1982

A study of age and sex-related differences in the perception of emotional stimuli

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AN ABSTRACT OF THE THESIS OF Nancy Mellor Canizio

for the Master of Science in Psychology presented August 12, 1982.

A Study of Age and Sex-related Differences in the Perception of Emotional Stimuli

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In a tachistoscopic perception task, adult males in the Fels Research Institute's longitudinal population (Kagan and Moss, 1960) were found to have a higher recognition threshold for pictures depicting dependency scenes than adult females. The female subjects had a higher recognition threshold for aggressive scenes than the males.

The present study was designed to further compare male and female perception of dependent and aggressive stimuli by including a developmental component to test if the perceptual differences vary with age. A benign or neutral stimulus category was added to aid in determining direction of any resulting differences:

i.e., heightened perception or avoidance of perception, and a recognition memory task was added to the tachistoscopic task to determine if there were any differences between sensory and long term memory of emotional stimuli.

A pretest was administered each subject in four age groups to establish individual visual thresholds in the tachistoscope. Preschoolers, third graders, ninth graders and college students were then tested on a matching procedure at threshold level (sensory memory task), and 48 hours later, above threshold, on a recognition memory task. The stimuli were colored photographs depicting aggressive, dependent and benign interactions of two adults, and the dependent measure was the number of correct identifications in each stimulus category: aggressive, dependent, and benign. Age by sex analyses of variance were calculated on three variables abstracted from the correct responses of the subjects to the three categories of stimuli. The variables were 1) overall number of correct identifications, 2) number of correct identifications of dependent photographs minus the number of correct identifications of aggressive photographs, and 3) the mean number of correct identifications of emotional photographs (aggressive and dependent) minus the number of correct identifications of benign photographs. The overall, dependent/aggressive and emotional/benign comparisons were analyzed on both the sensory memory and recognition memory tasks.

Significant differences were found in the aggressive/dependent comparison on both tasks, and in the emotional/benign comparison on the sensory memory task. Ninth grade males and females accurately

identified comparatively more dependent than aggressive pictures than the other three age groups on the sensory memory task. On the recognition memory task, ninth grade males and females accurately identified more aggressive than dependent pictures. There was a significant age by sex interaction on the emotional/benign comparison. Preschool males accurately identified comparatively more emotional than benign pictures, and college males accurately identified comparatively more benign than emotional. The results were reversed among females, with preschool females identifying more benign than emotional pictures and college females identifying more emotional than benign. There was comparatively little difference between males and females at the third grade and ninth grade levels.

Thus, the results of Kagan and Moss (1960) were not substantiated. Rather than a sex difference in the perception of dependency and aggression, there was an age difference which depends on whether the memory process being tested is sensory or long term. Biological and sociological changes appear to be accelerated in the adolescent phase, and both factors could be expected to affect perception. The age by sex interaction on the emotional/benign comparison suggests that preschool males and females' sensory perception may be different, and that socialization and or maturation continues to have differential effects on the sexes into adulthood.

A STUDY OF AGE AND SEX-RELATED DIFFERENCES IN THE PERCEPTION OF EMOTIONAL STIMULI

by

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A thesis submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE
in
PSYCHOLOGY

Portland State University

1982

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ACKNOWLEDGEMENTS

I attribute the reality of a finished product to committee chairman, Dr. James Paulson. He made statistical analysis exciting rather than painful. However, most important to me, his expressed excitement with the project made his insistence on quality less a hurdle than a goal. He handled morale and technical expertise with equal facility. Being deficient in both at times, I exploited his strength.

I wish to express appreciation to committee member Dr. Gerald Murch, who continued in that function even after his departure from Portland State to the private sector, and to committee member Dr. Gerald Guthrie, whose child psychology course inspired the developmental component of my study. Both Drs. Murch and Guthrie generated initial design suggestions and safeguards which aided in producing interpretable results. Dr. Barry Anderson provided excellent consultation in the interpretation phase of the study.

My husband Charles Canizio and sons Casey and Jesse deserve much gratitude for standing by me during the course of this study in spite of my periodic lapses as a wife and mother.

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A STUDY OF AGE AND SEX-RELATED DIFFERENCES IN THE PERCEPTION OF EMOTIONAL STIMULI

Developmental psychology is oriented toward resolving the mysteries of how an infant becomes an adult. Matthew Speier (1976) has labeled this orientation "the adult ideological viewpoint in studies of childhood," emphasizing the unique nature of this perspective. He suggests that research should focus on children as interactants with each other and with adults----adults who view them as what they should become, rather than what they are. Speier contends that these very units of children's behavior, often viewed as insignificant because of their short-term nature, might well be the most germane to a view of childhood as children see it. In like manner, Skolnick (1976) cautions against the "governing presuppositions" that guide our study of child development and socialization toward some notion of adult performance.

To extricate the adult-centered notion of a child's viewpoint from the child's view of reality, the area of visual perception is a logical beginning because of its importance in concept formation. Much developmental research has been focused on comparing hypothesized differences in information processing between young children and adults. An integral question for this research is whether any such differences lie in perceptual ability (organismic structure), or whether the experimental stimuli is processed differentially (cognitive experience). This presents the age-old nature/nurture dilemma.

Research will be reviewed suggesting organismic differences in the way children and adults handle sensory input. The nurture factor is the possible difference in meaning that identical stimuli might hold for individuals at various age levels. If age-dependent differences are found, they might thus represent organismic, cognitive or measurement variations. It is likely an interaction of all these factors exists in many developmental studies.

On the side of organic developmental difference, Rohwer (1970) made the substantial claim that "the ability to use a linguistic or verbal means for storing and preserving information emerges earlier developmentally than the ability to use visual or imagery processes for accomplishing the same ends." Furthermore, Conrad (1972) contends that preschoolers are unable to utilize a naming or labeling process to facilitate learning whether they vocalize or not. He conducted an STM experiment with subjects who were sometimes instructed to vocalize and sometimes not in the identification of familiar objects. From his results, he theorized that in children under four years, naming or verbal mediation does not occur. He also suggested that vocalizing interferes with an unstable naming development in five and six year olds impairing recall.

Neither position has withstood more carefully controlled experimentation. Jones' (1973) study of three-year-old children produced results showing superior performance on visual materials as compared with verbal. Visual stimuli included colored photographs rather than the line drawings of some preceding studies, the verbal and non-verbal presentation modes were clearly delineated, and pre-training was done

to insure an understanding of the task. In the paired associate task (even when the original stimuli were presented verbally), recall was superior when probed visually. This emphasizes the preschoolers' use of imagery.

Brown (1977) attempted to replicate Conrad's study using letters instead of pictures to bias the short-term memory task toward verbal coding, and he found a phonetic effect in preschoolers evidenced by a decreased performance in coding items of high phonetic similarity even when the stimuli were presented visually. Brown emphasized the fact that previous studies have underestimated the coding flexibility of preschoolers. These studies suggest that similar perceptual processes are functional in preschoolers as compared with older children and adults, and previous differential outcomes in recall tasks may indicate preschoolers' differing use of these resources.

Prior to the process of retrieval is the initial storing of information through some sort of coding or mnemonic process. Certainly at the visual level, and probably the other sensory levels as well, familiarity of stimuli has a significant effect on the earliest stages of visual processing (Solomon and Howes, 1951). A related factor of similar importance is the perceptual salience of stimuli. Odom and Lemond (1975) through a salience assessment procedure on four dimensions (form, color, number and position) dispute previous findings that older subjects are better able than younger subjects to attend to relevant and to ignore irrelevant information. Hagen and Hale (1973) proposed from an incidental-learning paradigm study that with increasing age, subjects have more cognitive control in selecting goal-

relevant information and ignoring incidental information. It seems from Odom and Lemonds' study that salience affects the ability to store and recall both relevant and incidental information, and that Hagan and Hales' results might have been produced by ignoring the difference in relative perceptual salience between the two groups. Adults might have had more experience with all the stimuli and therefore were not distracted by the salience of the irrelevant stimuli as were perhaps the younger subjects who had less overall familiarity with the stimuli and a decreased chance of perceiving uniform salience. When this factor is controlled, Odom and Lemonds' study shows that both intentional and incidental recall is facilitated by a high level of assessed salience for adults as well as younger subjects.

Salience and familiarity of stimuli played a major role in Toch and Schulte's (1961) binocular rivalry experiment with police administration students. A series of violent and non-violent pairs of pictures were presented in a stereoscope, and advanced police students as well as two groups of controls were asked to identify the picture they saw. The number of violent percepts was significantly greater for advanced police administration students than for first-year police students or psychology students (the two control groups did not differ significantly from each other). The training or experience of the advanced students rather than personality variables seemed to be responsible for the significant difference because it was assumed that personality characteristics would be similar for first-year police students and the advanced group----sensitivity to violent percepts was environmentally developed rather than an inherent individual character-

istic of men attracted to police administration study. Toch and Schulte discussed the possibility of police training removing the inhibition to perceive anti-social situations as well as the theory of an increased readiness to perceive violence. The design of the study did not permit distinguishing between these two explanations.

Wicklegren (1979) lends support to the idea of perceptual set in his discussion of a chunking process which is the hypothetical development of new nodes which are activated by a group of learned associations. He points out that expectations may influence perception by activating these nodes either at the semantic memory level through partial activation (priming) or through the feedback process to the sensory periphery. Thus in visual perception, Wicklegren suggests that roughly four nodes or ideas can be accessed at one time, but there seems to be a stratified system where one node activates another within its constituency. He cites the example of faster perception of a target letter that occurs in a word as opposed to a non-word.

