

EFFECTS OF AGGRESSING "ALONE" OR "WITH ANOTHER" ON PHYSIOLOGICAL AND PSYCHOLOGICAL AROUSAL¹

JOHN W. BAKER, II,² AND K. WARNER SCHAIE

West Virginia University

The hypothesis that aggressive experience reduces frustration as expressed by physiological and psychological arousal was investigated by assessing differences in arousal reduction achieved by the subject counteraggressing alone or through aggressive responses expressed with another person (vicar). Counteraggression occurred through overt (physical and verbal) and covert (fantasy and abated) means. One hundred twenty-eight undergraduate males were assigned to the different treatment conditions. Significant changes in systolic blood pressure were noted as a function of overt means of counteraggression. Effects of counteraggressing alone or with another, however, did not differ significantly.

Hokanson and Shetler (1961) and Hokanson and Burgess (1962) observed that systolic blood pressure is lowered when an angered individual sees the instigator of that "anger" attacked. In these studies college students were deliberately angered and given the opportunity to counteraggress against the instigator under several conditions. Provocation led to elevated systolic blood pressure, while the subjects showed a relatively quick reduction in residual systolic blood pressure when given the opportunity to aggress against the instigator physically (electric shock) or verbally (rating on a questionnaire). Responding by similar motor activity (button but no shock) and through writing stories to a TAT card did not yield the same quick blood pressure reduction.

Such findings have been interpreted by Berkowitz (1965) to mean that an individual in whom an aggressive response sequence has been activated achieves "completion" of this sequence and a resulting tension reduction when he believes the instigator has been injured, regardless of the form of aggression.

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²Requests for reprints should be sent to John W. Baker, II, who is now at Office of Military Psychology and Leadership, United States Military Academy, West Point, New York 10996.

However, the role of aggression anxiety has also been discussed (Berkowitz, 1960, 1962; Wurtz, 1960), suggesting that the arousal of aggressive tendencies, particularly among middle-class Americans, is anxiety producing since aggression might bring loss of approval, physical injury, or other deleterious effects. Such aggression anxiety may prevent individuals from aggressing against instigators in spite of self-acknowledged arousal and/or anger.

Berkowitz (1962) has suggested that the "completion" of the aggressive sequence cannot be accomplished unless the aroused individual perceives that he or an *acceptable substitute* has physically or psychologically injured the instigator. Rosenbaum and De Charms (1960) have noted that observations of the responses of others to environmental stimuli can often affect the observer's response system in the same way as if he had carried out the behavior himself. This type of phenomenon was described by Rosenbaum and De Charms (1960) as falling under the realm of vicarious experience. In view of their analysis and the inhibiting effects attributed to "aggression-anxiety," the present study asks whether the blood-pressure reduction obtained by Hokanson and his colleagues would also be observed if someone other than the angry person attacks the anger instigator. The participation of this "other individual" may enhance aggressive expression and minimize aggression anxiety when the instigator

of "anger" is attacked under the various experimental conditions.

Many previously studied components of the frustration-aggression model have been combined into a single multidimensional approach in the present experiment. The study investigates physiological and psychological changes in arousal when subjects were permitted to counteraggress alone or could observe another person carry out the behaviors. Attacking the instigator "alone" meant the subject did all the responding, whereas attacking "with another" meant the subject's partner (vicar) did the responding. For either the subject or his vicar to attack under overt conditions meant physical (shock) or verbal (oral) responding. For either to attack covertly meant fantasy (written) or abated (restricted) responding.

The following hypotheses were tested: (a) When the vicar expresses aggression overtly (physically and/or verbally), the subject shows a lowering of physiological arousal, and when the vicar expresses aggression covertly (fantasy and abated), there is a maintenance of, or an increase in, physiological measures over the immediate postarousal level; (b) there is less residual psychological arousal for the subject when the vicar aggresses overtly than if the subject does so himself. This is true because of the anxiety created by the aggression alone as a result of fear or punishment or guilt or some combination of the three; (c) there are no differences on the psychological measures of arousal in the covert situations, whether expression of aggression is by another or by the subject alone, because of the less intrinsic danger of retaliation for covert aggression.

