

## Valence and Arousal Ratings for Velten Mood Induction Statements<sup>1</sup>

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*Participants rated 84 statements adapted from Velten's original mood induction statements—designed to induce positive and negative mood—on two dimensions of emotion (valence and arousal), using the Self Assessment Manikin (SAM) (P. J. Lang, M. M. Bradley, & B. N. Cuthbert, 1999). Fifty-two of these Velten positive, negative, and neutral statements yielded SAM valence ratings that were consistent with Velten's previous valence designation (E. Velten, 1968). Reliability analyses for the positive, negative, and neutral statements indicated a high level of internal consistency in the three statement groups. Arousal and valence ratings of the statements were positively correlated. Related issues concerning differences in rating verbal versus visual emotional stimuli and recommendations for future work to improve the validity of Velten's mood induction statements are addressed.*

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Mood induction using statements designed to elicit positive and negative moods is a technique frequently used in emotion research. The first set of mood induction statements was created and tested by Velten (1968). Velten divided participants into three treatment groups: one group read positive statements; the second, negative; and the third, neutral. In each condition, participants were instructed to try to experience the mood. To control for demand characteristics, Velten had two additional

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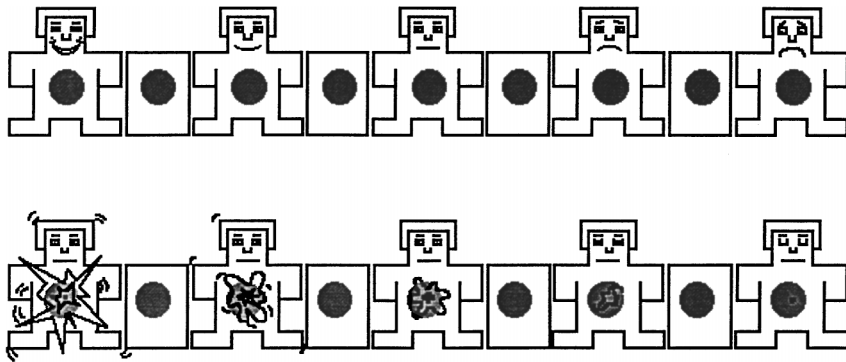
groups of participants that were instructed to act “as if” they were experiencing the mood. Participants’ ratings of mood increased following the “elation” treatment and decreased following the “depression” treatment. There was no change in mood ratings in the neutral and control groups. Hence, Velten’s work launched the interest in using verbal stimuli to induce mood.

Even though numerous researchers have adopted the Velten statements for use in mood induction studies, conflicting accounts exist as to the effectiveness of these statements. In particular, researchers continue to debate whether reported changes in mood are because of the nature of the statements or the demand characteristics (Clark, 1983; Gerrards-Hesse, Spies, & Hesse, 1994; Kenealy, 1986; Martin, 1990; Westermann, Spies, Stahl, & Hesse, 1996). Because some researchers do not disguise the intended use of these statements for inducing mood, possibly eliciting responses affected by social desirability or hypothesis guessing, Kenealy (1986) contended that the efficacy of the Velten technique is inconsistent across studies. Larsen & Sinnett (1991) concluded that mood induction techniques are more effective when deception is employed, but that mood induction without deception does produce real effects and that demand conditions may add to this effect. In addition to problems with demand characteristics, Gerrards-Hesse et al. (1994) and Westermann et al. (1996) both reported that the Velten technique was highly effective for inducing depression, but less so for inducing elation.

Numerous instruments have been developed to measure the experience of emotion. The Self Assessment Manikin (SAM; Lang, Bradley, & Cuthbert, 1999) was initially developed to judge the affective quality of visual stimuli. Originally derived from Osgood’s semantic differential (Osgood, Suci, & Tannenbaum, 1957), the SAM rating scale consists of a graphic figure representing three dimensions depicting the major elements involved in emotion: valence (e.g., degree of pleasure), arousal, and dominance. Valence and arousal appear to best characterize the structure of affect, although other dimensions have been described (Feldman-Barrett & Russell, 1999; Lang, Bradley, & Cuthbert, 1990; Osgood et al., 1957; Watson & Tellegen, 1985).

