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A combination of viewing reaction time and incidental learning task in child molesters, rapists, and control males and females (full version)

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Abstract

The present study was designed to explore the interference effects of sexual interest on viewing reaction time and cognitive functioning, in a group of sexual offenders. In order to test this hypothesis, 31 rapists, 27 child molesters, 53 control males and 24 control females, were given with a PC a viewing reaction time task while being distracted with photos of semi-nude males and females of various ages and other stimuli. In the second part of the experiment, the subjects were instructed to attempt to recall whether or not the photograph had been presented during the first part or whether it was novel. The results showed that extra-familial child molesters had their longest viewing times with the photos of girls, intra-familial child molesters and control women with the photos of adolescent females, and rapists and control males with the photos of women. The pattern of errors during the incidental learning task yielded several interesting findings. Intra- and extra-familial child molesters showed the best recognition with the photos of boys and adolescents males. Especially, extra-familial child molesters showed the best recognition with photos of boys, despite having looked at them for the shortest period of time, probably because of defensiveness. In general, the profile of child molesters seems to be between that of the control males' and the control females' profile, while the rapists' profile seems to have many common features with the control males' profile. In summary, viewing reaction time, in combination with incidental learning tasks, can serve as an unobtrusive measure of males' sexual interests. The results of this study encourage the development and use of such techniques in epidemiological studies, as well as on professionals working with children.

Important note

For the research needs and requirements, this is the open access and full version of the experiment, as derived after permission from: Giotakos O. (2005) Europ. J. of Sexol; Sexologies; (XIV), 54 : 13-20

Keywords

child molesters, rapists, viewing reaction time, test for pedophiles

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Introduction

Singer (1984), noted the complexity and multidimensionality of sexual arousal and he proposed a trichotomy of sexual arousal that was composed of aesthetic, approach, and genital responses. The aesthetic response, according to Singer, is a hedonic feeling in response to a sexual stimulus such as the sight of an attractive face or figure or the sound of a pleasantly stimulating voice. He stated that "a person displaying such a response would make an effort to keep the object in view by means of eye movements or head turning (Singer, 1984, p. 233). He suggested that the response could be indexed by monitoring the subject's gaze or facial expressions. Four decades earlier, Rozenzweig (1942) had found that male patients who were rated by staff as very interested in sexual topics and sexual behavior looked at sexual stimuli longer than patients rated low in sexual behavior. In other studies (Brown et al., 1973, Love et al., 1976, Ware et al., 1972), male college students spent longer looking at slides they rated as highly pornographic than less pornographic slides. Zamansky (1956) found that homosexual males looked longer at male nudes than female nudes, whereas the reverse was true for heterosexual males. In recent studies (Lang et al., 1980, Quinsey et al., 1993, Letourneau, 2002, Abel et al., 2004), viewing time was found to be significantly correlated with rating of sexual arousal, sexual stimulation, and sexual attractiveness.

Accurate measurement and classification of sexual arousal and preference are a prerequisite to adequate research and clinical activity. Typically, interviews, self-report measures, and questionnaires, in conjunction with penile plethysmiography, are used when assessing people with sexual problems. However, these methods are susceptible to distortion by the individual, while a major problem with phallometric testing is intrusiveness. Despite its reliability and validity, it is unlikely that such a specialized and intrusive test could be widely used in screening men who apply to work with children. Also, because of its intrusiveness, the use of phallometric testing with children or adolescents raises many ethical questions (O'Donohue & Letourneau, 1992, Letourneau, 2002).

The Choice Reaction Time procedure was based largely on a model of sexual arousal proposed by Singer (1984), which suggested the possibility of assessing sexual interest by measuring the orienting response of an individual to preferred-gender stimuli. This methodology is also supported by the work of Kohlers (1976), who reported that viewing time is greater for material that is motivating and interesting. Abel et al (1990) reported a positive correlation between subjects' self-reported level of sexual arousal and their viewing time. Quinsey et al (1975, 1996) found that subjects viewed young adults of the preferred sex the longest, the correlation between sexual attractiveness ratings and viewing times was higher for male than for female subjects (.80 vs .60), and phallometric and viewing time data were correlated in the expected manner (.70), although perhaps not as highly as hoped. Also, male subjects viewed slides of adult females longer than females viewed slides of adult males. Harris et al (1995) examined viewing time using slides of nude males and females of various ages to child molesters and normal men. They found that among normal men, viewing time and sexual attractiveness ratings were highly correlating, but the correlation was lower for child molesters.