Effects of expectation and/or inhibition seemed to be operative in Kagan and Moss's (1960) study conducted with adult subjects from the Fels Research Institute longitudinal population. In a tachistoscopic perception task, they found males to have a higher recognition threshold (measured by exposure time necessary to correctly identify stimuli) than females for pictures depicting dependency. They found the converse to be true for recognition thresholds of the aggressive pictures. The inference could be made that stimuli depicting dependency is stressful to adult males and stimuli depicting aggression is stressful to adult females, or that aggression is more salient and

familiar to females.

Jenkins (1957) has reviewed the often contradictory literature which has sought to deal with the relationship between affective processes and perception. Bruner and Goodman (1947) offer a working definition of these affective processes by categorizing them as "behavioral" determinants or "those active adaptive functions of the organism which lead to the governance and control of all higher-level functions." In this category would fall value, need and motivation factors which Jenkins discusses as differentially affecting perception. The second major category of perceptual determinants Bruner and Goodman term "autochthonous," the "characteristic electrochemical properties of sensory end organs and nervous tissue."

The present study will compare the effect of stimuli of differing emotional content (aggressive, dependent and neutral) on the perception and recognition processes of four age groups: preschool, third grade, ninth grade, and college students. It is suggested that varying the emotional content of colored photographs will produce age and sex-related differences in both a perception and recognition task, but that these differences will be due to "behavioral" determinants rather than age-related neural differences. The exception to this would be in size of short-term memory working space which should increase with age and produce quantitatively greater recognition with older subjects.

Cantor (1976) has shown that the salient needs of subjects significantly affect their categorization of the interactions of individuals. In turn, Klein, Schlesinger and Meister (1951) have pointed out that values seem to affect perception most when the task is

difficult or ambiguous. The design of this study with almost sub-threshold exposure of very similar photographs thus favors value-laden perception. However, predicting the values of the groups by age and sex and the direction perceptual differences will take is most difficult because the interaction of several factors must be considered: What are the different overt vs. covert values assigned the qualities of aggression and dependency? Is there a difference in the felt or expressed concern regarding these qualities? Whether valued positively or negatively, does a "current concern" (Klinger, 1975) with aggressive or dependent relationships determine the facility of perception? Across the considerations of value, need and concern, does intensity increase the difficulty of categorizing and associating images as Horowitz (1970) suggests?

In an attempt to integrate the various factors believed to affect perception, it is predicted that:

1. Subjects of both sexes at the preschool level will correctly identify and recognize proportionately more aggressive stimuli than dependency stimuli. It is hypothesized that there will be a salience factor involved because dominance, associated with aggression, is highly valued from the seemingly powerless position subjects at that age occupy.

2. The males of the three oldest groups will identify significantly more aggressive pictures than females of those groups. This is also based on a theorized value. Sex-role stereotyping suggests that males should be strong while females should be protected and taken care of.

3. The females of the three oldest groups will identify more dependency photographs. This might be produced by both an inhibition to perceive aggressive situations as well as greater willingness to identify with dependency issues. It is not felt this difference will be in effect in the preschool group because dependency is perhaps valued by both sexes at that age and therefore should be identified proportionately more than the neutral stimuli.

4. There will be an age-related difference in the correlations between the perceptual task and the recognition task with the younger subjects having a positive correlation, and the older subjects of both sexes recognizing more of the emotional stimuli than the neutral only on the perceptual task.

All the predictions are based on cognition differences rather than differences in sensory equipment between the subject groups.

METHOD

Subjects

Subjects were obtained through the educational and child care agencies of Astoria, Oregon, a town of approximately 10,000 located on the northwestern coast. A total of 72 individuals were tested on a sensory memory task, and 63 of those individuals were given a recognition memory task approximately 48 hours later.

College Age Group. Eight male and nine female subjects were obtained from psychology classes at Clatsop Community College. The ages ranged from 17 to 48 with a mean of 24.75 years. On the recognition memory task, one female was unavailable for testing. The researcher requested volunteers directly from the classroom.

Ninth Grade Group. Eight males and nine females were tested on the sensory memory task. Two females were unavailable for testing on the recognition memory task. Subjects' ages ranged from 14 to 15 years. They were obtained through a required freshman class at Astoria High School. Letters were sent home with students requesting parental permission to participate in the study. Students' and parents' questions about the study were answered in general terms by the class instructor and dean of students.

Third Grade Group. Ten male and ten female subjects participated in the sensory memory and recognition memory task. The ages ranged from 8 to 9 years. Subjects were obtained from the Astor and Gray

Public Elementary Schools, and the Children's Center Day Care program.

Preschool Group. Nine males and nine females participated in the sensory memory task, and five males and six females also participated in the second task. The ages ranged from four to five years. Subjects were obtained from the Children's Center, Josie Peper Child Care Center, and the Head Start Program by giving letters to the parents of the children requesting their permission to allow their children to participate. Five males and three females were from the Children's Center program, four males and five females were from Josie Peper, and one female was from the Head Start program.

There were nine subjects in all whose performance is not accounted for in the data. In the College group, one male subject was able to identify the pre-test pictures at the fastest exposure time so a threshold could not be obtained for him. One male and one female did not show for testing. In the Third Grade group, one female subject was dropped due to equipment problems which overexposed the test pictures. In the Preschool group, three males and two females could not complete testing because of refusal and inability to identify all the pre-test pictures.

Procedure Summary

Each subject was shown a series of ten pictures in a tachistoscope to establish an individual threshold which was defined as the exposure time necessary for the subject to correctly identify 50 percent of the stimuli. The subject's task was to match the picture shown in the tachistoscope with its copy mounted on a poster. The procedure

used was the up-and-down method described by Dixon and Massey (1968), and will be referred to here as "establishing threshold." A more detailed explanation of the procedure is included in a separate section. Figure 1 illustrates this and the subsequent steps in the procedure. After the exposure time at threshold was established, twelve test pictures were then shown to the subject one at a time in the tachistoscope at the established exposure time, and the subject was asked to identify the pictures and an additional six never seen by the subject before. They were asked to indicate by a "yes" or "no" if they had seen the pictures before. The tachistoscope was not used in this procedure, which will be referred to as the "recognition memory task."

Apparatus

A two-field mirror tachistoscope (Gerbrands, Model T-2B-1) with one channel lighted was used. Brightness was equated at 15 ML, and the target subtended a visual angle of 24.29^{o} by 25.14^{o}. The image was projected on the retina with a vertical angle of 24.29^{o} and a horizontal angle of 25.14^{o}. A polaroid camera with flash attachment was used to take the test photographs. An easel with the tray 71.4 cm from the ground was used for mounting the posters. Seating height of the subject and table height for placement of the tachistoscope varied considerably, but the subjects were always situated so their eyes fit directly into the mask of the tachistoscope, thus controlling distance from the target. Testing environment varied from school to school, but was always conducted in a private room in the institution the subject attended when the sensory memory task was given. The recognition

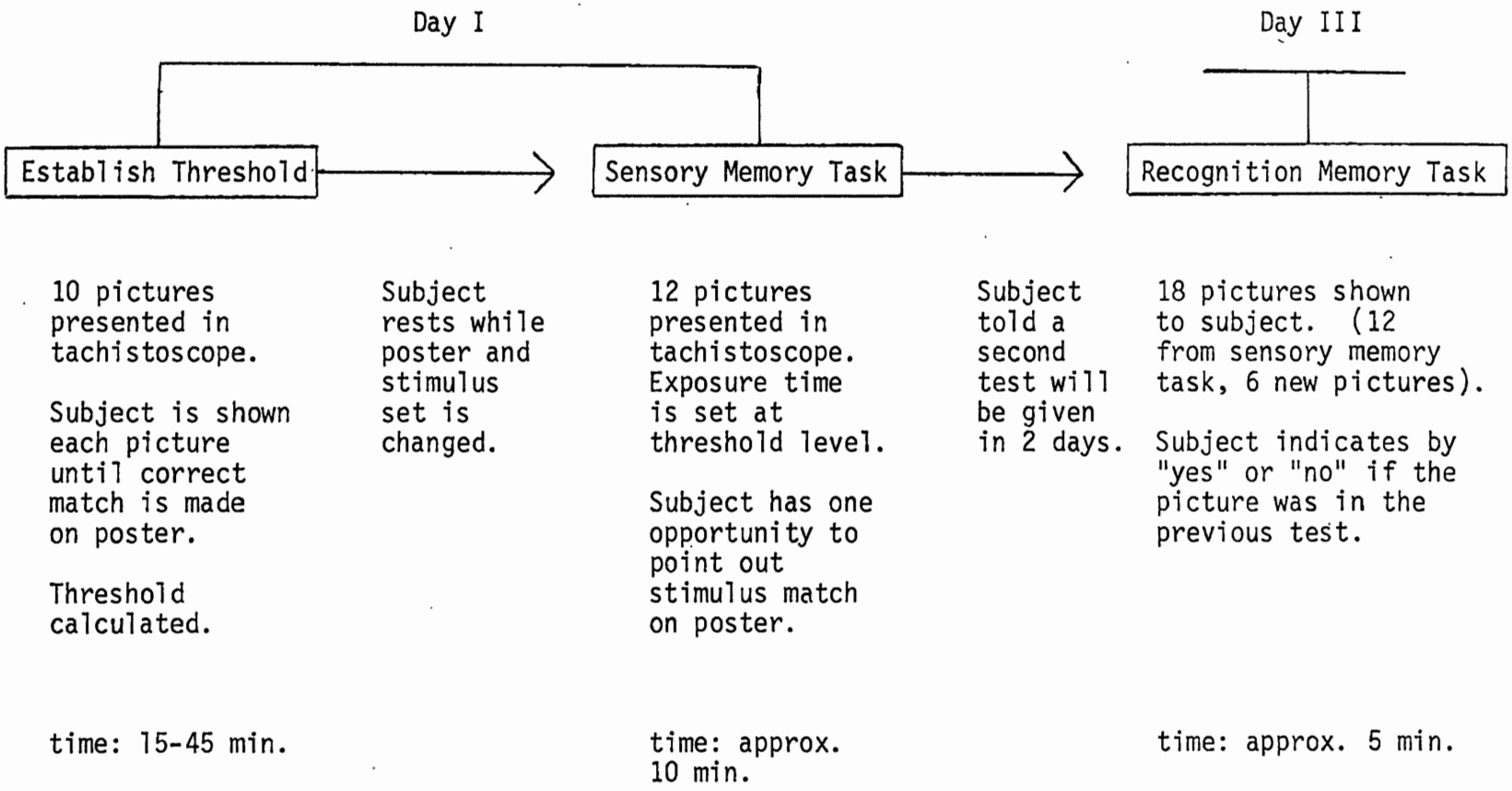

Figure 1. Procedure overview for each subject.

memory task was conducted in less structured settings, including a subject's home in one instance and workplace in two instances, as well as the institutions.

