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Richard A. Dienstbier

University of Nebraska-Lincoln, rdienstbier2@unl.edu

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# Attraction Increases and Decreases as a Function of Emotion-Attribution and Appropriate Social Cues<sup>1</sup>

Richard A. Dienstbier<sup>2</sup>

*University of Nebraska-Lincoln*

*To study the impact of startle-induced arousal on attraction, blindfolded subjects in a "vestibular function" study were startled by a loud noise accompanying the sudden backward tilt of the dental chair in which they were seated. In Study I startled male subjects indicated (on a "postexperimental" questionnaire) greater attraction toward a pretty female experimenter than did control subjects. Study II demonstrated the reverse, with startled male subjects disliking a male experimenter more than controls. In Study III, female subjects startled by a male experimenter indicated greater attraction than controls, although the pattern of their responses differed from males. While an attempt to induce misattribution of arousal to a (placebo) pill (Study IV) or to a noise (Study V) with "arousal" side effects resulted in negligible attenuation effects on the startle-attraction relationship, in Study VI the imposition of a delay period between startle and experimenter ratings resulted in reduced ratings of attraction. The role of arousal in romantic attraction is briefly discussed, and the relevance of these data to theories of emotion is considered.*

During the past decade increasing acceptance has been accorded the hypothesis that under proper circumstances undifferentiated arousal facilitates attraction toward an appealing opposite-sexed other (e.g., Berscheid & Walster, 1969). This hypothesis was stimulated initially by the work of Schachter and

<sup>1</sup>This research was supported by a grant from the Research Council of the University of Nebraska-Lincoln. The author wishes to thank Virginia Broady, Steve Slane, Nancy Kahn, Kathy Orr, and Cindy Smith, who acted as the researchers for Studies I, II and III, IV, V, and VI, respectively.

<sup>2</sup>Address all correspondence to Richard A. Dienstbier, Psychology Department, University of Nebraska-Lincoln, Lincoln, Nebraska 68588.

Singer (1962) and elaborated by the research of Valins (1996, 1967). Valins studied the positive relationship between the false feedback of supposed autonomic arousal and attraction for female nudes by male subjects. Although some later studies of that effect (Stern, Botto, & Herrid, 1972; Goldstein, Fink, & Mettee, 1972) attempted to determine whether real autonomic arousal was stimulated by false feedback of autonomic arousal, that research was largely inconclusive, leading Goldstein et al. to conclude that the influence of false autonomic feedback upon attraction rating "could not have been produced solely through the intermediary of actual physiological arousal." The exploration of the arousal-attraction hypothesis has, however, proceeded along other paths.

Elevating the arousal-attraction relationship to the status of a formal model, Patterson (1976) advocated "an arousal model of interpersonal intimacy," proposing that changes in feelings of attraction toward another are caused by increases in arousal level. As individuals interact with increasing intimacy, arousal levels rise. Whether that arousal results in the experience of positive or negative feelings toward the other depends upon each individual's needs and perceptions of the other and of the situation. For example, if the arousal were caused by the close approach of a stranger, negative labeling and negative reactions would occur, while if the arousal were caused by the approach of an attractive other, positive reactions would occur.

Dutton and Aron (1974) conducted research that relates to the arousal-attraction model as developed by Patterson, although the major dependent variables in the first two studies relate to sexual content of stories rather than to attraction per se. In the first of a series of three studies, males who visited either a frightening narrow suspension bridge or a less frightening bridge over the same scenic river were confronted by either a male or a female experimenter who asked the subjects to tell stories in response to TAT cards. When responding to the attractive female researcher, the subjects at the frightening bridge told more sexually oriented stories than did the subjects at the less frightening bridge. More related to the present research was the finding that subjects at the suspension bridge were also more likely to phone the female researcher later for a debriefing than were subjects at the less arousing site. Similar differences between subject responses at the two bridges did not occur when the research was conducted by the male experimenter. However, since subject-selection factors at the two different bridge sites provided a possible alternative explanation to the arousal-attraction hypothesis, the authors conducted a second study at arousing bridge. The female experimenter confronted male subjects either on the bridge or at least 10 minutes after leaving it. It was hypothesized that arousal induced by the suspension bridge would

dissipate during 10-minute delay, while subjects interviewed at the bridge would experience increased sexual stimulation due to their arousal. Although that hypothesis was confirmed, with more sexually oriented responses given on the bridge, some likely alternative explanations still remain. Not only did background features between the two conditions differ considerably, but it is possible that different personality characteristics could have been attributed to the female experimenter when she confronted subjects in the two different settings. In the third study, male subjects in a laboratory rated a female confederate as more attractive when they thought they were about to receive a painful electric shock than when they expected a mild shock.