Figure 1 shows the SAM rating scale for valence and arousal. For the valence dimension, SAM ranges from a smiling, happy figure, to a frowning, unhappy figure. For the arousal dimension, the SAM figure ranges from a wide-eyed, excited figure, to a relaxed, sluggish, or sleepy figure. Participants rate each picture along a continuously varying scale, indicating how each picture makes them feel along each dimension. Participants are instructed to place an “X” over any of the 5 figures on each scale, or in between each figure, to designate their experience of the stimulus. This results in a 9-point scale.

Lang and colleagues used the SAM to develop the International Affective Picture System (IAPS), a set of normative visual stimuli for the study of emotion. This resulted in a wide range of emotionally evocative pictures representing a variety of semantic categories providing a common database of stimuli and



**Fig. 1.** The Self Assessment Manikin rating scale used for ratings of Valence: From 1 (*very unhappy or sad*) to 9 (*extremely happy or pleasurable*) and Arousal: From 1 (*very calm or sluggish*) to 9 (*very excited or aroused*).

results across laboratories devoted to the study of emotion and attention. These and additional standardized color slides have become available throughout the world (Center for the Study of Emotion and Attachment-National Institutes of Mental Health [CSEA-NIMH], 1999).

In addition to rating pictures, the SAM has been shown to accurately measure emotional reactions to imagery (Miller et al., 1987; Vrana, Cuthbert, & Lang, 1986), and painful stimuli (McNeil & Brunetti, 1992). It has also been validated as an effective and easy method for assessing individuals' emotional experience.

To date, no attempt has been made to identify the affective dimensions in verbal statements employed in mood induction, as was done with the visual stimuli of Lang and colleagues. In the present study, participants rated a set of 84 Velten statements, using the SAM to rate valence and arousal. First, examining the SAM valence and arousal ratings will yield data indicating the effectiveness of these verbal stimuli to evoke positive, negative, and neutral affect. The data obtained herein will make it possible to examine the accuracy of Velten's previous valence designations for each statement by examining the valence means for each statement, and to determine which statements are inconsistent with his original designations and which agreed with them. In addition, the association between valence and arousal ratings for each individual statement can be examined to obtain more information about the affective experience evoked by that particular statement. Because previous studies revealed that females experience more negative affect than males (Cuthbertson, 1997; Nolen-Hoeksema, 1990), gender differences in valence and arousal ratings will also be examined to determine if females rate verbal statements as more arousing or as more positive or negative than males.

## METHOD

### Participants

Two hundred and twenty-one undergraduate students at Chapman University participated to earn a small quantity of course credit. The sample consisted of 69 males ( $M = 20.9$  years,  $SD = 3.3$ ) and 152 females ( $M = 20.7$  years,  $SD = 4.4$ ).

### Materials and Equipment

#### *Velten Statements*

The statements presented were taken from a paper by Seibert & Ellis (1991), in which a subset of 75 Velten statements was employed. Because in future work we planned to use neutral statements as baseline data, we constructed additional neutral statements and included them in the set of 84 statements used in the present study. The statements consist of positive, negative, and neutral statements designed to reflect present day events, and containing no reference to cognitive deficits, or to suicidal or somatic states. In their study, Seibert & Ellis report that the overall decrease in the number of statements as well as the reduction in test duration compared to those used in Velten's original work, did not influence the mood induction effectiveness.

#### *Ratings booklet and Self Assessment Manikin*

The ratings booklet consisted of a consent form, a background information sheet, SAM rating scales for three practice statements, and SAM rating scales for the 84 test statements. Each statement in the booklet was numbered and corresponded to the number of the statement, each of which was presented on a screen in the front of the classroom.

### Procedure

Two research assistants, one male and one female, facilitated the sessions. Participants in groups of about 20 were tested in a standard 20'  $\times$  26' classroom. Participants were instructed to rate the statements along the dimensions of valence and arousal, using the Self Assessment Manikin (SAM). The SAM is depicted in Fig. 1. Instructions were given to participants orally, followed by an automated Powerpoint presentation in which the test statements were presented randomly. Because reactivity could affect rating behavior, the statements previously designated as positive, negative, or neutral were presented in random order to minimize

any actual mood induction effects occurring during task performance. First, the three practice statements were presented and rated using the SAM (see Fig. 1). Participants were instructed to remain silent, and to try to experience each statement as though it was happening to them. Participants' questions were answered and examples provided for clarification. Each of the 84 test statements were presented to participants on a projection screen measuring  $5' \times 6.5'$ . Prior to each statement, a message alerting participants that a statement would be displayed was presented for 6 s. Following this announcement, the relevant statement was presented for 6 s, immediately followed by instructions to rate the statement in their ratings booklet. Participants were allowed 10 s to rate each statement.

