reflex." The early occurring decelerative HR CRs and later appearing accelerative CRs of the present study may obviously be interpreted within either of these theoretical frameworks.

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Rejection of input in the processing of an emotional film*

PETER SUEDFELD
The University of British Columbia, Vancouver, British Columbia, Canada

MATTHEW HUGH ERDELYI
Brooklyn College of The City University of New York, New York, New York 11210

and

CAROLYN R. CORCORAN
Douglass College, Rutgers - The State University, New Brunswick, New Jersey 08903

Subjects saw a film sequence that was abruptly terminated and followed by a letter matrix. One group saw a film of high emotionality (HE) while a second group saw one of low emotionality (LE). A control group was shown a blank white slide (B) followed by the same letter matrix as seen by the other subjects. ANOVA showed that control subjects had the highest sensitivity for the letter matrix and the HE group had the lowest sensitivity; the difference between HE and LE was not significant. When film subjects were divided into those who rated the films as high disgusting (HD) and those who rated the film as low disgusting (LD), ANOVA showed that control subjects had the highest sensitivity, LD subjects an intermediate level, and HD subjects the lowest, the difference between HD and LD in this case being significant. Results were interpreted as representing emotion induced rejection of input.

Recent research has demonstrated that emotional stimuli, whether verbal or pictorial, can produce processing disruptions for other proximate stimuli (Erdelyi & Appelbaum, 1973; Erdelyi & Blumenthal, 1973; Schultz, 1971; Tulving, 1969). "Proximate" can be defined either spatially or temporally, depending upon whether simultaneous or sequential presentation is used.

As a general rule, such experiments present discrete stimuli for brief durations. Because this is a somewhat artificial procedure, it is open to the criticism of questionable generalizability or external validity. Perception in the nonlaboratory environment usually involves the continuous processing of complex inputs

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that occur both simultaneously and sequentially. Thus, the emotional impact is a function of a relatively prolonged and diverse presentation, rather than of one fleeting exposure.

The present study used such prolonged and complex inputs, which were either high or low in emotional content. The test stimulus, by contrast, was a brief neutral one. Thus, the study dealt with the processing of unemotional information embedded in either an emotional or unemotional context. This made it possible to avoid some of the criticisms traditionally made of the "perceptual defense" literature (Erdelyi, 1974): e.g., that the differential sensitivity measures associated with emotionally charged stimuli are due to differences in familiarity or to biased reporting strategies. Furthermore, any disruption in set which may have been occasioned by the presentation of the target stimulus would apply equally to both the high- and low-emotional conditions, leaving emotionality as the only crucial variable between the two. The effects of stimulus emotionality on the processing of a contiguous nonemotional stimulus was thus tested by a method which both controlled for frequently found artifacts and approximated real-life information processing relatively closely.

METHOD

Subjects

The subjects were 45 female undergraduates enrolled in an introductory psychology course, who received extra credit for participating. They were assigned randomly to one of the three stimulus conditions.

Stimuli

There were two film stimuli; both were taken from an American Cancer Society film entitled "Early Diagnosis and Management of Lung Cancer." One sequence of about 8.5 min presented dialogue, graphs, and diagrams concerning the diagnosis and nature of cancer. This film was judged a priori to be relatively low in emotional impact (LE). Another 8.5-min sequence showed an actual lung cancer operation, and constituted the highly emotional film (HE). A third, control, condition consisted of a 1-min projection of a blank white slide (B) approximately equal in brightness to the movie field.

The recognition stimulus was a slide presenting a 3 by 4 matrix of letters of the alphabet, with a median frequency of occurrence of 13.5 (Fletcher, 1939). During the test phase, these 12 letters were randomly mixed with 12 others.

Procedure

Each of the HE and LE subjects (n = 14 and 13, respectively) was individually tested. A movie projector and a slide projector were combined with two shutters and a timer to function as a two-channel projection tachistoscope. Projection was through a one-way mirror, allowing subject to view the stimuli from a room other than that in which the equipment was located. A small tensor lamp enabled the experimenter to monitor subjects' eye movements through the one-way mirror.