The interpersonal intimacy model proposed by Patterson (1976) and the research by Dutton and Aron, cited above, are usually interpreted as supporting the emotion-attribution principles developed largely through a research tradition inspired by Schachter and Singer (1962) and elaborated by Mandler (1975) and others. Schachter and Singer demonstrated that the arousal induced by epinephrine injections could be attributed to various immediate situational cues, resulting in different emotional experiences (anger or euphoria) depending upon the nature of the situational cues and cognitive information given to the subjects. However, recent work by Marshall and Zimbardo (1979) and Maslach (1979) has demonstrated that undifferentiated arousal has a more negative than neutral character, suggesting that the phenomenon demonstrated by Schachter and Singer may be more limited than originally supposed. However, that earlier research has been instrumental in demonstrating the importance of situational stimuli in influencing the experience of emotion following undifferentiated arousal. One research tradition stimulated by that work has demonstrated that the impact of arousal may be attenuated if arousal is misattributed to a neutral source such as a placebo pill or loud noise (e.g., Nisbett & Schachter, 1966; Ross, Rodin, & Zimbardo, 1969; Dienstbier & Munter, 1971; Dienstbier, 1972). A second tradition has demonstrated that emotional responses may be increased by the combination of emotion-relevant stimuli and arousal elicited by such diverse factors as exercise and confrontation with an authority figure (Cantor, Zillmann, & Bryant, 1975; Zillmann, Johnson, & Day, 1974; Dienstbier, Hillman, Lehnhoff, Hillman, & Valkenaar, 1975).

Despite the substantial demonstrations of emotion-attribution principles and the good fit of the Dutton and Aron data with the specific application of emotion-attribution principles in the arousal-intimacy model of Patterson, other explanations are still possible and have been recently advanced. Kenrick and Cialdini (1977) suggested, for example, that the Dutton and Aron data may be accounted for on the basis of reinforcement principles. That is, they suggest that the presence of another person may help to relieve feelings of tension in arousal-producing circumstances; that other person is then experienced as more attractive. Similarly, Kenrick.

and Johnson (1979) suggest that apparent contradictions in the arousal-attraction literature can be accounted for by a classical conditioning model. They note that rating stimulus individuals in aversive circumstances leads to negative evaluations if the stimulus individuals are not *physically* present; however, the rating of physically present stimulus individuals in aversive circumstances results in positive evaluations. To demonstrate that the decreased evaluations of the absent stimulus individual were due to the minimal resemblance of the absent stranger to a real person, Kenrick and Johnson had subjects evaluate both present and absent stimulus individuals under identical aversive conditions. Their findings of increased liking for the present strangers and decreased liking for the absent strangers were explained by suggesting that real other persons function as “generalized reinforcers” under aversive circumstances; this reinforcing quality outweighs any potential generalization of negative affect from the aversive circumstances. The authors therefore propose their classical conditioning model as a superior substitute to the emotion-attribution model discussed above.

The research series presented in this paper was an attempt to demonstrate emotion-attribution principles in attraction. The studies presented overcome the alternative explanations that are possible for the Dutton and Aron research, and provide the clear test suggested by Kenrick and Cialdini between the reinforcement view and the emotion-attribution hypothesis. Those authors suggested that had Dutton and Aron included a male confederate condition in their laboratory experiment, with decreased attraction toward that male under high fear conditions, then the emotion-attribution view would be clearly supported and the reinforcement view clearly weakened. Under similar circumstances such a finding was noted in this research series.

The first three studies were undertaken to demonstrate that arousal induced by a startle procedure would result in increased ratings of attractiveness given to an opposite-sexed experimenter, but would result in decreased ratings for a same-sexed experimenter.

