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Kellianne Clark

Chapman University, clark170@mail.chapman.edu

Jaclyn Cutler

Chapman University, cutle105@mail.chapman.edu

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Accommodating Hyperaroused Information Processing in Persons at Risk for Alcoholism

Kellianne N. Clark and Jaclyn J. Cutler
Department of Psychology

S.L. Schandler Ph.D. Faculty Advisor

Introduction

Recent studies of alcohol and information processing indicate that chronic alcohol abusers display disrupted attentional operations. This is not the result of prolonged alcohol consumption because similar disruptions appear in nonalcoholic persons at risk for alcoholism. Children born to alcoholic parents are at the greatest risk for developing alcoholism, and they possess the highest incidence of attention disorders of any clinical group. Recently completed studies in our laboratory and others show that the attention disruptions displayed by adult children of alcoholics (ACOA) represent hyperarousal of primary orienting and attention mechanisms. This finding has led to the theory that when children of alcoholics consume alcohol, the alcohol reduces the hyperarousal and normalizes attention.

The alcohol-attention normalization theory has led to a more in depth search for attention disruptions in young, adolescent and adult COAs. One common report is that ACOAs in particular possess a high incidence of attention deficit disorders (ADD) as determined by clinical ADD assessment instruments. However, investigations of links between alcoholism risk and ADD indicate that, in direct contrast to the hypoarousal model of ADD, the ACOAs' attention problems represent hyperarousal of primary, mesencephalic, orienting and attention mechanisms which result in a reduced ability to select and encode relevant information. Thus, information from the environment literally swamps the ACOA's information processing system. They must either use some intervention to reduce the information flow (e.g., a central nervous system depressant like ethyl alcohol) or they must take more time to filter and extract the relevant information. If true, then unlike persons with ADD, clinical and cognitive assessments of ACOAs would benefit if the ACOA was provided with more time to encode and respond to the probe information. The present study was designed to begin an exploration of this question.

References

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Method

Subjects. One hundred and seventy-two healthy nonalcoholic volunteers aged 18 - 25 years served as subjects. One group of 86 subjects were adult children of alcoholics (ACOA) and the other group of 86 subjects were not adult children of alcoholics (NACOA). Group assignment was based on criteria established by previous investigators (Johnson & Bennett, 1995; Sher, 1991) and the Children of Alcoholics Foundation (Woodside, 1983). This information, and information about the use of alcohol and other substances was acquired from subject reports and completion of standardized psychometric screening instruments. No subject reported current heavy drinking or previous treatment for alcohol abuse. The presence of ADD was evaluated using the Brown Attention Deficit Disorder Scale.

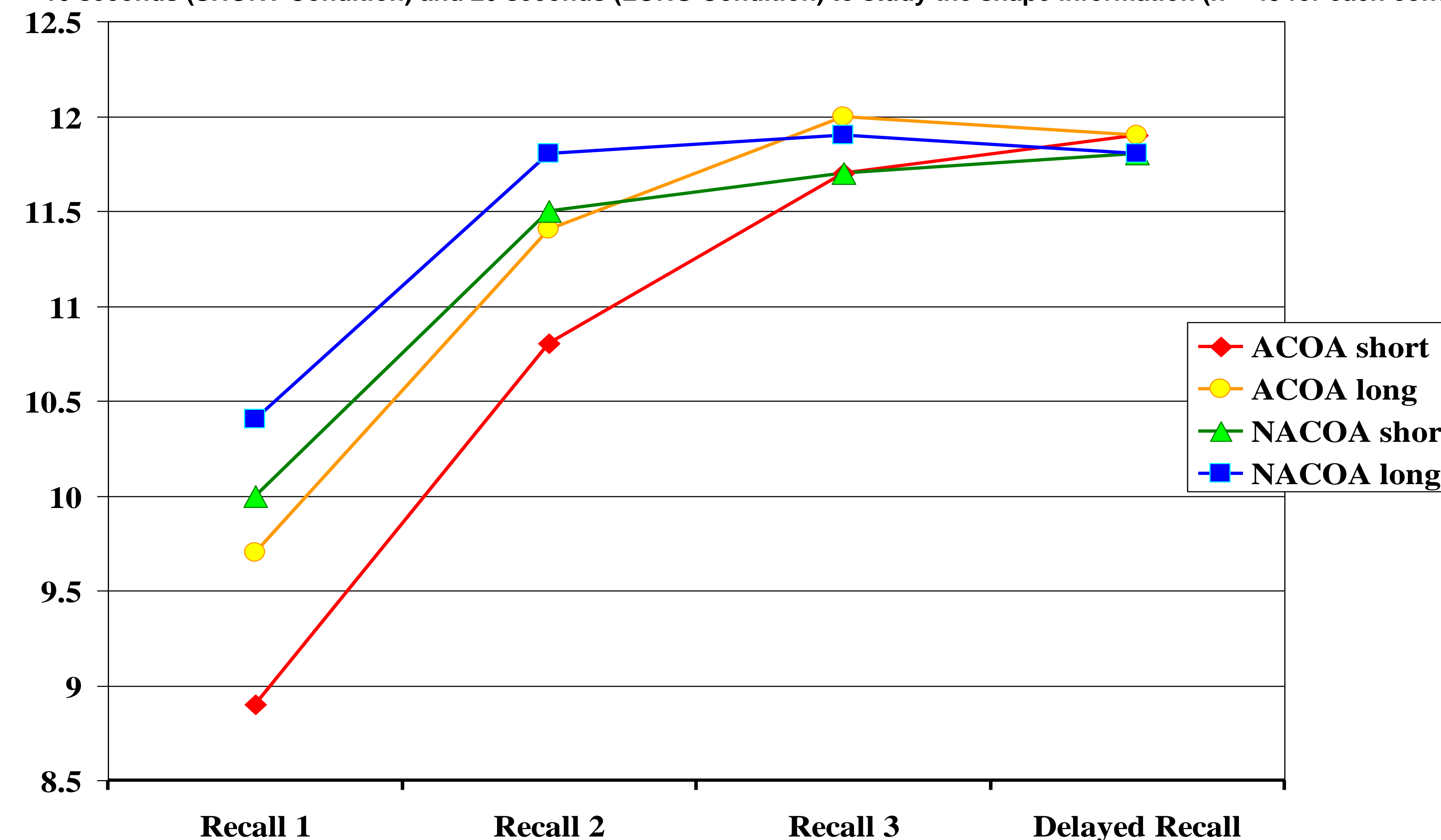
Apparatus. Previous research has found that visuospatial information processing is particularly sensitive to ACOA/NACOA status. Specifically, when compared to NACOAs, ACOAs display significantly reduced visuospatial processing. As such, this form of processing was selected as the primary cognitive probe task for the present study. Visuospatial processing was assessed using the Brief Visuospatial Memory Test-Revised (BVMT-R). This instrument primarily evaluates the subject's ability to reproduce simple and complex shapes and recall the position of the shapes within a defined spatial environment.