## RESULTS

### Frequency Analysis for Identification of Valence Type and Arousal Levels

Mean valence ratings obtained using the SAM were computed for each of the 84 Velten statements. Frequency analysis was used to identify statements that were perceived by participants as positive (the upper 33% of all 84 statements), neutral (the middle 33%), and negative (the lower 33%). Statement valence and arousal means accompany the Velten statements presented in Table I. This table indicates which statements failed to be consistent with Velten's original valence designations. Fifty-two statements were consistent with Velten's valence designations and the data from these statements were used in the following analyses. Seventeen of these were positive in valence, 19 negative, and 16 neutral. Valence rating means ranged from 2.50 to 6.97, revealing that not one of the statements consistently elicited extreme reactions across all participants.

In a similar fashion, statements were categorized as "low," "intermediate," and "high" in arousal according to the arousal mean for each statement. The ranges and cutoff values for valence and arousal mean ratings are presented in Table II. Figure 2 shows the mean scores for the statements as they distribute across a two-dimensional affective space defined by valence and arousal ratings.

### Internal Consistency of Valence and Arousal Subscales

To explore further the valence and arousal groupings, the internal consistency of the valence subscales (positive, negative, and neutral) and the internal consistency of the arousal subscales (high, intermediate, and low) were examined using Cronbach's alphas. All of the obtained subscale alphas were reasonable and these results are listed in Table III. Because these subscales are internally consistent, subscale valence scores were computed for all of the positive, neutral, and negative statements. In addition, subscale arousal scores were computed for all

**Table I.** Valence Means and Arousal Means for Velten Mood Induction Statements

Velten statement	Valence		Arousal	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
1 <sup>a</sup> = You have to take the ferry to get to the island.	4.30	1.79	4.18	2.32
2 – Why should I try when I can't make a difference anyway.	2.97	1.61	4.21	2.34
3 <sup>a</sup> = Some say that lady bugs are good for the garden.	6.37	1.57	4.13	2.22
4 + When I have the right attitude, nothing can depress me.	6.54	1.81	4.72	2.42
5 – What's the point of trying?	2.97	1.59	4.01	2.54
6 – Today is one of those days when everything I do is wrong.	3.75	1.81	3.40	2.43
7 + The world is full of opportunity and I'm trying to take advantage of it.	6.97	1.83	5.82	2.34
8 <sup>a</sup> + The Shakers invented the circular saw.	4.10	1.68	3.14	2.24
9 – When I talk no one really listens.	4.15	2.04	3.53	2.13
10 = The rug was made according to an old Navajo pattern.	5.22	1.25	3.07	2.22
11 <sup>a</sup> = The reefs along the coast are made of coral.	5.75	1.43	3.42	2.46
12 <sup>a</sup> = The Pacific Ocean has fish.	6.12	1.66	4.25	2.66
13 + When it comes right down to it, I'm just too cool.	5.70	1.74	4.14	2.46
14 <sup>a</sup> = The nightclub had a female vocalist and a live band.	4.56	2.36	4.47	2.50
15 = The movie theater was located downtown.	5.59	1.47	3.39	2.28
16 = The Gulf Islands are in British Columbia.	5.20	1.20	2.97	2.17
17 <sup>a</sup> = The eucalyptus tree was the largest tree on the block.	4.29	1.79	3.62	2.44
18 <sup>a</sup> = The desert climate is hot and dry.	4.51	1.76	3.42	2.38
19 – Sometimes I feel so guilty that I can't sleep.	2.80	1.46	4.54	2.60
20 = New York City is in New York state.	5.14	1.03	2.74	2.19
21 – Sometimes I feel really guilty about the way I've treated my parents.	4.05	2.07	4.14	2.56
22 = Some think that electricity is the safest form of power.	4.94	0.95	2.81	2.05
23 <sup>a</sup> = Some chimps have been taught to use sign language.	5.86	1.24	3.57	2.41
24 = Some baseball bats are made from the wood of the ash tree.	5.46	1.28	3.25	2.36
25 = She walked over to the shop and knocked on the door.	5.08	0.98	2.63	2.04
26 – There is no hope.	4.02	2.71	4.62	2.61
27 <sup>a</sup> = Savannah is in the state of Georgia.	5.97	1.97	4.29	2.95
28 = Perennials bloom every year.	5.46	1.07	2.95	2.15
29 = Olympia is the capital of the state of Washington.	5.31	1.21	2.86	2.11
30 + Nothing can bum me out now.	6.18	1.91	4.70	2.60
31 <sup>a</sup> = New Mexico is in the United States.	5.63	1.62	3.62	2.48
32 + My parents brag about me to their friends.	6.88	1.99	5.40	2.57
33 <sup>a</sup> + I've got some good friends.	5.46	2.73	5.24	2.55
34 + My future is so bright I've got to wear shades.	6.29	1.67	4.34	2.72
35 – I feel I am being suffocated by the weight of my past mistakes.	4.65	2.52	4.74	2.42
36 + Most people like me.	6.31	1.50	4.23	2.40
37 <sup>a</sup> = Most oil paintings are done on canvas.	5.85	1.42	3.38	2.28
38 – Nobody understands me or even tries to.	4.62	2.65	4.78	2.69
39 <sup>a</sup> = Most high schools have a band.	6.27	1.84	4.30	2.90
40 = Many buildings in Washington are made of marble.	5.16	1.03	2.75	2.16
41 + Life's a blast: I can't remember when I felt so good.	6.01	1.97	4.67	2.80
42 – Life is such a heavy burden.	3.00	1.43	3.97	2.17
43 + It's great to be alive.	6.41	1.92	4.61	3.04
44 = It snows in Idaho.	5.39	1.14	3.01	2.24
45 + It doesn't get any better than this.	5.99	2.04	4.98	2.53
46 <sup>a</sup> – I'm tired of trying.	4.96	2.51	4.59	2.60
47 = Mules hauled the supplies up the mountain.	5.37	1.27	3.20	2.21
48 <sup>a</sup> – My classes are harder than I expected.	4.74	1.93	4.62	2.37
49 <sup>a</sup> + I'm in charge of my life and I like it that way.	4.93	2.72	4.94	2.56
50 <sup>a</sup> + The relationships I have now are the best I've ever had.	4.97	2.81	5.29	2.73