According to the trichotomy of sexual arousal theory put forth by Singer (1984), if a stimulus or an aspect of the environment initiates the sexual response, then the individual should attempt to maintain contact with that stimulus. And, while attempting to maintain contact with the stimulus, the individual will be distracted and will experience decreased performance on a task requiring attention and concentration. Wright & Adams (1994) investigated the use of choice reaction time task, during which slides of sexually explicit and neutral stimuli were used as an interference task, to differentiate between groups of individuals on the basis of their sexual preference. Subjects also completed an incidental learning task to determine if a relationship existed between stated sexual orientation and memory for stimuli. They found a longer reaction time to slides depicting preferred sexual partners than to nonpreferred sexual partners or neutral scenes. In addition, the results indicated that sexual arousal does interfere with cognitive processing, since a main effect for gender was found for the incidental leaning task, with males having the fewest errors.

The present study was designed to further explore the motivational and interference effects of sexual interest on cognitive functioning in sexual offenders. The first hypothesis of this study was that individuals will have longer contact or reaction time with stimuli which are sexually appealing. The second hypothesis was that stimuli of sexual interest interfere with cognitive process and attention. To test these hypotheses we combined the viewing reaction time and the incidental learning task in samples consisting of rapists and child molesters, and we compared the findings with samples of control males and females.

Method

Subjects

A total of 135 participants completed this study. Of them, 31 had been convicted for rape, 8 for intra-familial child molestation, 19 for extra-familial child molestation, while 53 males and 24 females were used as control samples. The intra vs extra distinction made because phallometric data consistently discriminate persons with histories of extra familial child molestation from other persons (Quinsey et al., 1975, Freund & Blanchard, 1989). All sexual offenders were prison inmates found guilty for sexual offenses. Basic demographic data was recorded and a full medical, social, criminological, and sexual history was obtained. As a comparison group we used 53 men and 24 females, from the staff of the near hospital, who responded to a call for participation. Table 1 shows the basic demographic and criminological data, of the rapists and the intra- and extrafamilial child molesters.

Specific instructions read to participants for Part A of the study

"This study examines the effects of sexually explicit stimuli on information processing and memory. It comprises two parts. For the first part, you will view 80 photographs, showing people or objects, and 10 frames, without context. Each photograph will have a white dot located in one of two positions: the lower left-hand corner or the lower right-hand corner. Your task is, as quickly as you can, to locate the position of the dot on each picture and press the left button on the hand-held box if the dot appears in the left-hand corner or the right button if the dot appears in the right-hand corner. After depressing the button you may look at the picture for as long as you like. When you are ready to advance the picture, press the button located at the center of the box. You will have 10 practice trials to prepare you for the task. After the practice trials, I will then answer any questions, and the experimental trials will begin. After part A of the experiment will be completed, you will receive instructions for Part B. Do you have any questions before we begin?"

Specific instructions read to participants for Part B of the study

"You will now see 160 photographs, 80 of which are new and 80 of which you saw during Part A of this experiment. There are no blank frames in this part of the experiment, and none of the picture will have a white dot. Your task is to try to remember, as quickly as you can, if the photograph was used in part A of the experiment, or if it is novel. If you recognize the picture from Part A of the experiment, press the left button. If the picture was not presented in Part A, press the right button. After depressing the button you may look at the picture for as long as you like. Do you have any questions?"

Viewing Reaction Time & Free Viewing Time

The equipment consisted of a Pentioum II computer and a three-button joystick. The part A of the experiment consisted of 80 photos. There were 10 photos from each of the following 8 categories: violence, neutral, males, adolescent males, boys, females, adolescent females, and girls. Another 10 presentations were blank. The photographs were obtained from commercial magazines. The individuals appearing in the photos were shown standing (full body pictures), in a neutral, non-provocative posture. All of them were wearing bathing suits. All child, adolescent, and adult photos depicted, respectively, a person of the first, third and fifth Tanner's stage (Harris et al, 1995). The photographs of violence comprised different violence scenes, such as boxing, war, and football. The photographs with neutral content showed different home objects, such as chairs or tables. The blank slides consisted of a single solid-colored (blue) background, purposely devoid of content, in order to measure pure reaction time.

