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ABSTRACT

The present research assessed the ability to attend to relevant information in the presence of irrelevant distraction in hyperactive (H), learning disabled (LD), and unselected (US) children. A total of 20 LD, 20 H, and 20 US children divided into younger and older age groups participated in the study. Younger children were between 94 and 104 months of age; older children were between 105 and 126 months. The task was a computer-presented variation of a standard speeded classification card-sort task, one commonly used to assess attention ability of H and LD children. Children were asked to touch a target shape on a touch-sensitive video screen in the presence and absence of distractors. Individual response times (RT) were measured for 60 trials. Each child was scored for his or her average RT and variance of RT in each condition. No significantly different RT patterns to stimuli with and without distractors were observed among the younger or older LD, H, or US children. Both H and LD children were less stereotypic than US children in RT variance. The H children evidenced less stereotypic response for stimuli with distractors than for stimuli without distractors, and LD children demonstrated an opposite pattern. (RH)

Conference on Human Development, Nashville, TN
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DEGREE OF STEREOTYPIC RESPONDING BY HYPERACTIVE, LEARNING DISABLED, AND UNSELECTED CHILDREN IN A COMPUTER-CONTROLLED TASK

M. A. Metzger & L. Freund

No distractor

Distractor stimuli presented

on CRT touch-sensitive screen

INTRODUCTION

The present research assessed the ability to attend to relevant information in the presence of irrelevant distraction in hyperactive (H), learning disabled (LD), and unselected (US) children. Although the investigation of attention has been a well-researched area for both H and (more recently) LD children, few investigations have included both groups with verified diagnoses in one study. Prior investigations using response time (RT) tasks to assess attention ability of H, LD, and US children have relied exclusively on RT analyses and have not analyzed RT variation for individual children. This investigation intended to identify different attention task patterns of RTs and differing variability of task RTs for stimuli with and without irrelevant distraction among individual younger and older H, LD, and US children.

Younger and older ages for each diagnostic group were included in order to investigate the developmental lag hypothesis. This hypothesis suggests that young H and LD children develop basic level cognitive skills such as attention at a slower rate than US children, but that the diagnosed children eventually "catch up" in development at older ages.

The analysis of RT variability was an important additional analysis, particularly since variability or inconsistency of response is a characteristic often anecdotally associated with H children. Degree of response variability can be thought of as inversely related to degree of stereotypic responding. Therefore, response variance was the operational definition of degree of stereotypic responding in this study. Assessment of stereotypic response in H children may be particularly important because their major treatment, psychostimulant drugs, has been shown to induce stereotypic responding in animals.

METHOD

Subjects

20 LD, 20 H, and 20 US children participated in the study. The LD children were diagnosed by an educational specialist team assessment through the public school system. The H children were clinically diagnosed by the combined assessment of clinic pediatrician, teacher and parent behavior rating scales. These children were not on medication at the time of the study. The US children were from regular public school classrooms. All the children were grouped into younger (94 to 104 months) and older (105 to 126 months) groups. The number of children in each age and diagnosis group is shown in Table 1.

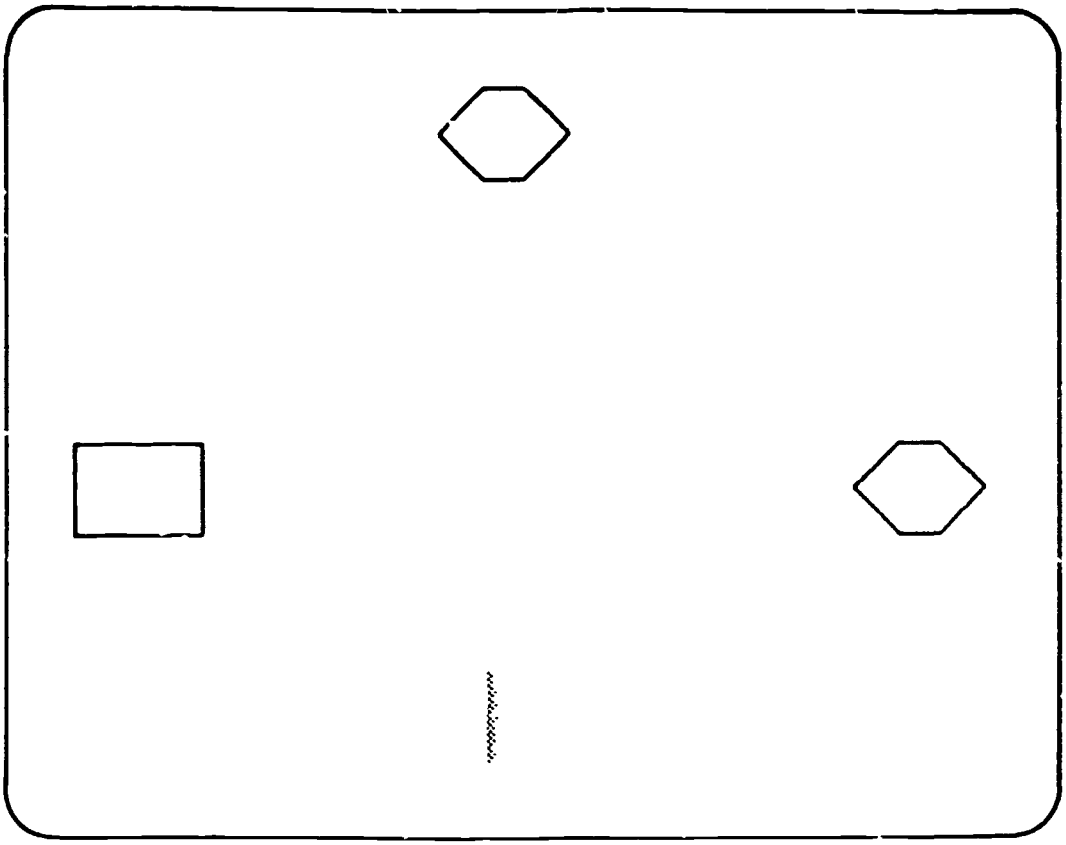
Table 1. Number in Groups by Age and Diagnostic Group.

