Journal of Mental Imagery, 1988, *12*(1), 115-124

Mental Imagery of Fear-Related Stimuli

JOHN R. SULER
Rider College
EDWARD S. KATKIN
State University of New York at Buffalo

While snake-fearful and non-fearful subjects made the same number of errors on an affectively neutral imagery task, the fearful subjects showed a significantly greater increase in their number of errors on a fear-related imagery task. No differences among the groups emerged for physiological arousal while imaging or for self-reported ratings of imagery vividness and anxiety level. These results suggest that mental imagery is more sensitive to anxiety than self-report and conventional physiological indices. Attempting to image fear-related stimuli may trigger unconscious defenses that disrupt the imagery in order to ward off threatening affect. In terms of Ahsen's Triple Code (ISM) theory, these defenses operate in the imagery system without registering in the somatic and meaning systems.

Recent theories propose a close association between mental imagery and physiological processes (Ahsen, 1982; Lang, 1979). In this reciprocal relationship, mental imagery can effect physiological changes, while physiological changes can in turn influence the construction of the imagery. A corollary of this hypothesized relationship is that imagery can be used to access or generate the emotional states associated with physiological arousal. The wide variety of psychotherapies that employ mental imagery techniques — including behavioral and psychodynamic approaches — assume that imagery is a potentially facile carrier of affect, or that it can be used to tap emotional conflicts efficiently at an unconscious level. Experimental research suggests that mental imagery accesses emotions, as defined by psychological and physiological indices, more effectively than verbal cognitive processes (Reyher & Smeltzer, 1968; Suler, 1985). Clinical evidence suggests that psychotherapeutic work with eidetic imagery can reveal the affective roots of various psychological problems, including phobias (Ahsen, 1965, 1968; Dolan & Sheikh, 1977).

Whether the ability to image clearly is altered by the affectively arousing

Authors' address: John R. Suler, Department of Psychology, Rider College, Lawrenceville, New Jersey 08648; Edward S. Katkin, Department of Psychology, State University of New York, Buffalo, New York 17777. Send reprint requests to first-named author.

quality of the imagery has generated some debate. In his perceptual-release theory, West (1962) stated that as arousal increases, so does the vividness of imagery until ultimately it becomes hallucinatory. Experimental studies have indicated that increased arousal may facilitate the use of imagery in various cognitive tasks (Butter, 1970; Hohn, Johnsen, & Tracy, 1976; Weingartner, Hall, Murphy, & Weinstein, 1976). However, other research suggests that elevated levels of arousal will disrupt the imagery process. For example, Euse and Haney (1975) reported that subjects who scored high on a state-trait anxiety questionnaire, as compared to low scorers, experienced a significant decrease in their ability to control and clearly visualize items on an imagery questionnaire. Imaging stressful stimuli also seems to be more difficult than imaging neutral stimuli for normal subjects (Jones & Johnson, 1978) and schizophrenics (Brett & Starker, 1977).

A distinction must be made between emotionally arousing imagery and imagery that stimulates anxiety-provoking ideation. Mental imagery may indeed provide efficient access to emotions, and the degree of affective charging of the imagery may be reflected in its vividness. However, according to psychodynamic theory, when imagery taps threatening affect that has been warded off, signal anxiety and defense mechanisms may be triggered. As a result, the structure of the imagery may be modified or disrupted as a protective cognitive maneuver. Horowitz (1967) supported this idea with his suggestion that there is an adaptive advantage to emotional imagery being vivid and easily recalled, but that overly stressful imagery may be repressed and barred from complete assimilation by verbal cognitive processes. Richardson (1969) similarly suggested that underlying motivational processes may result in the confabulation of imagery, and that one feature of neurosis may be poor imagery ability stemming from the defense against internal events. Experimental research by Moses and Reyher (1985) demonstrated that attempting to image scenes that depicted anger and aggression resulted in two types of image disparity — image failure and image substitution — which reflected unconscious defense mechanisms of repression and derivative formation.