## STUDIES I, II, AND III

### *Method*

In order to test the hypothesis that arousal would influence ratings of attraction toward an experimenter, depending upon the sex of the subjects and experimenter, experimental subjects were startled by a sudden feeling

of loss of support accompanied by a loud noise; those two events are traditionally thought of as a primary cause of arousal (e.g., Watson & Rayner, 1920). Control condition subjects were not exposed to the support loss and accompanying loud noise. For Study I, it was predicted that startled male subjects would attribute part of their arousal to the presence of the attractive female experimenter, increasing their liking ratings of her relative to control subjects. In Study II, it was predicted that startled male subjects would similarly attribute part of their arousal to the male experimenter, with the result that they would rate the male experimenter as less attractive, relative to unstartled controls, since the experience of heterosexual attraction would not be appropriate. In Study III, to demonstrate that the effect in Study II was due to the quality of "maleness" of the experimenter rather than due to undesirable physical or personality characteristics, the same male experimenter conducted a similar study with female subjects; it was predicted that those females who were startled would increase their attraction ratings toward the male, relative to unstartled controls.

Aside from the change in sex of subjects between Studies I and II and again between Studies II and III, and change in sex of experimenter between Studies I and II, the procedures for the three studies were identical.<sup>3</sup>

*Subjects.* Subjects in the three studies signed up for an experiment on "vestibular and balance function" in partial fulfillment of their basic psychology course research requirement. The sign-up sheets restricted the study to freshmen subjects, since it was felt that more success would be possible using a deception procedure with less sophisticated subjects.

In Study I, 60 males subjects were recruited. In response to the very detailed funnel-type postexperimental questionnaire used in all studies to detect suspicions and prior knowledge about the research, 1 subject was lost in Study I due to suspiciousness; in Study II, 60 male subjects were recruited with 2 lost

<sup>3</sup> A more formal procedure would involve a single study in which all conditions (particularly those of Studies I and II) were represented so that inferences then made between studies could be made more formally. Although such a course of action was considered after Studies I and II were completed, the decision to proceed on a single-study basis and not to replicate Studies I and II in a single study was made *for* several reasons. First, plans existed *for* essential replication of Study I, eliminating the need *for* a replication *per se*. Second, since only freshmen were used as subjects (as long as the supply lasted) *for* reasons discussed in the procedure section, subject quantities were limited to one study per semester. Third, this is expensive research in terms of subject and researcher time, making replication *for* experimental formality an expensive luxury. Fourth, and most important, even without the assumptions being met *for* formal statistical comparisons of the data *from* Studies I and II (and Studies II and III), it is apparent from the informal comparisons made (see results section) that the differences between Study II and the other two studies are large and real.

due to suspiciousness; in Study III, 56 female subjects participated with 1 dropped due to suspiciousness and 1 lost due to prior knowledge about the research.

*Procedure.* The procedures for all three studies were identical except for the use of a female experimenter in Study I.

In order to be as consistent as possible in appearance from day to day, the experimenter wore the same makeup (in Study I) and hairstyle each day and always wore a white lab coat over her/his clothing. To support the cover story, the experimenter explained that since the research involved vestibular and balance ability, it would be beneficial if all subjects read about those functions before the study. Subjects read photostat copies of four pages dealing with vestibular function from the textbook used in their basic psychology course.

Tape-recorded instructions then explained that once the subject was blindfolded and in the dental chair, all instructions and sound would come from the speaker directly above the subject's head; the only light came from that same location. These precautions were taken "in order to prevent the subject from localizing position through light leaks or from auditory cues." It was explained that the chair would be turned slowly in a circular manner by the 4-foot handle that extended from the footrest of the chair, and that each time she/he was asked, the subject was to tell the experimenter which direction she/he was facing. Since the subjects were to be blindfolded, they were told to indicate direction by referring to the numbers in the 6-foot circular steel hoop that was suspended from the ceiling and circled the chair at the level of the subject's head. To make sure that startle-condition subjects did not think the startle-induction procedures to be an accident, it was explained that the subject would "usually be moved in a circular plane by the chair, but *other types of movement will also be employed* both as tests of your vestibular ability and as distractions prior to vestibular ability tests."

The experimenter then shut off the tape and seated the subject in the dental chair. The subject was blindfolded while the experimenter chatted (according to a memorized script) about the nature of the study.