METHOD

Subjects

The subjects were 128 undergraduate males enrolled in introductory courses in the university. Sixty-four of these were considered controls. All subjects, experimental and controls, were exposed to high frustration. The experimental subjects were subsequently exposed to other differing experimental treatments.

Experimental Variables

The independent variables were (a) counteraggressing alone versus counteraggression by another

person in the presence of the subject and (b) overt (physical and verbal) versus covert (fantasy and abated) means of counteraggression under both "alone" and "with another" conditions of counteraggression. It should be noted that in spite of subjective observation of varying degrees of intensity in counteraggression, no objective assessment of the quality of counteraggression was reported.

The dependent variables were (a) residual psychological arousal as measured by Scheier and Cattell's IPAT 8 Parallel Form Anxiety Battery (Scheier & Cattell, 1960) and (b) residual physiological arousal as measured by systolic blood pressure, pulse rate, and respiration rate recorded on a three-channel polygraph. Systolic blood pressure was monitored on a multichanneled polygraph three times during the last 2 minutes of each phase and through the anxiety measure and then averaged for a single measure per phase. Respiration was continuously monitored, as was pulse rate, on the polygraph. Reported measures were the average readings per minute on both dimensions beginning 2 minutes prior to the end of a phase and through the anxiety assessment technique.

Procedure

The experiment was introduced to the subject as one involving physiological and psychological responses to working on routine intellectual tasks. Half of the experimentals and controls were exposed to a vicar who was presented as a classmate who would be available to answer questions and aid the subject on tasks if the subject requested assistance. The other half of either group proceeded through the experiment without such an ally.

Phase I. After a several minute adaptation period for both groups, the subjects (128) were administered the Picture Completion subtest of the Wechsler Adult Intelligence Scale (WAIS—Hokanson & Burgess, 1962; Hokanson & Shetler, 1961), following which both physiological and psychological measures were taken. Physiological measures were taken during and after the Picture Completion task. The anxiety scale was done immediately after the Picture Completion task. The elapsed time from the end of the Picture Completion task to the end of the anxiety measure and beginning of Phase II averaged 3 minutes and 5 seconds.

Phase II. The frustration-manipulation phase was then established. Here the 128 subjects were asked to count backwards from 99 to 1 as quickly as possible by two's. To make conditions highly frustrating, they were repeatedly interrupted and harassed concerning their slow performance, asked to begin again four times, and finally stopped with the statement that their data could not be used. This technique has been used by Hokanson (1961) to produce subjective feelings of intense anger.

Phase III. The situation to permit both counteraggressing alone or with another was set up as follows: The experimental subjects were told that the next task involved an interpersonal guessing game in that the subject was to think of a number be-

EXPERIMENTAL (Counteraggression)			CONTROL (Rest)	
	Alone	With Another	Alone	With Another
Physical	Overt	8	32	32
		8		
Verbal	Overt	8		
		8		
Fantasy	Covert	8		
		8		
Abated	Covert	8		
		8		

FIG. 1. Subjects under various experimental conditions.

tween 1 and 10 and write it down, following which the experimenter was to guess the number. This would be done for 10 trials. Under Experimental Condition 1 (aggressing alone) eight subjects were assigned to each of four modes of counteraggressing. In each case if the instigator guessed the number correctly the subject merely nodded his approval; if the instigator guessed incorrectly, he was attacked, depending upon the method called for. Under Experimental Condition 2 (aggressing with another) the subject was told that if the instigator guessed incorrectly, the vicar would see the number written down and would communicate to the instigator under one of the four ways of aggressing. If the instigator guessed correctly, the vicar would nod approval. After the counteraggressing under Experimental Conditions 1 and 2, the subjects were again given the physiological and psychological measures.

