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Reproduced from Television and social behavior, Vol. V
Television's effects: Further explorations. A technical
report to the Surgeon General's Scientific Advisory Com-
mittee on Television and Social Behavior. Washington,
D.C.: U.S. Government Printing Office, 1972.

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Facial Expressions of Emotion While Watching Televised Violence as Predictors of Subsequent Aggression

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Although the effects of viewing televised violence on children's subsequent aggressive behavior have been investigated in many studies, only limited progress has been made in understanding the circumstances under which such effects are most and least likely to occur. Previous approaches to this problem have generally used one of two techniques: (a) varying the type of violence, the victim, the aggressor, and/or the consequences; and (b) varying viewer characteristics (sex, age, social behavior, and so on).

In the present experiment, we employed a new approach: considering the viewer's *emotional* responses to the televised violence.¹ More specifically, this experiment was designed to determine: (a) if it is feasible

to derive measures of emotion from the facial behavior of television viewers; and (b) if differences among viewers' immediate emotional reactions to television violence are related to subsequent aggressive behavior—if children who look happy when someone is killed on television, for example, will subsequently behave more aggressively than those who do not.

Research on the face and emotion. Advances during the past decade in both method and theory show that it is possible to derive valid and reliable measures of emotional response from recordings of facial behavior. Facial behavior in response to television should be particularly informative when the TV fare does indeed have some emotional impact and when the viewer is unaware that his facial behavior is being recorded. While this expectation rests on a strong foundation of theory and research, some of the key supporting evidence is only now reaching the research literature. A brief review of this research tradition may, therefore, be helpful.

In their extensive review of more than a half-century's scientific research on the face and emotion, Ekman, Friesen, and Ellsworth (1971) conclude (a) that people can interpret, with high accuracy, facial expressions of emotion, and (b) that past studies which appear to contradict this conclusion are demonstrably flawed with methodological problems and should be reevaluated. During the past ten years, Ekman and his associates have found consistent support for this conclusion in studies using still and motion picture records (photos, films, and videotape) subjects in such diverse literate cultures as the United States, Japan, Brazil, Argentina, and Chile, and subjects in two preliterate cultures, the Fore and the Dani of New Guinea (Ekman, Sorenson, and Friesen, 1969; Ekman and Friesen, 1971).

In the Japanese-American study (Ekman, in press), adult males in the two cultures were shown stressful and nonstressful motion pictures. People in each culture then judged videotape recordings made of the facial behavior shown during film watching. In this study, both Japanese and American subjects were able to distinguish facial expressions during stress-watching from expressions during nonstress-watching, when the observed members of their own culture and members of the other cultures. The findings demonstrate that untrained observers can distinguish pleasant from unpleasant emotional expressions even on faces from another culture and another racial physiognomy.

As part of their work establishing cross-cultural universals in facial expression, Ekman and Friesen (1971) further found that untrained subjects, even in preliterate cultures, can reliably discriminate not only between pleasant and unpleasant affect, but among a set of specific emotions like happiness, sadness, anger, fear, surprise, and disgust. In short, the ability to judge specific, facially expressed emotions appears to be a robust phenomenon even in cultures with little exposure to Western man or to modern mass media.

In current studies, the ability to judge emotion has been found to extend—with interesting variations—to facial expressions seen very briefly (for 1/125th of a second), to subjects who are severely disturbed (as in schizophrenia or depression), and to subjects under the influence of marijuana or alcohol. All of this research points to the potential of using judgments made by untrained subjects as a well-calibrated instrument for measuring the emotions revealed in facial expression.

A second, more powerful methodology for measuring emotion from facial expression has also been developed during the last ten years. Ekman, Friesen, and Tomkins (1971) have developed the Facial Affect Scoring Technique (FAST) which employs sets of trained coders to score muscle movements in three areas of the face. They have found strong evidence for the validity of the FAST methodology in identifying the emotions conveyed by facial photographs. Similarly, Ekman (in press) found in the Japanese-American study that FAST was effective in coding motion as well as still pictures and that the resulting discriminations were more powerful and precise than those gathered from untrained observers.

While there was good reason to believe that facial measures could provide valuable data in the present study, this research extends previous work on the face and emotion in three important ways: (1) It places facial measures in a predictive rather than a postdictive frame. That is, while previous studies have typically asked whether an antecedent condition or stimulus can be inferred from facial expression, this study asks whether important social consequences can be predicted from emotional states as revealed in facial expression. (2) Facial expressions are elicited by everyday stimulation like television fare rather than by stress films. (3) The expressors are children rather than adults, females as well as males.

In designing this experiment, the investigators planned to use both observers' judgments and FAST scoring and to compare their effectiveness. Only the observers' judgments have been obtained to date. The findings from this approach do provide an answer to the primary substantive question: whether facial expressions of emotion during the viewing of televised violence are related to subsequent aggressive behavior.

Emotion and television violence. The idea that measuring the facial expressions of the viewer would be useful was based on the assumption that viewers who see the same violent episode on television may often have diverse emotional reactions. We further hypothesized that these different emotional reactions would be related to the incidence and frequency of subsequent aggression. Most simply stated: viewers who seem *happy* and *interested* when viewing violence might be expected subsequently to engage in more aggressive behavior than those who seem *unhappy*, *sad*, *disgusted*, *pained*, *afraid*, or *disinterested*.

One basis for this expectation is derived from Tomkins's (1962, 1963) theory of emotion, which suggests that experiencing positive affect is intrinsically rewarding, while experiencing negative affect is intrinsically punishing. If the viewer has a rewarding experience when viewing violence, he is apt to engage in that behavior himself; if his experience is punishing, he is not likely to engage in that behavior.

Another basis for the same expectation is the idea that positive emotional reactions when viewing a violent episode might be an index of some form of identification with the aggressor, while negative emotional reactions might be an index of some form of identification with the victim. Those who identify with the aggressor might be more likely than those who identify with the victim to engage subsequently in behavior like the aggressor's.

These formulations are illustrative of the reasoning which could lead to the expectation that specific emotional reactions of the viewer would be related to his or her subsequent aggressive behavior. However, it was not the aim of this study to investigate the source of differences among viewers' emotional reactions to televised violence, whether the source be expectations, mood, attitude, personality, peer relationships, school family background, or whatever. That is a later question which is important only if the feasibility study demonstrates that emotional reactions when viewing televised violence do indeed predict subsequent aggression.

The present experiment was conducted with a subsample of the children also studied by Liebert and Baron (1971). Boys and girls first viewed part of an actual television program depicting either violence or nonviolent sports; they were then given an opportunity to engage in aggressive behavior against a peer. Videotape records were taken of the children's facial expressions of emotion while they watched television. Liebert and Baron examined the relationship between the two types of television inputs and subsequent aggression, and found that, over all those children who viewed violence later engaged in more aggressive behavior than those who viewed the sports program. The present experiment examined whether the children's emotional reactions while watching the violent program predicted the incidence of subsequent aggressive behavior.

Our general hypothesis was that measurements of facial expression of emotion shown during the viewing of television violence are related to measurements of subsequent aggressive behavior. More specifically, we predicted that emotional expressions of *happiness, pleasantness, and interest* would be positively related to subsequent aggression, while expressions of *unpleasantness, sadness, fear, disgust, pain, and disinterest* would be negatively related to subsequent aggression. No prediction was made about expressions of *surprise, involvement, or arousal*, which could occur with either positive or negative feelings. No prediction was

made about expressions of *anger*, because the measurement procedure did not allow precise determination of when the angry expression occurred. If shown in phase with the aggressor's attack, anger would be a positive predictor, but if it were out of phase with the aggressor's activity or in response to the victim's suffering, it might well be negatively related to subsequent aggression.

METHOD

The subjects were five- and six-year olds, 30 boys and 35 girls. The sample included all of the subjects of this age group studied by Lieber and Baron.² Each child was brought to Fels Research Institute by a parent in response to a newspaper advertisement and/or a letter distributed in public elementary schools asking for volunteers to participate in a study of the effects of television on children.³ The economic and ethnic backgrounds of the subjects were widely varied. Although these characteristics were not considered in assigning subjects to treatment conditions, inspection of the data showed adequate distribution across conditions.

