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Arousal-Induced Attention to Self

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This research tested the prediction that increments in general arousal would induce self-focused attention. Subjects in three groups were exposed to manipulations designed to vary their levels of general arousal (running in place, waiting in a chair, reclining in a lounge chair) and were then given a measure of self-focused attention. This measure consisted of the number of first person singular pronouns subjects used to complete a set of sentences. Although a simple heart rate check on the manipulations revealed that running in place produced greater arousal than waiting in a chair, it did not indicate that reclining in a lounge chair reduced arousal below the level experienced while waiting. Significant differences in self-focus were observed among all three conditions, however, such that subjects who had run were more self-focused than those who had waited, and reclining subjects were less self-focused than waiting subjects. These findings are considered in terms of their implications for the experience of emotion and for the relationship between arousal theories and self-awareness theories.

In everyday language, the terms *nervous* and *self-conscious* are often taken to refer to the same phenomenal state. But in social psychology, the analogous constructs of arousal and self-awareness share a much more equivocal connection. Although behavior predictions derived from arousal theories (e.g., Spence, 1958; Zajonc, 1965) and self-awareness theory (Duval & Wicklund, 1972; Wicklund, 1975) often coincide, and although the two states are often traced to identical stimulus conditions (e.g., audiences, anticipated evaluation, behavior disruption, etc.), the data concerning this crucial relationship are ambiguous. Paulus, Annis, and Risner (1978) have shown, for example, that self-focus tends to decrease a palmar sweat index of arousal; yet Gibbons, Carver, Scheier, and Hormuth (1979) have found that self-reported arousal is unaffected by self-focus, and Gur and Sackeim (1979) have reported increased GSR (galvanic skin response) as a result of exposure to self-focusing stimuli. These empirical accounts do not share a common conclusion, but they do share a common assumption. Guided as they have been by the notion that self-focus might cause arousal, studies in this area have regularly failed to examine the opposite possibility —that arousal may cause self-focus.

The prediction that arousal leads to self-focused attention can be derived from two fairly distinct lines of reasoning. One of these involves the idea that arousal makes the self perceptually salient. Given that attention is typically directed toward those stimuli that are novel, distinctive, unexpected, or otherwise salient, it seems likely that departures from a normal arousal level that are detected in oneself could lead attention to focus on oneself. Extremely low levels of arousal could be salient in this way (e.g., unexpected drowsiness), but within the range of typical waking arousal levels, it is possible that incremental changes in arousal would most often draw attention to the self. In essence, this notion suggests that increments in physiological

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arousal are generally more salient than decrements and that increased arousal should thus result in self-focused attention.

The second argument linking arousal and self-focus draws on ideas regarding the self-perception of emotion. Beginning with the Schachter and Singer (1962) work and continuing in more recent extensions by Pennebaker (1980), Valins (1974), and Zillman (1978), it has been argued that when a person experiences physiological arousal, an understanding of the emotional nature of the arousal is not merely absorbed by passive observation, it is actively sought. In many cases, of course, this epistemic search ends quickly, because stimulus conditions indicate clearly how the arousal is to be construed. This is the case when the actual source of arousal is identified or when a plausible substitute is available to which the arousal may be misattributed. But when such sources are unclear or are no longer salient, the active search continues. Because this epistemic search ranges over a variety of cues that are self-relevant (e.g., stimuli that could produce emotion in the self, memories of such stimuli, emotion-specific internal sensations or symptoms, etc.), it can be suggested that such a search is equivalent to self-awareness (cf. Hull & Levy, 1979).

Independent of these lines of reasoning, it should be noted that an empirical study by Fenigstein and Carver (1978) also lends support to the idea that arousal causes self-focus. Subjects in this research who were given false heart rate feedback (either constant or accelerating) experienced greater self-focus than did subjects whose heartbeats were ostensibly monitored, but to whom no feedback was given. It seems that when a person's attention is artificially guided to an arousal cue, self-awareness ensues even when this cue indicates a constant level of arousal. Outside the false feedback setting, however, it seems likely that an individual's attention would naturally flow to the self only during periods of increased (or drastically decreased) arousal; constant arousal would not produce either salience or search and so would not result in self-focus. In showing that self-focus is produced by attention to arousal information, Fenigstein and Carver's results provide another important basis for our prediction.