The four modes of counteraggressing were:

1. *Physical (overt)*—Experimental Condition 1—The subject applied apparent electric shock to the instigator. Experimental Condition 2—Vicar applied apparent electric shock to the instigator.
2. *Verbal (overt)*—Experimental Condition 1—The subject was permitted orally to attack the instigator. Experimental Condition 2—Vicar was permitted orally to attack the instigator.
3. *Fantasy (covert)*—Experimental Condition 1—The subject was permitted to write a response to Card 8BM of the TAT (Hokanson & Burgess, 1962). Experimental Condition 2—Vicar wrote attack on instigator and showed only to subject.
4. *Abated aggression (covert)*—Experimental Condition 1—The subject pressed button signaling wrong response. Experimental Condition 2—Vicar pressed button signaling wrong response.

The control subjects were told to "sit for awhile" for a period of time equal to the average time required for the experimental subjects to do Phase III, after which the experimenter reassessed the control subjects on physiological and psychological dimensions. During Phase III the control subjects under "alone" conditions sat alone, while control subjects under "with another" conditions sat with and were permitted to converse with the vicar. The abated aggression experimental subgroup differed from the control group in that abated subjects re-

sponded to the intervening interpersonal guessing task by withholding aggression. The control group, however, after being aroused in Phase II, was not exposed to the interpersonal task, thus lacking any experimentally established means of expression back to the instigator.

The instigator in the experiment was introduced as a graduate student doing some research for his professor. The recorder was introduced as a lab technician and the vicar was introduced as a college classmate of the subject. A graphic summary of the conditions is provided in Figure 1.

RESULTS

Effectiveness of the Arousal Technique

Assessment of the arousal technique (reversed counting) and the effectiveness of resting versus counteraggression after arousal was accomplished by separate analyses of variance for the three physiological and one psychological measure. Differences among treatment means were subsequently assessed by Duncan's new multiple-range test.

All 128 subjects experienced the same experimental treatment up to the termination of measurement after Phase II. Attention therefore had to be directed toward the effectiveness of the arousal task. Table 1 summarizes the mean levels from Phase I (base line) to Phase II (postarousal) for all four dependent variables.

Arousal is commonly defined as an increase in physiological and/or psychological activation. In this sense, evidence of a significant increase ($p < .01$) from base line to postarousal could be demonstrated only for systolic blood pressure. There was a significant decrease ($p < .01$) in respiration as measured by breathing rate noted between Phase I and Phase II. No significant changes in pulse rate

TABLE 1
MEAN PHYSIOLOGICAL AND PSYCHOLOGICAL
LEVELS FOR ALL THREE PHASES

Phase	Arousal index			
	Blood pressure	Pulse rate	Respiration	Anxiety
I	129.77 ^a	86.92 ^b	19.86 ^b	6.13 ^a
II	137.20 ^b	85.89 ^{a,b}	18.73 ^a	6.13 ^a
III	131.03 ^a	84.49 ^a	18.67 ^a	6.21 ^a

Note.—For each of these measures, cells having any superscript in common are not significantly different (at or beyond the .01 level) by Duncan's multiple-range test. Each mean is based on 128 subjects.

or anxiety were noted from Phase I to Phase II.

Changes after Resting or Counteraggression

The analysis of changes noted when subjects permitted to rest (controls) or to counteraggress (experimentals) is summarized in Tables 1 and 2.