Upon arrival the parent and child were separated, the experiment was explained, and consent was obtained from the parent. Each child was then taken to a room; a television set was turned on, and the child was told he might watch for a few minutes until the experimenter was ready for him. The child watched television alone in the room for about six and one-half minutes. For all groups, the first two minutes consisted of two one-minute commercials videotaped from commercial television during 1970. The commercials (a towel advertisement and an advertisement for a family motion picture film) contained a number of sudden events, presumably intended to be humorous. In one, for example, the father of the household accidentally knocked the dishes off the breakfast table while the mother watched with resignation. In the other an unoccupied car accidentally rolled off a pier into the ocean. These commercials had been selected to provide a chance to evaluate the child's facial responsivity to visual inputs. After the commercials, the children in the experimental group were shown the first three and one-half minutes of a program from the series *The Untouchables*. This sequence contained a killing, a chase, the shooting and death of one villain, and an extended fist fight involving the second villain. In contrast, children in the control group viewed a highly active, competitive three-and-one-half-minute sports sequence showing both males and females in races, high jumps, and so on. For all subjects, the final seconds of the program showed a commercial for automobile tires. Within 15 seconds after the commercial began, the experimenter entered the room, told the child it was time to begin, and took the child to the next room.

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The child was seated at a response box apparatus modeled after the one employed by Mallick and McCandless (1966). The box displayed a red HURT button, a green HELP button, a white light, and several wires running to a vent in the wall. The subject was told that another child in the adjacent room was playing a game and that the wires were attached to this other child's game. When the other child turned a handle, the white light would be lit, and the subject could press either the HELP or HURT button. The HELP button would make the handle turn more easily, helping the other child win his game, while the HURT button would make the handle hot, hurting the other child and causing him to release the handle. The subject was told that the longer he held down either button, HELP or HURT, the more effect it would have on the other child. When the subject clearly understood the task, the experimenter left the room. Although the subjects were led to believe there was another child in the other room, in fact there was not. The entire procedure was timed to produce 20 trials (white lights).

After the completion of the twentieth trial, the experimenter reentered the room and led the child to another room designated as the "play room." The room contained three attractive nonaggressive toys: a handgun, a knife, and two inflated plastic dolls about three feet tall. The child was told he could play for a few minutes, and the experimenter left the room. Aggressive behavior was rated by an observer who watched the child from behind a one-way vision mirror. At the end of the play period, the experimenter reentered the room and asked the child to recall both the television program and the game he had played. (All subjects included in the data analysis correctly recalled the meaning of the red and green buttons and the essential content of the television program they had seen.⁴)

A videotape recording of each child's face was made during the entire period the child was in the television room. None of the children included in the data analysis noticed the camera, which was in another room and aimed through a small pane of clear glass. The videorecording included a multiplexed small image of the television program the child was watching. The sound track of the television program and the sounds made by the child were recorded on the audio track of the videotape.

Three samples from the videotape record of each subject were selected for data analysis. These samples consisted of one from the commercials and two from either the violent program or the sports program. The decision about sampling points was *a priori*. The two violent episodes from *The Untouchables* sequence were central to the plot and occupied about the same amount of time (27-30 seconds); as such they were among the longest incidents in the violent program. These two episodes—the shooting and the fight—also depicted two different types of violent actions. In the shooting, a plainclothes policeman fired a p

from a considerable distance during a chase at a victim who had already been established as a villain by his earlier physical assault on another uniformed policeman. The shooting also showed the consequence of the violence. The victim staggered, fell, and, as the camera zoomed in on his face, said his last few words and died with his pursuers hovering over him. The fight episode involved close body contact among four people the use of fists, with action so rapid it was hard to be certain who was attacking whom, ending with one person being held physically immobile by three others, including a policeman. The shooting immediately preceded the fight; the fight was the last episode in the first three and one-half minutes of *The Untouchables*.

Two 25-second episodes were selected, from comparable time points in the athletic program, of events which seemed to be of maximal potential interest and suspense. Sports A was an entire women's 100-meter race; Sports B was the final three-quarters of a men's 400-meter relay race. In addition, a thirty-second sample was selected from the initial commercials: about 15 seconds showing the last and most extreme act of carelessness by the husband—knocking all the dishes off the breakfast table, the resignation of his wife, and about fifteen seconds of the other commercial, in which an apparent torpedo fired at a boat is discovered to be a salami.

The measurements of emotion shown in the facial expression during these samples were obtained by requesting eight groups of observers to look at the samples and judge the emotions manifest in each.⁵ Each group was composed of about 25 college undergraduates who were paid for their participation. The inserts of the actual television programs (which had been multiplexed onto the tapes when they were recorded) were removed so that the observers could not see the program the child had been watching, but only the child's facial behavior. There were too many samples to show to any one observer—three samples for each of 65 children (Commercial, Shooting and Fighting, or Commercial, Sports A and Sports B). Furthermore, it was preferable that an observer not see more than one sample of any single child, since his judgment of the second or third sample might be influenced by his judgment of the first sample of that child. To solve these problems, four separate videotapes were made, to be shown to four separate groups of observers. Each of these tapes contained about 50 randomly ordered samples; each child appeared only once on each videotape. Each videotape contained about the same number of samples from the commercial, violence, and sports sequences, and each contained about the same number of male and female children. There was a fifteen-second pause between each sample of facial behavior, during which the observer wrote down his or her judgment of emotion. Each of the four videotapes required about fifty minutes for viewing.

There are two schools of thought about ways of measuring judgments of emotion from facial behavior. One approach has emphasized the use

of a small set of scales, most commonly including pleasantness and arousal or activity. The other approach has utilized a number of separate emotions, usually distinguishing among various unpleasant feelings (anger, fear, disgust, sadness) and providing a category for positive feelings (happiness). Two different forms were employed in this experiment to permit the use of both of these approaches. One form asked the observers to record their judgments on each of four nine-point scales labeled *pleasant-unpleasant*, *interested-disinterested*, *aroused-unaroused*, and *involved-uninvolved*. The other form asked the observers to rate each of the following emotions: *anger*, *happiness*, *disgust*, *fear*, *pain*, *sadness*, and *surprise*, using a nine-point scale to record whether each emotion was absent or slightly, moderately, or extremely shown. The observers who used this form were told to consider the duration of a facial expression, its relative intensity, and the frequency of its occurrence in determining whether to judge the emotion as slight, moderate, or extreme. Eight groups of observers were used to obtain independent judgments on each form for the four videotapes.

RESULTS

Facial measures

The pooled judgments of emotion made by the observers were used to establish each child's emotional reactions during each of the three videotape samples. The basic datum was the mean on an emotion scale, calculated across a group of observers who viewed a particular videotape of a child's facial expression and used a scale to record their judgments. For each child there were 33 such means: eleven emotion scale means (*pleasantness*, *interest*, *involvement*, *arousal*, *anger*, *disgust*, *fear*, *happiness*, *pain*, *sadness*, and *surprise*) for each of the three videotape samples (either Commercial plus Shooting and Fighting or Commercial plus Sports A and Sports B). Inspection of the distribution of these means suggested square-root transformations to normalize the distributions. All of the reported results were obtained using transformed scores.⁶

Technically it would be correct to refer to these scores on the children's reactions to the television programs as *judged* emotion, since the data source was observers' judgment of the facial behavior, not the child's own reported emotion nor any direct behavioral measurement. For ease of reading, however, we will forego the qualification *judged*, and more simply use the word *emotion*.

Measures of aggression

Four measures of postviewing aggressive behavior were utilized from the data collected by Liebert and Baron (1971)—three from the button

press task and one from the play room situation. The cumulative time that the child held down the red button across all trials seemed to offer a simple measure of the extent to which the child attempted to hurt the other child; this will be referred to as the HURT score. The cumulative time the child held down the green button offered a parallel measure of how much of the time the child attempted to help the other child; this will be referred to as the HELP score. The trial in which the child first pressed the red HURT button was also employed as an indicator of how ready the child was to hurt the other child; this will be referred to as the SLOWNESS TO HURT score. The AGGRESSIVE PLAY measure was the score provided by Liebert and Baron based on time-sampled

Table 1: Intercorrelations among postviewing behavior measures

ACROSS ALL SUBJECTS						
	HURT	HELP		SLOWNESS TO HURT		
HURT	--					
HELP	-.21	--				
SLOWNESS TO HURT	-.60**	.29*		--		
AGGRESSIVE PLAY	-.17	.08			--	.00

Intercorrelations among postviewing behaviors						
	Male aggression group			Female aggression group		
	HURT	HELP	SLOWNESS TO HURT	HURT	HELP	SLOWNESS TO HURT
HURT	--			--		
HELP	-.15	--		-.14	--	
SLOWNESS TO HURT	-.61*	.42	--	-.74**	-.01	--
AGGRESSIVE PLAY	.27	-.27	.02	.22	.04	-.08

Intercorrelations among postviewing behaviors						
	Male control group			Female control group		
	HURT	HELP	SLOWNESS TO HURT	HURT	HELP	SLOWNESS TO HURT
HURT	--			--		
HELP	.12	--		-.50*	--	
SLOWNESS TO HURT	-.60*	.00	--	-.68*	.58*	--
AGGRESSIVE PLAY	-.52*	.44	.41	.02	.36	.05

*p < .05

**p < .01

observations of the child during the playroom task.⁷ These four scores—HURT, HELP, SLOWNESS TO HURT, and AGGRESSIVE PLAY—were also subjected to the square-root transformation to normalize the distributions.