The experimental arrangements designed to test the hypothesis that arousal causes self-focus in the present study were straightforward. Subjects in three conditions were given tasks planned to vary general arousal levels among conditions. In one condition, the task consisted of relaxing in a lounge chair; in another condition, no special task was prescribed; and in a third condition, the task involved running in place for 2 min. (cf. the similar arousal manipulations of Hormuth, 1979; Zillman, Johnson, & Day, 1974; Burnam & Pennebaker, Note 1). A heart rate measure of arousal was administered to each subject following the task, and a measure of self-focus was then given. This self-awareness assessment consisted of the number of first person singular pronouns (e.g., I, me, my) the subject used to fill in blanks in a set of English sentences (cf. Carver & Scheier, 1978; Davis & Brock, 1975). A final heart rate measure taken some 15 min. later served as a baseline arousal index for each subject. In all phases of the experiment, care was taken to reduce the level of self-focusing stimulation (e.g., experimenter presence, anticipated evaluation, etc.) to a minimum.

Method

Subjects

Thirty undergraduates (17 female and 13 male) volunteered to participate in the experiment in return for extra credit in their introductory psychology classes at Trinity University. Equal numbers of subjects were randomly assigned to three conditions, a *relaxation* condition, a *normal* condition, and an *arousal* condition, with the restriction that the proportion of males and females be approximately the same across conditions.

Procedure

All subjects were tested individually by a female experimenter. When a subject arrived at the laboratory, he or she was told that the experiment consisted of several different tasks. Subjects in the relaxation condition were asked to lie down in a comfortable lounge chair and were told that the additional tasks would begin after a little while. The experimenter then left the room for 5 min. She returned and took the subject's wrist pulse, simply counting to herself the number of heartbeats in a

15-sec interval. The subject was then seated at a desk and given a questionnaire entitled "Linguistic Implications Form." The experimenter explained that the second task called for the subject to read the instructions and to complete the form; then she again left the room. After 15 min., she returned to the room and took the subject's pulse once again to complete the measurements. The subject was then probed for suspicion, debriefed, and thanked.

For subjects in the normal condition, a parallel procedure was followed in which the subject was asked to wait for a few minutes in a standard classroom chair instead of the lounge chair. For subjects in the arousal condition, the experimenter followed her introductory remarks by instructing the subject to run in place for a short time. She asked the subject to begin when she left the room and to continue until she returned. Returning after 2 min., the experimenter took the first pulse measure and then completed the measurement sequence. As a rule, about 2 min. elapsed for subjects in all conditions between the time the experimenter began the first pulse measure and the time the subject finished reading the Linguistic Implications Form instructions and began the self-focus items.

Self-Focus Measure

The assessment of self-focused attention was accomplished by means of an instrument similar to those devised by Carver and Scheier (1978) and Davis and Brock (1975). Instructions for this Linguistic Implications Form explained that some things people say are redundant, in that one or more words in a sentence can be guessed from knowledge of the remainder of the sentence. To "collect some basic statistics on the redundancy of a series of standard sentences," the form called for the subject to read 20 sentences, each containing a blank, and to choose the most appropriate word from among three alternatives for each blank. It was noted that the alternatives were all technically correct, but that a close analysis of each sentence might reveal that one alternative was more likely to occur in that context than others. Of the 20 sentences, 15 were fillers asking for noun, pronoun, adjective, or adverb responses.

The five critical items in the form each called for the subject to choose among three pronoun alternatives, one of which was first person singular. These items were:

1. After spreading fertilizer liberally over the flower bed, (I, she, we) watered the flowers.
2. Although (their, our, my) personal library consists of only few books, some of them are classics.
3. Please don't do this to (me, her, us), it is just not fair.
4. At first it didn't seem to make any difference, but by later that night the noise from the party was entirely too loud to allow (us, her, me) to sleep.
5. It isn't easy to get lost in this town, but somehow (I, we, they) managed it.

