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# The Effects of Humor and Laughter on Induced Anxiety

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The Effects of Humor and Laughter on Induced Anxiety

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A Thesis

Presented to

The Faculty of the Department of Psychology

The College of William and Mary in Virginia

In Partial Fulfillment

Of the Requirements for the Degree of

Master of Arts

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by

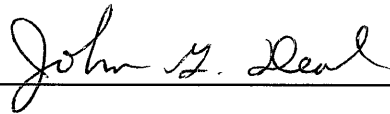
John G. Deal

1990

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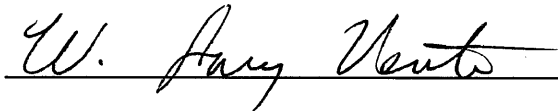
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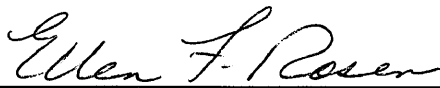
Approved, May 1990



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## DEDICATION

This thesis is dedicated to my parents, Jack and Jean Deal, without whose support and encouragement none of this would have been possible.

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## Abstract

Much of the previous research into the effects of humor and laughter on arousal has centered on humor's dual role in arousal reduction where humor is said to temporarily increase arousal during laughter, but induce net arousal reduction when laughter terminates (Bushnell and Scheff, 1979; White, Winzelberg, and Schultz, 1989). This study attempted to expand upon past findings by incorporating a continuous physiological measure of heart rate and the mood checklist Profile of Mood State (POMS; McNair, Lorr, & Droppleman, 1981) that measured the transient and net effects of humor and laughter on a mild induced state of anxiety. Sixty subjects had their arousal elevated utilizing imagery of public situations. Subsequently they viewed either a humorous or a non-humorous videotape related to public speaking situations. Technical complications with the heart rate apparatus caused this data to be invalid. Results from analyses of covariance on the POMS change scores showed that subjects exposed to the humorous videotape had significantly reduced scores on Total Mood Disturbance, Fatigue, and Confusion subscales, and elevated scores of the Vigor subscale on the POMS relative to those subjects exposed to the no-humor videotape. Locus of control was found to have no effect on subjects' perception of humor nor arousal reduction.



THE EFFECTS OF HUMOR AND LAUGHTER ON INDUCED ANXIETY

## Introduction

In the discipline of humor research there are a number of conceptual models which attempt to explain humor generation and appreciation. Examples of such conceptualizations are Superiority humor and Incongruity humor (Lefcourt & Martin, 1987).

Superiority humor, or disparagement humor, occurs when we mock, insult, laugh and generally derive pleasure from our feeling of superiority over those we feel are not on our level of stature. We generally gain a great sense of pleasure from the disparagement of others and, on occasion, ourselves (Keith-Spiegel, 1972).

Incongruity humor, on the other hand, involves the sudden and surprising shifts in cognitive processing of information (Keith-Spiegel, 1972). Koestler (1964) postulated humor as the result of the creation of bisociations, which he termed as the perception of an event in two normally incompatible contexts. These bisociations can be verbal, such as the phrase 'a dental chair is an elevator' used by dentists to create humor for children (Nevo & Shapira, 1988). These bisociations can also be looked upon as situations where contradictory emotions of playfulness and alarm are experienced such as tickling, a Jack-in-the-box toy, and roller coasters (Holland, 1982). Functionally, a joke catches the mind by surprise, startling

the individual into a sense of pleasure, and taking them away from the expected order of events that the mind endures routinely (Holland, 1982).

Dixon (1980) suggested that the left and right hemispheres of the brain work together to process the response to humor. However, though they work together, the right brain is postulated to be more important in understanding the nature of the joke due to its predisposition to primary process thinking related to humor and dominance in the manipulation of emotional responses to outside sources. This can be further explained by understanding that the left hemisphere of the brain is considered to be involved in the joke set-up due to its analytical and relational processing orientation. The right hemisphere, on the other hand, is crucial to understanding the punchline of the joke in that its function is simultaneous or holistic processing which brings together the set-up context and disparate context of the punchline into a humorous, unified whole (McGhee, 1983).

A conceptual theory of humor relevant to this study is the arousal theory of humor which comes about as a result of the function of the previous theories. The basic tenet of this theory is that humor has inherent physiological and psychological qualities that aid in anxiety/arousal reduction. Freud viewed humor, such as aggressive and sexual jokes, as a positive defense mechanism functioning to

release inhibitions of these contexts which would have otherwise been repressed and eventually damaging (Kuhlman, 1985).