The tape was subsequently turned on, directing the subject to be turned through 10 positions. During the times when the chair was being slowly turned, sounds of bells, buzzers, and speech continued on the tape in order to verify that the study concerned ability to localize position in the presence of various distractions. The experimenter noisily recorded the subject's responses on a clipboard to further validate the vestibular cover story. After nine slow moves the experimenter became "un blind" as to the subject's startle condition by picking up a card from a pile previously randomly arranged. This procedure was used to minimize the possibility of experimenter bias. Although all subjects were told

they would be moved in “all sorts of ways,” the suddenness of the 35-degree tilt and the accompanying noise of a 4-pound brass plate dropping onto a steel plate on the floor provided a very sufficient (pretested) level of startle for the experimental group subjects. In order to support the previous statements that the sudden tilting was just one more planned move in the sequence, one more gentle turning move was made after the startle maneuver, with the subject being asked to identify his position. Control subjects received the 10 turning moves without the sudden tilt and noise given the startled subjects.

After the chair-turning sequence, the experimenter removed the subject's blindfold and the subject was directed to a separate desk away from the experimenter's desk; the subject was asked to fill out the experiment and experimenter ratings. With the experimenter no longer “blind” to the subject's condition, the instructions for the dependent measure forms were read by the experimenter from a hand-held script to minimize the potential for experimenter bias. It was explained that a new experiment and experimenter evaluation program had just been initiated by the psychology department to assure that research participation was a fair and pleasant educational experience for the subjects. To assure “confidentiality of responses,” the subject was provided with an envelope addressed to “Psychology Department Experiment Evaluation Program”; the subject was instructed to seal the completed evaluation forms in the envelope and to drop the envelope into a bin (with other sealed envelopes visible inside). Identifying marks on the dummy envelopes in the bin allowed the subject's evaluations to be subsequently retrieved. Assured of confidentiality, the subject rated (on 9-point Likert-type scales) the experiment on four dimensions and then rated the experimenter (using similar scales) on dimensions of competence and intelligence. All those items were to disguise and lead up to real dependent measures of attraction as assessed by the liking item “How much did you like the experimenter personally” and the appearance item “Rate the general appearance of the experimenter.”

Following the administration of the thorough postexperimental questionnaire to assess suspicions, subjects received a total debriefing with the purpose of all aspects of the research explained and with subjects sworn to secrecy.

### *Results and Conclusions*

For comparison with the two dependent measures, data from the two experimenter ratings on competence and intelligence were also analyzed. Although in all three studies the direction of the data from those two dummy



**Table I.** Means and Standard Deviations by Condition for Measures of Attraction Toward the Experimenter for Studies I, II, and III

Dependent measure	Condition				<i>t</i> test
	Startle		No startle		
	Mean	<i>SD</i>	Mean	<i>SD</i>	
Study I, female <i>E</i> male <i>Ss</i> , <i>N</i> = 59					
Liking	8.43	1.07	7.68	1.17	2.57 <sup>a</sup>
Appearance	8.15	1.17	7.61	.99	1.89
Study II, male <i>E</i> , male <i>Ss</i> , <i>N</i> = 58					
Liking	6.62	1.72	7.62	1.50	-2.36 <sup>a</sup>
Appearance	6.98	1.43	6.90	1.61	.20
Study III, male <i>E</i> , female <i>Ss</i> , <i>N</i> = 54					
Liking	7.11	1.37	6.59	1.50	1.33
Appearance	7.44	1.28	6.70	1.41	2.02 <sup>a</sup>

<sup>a</sup>Statistically significant at  $< .05$  using a two-tailed test.

items was similar to the two dependent measures, no between conditions differences that were even close to statistical significance were predicted, expected, or obtained.

The dependent measures of liking for the experimenter and the rating of the appearance of the experimenter are not independent measures; the data of Table I must be interpreted in that light. It can be seen that ratings on the two dependent measure scales were affected in the predicted directions in all three studies. That is, the female experimenter was rated higher by the startled male subjects of Study I relative to controls just as the male experimenter was rated relatively higher by the startled female subjects in Study III; however, in Study II, startled male subjects rated the male experimenter lower than controls.

Although differences ranging between .50 and 1.00 scale points on 9-point scales may seem small in absolute terms, the range of scale use (as indicated by the standard deviations in Table I) was small and quite high, with subjects generally using only the top 5 points in the scales.

One non predicted finding of interest is that the appearance ratings given the male experimenter by the male subjects of Study II did not suffer from the arousal of the startled subjects, as the liking measure did. This finding does make intuitive sense, however, since it does not seem that differences in our general attraction toward same-sexed individuals are associated with feelings about their

<sup>4</sup>When subjects found the experimenter so attractive that they put their rating off the scale given, they were given a score of 10. In the five studies using this scale technique, this occurred 15 times for the liking measure and 10 times for the appearance measure.

physical appearance. The connection with our perception of the appearance of opposite-sexed others with our attraction toward them is, however, intuitively apparent; indeed, love is somewhat blind.