Photographs For Establishing Threshold. Twelve 8.8 cm x 8.5 cm photographs were used in the threshold procedure. They were candid shots of children against varying backgrounds taken in color. The pictures were mounted on white poster paper measuring 70.8 cm x 50 cm in clear picture-mounting tabs. The photographs were 8.5 cm from the top of the poster, 9.7 cm from the bottom, 10.5 cm from the left side and 8.5 cm from the right side. There was 5.5 cm between the columns, and 5 cm between the rows. Each column had three photographs, and each row had four. Duplicate copies of 10 of the photographs were mounted on white index cards 15.2 cm x 10.1 cm for placement in the tachistoscope.

Photographs For Sensory Memory Task. Sixteen Kodacolor copies of polaroid prints were mounted on white poster paper of the same dimensions of the previous section. The photographs were 8.8 cm x 8.5 cm. A scaled-down copy of the poster layout is shown in Figure 2. Photograph position was randomized. Duplicates of 12 of the photographs on the poster were mounted on the 15.2 cm x 10.1 cm white index cards for presentation in the tachistoscope. The subject matter of these 12 photographs included two dependent, two aggressive and two neutral poses for each sex. More detailed description of each photograph is provided in Table I. The major dependent variables were based on the identification of these 12 photographs.

Photographs For Recognition Memory Task. The original polaroid

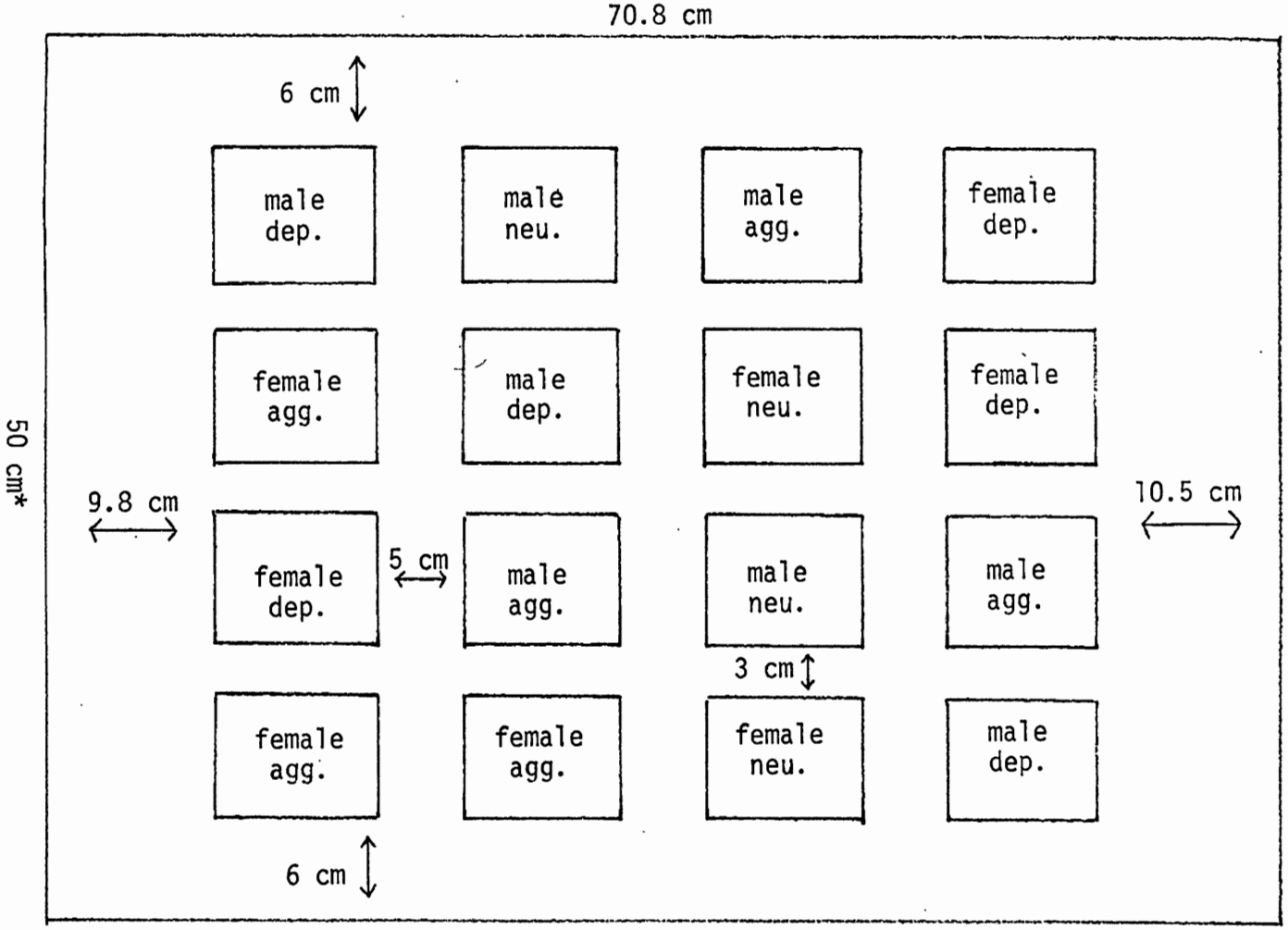

Figure 2. Typical display of photographs on sensory memory task.

*Figure drawn to 1/4 scale

TABLE I

DESCRIPTION AND USE OF STIMULI IN DEPENDENT, AGGRESSIVE AND NEUTRAL CATEGORIES

#	Persons	Activity	Use
		Dependent	
1.	2 males	hugging, both standing	Sensory Memory (in tachistoscope & on poster), Recognition Memory
2.	2 males	hugging, one on knees	Same as above
3.	2 females	hugging, one on knees	Same as above
4.	2 females	hugging, both standing	Same as above
5.	2 males	hugging, both standing	Sensory Memory (poster only)
6.	2 females	one holding other up	Sensory Memory (poster only)
7.	2 males	one holding other up	Recognition Memory
8.	2 females	hugging, both standing	Recognition Memory
		Aggressive	
9.	2 males	pointing gun	Sensory Memory (in tachistoscope & on poster), Recognition Memory
10.	2 males	with knife	Same as above
11.	2 females	with knife	Same as above
12.	2 females	with gun	Same as above
13.	2 males	with gun	Sensory Memory (poster only)
14.	2 females	with gun	Sensory Memory (poster only)
15.	2 males	with knife	Recognition Memory
16.	2 females	with knife	Recognition Memory
		Neutral	
17.	2 males	shaking hands	Sensory Memory (in tachistoscope & on poster), Recognition Memory
18.	2 males	with can of pop	Same as above
19.	2 females	looking at ring	Same as above
20.	2 females	with coffee cups	Same as above
21.	2 males	with ashtray	Recognition Memory
22.	2 females	with candle	Recognition Memory

prints of the 12 pictures used in the sensory memory task in the tachistoscope were used. They were 8.9 cm x 10.7 cm. Six additional polaroid prints of the same dimensions were added. Specific content information is included in Table I.

Validation of Stimuli. The dependent, aggressive and neutral classification of the pictures was validated in a procedure using 20 students (13 female and 7 male) from a college class. They were shown each picture in an overhead projector and given a choice of three responses to check (see appendix, exhibit A) as well as noting if the figures in the photograph appeared to be both male, both female, or one male and one female. Results are shown in Table II. The responses in the "other" category were interpreted by the researcher as to whether or not they fell in the appropriate category. An "other" category was not provided on the form used for the college students, but they were instructed to write comments if their perceptions didn't fit in the three categories listed, and they availed themselves of this. In three cases (photographs numbered 14, 16 and 22) the validation was poor and new stimuli were prepared. There was also poor validation of stimulus number 7, but this was not reproduced due to oversight. It was not used in the sensory memory task.