Berlyne (1972), however, did not view laughter as a cathartic release of tension, but as an inverted-U relationship between physiological arousal and pleasure. He proposed the arousal boost/arousal jag theories of arousal. The arousal boost occurs during the joke set-up, increasing an individual's arousal to a pleasurable level, whereupon the arousal jag takes over just as the arousal is getting uncomfortable. Functionally, the arousal jag is triggered when the punchline is given. This resolution lowers the tension/arousal associated with the set-up of the joke. Laughter is postulated to be a result of the combined arousal boost and arousal jag (Lefcourt & Martin, 1987). Though there has been much support for the arousal boost (Levi, 1965; Averill, 1969; Godkewitsch, 1976; Bushnell & Scheff, 1979; Scheff, 1979; Aeillo, Thompson, & Brodzinsky, 1983) there has not been much supporting research for the arousal jag (Lefcourt & Martin, 1987).

Physiologically laughter is seen as a reflexive emotional phenomenon which causes quick and sudden contractions of the diaphragm and larynx, and a muscular reaction of spasmodic contractions (Holland, 1982). Fry (1982b) has claimed relationships between the amount of laughter and cardiac response. He explains that during

exposure, heart rate increases, but after termination of the stimulus the HR decreases below the setpoint. He reasoned that this occurs because the punchline of the joke brings about a resolution effect.

The relationship between arousal levels and humor has been studied in which physiological mechanisms such as heart rate, skin temperature, and skin conductance were measured to indicate levels of arousal induced by humor and subsequent laughter. Averill (1969) exposed subjects to humorous and sad films while monitoring autonomic nervous system activity. He found an increase in heart rate and respiration by the subjects in the humorous condition over the sad condition. Langevin and Day (1972) and Godkewitsch (1976) demonstrated that the rated funniness of a humorous stimulus is positively correlated with amount of arousal induced as measured by the physiological indices of heart rate and skin conductance. Levi (1965) also found a relationship between humor and physiological variables in which subjects viewing aggressive and humorous films developed an increase in adrenalin/noradrenalin ratios. He theorized that there is a positive relationship between emotional arousal and change in adrenalin and hormone levels. And so it can be seen from these studies that humor has a positive relationship to arousal: the greater the funniness, the more arousal there is (Godkewitsch, 1976).

However, there are a number of studies in which humor

does not increase arousal and mood, but decreases it (Baron & Ball, 1974; Baron, 1978; Prerost, 1983, 1987). In these studies an induced aggressive mood of subjects was alleviated by exposure to a humor stimulus. However the arousal measurements were self-report mood scales as opposed to objective physiological measures (Prerost, 1987).

In attempting to explain the apparent paradox, hypothesized by Scheff (1979), that laughter and physiological measures indicate arousal while mood adjective checklists indicate relaxation, Bushnell and Scheff (1979) postulated that both conditions exist, but they are two different characteristics of the same phenomenon. The physiological correlates measure the momentary arousal after each laugh, while the mood checklists measure the overall net effect after the humorous stimulus is terminated. In their view while laughter occurs during a joke the arousal an individual experiences rises above baseline levels. However, after the laughter ends the internal physiological mechanisms rebound and overshoot past the baseline to a lower level. This trend continues during the humorous session summing the arousal valleys along the way, until in the end, a net decrease in arousal is obtained which accounts for the experienced relaxation. Bushnell and Scheff suggested that if physiological mechanisms were measured for an extended length of time after cessation of laughter then they too would show a net decrease in arousal

as indicated by self reports of mood. They then tested these hypotheses by combining both physiological correlates and mood adjective checklists to monitor arousal. As a result of exposure to humorous films, subjects' laughter momentarily increased heart rate during that time, but net effect was a reduction in heart rate levels. In addition there was a significant change in mood scores between the treatment and control groups, and also significant correlations between the mood checklist and frequency and intensity of laughter. However, their study contained several methodological flaws which hinder their conclusions. These include such things as using their own mood questionnaire instead of a tested checklist, and having each subject measure their own heart rate intermittently by taking a pulse reading from the wrist (Bushnell & Scheff, 1979).

In a recent experiment, White, Winzelberg, and Schultz (1989) attempted to build on these results by monitoring skin temperature continuously and heart rate intermittently. In another important addition to the methodology the researchers induced a mild state of anxiety in the subjects by means of a ten minute arithmetic task. This inducement of a mild anxiety ensured that there would be some arousal within the subject to be reduced by the humor. They found that humor did reduce anxiety as measured by a mood adjective checklist, but did not reduce arousal using the

physiological measures of heart rate and skin temperature. This can be explained partly by looking at the method of heart rate monitoring used. Similar to Bushnell and Scheff (1979), White et al. (1989) measured heart rate activity via wrist pulse intermittently throughout the experimental session. This can be an inconsistent, or even faulty measure due to the lack of sensitivity of wrist pulse measures and also to inconsistent readings by the experimenter over a number of trials. Additionally even though subjects knew the wrist pulse would be taken intermittently (though not the precise time), the actual event of taking the wrist pulse could conceivably affect its validity and reliability. Clearly continuous monitoring of heart rate using an objective mechanism, such as a polygraph could alleviate these measuring problems.