## STUDIES IV AND V

### *Method*

With the major hypotheses of interest apparently confirmed, Studies IV and V were undertaken to demonstrate that the arousal-attraction relationship would be attenuated if an additional element were introduced to which arousal could be attributed. Study IV utilized the placebo pill procedure introduced by Nisbett and Schachter (1966); Study V used the noise attribution procedure developed by Ross et al. (1969). While the Study IV procedure involved subjects being told either that arousal or benign side effects would result from a (placebo) pill they had previously ingested, Study V subjects were told to anticipate possible side effects of arousal or relaxation from a loud noise played through the overhead speaker during the critical turns of the dental chair.

The designs of both studies therefore used a factorial arrangement of startle or no startle from the movement of the chair against the anticipation of arousal or nonarousal side effects from either the placebo pill (Study IV) or the noise (Study V). It was predicted that in each study two main effects would result: startled male subjects would attribute part of their arousal to the presence of the attractive female experimenter, increasing their liking ratings for her, while subjects who could attribute their emotional arousal to the pill or the noise (the arousal side effect condition) would indicate relatively less liking toward the attractive female experimenter.

*Subjects.* The 53 male subjects of Study IV signed up for the study on a sheet indicating the study to be about the 'effects of a vitamin supplement on vestibular ability.' The 57 male subjects of Study V knew only that their study was to be about "vestibular ability." In Study IV, 1 subject was dropped because English was not his primary language, while 1 subject was dropped from Study V due to being significantly older (age 53) than the rest of the subjects.

*Procedure.* In Study IV, after subjects took the placebo capsule, they read about either arousal or benign side effects "they might experience" from the pill, in addition to the supposed influence of the pill on vestibular functioning. Arousal symptoms included "a pounding heart, hand tremor, sweaty palms, a warm or flushed face, and a tight sinking feeling in the stomach" (largely following Nisbett & Schachter, 1966). Benign pill side effects included changed

tendencies to yawn, eye blink rate change, and tired or heavy eyes. Since the random assignment of subjects to pill conditions was accomplished by the order in which the pill-description booklets were given to subjects, the experimenter remained blind to pill condition throughout the study. After a 10-minute delay task included to lend credibility to the pill manipulation, subjects were exposed to the autokinetic illusion to convince them that the pill really did produce physiological effects. That is, when subjects observed the illusion, they were led to believe that the visual effect was due to the effects of the pill. This procedure and the logic of the various steps are discussed in greater detail by Dienstbier and Munter (1971). After seeing the autokinetic illusion, subjects were seated in the dental chair and instructed in a manner similar to the previous research. When the subject understood his role, he filled out an appropriate pill side effects form to renew the salience of those side effects. He was then blindfolded and turned slowly in the chair as in the previous studies, with startle and control procedures also as in Studies I - III. After the chair-turning sequence the subject filled out a second pill side effect form with appropriate questions (to increase the salience of placebo "side effects"). The subject then filled out the dependent measure forms and the postexperimental questionnaire forms, and was debriefed as in Studies I-III.

In Study V, the vestibular cover story was introduced as in Studies 1- III, with the noise side effects not mentioned until they were relevant during the chair-turning sequence. Prior to the ninth turn, the subject was informed that during the next two moves the pattern of movement would change somewhat (a standard instruction used in the previous research) and that the background noise would be very much louder than before. Arousal condition subjects were told that noise of this intensity, with rapidly fluctuating volume and frequency, causes sensations like those experienced during emotional arousal with those sensations described as in Study IV. Relaxation-symptom subjects were told to anticipate symptoms including "a tired and relaxed feeling," and "some slight ringing in the ears." The loud noise from the speaker directly over the subjects' head began following those instructions, remaining on for 25 seconds during the ninth chair move and for 20 seconds during the final sequence (including during the startle manipulation for startle-condition subjects). After leaving the dental chair the subject was subjected to the same procedures as in Study IV, including the filling out of a side effects form tailored for arousal or relaxation conditions to increase the salience of those symptoms immediately before the experiment and experimenter ratings.