Table 1 shows the intercorrelations among the four measures of post-viewing behavior. From these relationships it is apparent that although a moderate relationship exists between HURT and SLOWNESS TO HURT, a child's score on any one of the measures is not necessarily informative about his scores on any of the others. Thus all four of the measures were employed in the data analysis.

The lack of a significant correlation between the HELP and HURT measures allowed us to examine whether the same emotional reactions which were positively related to HURT scores might be negatively related to HELP scores. One school of thought views emotional reaction as primarily a change in level of activation. It would be plausible from this viewpoint to predict that emotionally aroused children, regardless of the nature of the arousal (pleasant or unpleasant), would engage in *more* behavior subsequently, regardless of the nature of that behavior (helping or hurting). In contrast, recall that our hypothesis was based upon a different view of emotion, one which emphasizes the specific nature of the emotional arousal as crucial in determining the specific nature of the subsequent behavior. Just as we predicted that children who were *happy, pleasant, or interested* when viewing violence would engage in subsequent aggression, we would expect that those who showed *sadness, pain, disgust, or fear* would subsequently engage in helping or altruistic behavior. That the HURT and HELP measures were found to be independent supports our view of emotion and allows test of our hypotheses relating specific emotional reactions to different types of subsequent behavior.

Emotion shown while viewing and subsequent behavior: correlations

The simplest way to test our hypothesis and examine the relationship between the two sets of data—scores on emotional reactions shown during the viewing of the television programs and scores on subsequent behavior—was to correlate the two. Significant relationships were predicted between the two sets of scores only among those children who viewed violence, not among those who viewed the sports sequences. Looking *happy* or *sad* while watching a murder was thought to be an index of whether the viewer would subsequently attempt to hurt or help another child, either because the emotional reaction to violence suggested whether the child had identified with victim or aggressor, or because it indicated whether violent activity had been rewarding or punishing to the viewer. But there was no such reason to expect that emotional reactions of *happiness* or *sadness* during a track meet would be correlated

with subsequent aggression. Similarly there was no reason to expect the emotional reactions shown during the commercials would relate to subsequent behavior. Correlations were, however, calculated for all groups (those who saw violence and those who saw sports) and for the commercials as well as for the violence or sports sequences, in order to compare the relative occurrence of hypothesized relationships with unexpected relationships. To further assure a conservative evaluation of this investigation as a feasibility study, all statistical outcomes, including those for which directional predictions had been advanced, were evaluated by two-tailed tests.

It has repeatedly been found (Mischel, 1970) that males and females differ in their attitudes about aggression, in their motivations for engaging in aggression, and in the manners or styles in which they manifest aggression. Investigators who have studied the influence of violence viewing on subsequent aggressive behavior have indeed consistently reported differences between male and female subjects. Because of the likelihood of again uncovering such sex-related differences, the investigators decided, before obtaining the data, to conduct the data analysis separately for male and female subjects. We will consider the findings first for the boys, then for the girls.

Table 2 shows all the significant correlations obtained between the 11 emotion scales and the four postviewing behavior measures for the boys. (The complete set of correlations is in Appendix A.) As expected, significant correlations with postviewing behavior were found *only* for the emotions shown by viewers of the violent program. There were no significant correlations between the emotions shown during the commercial and subsequent behavior among either those boys who subsequently saw violence or those who subsequently saw sports. Also, as expected, there were no significant correlations between the emotions shown during the sports sequence and postviewing behavior.

The pattern of correlations shown in Table 2 for the boys strongly supports our hypothesis about the relationship between facial expressions of emotion and subsequent aggressive behavior. There was a lack of perfect correspondence between the findings for the two television violence samples (Shooting and Fighting) and a lack of complete correspondence between the results obtained from the observers who used the four emotion judgment scales (top four rows of the table) and the results from the raters who used the other seven emotion scales (bottom five rows of the table), but over all the consistencies were remarkable.

Positive emotion when viewing violence (*pleasantness* or *happiness*) was positively correlated with the HURT score both when the positive affect was shown during the Shooting and when it was shown during the Fighting. *Sadness* shown during the Shooting was inversely related to the HURT score. *Happiness* shown both during Shooting and during Fighting was positively associated with AGGRESSIVE PLAY. *Interest*

Table 2: Significant correlations between facial measures and postviewing measures—males who viewed violence (N=16)

	Shooting				Fighting			
	HURT	SLOWNESS TO HURT	HELP	AGGRESSIVE PLAY	HURT	SLOWNESS TO HURT	HELP	AGGRESSIVE PLAY
Pleasantness	.60*	--	-.53*	--	.51*	--	--	--
Interest	--	-.72**	-.51*	--	--	-.68*	-.65**	--
Involvement	--	--	--	--	--	-.62*	-.63*	--
Arousal	--	--	--	--	--	-.66**	-.60*	--
Happiness	.67**	--	--	.63*	.55*	--	--	.55*
Anger	--	--	--	--	--	--	--	-.59*
Pain	--	--	.61*	--	--	--	--	--
Sadness	-.61*	--	--	--	--	--	--	--
Surprise	--	--	.60*	--	.56*	-.57*	--	--

*p < .05

**p < .01

shown during the Shooting was inversely related to the SLOWNESS TO HURT measure (the more *interested* the child, the greater the likelihood that he would be quick to use the HURT button). *Interest, involvement, and arousal* shown during fighting were all similarly inversely related to SLOWNESS TO HURT.

The findings on the HELP measure were consistent with the findings for aggressive behavior. *Pleasantness* when viewing the Shooting was inversely related to helping, and *pain* when viewing the Shooting was positively associated with helping. *Interest, involvement, and arousal* shown during the Fighting episode were all negatively associated with subsequent helping.

Multiple regression techniques were applied to the data for the boys who viewed violence, in order to reveal which emotions would yield the best prediction of each of the postviewing measures. Generally the results were consistent with those reported in Table 2 and indicate that sets of emotion can account for more than half the variance in predicting postviewing behavior. The details about how these calculations were performed, the results, and the interpretation are given in Appendix B.

The findings on the girls failed to support the hypothesis. Few significant correlations were obtained; more were obtained in response to the commercial than in response to the violent episodes. Table 3 shows the significant correlations for the girls who saw the violent program. I

Table 3: Significant correlations between facial measures and postviewing behavior—girls who viewed violence (N=15)

	Videotape sample		
	Commercial		Shooting
	HURT	SLOWNESS TO HURT	HURT
Pleasantness	-.53*	--	--
Happiness	-.47*	--	--
Pain	--	--	--
Sadness	.52**	-.63**	.47*

* $p < .05$

** $p < .01$

seems wisest not to attempt to interpret the findings on the girls, but instead to view the few correlations which were significant as a chance finding. Only one of the 88 correlations for the reactions to the violence episode was significant. (By comparison, 21 of 88 were significant for the boys.) Further, the commercial produced a few more significant correlations than the program material, for both those who subsequently saw violence and those who saw sports. But even here, the number of obtained significant correlations does not exceed what might occur by

chance, and, unlike the data for the boys, they do not follow the predicted pattern.

Attempting to understand why the emotion shown during the viewing of violence correlated with postviewing behavior among the boys but not among the girls, we considered two possible explanations but largely dismissed them after further data analysis.

