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ABSTRACT

Forty-two educable mentally retarded children (21 boys, 21 girls) performed an oddity learning task in one of three conditions: experimenter not present, experimenter present and providing relevant cues (RC), and experimenter present and providing irrelevant cues (IC). The experiment was designed to test J. Turnure's outerdirectedness hypothesis which states that nontask orienting behavior by retarded individuals reflects an information seeking strategy rather than vacuous orienting to a salient social stimulus. Data on Ss' learning revealed significant treatment effects only for boys with performance being better in the RC than in the IC condition. Data on glancing behavior confirmed the hypothesis that Ss would generally show greater nontask orienting behavior in the presence of an experimenter. Reversal trials confirmed these findings and also indicated a significant positive correlation between learning and glancing in the RC condition and a significant negative correlation between them in the IC condition. (Author/GW)

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Department of Health, Education and Welfare

U.S. Office of Education
Bureau of Education for the Handicapped

Abstract

Twenty-one retarded boys and 21 retarded girls performed on an oddity learning task in one of three conditions: Experimenter not present (NI), Experimenter present and providing relevant cues (RC), and Experimenter present and providing irrelevant cues (IC). Learning data revealed significant treatment effects only for boys; performance was better in the RC than in the IC condition. Glancing data confirmed the hypothesis that subjects would generally show greater non-task orienting in the presence of an experimenter. Reversal trials also confirmed these findings and further revealed a significant positive correlation between learning and glancing in the RC condition ($\underline{p} < .02$) and a significant negative correlation in the IC condition ($\underline{p} < .05$). This correlation pattern agreed with expectations arising from an outerdirectedness hypothesis.

OUTERDIRECTEDNESS IN EDUCABLE MENTALLY RETARDED BOYS AND GIRLS[1]

James E. Turnure and Sharon N Larsen

University of Minnesota

Deficiencies of attention have been attributed to the mentally retarded from at least the time of Ribot (1890). Teachers often refer to these apparent deficiencies as short attention span, inattention, or distractibility. The crux of the problem is that retarded students sometimes appear to show excessive non-orientation toward tasks which teachers consider important. Turnure (1970c) has recently suggested that non-orienting behavior or distractibility in the mentally retarded child actually represents a form of information-seeking behavior (see also Turnure & Zigler, 1964). He has argued that retarded children may be inappropriately categorized as distractible by teachers in classroom situations when they are observed looking around for assistance on a task that is appropriate for only the normal or average IQ pupil (Turnure, 1970c). Similarly, other professionals who interact with retarded children, such as psychometricians and researchers investigating learning, would be likely to observe apparent inattentive behavior by their respective clients and subjects who would be seeking assistance and information beyond that allowable in most standardized testing conditions. It appears quite plausible that all of these adult individuals would be considered by the retarded child as sources of information, and so they would be objects of intense interest and attention by these children.

The hypothesis that the presence of an experimenter in a learning task results in a marked increase in glancing awav from the task and toward the experimenter by retarded children has received some confirmation by Turnure (1970 c; Turnure & Zigler, 1964). Further, in his 1970 studies, Turnure found that when the experimenter provided cues as to the correct response, the retarded subjects showed not only increased glancing but also improved performance over the condition in which the experimenter was present but providing irrelevant cues (Turnure, 1970c: see also Turnure & Zigler, 1964). Turnure (1970c) concluded that the patterns of results obtained in his research supported a hvpothesis that non-task orienting by the retarded reflects an information seeking strategy rather than vacuous orienting to a salient social stimulus. These findings, along with manv others (cf. Achenbach & Zigler, 1968; Turnure, 1970a, 1971), have been interpreted as substantiating the general hvpothesis that a developmental change occurs in children's attentional strategies. It has been characterized as a shift from a general outerdirected, information seeking orientation to a more innerdirected one, with retarded children tending to persist in the outerdirected stvle. That is, retarded children, although possibly not abnormallv distractible, are seen as excessively reliant on others for continuous directions on tasks -- a perfectlv normal but immature form of attending, and one which keeps these children dependent on others longer than necessarv. Further details on the outerdirectedness hypothesis may be found in the references cited just above, and particularly Turnure (1970b, 1970c).

The above findings (Turnure, 1970c), however, were confounded to some extent bv the use of subjects who had previous exposure to, and, for the most part, failure experience with the learning task.

As Turnure noted, the possibility exists that the greater glancing of the subjects in Study II when the experimenter was present over that shown by these same subjects in Study I when the experimenter was not present, might have been due to the failure experience in Study I rather than the presence of the experimenter, since failure has been shown to induce greater outerdirectedness in the retarded (Turnure & Zigler, 1964). Turnure's third study, with a naive group of subjects, showed the same pattern of greater glancing and superior learning in the Relevant Cue compared to the Irrelevant Cue condition. Clear interpretation of these latter results was also hampered, however, by the fact that this group of subjects displayed relatively less glancing and relatively less learning than subjects in Study II. Further, the third study was performed with very small groups of only three or four subjects each. More importantly, perhaps, the previous work could be faulted on a point of design. Because of the non-inclusion of a critical contrast condition in which subjects would have performed without an experimenter present, it was impossible to make direct comparisons of subjects' behavior with and without an adult present.

The present study was undertaken in order to clarify the relationship between learning and glancing, and the presence or absence of the experimenter, as well as the differential effects of having the experimenter giving or not giving cues. In addition, possible sex differences in learning or glancing under the various experimental conditions were investigated for the first time. In order to accomplish this, groups of male and female educable mentally retarded children were given the oddity learning task used by Turnure (1970c), in one of three experimental conditions: a) no experimenter present (Not In), b) experimenter with cues (Relevant Cue), and c) experimenter with no cues (Irrelevant Cue).

Method

Subjects

Forty-two children (21 boys, 21 girls) selected from special classes for the educable mentally retarded in the public schools of St. Paul, Minnesota, were randomly assigned to one of the three experimental conditions with seven girls and seven boys in each condition. The mean CA's, MA's, and IQ's of the six groups are presented in Table 1.