In this study the effects of humor induced laughter on arousal and subsequent mood states was examined. In this experiment, as in Bushnell and Scheff (1979) and White et al. (1989) a subjective measure and a physiological measure were obtained to indicate arousal levels. The differences were the use of the established Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1981) mood adjective checklist as the psychological measure and the use of a polygraph to continuously monitor a subject's heart rate as the objective physiological measure.

Additionally a mild state of anxiety was experimentally



induced in the subject. As previously stated this is needed to create a mood state upon which the humor and laughter can induce an effect of arousal reduction. White et al. (1989) induced anxiety into their subject by means of an arithmetic test. In this study anxiety was operationally defined as an increase in HR or an elevation of total mood disturbance scores on the POMS mood questionnaire. Imagery of speaking situations (for subjects who have a fear of speaking in public) was used to induce the anxiety to be relieved in this experiment. The questionnaire used to categorize those who fear public speaking has been used previously by Beatty (1988) and consists of six Likert-type response items. These items are 1) " I have no fear of giving a speech," 2) "Certain parts of my body feel tense and rigid while giving a speech," 3) "I feel very relaxed while giving a speech," 4) "My thoughts become confused and jumbled when I am giving a speech," 5) "I face the prospect of giving a speech with confidence," and 6) "While giving a speech I get so nervous I forget facts I really know."

The central hypothesis investigated in this study was that the continuous monitoring of heart rate (HR) by the polygraph would display patterns of physiological arousal during laughter, but patterns of relaxation after the laughter has subsided. It is suggested that the net effect of these patterns is an overall net reduction in arousal following the completion of the humorous stimulus. The POMS

mood checklist and the heart rate measure were hypothesized to display an increase in arousal/anxiety after the use of imagery and before the humorous stimulus was presented. The post humor film POMS and heart rate measures were expected to show a reduction in the induced arousal from the pre film imagery. It was also postulated that at 5 minutes and 10 minutes post humor stimulus, the POMS and HR would reveal even further reductions in arousal state.

This study also examined the differential effects of relevant humor arousal/anxiety reduction. Most of the research concerning the contextual salience of humor comes from Baron and Ball (1974), Kuhlman (1985), Mueller and Donnerstein (1977), Baron (1978), Prerost (1983, 1987; Prerost & Brewer, 1977). As alluded to above these studies incorporated differing types of aggressive humor to reduce the effects of experimentally induced anger. However, the results of these studies have been inconsistent. A number of experiments have found that non-aggressive neutral humor can be effective in reducing aggression (Baron & Ball, 1974; Baron, 1978; Mueller & Donnerstein, 1977), while others have found non-aggressive neutral humor to be of no consequence in aggression reduction (e.g. Prerost & Brewer, 1977). Prerost (1983) suggested that an individual's cognitive style could account for the previous contradictory results since prior studies did not manipulate a cognitive variable such as locus of control. Indeed in recent studies it has

locus of control. Indeed in recent studies it has been demonstrated that aggressive humor mediates the effects of induced aggression, but only if the subject had an internal locus of control (Prerost, 1983 & 1987).

In relation to this point it has been shown previously that internals are able to generate humor during difficult events better than externals (Lefcourt, Antrobus, & Hogg, 1974a) and also to appreciate humor more during frustrating events (Lefcourt, Sordoni, & Sordoni, 1974b). Prerost indicated that due to their cognitive disposition internals were able to engage in cognitive processes in an effort to utilize relevant aggressive humor in a cathartic manner (1983, 1987). Lefcourt Sordoni, and Sordoni (1974) suggested that internals' cognitive style enables them to appreciate and exhibit humor more efficiently than externals because they can mentally process the diverse elements of an event and subsequently distance themselves from the situation. These are processes which are required to enjoy and generate humor.

In the present study the issue of relevant humor effects were examined by exposing the subject to humor with content related to the type of stress induced. Following the lead of Prerost, locus of control was also included in the design. The hypothesis was that those subjects in the humor condition (relevant humor) who were classified as internals by Rotter's locus of control scale (1966) would

have more of their induced anxiety relieved than externals in the same condition. Another hypothesis was that the humor condition subjects would experience more reduction of anxiety than those in the control condition.