These items had been selected from among a larger pool administered to 115 subjects during pilot research. These items showed the highest mean interitem correlation (.17) in that sample. It should be noted that in other pilot work, we have found that subjects exposed to a mirror were significantly more likely to choose first person singular pronouns on these items than were subjects who were not confronted with such a self-focusing stimulus. The total number of first person singular pronouns chosen by the subject for these items served as the summary index of self-focused attention.

Results

Heart Rate Measure

Although investigators in several domains of psychology have used the notion of "general arousal" to guide their inquiries, physiological psychologists have not reached any clear agreement about which particular indices should be counted as measures of such a general construct (e.g., Lacey, 1967). For this reason, we arranged the present arousal manipulations in hopes that their face validity would obviate the need for extensive physiological measurement. We depended only on a simple heart rate measure as a crude index of arousal and instituted it mainly to make sure that subjects in the arousal condition had indeed performed the running-in-place task in the experimenter's absence.

Means for this heart rate measure (in beats per min.) are shown in Table 1. The manipulation means are for the pulse taken immediately before self-focus measurement, and the baseline means are for pulse taken about 15 min. later. A three-group analysis of covariance with manipulation heart rate as the criterion and baseline heart rate as the covariate yielded a significant effect, $F(2, 26) = 7.94$, $p < .002$. The manipulation heart rate means adjusted for the baseline covariate are also shown in Table 1, and they indicate quite clearly that (by the heart rate measure) the arousal manipulation was effective in the case of the arousal group.

Although the unadjusted manipulation heart rate means show the expected decrease for the relaxation group as compared with the normal group, this difference is not significant in an

Table 1
Heart Rate and Self-Focus Means by Condition

Measure	Condition		
	Arousal	Normal	Relaxation
Manipulation heart rate	92.4	80.4	77.6
Baseline heart rate	79.2	82.4	77.2
Adjusted manipulation heart rate	92.8	77.8	79.8
Self-focus index	3.6	2.7	1.6

Note. Self-focus entries could vary from 0–5, with greater values indicating greater self-focus.

analysis of variance and is reversed in direction when the baseline covariate adjustment is introduced. Interpreted conservatively, this result suggests that the relaxation group should be treated as an additional "normal" condition for later comparisons with the arousal group on the self-focus measure. However, since heart rate does not slow down as markedly with decreased physical activity as it speeds up with increased activity (Miezejeski, 1978), it could be that a "floor effect" interpretation of the relaxation group heart rate is in order. This uncertainty, in combination with the clear face validity of the manipulation, led us to opt for a continued separate consideration of the relaxation condition.

Self-Focus Measure

A three-group analysis of variance performed on the self-focus index revealed a significant overall effect, $F(2, 27) = 7.34$, $p < .003$; means for this measure are shown in Table 1. As expected, the arousal group mean of 3.6 was significantly greater than the normal group mean of 2.7, planned comparison $t(27) = 1.72$, $p < .05$ (one-tailed). The subjects who had been asked to run in place later experienced greater self-focus than the subjects who had merely been asked to wait. Also as expected, the relaxation group mean of 1.6 was significantly smaller than the normal group mean, planned comparison $t(27) = 2.10$ $p < .05$ Although this result is rendered somewhat unclear by the inconclusive heart rate evidence for arousal reduction in the relaxation group, it is consistent with our hypothesis.

In a correlational analysis of the self-focus items, we found a level of mean inter-item correlation (.19) similar to that observed in the pilot research. Because the scale was composed of only five items, this level of interrelation translates into a rather low reliability (K-R 20 $r = .53$). Although previous reports of similar measures have not included reliability data (Carver & Scheier, 1978; Davis & Brock, 1975), we suspect that this lack of strong inter-item consistency is a chronic feature of such quasi-projective measures. An important question for the present study, then, is the extent to which the five items behaved similarly across the three experimental conditions. To assess this, we conducted a three-group multivariate analysis of variance with the five individual items as dependent measures. Four of the five items showed mean differences across the three groups that paralleled those of the overall index, and the fifth showed a slight reversal of the difference for only two groups. The multivariate group effect was significant, $F(10, 46) = 2.28$, $p < .03$, indicating that the lack of strong covariance among items was not severe enough to attenuate the multivariate impact of the manipulation.

