

Verbal Versus Imaginal Cognitive Strategies in the Inhibition of Emotional Arousal

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A substantial body of evidence indicates that psychiatric disorders are accompanied by altered lateral brain function. The left hemisphere appears to become highly activated and dysfunctional in schizophrenia (Flor-Henry, 1974; Gruzelier & Hammond, 1976; Gur, 1978), while a specific right-hemisphere performance decrement has been found in affective disorders (Flor-Henry, 1974; Kronfol, Hamsher, Digre, & Waziri, 1978). These findings raise the issue of whether a particular alteration of hemispheric function is related to a predictable alteration of cognitive processes. The right hemisphere's documented importance to the understanding and expression of emotion (Heilman, Scholes, & Watson, 1975; Sackeim, Gur, & Saucy, 1978; Schwartz, Davidson, & Maer, 1975; Wechsler, 1973) seems to be facilitated by its capacity for global conceptual integration of sensory with visceral cues (Safer & Leventhal, 1977; Semmes, 1968). Smokler and Shevrin (1979) contrasted college students who showed a hysteric cognitive style, wherein ongoing cognition is infused with emotion, with those who showed an obsessive-compulsive style, wherein the intellectualized ideation is isolated from affective significance (Shapiro, 1965); a high frequency of left lateral eye movements observed for the hysteric-style persons suggested the importance of the right hemisphere's contribution to their naturalistic ideation. A possible role for the left hemisphere's verbal and analytic ideation in modulating the right hemisphere's emotional responsivity has been suggested by Tucker, Antes, Stenslie, and Barnhardt (1978). Characteristically anxious college students were observed to show a pattern of left-hemisphere activation and left-hemisphere performance impairment that may suggest a parallel in normal individuals to the pattern of left-hemisphere involvement in schizophrenia. Observing further that this apparent overactivation of the left hemisphere was accompanied by a decreased frequency of left lateral eye movements,

Tucker et al. (1978) suggested that the left hemisphere may normally provide an inhibitory function for emotion that is complementary to the right hemisphere's emotional responsivity. To examine whether persons would naturally use cognitive processes to facilitate or inhibit emotion that would reflect this hypothesized difference in the roles of the two hemispheres, Shearer and Tucker (1980) asked college students to view emotionally arousing slides and to either facilitate or inhibit their emotional responses. Independent ratings of the students' reports of their naturalistic cognitive strategies showed that verbal and analytic ideation was most often used when the task was to inhibit emotion, while global and imaginal thinking was used more often to facilitate the emotional experience. The present research was designed in an attempt to experimentally manipulate differential hemispheric contributions through providing subjects with a verbal/analytic or an imaginal/global cognitive strategy, such that a hypothesized differential efficacy in modulating emotional responsivity could be examined. In view of the dearth of evidence on the left hemisphere's role in emotion, and given the importance of sequential and analytic linguistic cognitive organization to such cognitive therapy procedures as self-statements (Meichenbaum, 1974), we requested subjects to specifically inhibit their emotional responses while viewing arousing slides, with the hypothesis that greater success in inhibiting both subjective and autonomic arousal would be achieved by a verbal/analytic rather than an imaginal/global cognitive strategy.

METHOD

Subjects and Procedure

Thirty-four female and 31 male right-handed undergraduates viewed a set of six slides of nude heterosexual couples and a set of six slides of aversive material, including disfigured bodies, starving children, and snakes (Shearer & Tucker, 1980). Half of the subjects (15 males and 16 females) were randomly assigned an imaginal/global cognitive strategy and half (16 males, 18 females) were assigned a verbal/analytic strategy. Same-sex undergraduate experimenters who were naive to the hypothesis of the study instructed the subjects in the assigned strategy. All subjects were told that their task was to minimize the intensity of the positive or negative emotion they experienced, using the suggested cognitive strategy. The imaginal/global strategy emphasized the use of mental images and imaginative fantasy, while the verbal/analytic strategy involved the use of covert verbalizations and analysis of the scene into parts. Following

two sexual and two aversive practice slides, the subjects received further instruction on the appropriate strategy, then viewed the two blocks of six emotional slides with the order of the blocks counterbalanced across subjects. Each slide was presented for 45 sec. Thirty seconds after slide onset, skin temperature was recorded from each hand from a thermistor at the base of the thumb. When the slide went off, the subjects were asked to rate the emotion they had experienced on a scale of -10 for very negative to +10 for very positive.