In addition to extending the results of the previous relevant/neutral studies by applying them to anxiety reduction of a non-aggressive nature this experiment added heart rate as a physiological measure of arousal; amount of laughter, and also subjective measures of humor enjoyment in the design. In the previous experiments the extent of arousal reduction was indicated by subjective mood adjective checklists alone. The inclusion of a heart rate measure and laughter measure helps to not only solidify the measures of arousal and mood, but also provides some information as to what mechanisms are involved in the hypothesized reduction in anxiety. If, as Prerost (1983) has suggested, the actual laughter and perceived enjoyment of humor has a minimal effect on mood reduction then the subjects should have similar laughing and enjoyment patterns, but should have differentiated mood reduction based on locus of control manifestations and relevance of humor. However, it is suggested here that in addition to cognitive style and salience of humor, laughter and enjoyment patterns have a definite effect on mood reduction. It has previously been shown that the laughter an individual exhibits creates a net physiological relaxation of the sympathetic nervous system

which, in turn, creates states of arousal reduction (Bushnell & Scheff, 1979; White, et al., 1989). Because laughter results from the cognitive style in which Lefcourt, Sordoni, and Sordoni (1974b) suggest that internals are superior the predictions of their superiority in arousal reduction continue because the internal subject should ascertain the punchline of the jokes quicker and laugh if it is amusing to them. The difference is the emphasis placed on laughter; its resultant physiological effect has been elevated from that of prior research.

Another point alluded to above is that if the individual does not find the humor funny then there is not going to be any reduction of arousal with respect to any kind of cognitive style. If there is no laughter then that is an indication that, either there is no cognitive understanding of the humor occurring by the subject, or the subject simply did not find the humor amusing. These events would severely curtail the amount of anxiety reduction because both cognitive and physiological systems are needed to work together. Without the cognitive operations there would be no laughter and without the laughter, which does not always occur, there would be no physiological relaxation.

In summing up, the central hypotheses for this study include reduction in the induced arousal significantly greater for subjects in the humorous condition than the non-

humorous condition as measured by HR and the POMS. Additionally it is hypothesized that there is more arousal reduction for subjects classified as internals than externals and that the pattern and amount of laughter has a positive correlation with amount of arousal reduction.

## Method

### Subjects

Subjects were 60 Introductory Psychology students from the College of William and Mary in Virginia. They were pre-selected on the basis of a criterion of having a fear of speaking in public. The general criterion for categorization as having a fear of speaking in public was a score of 24 or higher (out of possible 30) on the PRCA public speaking questionnaire (Beatty, 1988). The global mean score on the PRCA was 26.94 for all subjects. The scores for the humor and no-humor groups were equivalent with means of 27.00 and 26.89 respectively. There were 32 females and 28 males who participated in this study. Subjects received course credit for their participation.

### Materials

Heart rate (HR) was continuously monitored by a Grass Model 7 polygraph machine utilizing a finger probe. Data from the polygraph was automatically transferred to an IBM PC computer system and analyzed. The videotapes used in the experiment were either a relevant humorous videotape of 3 stand-up comics (Billy Crystal, Bill Cosby, and Robin Williams) or non-humorous control videotape of a lecture on Gandhi. Self report measures included the Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1981) and Rotter's Locus of Control Scale (LC; Rotter, 1966).

### Procedure

Subjects first filled out a consent form, were made comfortable and were then informed that the nature of the experiment was "to examine the effects of speech making on physiological processes of an individual." The experimenter subsequently acquainted the subject with the physiological measuring apparatus explaining that the polygraph was there to merely monitor the subject's HR and nothing else. Thus subject concern and anxiety toward the equipment was minimized. After the HR finger probe was attached to the subject they sat quietly for five minutes in order to obtain a stable baseline HR. The subject's HR would then be monitored throughout the duration of the experiment. Following this the experimenter attempted to elevate the subject's arousal/anxiety via the imagery. Subjects described an anxiety provoking speaking situation that they may have had happen to them recently. The experimenter then had the subject close his/her eyes and imagine the situation described to them by the experimenter. Following this the experimenter had the subject imagine another speaking situation (designed by the experimenter) that was described to them. After completion of this imagery period the subject completed the first POMS questionnaire (designated as the pre POMS score). Following the completion of the POMS the subject imagined the last speaking situation that was described to them. Following the last imagery session the subjects viewed either the humorous or non-



humorous/control videotape. The subject was instructed to "project yourself into the situation occurring in the videotape." The videotape lasted approximately 15 minutes. The subject was viewed through a two-way mirror and patterns and duration of laughter were monitored during the videotape. On twenty subjects an external rater was brought in to monitor the laughter in order to gain a measure of interrater reliability. Laughter is defined as the subject's non-verbal vocalization similar to a repeated "Ha-Ha" variety. Following completion of the humor stimulus heart rate was monitored continuously for 10 minutes after the videotape had finished and measures taken at 5 minutes (POST1HR) and 10 minutes (POST2HR) to ensure full measure of the net physiological reaction and also to monitor the hypothesized decrease in HR over that period of time. One more POMS questionnaire was given at five (post1 POMS) after cessation of the humorous stimulus. Finally the subject rated the funniness of each of the three clips on the videotape and the overall funniness of the videotape on a 7-point scale with 1 being 'not at all funny' and 7 'being extremely funny'. The subjects also indicated previous viewing of the videotape vignettes.