### *Results and Conclusions*

The data from Studies IV and V appear in Table II. Although the direction of the data of Study IV gives weak support to the hypothesis that arousal

Table II. Means by Condition and Analysis of Variance for the "Liking" and "Appearance" Measures of Studies IV and V

Dependent measure	Condition				F ratio	
	Startle, benign symptoms <sup>a</sup>	Startle, arousal symptoms	No startle, benign symptoms <sup>a</sup>	No startle, arousal symptoms	Startle	Interaction
Study IV, using placebo pill manipulation, <i>N</i> = 52						
Liking	8.38	8.00	7.50	7.23	4.02 <sup>c</sup>	< 1
Appearance	8.46	8.15	8.00	7.81	2.21	< 1
Study V, using noise manipulation, <i>N</i> = 56 <sup>b</sup>						
Liking	7.79	7.79	7.64	7.36	< 1	< 1
Appearance	8.36	8.36	7.79	7.79	3.77 <sup>d</sup>	< 1

<sup>a</sup>For Study V, these were "relaxation symptoms" rather than "benign."

<sup>b</sup>The means for Study V are accurately represented in this table — the repetition of one number four times and one twice is not a mistake.

<sup>c</sup>Probability level  $p < .05$ .

<sup>d</sup>Probability level  $p < .07$ .

symptoms that are attributed to an irrelevant source such as placebos or noise might attenuate the attraction ratings given the experimenter, the results are far from statistical significance. In Study V, even substantial directional support is lacking. In both studies, replication of the basic arousal (from startle) attraction relationship is achieved, though with a different pattern in the two studies.

The experimenter for Study V was a female graduate student who was considerably older than the male subjects. In all other studies using female experimenters, the experimenter was an undergraduate. Additionally, my informal observation of experimenter-subject interactions indicated that this experimenter related to her subjects on a much more formal basis than the other researchers. It was to overcome this potentially unappealing style that she was the only one who wore a miniskirt with lab coat left unbuttoned rather than slacks with coat buttoned. Thus, while she provided an appealing visual image, her personal appeal to the subjects was uncertain. In accordance with these observations, it is particularly interesting that the pattern of data between Study V and Studies I and IV indicates that it was the appearance measure in Study V rather than the liking measure that seemed to reflect most sensitivity to the arousal manipulation. These observations suggest informally the same relationship noted when the sex of experimenter was varied for male subjects between Studies I and II—the specific characteristics of the elements to which emotional arousal may be attributed determine the type of attributions that are possible.

## STUDY VI

### *Method*

In the five studies above, elaborate precautions had been taken to convince the subjects of the validity of the vestibular cover story and to convince them that the arousal manipulation was a planned part of the research procedure. (For example, a check on whether startled subjects perceived the chair tilt to be an accident, a regular part of the procedure, or whether they were uncertain yielded 51 indicating that the sequence was a planned part of Study VI and 1 uncertain.) Additionally, the postexperimental questionnaire asked direct and specific questions about suspicions about all important aspects of the research to check on the effectiveness of those efforts. Despite those efforts, the failure in Studies IV and V to demonstrate the attenuation of the arousal-attraction relationship through

arousal misattribution to the “arousing” pill or noise casts a pall over the emotion-attribution hypothesis. Such “tried and true” methods of arousal misattribution should have been effective. It was in order to provide the missing converging evidence for the emotion-misattribution explanation that Study VI was developed. It was hypothesized that if the misattribution explanation of the arousal-attraction relation were valid, that relationship should be weakened with the passage of a short span of time, just as was apparently the case in the second study of the Dutton and Aron (1974) research. Specifically, it was hypothesized that in a study in which all the male subjects experienced startle-induced arousal, the imposition of a 10-minute relaxation period following the startle would reduce the attraction ratings given the attractive female experimenter relative to aroused subjects who experienced the 10-minute relaxation before being startled.

*Subjects.* There were 54 male subjects recruited for the “vestibular” study. The data from 1 subject were lost due to suspicion, while those from a 2nd were uninterpretable due to the dependent measure form being improperly filled out.

*Procedure.* Three changes were made in the procedures used in Studies I-III. Subjects were told that a 10-minute relaxation period was to be inserted into the middle of the chair-turning sequence to assess the effects of relaxation on vestibular ability, and they were told more details about the chair-turning sequence prior to that procedure than previously. All subjects were also told about the background noises and sounds during the chairturning sequence (to validate the cover story) and that they would “be tilted back in the chair.” (Of course, subjects had no idea of how suddenly the tilt would occur.) Delay-condition subjects were told that the tilt would occur during the chair-turning sequence that followed the 10-minute relaxation period (during which soft relaxing music was played), while subjects in the immediate condition were told that the tilt would occur prior to the relaxation period. This detailed information was given to subjects of both conditions so that immediate-condition subjects could relax during the 10-minute relaxation period without worrying about being startled later when the turning sequence was resumed.