*(Continued)*

Table I—Continued

Velten statement	Valence		Arousal	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
51 + I'm going to have it all!	6.24	1.93	4.82	2.97
52 <sup>a</sup> – My parents don't know who I am.	4.73	2.50	4.72	2.47
53 <sup>a</sup> + I'm energized.	5.10	2.25	4.93	2.75
54 = Santa Fe is the capital of New Mexico	5.02	0.77	2.47	1.98
55 <sup>a</sup> – I'm completely alone.	4.66	2.76	4.86	2.71
56 + I know if I try I can make things turn out fine.	6.00	1.49	4.03	2.63
57 <sup>a</sup> + I know I can get the things I want in life.	4.95	2.54	4.68	2.69
58 <sup>a</sup> = An orange is a citrus fruit.	4.01	2.03	3.47	2.53
59 + I know I can do it; I'm going to seize the day!	6.80	2.01	5.82	2.62
60 – I feel worthless.	2.50	1.67	3.67	2.53
61 – I feel like my life's in a rut that I'm never going to get out of.	2.54	1.55	3.75	2.44
62 <sup>a</sup> = Apples are harvested in the Fall.	4.21	1.79	3.43	2.51
63 – I feel cheated by life.	3.24	1.64	4.00	2.49
64 + I can make things happen.	6.86	1.49	5.45	2.47
65 <sup>a</sup> + I bet things will go well for the rest of the day.	4.90	2.44	4.44	2.46
66 <sup>a</sup> = He played basketball yesterday morning.	4.44	1.57	3.34	2.43
67 – Everyone else seems to be having more fun.	4.29	1.46	2.98	2.11
68 – I don't think things are ever going to get better.	3.96	1.86	3.35	2.38
69 = Elephants carried the supplies.	5.34	1.26	3.16	2.31
70 <sup>a</sup> + Things look totally awesome.	5.02	2.48	4.61	2.69
71 = Diamonds really can cut glass.	5.41	1.15	2.97	2.29
72 <sup>a</sup> = Corn is sometimes called maize.	6.11	1.65	4.16	2.92
73 – I doubt that I'll ever make a contribution in the world.	4.10	1.92	3.46	2.41
74 = Basket weaving was invented before pottery making.	4.98	0.95	2.63	2.03
75 <sup>a</sup> = Arizona has both deserts and pine-covered mountains.	4.43	1.92	3.40	2.48
76 <sup>a</sup> = All the children were playing on the swings.	6.76	1.57	4.77	2.71
77 <sup>a</sup> = A neuron fires rapidly.	5.96	1.66	4.37	2.65
78 <sup>a</sup> – My mistakes haunt me; I've made too many.	4.95	2.52	4.79	2.70
79 – I wish I could be myself, but nobody likes me when I am.	3.12	1.74	3.94	2.55
80 – Every time I turn around, something else has gone wrong.	4.44	2.14	4.25	2.38
81 + I feel creative	6.21	1.44	4.18	2.68
82 – Even when I give my best effort, it just doesn't seem to be good enough.	3.03	1.53	3.99	2.46
83 + I feel completely aware.	6.27	1.72	4.80	2.33
84 + I can make any situation turn out right.	6.32	1.65	4.39	2.83