Apparatus

The apparatus was similar to that employed by Turnure (1970c). A lightproof booth housed the response recording equipment, the projector which presented the learning problem stimuli, and observers who could closely and unobtrusively observe the subjects through a one-way vision mirror. An 8 x 45 inch base board provided a locus for the 7 1/2 x 11 inch stimulus presentation, response, and reward panel which fitted in just below the one-way mirror. This panel consisted of three movable plastic windows, designed to trip micro-switches when pressed, so that responses were recorded and feedback for a correct response was dispensed. Feedback was the illumination of a red reward light located above each window.

Stimuli were projected from the rear onto the plastic windows by a Kodak Carousel 800, which allowed for automatic projection of stimuli according to a fixed schedule established by the experimenter (4 seconds on, with an inter-trial interval of 1 second). A remote control device allowed the experimenter outside the booth to project

Table 1

Mean CA's, MA's and IQ's of the Subjects in the Three Experimental Conditions by Sex

Condition	CA	MA	IQ	n
Not In				
Girls	8-10	6-4	71.0	7
Boys	8-6	6-1	70.0	7
Combined	8-8	6-3	70.5	14
Irrelevant Cue				
Girls	8-8	6-4	71.1	7
Boys	8-5	6-3	71.8	7
Combined	8-7	6-4	71.5	14
Relevant Cue				
Girls	8-6	6-4	72.6	7
Boys	8-7	6-5	73.0	7
Combined	8-7	6-5	72.8	14

training stimuli. The six stimuli--circle, square, triangle, cross, octagon, and >———< -- appeared as black figures in the illuminated windows.

A twenty-pen Esterline-Angus event recorder was wired to the equipment described above so that there was continuous and simultaneous recording of the correct stimulus window, the subject's response, and the observer's judgment regarding the subject's incidence and duration of glance behavior (recorded during both trial and inter-trial periods). A glance was recorded each time a subject's eyes left the stimulus panel.

Procedure

Each subject was brought from his classroom to the experimental room by the male experimenter and seated before the apparatus. The experimenter took a seat to the right and spent a minute checking the child's name, class, etc., and then gave instructions and two training trials. During this initial period the experimenter was careful never to look toward the mirror. The training trials, which gave the subject an opportunity to respond to the apparatus, involved figures other than those used in the experiment proper. The instructions throughout were standard and very similar to those used in prior studies (Turnure, 1966, 1970a, 1970c, 1971).

The task presented to the children was an oddity problem as modified by Moon and Harlow (1955). The subject had to select the odd one of three stimuli in order to be reinforced by the red reward light. The odd figure appeared in either the right or left stimulus-response window but never in the center, a procedure which has been found to facilitate learning, presumably by reducing relevant response alternatives (cf. Moon & Harlow, 1955; Ellis, Hawkins, Pryer & Jones, 1963). The stimuli were selected randomly for presentation on the left or right according to a Gellerman series designed to control for the possibility of inflated numbers of correct responses due to fortuitous response preferences by the subject.

Not In Condition. After completion of the instructions and training trials, the experimenter rose and entered the rear of the booth. With the presentation of the first slide, the observer began recording the subject's glances. Each subject was given 60 trials (total time = 5 min.). Immediately following these oddity trials, and without comment by the experimenter or change in the timing, 18 reversal trials were given. In the first 10 of these, the background color was changed from white to pale red and the correct choice was now the same rather than the different stimulus in either the right or left window. In the remaining eight trials, four of the red-colored reversal slides were presented alternately with four black and white oddity slides, which again required a response to the odd stimulus. The reversal trials were included in order to begin the development of an additional measure of the child's attention to and learning of the discrimination task, and the relationship of his learning to his glancing. For instance, if in the cue condition a child was consistently correct at the end of the oddity trials and continued to consistently choose correctly on the reversal trials, without errors even on the initial reversal trial, it would seem reasonable to conclude that this child was depending very closely on the cues provided by the experimenter, rather than on his own ability to solve the task.

Following the last slide, the experimenter praised the child for his performance, made a few inquiries concerning the game, and then returned the child to his classroom.

Relevant Cue Condition. Upon completion of the instructions and training trials, the experimenter did not rise and enter the rear of the booth. Rather, he slid his chair from the side of the subject a foot or two to the rear. The experimenter could then be seen in the mirror, and also directly by a minimal head turn of the subject. The subject was told that the experimenter was "going to start all the pictures coming," and while the experimenter juggled the remote control switch, the observer switched the projector to automatic advance. The experimenter sat with his head oriented down toward a clipboard, which held cues as to whether the left or right stimulus window was correct. When each slide came on the experimenter lifted his head sharply, and tilted his head to the left or right and looked at the correct stimulus. When the 78 trials were completed, the experimenter praised the child for his performance, made a few inquiries concerning the game and returned the child to his classroom.

Irrelevant Cue Condition. In this condition the experimenter remained with the child, as in the Relevant Cue Condition. When each slide came on the experimenter lifted his head sharply but kept it in the median plane, providing no cue as to the correct stimulus. The remainder of the procedure was identical to the other two experimental conditions.

In order to aid analysis of glancing and response latency data, criterion was considered to be six consecutive correct responses, even though all subjects were required to continue in the oddity task for 60 trials. The separation of precriterion and postcriterion glancing scores was designed to allow for a test of the hypothesis that greater precriterion glancing would occur in conditions in which the experimenter was present.

Results

Learning Data

Table 2 presents the mean learning scores by sex and combined for all subjects in the three experimental conditions. A Condition x Sex analysis of variance of the mean number correct responses produced significant condition, sex, and Condition x Sex interaction effects (see Table 3). The simple effects analyses of conditions within sex were significant for the boys ($F = 58.13$; $df = 2, 36$; $p < .001$), but not for the girls. Further analysis of the boys scores by means of a Newman-Keuls test for differences among means was then performed. This analysis revealed that the number correct in the Relevant Cue condition was significantly greater than in the Irrelevant Cue and the Not In condition (both p's $< .05$).

