An Elimination of Extraneous
Arousal in Investigations of Energization

An Honors Thesis (ID 499)

by

Shawn M. Mitchell

Thesis Director

Ball State University

Muncie, Indiana

May, 1987

Expected date of graduation (Spring/1987)
An Elimination of Extraneous Arousal in Investigations of Energization

A recent theory of motivational arousal (Brehm, Wright, Solomon, Silka, & Greenberg, 1983) proposes that the mobilization of energy (energization) is a function of an individual's perception of what can be done, must be done, and is worth doing in order to attain a goal. Specifically, individuals will energize (become motivationally aroused) to the degree that they perceive 1) themselves as capable of performing an instrumental task and 2) the goal as worth the effort required for acquisition. On one end, an individual presented with an easy instrumental task should energize little. Similarly, when an individual faces an impossible task, energization will not benefit the individual and should not occur. By the same token, if the perceived instrumental task difficulty surpasses the maximum value of the goal (level of potential motivation), energization, again, should be low. On the other end, when a goal is difficult but possible to attain and worth the effort needed for acquisition, energization will be high.
Thus, energization will increase as a linear function of perceived task difficulty until either the instrumental task is perceived as impossible or the perceived effort required surpasses the maximum value of the goal. Again, the result, in either case, will be low energization.

Brehm, et al. (1983) make two critical assertions about energy mobilization. First, the level of energization will be a direct function of an individual's intention to exert effort on an instrumental task. Second, the subjective valence of a goal (i.e., the attractiveness of an approach goal and the unattractiveness of an avoidance goal) will be determined directly and positively by the level of energization or motivational arousal.

While the theory of energization has stimulated a variety of hypotheses, the fundamental methodology has remained virtually unaltered. Subjects are typically run individually with minimal experimenter contact. A situation is presented in which subjects read that they will complete a task (e.g., memorizing trigrams, calculating math problems) of one of several difficulty levels (easy,
difficult, or overly difficult). Subjects typically are informed that upon successful completion of their assigned task, a reward (goal object) will be given to them. A reward of $1.00 has been the precedent. Dependent variables tend to remain in questionnaire format and use straightforward questions to measure energization (i.e., subjective goal valence) and perceived task difficulty.

Interestingly, some researchers have not obtained the expected pattern of data (J. W. Brehm, personal communication, May, 1986). While their data for the difficult and impossible cells were in the expected pattern, the means in the easy cells were often too high for energization theory to account for. Upon examination of the data, it was noted that while most of the subjects in the easy task conditions rated the goal low on attractiveness as expected, other subjects rated the attractiveness of the goal high, suggesting high arousal. It was deduced by Biner (1983) that another type of motivational arousal might be accounting for these high valence ratings.

Biner (1983) tested Brehm's contention that energy is mobilized conservatively. Brehm defines energization as the "process
Extraneous Arousal

by which an organism prepares to undertake an effortful task" (Brehm, et al., 1983). This process is proposed to occur only in immediate anticipation of tasks. Thus, in order to tap energization methodologically, Brehm and his colleagues have had to lead subjects to believe that tasks would be starting immediately to ensure that energy mobilization was fully underway. During this period, subjects, instead of receiving the task which they expect, are asked to fill out a questionnaire containing the dependent variables. Under the premise that individuals will energize in immediate anticipation of an effortful task and will remain energized only as long as the instrumental task continues, Biner hypothesized that once energized and told of be a 30 minute delay, subjects would immediately start to de-energize. After ten minutes, at the outside, subjects' arousal levels were expected to return to baseline (Zillman, Johnson, & Day, 1974). Thus, Biner predicted that when dependent measures were administered ten minutes into a 30 minute delay (enough time for residual arousal to dissipate, yet before re-energization was expected to occur), goal valence ratings would be low and uniform
across manipulated task difficulty. This pattern did not emerge. While a replication comparison group showed the predicted nonmonotonic effect of task difficulty on goal ($1.00) valence, the time-delay group revealed a strongly significant negative linear trend of valence ratings across task difficulty levels. This result was somewhat consistent with the previously discussed energization data which showed a high level of arousal in easy conditions.