The analysis of the three phases of measurement generally yielded significant changes which were not always in the direction expected. Changes for all physiological measures were significant ($p < .01$), but the psychological variable was not significantly affected. Blood pressure ($p < .01$) was significantly changed and in the predicted direction (Table 1). Subjects' blood pressure was significantly decreased after either resting or counteraggression, and base-line measures (Phase I) did not differ significantly from postrelease (Phase III) measures (Table 1). Pulse rate ($p < .01$), although showing significant changes, was quite different in direction from blood pressure (Table 1). Pulse rate dropped upon each subsequent recording in such a manner that base-line and postarousal measures were not significantly different nor were postarousal and postrelease measures. However, postrelease was significantly different ($p < .01$) from base line. Respiration showed significant changes ($p < .01$) with each subsequent measurement and in much the same

direction as the pulse rate. Respiration dropped significantly ($p < .01$) from the base-line measurement to both postarousal and postrelease. However, there was no significant drop from postarousal to postrelease just as was noted with pulse rate. Generally speaking, the arousal task and release mechanisms (rest or counteraggression) showed the expected directional results only for blood pressure, with some significant, but confusing, effects for the pulse rate and respiration, and absolutely no differential effect for the psychological variable.

Further Analysis of Subjects Permitted to Counteraggress

A further analysis of the experimental subjects was performed in an effort to ascertain any differential effects of the mode of counteraggression. The initial analysis (Table 3) of these 64 subjects noted the combined effects of physical and verbal (overt) counteraggression as compared to that of fantasy and abated aggression (covert). (Subsequently, the four modes were assessed as to their individual effects.) Within the experimental subjects, significant changes ($p < .01$) over times of measurement occurred for blood pressure and respiration. Also there was a significant interaction between occurrence of measurement and the modes of counteraggression. Table 3 shows the complete analysis of variance.

TABLE 2
ANALYSIS OF VARIANCE OF AROUSAL MEASURES

Source	df	Arousal index							
		Blood pressure		Pulse rate		Respiration		Anxiety	
		MS	F	MS	F	MS	F	MS	F
Between Ss	127								
Control-Experimental (A)	1	653.649	1.392	358.440	<1	2.667	<1	2.25	<1
Alone-With another (B)	1	177.399	<1	146.274	<1	24.000	<1	8.64	2.85
A × B	1	470.377	1.002	11.690	<1	.093	<1	1.60	<1
Error between	124	469.308		467.709		36.604		3.03	
Within Ss	256								
Phase (C)	2	2,024.987	107.77**	190.347	9.75**	57.167	16.171**	.30	<1
A × C	2	20.914	1.113	69.143	3.54	12.323	3.48*	.75	<1
B × C	2	3.820	<1	.383	<1	1.219	<1	.025	<1
A × B × C	2	50.049	2.663	10.273	<1	.657	<1	.815	<1
Residual between	248	18.789		19.523		3.535		.842	

* $p < .05$.

** $p < .01$.

TABLE 3
ANALYSIS OF VARIANCE OF AROUSAL MEASURES WITHIN THE COUNTERAGGRESSION GROUP

Source	df	Arousal index							
		Blood pressure		Pulse rate		Respiration		Anxiety	
		MS	F	MS	F	MS	F	MS	F
Between Ss	127								
Alone-With another (A)	1	35.021	<1	37.631	<1	12.505	<1	1.40	<1
Overt-Covert (B)	1	1.688	<1	78.797	<1	1.172	<1	13.98	4.438*
A × B	1	204.187	<1	931.921	1.611	135.005	4.232*	3.91	1.241
Error between	60	476.432		578.174		31.900		3.15	
Within Ss	128								
Phase (C)	2	1,010.005	71.328**	45.329	1.937	19.224	5.841**	.990	1.544
A × C	2	13.287	<1	7.255	<1	.880	<1	.500	<1
B × C	2	176.359	12.454**	3.109	<1	2.016	<1	.045	<1
A × B × C	2	6.579	<1	23.079	<1	3.069	<1	.210	<1
Residual within	120	14.160		23.292		3.291		.641	

* $p < .05$.
** $p < .01$.

Assessment of the changes effected by experimental conditions within the total counteraggression group (Table 4) produced significant and expected results only for the blood-pressure indicator ($p < .01$). Here, as in the overall analysis, there was a significant difference between the postarousal measure and both base-line and postcounteraggression. Base-line and postcounteraggression were not significantly different. Although trends were similar with pulse rate and the psychological measure, changes here did not reach statistical significance. The respiration measure also varied significantly in the same direction as did the overall analysis (Table 4).