The simple effects of sex within condition were significant for all three experimental conditions at the .001 level. It was only in the Relevant Cue condition that this difference was a result of a superior performance on the part of the boys. In the other two conditions the girls performed significantly better than did the boys. The source of the significant interaction in the original analysis of variance was clearly attributable to this change in the direction of the significant difference between the sexes (see Figure 1).

Table 2

Mean Number Correct by Sex in the Three Experimental Conditions

		Condition		
		Not In	Irrelevant Cue	Relevant Cue
Girls	$\bar{X}$	30.6	30.0	32.4
	SD	16.5	12.3	15.0
Boys	$\bar{X}$	25.0	22.9	37.6
	SD	9.3	9.3	14.6
Combined	$\bar{X}$	27.8	26.4	35.0
	SD	13.2	11.1	14.5

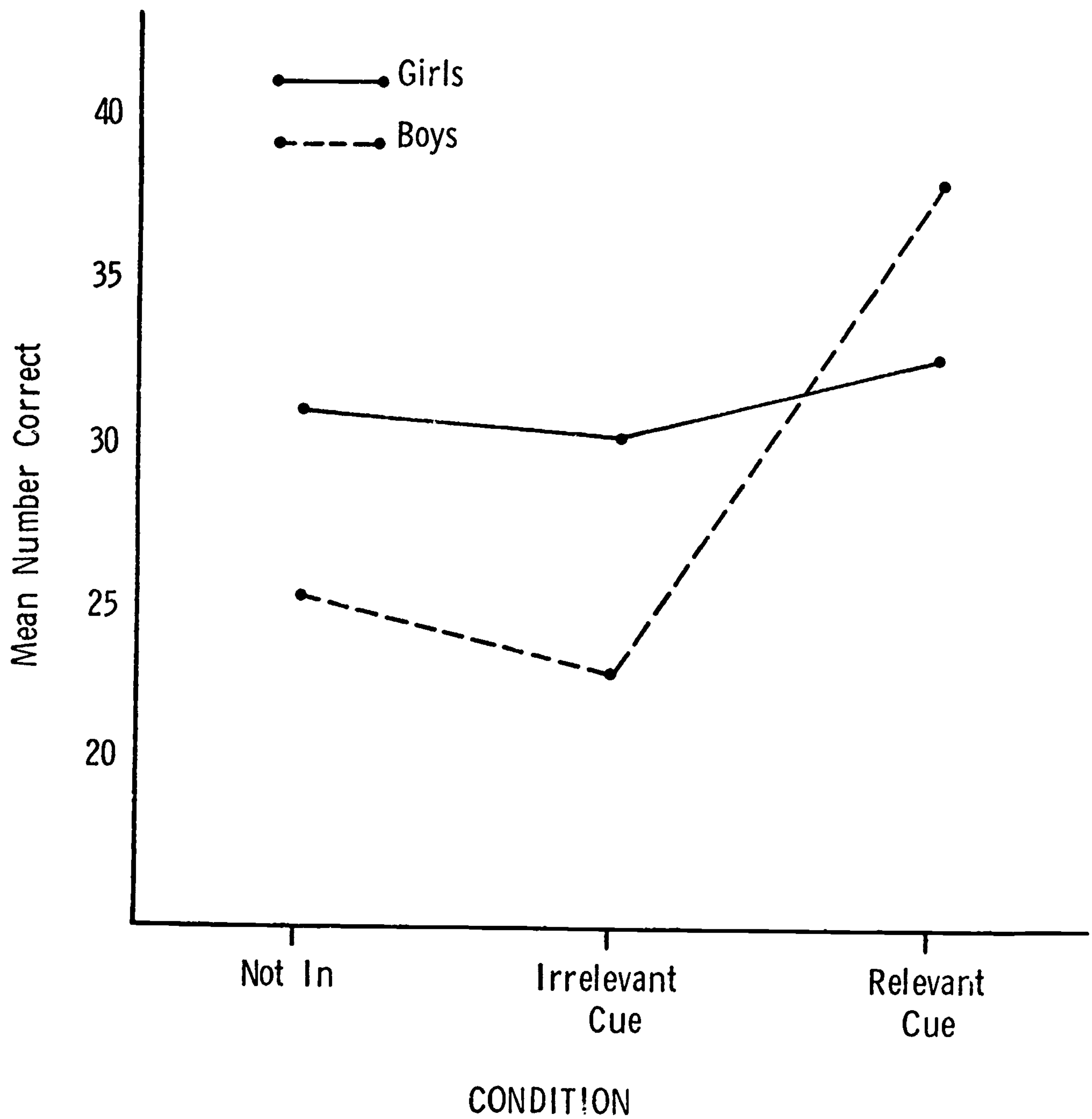
Table 3

Summary Table for Analysis of Variance of Mean Number Correct

Source	SS	df	MS	F	p
Condition (C)	595.21	2	297.61	37.72	.001
Sex (S)	67.76	1	67.76	8.59	.01
C x S	312.04	2	156.02	19.77	.001
Within Error	273.99	36	7.89		
Total	1249.00	41			

Figure 1

Mean Number Correct Responses in Three Conditions by Boys and Girls



Glancing Data

The mean number of glances and the mean amount of time spent glancing over the total five minute (300 seconds) period are shown in Table 4 for both sexes in all conditions. Inspection of this table reveals a clear trend in the data. That is, in both conditions in which the experimenter was present (Irrelevant Cue and Relevant Cue), the number and time of glancing are considerably greater than when he was not. A less clear difference in glancing behavior is evident between the two conditions in which the experimenter was present; slightlv greater amounts of glancing occurred under the Relevant Cue condition. A Condition x Sex analysis of variance of these data, however, resulted in no significant effects for either the total time or number of glances. Inspection of the standard deviations on Table 4 suggests that this was probably attributable to the very large variability about each mean. In effect, individual differences in the total amount of glancing were extremely great.