Many studies investigating the influence of affective arousal on mental imagery have relied on subjective reports of image clarity, arousal level, or both. The purpose of the experiment described in this paper was to evaluate the ability to image potentially anxiety-provoking stimuli using objective assessments, including performance on objectively scored imagery tasks in addition to psychophysiological measures of arousal. It was predicted that fearful subjects performing an imagery task involving fear-related stimuli would make more errors on that task than non-fearful subjects, and more errors than both fearful and non-fearful subjects performing a comparable neutral task.

Method

Subjects

A questionnaire assessing fear of snakes, similar to that of Lang and Lazovick (1963), was administered to 400 undergraduate students during mass testing in introductory psychology courses. Sixteen students scoring in the upper 10% participated in the experiment and were designated as the snake-fearful group. Twenty-one students in the lower 10% participated and were designated as the non-fearful group. Because all subjects in the fearful group were female, only females were selected for the non-fearful group. Informed consent was received from all the subjects. They were told they had been selected based on the results of mass testing, but were not specifically told that they had been selected based on their snake-fear scores.

Apparatus

Subjects were seated in a comfortable chair inside a soundproof chamber and were monitored by a partially concealed video camera. Electrodes attached to thenar and hypothenar eminences of the left palm were used to record basal skin conductance (BSC) and electrodermal responses (EDR). BSC was displayed at a sensitivity of 1 micromho/mm and EDR at .04 micromho/mm on a Grass model 7 polygraph. A computer regulated all the procedures in the experiment: it controlled the slide projection of the stimuli for the imagery tasks, recorded data from a buttonpress panel placed in the subjects' laps, and guided the subjects through the experiment by presenting instructions via tape recorder and television monitor.

Procedure

After a 10-minute rest/baseline period, all subjects performed the *unobstructed* block letter task, an imagery task adapted from Brooks (1968). The instructions for this task defined a two-dimensional block letter, emphasizing that any particular letter consists of a finite number of right-angle corners. An example was projected on the chamber wall. The subjects then viewed three slide projections of other block letters positioned between parallel lines. For each trial the projection of the letter lasted six seconds. When the projection was turned off, a tone signaled the subjects to begin imaging the letter. Starting at the lower left-hand corner of the letter in their imagination, they proceeded clockwise around its edges, categorizing each corner as touching ("yes") or not-touching ("no") one of the parallel lines (see Figure 1). As they performed this imagery task, they recorded their responses by pressing the "yes" and "no" buttons on the panel in their lap. For example, the correct answer for the block letter T is: yes/no/no/yes/yes/no/no/yes.

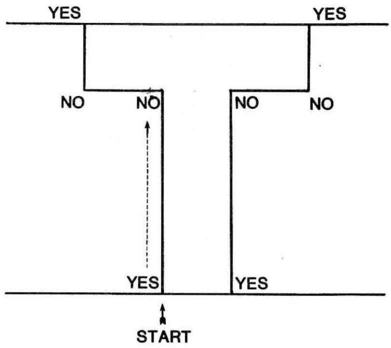

Figure 1. Example of Unobstructed Block Letter Task.

The subjects then performed three trials of the *obstructed* block letter task. For subjects randomly assigned to the *snake* condition, a slide projection lasting 6 seconds depicted a professional artist's drawing of a snake wrapped around a block letter, its body hiding some of the corners of the letter but not others (see Figure 2). The block letters that were depicted, the positions of the snake's body, and the corners that were hidden changed across the three trials. For subjects in the *rope* condition, slide projections identical to those in the snake condition were presented, with the exception that ropes were wrapped around the block letters (see Figure 3). Starting at the lower left-hand corner of the letter in their imagination, all subjects proceeded clockwise around its edges, categorizing each corner as either visible ("yes") or hidden by the snake/rope ("no"). As they performed the task,

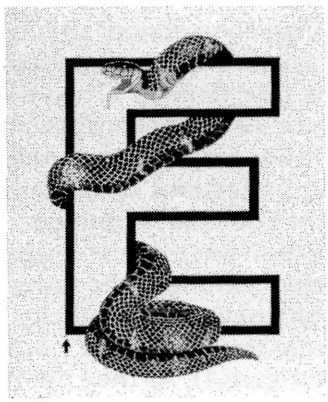

Figure 2. Example of Snake Letter.