The third change in Study VI concerned the form of the dependent measure. Since only the upper end of the 9-point scale of the previous studies was used, subjects effectively restricted themselves to very few choices. Therefore, in Study VI, 20-cm horizontal lines were used with the same experiment and experimenter questions as before, with instructions for the subject to draw a vertical pencil line through the 20-cm line at a point corresponding with his attitude. The end points and midpoint of the line were labeled “0, not at all,” “50, moderately,” and “100, extremely.”

### Results and Conclusions

A pilot of the Study VI procedure had been run with a different experimenter using the 9-point dependent measure scales as in Studies I-V. That research became the pilot rather than the main study only because the experimenter could not complete the research due to other employment. The data from the pilot study indicated that while the delay versus immediate conditions apparently affected the appearance ratings (8.55 for delay vs. 7.89 for immediate,  $N = 20$ ,  $t = 1.40$ , n.s.), with those experiencing later arousal indicating greater attraction toward the experimenter, the manipulation did not differentially affect the liking measure (8.18 for delay vs. 8.11 for immediate).

The data from Study VI provide a very close replication of those pilot data; however, the changed nature of the dependent measure scales was such that lower numbers represent greater liking for the experimenter. On the appearance measure, delay subjects indicated greater attraction relative to subjects in the immediate arousal condition (1.17 cm from the high end of the 20-cm line vs. 2.01 cm,  $t = 1.74$ ,  $p < .05$ , one-tailed). On the liking measure, however, no difference close to statistical significance was recorded (3.02 cm for delay vs. 2.46 cm for immediate,  $t = .83$ , n.s.).

The data of Study VI therefore provide a partial confirmation of the hypothesis that those delay subjects who experienced stronger arousal at the time of rating would rate the experimenter higher than those whose arousal may have dissipated during the 10-minute delay period. Despite not providing a total confirmation of the hypothesis, the data pattern does make sense. Since the presence of the experimenter at the time of startle is obvious to the blindfolded subjects, the startle and its subsequent arousal may contribute to increased feelings of liking that are reflected in the later liking ratings, irrespective of whether the arousal occurred shortly before the ratings or more than 10 minutes before. However, for the appearance ratings of the experimenter to increase with arousal, it may be that the *visual* presence of the experimenter in conjunction with the arousal is necessary. Hence the sensitivity of the appearance measure to the delay manipulation may be due to the combination of arousal plus the *visual* presence of the experimenter being more likely in the delay condition than in the immediate condition.

### DISCUSSION

Modern versions of emotion-attribution theory emphasize the role of external stimulus elements in conjunction with subject characteristics (e.g., sex, internalized

social and cultural expectations) in determining how undifferentiated arousal may contribute to different emotional experiences (Dienstbier, 1979). Although other writers in this area have suggested that the misattribution of arousal from one element to another will occur only if the original source of the arousal is ambiguous or even unknown (e.g., Schachter & Singer, 1962; Ross et al., 1969), I have suggested elsewhere (Dienstbier, 1978, 1979) that even when the true arousal-eliciting elements are very obvious, the individual may be strongly motivated by internalized social and cultural standards to experience that arousal in different ways, and hence to misattribute that arousal to new elements. These studies provide an illustration of that principle, for although the source of arousal must be initially quite obvious to the startled subjects, the procedure is constructed to give the impression that the startle manipulation is simply another type of chair movement with no special qualities worthy of unusual attention. **In Study VI**, subjects are even told (in a low-keyed manner) that they might be somewhat “startled” by the “tilting of the chair.” Despite this obviousness of arousal source, the research findings suggest that if sufficiently salient social stimuli are present, some misattribution of arousal may occur, increasing or decreasing ratings of attraction depending upon the environmental cues available to the subject and the needs and cognitions held.