A direct test of the hvpothesis that greater glancing would occur in conditions in which the experimenter was present over when he was not made bv means of orthogonal comparisons. These analyses showed that a significantly greater total number of glances occurred in the experimenter present conditions (combined) than in the Not In condition, as way hvpothesized (F = 4.53; df = 1, 36; p <.025; one-tailed test). A similar comparison was not significant, however, for the total time spent glancing (F = 2.60; df = 1, 36; n.s.).

The measures of glancing presented here were converted to percentages by dividing each subject's time glancing score by total time available. These percentages, shown in Table 5 clearly show that

Table 4

Means and Standard Deviations of Total Number of Glances and Total Amount of Time Spent Glancing

Condition	Number		Time	
	$\bar{X}$	SD	$\bar{X}$	SD
Not In				
Girls	7.0	4.8	6.8	4.4
Boys	10.1	7.3	9.6	7.3
Combined	8.6	6.2	8.2	5.9
Irrelevant Cue				
Girls	15.7	11.0	12.1	10.5
Boys	14.0	8.4	12.6	11.2
Combined	14.9	9.4	12.4	10.5
Relevant Cue				
Girls	16.7	16.1	17.7	16.3
Boys	16.9	11.1	12.1	7.2
Combined	16.8	13.2	15.0	12.4

Table 5

Percentage of Total Time and Precriterion Time and Postcriterion Time (for Criterion Subjects) Spent Glancing

		Percentage			
Condition	Total	Precriterion			Postcriterion
		Group	Crit Ss	Non-crit Ss	Crit Ss only
Not In					
Girls	2.3	1.6	---	---	---
Boys	3.2	3.0	---	---	---
Combined	2.8	2.3	.94	3.1	3.5
Irrelevant Cue					
Girls	4.1	4.1	---	---	---
Boys	4.2	4.2	---	---	---
Combined	4.1	4.2	3.4	4.4	2.9
Relevant Cue					
Girls	5.9	5.0	---	---	---
Boys	4.0	4.0	---	---	---
Combined	5.0	4.5	3.2	5.5	3.8

the subjects spent a relatively small percentage of the total time looking about. The girls in the Relevant Cue condition show the largest percentage of time glancing, but it was still less than 10% of the experimental time. These data are in good accord with those from Turnure's earlier study (1970c), where no group of retarded subjects was found to glance over 10% of the time, and thus further substantiate his questioning of the appropriateness of designating children as distractible who are, in fact, glancing around for such a small proportion of the time.

As in previous work (Turnure, 1966, 1970a, 1970c, 1971) glancing was further analyzed by separation into pre- and post-criterion components (criterion was six consecutive correct responses). Precriterion number glance scores were computed by dividing the number of glances to criterion by the number of trials to criterion; precriterion time glancing scores were computed by dividing the time glancing to criterion by number of trials to criterion. Total number and time glances divided by 60 trials composed the scores for subjects not reaching criterion. An omnibus Sex x Condition analysis of variance of the precriterion glance data produced no significant findings for either number or time glancing. Again, however, in order to make a direct test of the hypothesis that greater precriterion glancing would occur in conditions in which the experimenter was present, orthogonal comparisons were made for precriterion number and time glancing scores. The difference in precriterion number glancing scores for the experimenter present conditions (combined) and the Not In condition was significant ($F = 3.68$; $df = 1, 36$; $p < .05$; one-tailed test). The same test for precriterion time glancing was also significant (F = 3.13; df = 1, 36; p < .05; one-tailed test). Pre-criterion and post-criterion glance scores were also converted to percentages, and these percentages may also be seen in Table 5.

Pearson product-moment correlations of pre-criterion time and number glance scores with total number correct were computed and are shown in Table 6. From this table it can be seen that only in the Not In condition, and really only for pre-criterion number glance scores, is this relationship a significant one. It is not clear why the correlations in the Relevant Cue condition are in the negative direction, which they should not be if subjects were getting guidance for correct responding from their glancing. Inspection of scatter plots of the learning and glancing data showed that at least one high scoring boy and girl were not observed to glance at all, and with such small groups (n=7), this was sufficient to reverse the correlations from those expected. It is noteworthy in this regard that when Relevant Cue condition subjects who made no glances during the task were eliminated, the correlation did show the positive directionality proposed in the outerdirected hypothesis, although the relationship was not statistically significant (r = .13; df = 11; n.s.).

Response latency data

The means and standard deviations of response latencies for each group, averaged over the 60 oddity trials, are shown in Table 7. As can be seen from this table overall mean latencies were similar for all groups. A Sex x Condition analysis of variance of these data revealed no significant differences. Based on previous studies

Table 6

Pearson Product-Moment Correlations of Precriterion Number and Time Glance Scores with Total Number Correct

	Condition					
	Not in		Irrelevant cue		Relevant cue	
	No.	Time	No.	Time	No.	Time
Girls						
r	-.72	-.68	-.002	-.03	-.17	-.24
n	7	7	7	7	7	7
p	.10	.10	n.s.	n.s.	n.s.	n.s.
Boys						
r	-.38	-.19	-.58	-.52	-.55	-.57
n	7	7	7	7	7	7
p	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Combined						
r	-.57	-.46	-.18	-.22	-.37	-.34
n	14	14	14	14	14	14
p	.05	.10	n.s.	n.s.	n.s.	n.s.

Table 7

Overall Mean Response Latencies (averaged over 60 trials) for Each Experimental Condition

		Not In	Irrelevant Cue	Relevant Cue
			Condition	
Girls	$\overline{X}$	1.5	1.9	1.7
	SD	0.3	0.3	0.8
Boys	$\overline{X}$	1.6	1.5	1.4
	SD	0.3	0.6	0.3
Combined	$\overline{X}$	1.5	1.7	1.5
	SD	0.3	0.4	0.5

(Levin & Maurer, 1969; White & Plum, 1964; Turnure, in preparation), response latencies were further analyzed to show their relation to the acquisition of the correct response. For these analyses subjects were classified as criterion or non-criterion depending on whether they made six consecutive correct responses or not, as in the glancing data described above. The means and standard deviations of criterion subjects' response latencies, separated into pre- and post-criterion, and those of non-criterion subjects over 60 trials, are presented for each condition in Table 8.