## Results

To test the significance of the hypothesized change in heart rate and psychological mood state between relevant humor conditions and locus of control, a 2x2 Analysis of Covariance (ANCOVA), containing two levels of locus of control (external and internal) and two levels of humorous stimuli (humor and no humor), with the pre-score as the covariate was calculated. The specific dependent measures analyzed include change scores of the Tension/Anxiety, Depression, Hostility/Anger, Confusion, Fatigue, Vigor, and the Total Mood Disturbance (TMD) scales, where each pre measure of these variables taken after the viewing of the videotape is subtracted from the post measure, taken in the midst of the imagery sessions (before the videotape presentation). A negative change score indicates a decrease in the negative mood variables which translates to an increase in mood or a decrease in anxiety. A positive change score indicates an increase in Vigor from pre to post measures which denotes an increase in mood. In the case of the heart rate data, a technological complication in the monitoring apparatus caused this data to be invalid and so will not be considered in the analysis.

The laughter that occurred was rated by the experimenter for each subject and by a second rater for twenty subjects. The laughter was scored in 30 second intervals. A Pearson Correlation Coefficient was calculated

to test the interrater reliability. The Pearson test revealed an extremely significant correlation between the experimenter and the external rater with an outcome of  $r(20) = .9853, p < .000$ .

The pre to post change score for each POMS measure served as the dependent variable while the pre score of each variable acted as the covariate. The TMD change score for the Profile of Mood States (POMS) analyzed by an ANCOVA yielded a significant value of  $F(1,55) = 10.177, p < .05$  for subjects in the HUMOR condition. The means of the humor (mean=35.57) and no-humor (mean=14.27) groups indicate that the humor group decreased its TMD score significantly more than the no-humor group. However there was no significance for the LC condition,  $F(1,55) = 1.83, p > .05$ ; nor for the interaction effect,  $F(1,55) = .344, p > .05$ . The POMS was also tested along each of its six subscales (Tension/Anxiety, Depression, Fatigue, Confusion, Hostility/Anger, and Vigor). Of these six subscales the Tension/Anxiety subscale change scores were not significant with values of  $F(1,55) = 3.603, p > .05$  (by HUMOR);  $F(1,55) = .175, p > .05$  (by LC);  $F(1,55) = .237, p > .05$  (interaction). Likewise the Hostility/Anger subscale change score tested non-significant with calculations of  $F(1,55) = 2.21, p > .05$  (by HUMOR);  $F(1,55) = 1.41, p > .05$  (by LC);  $F(1,55) = .018, p > .05$  (interaction). Significant results were obtained with respect to the HUMOR effect for the

Fatigue subscale,  $F(1,55) = 12.86, p < .001$ ; the Confusion subscale,  $F(1,55) = 12.223, p < .001$ ; and the Vigor subscale,  $F(1,55) = 32.216, p < .000$ . However there were no significant results found in the remaining subscales on either the LC nor interaction effects. The one exception to this was on the Depression subscale which was significant with respect to LC with a result  $F(1,55) = 6.493, p < .015$ . Cell means for the pre and post scores of the POMS variables analyzed for the humor and no-humor condition can be seen in Table 1.

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 Insert Table 1 about here  
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ANCOVAS conducted on the POMS change scores for males and females revealed similarities and differences between the two groups. Both males and females had significant differences on the Vigor subscale with respect to the HUMOR condition with values of  $F(1,23) = 11.74, p < .002$  (males) and  $F(1,27) = 24.68, p < .001$  (females). In comparisons of subjects in the HUMOR condition females displayed differences on the Fatigue subscale,  $F(1,27) = 11.89, p < .002$ ; the Confusion subscale,  $F(1,27) = 22.41, p < .001$ , and the TMD scale,  $F(1,27) = 8.94, p < .010$ . Conversely males did not show differences in the Fatigue subscale,  $F(1,23) = 4.829, = p > .05$ ; Confusion subscale,  $F(1,23) = 2.88, p > .05$ , nor the TMD scale,  $F(1,23) = 3.99, p > .05$ . There were no

4.829, =  $p > .05$ ; Confusion subscale,  $F(1,23) = 2.88$ ,  $p > .05$ , nor the TMD scale,  $F(1,23) = 3.99$ ,  $p > .05$ . There were no significant differences for gender on locus of control or interaction effects, or on the other POMS subscales.