A single white dot on the right or left down corner of each picture was presented 2 seconds after each photo had appeared on screen. Each participant was instructed to locate the white dot and to record what they saw, as quickly as possible, by pressing a button on a hand-held box that corresponded with the position of the dot in the photograph. The placement of the dots was balanced and in random order. The pictures were also in random order; rputer-generated table of random numbers. Upon given a selection response, the subject could watch the picture for any time they wanted, and they could advance the picture by pressing the central button.

A blank –white- space between stimuli presentations, which lasted 2 seconds, served as the intertrial interval. The hand-held button-box, which the participants used to record

Table 1 : Basic demographic, social, and criminological data, of the rapists and the intra- and extra-familial child molesters.

	Rapists N=31	Intra-familial Child Molesters N=8	Extra-familial Child Molesters N=19
	Mean ± SD	Mean ± SD	Mean ± SD
Age	30.9 ± 8.8 (range: 21-58)	42.0 ± 10.4 (range: 21-55)	40.3 ± 8.7 (range: 20-59)
Sentence (years)	11.6 ± 9.5	17.2 ± 12.8	18.4 ± 11.9
Stay in the prison (months)	22.2 ± 20.7	35.2 ± 28.2	43.2 ± 37.7
Age of victims	29.5 ± 15.4	9.3 ± 3.0	10.4 ± 4.0
	N (%)	N (%)	N (%)
Illiterate	5 (16%)	1 (12%)	1 (5%)
Primary + High School (9 years)	8 (26%)	5 (62%)	10 (52%)
Low or bad financial	30 (97%)	7(87%)	12 (63%)
Single	15 (53%)	2 (25%)	5 (25%)
Divorced	5 (16%)	5 (62%)	11 (60%)
Drug abuse	15 (54%)	4 (50%)	16 (84%)
Suicidal Behavior	5 (16%)	2 (25%)	5 (26%)
History of childhood sexual abuse	3 (10%)	2 (25%)	5 (26%)
Bisexual	8 (26%)	1 (12%)	10 (43%)

their dot placement selections, contained three momentary buttons, and was connected to the computer via a serial port interface. The middle button was located in the center of the box and was used to advance the photo. A computer program was created to integrate the computer and the hand-held box. The investigator monitored the experiment from a control room that was separate from the experiment chamber where the subject sat.

The experimental trials began when the experimenter started the computer program, which advanced the first photo of the series and started the timer. Upon receiving a selection response from the participant via the hand-held box, the computer recorded whether or not the selection was correct, and recorded the viewing reaction time for the trial. When the subject pressed the centered button, the computer recorded the delay time for the trial and advanced the picture. This process continued until all 80 photographs in that series were shown. For the purpose of the analysis, at the end of each series of photos the computer totaled the correct responses and sorted the total, the mean time, and the standard deviations of the viewing reaction time and the free viewing time of phase A, for each person and type of stimuli. Ten practice trials consisting of all the kinds of pictures preceded the first series of experimental trials only to accustom the participant to the procedure.

Incidental learning task

This part of the experiment, phase B, consisted of a series of 160 photos. Eighty of them were identical to those seen in the first part of the experiment, minus the white dot. The rest 80 were novel and consisted of 10 photos from each of the following 8 categories: violence, neutral, males, adolescent males, boys, females, adolescent females, and girls. The subjects were instructed to attempt to recognize and recall, as soon as possible, whether or not the photo had been presented during the first part of the experiment. They were also instructed to record quickly their selection, previously seen or novel, by pressing the left button for previously seen stimuli or by pressing the right button for novel stimuli. During this part of the experiment, there were the same intertrial intervals to separate the photos. Upon given a selection response, the subject could watch the photo for any time they wanted, and could advance the picture by pressing the central button. At the end of the 160 trials, the computer sorted the correct and incorrect responses for each person and type of stimuli. In addition, the computer recorded the delay time for any trial, and at the end it sorted the total, the mean time, and the standard deviations of the free viewing time, of phase B, for each person and type of stimuli.