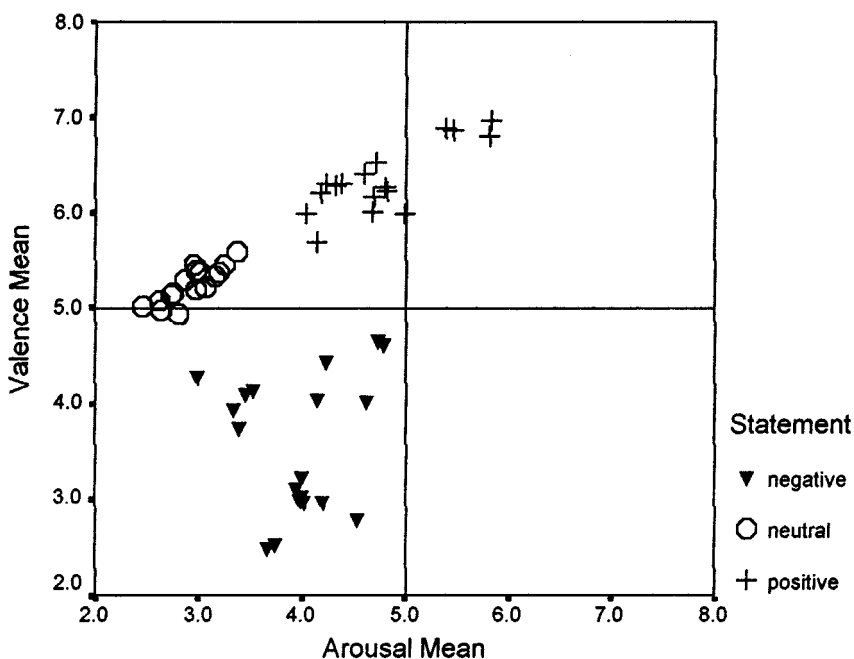
Note. Ratings of Valence: From 1 (*very unhappy or sad*) to 9 (*extremely happy or pleasurable*) and of Arousal: From 1 (*very calm or sluggish*) to 9 (*very excited or aroused*). Velten's Designation: + (*elation*); – (*depression*); = (*neutral*). *N* = 221.

<sup>a</sup>Statements that yield valence means inconsistent with Velten's Designation as determined by the SAM cutoff criteria.

Table II. SAM Valence and Arousal Cutoff Scores for Low-, Intermediate-, and High-Valence Groups

	Low	Intermediate	High
Valence	2.50–4.65	4.66–5.59	5.60–6.97
Arousal	2.47–3.47	3.48–4.44	4.45–5.83

Note. Low-valence means correspond to statements that are negative; intermediate ones to neutral statements; and high ones to positive statements.



**Fig. 2.** A two-dimensional depiction of Velten mood induction statements as rated by the Self Assessment Manikin.

of the high arousal statements, and for all of the intermediate and low arousal statements.