To determine if separation of response latency scores of criterion subjects into pre-and post-criterion components was justifiable, direct difference t tests of these scores were carried out within conditions. In all three conditions the mean pre-criterion response latency was significantly greater than the post-criterion latency (Not In: $t = 4.13$, $df = 4$, $p < .02$; Irrelevant Cue: $t = 3.07$, $df = 2$, $p < .05$; Relevant Cue: $t = 2.76$, $df = 5$, $p < .05$). A one-way analysis of variance of pre-criterion latencies for criterion subjects in the three conditions was carried out and the resultant F was of marginal significance ($F = 2.88$; $df = 2, 11$; $p < .10$), as was the F of an analysis on their post-criterion latencies ($F = 3.50$; $df = 2, 11$; $p < .10$). A similar analysis for non-criterion subjects' response latencies (averaged over 60 trials) was nonsignificant ($F < 1$).

The differences between the pre-criterion response latencies for criterion and non-criterion subjects within conditions were analyzed by simple t tests. The computed t's are also shown in Table 7 and it can be seen that a highly significant difference was found for the Irrelevant Cue condition, and that differences of marginal significance

Table 8

Precriterion Response Latencies for Criterion and Non-Criterion Subjects, and _t_ tests within Conditions

	Not In		Irrelevant Cue		Relevant Cue	
	Pre	Post	Pre	Post	Pre	Post
Criterion _Ss_						
$\bar{X}$	1.80	1.47	3.07	1.65	2.56	1.29
SD	.09	.20	.64	.23	1.04	.14
n	5	5	3	3	6	6
Non-Criterion _Ss_						
$\bar{X}$	1.51		1.65		1.56	
SD	.34		.36		.72	
n	9		11		7	
t	1.73		4.64		1.87	
_df_	12		12		11	
_p_	.10		.001		.10	

were obtained for the other two experimental conditions.

The relationship between response latencies and learning of the oddity problem was explored by a series of correlational analyses. Pearson product-moment correlations of the total number correct response made by each subject with mean response latencies to criterion (or through 60 trials for non-criterion subjects) were computed. Significant correlations were found for the Irrelevant Cue (r = .82, df = 12, p <.001) and Relevant Cue (r = .64, df = 11, p <.02) conditions, and a correlation of marginal significance was found for the Not In condition (r = .46, df = 12, p <.10). These correlations were entered into a series of multiple correlations of the number correct with response latencies and amount of precriterion time glancing, both with and without age partialled out, in order to determine the merit of combining response latency and precriterion glancing into a unitary predictor of learning. All correlations necessary for computation of these R's as well as the R's themselves are shown in Table 9. The resultant R's indicate that it was only for the Not In condition that combining response latency and glancing into a unitary predictor of learning resulted in a substantially increased amount of variance accounted for by R (R = .66, R^2 = 43%) over that accounted for by the largest of the individual r's (r= .48, r^2 = 23%).

Reversal trials

Table 10 presents the means and standard deviations for learning, time glancing and response latencies averaged over the 18 reversal trials. A Conditions x Sex analysis of variance of the number correct scores revealed a significant sex difference only (F - 4.36, df - 1, 36;

Table 9

Pearson Product-Moment Correlations of Number Correct, Precriterion Response Latencies, Precriterion Time Glancing and their Multiple Correlation, With and Without Age Partialled Out, for the Three Experimental Conditions

1 = Number Correct
2 = Precriterion response latency
3 = Precriterion time glancing
4 = Age

	Not In	Irrelevant Cue	Relevant Cue*
r_{12}	.46	.82	.64
$r_{12.4}$	.48	.82	.64
r_{13}	.46	.22	.44
$r_{13.4}$	.47	.18	.47
r_{23}	.03	.06	.59
$r_{23.4}$	.05	.04	.60
$R_{1.23}$	.64	.84	.64
$R_{1.23(4)}$	.66	.83	.65

*All correlations in this condition are based on n = 13; one subject was not included since data were missing on the precriterion response latency variable; n = 14 in the other two conditions.

Table 10

Means and Standard Deviations of Learning, Amount of Time Glancing and Response Latencies on Reversal Trials

	No. correct		Amount time glancing		Response latencies	
	$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	SD
Conditions						
Not In						
Girls	5.7	1.7	1.1	1.2	1.3	0.3
Boys	4.7	0.9	1.7	2.0	1.4	0.3
Combined	5.2	1.4	1.4	1.6	1.4	0.3
Irrelevant Cue						
Girls	6.1	2.7	1.8	1.6	1.8	0.6
Boys	4.3	1.6	4.1	5.0	1.4	0.3
Combined	5.2	2.4	3.0	3.7	1.6	0.5
Relevant Cue						
Girls	8.1	5.0	4.1	5.2	1.3	1.0
Boys	5.9	2.2	3.2	3.7	1.5	0.2
Combined	7.0	3.9	3.6	4.3	1.4	0.6

$p < .05$). Observation of Table 10 indicates that in every condition, the girls obtained a greater number correct than did the boys. This is partially at variance with the results from the 60 oddity trials that preceded reversal in which the boys performed better than did the girls in the Relevant Cue condition. There continued to be, however, better performance in the Relevant Cue condition than in either of the other two conditions in reversal for both boys and girls, just as in the first 60 trials.