The findings of Studies I and II, with male subjects and, respectively, a female and male experimenter, that arousal would either contribute to or subtract from attraction ratings provides the strong test of emotion-attribution theory versus conditioning explanations of the arousal- attraction relationship suggested by Kenrick and Cialdini (1977). The findings clearly support the emotion-attribution view. The findings of Study III that female subjects found the same male experimenter (as in Study II) more attractive after startle confirms the expectation that the opposite reaction toward that experimenter by male subjects was due to the male sex of the experimenter rather than to some intrinsic negative characteristics. (That is, while it would be expected that arousal misattributed to a repulsive stimulus would result in ratings of increasing repulsiveness, this was clearly not the mechanism accounting for the Study II results.) But if the emotion-attribution approach is justified, why, in Studies IV and V, did the manipulation of adding elements to which the arousal could be misattributed fail?

The most likely explanation for one wishing to defend the emotion-attribution approach is that the placebo pill and the noise manipulations provided stimuli of insufficient salience and/or of insufficient appropriateness for arousal misattribution in those studies. Probably both explanations apply somewhat. It is difficult to make a physical stimulus as salient as a social one without having to draw attention to the physical stimulus in a manner that makes most cover stories



difficult to believe; that is, if an experimenter emphasizes too strongly an idea such as "this pill will make you feel aroused," modern subjects tend to become suspicious. On the other hand, a very attractive opposite-sexed experimenter in close physical proximity is a very significant and salient stimulus. In fact, the presence of the opposite-sexed experimenter is sufficiently salient that the tendency for undifferentiated arousal to be experienced as a negative effect (suggested by Maslach, 1979, and by Marshall & Zimbardo, 1979) is overcome. This view of the extreme salience of social stimuli is supported by most major theorists of human emotion (e.g., Izard, 1977) who regard the vast majority of significant emotional experiences as socially induced. Thus the attribution of undifferentiated arousal to a salient human stimulus may be far more likely than attribution to a nonhuman (placebo or noise) stimulus.

While emotion-attribution theory, as discussed above, suggests that undifferentiated arousal may contribute to different emotional reactions depending upon both external stimuli and internalized norms, values, cognitions, etc. held by the individual, discrete or differential emotions theory suggests that the "fundamental" emotions are indeed "fundamentally" different from each other. According to that approach, undifferentiated arousal is not likely to be simply misattributed to just any stimulus, nor will such arousal contribute to all emotional states. Evidence cited for that view includes the similarity of facial expressions noted by cross-cultural research (e.g., Izard, 1977) and the between-emotions differences in facial muscle electrical potential during the experience of different emotional states (e.g., Schwartz, Fair, Greenberg, Freedman, & Klerman, 1974).

Although theorists representing these "competing" views of emotion attribution and discrete emotions have often argued as if the views were contradictory (see Dienstbier, 1979, for a review), sufficient evidence has been developed for both views that a strong case can be made that both positions are defensible. Just as there are physiological responses that are relatively unique to specific emotional states (e.g., anger, fear, interest, joy), there are other physiological components that are common to all emotional states characterized by increased arousal. A reviewer of a prior draft of this paper suggested that these data would be compatible with a discrete or differential approach if one assumed that an emotional state or predisposition existed toward the experimenters in these studies (prior to startle). A reasonable elaboration would suggest interest or sexual attraction toward the attractive opposite-sexed experimenter (as in Studies I and III) and a negative state such as anger or disgust toward the same-sexed experimenter (as in Study II). Those emotional states would then be "amplified" by arousal induced by startle. The advantage of that view for the interpretation of this research is that the assumption that arousal is "attributed" to the presence of the experimenter is not

necessary; the disadvantage is that the loss of the attribution concept leaves the path of causality from startle to experimenter rating somewhat vague, and necessitates the assumption of a prior emotional state. A comparison of Studies II and III provides some suggestive evidence. The female subjects in the control condition of Study III liked the male experimenter less than did their male counterparts of Study II. Yet, when startled, female liking increased while male liking for the same experimenter decreased. While those data are not conclusive, they do not support an alternative explanation, which depends upon an "already existing emotion" being enhanced by startle-induced arousal.

While this research demonstrates that some components of the arousal underlying both increases and decreases in attraction are also apparently common to the undifferentiated arousal induced by startle, it may be seldom that such arousal is a major component in the feeling of romantic attraction in normal settings. Those components of arousal that are usually associated with "making the heart grow fonder" in romantic love (see Walster & Berscheid, 1971) are probably at least as related to specific sexual arousal as to an undifferentiated arousal common to many emotions. The romantically inclined reader is therefore cautioned that investment in dental equipment may not be warranted.

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