One possibility was that perhaps the girls did not experience the same emotions as the boys when viewing the violent program. If, for example, the girls showed little or no *pleasantness, happiness, sadness, or interest* (emotions which correlated with subsequent behavior for the boys) then their emotions could not correlate with their postviewing behavior since correlations require that there be a range of scores on each variable being related. Analysis of variance (ANOVA) techniques tested this possibility by determining whether there was any difference between the emotion shown by the girls and that shown by the boys, regardless of the program viewed or particular program episodes. Three of the 22 ANOVAs revealed a sex difference; on the Fighting sequence and Sports I (the men's relay race), boys were more *involved* and *aroused* than girls and on *sadness* there was an interaction between sex and type of program (but no main effect for sex). However, these differences between boys and girls are not sufficient to explain why emotional reactions were correlated with postviewing behavior for boys but not for girls. While boys and girls did differ in *involvement, arousal, and sadness* in response to the Fighting episode, they did not differ in *interest, pleasantness, happiness, anger, and surprise*; yet all these latter emotions did correlate with postviewing behavior for boys and not for girls. Furthermore, boys and girls did not differ in *any* of their emotional reactions to the Shooting episode, yet many of these emotions were correlated with subsequent behavior for boys but not for girls. In general, then, the suggestion that girls did not experience the same range of emotion as the boys—and therefore that their emotional reactions could not be similarly correlated with their subsequent behavior—does not appear tenable. (Appendix C reports these analyses in detail.)

A second possible explanation was that perhaps the girls showed much less aggressive behavior than the boys. If that were so, then the emotions shown by the girls could not be correlated with subsequent aggressive behavior because correlations require (as noted earlier) a range of scores on both variables. ANOVA failed to find an overall sex difference or a sex difference in relation to the type of program viewed (sports or violence) for the HURT measure, the HELP measure, or the SLOWNESS TO HURT measure. The ANOVA for the AGGRESSIVE PLAY measure did reveal a significant effect for sex and for program viewed in relation to sex; the boys who had watched a violent program showed more AGGRESSIVE PLAY than the girls who had watched violence, while there was no such difference on this measure between

boys and girls who had watched the sports sequence. (Appendix D reports these analyses.) Despite this difference in AGGRESSIVE PLAY, the fact that the boys did not differ from the girls in the three measures of button press task behavior requires that we reject the possibility that a sex difference in postviewing behavior can account for the fact that emotional reactions during the viewing of television correlated with postviewing behavior for boys and not for girls.

Summary of sex differences: Two possible differences between boys and girls (emotional reactions and postviewing behavior) were examined as possible bases for the finding that emotional reactions to the programs were correlated with postviewing behavior for boys but not for girls. The data analysis failed to find substantial differences between boys and girls on either. Two other possibilities, which could not be tested in this experiment, will be considered in the discussion.

Let us turn now to another method of examining the data relevant to our hypothesis about emotional reactions and post viewing aggression.

Emotion while viewing, program viewed, and sex of the viewer as predictors of postviewing behavior: analysis of variance

Analysis of variance techniques provided a complementary pattern of results as well as new information which had not been revealed in the correlational analysis reported in Tables 2 and 3. The ANOVAs showed that children who had different emotional reactions to the violent program showed different behavior on some the postviewing measures. (The correlations could determine only that emotional reactions were related to postviewing measures, not whether children who showed different emotional reactions to the violent program subsequently manifested significantly different aggressive behavior.) The ANOVAs also revealed that when children who had shown a similar emotional reaction were compared, those who had seen the violent program subsequently engaged in more aggressive behavior than those who had seen the sports program.

Three independent variables were used in calculating the ANOVAs: program viewed (violence or sports), sex of the viewer, and emotion shown (a high, medium, or low score based upon trichotomizing the scores on an emotion scale within each group of viewers). ANOVAs were calculated utilizing each of the emotions and each of the postviewing behavior measures for which a significant correlation had been obtained among the boys who viewed violence (Table 2). Appendix E reports the results of these separate ANOVAs. A summary of these findings, integrating the results across separate ANOVAs, is presented below.

Differences among those who viewed violence. Among the boys those who reacted to the violence with the most *pleasantness* (high scores) subsequently engaged in more hurting behavior than those who reacted to the violence with the most *unpleasantness* (low scores). Similarly, those who reacted to the violence with the least *sadness* subsequently engaged in more hurting behavior than those who reacted with the most *sadness*. These results were found for both the Shooting and the Fighting samples. Further, among the boys, those who reacted to the Shooting with the most *disinterest* subsequently were slower to hurt and engaged in more helping behavior than those who showed the most *interest*.

No such findings were obtained for the girls, and no differences were found for either boys or girls in AGGRESSIVE PLAY as a function of emotional reactions.

Differences among those who viewed violence or sports. Among the boys who showed the most *pleasant* reactions, those who viewed violence subsequently engaged in more hurting behavior than those who viewed sports. Similarly, among the boys who showed the least *sadness* those who viewed violence subsequently engaged in more hurting behavior than those who viewed sports. These findings were obtained both when reactions to the Shooting were compared with reactions to Sports A and when reactions to the Fighting were compared with reactions to Sports B. Among the boys who showed the most *disinterest*, those who viewed Sports A were slower to hurt than those who viewed the Shooting.

Among the girls who showed the most *unpleasantness*, those who viewed violence subsequently engaged in more hurting behavior than those who viewed sports. Similarly, among those girls who showed the most *sadness*, those who viewed violence subsequently engaged in more hurting behavior than those who viewed sports. These findings were obtained both when reactions to the Shooting were compared with reactions to Sports A and when reactions to the Fighting were compared with reactions to Sports B.

No significant findings were obtained as a function of emotional reaction, on either the HELP or AGGRESSIVE PLAY measures, for either boys or girls.

Differences between boys and girls. Among the children who showed the most *interest* when viewing the Shooting, the girls were slower to hurt than the boys.

DISCUSSION

This experiment was designed as a feasibility study, to determine if facial expressions of emotion shown during the viewing of televised violence predict subsequent behavior. The success achieved with the

boys suggests a positive answer to the feasibility question. The results obtained with the five- and six-year-old boys confirmed the specific hypothesis: boys whose facial expressions during the Shooting or the Fighting episodes showed *happiness, pleasantness*, and not *sadness*, tended to use the HURT button more than boys whose facial expressions showed *unpleasantness, sadness*, and not *happiness*. Boys whose facial expressions during the Shooting or Fighting showed *interest* used the HURT button earlier in the task than boys whose facial expressions during the Shooting or Fighting showed *disinterest*.

The facial expressions shown during violence were also related to the use of the HELP button. Boys whose facial expressions during the Shooting showed *unpleasantness, pain, surprise*, or *disinterest* tended to use the HELP button more than did those whose facial expressions showed *pleasantness, little pain, no surprise, or interest*.

The facial expressions shown by the boys during the violent program were also related to aggression shown in the other task, the play situation. Boys whose facial expressions during the Shooting or Fighting episodes showed *happiness* tended to engage in more aggressive play than those boys whose facial expressions during the Shooting and Fighting were not *happy*.

The findings for the five- and six-year-old boys also showed that it was not simply the emotional reaction to television which predicted subsequent aggression, but more specifically the emotional reaction to a violent program. Emotional reactions to the sports program or to the commercials did not relate to subsequent aggression. In addition, there were no differences in the emotional reactions shown to violence as compared to the sports program on most of the emotion scales correlated with postviewing behavior. Another way to illustrate this part of the findings is to examine just those boys who showed the most *pleasantness* and the least *sadness*. Among these boys, those who were viewing violence behaved more aggressively afterwards than those who were viewing the sports event.

In presenting the results on the correlations among the postviewing behavior measures, we noted that the lack of relationship between the HURT and HELP measure was important since it would allow a test of an alternative conceptualization of the relationship between emotion and postviewing behavior to the one we had hypothesized. That alternative view might lead to the hypothesis that when children are emotionally aroused (regardless of whether the arousal is positive or negative), they will subsequently engage in more active behavior of any kind, hurting or helping. The findings from this experiment directly contradict this hypothesis. The *arousal* measure was not positively related to either HURT or HELP measures; instead *arousal* during the Fighting episode was inversely related to the SLOWNESS TO HURT measure and to the HELP measure, and unrelated to the HURT measure. The direction or type of emotional arousal predicted the direction or type of subsequent

activity. That is, those boys who appeared *pleasant, happy*, and not *sad* showed more hurting and less helping behavior; those who appeared *unpleasant, not happy*, and *sad* showed more helping and less hurting behavior. As we hypothesized, it was the *type* of emotional reaction which was crucial.

These findings for the boys suggest that, in order to understand the influence of televised violence on the likelihood of subsequent aggression, we must consider the child's emotional reaction to the violence. While across the population seeing violence may increase the likelihood of aggression, an equally important predictor may be the viewer's reaction to violence. This study has shown that there are markedly different emotional reactions to the same violent program and that these different reactions, as indicated by facial expression, *do* predict subsequent aggression. Put another way, the results on the boys suggest the necessity of considering not just whether the input is violent or not, but also the perceiver's reactions to that input, if the variations in the amount of subsequent aggression among those who view violence are to be understood.