It was hypothesized by Biner (1983, 1987) that the motivational arousal responsible for the unexpected data in the easy condition was due to reactance arousal (Brehm and Brehm, 1981; Brehm, 1966). Reactance theory proposes that the threat of elimination or the elimination of an established behavioral freedom results in a motivation to restore the freedom (reactance) and an increase in the perceived attractiveness of the threatened freedom in question. Reactance offers a plausible explanation for the ratings of subjects who, in the easy condition of energization experiments, exhibit high arousal.

Subjects assigned to an easy instrumental task should not
energize due to the fact that it is unnecessary. Presumably subjects identify the task as one which they are capable of successfully completing without substantial effort. Thus, they may perceive the attainment of the goal object--conditional upon the successful completion of the task--as an established freedom. Interestingly, as the difficulty of the assigned task increases, the certainty of success diminishes, and consequently, the freedom to attain the goal becomes less firmly established. And, if at some point following a subject's task assignment, he doubts the validity that he will have an opportunity to earn the goal through, for example, an unexpected interruption, his freedom can be considered to be threatened, and reactance arousal should occur.

As mentioned earlier, psychologists studying energization typically interrupt their subjects with the dependent measures just prior to task commencement so as to ensure that the process of preparation to undertake the task is fully underway. If a subject incorrectly interprets this interruption as a threat to the opportunity (freedom) to earn the $1.00, reactance arousal should result, and be
highest for the easy task condition, the condition where freedom establishment is strongest.

The present study attempts to distinguish energization and reactance arousal by demonstrating that high arousal in the easy conditions of energization experiments can be effectively controlled by eliminating sources of reactance arousal. Specifically, when a questionnaire with the dependent measures is expected by subjects, i.e., it is attached to the experimental booklet and numbered as an additional page, low arousal will result, as predicted by the energization model. In such a case, there is no threat via an interruption and reactance is inapplicable. However, if the subject is interrupted and instructed to walk across a room to get the questionnaire, reactance arousal will occur. The reasoning here is that an interruption prior to the instrumental task will threaten the subject's freedom to earn the goal, or $1.00. It is hypothesized that a manipulation of task difficulty will result in differential establishment of this freedom. In summary, it is expected that in the interruption condition (reactance) arousal will be high in the easy
cell and low in the difficult cell. Conversely, the no interruption, or attached condition (energization) is expected to show low arousal in the easy cell and high arousal in the difficult cell. Because both theories would predict low arousal at an impossible task difficulty level, this condition is not included in the experimental design.

The hypothesis was tested in a 2x2 between subjects factorial design. Using one dollar as a goal object, task difficulty was manipulated by varying the size of a set of trigrams to be memorized. This manipulation of task difficulty was crosscut by an interruption/no interruption manipulation such that one half of the subjects received the dependent measures attached to their experimental booklet, while the remaining one half of the subjects were unexpectedly asked to walk across the room to get their questionnaires while waiting to receive the task. The dependent measures tapped goal valence and perceptions of task difficulty. An interaction between task difficulty and the interruption/no interruption manipulation was expected. Specifically, goal attractiveness ratings were expected to be a negative function of
task difficulty in the interruption condition and a positive function of task difficulty in the no interruption condition. A main effect for the interruption/no interruption manipulation was also expected with higher ratings anticipated in the no interruption condition.

Method

Subjects

Fifty-one male undergraduates from introductory psychology classes at Ball State University participated in the study as partial fulfillment of class requirements. Data from two subjects were excluded from the final analysis: One misunderstood the experimental instructions concerning the task, and one had learned of the experimental procedures from a friend.

Procedure

Subjects were run individually by one of two female experimenters according to a randomized blocks design. Upon arrival, subjects were greeted and led to an experimental cubicle and seated
at a table. Subjects were told, "Please sit at the table, there. Everything you need to know about the study is in the booklet. You may begin."

After turning to, reading, and signing the informed consent statement, subjects were instructed to continue to the next page and read the introduction.

**Difficulty Manipulation.** The introduction reiterated the purpose of the study as one concerned with the way memorization affects one's perceptions of his environment. It was explained that the subjects would learn a set of nonsense trigrams (e.g., RFT, YHG, AED) and two example sets were shown. The two sets, labeled "Set A" and "Set B," contained two and twenty trigrams, respectively. Subjects were told that they had been randomly assigned to learn a similar set of one of the two sizes and in order to find out which size set they were assigned, they were to look in the upper right hand corner of the page. There they would find either an "A" or "B" corresponding to the example sets.