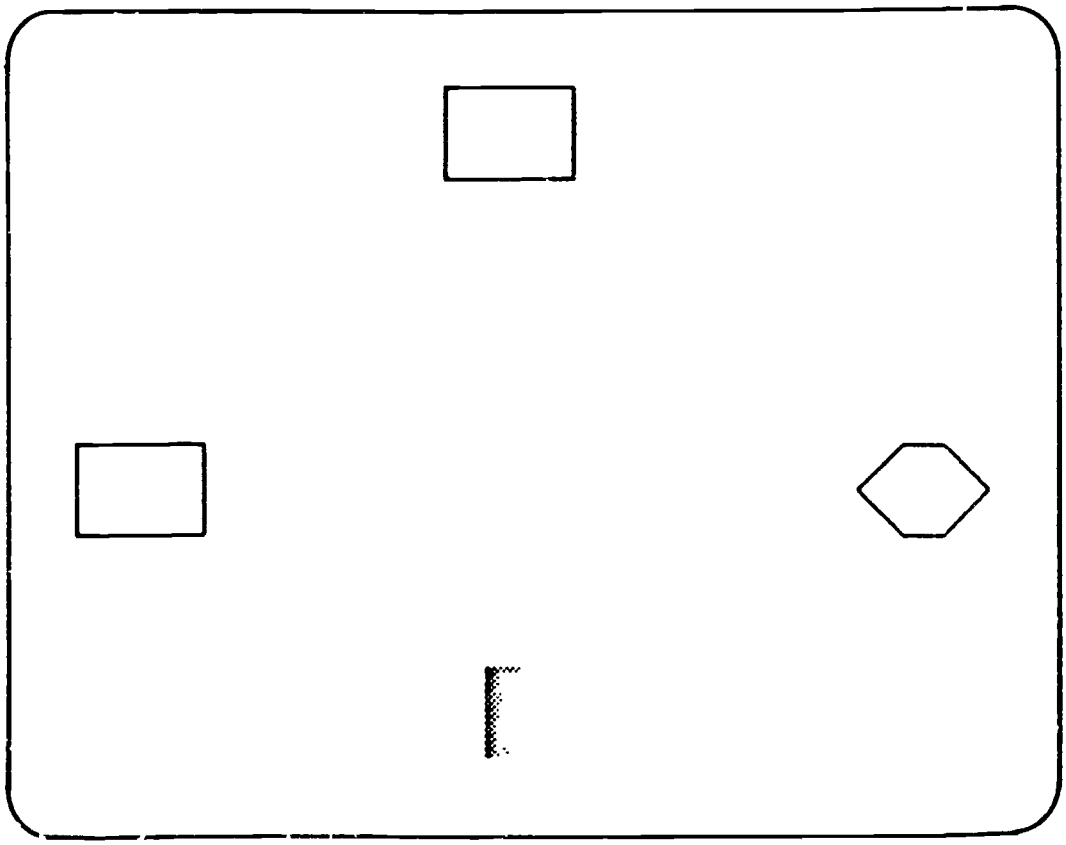
	Number in Diagnostic Group		
	Unselected	Hyperactive	Learning Disabled
Age			
Younger (94 to 104 mos.)	9	14	7
Older (105 to 126 mos.)	11	5	12