Pearson Product Moment Correlations between amount of laughter (TOTL), time of laughter, locus of control scores (LC), and POMS change scores, and whether or not the subject had seen parts of the videotape before (BEFORE) were also analyzed. The total amount of laughter was calculated by whether or not the subject laughed during each of the 30 intervals (15m) of the videotape presentation. This would mean an individual that laughed during no interval would have a TOTL score of 0.00, while an individual who laughed during each interval would have a TOTL score of 30. The mean TOTL for the no-humor group was 0.00, with a SD of 0.00; while the mean TOTL for the humor group was 8.06, with a SD of 7.78. There was a significant correlation between total amount of laughter (TOTL) versus the overall funniness rating of the videotape and TOTL versus Before with results of  $r(60) = .5417$ ,  $p < .000$  and  $r(60) = .5397$ ,  $p < .000$  respectively. Additionally there was a significant correlation between the funniness rating/Before with a result of  $r(60) = .7044$ ,  $p < .000$ . When focussing on the humor condition group, however, the significant correlations diminish. The TOTL/Before correlation yielded  $r(30) = .1387$ ,  $p > .05$ ; the Before/funniness result was  $r(30) = .1387$ ,  $p$

>.05; and the TOTL/funniness rating analysis revealed  $r(30) = .0870$ ,  $p >.05$ . Separating out the LC and Gend effects from the overall effects, significant results similar to the overall comparisons appear which can be seen in Tables 2 and 3.

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Insert Tables 2 and 3 about here  
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In the global comparisons there were significant correlations between the TOTL and POMS change scores which can be seen in Table 4.

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Insert Table 4 about here  
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Partial Correlations using the TOTL, funniness ratings, and significant POMS scores of TMD, Vigor, Confusion, and Fatigue were conducted to determine the contributions of laughter and rated funniness to these POMS change scores. The partial correlation analysis conducted on the TOTL versus POMS change scores while controlling for rated funniness revealed no significant relationships between the amount of laughter and the POMS variables. Conversely the analysis conducted on the funniness rating versus the POMS change scores yielded significant correlations between funniness/TMD and funniness/Vigor with results of  $r(58) = -.4340$ ,  $p <.001$  and  $r(58) = .6155$ ,  $p <.001$ , respectively.

Similarly there were significant correlations between the funniness/Fatigue,  $r(58) = -.5039$ ,  $p < .001$ ; and funniness/Confusion,  $r(58) = -.3817$ ,  $p < .001$ .

T-tests were used to test differences between subgroups on total amount of laughter. These tests revealed significant differences between laughter exhibited by subjects in the humor and no-humor group;  $t(58) = 5.68$ ,  $p < .000$ . In addition there were also significant differences as to the ratings the humor and no-humor groups gave to the funniness of the videotape;  $t(58) = 13.14$ ,  $p < .000$ . T-tests were also conducted on the change scores for subjects in the LC and GEND groups. There were no significant differences in the TOTL exhibited by externals and internals,  $t(58) = 1.26$ ,  $p > .05$ . In addition there were no significant differences for subjects with differing locus of controls,  $t(58) = .47$ ,  $p > .05$ , in the funniness rating of the videotape; or in the amount of laughter exhibited,  $t(58) = 1.26$ ,  $p > .05$ . Similar non-significant results were found in tests of gender differences in TOTL,  $t(58) = -1.14$ ,  $p > .05$ ; and funniness rating,  $t(58) = .44$ ,  $p > .05$ .

## Discussion

In this study the principle hypothesis of a reduction of induced anxiety or arousal was partially supported. There were significant positive effects on psychological arousal or mood as indicated by the reduction of the total mood disturbance (TMD) score of the POMS questionnaire. As revealed by the analysis the TMD score substantially decreased more for subjects in the humor group than for those in the no-humor group. In addition there were significant differences in the Fatigue and Confusion subscales in the humor/no-humor comparison. A substantial positive effect was also found in the pre to post Vigor scores which significantly increased more in the humor condition than in the no-humor conditions. However even for the remaining subscales of Tension/Anxiety, Depression, and Hostility/Anger the change scores decreased more for subjects in the humor group than in the no-humor group (as seen in Table 1). Though these differences were not significant they did occur in the hypothesized direction. It would appear that the great increase in Vigor and corresponding decrease in Fatigue accounted for most of the overall TMD decrease. This explanation corresponds to the hypothesis that laughter can be an arousing agent which increases respiration, circulation, and muscular activity (Averill, 1969; Langevin & Day, 1972; Holland, 1982).

Because of the non-validity of the heart rate data no



discussion of its effects in this experiment is warranted.

Generally these results mirror those from White, et al. (1989) in that the subjects' arousal/anxiety was reduced as measured by the mood questionnaires. The subjects in the humor/no-humor group differed significantly in the amount of laughter exhibited as revealed by the T-test analysis. Means of 8.0667 (SD=7.78) for TOTL in the humor group compared with 0.00 (SD=0.00) for the no-humor group was supportive of the hypothesis that subjects would laugh more if they viewed the humorous videotape than if they viewed the non-humorous control videotape. Corresponding to this was the difference in rated funniness of the two videotapes. Again the expected higher funniness rating of the humorous videotape was obtained. Thus the experimental manipulation in which the humorous tape was designed to be rated as much funnier and evoke more laughter than the control videotape was successful. Similarly the significant global correlation between the TOTL and the funniness rating of the videotape for both groups went as predicted. However, when conducting this correlation of TOTL versus the rated funniness for the humor/no-humor groups the significance dissipated. This would indicate that the significance occurred, in large part, to the no-laugh/low rated funniness effect of the control videotape. In looking at the means of the TOTL and rated funniness for the humor group it is evident that although they found the videotape humorous