Subjects were, in fact, randomly assigned to conditions such
that one half were led to believe they would be learning a set of two trigrams (easy), and the remaining one half a set of twenty trigrams (difficult). All subjects read that the experimenter would bring in a set of trigrams the size they were assigned and they would have two minutes to memorize the full set. It was explained that if the subject correctly memorized the full set in two minutes, he would receive the one dollar bill on the table. If he did not succeed, he would not receive the dollar. The introduction concluded that if the subject saw an "A" above, he had to memorize only two trigrams in two minutes, a very easy task. If he saw a "B," however, he had to memorize 20 trigrams in two minutes, a much more difficult task. Thus, the only difference in the script between the two levels of the difficulty manipulation was the letter "A" or "B" in the upper right hand corner of this page. The experimenter was blind to this manipulation.

**Interruption/No interruption Manipulation.** The manipulation of task difficulty was crosscut with a two-level interruption/no interruption manipulation. Questionnaires containing the dependent
measures were either attached to the experimental booklet as its last page (no interruption) or separate from the experimental booklet (interruption). Thus, subjects in the no interruption condition simply continued to the last page as instructed and filled out the dependent measures. When through, they were instructed to contact the experimenter through the intercom by stating "ready" to start the task. Subjects in the interruption condition, on the other hand, read, "After you have read and understand the above introduction and are ready to start your task, please state, in a normal tone of voice, 'ready' and the experimenter will bring in the task. All you have to do is push the button on the intercom, say 'ready' while pushing it, then let it go."

Instead of bringing in the task, the experimenter responded via the intercom, "Behind you there are some shelves. Get one questionnaire from the bottom shelf. Read it and answer the questions. When you're finished, we'll start the task." It may be noted here that subjects in this condition were watched through a small gap in curtains covering the mirror side of a one-way window.
between the experimental room and the control room. This ensured that the subject had heard and followed the instructions stated over the intercom. These subjects again were instructed on the questionnaire to contact the experimenter when they were through.

After filling out the questionnaire, all subjects were probed for prior knowledge of the experiment, thoroughly debriefed and given the dollar bill, after reading and signing a receipt for it.

**Dependent Measures.** The questionnaire was identical for both the interruption and no interruption conditions. A brief statement of explanation was at the top of the page indicating that the experimenters were concerned with the subject’s perceptions of the situational environment and would appreciate his responses to the questions, after which the task would be given. The explanation reinforced that all responses would be private and the subject’s name would not be associated with the study. The subject was asked to circle the number which best described his feelings about each question.

Following the explanation were four questions which consisted of
the major dependent measure of goal object (i.e., one dollar) attractiveness and three questions intended to check the success of the difficulty manipulation (i.e., perceived difficulty of task, perceived likelihood of success on the task, and predicted amount of effort expenditure). All responses were made on a Lickert-type scale from one to nine. For the goal attractiveness measure one represented “not at all attractive” and nine represented “extremely attractive.” Similarly, for the difficulty manipulation measures one corresponded to “not at all difficult,” “not at all likely,” and “none at all” (i.e., effort), while nine corresponded to “impossible,” “extremely likely,” and “a lot,” respectively.

Results

Manipulation Checks.

Subjects’ estimates of task difficulty, likelihood of success, and effort expenditure are listed by condition in Table 1. As can be seen, means of subjects’ estimates were as predicted, indicating task
difficulty was successfully manipulated. Perceived difficulty means increase as intended, from easy to difficult. Analysis of variance on these scores revealed a strong main effect for the difficulty manipulation, $F(1, 45) = 115.671, p < .001$ and neither an effect for the interruption/no interruption manipulation nor an interaction was found. Simple effects across difficulty levels for both the interruption and the no interruption conditions were statistically significant at the 1% level or better.