### Relationships Among Valence and Arousal Ratings

A repeated-measures analysis of variance was conducted to examine the difference among arousal ratings for the three types of valence statements. The three levels of the independent variable were positive, neutral, and negative, and arousal ratings were the dependent measures for this analysis. The differences among arousal ratings for positive, neutral, and negative statements were statistically significant,  $F(2, 414) = 114.377$ ,  $p = .000$ ,  $\eta^2 = .356$ . High arousal was associated with high (positive) valence, low arousal with intermediate (neutral) valence, and intermediate arousal with low (negative) valence, revealing that the association

**Table III.** Cronbach's Alpha Coefficients for Valence and Arousal Subscales

Valence			Arousal		
Positive	Neutral	Negative	Low	Intermediate	High
.8301	.7054	.9028	.8850	.9346	.8865



**Table IV.** Valence and Arousal Designation for Each Mood-Induction Statement According to SAM Mean Cutoff Criteria

Valence	Arousal levels		
	Low	Intermediate	High
Positive		13, 34, 36, 56, 81, 84	4, 7, 30, 32, 41, 43, 45, 51, 59, 64, 83
Neutral	10, 15, 16, 20, 22, 24, 25, 28, 29, 40, 44, 47, 54, 69, 71, 74		
Negative	6, 67, 68, 73	2, 5, 9, 21, 42, 60, 61, 63, 79, 80, 82	19, 26, 35, 38

between arousal and valence is curvilinear. Table IV shows these relationships as does Figure 2.

The relationship between valence and arousal was also examined using linear and quadratic correlation. The unit of analysis for this correlation was each statement (rather than each participant's rating) and the data were the 52 means for valence and arousal. The linear correlation for valence and arousal was significant,  $r(50) = .324$ ,  $p = .019$ , as was the quadratic correlation,  $r(50) = .562$ ,  $p = .000$ . Because of the low arousal ratings for the neutral statements, the relationship between arousal and valence is curvilinear, and hence, the quadratic correlation coefficient may reflect the relationship between valence and arousal for each statement more accurately than the linear correlation (see Fig. 2).

### Gender Differences

To examine the effects of gender on valence ratings, a repeated-measures analysis of variance was performed. As expected, there was a main effect of valence type,  $F(2, 438) = 381.18$ ,  $p = .000$ ,  $\eta^2 = .667$ , a finding that reflects the elimination of discrepant statements as well as the robustness of the positive, neutral, and negative statements used in this statement set. However, the main effect of gender was not significant, nor was the gender–valence interaction. All of the pairwise comparisons (positive and negative, positive and neutral, neutral and negative) yielded correlated  $t$  statistics that were significant at less than .0001, and as a result, remained significant after adjusting the pairwise significance levels according to the Bonferroni inequality.

Similarly, the effect of gender on arousal ratings was examined using repeated-measures ANOVA. As before, there was a main effect of arousal type,  $F(2, 438) = 223.58$ ,  $p = .000$ ,  $\eta^2 = .51$ , but no main effect of gender. However, after correcting for sphericity, the interaction of arousal type and gender was significant:  $F(2, 438) = 6.43$ ,  $p = .002$ ,  $\eta^2 = .029$ . This difference was due to males rating

low arousal statements as more arousing than females, (Males:  $M = 3.35$   $SD = 1.48$ ; Females:  $M = 2.84$   $SD = 1.45$ ), a difference that remained significant after the Bonferroni adjustment. The male–female mean differences for arousal–intermediate and arousal–high statements were not significant.

The low arousal statements consisted of sixteen neutral statements and four negative statements. None of the low arousal statements were positive. See Table III. The above analysis reveals that on average males rated the low arousal statements as more arousing than did females. To determine if there were gender differences in neutral low arousal statements, in negative low arousal statements, or in both, post hoc comparisons were conducted. These analyses revealed that males rated the neutral low arousal statements as more arousing than did females (Males:  $M = 3.40$ ; Females:  $M = 2.85$ ), a mean difference that was significant after the Bonferroni adjustment,  $t(219) = 2.31$ ,  $p = .022$ . Males also rated the negative low arousal statements as more arousing than did females (Males:  $M = 3.73$ ; Females:  $M = 3.10$ ), a difference that was also significant after the Bonferroni adjustment,  $t(219) = 2.40$ ,  $p = .017$ . Taken together, these results indicate that males rated low arousal statements as more arousing than did females, regardless of statement valence.

## DISCUSSION

These data augment the growing database of sentence stimuli for use in mood induction research. SAM ratings of some of the 84 Velten statements were not consistent with Velten's original valence designations. Those statements that failed to meet the cutoff criteria based on the SAM ratings should be used with caution when utilizing the list of statements provided here, because they may not reliably reflect valence and arousal experienced during mood induction. On the other hand, it is highly probable that any of the statements meeting the SAM ratings criteria (52 of the original 84) should induce mood as expected and will be valuable for future mood induction experiments. The strong reliability coefficients for the positive, neutral, and negative statement subsets support the validity of using the SAM to measure valence.