Procedure

The participants were seated in the experiment chamber and were given instructions for the first part of the experiment. The specific instructions that were given to each subject are printed in Appendix A. The experimenter then left the chamber and closed the door that separated the two rooms. Verbal communication was possible between the experimenter and participant without the use of an intercom. Upon receiving a verbal sign from the participant that she or he was ready to begin, the experimenter started the computer program for the ten practice trials. Upon completion of the practice trials, the experimenter entered the experimental chamber to answer any questions. The experimenter then exited the chamber and awaited a verbal signal from the participant that she or he was ready to begin part one of the study: the experimenter then initiated the computer program for the first series of pictures. After completion of part one of the study the participants had a few minutes' break and the experimenter provided instructions for part two of the study. The computer program started for the ten practice trials. Upon completion of the practice trials, the experimenter entered the experimental chamber to answer any questions. The specific instructions given for the 2nd part of the study are provided in Appendix A.

Results

Viewing Reaction Time and Free Viewing Time Analysis

Regarding the viewing reaction time of Phase A, the data were analyzed using ANOVA. As shown in Figures 1 and 2. the rapists had the longest viewing reaction time (VRT) at the photos of females, while the extrafamilial child molesters had the longest VRT at the photos of girls. The intrafamilial child molesters, and the control males and females had the longer VRT at the photos of adolescent females. The between groups analysis (rapists, itrafamilial child molesters, extrafamilial child molesters, control males, control females) ($F=18.2$, $p<.000$) followed by the Tukey HSD test, showed that the groups convicted for sexual offenses demonstrated significantly longer reaction times than the control males and females. The between type of stimuli analysis (photos of violence, neutral, blank, males, adolescent male, boys, females, adolescents females, and girls) ($F=6.1$, $p<.000$). , followed by the Tukey HSD test, showed that the photos of boys as well as of girls had significantly shorter viewing reaction times in relation to the other stimuli. The interaction between group and type of stimuli revealed several significant differences ($F=2.0$, $p<.000$).

Regarding the free viewing time (FVT), in phases A and B, (Figures 3, 4, 5, and 6), the ANOVA followed by the Tukey HSD test, yielded a significant effect for group ($F=2.5$, $p<0.04$ and $F=4.3$, $p<0.002$, respectively), indicating that intra-familial child molesters demonstrated significantly longer free watching times than the rest groups of the experiment. The between type of stimuli analysis in the Phase A ($F=12.1$, $p<0.000$), followed by the Tukey HSD test, indicated that the blank picture had the significantly shorter, while the photos with the females as well as the adolescent females had the longer free watching time, than the other stimuli. In Phase B ($F=4.8$, $p<0.000$), the photos with the females had also the longer free watching time, than the rest stimuli. The

interaction between group >< type of stimuli, FVT - Phase A, revealed several significant differences (F=2.2, p<.000), while similar results were revealed during the analysis of the FVTphase B (degree of freedom=28, F=2.6, p<.000).

Table 2 shows in general that all the groups had their longest viewing times at photos related to the female gender, while their shortest viewing times at photos related to the male gender. Especially, rapists, as well as control males, had the longest viewing times at photos with adult females, while the pedophiles had the longest viewing times at photos with girls. Totally 65 errors were recorded during the VRT task of phase A. In order to analyze the number of errors made during the VRT task, repeated measures of ANOVA showed non significant differences. The results indicate that the subjects, not only recorded successfully the placement of the dot, but that they also were reliable to the experiment procedure.

Incidental learning task

In order to analyze the number of errors made during phase B of the experiment, repeated measures of ANOVA showed significant differences in the between group (F=11.5, p<0.000), in the between type of stimuli (F=38.1, p<0.000), as well as in the interaction analysis (F=1.8, p<0.000). Table 3 shows the fewer errors recorded from each group, indicating the correctly recognized stimuli as present or absent. We can see that intra- as well as extrafamilial child molesters recognized correctly more often as being seen (photos previously presented in phase A) the photos of boys than the other stimuli (Figures 7, 8). Especially, extra familial child molesters had the best recognition with the photos of boys, although they had the shortest free viewing time with them. The other groups showed a mixed recognition for photos of females or adolescent females. The best recognition of novel stimuli (stimuli not presented in phase A) also showed mixed results (Figures 9, 10). Finally, the total errors, indicating the total ability of recognition, (e.g., previously seen plus novel stimuli) showed that intra- and extrafamilial child molesters, as well as the control females had the best recognition with the photos of adolescent males, while rapists and control males had the best recognition with the photos of adolescent females (Figures 11, 12).