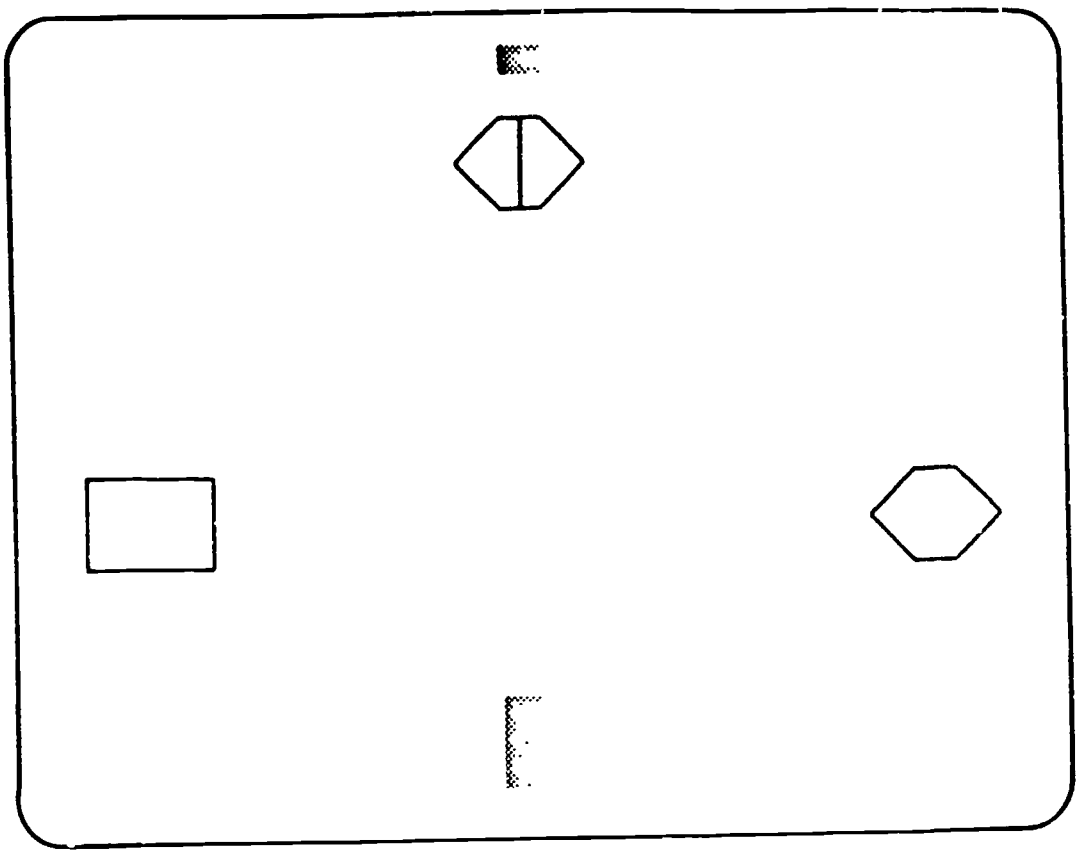
METHOD

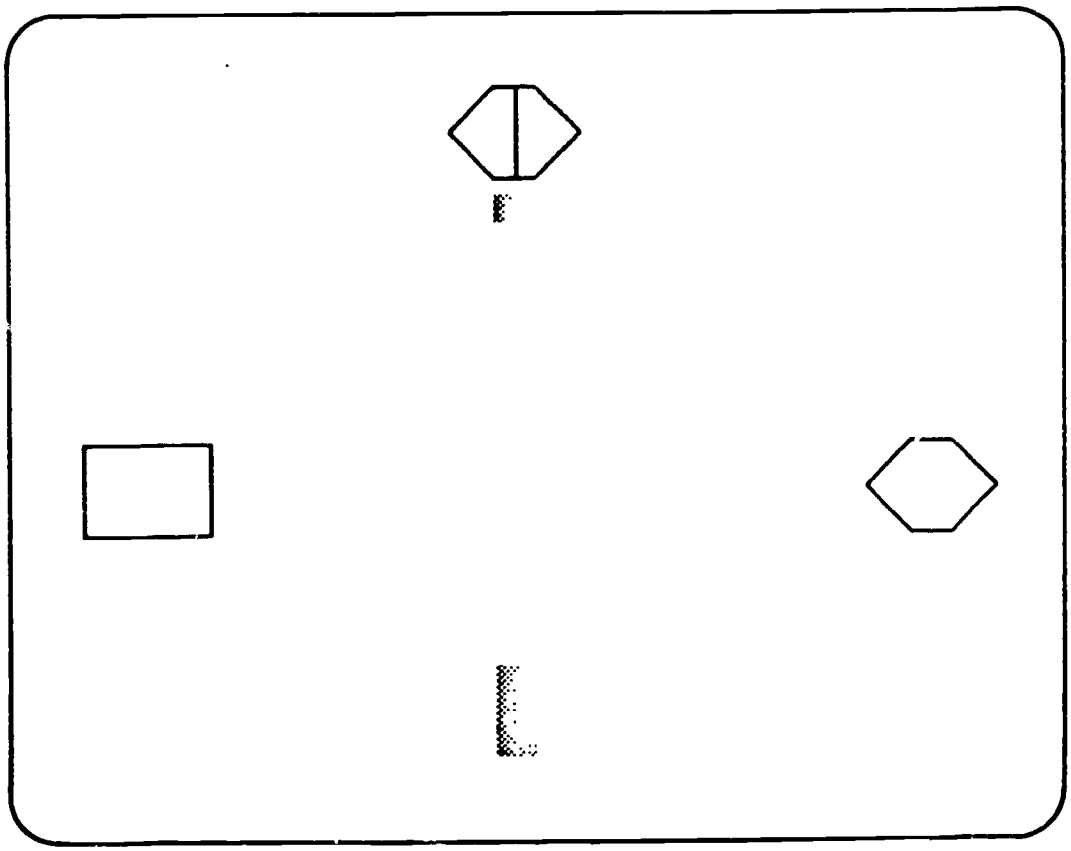
Procedure

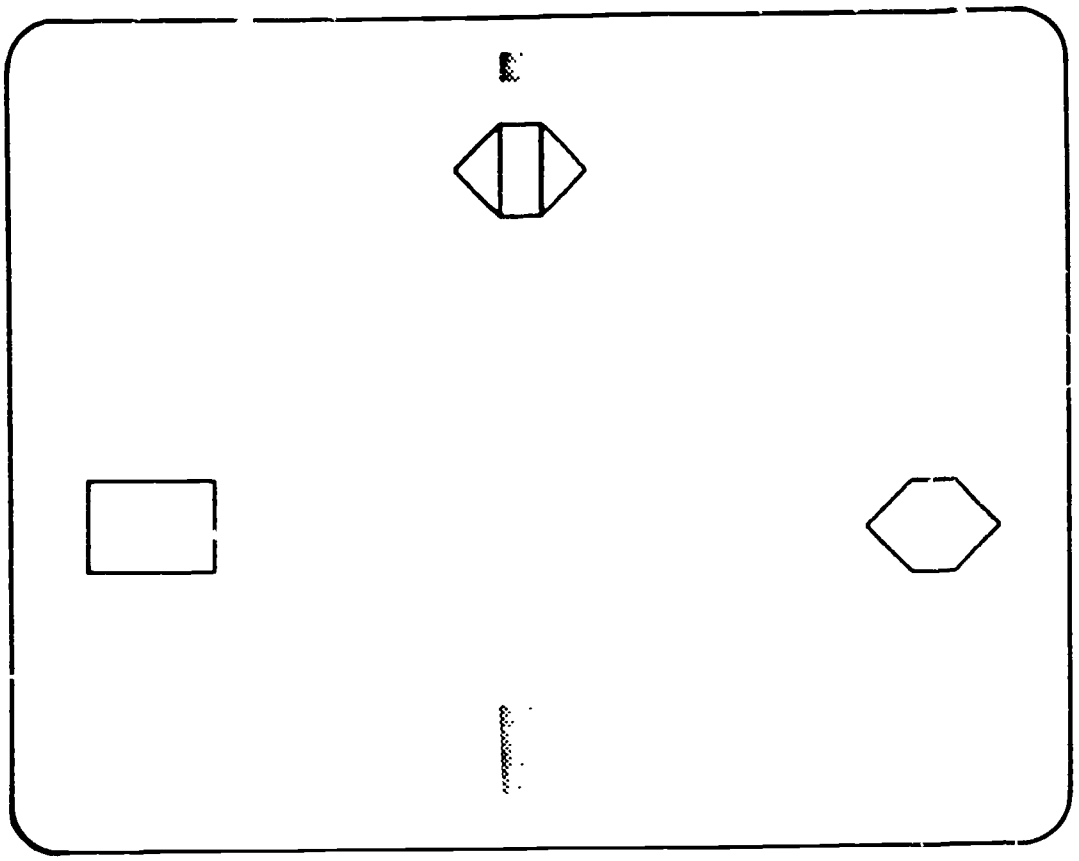
The task used was a computer-presented variation of a standard speeded classification card-sort task, commonly used to assess attention ability of H and LD children. Children were asked to touch a target shape on a touch-sensitive video (CRT) screen in the presence and absence of distractors. Individual response times were measured for 60 trials after a large number of practice trials. Trials were alternated such that 15 trials of stimuli with no distractors were followed by 15 trials of stimuli with distractors. Each child was scored for his or her average RT and variance of RT in each distraction and non-distraction condition.