RESULTS

The ratings of subjective emotion were summed over each block of six slides and subjected to a repeated-measures analysis of variance, with sex and strategy as between factors and stimulus (sexual/aversive) as a repeated factor. Sexual slides were rated more positive than aversive ones, $F(1,61) = 365.02, p < .001$, and females gave more negative ratings overall ($\bar{X} = -.94$) than males ($\bar{X} = -.19$), $F(1, 61) = 8.45, p < .006$. While the hypothesized main effect for strategy was not significant, there was a significant strategy by stimulus interaction, $F(1,61) = 4.01, p < .05$. While subjective emotion ratings were more intense for the imaginal strategy than the verbal one across both stimulus types, the difference was slight for the aversive slides (-4.00 vs. -3.67) while it was strong for the sexual slides (5.30 vs. 3.87). One mean skin temperature reading in degrees change from initial baseline was obtained for each hand for each subject by summing over the six slides in each stimulus condition. A repeated-measures analysis of variance, with sex and strategy as between factors and stimulus and hand (left/right) as repeated factors, was performed on these data. Table I presents the means categorized by the several factors. Overall, subjects' hands became warmer during the experiment; apparently their sympathetic arousal (Sternbach, 1966) was

Table I. Mean Skin Temperature for Males and Females in the Left and Right Hands While Using Imaginal and Verbal Cognitive Strategies in Response to Sexual and Aversive Slides

	Sexual				Aversive			
	Imaginal		Verbal		Imaginal		Verbal	
	L	R	L	R	L	R	L	R
Males	1.02	.89	1.46	2.01	1.22	1.26	1.83	2.19
Females	1.23	1.19	2.24	2.37	1.16	.96	1.65	1.88

high before the slides began and decreased as they viewed the slides. This observation suggests that both cognitive strategies were effective in inhibiting arousal or that the slides were less arousing than the subjects expected at the outset, or some combination of these factors; the generally moderate ratings of subjective intensity are congruent with such interpretations. Within this overall effect, the main effect for cognitive strategy was significant, $F(1,61) = 4.95$, $p < .03$, with higher skin temperature for the verbal/analytic strategy than for the imaginal/global one suggesting that the verbal strategy was particularly successful in decreasing sympathetic arousal. The four-way interaction involving sex, strategy, stimulus, and hand was also significant, $F(1,61) = 4.88$, $p < .04$. While an interaction of this order is difficult to interpret, two trends appeared to contribute to the effect. Males seemed to show greater vasoconstriction to the sexual slides, while females appeared more activated in response to aversive material; the sex by stimulus interaction itself approached significance, $F(1,61) = 3.18$, $p < .08$. Also apparent in this interaction was a tendency for a warmer right hand to accompany the verbal strategy, compared to a warmer left hand with the imaginal strategy. This tendency was not significant in its own right, however, and accounted for substantial variance in the data only as it interacted with the sex and stimulus factors.

DISCUSSION

The comparison of the effect of cognitive strategy upon autonomic arousal in the present data indicated that the verbal/analytic strategy was more effective than the imaginal/global one in decreasing bilateral peripheral vasoconstriction, and thus sympathetic arousal, as the subjects viewed the emotional material. The results for the subjective ratings of emotional intensity paralleled the autonomic response, at least for the sexual material. For the sexual slides, the verbal/analytic strategy seemed to decrease both autonomic and subjective responsivity, while the aversive slides were still rated as subjectively negative even though vasoconstriction was reduced. In general, these observations seem to provide support for the finding of Shearer and Tucker (1980) that when asked to inhibit their emotional responses, most people will engage in verbal and analytic thinking rather than ideation that is global and imaginal; not only is this naturalistic cognitive preference widespread, it also seems to be effective.

Common sense would hold that "rational" ideation, analytic, sequential, and linguistically structured, is less susceptible to emotion than is imaginative thought. However, research on lateralized cognitive processes and emotion should be able to achieve more than a validation

of the obvious; it may be possible to use a neuropsychological model to delineate the unique features of neurally distinct cognitive systems and to study how these are relevant to motivation and emotion. The central inferential issue is whether it is possible to attribute a cognitive process to a particular hemisphere. Research on lateral eye movements (Ehrlichman & Weinberger, 1978) and on electroencephalographic activation (Davidson & Ehrlichman, 1980) has shown that providing a subject with a task that the experimenter thinks should be performed with a particular hemisphere does not ensure that a given subject will resort only to that hemisphere in attempting to handle the task. When training is provided in a specific cognitive strategy, as in the present study, the cognitive processes that are thought to be unique to a particular hemisphere can be more carefully controlled. However, in utilizing a neuropsychological model, it is important to maintain respect for the inferential nature of the connection between brain function and cognitive processes. With sufficient consideration of the requisite inferences, it should be possible in further research to delineate the implications of a particular pattern of hemispheric activation for an individual's daily coping attempts, and thus to better understand how altered lateral brain function in psychiatric patients may be interdependent with alterations in ideational and interpersonal functioning.

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