Table 2 : The longest and the shortest viewing reaction times and free viewing times, recorded in the groups of rapists, intra- and extrafamilial child molesters, control males, and control females, during the phase A and phase B of the experiment.

	The Longest Viewing Times			The Shortest Viewing Times		
	Viewing Reaction Time	Free Viewing Time, Phase A	Free Viewing Time, Phase B	Viewing Reaction Time	Free Viewing Time, Phase A	Free Viewing Time, Phase B
Rapists	♀ Adult	♀ Adult	♀ Adult	Girls	♂ Adolescent	♂ Adult
Intra- familial child molesters	♀ Adolescent	♀ Adolescent	♀ Adult	♂ Adolescent	Boys	♂ Adult
Extra- familial child molesters	Girls	♀ Adolescent	Girls	♂ Adolescent	Boys	♂ Adolescent
Male Controls	♀ Adolescent	♀ Adult	♀ Adult	Boys	Boys	♂ Adolescent
Female Controls	♀ Adolescent	♀ Adolescent	Girls	♀ Adult	Boys	♂ Adolescent

Table 3 : The fewest errors, in Phase A and B, recorded by the groups of rapists, intra-, extra familial child molesters, male controls, and female controls, during the procedure of incidental learning task, indicating their best recognition of the stimuli.

	The best recognition of the stimuli presented during phase A*	The best recognition of the novel stimuli, presented during phase B
Rapists	♀ Adolescent	♂ Adolescent
Intra- familial child molesters	Boys	♀ Adolescent
Extra- familial child molesters	Boys	♂ Adolescent
Male Controls	♀ Adolescent	♂ Adolescent
Female Controls	♀	♀ Adolescent

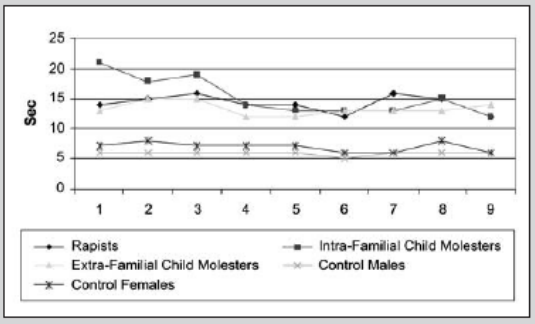

Figure 1 : The Viewing Reaction Time, Phase A, for the stimuli (photos) with: 1. Violence, 2. Neutral, 3. Blank, 4. Males, 5. Adolescent Males, 6. Boys, 7. Females, 8. Adolescent Females, and 9. Girls.

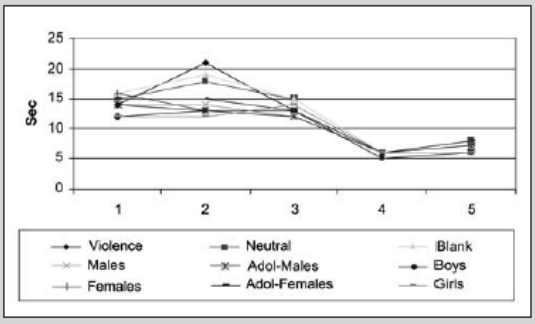

Figure 2 : The Viewing Reaction Time, Phase A, in:1. Rapists, 2. Intra-Familial Child Molesters, 3. Extra-Familial Child Molesters, 4. Control Males, and 5. Control Females.

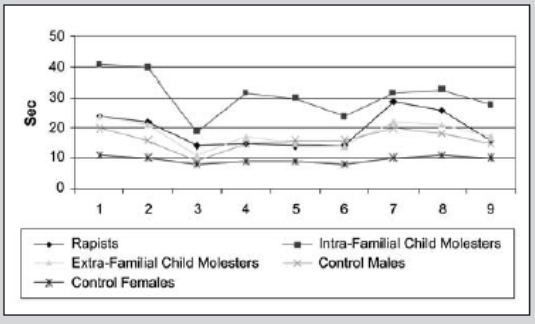

Figure 3 : The Free Viewing Time, Phase A, for the stimuli (photos) with: 1. Violence, 2. Neutral, 3. Blank, 4. Males, 5. Adolescent Males, 6. Boys, 7. Females, 8. Adolescent Females, and 9. Girls.