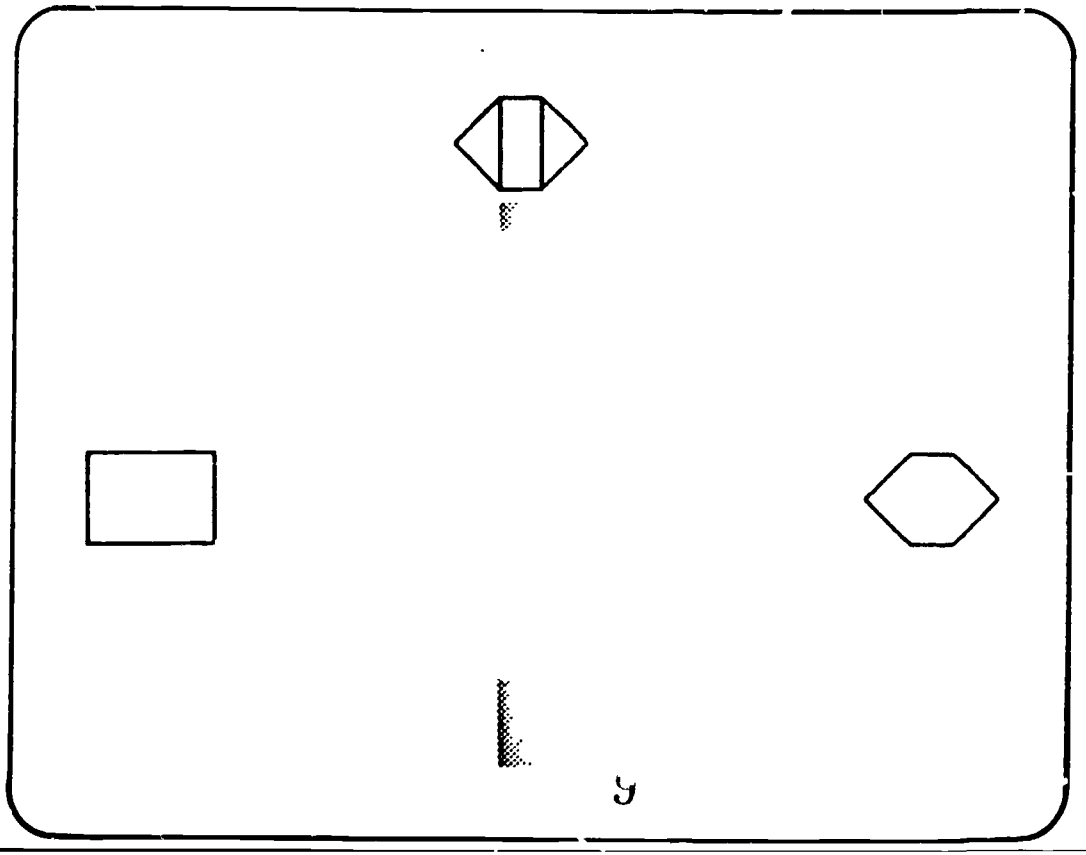


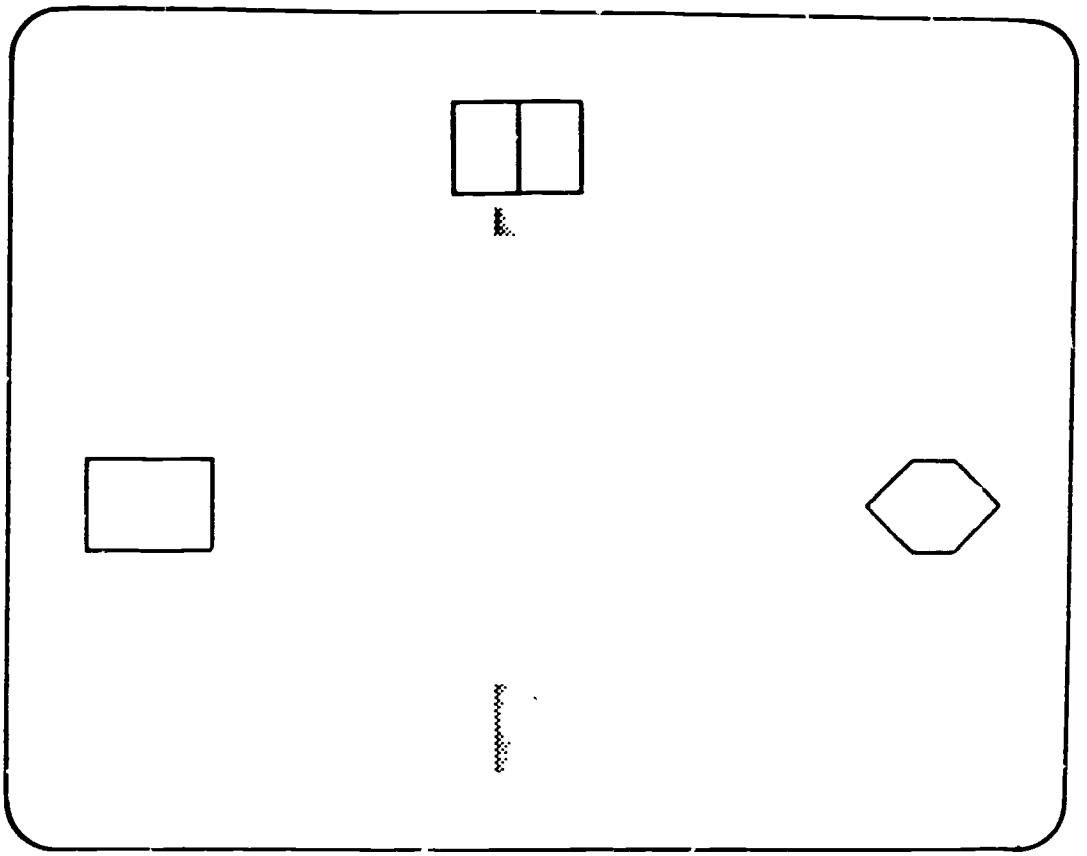


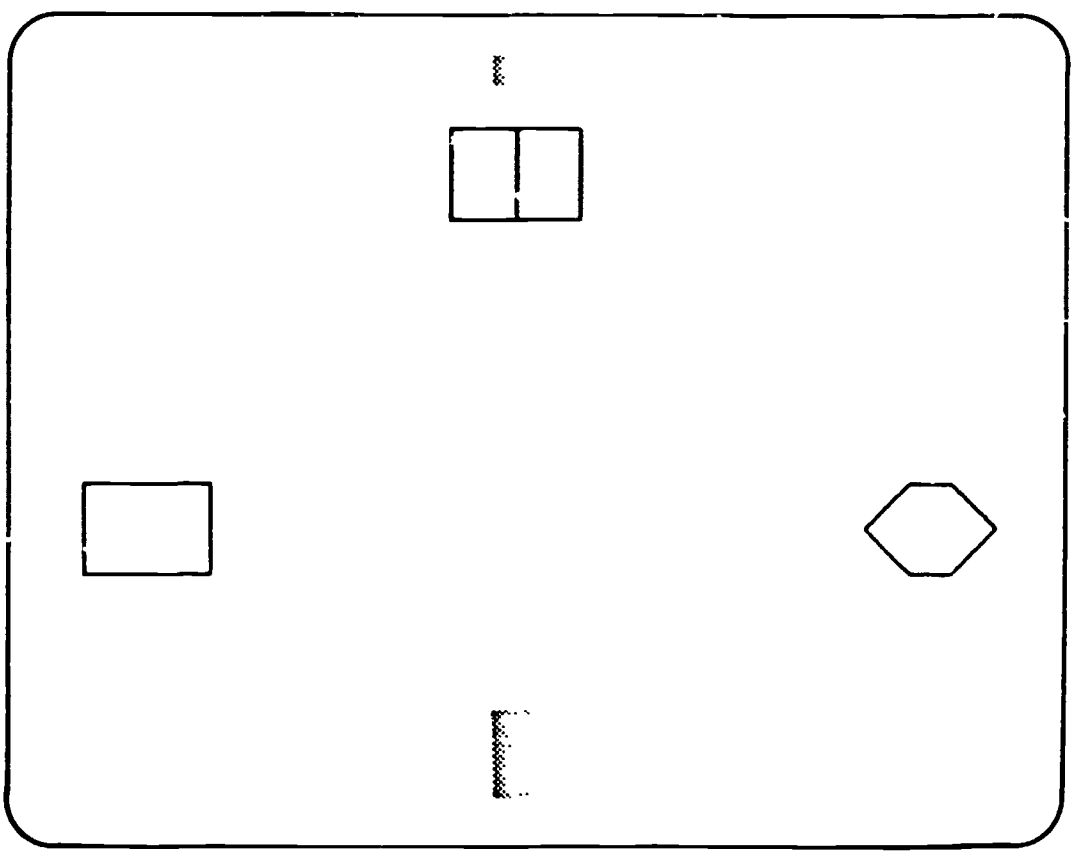


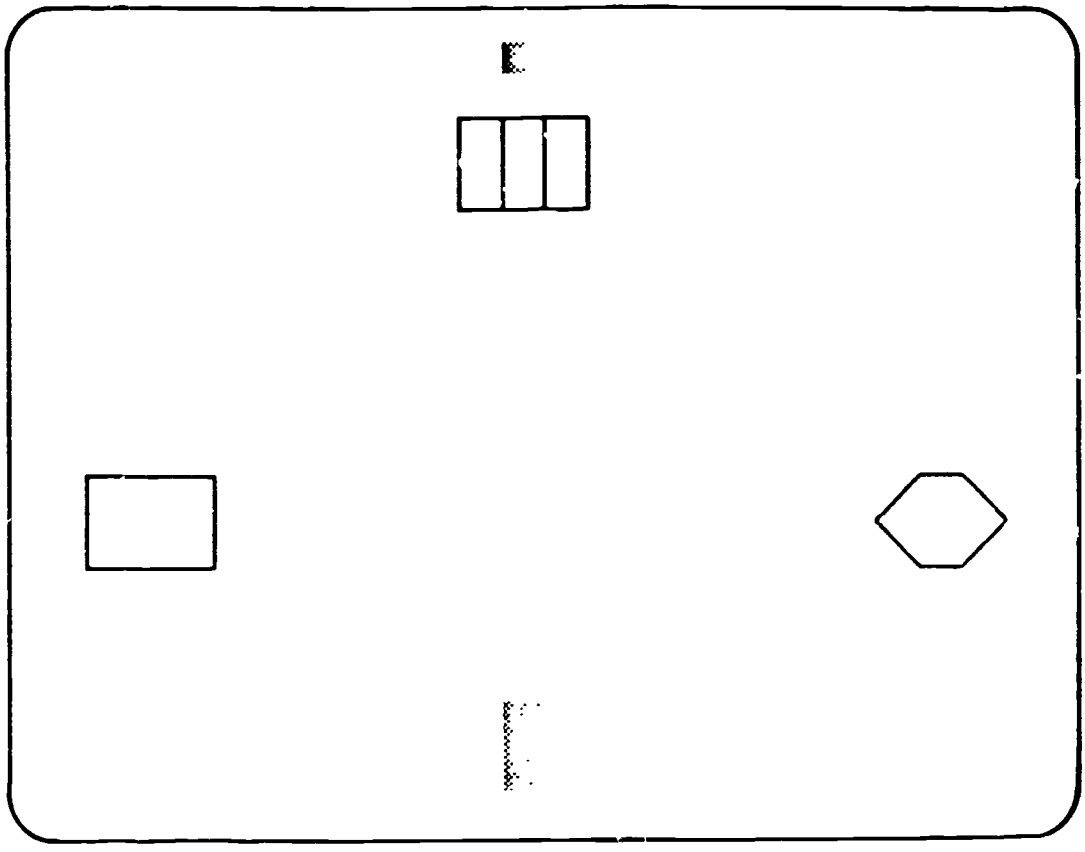


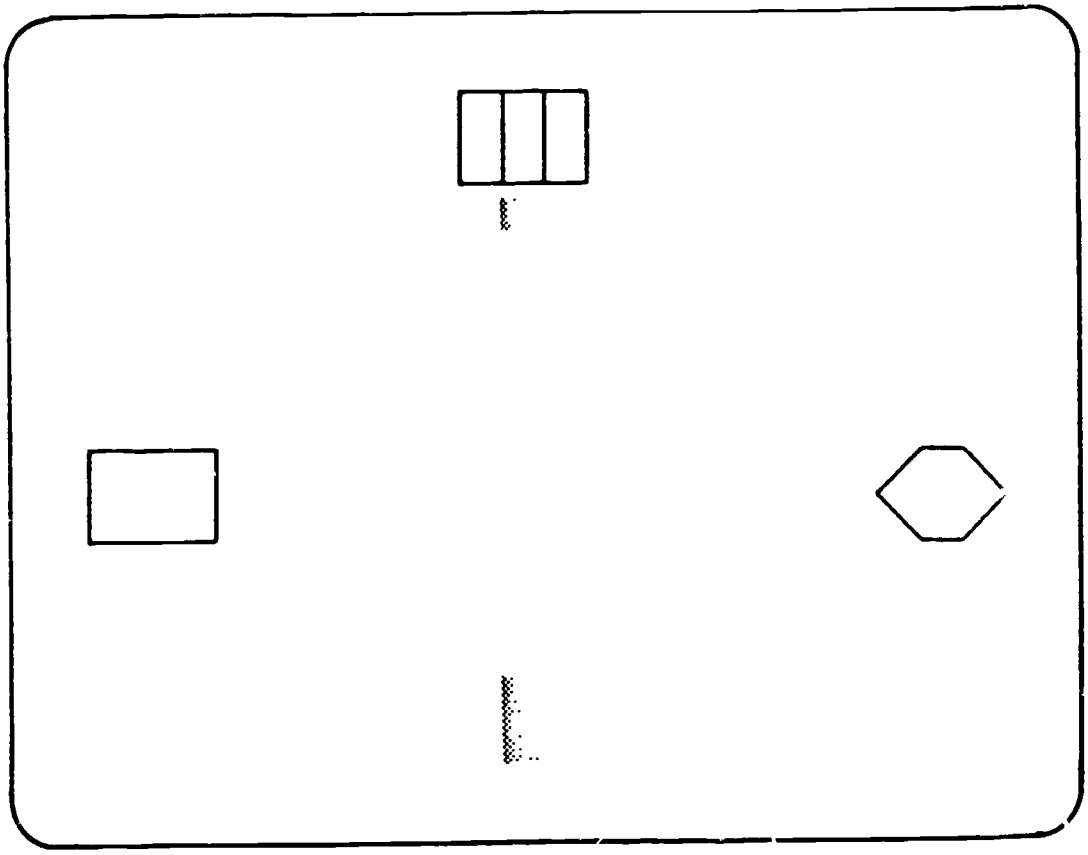












Response Time Scores

A mixed diagnosis X age X stimuli ANOVA was conducted with the RT scores (see Tables 2 and 3). Hyperactive children demonstrated significantly longer RTs than LD children (protected t (52) = 3.22, $p < .01$) and US children (protected t (52) = 3.21, $p < .01$). Younger children also demonstrated significantly longer RTs than older children overall. There was no evidence for different patterns of RT to stimuli with or without irrelevant distractors among the younger and older LD, H, or US children.

Table 2. Means and Standard Deviations of Response Time for Stimuli With and Without Distractors by Age and Diagnostic Group.