Table 3 also indicates a significant ($p < .01$) interaction for the blood-pressure variable between measurement phase and the subject's use of either overt or covert modes of coun-

teraggression. Table 5 shows the treatment means for blood pressure as a function of overt and covert communication.

In the experimental group, where counteraggression was permitted, both overt and covert means showed a significant increase in blood pressure from base line to postarousal. However, in the overt condition where counteraggression toward the instigator was permitted either physically or verbally, the postcounteraggression reading was significantly decreased ($p < .01$), whereas there was no significant decrease in the postcounteraggression of covert subjects where aggression was not overtly communicated to the instigator. Also, under overt conditions, the postcounteraggression reading was not significantly different from base line. Whereas the postcounteraggression covert reading was reduced some-

TABLE 4
MEAN LEVELS OF AROUSAL WITHIN THE COUNTERAGGRESSION GROUP

Phase	Arousal index			
	Blood pressure	Pulse rate	Respiration	Anxiety
I	128.13 ^a	87.05 ^a	19.72 ^b	6.15 ^a
II	135.80 ^b	87.38 ^a	19.17 ^{a,b}	6.17 ^a
III	130.17 ^a	85.78 ^a	18.63 ^a	6.38 ^a

Note.—For each of these measures, cells having any superscript in common are not significantly different (at or beyond the .01 level) by Duncan's multiple-range test. Each mean is based on 64 subjects.

TABLE 5
MEAN SYSTOLIC BLOOD PRESSURE LEVELS AS A FUNCTION OF OVERT AND COVERT COUNTERAGGRESSION

Phase	Mode	
	Overt	Covert
I	129.25 ^{a,b}	127.00 ^a
II	136.38 ^d	135.22 ^{c,d}
III	128.19 ^a	132.16 ^{b,c}

Note.—For this table, measures having any superscript in common are not significantly different (at or beyond the .01 level) by Duncan's multiple-range test. Each mean is based on 32 subjects.

TABLE 6
MEAN BLOOD PRESSURE LEVELS FOR PHYSICAL,
VERBAL, FANTASY, AND ABATED MODES
OF COUNTERAGGRESSION

Phase	Overt		Covert	
	Physical	Verbal	Fantasy	Abated
II	139.06	133.69	139.00	131.44
III	129.13 ^a	127.25 ^a	135.88	128.44

^a Change from Phase II to Phase III is significant (at or beyond the .01 level of confidence) based on Duncan's multiple-range test. Each mean in this table is based on 16 subjects.

what, it was still significantly different from base line ($p < .01$). The opportunity to express counteraggression overtly to the instigator either by the subject himself or by seeing someone else do it had the expected results of lowering blood pressure to approximate base-line readings.

The noted interaction of overt and covert modes of counteraggression with occurrence of measure left open to question whether the individual modes of aggression within the overt or covert groups contributed in the same way to the changing blood pressure readings after counteraggression. Further analysis of the separate modes of aggression revealed that both physical and verbal communication contributed about equally to the reduced blood pressure under overt communication. Also, there was the same nonsignificant drop in blood pressure from post-arousal to postcounteraggression under both covert communication groups, with no significant difference between the individual

modes of fantasy and abated aggression (Tables 6 and 7).

DISCUSSION

Responding Alone or with Another

The fact that any expression of aggression (socially approved or condemned) carries some possibility of retaliation ought to be subjectively arousing. Therefore, if a vicar substitutes as the instigator's counteraggressor, the imminent retaliation may not be threatening to the subject in that the instigator's recourse would probably be directed to the source of counteraggression (vicar) rather than to the subject himself. However, in the present study the vicar's presence or absence did not produce any significant difference in arousal. It was noted that the vicar served more as a companion with whom the subject could converse. A number of the subjects commented postexperimentally that the vicar was seen more as an ally of the instigator than of the subject himself.