In the reversal trials as well as in the oddity trials there was greater glancing when the experimenter was present than when he was not (cf. Table 10). In addition, the girls continued to spend more time glancing than the boys only in the Relevant Cue condition. As in the oddity trials, however, these differences did not produce any significant findings in a Condition x Sex analysis of variance. Correlations of number correct with amount of time glancing are shown in Table 11. Significant correlations were obtained for both experimenter present conditions across sexes. A significant negative correlation was found for the Irrelevant Cue condition and for the boys in this condition, in particular, a very high and significant negative correlation was obtained. In contrast, there was a positive relationship between learning and glancing in the Relevant Cue condition of about the same magnitude for both the boys and girls. Thus it appears that the glancers in the Relevant Cue condition tended to make more correct responses, whereas the glancers in the Irrelevant Cue condition tended to make fewer correct responses. The boys in the Irrelevant Cue condition in particular seemed to be spending a greater amount of time glancing on an average, and also tended to perform less well. In fact, in reversal as in the oddity trials, the boys performed less well in the Irrelevant Cue condition than they

Table 11

Correlation of the Number Correct with the Amount of Time Glancing in Reversal

		Condition		
		Not In	Irrelevant Cue	Relevant Cue
Girls	r	.25	-.27	.65
	n	7	7	7
	p	n.s	n.s	n.s
Boys	r	-.52	-.90	.58
	n	7	7	7
	p	n.s	.01	n.s
Combined	r	-.17	-.57	.62
	n	14	14	14
	p	n.s	.05	.02

had in the experimenter Not In condition.

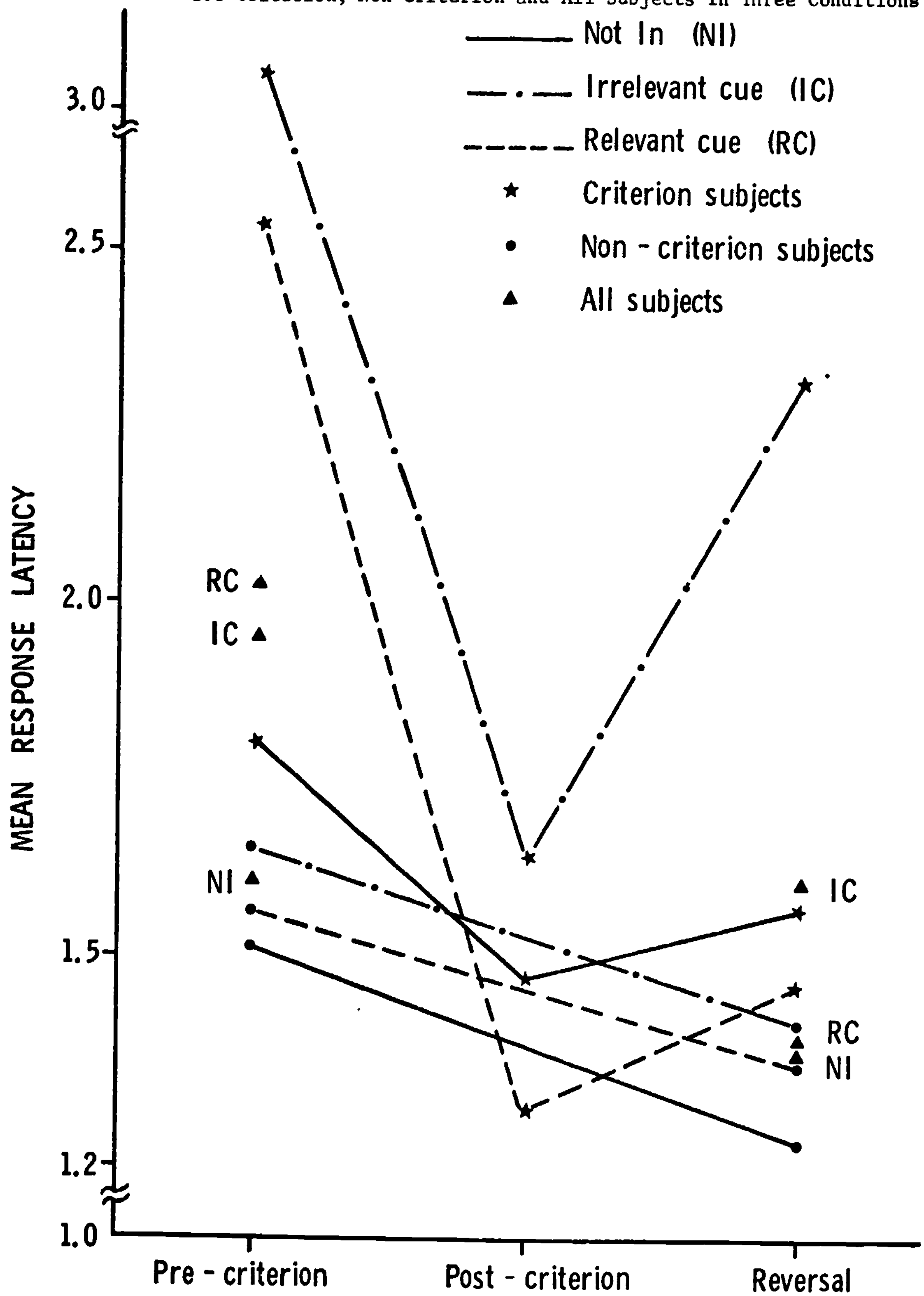
Figure 2 graphs mean response latencies for reversal trials, as well as the pre- and post-criterion means for the preceding 60 oddity trials. Means for criterion and non-criterion subjects are shown separately, and condition means including all subjects are also shown. Considering the reversal trials alone, it can be seen that once again the mean response latencies for criterion subjects were longer than those of non-criterion subjects in each condition, and also that it continues to be the Irrelevant Cue condition, in reversal as in the oddity trials, for which the difference is the greatest. The comparison of reversal means with pre-criterion means reveals that for both criterion and non-criterion subjects separately, or combined, in all experimental conditions, precriterion means are greater. It should be noted that the Relevant Cue condition means for criterion subjects dropped considerably from pre-criterion to reversal trials; this was also the case for the Irrelevant Cue criterion subjects' mean, although the drop in latency was only half that observed for the Relevant Cue criterion subjects. Also, for all criterion subject groups, the reversal response latency, although less than the pre-criterion mean of the oddity trials, exceeds the subjects' post-criterion means; this is particularly the case for the Irrelevant Cue condition subjects.