It is, of course, necessary to regard the implications of this study as suggestive rather than conclusive. The experiment should be replicated with children of the same and other ages, with other violence inputs, and perhaps also in other settings.

Let us now discuss the failure to obtain results with the girls. We considered two possible explanations of the fact that emotional reactions shown during the viewing of violence were correlated with subsequent aggression for the boys but not for the girls. From the findings it appears unlikely that this is due to a difference between boys and girls either in emotional reactions during a violent program or in subsequent aggression. The data do not allow tests of other possible explanations, but at least two which could be explored in further research can be mentioned. First, it may have been important that the violence shown was male, not female—male actors, both as victims and as aggressors; male roles, cops and robbers; male forms of aggression, shooting and fist fighting. Second, it may be necessary to consider individual differences in the extent to which girls have been censored or punished for empathizing with or approving of aggressive activity. Other studies are necessary to test these possibilities, utilizing other types of inputs with female characters and with other types of violence, using girls of different ages and differentiated in terms of attitudes about aggression.

The findings on the boys raise the tantalizing question of why some five-year-old boys react with *happiness* and *interest* while others react with *sadness* and *disinterest* to a shooting or to fighting. The question is important, since these different emotional reactions shown in facial expressions did serve to account in some large part for differences in subsequent aggression. The experiment was not designed, however, to examine the determinants of individual differences in emotional reaction

to the viewing of violence. All that can be done is to mention some of the possibilities which should be explored in subsequent research. The difference between a positive and a negative emotional reaction to the viewing of televised violence may be due to transient phenomena such as the mood or expectations of the viewer, the type of program watched on television prior to the experiment, and so on. Or the difference may be related to such enduring characteristics as personality, parental attitudes toward aggression, and child rearing practices. Further research is needed to explore these possibilities. Further study should also study the stability of the child's emotional reaction to the viewing of televised violence: is it consistent over repeated occasions, different program formats, different forms of violence?

In the design of this feasibility study, one aim was to compare two different methods for extracting information about emotion from facial expression. Only one of these methods, the grosser and less costly, has been used—aggregated judgments by observers of the facial expressions. The success with this gross measure suggests that applying the more precise measurement system would be fruitful. The Facial Affect Scoring Technique (Ekman, Friesen, and Tomkins, 1971) would answer new kinds of questions. Exactly when is a particular emotion shown: does a child show a *happy* facial expression when the aggressor shoots, when the victim falls, as the victim dies, after the violence subsides? What is the sequence of emotional reactions; do some children show *happiness* at the attack, followed by *sadness* at the death, followed by *happiness* as the violence subsides? This more precise and exact measurement procedure might even succeed in predicting the subsequent aggression of the girls. If girls (more than boys) could be expected to have conflicting attitudes about violence, then a measurement procedure which looks at sequences of emotional reactions could be useful. But this is another question which can be answered only through more study.

The implications of this experiment for both basic and applied research questions should be noted. For students of emotion, and in particular for those interested in facial expression of emotion, this experiment provides the first evidence that the momentary facial expression shown during an emotional experience can predict subsequent complex social behavior. In the long history of research on whether facial expressions provide accurate information about others, research has been *postdictive*, attempting to determine whether the eliciting stimulus could be inferred from the facial expression. This experiment has fundamental importance in showing the *predictive* value of facial expressions of emotion.

The experiment also offers promise for a number of applied studies within the area of television violence and aggression. This experiment has shown that children differ in their emotional reactions to violence and that these differences in emotional reaction do predict, for the boys, differences in subsequent aggressive behavior. If further research con-

firms the finding that measures of facial expression while viewing violence predicts subsequent aggressive behavior, and determines the generality of that finding with different age groups, with girls as well as boys, and with different types of violent material, then this measure should be included in further research on the host of questions relevant to understanding television and social behavior. The interactions among input, setting, prior exposure, and viewer variables in relation to subsequent aggression may be better illuminated if emotional reactions as revealed by facial expressions are also considered. The particular utility of measuring facial expressions is that records can be gathered unobtrusively, without influencing the subject, and from very young subjects who may not be accessible to verbal testing or for whom it may be difficult to arrange a postviewing aggressive task situation.

In final summary, this study points to several important conclusions:

(1) It does appear feasible to obtain unobtrusively valuable indicators of emotional state from the facial expressions of children watching television.

(2) These facially revealed emotional states appear to be important predictors of later significant social behavior.

(3) In all, several different emotions seem relevant in predicting later behavior. *Pleasantness* and/or *happiness*, *interest*, *involvement*, *arousal*, *anger*, *pain*, *sadness*, and *surprise* were each significantly correlated with at least one class of postviewing behavior.

(4) Similarly, quite varied and relatively uncorrelated social behaviors can be predicted from emotional states. While altruistic (HELP) behavior cannot be predicted from aggressive (HURT) behavior (the intercorrelation being only $-.21$), both kinds of behavior can be predicted above chance from the emotional states revealed during the preceding viewing of televised violence (at least for the boys).

(5) Emotional states while watching violence account for a significant share of the variance in predicting later aggression and altruism. For boys, multiple correlations among a few emotions can account for more than 50 percent, and up to 75 percent, of the variance on all four postviewing behaviors.

(6) While viewing televised violence may increase the likelihood of aggressive behavior, an equally important factor may be the emotional response of the child to dramatic portrayals of aggression. Thus, the interaction of input and affective response in understanding the impact of television on children appears to be a uniquely promising and important prospect for future research.

FOOTNOTES

1. We are grateful to Norma McCoy Irons, Associate Professor of Psychology, San Francisco State College, for her many valuable contributions to the design of this study and interpretation of results. The research was conducted under a contract with the National Institute

of Mental Health. Drs. Ekman, Friesen, Zlatichin, and Malmstrom are at the Department of Psychiatry (Langley Porter Institute), University of California, San Francisco. Dr. Liebert is at the Department of Psychology, State University of New York at Stony Brook. Dr. Harrison is at the Department of Communication, Michigan State University. Dr. Baron is at the Department of Psychology, University of South Carolina.

2. Videorecordings of facial expressions were obtained also on a comparable number of eight- and nine-year-old children, but these records have not been analyzed.
 3. A more detailed description of the subject population and the experimental procedures is given in Liebert and Baron, 1971.
 4. Nine children were terminated before the data were collected because they refused to remain alone, cried, or left the experiment situation. Five other children did not understand or follow instructions for the button press task and three played or explored the room instead of watching television. The remaining subjects totaled 3 boys and 35 girls, as reported in the text.
 5. The validity and reliability of data gathered from untrained observers is strongly indicated in recent research (Ekman and Friesen, 1971; Ekman, Friesen, and Tomkins, 1971; Ekman, Friesen, and Ellsworth, 1971; Ekman, in press): (a) evidence indicates that the average young adult of college age and intelligence can effectively discriminate facial expression of emotion, although he may not be able to specify the facial cues or the inference process he employs; (b) individual differences in ability to perform the task or to judge a specific affect can be neutralized by pooling the judgments of a group of observers, to yield a reasonable measure.
- In the present study, with two groups of observers judging the same tapes, it was possible to obtain some indication of relative reliability by comparing judgments on two similar scales, *pleasantness* and *unpleasantness* and *happiness*. Judgments on these scales are only partially redundant. While the opposite end of the pleasantness scale was *unpleasantness*, the opposite end of the happiness scale was *not showing happiness*, rather than specification of some unhappy emotion (anger, sadness, etc.). Nevertheless, the correlations ranged from .65 to .88, with half the correlations above .80. These findings show that at least in terms of happiness and pleasantness, judgments were reliable, in that similar groups of observers provided similar measurements of the same stimuli.
6. This statistical adjustment, which is common practice for highly skewed data, was selected on *a priori* grounds according to the recommendations of Winer (1962, pp. 218-22). Specifically, the transformation $x' = \sqrt{x} + \sqrt{x + 1}$ was employed.
 7. Of the other measures which could be derived from the button press task we used three: number of HURT button presses, mean HURT

duration and mean HELP duration. The pattern of findings was generally the same as is reported.