	Stimuli (in ms)	
	Without Distractors	With Distractors
Diagnostic Group		
Age Group		
Unselected		
Younger		
M	1.710	1.740
SD	.176	.164
Older		
M	1.460	1.490
SD	.107	.093
Hyperactive		
Younger		
M	1.870	1.940
SD	.138	.141
Older		
M	1.680	1.760
SD	.195	.212
Learning Disabled		
Younger		
M	1.620	1.750
SD	.180	.200
Older		
M	1.460	1.490
SD	.149	.160

Table 3. Summary Table for Diagnosis by Age by Stimuli Response Time ANOVA (transformed scores).

Source	df	MS	F
Diagnosis	2	.01388	12.07*
Age	1	.03121	27.14*
Diagnosis X Age	2	.00030	.26
Error	52	.00115	
Stimuli	1	.00244	25.11*
Stimuli X Diagnosis	2	.00014	1.48
Stimuli X Age	1	.00010	.98
Stimuli X Age X Diagnosis	2	.00021	2.20
Error	52	.00010	

* $p < .0001$

RESULTS

Response Time Variance Scores

A mixed diagnosis X age X stimuli ANOVA was conducted with the RT Variance scores (see Tables 4 and 5). There was a main effect of diagnosis. Overall, H and LD children were less stereotypic in response that US children (H vs. US, protected t (52) = 2.02, $p < .05$; H vs. LD, n.s.).

The result of greatest interest was the significant diagnosis X stimuli interaction shown in Figure 1. This interaction revealed different patterns of stereotypic response to stimuli with and without distractors among the LD, H, and US children. The comparison of stimuli without distractors vs. stimuli with distractors for H children was significant (protected t (52) = 2.05, $p < .05$) where as a similar comparison for US children was not significant.

Table 4. Means and Standard Deviations of Response Time Variances for Stimuli With and Without Distractors by Diagnostic Croup.