Discussion

The present study was carried out to assess the generality of certain findings which had emerged in previous research involving institutionalized retardates as subjects (Turnure, 1970c, Studies II & III), and to assess the validity of a particular interpretation

Figure 2

Mean Pre-criterion, Post-criterion and Reversal Response Latencies for Criterion, Non-criterion and All Subjects in Three Conditions



(the outerdirectedness hypothesis) of the results obtained in that investigation in a more appropriately constructed design. The results of this study offer a clear replication of most of the previously obtained findings, and through the inclusion of a new contrast group, substantiate the general validity of the previous interpretation of the results.

The combined boy-girl learning data gathered in this study (see Table 2) show the same pattern of results as was previously obtained (Turnure, 1970c, Studies II & III) in comparable conditions. That is, subjects in the Relevant Cue condition showed superior learning compared to that shown by Irrelevant Cue subjects. As was noted in Figure 1 and Table 2, however, the results were statistically significant only for boys, with girls showing only minimal effects of the treatments. Thus, at least one qualification of the generality of the outerdirectedness hypothesis, as applied to retarded children in general, must be entered here. That is, mentally retarded girls apparently are not as outerdirected as mentally retarded boys. Indeed, one could say from the presently obtained results that they are not outerdirected at all. But the lack of any significant sex differences in previous research on outerdirectedness in the retarded cautions that the results for the girls obtained herein may be situation specific in some way.

One factor previously unexamined in research on inner- and outerdirectedness, but known to be of substantial importance in determining certain aspects of interpersonal interactions of retarded children and normal adults, is the role of social deprivation (Gewirtz & Baer, 1958; Zigler, 1962). Although not systematically monitored in any way, the experimenter's subjective impression of certain differences in the general behavior of the male and female subjects seems interpretable in terms of social deprivation theory, and may be of some value, at least for the purposes of guiding future investigations into the basis of the Condition x Sex interaction obtained in the learning data. The experimenter noted that whenever he would enter a classroom to obtain a particular subject, all the children appeared very eager to go with him and participate in the "game," a very common general reaction. However, on the way to the experimental situation, the boys almost always showed an extreme and active interest in the experimenter, who was an adult male (the writer), initiating conversations and otherwise contributing to a lively interaction, while girls were much more sedate, and even withdrawn, or shy, during this period. The effects of this difference in pre-experimental interaction tendencies may well have carried over into the experimental situation. The suggestion of these observations that emotional dependency may interact with instrumental dependency (cf. Ross, 1966) in certain situations would have implications for predictions concerning behavior based on outerdirectedness, which has been considered primarily as a form of instrumental dependency in the past (cf, Achenbach & Zigler, 1968; Sanders, Zigler & Butterfield, 1968; Turnure & Zigler, 1964). The role of social deprivation referred to above, would emerge when one considers that all of the teachers in the six special classes from which the present samples of children were drawn, were women. Thus, we may see the need for a Sex of S x Sex of E x Sex of T (teacher) study to help unravel some of the complexities that reflect the reality of how mentally retarded children may best acquire knowledge from adults.

An unexpected result that slightly complicates interpretations of the relative performance of the girls and boys was the significantly superior performance of girls compared to boys in the Not In condition. That condition was, of course, the baseline control for children's learning of the task, uninfluenced by the presence and actions of an adult authority figure. No obvious explanation for this finding appears to be available; the closeness of the match of IQ, MA and CA appears to rule out these variables. If one accepts the performance of the girls in this, and the other two conditions, as the more reliable estimate of untreated performance capability in the population studied, then it is only the poor performance of the boys in the Not In condition which must be accounted for in this case. While possible farfetched, it is possible to build speculation on the observations, recounted above, of the intense motivation of the boys to interact with E. Given this, it is possible to conjecture that the boys were disappointed or depressed when E withdrew in the Not In condition, and that this emotional reaction interfered with their performing up to capability.

The poor performance of the boys in the Not In group also contributed to the failure to find any significant result of the Irrelevant Cue condition. Although subjects in the Irrelevant Cue condition performed slightly poorer than Not In subjects (and this again was more the case for boys), the differences were minimal and insignificant. However, it should be made clear that the treatment constituting the Irrelevant Cue condition is a very weak one, amounting only to having an experimenter remain in the immediate situation and move around a little, primarily as a control for the movement required to implement the Relevant Cue condition. Certainly a greater influence on the learning scores would have been observed (given the validity of the outerdirectedness hypothesis, as confirmed for the boys in the Relevant Cue condition), if the experimenter had been giving misleading cues, i.e., if he had been orienting to the negative stimulus. However, since it is entirely possible to test the outer-directedness hypothesis by the use of only neutral and positive conditions, subjecting retarded children to the negative cue condition and its inherent failure experience appears neither necessary nor desirable.

A condition such as the Irrelevant Cue one would be expected to significantly impair the performance of retarded children only if they were easily distracted by the irrelevant behavior of others. The fact that subjects in the Irrelevant Cue condition performed no poorer than subjects in the Not In condition suggests that these retarded children were not grossly distractible, a suggestion that is further borne out by recalling that no group of subjects spent more than six percent of the time available glancing away from the task (see also Turnure, 1970c). Of course, subjects in the Irrelevant Cue condition did glance away slightly more than Not In subjects, but this glancing did not greatly impair learning performance. It appeared that these subjects took advantage of post-response and inter-trial intervals to look at the experimenter, a reasonable strategy, similar to that noted by Cruse (1961) in his study of retardates' distractibility.

Results from the glancing data confirmed the hypothesis that the subjects would, in general, show greater non-task orienting in the presence of the experimenter than in his absence. However, as discussed above, this non-task orienting should not be considered as evidence of distractibility in mentally retarded children, but rather as an information seeking strategy, or, in the case of subjects in the Irrelevant Cue condition, as a different sort of indication that these children can plan and control their orienting, i.e., attentive behavior, when so inclined.