REFERENCES

- Ekman, P. Universals and cultural differences in facial expressions of emotion. In Cole, J. K. (Ed.) *Nebraska symposium on motivation, 1971*. Lincoln, Neb.: University of Nebraska Press (in press).
- Ekman, P., and Friesen, W. V. Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology*, 1971 17(2), 124-29.
- Ekman, P., Friesen, W. V., and Ellsworth, P. *Emotion in the human face: guidelines for research and a review of findings*. New York: Pergamon Press, 1971.
- Ekman, P., Friesen, W. V., and Tomkins, S. S. Facial affect scoring technique: a first validity study. *Semiotica*, 1971, 3(1), 537-58.
- Ekman, P., Sorenson, E. R., and Friesen, W. V. Pan-cultural elements in facial displays of emotions. *Science*, 1969, 164(3875), 86-88.
- Liebert, R. M., and Baron, R. A. Short-term effects of televised aggression on children's aggressive behavior. In *Television and social behavior*, Vol. 2 (this series). Washington, D. C.: U. S. Government Printing Office, 1971.
- Mallick, S. K., and McCandless, B. R. A study of catharsis of aggression. *Journal of Personality and Social Psychology*, 1966, 4, 591-96.
- Mischel, W. Sex typing and socialization. In Mussen, P. (Ed.) *Carmichael's manual of child psychology*, Vol. 2 (3rd Ed.). New York: Wiley, 1970.
- Tomkins, S. S. *Affect, imagery, consciousness*, Vol. 1: *The positive affects*. New York: Springer, 1962.
- Tomkins, S. S. *Affect, imagery, consciousness*, Vol. 2: *The negative affects*. New York: Springer, 1963.
- Winer, J. B. *Statistical principles in experimental design*. New York: McGraw-Hill, 1962.

Appendix A: Correlations between facial measures and postviewing measures for males who viewed violence

Table A-1 presents the correlations between postviewing behavior and those affects which showed at least one significant relationship with some postviewing measure. Table 2, in the text, displayed this data in abbreviated form, highlighting the significant correlations only.

As noted in the text, the correlational hypotheses were tested using two-tailed tests, although the investigators did have specific, directional hypotheses for some of the emotions, e.g., the prediction that happiness would correlate with later aggression. If the more generous, one-tailed significance level is used, four additional relationships become "significant": (a) the greater the involvement while watching the shooting sequence, the quicker the individual is to aggress; (b) the more pain expressed during the shooting sequence the slower the individual is to aggress; (c) the more sadness shown during the shooting, the less aggressive play; and (d) the more pleasantness shown during the fighting sequence, the less the individual helps later. These findings conform to expectations and are consistent with the other findings discussed in the text.

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Table A-1: Correlations between facial measures and postviewing measures—males who viewed violence (N=15)

	SHOOTING				FIGHTING			
	HURT	SLOWNESS TO HURT	HELP	AGGRESSIVE PLAY	HURT	SLOWNESS TO HURT	HELP	AGGRESSIVE PLAY
PLEASANTNESS	.60*	-.36	-.53*	.23	.51*	-.24	-.44 ^Δ	.39
INTEREST	.28	-.72**	-.51*	-.01	.34	-.58*	-.65**	-.13
INVOLVEMENT	.09	-.49 ^Δ	-.30	.18	.32	-.62*	-.63*	-.14
AROUSAL	.33	-.14	.31	.20	.31	-.66**	-.60*	-.14
HAPPINESS	.67**	-.31	-.31	.63*	.56*	-.10	-.19	.55*
ANGER	-.43	.24	.13	-.43	-.01	-.15	.10	-.59*
PAIN	-.19	.45 ^Δ	.61*	-.08	.10	-.35	-.07	-.14
SADNESS	-.61*	.28	.31	-.47 ^Δ	-.16	-.24	-.04	-.21
SURPRISE	.30	-.09	.60*	.13	.56*	-.57*	-.14	.35

*p < .05 (two-tailed test)

**p < .01 (two-tailed test)

^Δp < .05 (one-tailed test)

Appendix B: Multiple regression analysis

Multiple correlations were calculated only for the data on the boys who had seen the violent program, to reveal which emotions would yield the best prediction of each of the postviewing measures and to indicate how large the correlation would be when more than one emotional reaction to a television episode was considered. In calculating the multiple regressions, the judgments from each group of observers were first considered separately and then again pooled. Table B reports only those multiple correlations in which the figure obtained was larger than the figures reported in Table 2 when each of the emotion scales were separately correlated with the postviewing measures. Further, following the usual statistical conventions no more than the first three scales were reported and only if there was an increase in the correlation by at least five points between the first and the second, or the first and the third, scale. Finally the correlations reported are corrected for the small sample size; the correction acts to reduce the size of the coefficient.

Sizeable multiple correlations were obtained. *Pleasantness* and *arousal* during the shooting predicted the HURT scores. Not being *aroused*, not being *surprised* and being *happy* predicted SLOWNESS TO HURT; Not being *angry*, being *happy* and being *sad* predicted AGGRESSIVE PLAY; the contribution of *sadness* in this multiple correlation was the only finding which contradicted the findings from Table 2, and it is not readily explicable. Showing *pain* and *surprise* but not *happiness* during the shooting correlated with the HELP measure. Not being *interested* but showing *disgust* during the fight correlated with the HELP measure.

Table B-1: Multiple correlations of emotions during viewing and postviewing behavior—males who viewed violence (N=15)

TV episode	Emotions	R	Postviewing measure
Shooting	PLEASANTNESS	.56*	HURT
	PLEASANTNESS + AROUSAL	.77**	
Fighting	-AROUSAL	.62*	SLOWNESS TO HURT
	-AROUSAL - SURPRISE	.66**	
	-AROUSAL - SURPRISE + HAPPINESS	.71*	
Fighting	-ANGER	.54*	AGGRESSIVE PLAY
	-ANGER + HAPPINESS	.77**	
	-ANGER + HAPPINESS + SADNESS	.87**	
Shooting	PAIN	.57*	HELP
	PAIN + SURPRISE	.68*	
	PAIN + SURPRISE -HAPPINESS	.80**	
Fighting	-INTEREST	.62*	HELP
	-INTEREST + DISGUST	.71*	

*p = .05
**p = .01

Appendix C: An examination of differences in emotional reactions between boys and girls

These analyses were performed in order to determine whether there were differences in the emotional reactions to the violent or sports programs between boys and girls which might account for the finding (Table 2) that emotional reactions correlated with postviewing measures for boys but not for girls. Eleven separate ANOVAs were calculated, one for each of the emotion scales on the behavior shown during the viewing of the Shooting and Sports A; and another eleven ANOVAs were calculated for the emotion scores on the behavior shown during the viewing of the Fighting and Sports B.

Only one of the eleven ANOVAs on the Shooting and Sports A facial behavior scores yielded a significant finding. Table C-1 shows that when the *happiness* scores were considered, there was more *happiness* shown during the sports than violent sequence regardless of the sex of the viewer ($p = .05$). Three of the eleven ANOVAs on the Fight and Sports B sequence, however, yielded a significant finding. Table C-2 shows that when *sadness* scores were employed, there was a difference between the reactions of the boys and girls to the violence and sports sequences (sex of the viewer \times program viewed interaction $p = .05$). Males showed more *sadness* during the Fight than females (t-test, $p = .01$), while there was no difference between males and females in the *sadness* shown during the Sports B sequence. Tables C-3 and C-4 show that during Fighting and Sports B (the men's relay race), there were main effects for sex on *involvement* and *arousal*—i.e., boys were more aroused and involved than girls while watching both the fight scene and the 400-meter relay race.

Since only four of the 22 ANOVAs show any significant differences—and only three of these indicate any sex difference—these findings must be interpreted with caution. In general, however, the results appear to suggest a negative answer to the substantive question: did the girls and boys differ in their emotional reactions during violent and sports programs? When emotions shown while watching the Shooting and Sports A sequence were considered, there were *no* significant differences between boys and girls on any of the eleven emotions, regardless of the program viewed. When emotions shown during the Fighting and Sports B sequence were considered, there were no differences between boys and girls on *pleasantness*, *interest*, *happiness*, *anger*, *disgust*, *pain*, *surprise*, or *fear*, but the boys showed more *sadness* than the girls during the Fight and greater *involvement* and *arousal* during both the Fight and Sports B.

The possibility of a difference between males and females in the emotions shown during the television programs was raised as one conceivable explanation of why significant correlations were obtained between emotions and postviewing behavior for boys but not girls. These ANOVAs suggest that by and large there were few differences in the emotions shown by boys and girls; therefore this explanation seems doubtful.