Whereas Velten's positive and negative statements are self-referent, the neutral statements are not, and usually lack relevance to mood (e.g. Statement #71, "Diamonds really can cut glass."). The choice of non–self-referent neutral statements as a control is thought to be useful in identifying contrasts in mood as produced by mood induction stimuli. The post hoc  $t$  tests revealed that the neutral statements are truly distinct from the positive and negative ones, an outcome that lends support for using neutral statements that are nonreferential in mood induction research. Additional studies using self-referent neutral statements (e.g. "I am feeling o.k.") as well as nonreferential statements could clarify this issue.

Somewhat surprising was that the average statement ratings reflect a range that is restricted compared to what was expected (Range = 2.50–6.97 SAM valence ratings and Range = 2.47–5.83 SAM arousal ratings, compared to the IAPS mean SAM ratings of 1.31–8.34 for valence, and 1.76–7.35 for arousal). This difference may be due to a scarcity of statements eliciting negative emotional experience of an extremely arousing nature, (i.e., “The man that murdered my wife deserves to die in the gas chamber.”) or to a scarcity of statements eliciting positive emotional experiences that are unarousing or even calming (i.e., “I feel at peace as I sit by the lake.”). Identifying statements that could elicit extreme emotional experiences has the potential to add methodologically to the study of mood induction.

The absence of high mean ratings for arousal and valence may have arisen because young adult participants are more accustomed to using verbal rather than visual indicators of affective states. Even though the use of the Self-Assessment Manikin when children are rating their affective states yields data that is more likely to have greater construct validity, adults may find this type of nonverbal method difficult or imprecise compared to the verbal methods that they are accustomed to. Clarifying the relationships between verbal and nonverbal methods of collecting affective data could yield findings of methodological import for the study of emotion.

Another important consideration is whether ratings of the Velten statements represent actual moods that participants experience or that participants infer what they *should* feel given the valence of mood induction to which they are assigned. This consideration also merits further investigation.

The significant quadratic correlation reflected the tendency for arousal to increase as valence increased. However, the curvilinear relationship depicted in Fig. 2 arises because the neutral statements are consistently rated as low in arousal. This finding is not unexpected, because neutral statements should elicit very low levels of arousal if any. Because most mood induction studies use neutral statements to clarify the nature or magnitude or both of experimentally induced changes in emotion, it may be useful to ignore the neutral statement data when conducting statistical analyses that require that the variables be linearly related. Furthermore, our findings suggests that valence and arousal are associated, rather than being independent dimensions, as is sometimes assumed (Lang, Greenwald, Bradley, & Hamm, 1993; Mehrabian & Russell, 1974; Osgood et al., 1957).

Even though males and females rated valence and arousal for positive and negative statements similarly, males rated low arousal statements as more arousing than did females. Males rated the sixteen low arousal/neutral valence statements as more arousing than did females. Males also rated the low arousal/negative valence statements as more arousing than did females but there were only four of these statements. This finding indicates that gender may be a factor in baseline measurements during mood induction. The absence of gender differences for positive statements in arousal ratings was unexpected. Other studies report that females

show greater concordance between judgments of valence and physiological measures of emotion (Lang et al., 1993; Schwartz, Brown, & Ahern, 1980) and that they experience greater depressive affect as compared to males (Cuthbertson, 1997; Nolen-Hoeksema, 1990).

This database of positive, negative, and neutral statement ratings addresses some of the methodological issues relevant to using verbal stimuli to induce moods. Development of additional verbal statements for use with the SAM has the potential to enable researchers to induce a wider range of emotion experimentally, using stimuli that are inexpensive and readily available. Reliable relationships between physiological indicators of valence and arousal have been obtained using visual stimuli (Lang et al., 1990, 1993). The ultimate test of verbal mood induction efficacy would be the observation that physiological measures of emotion are correlated with the moods induced using verbal statements like the ones used in this study. However, the affective components of verbal statements merit further investigation before using physiological measures to obtain information about the effects of verbal stimuli on emotion. In addition, investigating the effectiveness of mood-inducing statements could facilitate refinement of self-talk techniques for use with clinical populations in which modulation of affective states is desirable.

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