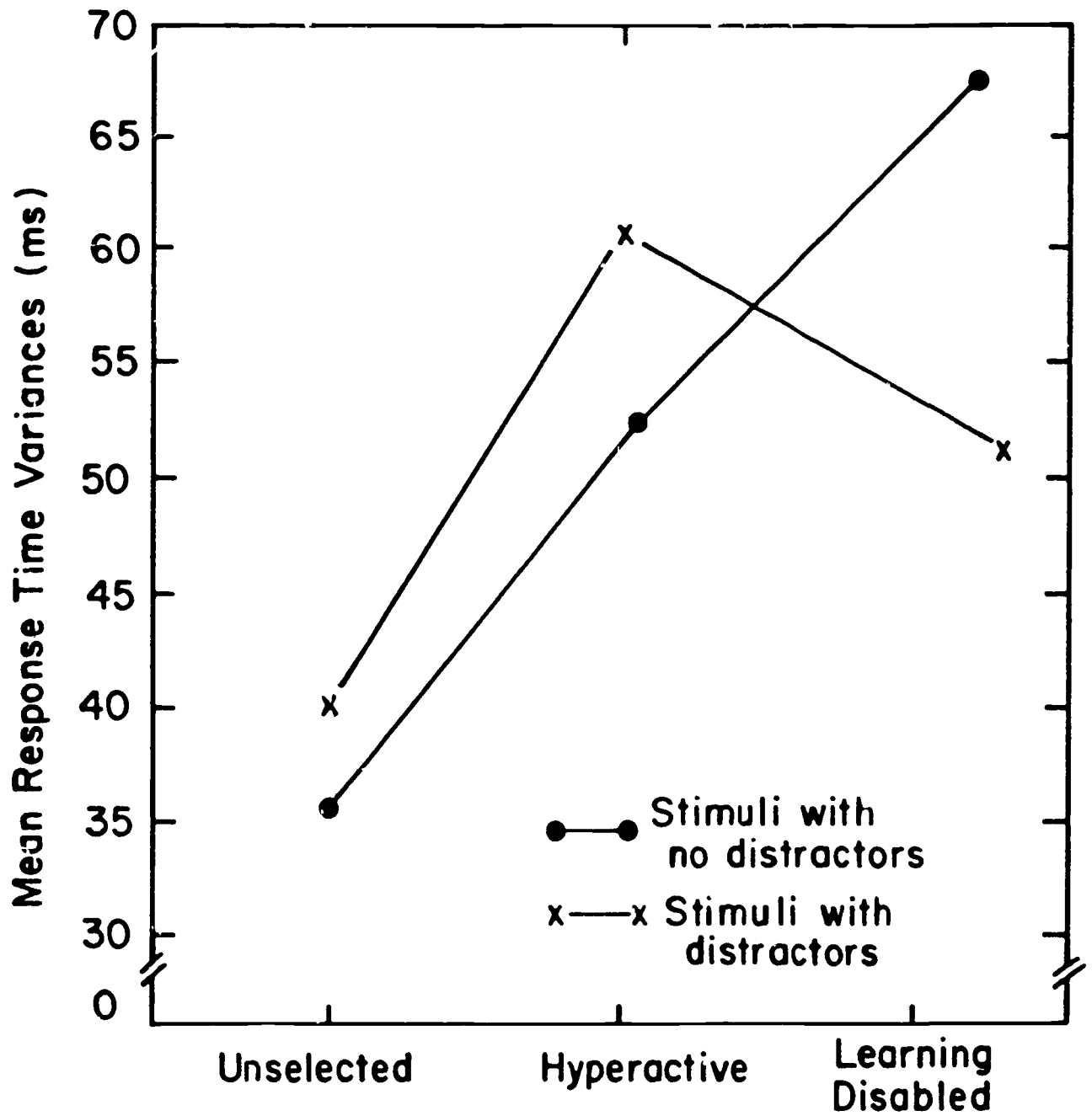
	Diagnostic Group (in ms)		
	Unselected	Hyperactive	Learning Disabled
Stimuli			
Without Distractors			
M	36.0	52.5	68.0
SD	27.0	35.5	33.0
With Distractors			
M	40.0	59.0	49.0
SD	24.5	20.0	22.0

Table 5. Summary table for Diagnosis by Age by Stimuli Response Time Variance ANOVA (transformed scores).

Source	df	MS	F
Diagnosis	2	.00078	3.78*
Age	1	.00033	1.61
Diagnosis X Age	2	.00006	.75
Error	52	.00021	
Stimuli	1	.00003	.37
Stimuli X Diagnosis	2	.00031	3.79*
Stimuli X Age	1	.00025	3.04
Stimuli X Diagnosis X Age	2	.00009	1.05
Error	52	.00008	

*$p < .03$

Figure 1. Mean Response Time Variances for Stimuli With and Without Distractors by Diagnostic Group.



DISCUSSION

No significantly different RT patterns to stimuli with and without distractors were observed among the younger or older LD, H, or US children. This result and the lack of age X diagnosis X stimuli interaction for RT variances provides no support for the developmental lag hypothesis. The significant RT Variance diagnosis X stimuli interaction, however, revealed an interesting difference in variance patterns. Both H and LD children were less stereotypic than US children in RT Variance, but, the H and LD patterns differed. The H children evidenced less stereotypic response for stimuli with distractors than for stimuli without distractors and LD children demonstrated an opposite pattern. These results suggest that what differentiates H and US children in their attentional responses in not the H child's overall ability to disregard irrelevant distraction, but the H child's inability to maintain a consistent, stereotypic attentional response. The LD RT Variance pattern is more difficult to interpret. We propose that the LD pattern resulted because the initial stimuli- with- no-distractors trials always preceded the stimuli- with-distractors trials. We suggest that the LD children were still learning on the initial no distractor trials and thus demonstrated higher variability of response. Future investigations are necessary to validate this interpretation of the LD pattern of RT Variances.