Table C-1: The differences on HAPPINESS for boys and girls watching "Shooting" or "Sports A"

Source	df	MS	F
Shooting vs Sports A (A)	1	2.07	4.23*
Boys vs Girls (B)	1	0.12	
Interaction: A x B	1	0.01	
Error	61	0.49	

Table C-2: The differences on SADNESS for boys and girls watching "Fighting" or "Sports B"

Source	df	MS	F
Fighting vs Sports B (B)	1	0.01	
Boys vs Girls (B)	1	0.13	
Interaction: A x B	1	1.04	4.23*
Error	61	0.25	

*p < .05

Table C-3: The differences on INVOLVEMENT for boys and girls watching "Fighting" or "Sports B"

Source	df	MS	F
Fighting vs Sports B (A)	1	0.14	
Boys vs Girls (B)	1	2.70	4.85*
Interaction: A x B	1	0.01	
Error	61	0.56	

Table C-4: The differences on AROUSAL for boys and girls watching "Fighting" or "Sports B"

Source	df	MS	F
Fighting vs Sports B (A)	1	0.00	
Boys vs Girls (B)	1	2.23	4.55*
Interaction: A x B	1	0.08	
Error	61	0.49	

*p < .05

Appendix D: An examination of differences in postviewing behavior between boys and girls

These analyses were performed in order to determine whether there were differences in the postviewing behavior of boys and girls which might account for the finding (Tables 2 and 3) that emotional reactions correlated with postviewing behavior for boys and not for girls. ANOVAs were calculated utilizing each of the emotions and each of the postviewing behavior measures for which a significant correlation had been obtained for the boys who viewed violence (Table 2). Each of these ANOVAs was a 2 x 2 x 3 analysis: sex (male vs. female), program (sports vs. violence), emotion (high, medium, and low). Appendix reports the findings dealing with the emotion variable; here we will only consider the findings on the sex variable, or interactions of sex with program viewed. A total of 19 ANOVAs were performed, six utilizing the HURT scores, four with the SLOWNESS TO HURT scores, six with the HELP scores, and three with the AGGRESSIVE PLAY scores.

There were no significant findings for the sex of the viewer, or for sex of the viewer in relation to the type of program viewed, for the ANOVAs on the HURT, HELP, or SLOWNESS TO HURT measures. The ANOVAs for the AGGRESSIVE PLAY measures, however, showed a significant effect for sex and for program viewed in relation to sex. Tables D-1-D-3 show the ANOVAs for the AGGRESSIVE PLAY measures when conducted with the emotion scales of *happiness*—on both Shooting vs. Sports A and Fighting vs. Sports B—and *anger* on Fighting vs. Sports B. In all three, the boys showed more AGGRESSIVE PLAY than the girls.

The possibility of a difference between boys and girls in postviewing behaviors was examined as an explanation of why the emotions shown during the violent program were correlated with postviewing behavior for boys but not for girls. The fact that the ANOVAs failed to reveal any sex difference for the three button press task measures (HURT, SLOWNESS TO HURT, and HELP), even though behavior on these measures was correlated with emotions shown for the boys, suggests that an explanation which postulates a difference in postviewing behavior between boys and girls must be rejected.

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Table D-1: The emotion HAPPINESS displayed by boys and girls watching "Shooting" or "Sports A", related to AGGRESSIVE PLAY

Source	df	MS	F
Shooting vs Sports A (A)	1	15.63	8.08**
Boys vs Girls (B)	1	19.77	10.23**
High, medium or low happiness (C)	2	0.58	
Interaction: A x B	1	10.01	5.18*
Interaction: A x C	2	0.45	
Interaction: B x C	2	1.35	
Three-way interaction: A x B x C	2	2.87	
Error	53	1.93	

*p < .05
**p < .01

Table D-2: The emotion HAPPINESS displayed by boys and girls watching "Fighting" or "Sports B", related to AGGRESSIVE PLAY

Source	df	MS	F
Fighting vs Sports B (A)	1	14.43	8.22**
Boys vs Girls (B)	1	18.42	10.49**
High, medium or low happiness (C)	2	1.70	
Interaction: A x B	1	11.01	6.27*
Interaction: A x C	2	4.66	
Interaction: B x C	2	3.55	
Three-way interaction: A x B x C	2	0.34	
Error	53	1.76	

*p < .05
**p < .01

Table D-3: The emotion ANGER displayed by boys and girls watching "Fighting" or "Sports B", related to AGGRESSIVE PLAY

Source	df	MS	F
Fighting vs Sports B (A)	1	15.41	8.51**
Boys vs Girls (B)	1	19.53	10.78**
High, medium or low anger (C)	2	0.90	
Interaction: A x B	1	10.18	5.62*
Interaction: A x C	2	3.23	
Interaction: B x C	2	1.02	
Three-way interaction: A x B x C	2	3.80	
Error	53	1.81	

*p < .05
**p < .01

Appendix E: Emotion while viewing, program viewed, and sex of the viewer as predictors of postviewing behavior

In these ANOVAs the measures of postviewing behavior were cast as the dependent variables. There were three independent variables in the $2 \times 2 \times 3$ ANOVAs: sex of the viewer, program viewed (violence vs sports) and emotion shown, a high, medium or low score based upon trichotomizing the scores on each of the emotions and each of the postviewing behavior measures for which a significant correlation had been obtained for the boys who viewed violence (Table 2).

Table 2 reported three emotions, *pleasantness*, *happiness*, and *sadness*, correlated with the HURT measure. Six ANOVAs were performed, one for each of these emotion scales, first utilizing the judgments from the videotape samples when the children had been viewing either the Shooting or Sports A, and again for the videotape samples of their facial behavior while they watched either the Fighting or Sports B. Only the former yielded significant findings for the emotion variable.

Table E-1 shows the ANOVA results for *pleasantness*; Table E-2 shows the ANOVA for *sadness*. The ANOVA for *happiness* and the HURT measure failed to yield significant findings for emotion or interactions with emotion, although the tendencies were consistent with the ANOVAs for *pleasantness* and *sadness*. When *pleasantness* was employed in the ANOVA, there was an interaction between the program and the emotion, when *sadness* was employed in the ANOVA, there was an interaction between sex and emotion, and also among emotion, sex and program. Figure 1 shows these findings within these ANOVA classifications. T-tests between means showed the following significant differences:

- a. Among males who viewed violence, those high on *pleasantness* had greater HURT scores than those low on *pleasantness* ($p = .05$); among males who viewed violence, those low on *sadness* had greater HURT scores than males high on *sadness* ($p = .01$).
- b. Among males who were high on *pleasantness*, those who viewed violence had greater HURT scores than those who viewed sports ($p = .05$); among males who were low on *sadness*, those who viewed violence had greater HURT scores than those who viewed sports ($p = .05$).
- c. Among females who were low on *pleasantness*, those who viewed violence had greater HURT scores than those who viewed sports ($p = .05$); among females who were high on *sadness*, those who viewed violence had greater HURT scores than those who viewed sports ($p = .05$).

These findings on the HURT measure were internally consistent and consistent with the correlational data (Table 2).

Table 2 reported that *interest* was correlated with SLOWNESS TO HURT for the males who viewed violence, when both the Shooting sample and the Fighting sample were analyzed. *Involvement*, *arousal*, and *surprise* were correlated with SLOWNESS TO HURT but only for the Fighting sample. Five ANOVAs were performed utilizing SLOWNESS TO HURT scores as the dependent variable: two for *interest*, in the Shooting and Sports A, and in the Fighting and Sports B; one for *arousal*; one for *involvement*, and one for *surprise*, utilizing only the scores from the Fighting and Sports B samples. Only one of these five ANOVAs yielded significant findings for the emotion variable—*interest* in the Shooting and Sports A sample. Table E-3 shows the results of this ANOVA. When *interest* in the Shooting or Sports A sample was analyzed, there was a main effect for the emotion, and an interaction between emotion, sex and program. Figure 2 shows these findings.

Within these ANOVA classifications, t-tests between means showed the following significant differences:

- a. Those males *disinterested* (low) in the Shooting were slower to hurt than those high on *interest* ($p < .05$).
- b. Among males who were high on *interest*, those who viewed Sports A were slower to hurt than those who viewed the Shooting ($p < .01$).
- c. Among children who were most *interested* (high) in the Shooting, the girls were slower to hurt than the boys ($p < .05$). These findings on SLOWNESS TO HURT were internally consistent and also consistent with the correlational results reported earlier in Table 2.