Analysis of probability of success and effort expenditure ratings also resulted in reliable main effects for manipulated task difficulty, $F(1, 45) = 73.933, p < .001$ and $F(1, 45) = 5.154, p < .03$, respectively. The pattern of means for the two scales were as predicted, i.e., as the task difficulty level increased, perceived effort expenditure increased and the perceived likelihood of success on the task decreased. Differences across difficulty levels were reliable at the 1% level with the exception of perceived effort in the interruption condition. No main effect for the interruption/no interruption manipulation nor an interaction was found for either
likelihood of success or effort expenditure.

**Goal Attractiveness.**

A task difficulty by interruption/no interruption interaction was predicted. Specifically, it was expected that the no interruption condition (energization) would produce a positive linear relationship between goal attractiveness and task difficulty, and the interruption condition (reactance) would result in a negative linear relationship between goal attractiveness and task difficulty.

A 2x2 analysis of variance yielded a statistically significant difficulty by interruption/no interruption interaction on goal attractiveness, $F(1, 45) = 19.413, p < .05$, in the predicted pattern. Analysis of variance on these scores also showed a strong main effect for the interruption/no interruption manipulation, $F(1, 45) = 7.962, p < .01$, for the most part due to the difference in scores in the easy condition, $t(45) = 3.38, p < .001$. Specifically, scores were significantly higher for the interruption condition. Simple effects also included a significant increase in goal attractiveness from the easy to difficult conditions in the no interruption group,
\( t(45) = 1.834, p < .05 \). The simple comparisons across the interruption/no interruption manipulation for the difficult condition, and across difficulty levels in the interruption were not reliably different. There was no effect for experimenter nor did it interact with the other independent variables.

Discussion

The results of the study support the predicted interaction of task difficulty and interruption/no interruption on goal attractiveness. As predicted, there was a positive linear effect of task difficulty on goal attractiveness in the no interruption condition (energization) and a negative linear relationship in the interruption condition (reactance).

The no interruption condition of the present study successfully replicated the findings of Brehm, et al. (1983). Goal attractiveness was found to be a positive linear function of the perceived difficulty of goal attainment. In this condition, reactance arousal was rendered
inapplicable by eliminating any form of interruption.

The interruption condition demonstrated that an unexpected interruption for dependent measure administration will result in a reactance pattern. Although to date it has not been empirically shown, reactance theory would predict that a threat to a freedom which has been relatively more strongly established will create more reactance arousal. Therefore, high reactance arousal can account for the high goal (or freedom) attractiveness in the easy condition upon an interruption (or threat), where subjects are relatively more confident of their opportunity to earn the goal than their counterparts in the difficult condition. Not surprisingly, goal valence ratings in the interruption-difficult condition are higher, but not reliably, than ratings in the no interruption-difficult condition. Because subjects in the difficult condition are, by definition, less confident of their ability to earn the goal, reactance arousal should also be less. Consequently, reactance arousal should not be expected to interfere with energization, but add to it differentially in the easy vs difficult conditions. This produced the strong interruption/no interruption
difference in the easy condition but only a modest difference in the difficult task condition.

The findings of the present research suggest the use of non-threatening (i.e., reactance arousing) experimental procedures when investigating the energization model. The findings of the present research distinguish energization and reactance as two distinct processes. The implication is that by screening energization studies for procedures which could be perceived as revoking the subjects' freedom to earn the said goal object, researchers can anticipate "cleaner" experimental designs.
References


Table 1

Mean Ratings for Goal Attractiveness and Manipulation Checks

<table>
<thead>
<tr>
<th>Condition</th>
<th>Attractiveness</th>
<th>Difficulty</th>
<th>Likelihood</th>
<th>Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Interruption</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy (n=12)</td>
<td>3.00</td>
<td>2.17</td>
<td>7.58</td>
<td>5.42</td>
</tr>
<tr>
<td>Difficult (n=12)</td>
<td>4.67</td>
<td>6.92</td>
<td>3.25</td>
<td>7.08</td>
</tr>
<tr>
<td>Interruption</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy (n=12)</td>
<td>6.08</td>
<td>2.17</td>
<td>7.58</td>
<td>6.67</td>
</tr>
<tr>
<td>Difficult (n=13)</td>
<td>5.23</td>
<td>7.85</td>
<td>2.69</td>
<td>7.38</td>
</tr>
</tbody>
</table>

Note: Response scales ran from 1 (low) to 9 (high).