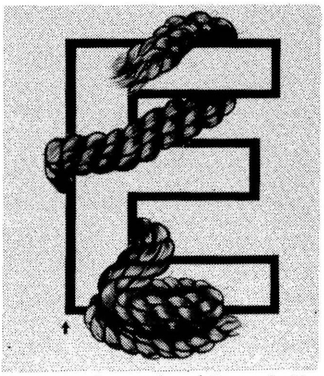

Figure 3. Example of Rope Letter.

they recorded their responses by pressing the appropriate button on the lap panel.

After each trial, the subjects in both conditions used a 5 point bipolar scale to rate the vividness of their imagery and the level of anxiety they experienced while imaging. They also answered true/false questions about the position and shape of the snake/rope. Using a 5-point bipolar scale, four research assistants blindly rated the video recordings for the degree to which the subjects closed or averted their eyes from the slide projection during the snake/rope task.

At the end of the experiment all subjects viewed for 30 seconds a slide projection of a close-up photograph of a real snake. Afterwards they completed Sheehan's (1967) shortened form of the Betts' mental imagery scale. Basal skin conductance and electrodermal responses were recorded throughout the experiment. The experimenters were blind to whether subjects were snake-fearful or non-fearful and to the specific hypotheses of the study.

Results

An error score on the unobstructed block letter task was derived by taking the absolute value of the difference between the number of corners the subject categorized as touching the parallel lines and the actual number of corners touching the lines. An error score for the obstructed block letter task was derived by taking the absolute value of the difference between the number of corners the subject categorized as visible and the actual number of visible corners.

An ANOVA of these error scores for the fearful and non-fearful subjects performing the obstructed and unobstructed block letter tasks revealed a significant group by task interaction, $F(1,33) < 9.54, p < .01$. This interaction revealed that both the fearful and non-fearful groups made a similar low number of errors on the unobstructed block letter task (M =.6 and .5, respectively), while for the letters obstructed by snakes/ropes the fearful subjects made four times as many errors (M = 1.7) as the non-fearful subjects (M =.4). Therefore, the fearful subjects showed a significant increase in errors when moving from the unobstructed to the obstructed task, while the non-fearful subjects showed no change. This interaction accounted for the significant main effect showing an overall greater number of errors for the fearful group, M = 1.15, as compared to the non-fearful group, M = .48, $F(1, 33) = 7.79, p < .01$. When comparing the subjects in the snake and rope conditions, there were no significant differences in the number of errors made.

An ANOVA of the self-report ratings by fearful and non-fearful subjects in the snake and rope conditions revealed no significant results concerning imagery vividness and the level of anxiety experienced while imaging the obstructed block letters. There were similarly no significant differences among the fearful and non-fearful groups for their scores obtained on the true/false questions pertaining to the shape and position of the ropes and snakes. An ANOVA of the ratings of the extent to which subjects closed or averted their eyes from the slide projections showed no differences among the fearful and non-fearful groups in the snake and rope conditions. Interjudge agreement among the three raters was high, mean $r = .89$. A *t*-test of the scores on the visual subscale of Sheehan's (1967) imagery scale revealed no significant differences between the fearful and non-fearful groups.

During the obstructed and unobstructed tasks the fearful and non-fearful subjects did not differ in their absolute values for BSC and EDR, nor in the scores representing deviations from the mean BSC and EDR during baseline. However, during the slide projection of the close-up photograph of a real snake, there was a greater increase in BSC over the baseline mean for the fearful subjects, M = 2.47 micromhos, as compared to the non-fearful subjects, M = 1.40 micromhos, $F(1,33) = 8.83, p < .01$.

Discussion

The snake-fearful subjects made more errors than the non-fearful subjects while visualizing the letters obstructed by the snakes and ropes; but the two groups did not differ in their ability to image the affectively neutral stimuli of the unobstructed block letter task. They also did not differ in their scores on the Sheehan (1967) imagery scale. Therefore, the fearful and non-fearful subjects may be considered equivalent in their general aptitude for mental imagery, but the fearful subjects showed a significant decrement in their ability when imaging fear-related stimuli.