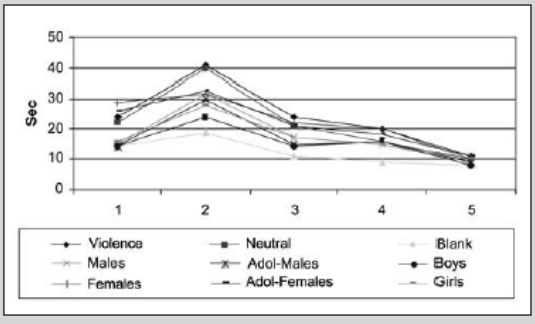

Figure 4 : The Free Viewing Time, Phase A, in:1. Rapists, 2. Intra-Familial Child Molesters, 3. Extra-Familial Child Molesters, 4. Control Males, and 5. Control Females.

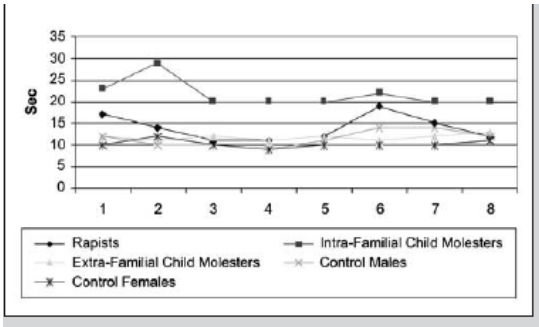

Figure 5 : The Free Viewing Time, Phase B, for the stimuli (photos) with: 1. Violence, 2. Neutral, 3. Males, 4. Adolescent Males, 5. Boys, 6. Females, 7. Adolescent Females, and 8. Girls.

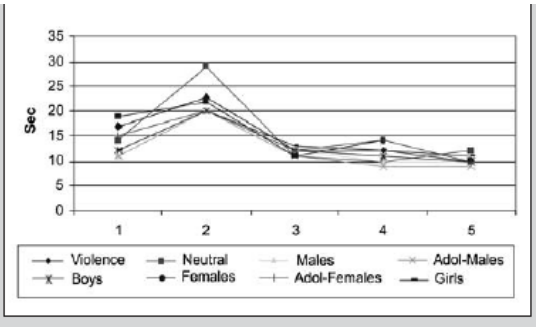

Figure 6 : The Free Viewing Time, Phase B, in:1. Rapists, 2. Intra-Familial Child Molesters, 3. Extra-Familial Child Molesters, 4. Control Males, and 5. Control Females.

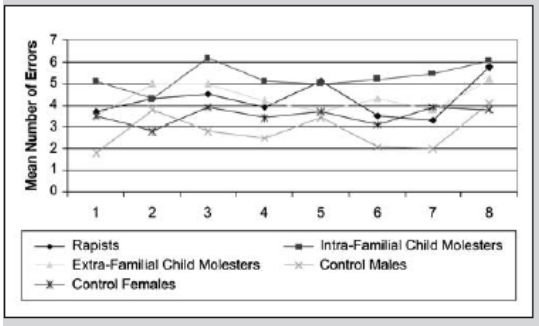

Figure 7 : Mean number of errors for the photos presented during phase A, but the individual recorded as it had not been presented. Results for the stimuli (photos) with: 1. Violence, 2. Neutral, 3. Males, 4. Adolescent Males, 5. Boys, 6. Females, 7. Adolescent Females, and 8. Girls.

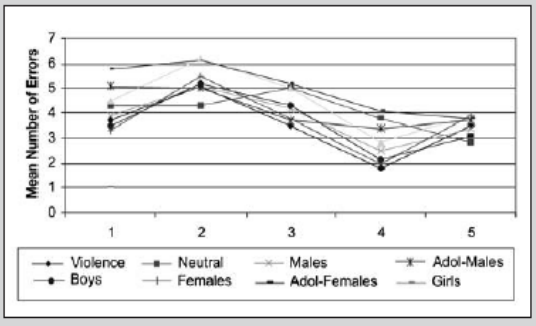

Figure 8 : Mean number of errors for the photos presented during phase A, but the individual recorded as it had not been presented. Results in the:1. Rapists, 2. Intra-Familial Child Molesters, 3. Extra-Familial Child Molesters, 4. Control Males, and 5. Control Females.