Procedure. Subjects served individually in a single study session. After reading and signing an informed consent, the subject completed the CAST and MAST instruments. ACOA/NACOA status was evaluated immediately after completion of the CAST. The subject was next administered the immediate recall task of the BVMT-R. During this task the subject first studied a probe picture of six shapes positioned on a grid. One-half of the ACOA (n=40) and NACOA (n=40) subjects were randomly assigned to a SHORT information study condition and were given the instrument standard of 10-sec to study the grid position of the shapes. The remaining half of the ACOA and NACOA subjects were given an extended 20-second information study period (LONG condition). Once studied, the grid was removed, and the subject was required to recall and draw the grid and the shapes in their original positions. The subject completed three of these recall trials. The BVMT-R requires a 30-minute interval between the initial recall trials and delayed recall and recognition trials. The subject then received the BVMT-R delayed recall task which required another drawing of the original grid and shapes. This was followed by the final BVMT-R recognition task.

Results

BVMT-R performance data for each subject consisted of recall scores for the initial three recall trials and a delayed recall score measured 30 minutes after the initial recall trials. Figure 1 presents a summary of these data for the ACOA and NACOA groups provided with information review periods of 10 seconds (SHORT Condition) and 20 seconds (LONG Condition). Compared to the other groups, ACOA subjects in the SHORT Condition displayed significantly poorer recall performance on trials 1 and 2.

Figure 1: Mean number of shapes correctly recalled from the Brief Visuospatial Memory Test – Revised for ACOA and NACOA subjects given 10 seconds (SHORT Condition) and 20 seconds (LONG Condition) to study the shape information (n = 43 for each condition).



Conclusions

The present finding of elevated Brown ADD Scale scores for ACOA subjects is consistent with previous findings. However, the visuospatial performance data from the BVMT-R do not support the presence of ADD in ACOAs. If an ADD-defined, hypoaroused information intake process was in operation, then the visuospatial information processing of the ACOA subjects would not have benefited from an extended information review period. The extended period would only have exacerbated the reduced ability of persons with ADD to maintain vigilance over time. On the other hand, a hyperaroused information intake process would benefit from an increased information review period. With no other stimulation than the probe stimulus shapes, persons with a hyperaroused information intake system would have additional time to filter and encode the salient components of the shapes. This is what we hypothesize is the underlying mechanism affecting information processing in the ACOA. This hypothesis is supported further by the increasing recall performance of the ACOAs as they receive more recall (i.e., practice) trials. After three or four recall trials, their performance is essentially identical to that of the NACOAs.

Compared to NACOAs, ACOAs are more sensitive to their information processing ability and reliably report experiencing an alcohol-related 'boost' in their information processing. An immediate conclusion is that ACOAs are at high risk for alcoholism because their initial experience of an alcohol-related assist in information processing reinforces their continued use of alcohol. This could hardly lead to a viable therapy: The administration of alcohol to an alcoholism risk group would neither prevent nor reduce alcohol use. The primary objective of the current research is to evaluate an alternative approach using strategies that alter the dynamics of information processing and take advantage of the ACOA's enhanced sensitivity to their information processing performance. For example, if an ACOA experiences a learning performance enhancement associated with having more time to select a correct response, then they may incorporate this strategy, rather than the consumption of alcohol, into future learning situations. This outcome would allow development of more accurately focused, self-regulated prevention strategies for persons at higher risk for alcoholism.

The parameters for optimizing information delivery to achieve maximum encoding and storage have been well-developed. If the ACOA can sufficiently alter information processing demands to optimize attention and orienting, then any similar effect they experience as the result of alcohol ingestion may be moot. This outcome would allow development of more accurately focused self-help preventive strategies for persons at higher risk for alcoholism, reducing or eliminating what is now a 14 times greater probability that these persons will become chronic alcohol abusers who themselves produce high risk offspring.