As compared to the non-fearful group, the fearful subjects did not differ in the extent to which they avoided looking at the slide projections of the snake/rope stimuli, or in their recall of the details about the shape and position of the snakes/ropes. These findings, therefore, contradict the arguments that the fearful subjects' decreased performance in imaging could be explained by their tendency to divert their eyes from the stimuli, or by their sharp focus on the snakes/ropes to the exclusion of concentrating on the imagery task. That the two groups did not differ in their recall about the shape and position of the snakes/ropes also weighs against the argument that defenses hindering perception of the stimuli accounted for the fearful subjects' decreased performance. Finally, one might argue that the obstructed imagery task was more difficult than the unobstructed task, and that the fearful subjects made more errors on the obstructed task than did the non-fearful subjects simply because they are unskilled imagers. However, as mentioned above, the evidence indicated no difference in general imagery ability between the two groups. Also, the non-fearful group made slightly fewer errors on the obstructed task as compared to the unobstructed task, which suggests that the obstructed task was not more difficult.

According to the hypothesis of the study, the anxiety and defense mechanisms triggered by attempting to visualize the snakes stimulated the disrupting or altering of the fearful subjects' imagery. However, they were as poor at imaging the ropes wrapped around the block letters, which presumably were neutral stimuli, as they were for the snakes wrapped around the letters. Although this similar disruption of their imagery for the roped letters was unexpected, it is possible that the fearful subjects' cognitive associations to the twisting ropes triggered sufficient anxiety to affect their imagery. All subjects were told at the beginning of the experiment that they might be asked to perform imagery tasks involving snakes and that they would see a photograph of a real snake. This information might have sensitized the fearful group, thus stimulating anxiety-provoking ideation among those fearful subjects who visualized the roped letters.

While viewing the close-up photograph of a real snake, the fearful group did show greater physiological arousal than the non-fearful group, which indicates that they were indeed afraid of snakes. However, there were no significant differences in physiological arousal among the fearful and non-fearful groups imaging the block letters obstructed by snakes and ropes; nor did they differ in their self-report of their imagery vividness and the level of anxiety they experienced while performing these imagery tasks. If anxiety contributed to the interference of the fearful subjects' imagery of the snake stimuli, it was not sufficiently intense to be detected by psychophysiological measures or self-report. Therefore, it is possible that imagery integrity is more sensitive to stressful or anxiety-provoking stimuli than are physiological or self-report indices.

Interpreted from a psychodynamic perspective, these results may indicate that unconscious anxiety and defense mechanisms (which cannot be detected by self-report indices) influence the intrapsychic processing of mental imagery. Psychoanalytic theory states that the unrealistic fear of snakes is rooted in unconscious conflict — with the snake image conveying phallic symbolism and connotations of evil, castration, engulfment, or temptation. The attempts of fearful subjects to visualize snakes or a stimulus with serpentine connotations (i.e., twisted ropes) may trigger, on an unconscious level, signal anxiety and concomitant defensive strategies to ward off any threatening affect that might be stimulated by the imagery. Freud (1900) similarly noted how the fabric or dreams, another form of mental imagery, may be obfuscated by ego censorship at those points where conflict-related affect is most salient. As a result of their experimental research, Moses and Reyher (1985) concluded that the defenses against imaging anxiety-provoking stimuli may result in a failure to construct the image, or an uncontrolled emergence of derivative images that substitute for the image that was consciously intended. Disrupting the structure of a mental image may be one of the first lines of intrapsychic defense, even before anxiety can be detected by self-report or conventional physiological measures. As a general rule, mental imagery may be a sensitive barometer of subtle intrapsychic tactics.