Channel 1 of the tachistoscope was the movie projector, with a clearly audible sound level. Subject sat about 3 ft in front of the screen. At the end of the HE or LE stimulus, there was a 200-msec dark interval, followed by activation of Channel 2 (the target stimulus matrix) for 250 msec. Immediately upon its termination, subjects filled out a recognition test form, followed by a rating of the film stimulus and a smoking questionnaire. The entire session lasted approximately 30 min.

In the control condition (B), Channel 1 was a blank white slide. The procedure was otherwise identical, except that the last two forms were not administered.

Measures

Recognition was measured by a 6-point confidence rating scale (Green & Swets, 1966). Positive (+1 through +3) ratings indicated subjects' judgment that a given letter had been shown as part of the stimulus matrix, negative (1 through −3) ratings that it had not. The test form was of 2 pages, containing the 12 recognition stimuli plus 12 distractor stimuli in random order. ROC curves were generated from subjects' rates of hits and false alarms. Proportion of area under the ROC curve, P(A), was calculated as a distribution-free measure of sensitivity.

RESULTS

Using the procedure of Green and Swets (1966), it was determined that only three effective discriminations were made: +3 and +2 relative to all other ratings. Therefore, the latter group (+1 through −3) was combined into one rating point, +1′. ROC curves generated from hit and false alarm rates for those rating points are shown in Fig. 1.

Mean P(A)s for the three groups were: HE = 56.48, LE = 60.83, B = 66.13. ANOVA gave a significant difference [$F(2,42) = 4.02$, $p < .05$]. The linear trend was significant [$F(1,42) = 7.64$, $p < .01$].

The most discriminating emotionality scale, that of disgustingness of the last few minutes of the film, was used to perform a median split on all subjects in the two film groups. Disgustingness ratings were 1-4 in the high (HD) group and 5-7 in the low (LD). ROC curves generated from the data of HD, LD, and B controls subjects are shown in Fig. 2.

Mean P(A)s were: HD = 54.96, LD = 61.93, B = 66.13, [$F(2,42) = 5.38$, $p < .01$]. HD and LD differed from each other [$F(1,42) = 3.75$, $p = .05$]. There was a significant linear trend [$F(1,42) = 10.79$, $p < .01$].

There was no apparent difference in eye movements, and smoking habits did not affect recognition (almost none of the subjects was a smoker).

DISCUSSION

In this relatively realistic situation involving coherently unfolding visual sequences, emotional content was shown to disrupt visual processing. Traditionally advanced methodological artifacts such as the effects of frequency and response strategy biases, which invariably arise from the comparision of *different* target stimuli (emotional vs neutral), do not apply to this procedure since performance measures were based on the *identical* visual target regardless of group.

Although superficially dissimilar to traditional perceptual defense experiments involving tachistoscopic stimulus presentations, the present study is fundamentally of the same class, with two differences of detail—a sequentially coherent and therefore realistic stimulus rather than a static frozen flash, and

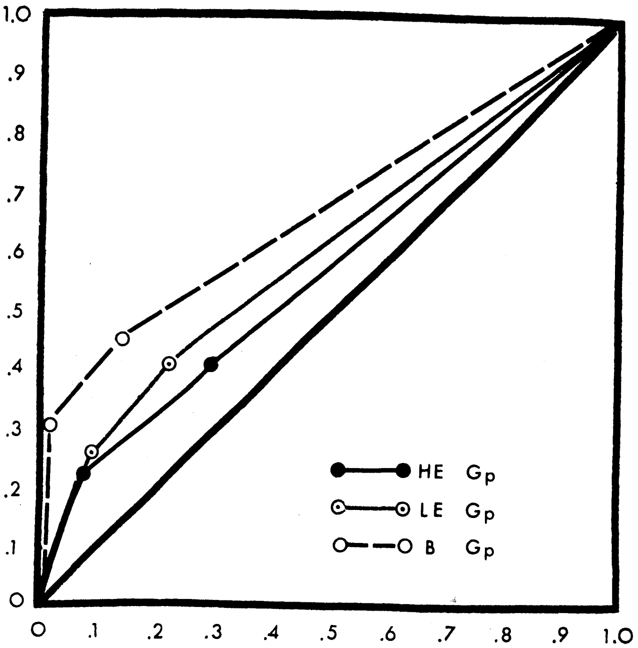

Fig. 1. ROC curves for the HE, LE, and B control groups based on the rating points +1′, +2, +3.