(mean=5.03, out of 7.00) it did not elicit a correspondingly high amount of laughter from the subject (mean=8.06, out of 30.00). This dearth of laughter could be seen as the reason for no significant differences in the change scores of the other POMS subscales such as Tension/Anxiety, Hostility/Anger, and Depression. As White, et al. (1989) point out this is a common hurdle in previous humor research. There seems to be a definite discrepancy in how funny a subject thinks the stimulus is and the amount of laughter engendered. In most humor studies problems of accuracy in measuring physiological responses and eliciting amounts of laughter correlating to the rated funniness of the stimulus are commonplace. Though problems can occur utilizing complex physiological mechanisms; objective, continuous monitoring of autonomic responses are required in that the actual act of measuring heart rate level, especially by the experimenter or subject, can be altered by the actual execution of taking the measure. Similarly the inherent difficulty of obtaining ample laughter amounts is related to the heart rate measuring problem discussed above in which the artificiality of the experimental situation can detrimentally affect the results. Just as the act of measuring the pulse can disrupt the rhythm of the heart rate in the experiment, the often sterile nature of the laboratory can impede the generation of laughter in the subject. The act of making someone laugh can be an elusive

and inconsistent occurrence outside of the laboratory situation and these qualities of laughter are magnified in the experimental situation. Since humor seems to be social in nature White, et al. (1989) even tested the effects of groups size in generation of laughter and anxiety reduction. However, they found no differences in laughter results for subjects tested alone or in groups. This underscores the difficulty in eliciting laughter and humor effects from subjects in the experimental situation. Additionally subjects in the experiment may not think they are supposed to laugh and so do not in an attempt to aid the experimenter or possibly give inflated ratings of funniness for similar reasons.

The results of the partial correlation analyses indicate, however, that laughter may not be all that important a factor. When controlling for rated funniness of the videotape, the significant global correlations of TOTL and the Fatigue, Confusion, Vigor, and TMD change scores (seen in Table 4) were removed. However when controlling for the total amount of laughter the correlations between the funniness rating and the POMS scores remained significantly high. This would suggest that the subject's rating of the videotape was more responsible for arousal effects than amount of laughter involved. This leads to another point with respect to laughter, which is that the amount individuals presumably laugh outside the laboratory

could be overstated. It is a possibility that individuals just do not laugh as much as we would presume. The seemingly meager laughter amounts obtained by many humor studies may not be reduced by the laboratory situation at all, but a true indication of how much, or how little, we laugh.

The manipulation check for interrater reliability in the rating of amount and time of laughter for twenty subjects between the experimenter rater and the external rater was exceptionally high. This assures that the laughter ratings made by the experimenter on the subsequent trials were valid and reliable.

Gender effects were also interesting. In this study females showed much greater change in the elevation of Vigor than males. In addition the females had significant differences on the Fatigue, Confusion, and TMD scales but the males did not. The measures also indicate that female subjects' scores were largely responsible for the global differences displayed in the results found with respect to the POMS measures.

Though the heart rate results were not analyzable it does not take away from the fact that Bushnell and Scheff's (1979) model concerning the rise and fall of heart rate as corresponding with laughter needs to be studied further. Another possible explanation for the paradox of physiological arousal/psychological relaxation could be that

both the psychological mood and physiological arousal increase in response to humor/laughter. With respect to psychological relaxation, this effect could come as a result of an increase in Vigor/decrease in Fatigue which makes the overall mood better. This corresponds to the results of this study where the elevation of Vigor provided the impetus for the total mood disturbance scores to decrease. In regard to physiological arousal increase, support comes from the research of White, et al (1989) where arousal in the post intervals (5m and 10m) was elevated over the baseline arousal. At the same time, however, the subjects' scores on the mood questionnaire decreased from the baseline measures. Perhaps the physiological arousal is seen as non-threatening by the subject due to the nature of its source (Lazarus, 1977) and so serves to rejuvenate the individual.

