differences along the SAM dimensions of pleasure and arousal might covary consistently with other measures of reactivity in physiological or behavioral systems. Lang and his colleagues (Greenwald, Cook, & Lang, 1988; Lang et al., 1993) have recently generated a large database indicating that cardiac and electrodermal responses, as well as facial displays of emotion, systematically vary with differences in affect as indexed by the SAM dimensions of pleasure and arousal. For instance, as reports of pleasure decrease, heart rate slows, skin conductance responses increase, and facial corrugator EMG responses increase; in addition, the magnitude of the defensive startle reflex shows a strong negative correlation along the pleasure dimension, such that unpleasant stimuli prompt larger blink reflexes (see Lang, Bradley, & Cuthbert, 1990, for an overview). On the other hand, both choice viewing time and memory performance appear to be strongly related to variations in rated arousal, with material rated as highly arousing viewed longer, remembered better in a free recall task, and reacted to more quickly in a recognition reaction time task (Bradley, Cuthbert, & Lang, 1990; Bradley, Greenwald, Petry & Lang, 1992). Thus, different physiological and behavioral systems are tuned to different dimensions, which has important ramifications for expected changes in emotional response across measured systems. At the least, if reports of pleasure and arousal directly relate to behaviorally relevant emotional reactions, it is important to elicit these affective reports from patients regarding their affective responses to a variety of stimuli — both clinically and nonclinically relevant.

Here and in previous work, the dominance factor has accounted for the least variance in affective judgments, and is the most variable in terms of its semantic label across investigation. Judgments of dominance presumably index the interactive relationship that exists between the perceiver and the perceived, with high dominance associated with the one having maximum control in the situation. Since this rating is inherently relational, dominance judgments will clearly need to specify which member of the interaction is being judged: in this case, the subject or the pictured object. An unpleasant picture that was rated differently in dominance here was a snake, which received a low dominance rating using SAM but a high dominance rating using the semantic differential. In most relationships involving a snake — a typically feared object — and a human being, it is likely that the person will be perceived as relatively lower in control than the snake. This suggests that the semantic differential method, which led to high dominance ratings for the picture of the snake, may produce confusion regarding which element of the interaction is being rated for dominance, leading to rating the snake's dominance, rather than the subject's feelings of control. When using SAM, on the other hand, it

appears the subject reliably rated his or her own reaction to the pictured object, as the snake was (understandably) rated as leading to feelings of low pleasure, high arousal, and low control. SAM may elicit more consistent judgments concerning the rated referent because the SAM figure itself is human-like, clearly indicating that it is a person's sense of control that is the focus of the dominance judgment.

To summarize, SAM is an easy to administer, non-verbal method for quickly assessing the pleasure, arousal, and dominance associated with a person's emotional reaction to an event. Judgments regarding the amount of pleasure and arousal experienced when viewing a picture using SAM correlated highly with ratings obtained using the verbal, more lengthy semantic differential scale. Differences obtained in judgments of dominance suggest that SAM might be more accurate in tracking the subject's — rather than the stimulus' — feelings of control. Because of these properties, SAM is a useful instrument when determining the subjective experience of emotion associated with processing most stimuli, and can be employed with a variety of subject populations, including non-English speaking subjects, children, people with language disorders, and of course all clinical syndromes. Finally, SAM allows rapid assessment of what appear to be fundamental dimensions in the organization of human emotional experience, as well as an assessment of the shape of the resulting affective space. Covariation between reports of pleasure and arousal using SAM and responses in physiological and behavioral systems has already demonstrated strong concordance. Taken together, these data indicate that SAM is an effective method for measuring existing feeling states, relating them to other indices of emotional response, and assessing changes due to time, therapeutic intervention, or other processes affecting affective reactions to contextual stimuli.

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