The 22 resulting stimuli were presented to a ninth grade class of nine males and ten females by passing them around the room because of the previous poor visibility in the projector. An "other category was included on the response form (see appendix, exhibit B) which had only been offered verbally to the College group. Again, the written comments in this category were interpreted by the researcher as to whether or

TABLE II

VALIDATION OF STIMULUS; TABULATION OF RESPONSES TO QUESTIONNAIRE

College Students (13 females and 7 males)[a]

Stimulus #	Male	Female	Category Checked: Both	Anger	Need	Nothing	Other
Nominally Dependent Photographs							
1.	19			1	19		
2.	20				20		
3.		16	3		17		2
4.		19			18		
5.	18				19		1
6.		20		1	18		2
7.	20			11	5	1	2
8.		20			20		1
Nominally Aggressive Photographs							
9.	20			12		1	6
10.	19			17			3
11.		19		18			
12.		19	1	15			6
13.	20			19			1
14.		16	3	17		1	2
15.	12	1	6	3	10	2	1
16.	3	15		5	1	7	4
Nominally Neutral Photographs							
17.	18				2	12	7
18.	20				1	15	3
19.	1	18		2	3	8	4
20.		19			2	14	2
21.	20			1		16	3
22.		18		2	8	5	3

[a]Some students checked more than one descriptive category and some left items blank.

not they fell in the appropriate category of the stimulus. Validation results for the Ninth grade group are shown on Table III.

Procedure

Establishing Threshold. Prior to the testing from which the dependent variables were gathered, a pre-test was given each subject to establish their individual threshold level. The group of 10 colored pictures of children against various backgrounds was used for this purpose. The pictures were shuffled for randomization and the first picture was presented at an exposure time in the tachistoscope which was believed to be below the subject's threshold. The initial exposure time varied according to the subjects' ages as there was found to be wide variability in threshold level, with the preschoolers' threshold being comparatively high.

The College group was the first population tested, and when attempting to establish threshold for the first subject, he was able to identify the pre-test pictures at the fastest exposure time setting on tachistoscope. Because of this, four sheets of blue plastic filters were placed in the eye opening to reduce visibility. When the Preschool group was tested, subjects began tiring on the pre-test because visibility was so difficult for them with the filters. They began to ask to leave the experiment prior to finishing the test. Thus, approximately halfway through the preschool population, the filters were removed and the remainder of the preschool group was tested without filters. This served to increase the number of correct identifications for subjects without filters, but because the fundamental dependent

TABLE III

VALIDATION OF STIMULUS CATEGORIES;
TABULATION OF RESPONSES
TO QUESTIONNAIRE

Ninth Grade Students (9 males, 10 females)[a]

Stimulus #	Male	Female	Category Checked: Both	Anger	Need	Nothing	Other
Nominally Dependent Photographs							
1.	18		1	1	13		4
2.	18	1		1	11	3	4
3.		19			15		3
4.		18		1	13		5
5.	18		1		12	1	6
6.		18	1		17	1	1
7.	19			3	7	2	7
8.		18			13	1	4
Nominally Aggressive Photographs							
9.	19			13		2	3
10.	18	1		19			
11.		17		16			2
12.		19		18			1
13.	19			15		1	3
14.	1	18		17			2
15.	18	1		17	1		1
16.		19		16			3
Nominally Neutral Photographs							
17.	19				1	9	8
18.	17					15	2
19.		19			3	12	4
20.		19				10	9
21.	18	1		1		11	8
22.		19				15	4

[a]Some students checked more than one descriptive category and some left items blank.

variables in the study involve within-subject contrasts of response to aggressive, dependent, and neutral stimuli, a between-subjects difference should not invalidate the preschool data.

The initial pre-test picture was presented at the anticipated threshold level of the subject, and exposure time was increased by two milliseconds until a correct identification was made. The second pre-test picture was presented at two milliseconds less exposure time than the time of the previous correct identification. Either the time was recorded if a correct identification was made or the exposure time was increased by two milliseconds until this occurred. Each correct identification meant placement of the next pre-test picture in the tachistoscope and presentation at two milliseconds less exposure time than the previous correct identification. Threshold was computed on the basis of nine pre-test pictures, throwing out the first one and using the formula $x=y\pm 1/2\ d$, where x is the mean of the exposure times for successful identification of stimuli or incorrect identification of stimuli, whichever is less, and $1/2\ d = 1$ since there is a two millisecond increment. One is added if the formula is based on failures and subtracted if based on successes (Dixon and Massey, 1968). The range of exposure times and threshold levels are shown in Table IV.

Prior to beginning this task, the subject was seated in front of the tachistoscope with an easel supporting a poster with 12 colored photographs of children positioned to the left of the tachistoscope. The subject's name, age and vision information was recorded. The latter included whether or not the subject used corrective lenses and if there was any indication of color blindness. Instructions were given that a

TABLE IV

LOW, HIGH AND AVERAGE RANGE OF EXPOSURE TIMES (IN MSEC) FOR FIRST IDENTIFICATION AND THRESHOLD LEVEL

College Group

	Males		Females	
	First Identification	Threshold	First Identification	Threshold
Low	14	49	14	66
High	800	849	278	296
Average	150	228.4	95.8	134.8
Ninth Grade Group				
Low	16	57	32	50
High	132	150	138	210
Average	60.6	106.9	68.4	122.7
Third Grade Group				
Low	32	109	74	109
High	310	905	296	420
Average	167.8	296.2	153.8	220.5
Preschool Group				
Low	12	14	22	41
High	910	929	844	868
Average (Total)	407.1	419.2	368.2	444.4
Average (Without Filters)	43.6	54.6	91	205.5
Average (With Filters)	861.5	875	590	635.6

series of pictures would be shown one at a time in the machine so that they could barely be seen, but as soon as the subject thought they knew which picture was being shown, they were to point it out on the poster. Guessing, even if the subject wasn't entirely sure was encouraged and was not penalized. The order of presentation as well as position on the poster was randomized by shuffling the stimuli before each subject was tested. The pre-test was then conducted in the manner described. The subject was told he could rest while the researcher calculated threshold level.

Sensory Memory Task. A second poster was then placed on the easel containing the 16 colored photographs made up of three "dependent" male interactions, three "dependent" female interactions, three "aggressive" male interactions, three "aggressive" female interactions, two "neutral" female interactions and two "neutral" male interactions. To reduce the possibility of identification by elimination, one dependent female and dependent male interaction as well as one aggressive male and one aggressive female picture on the poster was not presented in the tachistoscope.

Duplicates of the 12 pictures on the poster were each presented once in the tachistoscope at the exposure time determined in the pre-test situation to be threshold level. Directions given to each subject were that each picture would be presented once and they were to try to match the one in the tachistoscope by pointing to its duplicate on the poster. They were urged to guess if they were unsure. Stimuli were numbered on the back and the number of the stimulus they guessed each time was recorded. The number of correct identifications in each

category - dependent, aggressive and neutral - were tabulated and used in the analysis of the results. The number of incorrect identifications in each stimulus category was also tabulated and used in an analysis.

Recognition Memory Test. An arrangement was made to set up a second testing time with each subject. Approximately two days later, with some exceptions, they were shown 18 pictures including the 12 shown in the tachistoscope. Instructions were given that some of the pictures had been shown to them in the previous test and some were photographs they had never seen. They were asked to say "yes" if they had seen the picture presented and "no" if they had not. The pictures were the original polaroid prints from which the copies used in the previous task had been made. The six new pictures included two in the "dependent," two in the "aggressive" and two in the "neutral" category, one each with females and one each with males. Each picture was handed to them and they were asked to place it face down when they were finished responding. Order of presentation was randomized by shuffling the pictures. Response was recorded with the number of each stimulus presented.

RESULTS

Age by Sex analyses of variance were calculated on three dependent variables abstracted from the correct responses of the subjects to the three different categories of stimuli. This resulted in six ANOVA's: three for the sensory memory task and three for the recognition memory task. The dependent variables were a) the total number of correct identifications for each subject, which will be referred to as the overall comparison; b) the number of correct identifications of dependent stimuli minus the number of correct identifications of aggressive stimuli - the dependent/aggressive comparison; and c) the mean of the number of correct identifications for dependency and aggressive stimuli minus the number of correct neutral identifications - the emotional/benign comparison. Tables V, VI and VII show the means and standard deviations and the results of the analyses of variance for the respective dependent variables.

A significant sex-by-age interaction effect occurred in the emotional/benign comparison on the sensory memory task. Figure 3 illustrates this interaction. Females in preschool correctly identify less of the emotional stimuli (aggressive and dependent) than neutral. By third grade this is reversed and continues with increasingly greater difference favoring emotional stimuli through college age. Males in preschool correctly identify more of the emotional stimuli in comparison with neutral, but the difference declines until college age when

TABLE V

OVERALL COMPARISON OF CORRECT RESPONSES ON SENSORY MEMORY TASK

Mean and Standard Deviation Scores

	Males			Females		
	n	Mean	S.D.	n	Mean	S.D.
College Group	8	7.88	2.10	9	9.11	3.14
Ninth Grade Group	8	7.75	1.67	9	8.33	2.12
3rd Grade Group	10	7.50	2.80	10	7.30	3.02
Preschool Group	9	8.22	2.91	9	6.11	2.03

Analysis of Variance

	SS	df	MS	F	p
Age	19.63	3	6.54	.98	
Sex	.29	1	.29	.04	
Age x Sex	28.17	3	9.39	1.35	
Within	446.99	64	6.98		
Total	495.07	71			

TABLE VI

DEPENDENT/AGGRESSIVE COMPARISON OF CORRECT RESPONSES ON SENSORY MEMORY TASK

Mean and Standard Deviation Scores[a]

	Males			Females		
	n	Mean	S.D.	n	Mean	S.D.
College Group	8	4.88	1.13	9	4.22	1.39
Ninth Grade Group	8	5.25	1.39	9	5.56	1.59
3rd Grade Group	10	4.00	1.05	10	4.50	1.35
Preschool Group	9	3.89	1.27	9	3.89	1.17

[a]These are scaled scores where 4 = no difference, 4+ = more dependent, 4- = more aggressive.