A final correlational analysis was undertaken to explore the relationship between arousal and self-focus at the level of individual subjects. For this purpose, a *corrected arousal* index was computed for each subject as the difference between manipulation and baseline heart rate measures. For subjects aroused during self-focus assessment, this index would be positive, whereas for those whose level of arousal was below normal during self-focus assessment, this index would be negative. The correlation between this index and the self-focus index across all subjects was positive and significant, $r(30) = .37$, $p < .02$, showing again the general connection between arousal and self-focus. Separate calculations of this correlation for a number of special subsamples (i.e., males and females; subjects in the arousal, normal, and relaxation groups; and subjects whose corrected arousal

was positive versus those for whom it was negative) revealed coefficients substantially similar to this overall correlation. Although none of these reached significance, it is also true that none were significantly smaller than the overall correlation.

Discussion

The pattern of the present findings strongly indicates that under the conditions of this experiment, self-focused attention was produced by increments in general arousal. Subjects who ran in place for 2 min. as an arousal manipulation subsequently showed greater self-focus (by completing sentences with more first person singular pronouns) than did subjects in a normal comparison group who merely waited for an equivalent period. Subjects who waited in a lounge chair as a relaxation manipulation showed decreased self-focus as compared with the normal group. Since a heart rate check on the manipulations revealed that subjects in the arousal group were more aroused than normals, but did not show that subjects in the relaxation group were less aroused than normals, we cannot argue that the present evidence is conclusive regarding reductions in arousal and reduced self-focus. However, the significant positive correlation between heart rate increments and self-focus across the entire sample does suggest that such a relationship may hold within the range of arousal levels examined in this study.

Interpretations of the Arousal/Self-Focus Link

Because the present results generally support the hypothesis that arousal causes self-focus, it becomes important to establish a proper theoretical interpretation of this relationship. As noted earlier in this report, one possibility is that arousal is perceptually salient and hence draws one's attention toward oneself. In this view, a variety of different internal states (e.g., arousal, pain, hunger, etc.) might provide the impetus for self-focus when they become sufficiently intrusive to seize one's attention. Because such states may compete for attention with environmental stimuli, task demands, and the like, this proposition would additionally suggest that during strenuous, arousing, or absorbing activities, one might not become self-focused at all; rather, only after such salient tasks would the otherwise unoccupied person experience self-focus. This interpretation allows for the integration of the present findings with those of Duval and Wicklund (1973), who found that self-focus is decreased during an absorbing activity.

The second reasonable interpretation of our findings suggests a much broader theoretical framework within which the arousal/self-focus link may find representation. Arousal-induced attention to the self may be closely tied to the epistemic search that occurs in the processing of information about emotions. As an extension of the Schachter and Singer (1962) formulation, it can be argued that the occurrence of arousal naturally leads to a search for information about what emotion is being experienced, that this information is typically of real or potential relevance to the self (e.g., internal sensations, external stimuli that have recently impinged on the self, memories of past emotional behavior, etc.), and that such a search of self-relevant information is part of a more general attention to the self that is engaged at the same time. According to this view, self-focus was observed as a consequence of arousal in the present research because the self-focus measurements were taken in an interval some 2 min. after the manipulations of arousal level were complete. Under these conditions, it is likely that the actual causes of arousal (running in place for the arousal group; sitting upright in a chair for the normal group) were relatively nonsalient for our subjects (cf. Zillman, 1978) and that self-focus was engaged to explain the residual arousal.

Although the validity of this interpretation cannot be tested through recourse to the present data, the notion that epistemic search involves self-focus gives rise to some interesting propositions, some previously tested and others as yet unexamined. One idea, for example, is that the self-attention produced by arousal usually is proportional to the level of unexplained arousal. In settings where low or moderate levels of arousal are produced, the ensuing low levels of self-focus might yield a "weak" epistemic search that would

result in only partial or incomplete knowledge of one's emotional state. The enhancement of the natural, arousal-produced self-focus through exposure to additional external inducements to self-focus would be expected, then, to lead to a more extensive search and hence to more valid self-perceptions of emotions. In studies by Gibbons, Carver, Scheier, and Hormuth (1979); Scheier (1976); Scheier and Carver (1977); and Scheier, Carver, and Gibbons (1979), this is precisely what has been found: External self-focusing stimuli (e.g., mirrors) function to produce more veridical and intense perceptions of one's own emotional state.