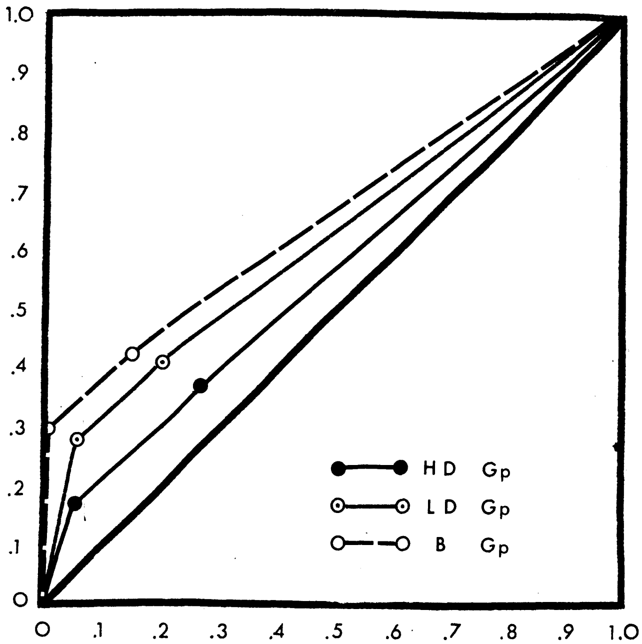

Fig. 2. ROC curves for the HD, LD, and B control groups based on the rating points +1′, +2, +3.

the performance test not on the full input ("visual population") but instead on a "visual sample" of the input, the common target matrix. It would not be incorrect to conceptualize the present approach as a *temporal* variant of the topographic visual sampling techniques introduced by Sperling (1960) and Averbach and Coriell (1961). As such, performance on the target, viewed as a visual sample—a slice of input if not a slice of life—may be construed as indicative of general processing performance on the stimulus sequence as a whole (the population). Disruption of target processing would thus imply a general processing disruption of the entire emotional film segment.

One interpretive framework for these findings is to conceive of "affect" itself as representing an informational channel, creating for the subject a traditional distribution of attention problem, wherein he must decide what portion of the input to attend to and what portion to reject, given hypercapacity input loads. (For a generalization of the concept of "channel" see Moray, 1970.) For a limited capacity processor, decision strategies to attend to one channel imply a rejection of another channel whether or not this is the explicit intent of the processor.

In short, what is suggested here is that the affective content of the emotional films introduces additional informational burdens upon the subject, forcing him to share his limited attention span over a wider set of input channels, including the affective. Allocation of limited attentional resources to any particular channel necessarily implies a relative rejection of other channels, hence the processing disruption. In order to process the emotional content of the input, subjects have less processing capacity left over for its cognitive content. Whether this is defensive input rejection of affect-arousing cognitive materials (note that the subjects have no way of knowing in advance the neutral nature of the target matrix), or a rejection by default caused by channel capacity limitation, cannot be definitively answered by the present study. One hint that defensive processes may be involved is the report of many subjects that they had wanted to look away from the more stressful scenes of the film but were restrained from so doing by the experimenter's monitoring of their eye behavior through the one-way mirror.

Finally, a word about subject variability in reacting to the emotional content of the films. Such variability was not unexpected and may be attributed to several factors. First, even the LE film was emotionally arousing to some subjects, presumably because it dealt with cancer. The inclusion of a completely innocuous comparison stimulus would probably have made the effect of the HE film in this study appear even greater. While this procedure had been considered, it would have incurred difficulties in equating film length, meaning, complexity, color, film quality, actors, etc. The explanation proposed above fits the HD-LD differences that were found: those subjects who attended more intensely to their own emotional state (the affective channel) both rated the film as more emotionally arousing and were less efficacious in processing the embedded letter matrix.

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