Hypotheses for the locus of control effects were generally found to be not supported by significant effects. As mentioned previously, except for the Depression subscale there were no significant results for either the locus of control main effect or interaction effect of LC with humor/no-humor condition. Though the analyses showed no significant differences in how internals and externals responded, if cell means (5.13, 2.93 respectively) for TOTL are examined it can be seen that the internals did, in fact, laugh more than the externals as hypothesized; though not significantly. Cell means (see Table 2) for internals and

externals follow the global results with significant correlations between variables TOTL, RAT, and BEFORE. Overall significant support for the hypotheses for differences in the effect locus of control would have on appreciation of humor and utilization of humor to reduce arousal/anxiety was not found. The same lack of sufficient amounts of laughter which possibly hindered the humor/no-humor condition effects could also account for no differences in the locus of control variable effects with respect to the POMS measures. Another reason for the non-significance is that this study deviated from the prior research of locus of control and humor, which possibly detracted from the variable's effects. In the previous research on LC, frustrating events (Lefcourt, Sordoni, & Sordoni, 1974b) and aggressive humor (Prerost, 1983; 1987) were incorporated into the designs. The imagery of speaking in public, though designed to be anxiety provoking, could not be termed as frustrating. In addition the humorous videotape used was relevant to speaking in public (it was a tape of standup comics), but of a slightly indirect nature. Possibly the humor utilized should have more direct and obvious relevance to the behavior involved. In the situation of looking at aggressive behavior, the relevant aggressive humor used to neutralize would seem to be inherently direct (e.g. Bugs Bunny cartoons) in nature. Furthermore the nature of the Prerost's aggressive behavior

and the speech anxiety behavior incorporated here could be qualitatively different and so not really comparable. In sum, perhaps only aggressive behavior/aggressive humor research can obtain results similar to the Prerost studies.

Due to the lack of significance of the locus of control effects and the invalid heart rate data discussed above, the hypothesized results were only partially supported.

However, the decrease in total mood disturbance is at least partially consist with the cathartic effect of humor/laughter in the reduction of anxiety. The mechanisms involved, whether along the Bushnell and Scheff model or some other model, remain to be discovered and subsequently replicated. These research obstacles must be overcome with innovative research designs that can hopefully secure accurate physiological responses and, even more crucial, evoke sufficient laughter from the subject to obtain valid results.

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Table 1

Pre and Post Cell Means for Humor and No-Humor Conditions


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<u>Humor Group</u>		
<u>VARIABLE</u>	<u>PRE</u>	<u>POST</u>
Tension/Anxiety	14.166	6.500
Depression	13.133	5.366
Hostility/Anger	8.8667	3.200
Fatigue	11.400	5.966
Confusion	11.566	6.066
Vigor	8.8333	15.867
TMD	70.367	32.800

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<u>No-Humor Group</u>		
<u>Variable</u>	<u>Pre</u>	<u>Post</u>
Tension/Anxiety	14.266	8.9333
Depression	13.333	7.0667
Hostility/Anger	7.7000	5.1667
Fatigue	10.567	10.367
Confusion	11.167	9.6000
Vigor	9.7667	7.9667
TMD	66.867	52.600

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Table 2

Cell Correlations and Means for Locus of Control on Total Amount of Laughter (TOTL), Rating of Funniness (RAT), and Prior Viewing of Videotape (BEFORE)

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Correlations

	TOTL-RAT	TOTL-BEFORE	RAT-BEFORE
Internals	.52*	.58*	.71*
Externals	.66*	.53*	.69*

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Means

	TOTL	RAT	BEFORE
Internals	5.13	3.50	.40
Externals	2.93	3.26	.36

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\*p<.001

Table 3

Cell Correlations and Means for Gender on Amount of Laughter (TOTL), Rating of Funniness (RAT), and Prior Viewing of Videotape (BEFORE)

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Correlations

	TOTL-RAT	TOTL-BEFORE	RAT-BEFORE
Males	.58*	.33**	.59*
Females	.57*	.68*	.80*

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Means

	TOTL	RAT	BEFORE
Males	2.96	3.50	.39
Females	4.96	3.28	.37

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\* $p < .001$ , \*\* $p < .05$

Table 4

Global correlations of TOTL and RAT versus POMS change scores

<u>Change Scores</u>	TOTL	RAT
TENSION/ANXIETY	-.09	-.29**
FATIGUE	-.26**	-.55***
CONFUSION	-.41***	-.51***
HOSTILITY/ANGER	-.19	-.22*
DEPRESSION	-.13	-.27**
VIGOR	.28**	.65***
TMD	-.28**	-.50***

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\* $p < .05$ , \*\* $p < .02$ , \*\*\* $p < .001$

## VITA

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The author was born in Richmond, Virginia on October 13, 1965. He received his B.A. in Psychology from the University of Richmond, Virginia in May, 1988. He served as an undergraduate research assistant to Frederick Kozub, Ph.D. from Jan. 1987 to May 1988. During this time the author worked on a research project entitled "Dietary Induced Weight Gain and Recovery of Body Weight in Mongolian Gerbils" and also acted as a coordinator of the "Operant Packages for the Neuroscience" computerized operant conditioning laboratory installed at the University. In addition the author acted as a research assistant from May, 1987 to Sept., 1987 under the advisement of Michael Wogalter, Ph.D. on a project entitled "Eyewitness Identification: Composite Construction on Subsequent Recognition Performance." As an M. A. candidate at the College of William and Mary the author completed his first-year project entitled "The Effects of Humor Induced Laughter on Mood States" as well as the current thesis.