Another derivation from the equation of self-focus and epistemic search becomes available when we return to the issue addressed at the outset of this report—the causal direction in the link between arousal and self-focus. Although evidence on the possibility that self-focus causes arousal is ambiguous at best, it is of interest to consider the ramifications of this hypothesis in light of the present framework. Suppose, for instance, that self-focus causes arousal only under the specific conditions suggested by Brockner and Hulton (1978), Gur and Sackeim (1979), and Wine (1971)—conditions of a strong negative intra-self discrepancy. If a person has dispositionally low self-esteem or is exposed to a negative self-esteem manipulation, it could be that the strong self-criticism produced by self-focus would be translated into an increase in general arousal. Although the direct measurement of this process has been accomplished only by Gur and Sackeim (1979), there is much circumstantial evidence for this sort of mechanism in the works of Brockner (1979), Brockner and Hulton (1978), Liebling, Seiler, and Shaver (1974), and others.

The idea that unexplained arousal produces self-focus adds an interesting footnote to this hypothesis. We might expect that whenever the aroused and self-critical person would begin to be distracted from the negative discrepancy, the extent to which current arousal is explained would be reduced. This lack of explanation, in turn, might engage greater self-awareness through the processes demonstrated in our study and hence would return the individual's attention to the negative discrepancy. More arousal would then be the result. This cyclic restoration of self-focus would tend to leave the person in a continuous state of arousal, one that is labeled in a negative way as anxiety, fear, or anger. Arousal-induced attention to the self, in this light, may be a central part of the feedback mechanism that underlies the unusual stability of negative mood states (Beck, 1976), the emotional exacerbation of dysfunctional behavior (Storms & McCaul, 1976), and the anxiety-linked performance decrements experienced by low self-esteem individuals (Wine, 1971). Future research designed to examine this possibility certainly seems warranted.

Implications for Arousal and Self-Awareness Theories

In the early stages of the development of self-awareness theory, several investigators suggested that self-awareness effects could be attributable solely to variations in arousal produced by self-focusing stimuli (e.g., Liebling, Seiler, & Shaver, 1974). Given the broad matrix of behavioral effects currently traceable to self-awareness that are not derivable from arousal theories (see Carver, 1979; Wicklund & Frey, 1980), this suggestion is not as threatening to self-awareness theory as it once was. The present findings suggest, in an interesting counterpoint to this early controversy, that arousal effects may be interpretable in terms of self-awareness mechanisms. Indeed, in a recent empirical attempt to differentiate arousal and self-awareness effects, Hormuth (1979) found that arousal, like self-focus, made subjects more likely to adhere to their self-reported standards regarding originality in a word association task. Given his findings and the results of the present study, it seems fair to suggest that some of the behavioral effects of arousal could be traceable to concomitant variations in self-focus.

As illustrations of arousal research that might bear reinterpretation from a self-awareness perspective, we might cite two examples. First, there is the research suggesting that empathic arousal is a necessary precursor to helping behavior (Coke, Batson, & McDavis, 1978; Gaertner & Dovidio, 1977). Since Wegner (1980) has reviewed evidence that self-

awareness may also be a precondition for helping, it is possible to speculate that empathic arousal only produces effects to the extent that it engages self-awareness. A second potential area for reinterpretation is the research suggesting that arousal is necessary for the induction of cognitive dissonance (Zanna & Cooper, 1976). Drawing on Wicklund's (1975) review of research implicating self-focus in this same process, we might venture the idea that arousal is a part of dissonance induction because it brings about self-directed attention. To be sure, these notions must be viewed as possibilities only, because the research needed to establish their validity has yet to be conducted. But in looking beyond the present findings, a number of fascinating prospects like these come into view.

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