Analysis of Variance

	SS	df	MS	F	p
Age	22.39	3	7.46	4.41	*
Sex	.03	1	.03	.02	
Age x Sex	3.41	3	1.14	.69	
Within	108.32	64	1.69		
Total	134.15	71			

* $p < .025$

TABLE VII

EMOTIONAL/BENIGN COMPARISON OF CORRECT RESPONSES ON SENSORY MEMORY TASK

Mean and Standard Deviation Scores[a]

	Males			Females		
	n	Mean	S.D.	n	Mean	S.D.
College Group	8	3.38	1.51	9	5.44	1.67
Ninth Grade Group	8	4.25	2.55	9	4.67	.87
3rd Grade Group	10	4.80	1.75	10	4.30	1.57
Preschool Group	9	5.00	1.97	9	3.44	1.42

[a]These are scaled scores where 4 = no difference, 4+ = more emotional, 4- = more benign.

Analysis of Variance

	SS	df	MS	F	p
Age	1.04	3	.35	.10	
Sex	.20	1	.20	.06	
Age x Sex	31.64	3	10.55	3.02	*
Linear x linear	29.71	1	29.71	8.5	**
Residual	1.93	2	.97	.28	
Within	223.65	64	3.50		
Total	256.53	71			

* $p < .05$

** $p < .01$

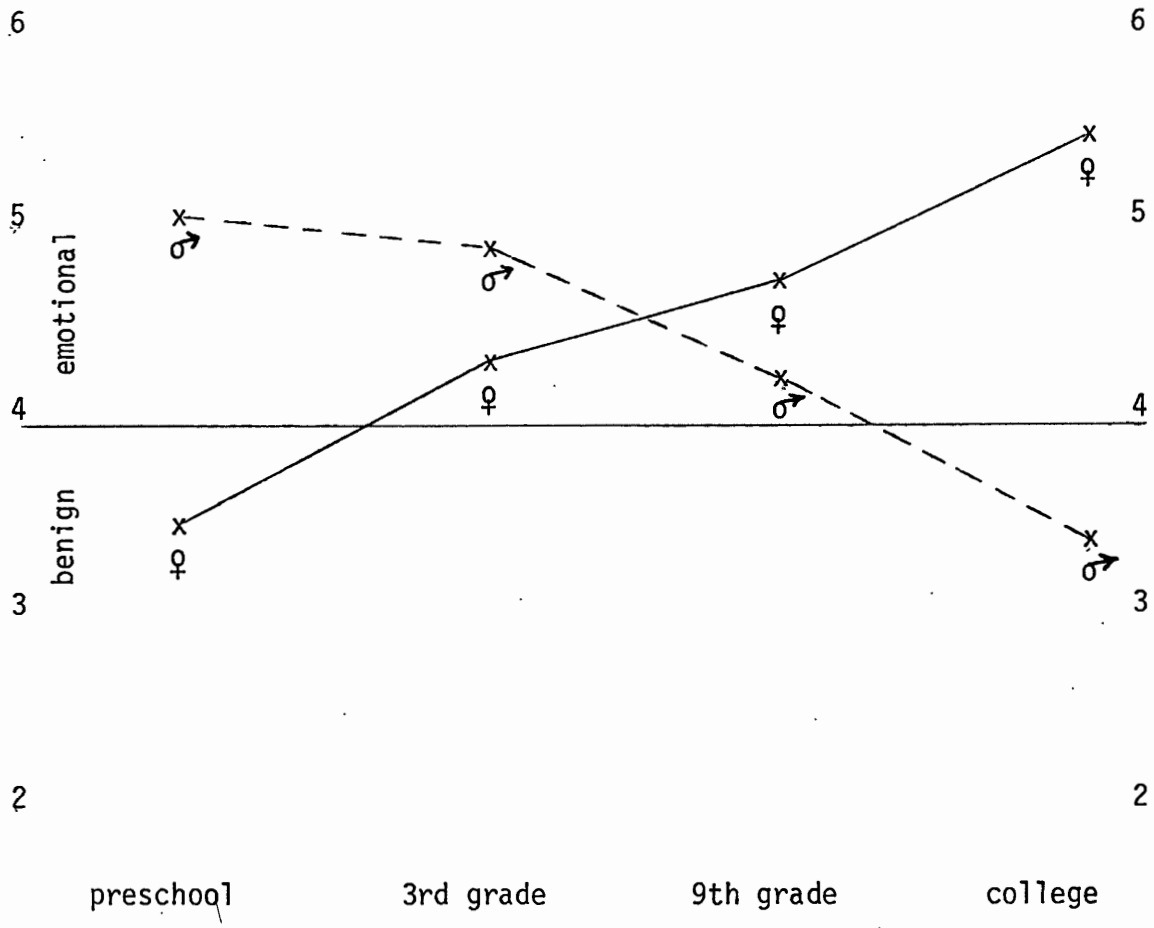

Figure 3. The emotional/benign comparison of correct choices on the sensory memory task. Mean differences shown as scaled scores, 4 = no difference.

males identify slightly less emotional than neutral stimuli. The analysis of variance in Table VII illustrates that the linear-by-linear component of interaction accounts for almost all of the significant variability.

A significant age effect occurred in the dependent/aggressive comparison on the sensory memory task. Ninth grade males and females correctly identified significantly more dependency pictures than preschoolers and third graders. A t-test for differences among several means reveals that there was not a significant difference with the college age group. Figure 4 illustrates these results.

A significant age effect in the opposite direction occurred in the recognition memory task with the dependent/aggressive comparison. The means and standard deviations and results of the analyses of variance are shown in Table VIII. Figure 5 shows that in the recognition task the ninth graders identify significantly less dependency pictures on the dependent/aggressive contrast, whereas there was no significant difference for the other age groups on that comparison. A t-test for differences among several means was used to determine that the ninth graders' decreased identification of dependency pictures was significantly more marked than for the other age groups. This effect occurred from both more false recognitions and more recognition omissions of dependency pictures than for aggressive pictures in the ninth grade group. On the same dependent/aggressive contrast, male and female college students also had more false recognitions of dependency stimuli but less recognition omissions than the same "miss" type errors for aggressive stimuli. This resulted in a nonsignificant

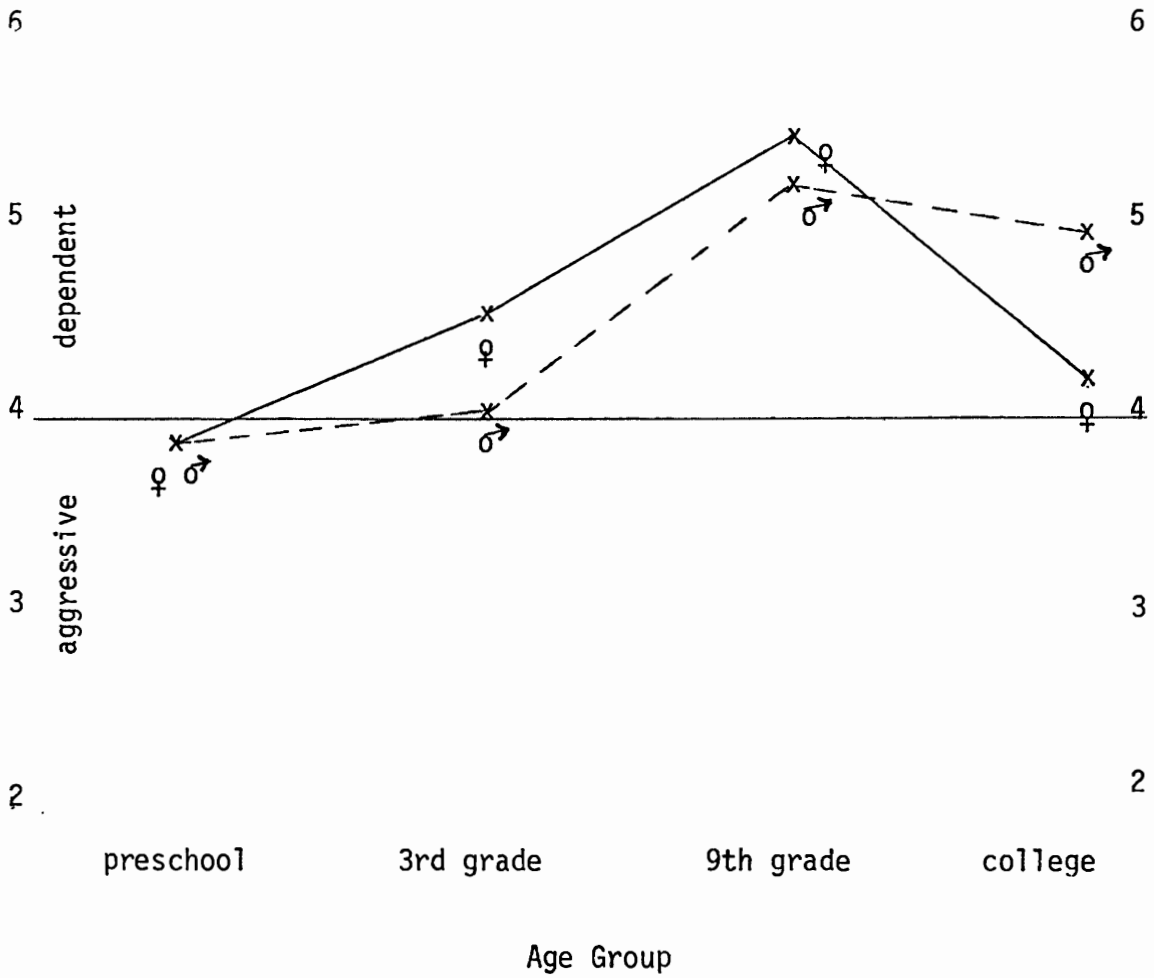

Figure 4. The dependent/aggressive comparison of correct choices on the sensory memory task. Mean differences shown as scaled scores where 4 = no difference.