The results also can be interpreted according to Ahsen's (1982) ISM or Triple Code Model of mental imagery. The defenses that altered the fearful subjects' imagery participated at the "I" (image) level of the ISM sequence, where complex enactive and staging processes culminate in the construction of the image. The arousal of affect and signal anxiety that stimulated these defenses may have been associated with central nervous system activity, but did not register in the peripheral system (electrodermal activity) or in motor behavior (closing eyes, looking away from the fearful stimulus). Therefore, the somatic (S) component was not fully activated. Similarly, verbal or lexical meaning (M) attributed to the imagery did not differ between the fearful and non fearful subjects because they did not differ in the self-report measures. The fearful subjects were not conscious, on a verbal level, of the diminishing of their imagery or of the meaning of that diminishing. Therefore, a lack of equivalence existed between the consciously experienced "overt" image and the underlying "covert" image — which, according to Ahsen's theory, indicates intrapsychic conflict.

That fear-related stimuli may be difficult to image is an important finding for any form of psychotherapy that utilizes mental imagery techniques. Insight-oriented approaches should consider the possibility that exploratory imagery may both unravel unconscious realms as well as trigger defenses that reciprocally alter the imagery. When using such behavior therapy techniques as systematic desensitization or covert sensitization, precautions might be taken to assess the clients' ability to image fear-related stimuli, and if necessary, to help them enhance that imagery.

REFERENCES

Ahsen, A. (1965). *Eidetic psychotherapy: A short introduction.* Lahore: Nai Matbooat.

Ahsen, A. (1968). *Basic concepts in eidetic psychotherapy.* New York: Brandon House.

Ahsen, A. (1982). Imagery in perceptual learning and clinical application. *Journal of Mental Imagery, 6,* 157-186.

Brett, E.A., & Starker, S. (1977). Auditory imagery and hallucinations. *Journal of Nervous and Mental Disease, 164,* 394-400.

Brooks, L.R. (1968). Spatial and verbal components of the act of recall. *Canadian Journal of psychiatry, 22,* 349-368.

Butter, M.J. (1970). Differential recall of paired associates as a function of arousal and concrete-imagery levels. *Journal of Experimental Psychology, 84,* 252-256.

Dolan, A.T., & Sheikh, A.A. (1977). Short-term treatment of phobia through eidetic imagery. *American Journal of Psychotherapy, 1,* 217-228.

Euse, F.J., & Haney, J.N. (1975). Clarity, controlability, and emotional intensity of image: Correlations with introversion, neuroticism, and subjective anxiety. *Perceptual and Motor Skills, 40,* 443-447.

Freud, S. (1900). *The interpretation of dreams.* (J. Strachey, Trans.). New York: Macmillan.

Hohn, R.L., Johnsen, E.P., & Tracy, D.B. (1976). Arousal and imagery effects on reminiscence and forgetting of nouns. *Journal of General Psychology, 94,* 147-148.

Horowitz, M.J. (1967). Visual imagery and cognitive organization. *American Journal of Psychiatry, 123,* 938-946.

Jones, G.E., & Johnson, H.J. (1978). Physiological responding during self-generated imagery of contextually complete stimuli. *Psychophysiology, 15,* 439-446.

Lang, P.J. (1979). A bio-informational theory of emotional imagery. *Psychophysiology, 16,* 495-512.

Lang, P.J., & Lazovick, A.D. (1963). Experimental desensitization of a phobia. *Journal of Abnormal and Social Psychology, 66,* 519-525.

Moses, I., & Reyher, J. Spontaneous and directed visual imagery: Image failure and image substitution. *Journal of Personality and Social Psychology, 48,* 233-242.

Reyher, J., & Smeltzer, W. (1968). Uncovering properties of visual imagery and verbal association: A comparative study. *Journal of Abnormal Psychology, 73,* 218-222.

Richardson, A. (1969). *Mental imagery.* New York: Springer.

Sheehan, P.W. (1967). A shortened form of Betts' Questionnaire Upon Mental Imagery. *Journal of Clinical Psychology, 23,* 386-389.

Suler, J.R. (1985). Imagery ability and the experience of affect by free associative imagery. *Journal of Mental Imagery, 9,* 101-110.

Weingartner, H., Hall, B., Murphy, D.L., & Weinstein, W. (1976). Imagery, affective arousal and memory consolidation. *Nature, 263,* 311-312.

West, L.J. (1962). A general theory of hallucinations and dreams. In L.J. West (Ed.), *Hallucinations.* New York: Grune and Stratton.