Response latency data were analyzed for the first time in these studies with the retarded. A gratifying similarity in the results of these analyses and those from data employing normal (Turnure, 1970c) and highly competent young children (Turnure, 1971) was obtained. These mentally retarded subjects showed an acceleration in response latencies subsequent to reaching criterion (referring only to subjects who achieved this level of task mastery, of course), relative to their pre-criterion latencies, with their pre-criterion latencies also being significantly longer than those of subjects not reaching criterion. These findings are identical to those found with normal subjects (Turnure, in preparation). A set of strong and highly significant positive correlations of response latency with learning was found for subjects in the two experimental (cue) conditions, but not for controls, which is a pattern of results also obtained, in general, with normal subjects in comparable "distracting" experimental and "minimally distracting" control conditions (Turnure, in preparation).

The reversal task, added at the end of the 60 original learning trials, showed that girls were not as detrimentally effected by this change in task requirements as were the boys, although boys in the Relevant Cue condition still performed better than boys in the other two conditions, just as during original learning. The glancing data again showed more glancing in the two experimenter-in conditions, and correlational analyses of the relation between glancing and learning disclosed some interesting and informative findings. Most notable of these were the significant overall correlations found in the two cue conditions, where the experimenter was accessible to the subjects. What was most striking about these correlations, aside from their magnitude, was the difference in direction observed, with Relevant Cue subjects showing higher learning scores associated with greater glancing, and Irrelevant Cue subjects showing the opposite result. This correlational pattern is exactly what one would expect if subjects truly were relying on information being provided from an external agent, but with only one group having it provided to them.

Acquisition phase findings add considerable breadth to the significant results found in the Reversal phase of the present study, testifying to the usefulness of the reversal manipulation. It is worth noting here that in the only other study providing exact data on the relationship of glancing and learning, where in at least one condition, positive information was being provided (Turnure, 1970c), the same pattern of negative correlation in the Irrelevant Cue condition and positive correlation in the Relevant Cue condition was found. These correlations, which had not been previously reported due to their lack of statistical significance, were: Relevant Cue $\underline{r} = .34$, $\underline{df} = 7$, n.s.; Irrelevant Cue $\underline{r} = -.10$, $\underline{df} = 6$, n.s. These findings are similar to those from the main portion of this study (i.e., the correlational results on p. 11). It is important to note, at this point, that the correlational results reported there demonstrated the pattern of negative correlation in the Irrelevant Cue condition and positive correlation in the Relevant Cue condition only following the elimination of those subjects who showed no glancing behavior. The fact that these subjects were not distractible and should be considered as innerdirected reminds us that retardates constitute a heterogeneous group of individuals. The outerdirectedness hypothesis must be considered as referring only to general tendencies, in boys as well as in girls.

The success of the reversal manipulation suggests, on a more general level, that procedures based on a strategy of surprise (such as the appearance of the red background in the present reversal task) may be necessary to most directly disclose the outerdirected propensities of educable mentally retarded children in the schools. This seems to be the case because of a countervailing tendency among these children to hold themselves oriented to their assigned task so as to avoid punishing remarks presumably directed at them by teachers when they glance around in the classroom during task assignments. The perplexing and unfortunate dilemma facing the retarded child in the classroom under the prevailing conditions has been previously discussed (Turnure, 1970b).

References

Achenbach, T., & Zigler, E. Cue learning and problem-learning strategies in normal and retarded children. Child Development, 1968, 39, 827-847.

Cruse, D. B. Effects of distractions upon the performance of brain-injured and familial retarded children. American Journal of Mental Deficiency, 1961, 66, 86-92.

Ellis, N. R., Hawkins, W. F., Pryer, M. W. & Jones, R. W. Distraction effects in oddity learning by normal and mentally defective humans. American Journal of Mental Deficiency, 1963, 67, 576-583.

Gewirtz, J. L., & Baer, D. M. The effect of brief social deprivation on behaviors for a social reinforcer. Journal of Abnormal and Social Psychology, 1958, 56, 49-56.

Levin, G. R., & Maurer, D. M. The solution process in children's matching to sample. Developmental Psychology, 1969, 1, 679-690.

Moon, L. E., & Harlow, H. F. Analysis of oddity learning by Rhesus monkeys. Journal of Comparative and Physiological Psychology, 1955, 48, 188-194.

Ribot, T. The psychology of attention. London: Kegan Paul, 1890.

Ross, D. M. The relationship between dependency, intentional learning, and incidental learning in preschool children. Journal of Personality and Social Psychology, 1966, 4, 374-381.

Sanders, B., Zigler, E., & Butterfield, E. C. Outerdirectedness in the discrimination learning of normal and mentally retarded children. Journal of Abnormal Psychology, 1968, 73, 368-375.

Turnure, J. E. Children's reactions to distractions: A developmental approach. (Doctoral dissertation, Yale University) Ann Arbor, Mich.: University Microfilms, 1966, No. 66-4940.

Turnure, J. E. Children's reactions to distractors in a learning situation. Developmental Psychology, 1970, 2, 115-122. (a)

Turnure, J. E. Distractibility in the mentally retarded: Negative evidence for an orienting inadequacy. Exceptional Children, 1970, 37, 181-186. (b)

Turnure, J. E. Reactions to physical and social distractors by moderately retarded institutionalized children. Journal of Special Education, 1970, 4, 283-294. (c)

Turnure, J. E. Control of orienting behavior in children under five years of age. Developmental Psychology, 1971, 4, 16-24.

Turnure, J. E. Interrelations of orienting responses, response latency and learning. 1971, in preparation.

Turnure, J. E., & Zigler, E. Outer-directedness in the problem-solving of normal and retarded children. Journal of Abnormal and Social Psychology, 1964, 69, 427-436.

White, S. H., & Plum, G. E. Eye movement photography during children's discrimination learning. Journal of Experimental Child Psychology, 1964, 1, 327-338.

Zigler, E. Research on personality structure in the retardate. In N. R. Ellis (Ed.), International review of research in mental retardation. Vol. 1. New York: Academic Press, 1966.

Footnote

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