TABLE VIII

DEPENDENT/AGGRESSIVE COMPARISON OF ERRORS ON RECOGNITION MEMORY TASK[a]

Mean and Standard Deviation Scores

	Males			Females		
	n	Mean	S.D.	n	Mean	S.D.
College Group	8	3.75	1.28	8	3.63	1.42
Ninth Grade Group	8	4.88	.99	7	4.86	.69
3rd Grade Group	10	4.40	.70	10	3.60	.97
Preschool	5	4.40	.89	6	3.67	.52

[a]Errors were the total # of false "yes's" and false "no's."

Analysis of Variance

	SS	df	MS	F	p
Age	11.26	3	3.75	3.124	*
Sex	2.60	1	2.60	2.16	
Age x Sex	1.82	3	.61	.50	
Within	64.84	54	1.20		
Total	80.51	61			

* $p < .05$

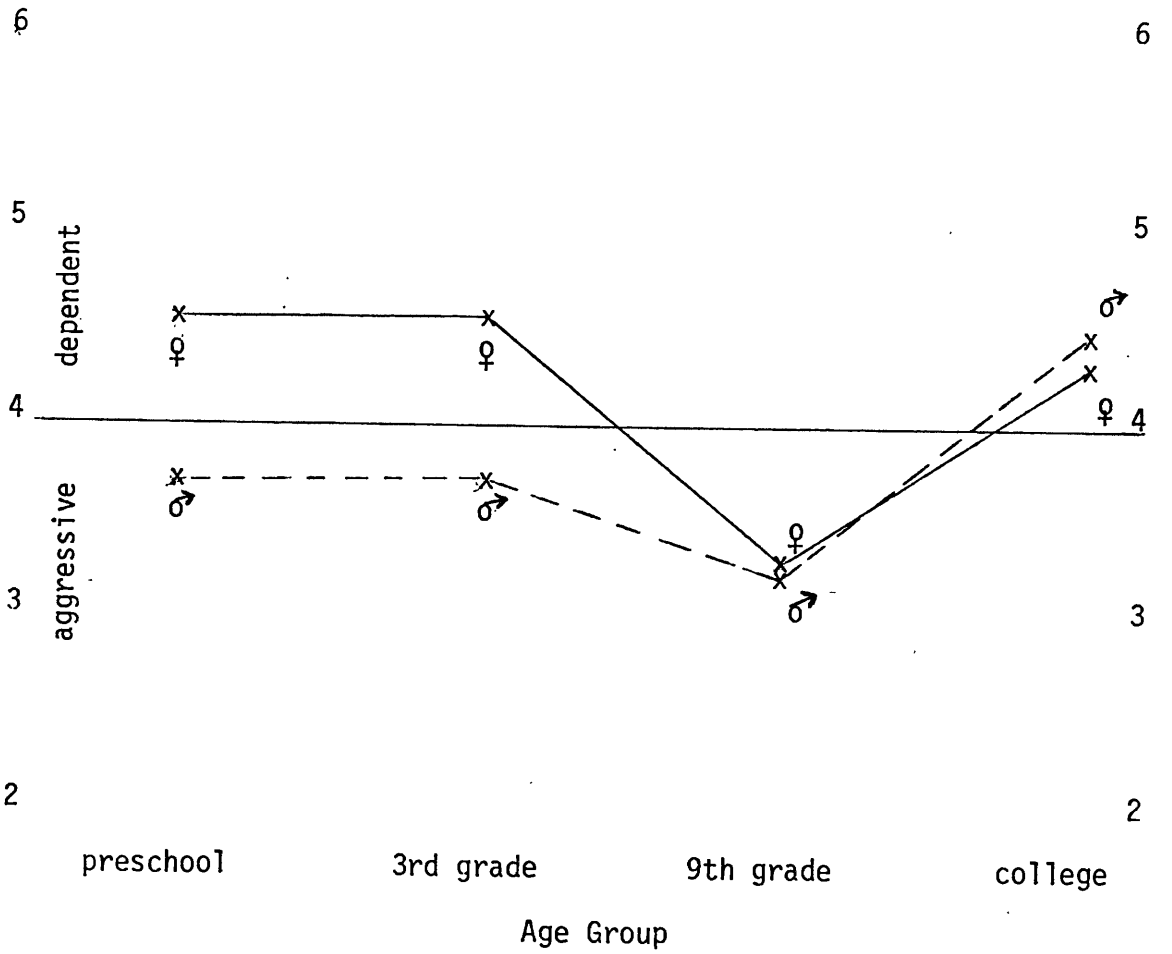

Figure 5. The dependent/aggressive comparison of correct choices on the recognition memory task. Mean differences shown as scaled scores where 4 = no difference.

difference on the dependent/aggressive comparison for the college group. Third graders were close on numbers of errors for all three categories and also resulted in no significant difference on the comparison. The subject loss from the preschool group (four males and three females) was high enough to make questionable the validity of their data. Also, of the five males and six females that were tested, six subjects said "yes" to all the pictures presented, and most of these subjects barely looked at the pictures before giving an answer. The results of the preschool group cannot be meaningfully interpreted on the recognition memory task for these reasons.

In the analysis of variance in the overall comparison of total number of correct identifications, there was no significant source of variation (see Table IX). This suggests that the method for establishing threshold was effective in correcting for the variation of visual acuity of the four age groups. There was also no significant source of variation in the emotional/benign comparison on the recognition memory task (Table X).

A dependent/aggressive and emotional/benign comparison was abstracted from the incorrect pictures chosen on the sensory memory task and analyzed by analyses of variance. The means and standard deviations and results of the ANOVA's are shown on Tables XI and XII. There were no significant sources of variation in either ANOVA.

TABLE IX

ANALYSIS OF VARIANCE FOR OVERALL COMPARISON OF ERRORS ON RECOGNITION MEMORY TASK

	SS	df	MS	F	p
Age	28.58	3	9.53	2.49	
Sex	.47	1	.47	.12	
Age x Sex	1.34	3	.45	.12	
Within	206.71	54	3.83		
Total	237.10	61			

TABLE X

ANALYSIS OF VARIANCE FOR EMOTIONAL/BENIGN COMPARISON OF ERRORS ON RECOGNITION MEMORY TASK

	SS	df	MS	F	p
Age	5.81	3	1.94	.83	
Sex	5.88	1	5.88	2.51	
Age x Sex	4.80	2	1.60	.68	
Within	126.34	54	2.34		
Total	142.83	61			

TABLE XI

DEPENDENT/AGGRESSIVE COMPARISON OF INCORRECT CHOICES ON SENSORY MEMORY TASK

Mean and Standard Deviation Scores[a]

	Males			Females		
	n	Mean	S.D.	n	Mean	S.D.
College Group	8	11	2.51	9	10.11	2.47
Ninth Grade Group	8	8.75	2.71	9	11.22	2.11
3rd Grade Group	10	9	2.58	10	9.40	2.46
Preschool Group	9	9.56	1.81	9	9.44	2.83

[a]These are scaled scores where 9 = no difference, 9+ = more dependent, 9- = more aggressive.

Analysis of Variance

	SS	df	MS	F	p
Age	18.88	3	6.29	.93	
Sex	3.90	1	3.90	.58	
Age x Sex	27.71	3	9.24	1.36	
Within	433.88	64	6.78		
Total	484.37	71			

TABLE XII

EMOTIONAL/BENIGN COMPARISON OF INCORRECT CHOICES ON SENSORY MEMORY TASK

Mean and Standard Deviation Scores[a]

	Males			Females		
	n	Mean	S.D.	n	Mean	S.D.
College Group	8	11.5	1.93	9	10.78	3.53
Ninth Grade Group	8	12.00	5.07	9	13	4.12
3rd Grade Group	10	13.4	2.80	10	12	2.63
Preschool Group	9	12.00	5.05	9	12.33	3.28

[a]These are scaled scores where 9 = no difference, 9+ = more emotional, 9- = more benign.

Analysis of Variance

	SS	df	MS	F	p
Age	45.77	3	15.26	1.08	
Sex	.72	1	.72	.05	
Age x Sex	15.36	3	5.12	.36	
Within	907.32	64	14.18		
Total	969.17	71			

DISCUSSION

Sensory Memory Task

The results of the sensory memory task support the hypothesis that varying the emotional content of visual stimuli will produce age and sex-related differences in perception as measured by number of correct identifications. Once threshold level, defined as the exposure time necessary to identify 50% of the stimuli, was equated for each subject, there was no difference in the overall number of correct identifications for each age group. There were no significant differences in the frequency of incorrect response between the different stimulus categories. Thus, the ninth graders' relatively large number of correct identifications of dependent stimuli on the dependent/aggressive comparison, point toward a perceptual explanation of these significant results rather than an explanation in terms of response bias. For a response bias to be operative, it would seem a significant difference among incorrect choices would have resulted.

The direction of the results runs counter to the findings of Kagan and Moss (1960) that adult males have a higher recognition threshold for dependency pictures than their female peers and the latter have a higher recognition threshold for aggressive pictures than their male peers. Male college students in the present study had in fact more correct identifications of dependency stimuli on the dependent/aggressive comparison, although it was not a significant difference.