Discussion

The present study describes the investigation of a nonintrusive procedure designed to measure the aesthetic aspects of sexual arousal as described by Singer (1984). We hypothesize that the aesthetic response (defined as the subject's gaze, one index of attraction) towards a sexually attractive individual should interfere or compete with other cognitive activity. In order to test this hypothesis, subjects were given a choice reaction time task while being distracted with pictures of semi-nude preferred sex and other type stimuli. It was hypothesized further that incidental learning (i.e., learning which take place in the absence of formal instructions) would be greater concerning the preferred pictures since there should be an association between the length of time viewing the stimuli and memory for the stimuli.

In fact, the present results showed that extra familial child molesters had the longest viewing times at the photos of girls, intra-familial child molesters and control females at the photos of adolescent females, while rapists and control males at the photos of women. Regarding the photos presented during phase A, intra- and extra-familial child molesters showed the best recognition for the boys. Regarding the photos presenting in both phases A and B, intraand extra familial child molesters showed the best recognition for the adolescent males. Especially, extra familial child molesters showed the best recognition with the photos of boys, although they had the shortest free viewing time on them, probably because of suppression. In a previous study, Harris et al (1996) had found also that child molesters viewed the slides quickly, compared to the controls, and the authors suggested that these short viewing times may indicate defensiveness. Finally, rapists and control males of the present study showed a very similar recognition profile, characterized by their best recognition for the photos of females and adolescent females.

It has been demonstrated that both anxiety and depression decrease performance on a cognitive task such as the Stroop Color-Naming Task (Fox, 1993, Segal, 1995). Consequently, it could be hypothesized that if sexual interest was elicited during a similar discrimination task, similar interference effects should occur. This hypothesis received support in the pilot project by Wright and Adams (1994) which demonstrated that slides of nude adults caused interference and increased reaction time during a choice discrimination task. Furthermore, the interference was only present if the sexual stimuli were congruent with the individual's sexual orientation. The present results are consistent with literature on Stroop effect. Sexual interest, the motivational variable used in this study, is a positive emotion, and the results indicate that sexual interest facilitates as well as interferes with information processing. The pattern of errors during the task yielded several interesting findings. On the incidental learning task, recognition for preferred both gender and age stimuli that were presented during the experimental trials was greater than the non-preferred stimuli.

While these procedures are appropriate with men, it is some-what problematic with women, particularly heterosexual women. The results may be due to the fact that women are less sexually aroused by visual stimuli as compared to other stimulus modalities than men (Leitenberg & Henning, 1995). The women in our experiment showed mixed results: longer viewing reaction times and free watching times with the pictures of adolescent females, and best recognition with the pictures of females and adolescent males. Quinsey et al (1995) found that male subjects viewed slides of same-sex adults longer than female subjects did, and the authors gave the interpretation that the visual appraisal of same-sex adults is more important for males than females because of greater importance of malemale competition in the environments of evolutionary adaptation (Barber 1995). The findings of the present study may indicate that there is also a female / female competition. Furthermore, in this research the findings indicate a female profile that shares some common features with the profile of child molesters. The child molesters' profile seems to be between the males and females profile, and this may possibly be associated with the high levels of homosexual experiences of this subsample.

Another issue is whether an individual can fake the results of this task and what a fake profile looks like. A study of faking should include the results of the viewing reaction time task as well as the incidental learning task since both tasks have shown high correct identification accuracy rates (Wright & Adams, 1999). This procedure would be useful for situations in which an individual is unable to achieve an erection, because of anxiety during the testing, which would invalidate the results of plethysmography. This procedure may also be a more appropriate assessment tool for young sex offenders since it is less intrusive. More research using this procedure is needed to replicate these findings. In summary, viewing time, in combination with incidental learning tasks, can serve as an unobtrusive measure of males' sexual interests. The present results support the development of such techniques in epidemiological studies, and on people who work with children.

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