Table 2 reported that six emotions correlated with the HELP measure: *pleasantness*, *interest*, *pain*, and *surprise* during the Shooting and *interest*, *involvement*, and *arousal* during the Fighting. Only one of the six ANOVAs performed with the HELP measure yielded a significant finding for emotion variable—there was a main effect for *interest* shown in Shooting and Sports A. Table E-4 and Figure 3 show the findings from this ANOVA. The main effect for *interest* means that those more interested in the program, regardless of the content of the program, had smaller HELP scores than those low in *interest*. The figure shows that this appears to be so only for the males who saw violence and the females who saw sports; t-tests showed that the only significant difference among the groups was for the males who saw violence. Those boys highly *interested* in the Shooting had smaller HELP scores than those who showed low *interest* in the Shooting ($p < .05$). When this analysis was performed utilizing the mean HELP score instead of the total HELP score, significant results for emotion were not obtained. This is the only instance in which the results obtained with HURT or HELP scores were not duplicated when mean cumulative scores were employed.

Table 2 reported three emotion scales correlated with AGGRESSIVE PLAY, but none of the ANOVAs utilizing these scales yielded a significant finding for emotion, or emotion in interaction with sex and/or program viewed.

Table E-1: The emotion PLEASANTNESS displayed by boys and girls watching "Shooting" or "Sports A," related to later HURT behavior

Source	df	MS	F
Shooting vs. Sports A (A)	1	124.81	
Boys vs. Girls (B)	1	7.02	
High, medium, or low pleasantness (C)	2	89.69	
Interaction: A x B	1	0.00	
Interaction: A x C	2	252.40	4.0
Interaction: B x C	2	142.00	
Three-way interaction: A x B x C	2	96.46	
Error	53	62.77	

* $p < .05$

Table E-2: The emotion SADNESS displayed by boys and girls watching "Shooting" or "Sports A," related to later HURT behavior

Source	df	MS	F
Shooting vs. Sports A (A)	1	120.87	
Boys vs. Girls (B)	1	6.11	
High, medium, or low sadness (C)	2	22.26	
Interaction: A x B	1	0.05	
Interaction: A x C	2	148.56	
Interaction: B x C	2	245.03	4.00*
Three-way interaction: A x B x C	2	194.80	3.18*
Error	53	61.33	

* $p < .05$

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Table E-3: The emotion INTEREST displayed by boys and girls watching "Shooting" or "Sports A", related to later SLOWNESS TO HURT behavior

Source	df	MS	F
Shooting vs Sports A (A)	1	21.39	
Boys vs Girls (B)	1	4.28	
High, medium or low interest (C)	2	29.97	3.69*
Interaction: A x B	1	0.36	
Interaction: A x C	2	6.08	
Interaction: B x C	2	0.89	
Three-way interaction: A x B x C	2	42.44	5.23**
Error	53	8.12	

*p < .05

**p < .01

Table E-4: The emotion INTEREST displayed by boys and girls watching "Shooting" or "Sports A", related to later HELP behavior

Source	df	MS	F
Shooting vs Sports A (A)	1	45.46	
Boys vs Girls (B)	1	52.03	
High, medium or low interest (C)	2	233.98	4.04*
Interaction: A x B	1	48.21	
Interaction: A x C	2	70.29	
Interaction: B x C	2	6.52	
Three-way interaction: A x B x C	2	61.36	
Error	53	57.86	

*p < .05

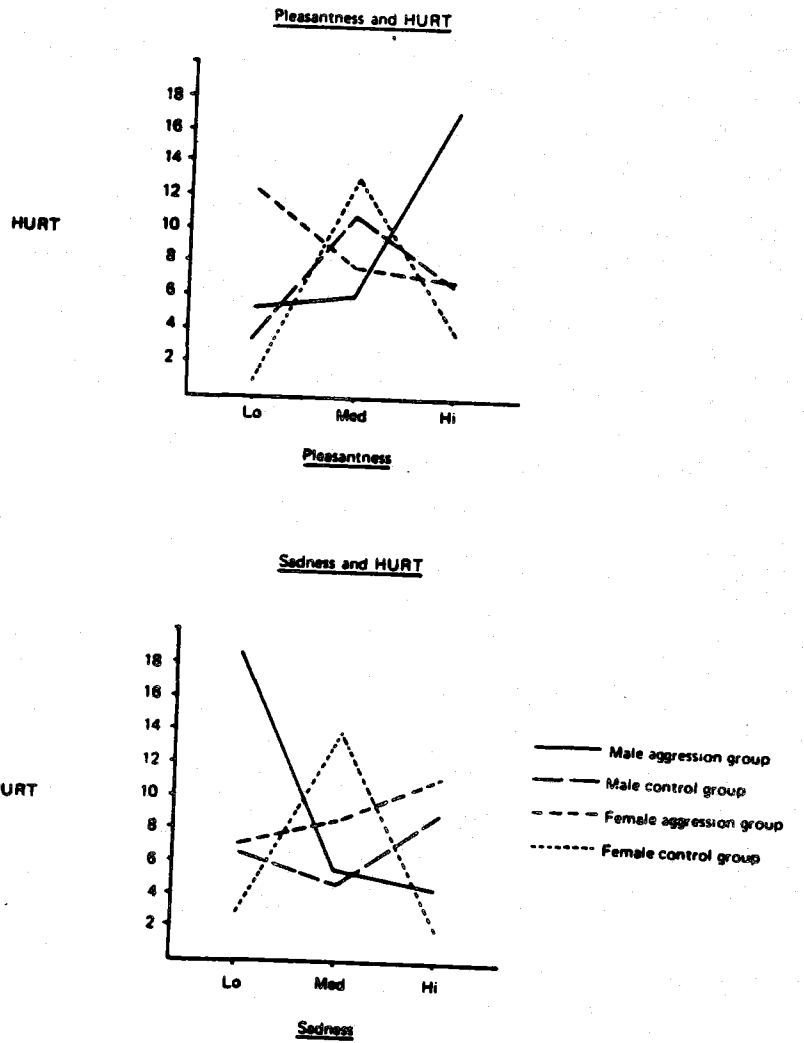


Figure 1

SLOWNESS TO
HURT

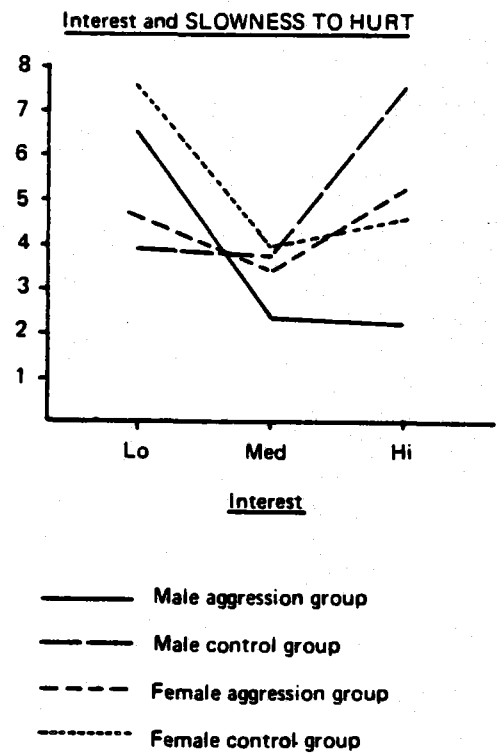


Figure 2: Interest and SLOWNESS TO HURT

HELP

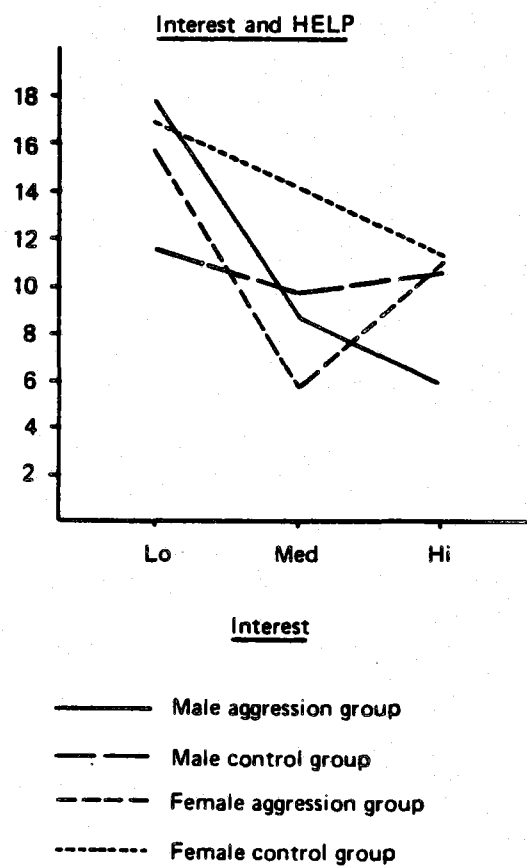


Figure 3: Interest and HELP