However, there are significant design differences between the present study and Kagan and Moss' work, and these reduce the validity of any comparisons between the two. Kagan and Moss presented only dependent and aggressive pictures (no benign category), and the longitudinal population was only tested on the tachistoscopic task as adults. The most critical design difference was the fact that Kagan and Moss presented the pictures at seven pre-established exposure times rather than individualizing threshold levels as done in the present study. Table IV shows that the average threshold level for college females (134.78) as measured by exposure time in milliseconds is lower than that for males (228.38). If this difference is significant and found to be true in Kagan and Moss' population, it could have confounded their results. If the female subjects did view the pictures in Kagan and Moss' study primarily above threshold, then their results may have been produced by a response suppression rather than by perceptual sensitivity differences between men and women. As mentioned however, there were no significant differences in the frequency of incorrect responses between the different stimulus categories in the present study, thus not even the response preferences found in Kagan and Moss' study are evident here. It remains speculative whether this is due to a change in the population since 1960, a sampling difference, or most likely a product of the many design differences. The fact that there were no significant sex differences at any age level on the comparative number of dependent and aggressive identifications on either the sensory memory or recognition memory tasks lends weight to the idea that design differences were responsible for the contrasting results.

The significant effect for ninth graders on the dependent/aggressive comparison where both males and females had comparatively greater accuracy in identification of dependency stimuli seems to support the findings of Toch and Schulte (1961) that training and conditioning can affect perceptual acuity. During the procedure in which ninth graders validated the stimuli (none served as subjects), there were audible comments from some students regarding the dependency scenes and their possible homosexual implications. There is ample evidence that significant hormonal changes are a part of adolescence. Brecher (1971) cites the increased testosterone levels in both males and females. There is genital development, secondary sexual maturation, and in females, the onset of menses. The remarks of the ninth graders reflecting their socialization, paired with their biological development at that age, would suggest that sexuality is a significant issue for them. (Separating maturational and conditional influences would be a significant task.) The dependency scenes were certainly interpreted sexually by some subjects, and it is to be expected on a more frequent basis than either the aggressive or benign scenes. The police academy students of Toch and Schulte's study perceived violent pictures with greater frequency than the non-violent scenes in a binocular rivalry test, suggesting that experience with a subject heightens perception of it. Adding to the validity of this explanation (emerging sexuality in adolescence and perception of dependency scenes that depict closeness and possibly sexuality) is the fact that the college group was not significantly different in their response on the dependent/aggressive comparison from the ninth grade group. Because the college females

had almost equal perception of aggressive and dependency stimuli, that age group was not significantly different from the preschool and third grade groups, while the results of the ninth grade group were. It can be theorized that sexuality remains a more potent issue for adults than for the two youngest populations in the study, however increasing familiarity with sexual stimuli may serve to reduce the novelty of any implied sexuality in the dependency scenes and eliminate the comparatively more accurate perception of it in the adult subject group.

Berelson and Steiner (1964) indicate that perceptual selection and organization is affected by expectations, motives and needs in play at the time. In an ambiguous field, the authors claim motivation and subjective importance of the stimulus increases an individual's perception of the relevant subject. Besides sexual connotations drawn from the dependency scenes, it seems ninth graders generated a broader range of associations to the dependency stimuli including "happy, sad, caring, loving," etc., than the college group which also validated the stimuli. Perhaps the ninth grade population which typically experiences a new school setting, increased need for independence, the separation process from family, and emerging sexuality, viewed the dependency stimuli with more associative strength. Corteen (1969) states that items with a greater response factor, i.e., chance of association, "will produce more viable dynamic traces within the general context of the item set." Supposedly, the greater the associative strength, the greater the number of pathways to recall the item.

There is also the possibility that the ninth grade subjects brought to the testing situation a set of expectations creating an

artifactual effect that would not hold true for ninth graders generally. Initially, when receiving the letters requesting permission for their children to participate in the experiment, some parents phoned the high-school to find out if their children would be shown pornographic pictures. (The wording of the letter requesting subjects was subsequently changed from "photographic pictures of adults" - Exhibit C in the addendum, to "a series of pictures" - Exhibit D in the addendum.) The Dean of Students fielded these questions, but it is expected that parents and teenagers discussed the project in more depth than the other subject groups, especially with regard to any sexual implications. To compound this pre-testing effect, many of the subjects were drawn from the same class. Although this was also true for the college group, it is likely that ninth graders are a more cohesive peer group in a one-highschool town, and would have greater opportunity to discuss the research with each other prior to becoming a subject. There is not a significant difference between the ninth grade and college age group in any event which lends plausibility to a perceptual conditioning or priming effect. With the exception of one subject, college subjects were all drawn from the same institution and primarily from the psychology classes of that institution. The validation of stimuli was conducted only at the highschool and college, and comments generated from that process in the classes could have circulated around the institutions prior to testing individual subjects.

The significant age-by-sex interaction on the sensory memory task contradicts the hypothesis that both sexes would have more accurate perception of the aggressive stimuli as compared with perception of the

benign and dependent stimuli. Instead, the preschool male and college female populations had heightened perception of both aggressive and dependency stimuli (emotional) and comparatively less accurate perception of the benign stimuli. Jersild (1935) cites sex-related differences in the display of aggression in the preschool environment with four-year-old males exhibiting more hitting behavior and four-year-old females doing more screaming. The dependent and some of the aggressive stimuli involve bodily contact with implied action, and this could be a salient attraction for the preschool males. Feshbach and Feshbach (1972) cite the evidence that younger nursery school children manifest more physically-aggressive responses, but with increasing age, this aggressiveness is gradually inhibited to conform with culturally acceptable expressions of behavior. They indicate physical aggression is less tolerated for girls and verbal aggression is more evident in their behavior. The neutral pictures of this study imply a verbal transaction: two women facing each other with a coffee cup and two men facing each other with a can of soda pop. This may have been responsible for the females at the preschool level having an increased identification rate for these photographs.

Another possible differentiating feature of the stimuli is that the aggressive and dependent pictures have more variety in the posing of the individuals, whereas the benign pictures as mentioned are all with two individuals standing slightly apart looking at each other. This could have weighted the emotional pictures toward a spatial mnemonic because of more distinct visual differentiation and the benign pictures with less visual variation toward some other mnemonic. Kurdek

and Rodgon (1975) found sex differences in perceptual and affective perspective taking tasks. Perceptual perspective taking involved replicating the position of a disk in front of the subject in the identical position it faced the experimenter. In the appropriate affective perspective task, the response of the subject pictured was congruent with the story line: happy face on boy receiving favorite ice cream cone. The inappropriate affective perspective task would picture a sad face on the boy under the same condition. Males had superior performance on perceptual and affective perspective taking while females projected their own responses more often in the inappropriate affective perspective tasks. The authors theorize that it might be indicative of males' accelerated development of mechanical-spatial skills and females' accelerated verbal skills development. The inappropriate affective perspective tasks had narrative interpretations that would result in perception of different affect than that apparent visually. The perceptual perspective and appropriate affective perspective tasks were congruent with purely visual interpretations. Kurdek and Rodgon quote the findings of Maccoby and Jacklin (1974) that spatial-verbal skill level differences between sexes is not manifest until early adolescence. However, Kurdek and Rodgon tested kindergarten through sixth grade subjects and found the sex difference in all grade levels. The results of the present study are drawn from a wider range of developmental levels and found the sex difference greatest at the preschool and college level with very little difference at the third grade and ninth grade level. If greater spatial variation differentiated the emotional category of stimuli from

the benign, then perhaps preschool males and college females were attending to visual cues. What this would mean for sex differences in spatial and verbal skill development is unknown.

It could be postulated that the sex difference in favor of dependent and aggressive pictures for preschool males on the emotional/benign contrast reflects a labeling or categorization process which differentiated the emotional pictures from the benign and resulted in more accurate perception for the preschool male subjects. Bruner (1964) discusses an "in-press study of Potter's" where children six through twelve are presented colored photographs of ordinary scenes. As they are brought gradually into focus, the six-year-olds generate many hypotheses, usually unrelated about what the picture is. The nine-year-olds also generate hypotheses but relate one to another, as when first perceiving a merry-go-round, their later perceptions might also relate to play equipment or amusement centers. Adolescents are even more restricted in later hypotheses to their original perceptions, even to the point of failing to accurately identify items that don't fit the scheme. Bruner cites this as evidence that children begin around age nine to both "make references to states and constraints" in their percepts not immediately evident as well as "cumulate information about them into structures which can be operated on by rules beyond similarity and contiguity." This skill is believed to increase through age 12. Perhaps the preschool male subjects' results in the present study are evidence that this ability to translate visual experience into symbolic form is present at an earlier age.

The present study seems to support Brown's (1977) contention that

the coding flexibility of young children is underestimated. His study with four and five year olds used letter stimuli which the subjects were required to name during their initial visual presentation. He compared recall of the placement of these letters when a verbal probe (no visual cues) was used, to recall with a visual probe (no verbal cues). The subjects had to point to where the letter was placed face down after the experimenter either showed them a letter or named the letter. The design included groups of letters with high and low visual similarity and high and low phonetic similarity. He found that there was better recall of letters of high visual similarity, even when recall was probed verbally. Also, when scores were uncorrected for serial position, there was a detrimental effect of high phonetic similarity in the verbal probe condition suggesting that they coded the visual items phonetically during input. It seems likely that preschoolers, like older subjects, are able to vary perceptual modality in memory tasks. In the present study, it is possible the emotional pictures represented something visually and/or phonetically to the male subjects not abstracted by the females. There are certainly more variations possible with scenes than with letters and this could by why a sex difference occurred among preschoolers in this study but none was found in Brown's work.