Different Modes of Counteraggression

The two basic manifestations of counteraggression were in either an overt or covert manner. The overt modes of counteraggression were expressed directly to the instigator so that both he and the counteraggressor were consciously aware of the attack.

Berkowitz (1962, 1965) has interpreted previous studies (Hokanson & Burgess, 1962) as suggesting that when overt modes of counteraggression occurred, physiological arousal

TABLE 7
ANALYSIS OF VARIANCE OF BLOOD PRESSURE LEVELS WITHIN
THE COUNTERAGGRESSION GROUP

Source	SS	df	MS	F
Between Ss	28,826.813	63		
Alone—With another (A)	35.021	1	35.021	≤1
Physical-Verbal-Fantasy-Abated (B)	1,893.188	3	631.062	1.367
A × B	1,052.271	3	350.751	≤1
Error between	25,846.333	56	461.542	
Within Ss	4,111.667	128		
Phase (C)	2,020.011	2	1,010.005	72.298*
A × C	26.573	2	13.287	≤1
B × C	462.531	6	77.089	5.518*
A × B × C	37.885	6	6.314	≤1
Residual within	1,564.667	112	13.970	

* $p < .01$.

levels were reduced to the extent that the subject perceived injury to the instigator because of the "completion" of an activated action tendency. The present study supported the previous reasoning in terms of the decrease in systolic blood pressure. As in other studies, furthermore, pulse-rate and respiration measures did not tend to be as sensitive to the experimental treatment as did blood pressure. Seeing the instigator injured appears to have lowered physiological levels of the subject. This was noted regardless of the presence or absence of the vicar. Thus, what was crucial seemed to be the perception by the subjects of the instigator's being injured, regardless of who accomplished the injury.

Also supporting previous findings (Hokanson & Burgess, 1962) was the failure to demonstrate a significant lowering of blood pressure under covert modes of counteraggression. The subject apparently did not perceive this mode of counteraggression as having been injurious to the instigator. Hence, arousal was maintained because there was apparently no completion of an action tendency.

Generally, the data of the present study tend to support the contention by Berkowitz (1965) that a number of different aggressive actions upon the instigator of aggression will "complete" the aggressive response chain. In fact, it appears another person's response can

substitute for and accomplish completion of that same response chain for the aroused individual.

REFERENCES

- BERKOWITZ, L. Some factors affecting the reduction of overt hostility. *Journal of Abnormal and Social Psychology*, 1960, 60, 14-21.
- BERKOWITZ, L. *Aggression: A social psychological analysis*. New York: McGraw-Hill, 1962.
- BERKOWITZ, L. (Ed.) *Advances in experimental social psychology*. New York: Academic Press, 1965.
- FESHBACH, S. The stimulating versus cathartic effects of a vicarious aggressive activity. *Journal of Abnormal and Social Psychology*, 1961, 63, 381-385.
- HOKANSON, J. E. The effects of frustration and anxiety on overt aggression. *Journal of Abnormal and Social Psychology*, 1961, 62, 346-351.
- HOKANSON, J. E., & BURGESS, M. The effects of three types of aggression on vascular processes. *Journal of Abnormal and Social Psychology*, 1962, 64, 446-449.
- HOKANSON, J. E., & SHETLER, S. The effects of overt aggression on physiological arousal level. *Journal of Abnormal and Social Psychology*, 1961, 63, 446-448.
- ROSENBAUM, M. E., & DECHARMS, R. Direct and vicarious reduction of hostility. *Journal of Abnormal and Social Psychology*, 1960, 60, 105-111.
- SCHEIER, I. H., & CATTELL, R. B. *Handbook for the IPAT 8 Parallel Form Anxiety Battery*. Champaign, Ill.: Institute for Personality and Ability Testing, 1960.
- WURTZ, K. R. Some theory and data concerning the attenuation of aggression. *Journal of Abnormal and Social Psychology*, 1960, 60, 134-136.

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