Recognition Memory Task

Ninth graders' recognition of dependency pictures was significantly inferior to their recognition of aggressive pictures. This result conflicts with their superior perception of dependency pictures

on the sensory memory task. The dependent variable on the recognition memory task was the number of correct recognitions of old stimuli (yeses) plus the number of correct rejections of new stimuli (noes). Because the ninth graders' high number of errors on the recognition of dependency stimuli were produced by both more false recognitions and recognition omissions than for aggressive stimuli, an avoidance theory is not plausible as an explanation for the results. The college group had no significant difference in the number of errors on recognition of the dependent and aggressive stimuli. Even though they had more false recognitions of dependency pictures, they had less recognition omissions than they had for the aggressive category. The ninth graders seemed to have greater confusion regarding the dependency stimuli on the recognition memory task than they did for aggressive and benign stimuli: They thought they had seen the dependency pictures before when they hadn't, and they thought they hadn't seen them when in fact they had. Perhaps the intensity involved in the ninth graders' perception of the dependency photographs on the sensory memory task increased the difficulty of categorizing and associating those images on a permanent basis as Horowitz (1970) has found.

Caution must be used in linking the interpretations of the sensory and recognition memory tasks because of the different testing procedures used. The sensory memory task involved threshold level perception, a cumbersome machine, limited presentation time, and from the appearance of the subjects, a higher level of frustration. The recognition memory task involved six new stimuli, a much more limited "yes-no" response choice, above threshold visibility, and shorter

testing time involving less reported fatigue and frustration. Although this makes it difficult to draw comparisons between the sensory memory and recognition memory tasks, the fact remains that significant results (in opposite directions) occurred with the same population (male and female ninth graders) on the same comparison (dependent/aggressive).

The possibility of dependency photographs having relevant and salient associations that result in greater accuracy of identification on the sensory memory task has earlier been reviewed. The possibility of a broader range of associations for dependency stimuli by the ninth graders was also discussed. In a comparison of the responses from the validation of stimuli procedure done with the ninth grade and college group, there is evidence that dependency is a less discreet category for the ninth grade group. It may be that a richer associative memory process produced a heightened sensory response to the dependency stimuli but impaired storage of them. The results of the validation procedure suggest a more varied associative process involved with dependency photographs as earlier reviewed including the responses: happy, sad, caring, loving, etc. Martin (1968) discusses encoding variability and the results of research showing that high-M stimuli have less encoding variability than low-M stimuli. He worked with letter trigrams such as mop (high-M) and mqz (low-M) and found that the more finite the meaning, the greater the chance it will be perceived as a whole with the same encoding response each time it is perceived. Referring to encoding as the first stage in a two-stage process of perception, he suggests encoding is the initial information taken from the stimulus or "partial" percept." The second stage he refers to as association and is the

response to the partial percept. If the partial percept of the same stimulus varies over time, then he hypothesizes a varied response set. The hypothesis that has been supported in a paired associate learning study is that inconsistent encoding of low-M stimuli inhibits learning or recall. Perhaps the dependency pictures elicited one association for the ninth graders in the sensory memory task and a different association to the same pictures when presented for recognition. Furthermore, it could be hypothesized that third graders had not developed as many encoding possibilities to dependency scenes, while college students had settled more consistently on one association to dependency scenes having successfully negotiated the adolescent phase. (Preschoolers' results on the second task cannot be speculated about because of the drop-out rate.)

The first introduction to the dependency stimuli for many of the ninth graders could have been one associative level: "I don't want any child of mine looking at pornographic pictures," said when they presented the permission slip to their parents, and this may have been different from the association they made when actually presented the photographs. This broader associative field may have sensitized the ninth graders to the dependency pictures on the sensory memory task as police cadets in Toch and Schulte's (1961) were sensitized to violent scenes. This may have increased the difficulty of categorization and storage of the dependency pictures and reduced the accuracy of identification on the recognition memory task. The third grade group perhaps had a visual percept of the dependency stimuli, i.e., close - hug, which was stored at the same rate as the aggressive and benign percepts.

If associations were generated by the dependency stimuli within the college and third grade groups, the speed of presentation may have limited their number. As indicated in the results section, conclusions cannot be drawn about the preschool group's responses on the recognition memory task because of subject loss.

SUMMARY

The results of the study provide added support to the theories that visual perception can be qualitatively altered through the conditioning power of affective processes. In this experiment, age and sex seem to have influenced sensitivity to photographs distinguishable primarily by implied emotional content. Contrary to the working hypotheses, males do not seem to have a higher threshold for dependency scenes than for aggressive scenes, and females do not seem to have a higher threshold for aggressive scenes than for dependency scenes. The initial hypothesis that children may have coding flexibility at an earlier stage of development than previous studies suggest is supported. Further study of the processes involved in the outcome could involve preschool and third grade validation of the stimulus categories. To gain a perspective of their experience, stimulus categories could be presented to them for labeling in their language and a second group of subjects could validate or invalidate the categories. The designs of the sensory memory task and recognition memory task could be equated with the only variable being time interval. Responses on a sensory, short-term memory task and long-term memory task could then be compared for more precise information regarding the role of these processes in the perception and storage of information from pictures with varying affective content.

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APPENDIX A

COLLEGE STUDENTS' QUESTIONNAIRE FOR STIMULUS VALIDATION

The people in this photo appear to be .....

1. angry with each other 2. needing each other 3. feeling nothing in particular

The people in this photo appear to be .....

1. angry with each other 2. needing each other 3. feeling nothing in particular

The people in this photo appear to be .....

1. angry with each other 2. needing each other 3. feeling nothing in particular

The people in this photo appear to be .....

1. angry with each other 2. needing each other 3. feeling nothing in particular

The people in this photo appear to be .....

1. angry with each other 2. needing each other 3. feeling nothing in particular

The people in this photo appear to be .....

1. angry with each other 2. needing each other 3. feeling nothing in particular

APPENDIX B

NINTH GRADE STUDENTS' QUESTIONNAIRE FOR STIMULUS VALIDATION

(A) The person or people in this photo appear to be .....

1. angry 2. needing each other 3. feeling nothing in particular 4. other

They are .....

1. both male 2. both female 3. a male and a female

(B) The person or people in this photo appear to be .....

1. angry 2. needing each other 3. feeling nothing in particular 4. other

They are .....

1. both male 2. both female 3. a male and a female

(C) The person or people in this photo appear to be .....

1. angry 2. needing each other 3. feeling nothing in particular 4. other

They are .....

1. both male 2. both female 3. a male and a female

(D) The person or people in this photo appear to be .....

1. angry 2. needing each other 3. feeling nothing in particular 4. other

They are .....

1. both male 2. both female 3. a male and a female

APPENDIX C

INITIAL CONSENT FORMS

Informed Consent (adult)

I, _____ hereby agree to serve, or I, _____ hereby allow my child, _____, if willing, to serve as a subject in the research project involving visual perception entitled "A Study of Age and Sex-related Differences in the Perception of Emotional Stimuli" conducted by Nancy Canizio. I understand that the study involves looking at photographic pictures of adults.

It has been explained to me that the purpose of the study is to learn if there are differences in the speed with which people recognize different pictures. I may not receive any direct benefit from participating in this study, but my participation may help to increase knowledge which may benefit others in the future.

I have asked and had answered to my satisfaction any questions I may have had about the study, and I understand what is expected of me or my child. I understand that I, or my child, is free to withdraw from participation in this study at any time. I have read and understand the foregoing information.

Date_____ Signature_____

If you experience problems that are the result of your or your child's participation in this study, please contact Richard Streeter, Office of Graduate Studies and Research, 105 Neuberger Hall, Portland, State University, 229-3423.

Informed Consent (minor)

I, _____ am willing to participate in Nancy Canizio's research project. I understand that I am going to be looking at some photographs and will be trying to pick out which ones are shown. It has been explained to me that the purpose of the study is to find out more about how people see things. I have asked any questions I may have had. I understand I can leave the experiment at any time if I don't want to continue.

I have read, or had read to me, and understand this information.

Date_____Signature_____

APPENDIX D

REVISED CONSENT FORMS

Dear Parent(s):

I would like your child's help in completing the research work I am doing on my master's thesis at Portland State University. The staff at _____ have agreed to let me ask for volunteers from the school to participate in my study. If you give permission and your child agrees, I would ask him/her to look at pictures through a viewer and then match them with another set.

If you would like to ask me further questions about the study before deciding whether or not to allow your child to participate, please don't hesitate to call me at 458-6029. If you are willing, please sign the enclosed form and return to your child's school.

Thank you,

Nancy Canizio

Informed Consent

I, _____ hereby agree to serve, or I, _____ hereby allow my child, _____, if willing to serve as a subject in the research project involving visual perception entitled "A Study of Age and Sex-related Differences in the Perception of Emotional Stimuli" conducted by Nancy Canizio. I understand that the study involves looking at a series of pictures.

It has been explained to me that the purpose of the study is to learn if there are differences in the speed with which people recognize different pictures. I may not receive any direct benefit from

participating in this study, but my participation may help to increase knowledge which may benefit others in the future.

I have asked and had answered to my satisfaction any questions I may have had about the study, and I understand what is expected of me (or my child.) I understand that I, or my child, is free to withdraw from participation in this study at any time. I have read and understand the foregoing information.

Date_____Signature_____

If you experience problems that are the result of your, or your child's participation in this study, please contact Richard Streeter, Office of Graduate Studies and Research, 105 Neuberger Hall, Portland State University, 229-3423.

Informed Consent (minor)

I, _____ am willing to participate in Nancy Canizio's research project. I understand that I am going to be looking at some photographs and will be trying to pick out which ones are shown. It has been explained to me that the purpose of the study is to find out more about how people see things. I have asked any questions I may have had. I understand I can leave the experiment at any time if I don't want to continue.

I have read, or had read to me, and understand this information.

Date_____Signature_____