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Deviant Response Patterns as a Function of Chronological Age.

Sidney Otho Hesterly

Louisiana State University and Agricultural & Mechanical College

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PATTERNS AS A FUNCTION OF CHRONOLOG-
ICAL AGE.

Louisiana State University, Ph.D., 1960
Psychology, clinical

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**DEVIANT RESPONSE PATTERNS AS A FUNCTION OF
CHRONOLOGICAL AGE**

A Dissertation

**Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy**

in

The Department of Psychology

by

**Sidney Otho Hesterly
B.S., Henderson State Teachers College, 1955
M.A., Louisiana State University, 1957
August, 1960**

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ABSTRACT

This study was undertaken to test two hypotheses: (1) that the response patterns of normal children on the Perceptual Reaction Test (PRT) vary with age and reflect the children's maturity level, as defined by chronological age, making possible the development of age scales based on group tendencies, and (2) that the response patterns of normal adults on the PRT vary with age, when older age groups are considered, and reflect decreases in scores on the age scales as they approach senility. These anticipated findings are predictions based upon Berg's Deviation Hypothesis. Age scales based upon PRT deviant responses were developed, for males and females separately by comparing the response patterns of 500 normal six-year-old children with those of 850 normal adults by means of a cross-validation technique described by Katzell. In addition, 500 older children, aged seven through 16 years; 203 normal adults, aged 20 through 59 years; and 200 elderly adults, aged 60 through 83 years were used as subjects in testing the second hypothesis of this study and in the development of test norms in terms of T-scale values. Nonparametric median tests were used to determine the statistical significance of the group differences.

The resulting statistical values indicated that the PRT age scale scores of normal children increased with age

(p less than .001), and that children and elderly adults, treated separately, obtained significantly lower scores than normal adults, aged 20 through 59 years (p less than .001 in each case). Elderly adults obtained PRT age scale scores most nearly approximating those of children, aged nine through ten years, suggesting some common critical behavioral similarities between the two groups.

INTRODUCTION

For many years it has been known that human behavior rarely obeys the laws of probability. This is especially true when individuals are placed in situations where a correct response is not apparent. Instead of responding in a random manner, they tend to choose certain responses significantly more often than others, so that biases occur. For example, when a coin is flipped, 80 percent of the subjects will call "heads" and 20 percent, "tails," on the first toss instead of the 50 percent expected by chance (Goodfellow, 1940). Biases such as this often occur in the responses of subjects who are administered multiple-choice tests. Cronbach (1946, 1950) identified a number of these biases and used the term "response sets" in describing them.

Following evidence that such sets or biases might reflect personality traits (Lorge, 1937; Voth, 1947; Wallen, 1945), Berg and Hunt (1949) developed a test which was specifically designed to elicit response sets. This test, the Perceptual Reaction Test, hereafter called the PRT, consists of 60 abstract designs drawn with ruler and compass. The subject is required to mark one of the following options for each design: like much (LM), like slightly (LS), dislike slightly (DS), or dislike much (DM). Of course, the subject can make no response (NR), although this is contrary

to the test instructions. Thus, 300 responses to the 60 stimulus patterns are possible. Using the response biases which appear when the PRT is administered to different groups of subjects, Berg (1955, 1957) investigated personality differences, but with only limited success when the bias itself was used as a measure. However, when he shifted his attention to those responses which departed from the typical bias patterns, i.e., the uncommon or atypical responses, results were more promising (1957). These departures, which Berg called "deviant responses," were used by Barnes (1955) to construct a series of clinical scales. More intensive accounts of this problem and its development have been given by Berg (1955, 1957). In the latter publication he stated the Deviation Hypothesis as follows:

"Deviant response patterns tend to be general; hence those deviant behavior patterns which are significant for abnormality (atypicalness) and thus regarded as symptoms (earmarks or signs) are associated with other deviant response patterns which are in noncritical areas of behavior and which are not regarded as symptoms of personality aberration (nor as symptoms, signs, earmarks)" (Berg, 1957, p. 159).

A series of further investigations (Adams, 1959; Barnes, 1956; Bass, 1955; Berg and Collier, 1953; Berg and Rapaport, 1954; Chapman and Campbell, 1957; Grigg and Thorpe, 1960; Harris, 1958; Hesterly and Berg, 1958; Rapaport and Berg,

1955; Roitzsch, 1959) were stimulated by the early studies. The Hesterly and Berg (1958) study provided the suggestion for the present research. This investigation compared the response patterns of normal children to the PRT with those of normal adults and schizophrenic adults in order to test the hypothesis that children's response patterns would differ significantly from those of normal adults in such a way as to approximate the deviant patterns which Barnes (1955) had found with schizophrenic adults. The results supported this hypothesis. There was clearly a significant tendency for scores on Barnes' schizophrenia scale to decrease with age, so that older children tended to score more like normal adults. Younger children, by contrast, responded like adult schizophrenics, suggesting that a characteristic like immaturity may have been shared by both groups. In addition, the standard deviations in schizophrenia scores among children and schizophrenic adults were almost twice as large as those of normal adults indicating less consistency in the response patterns of the former. Finally, children and schizophrenic adults characteristically chose the like much option for many (35 to 56 percent) of their responses, while normal adults seldom exhibited this tendency. Thus, as they grow older, normal children tend to alter their patterns of response to the PRT designs. They make fewer deviant responses, become more consistent in their response patterns, and make fewer like much responses to the PRT

designs. They respond more like normal adults with increasing age.

The present study represents an attempt at using these changes with age in the response patterns of normal children as a measure of maturity as defined by chronological age. The Deviation Hypothesis (Berg, 1957) suggests that the various "critical" behavior patterns which are associated with the physical and psychological changes which occur as children grow to maturity, should be reflected in "non-critical" response patterns on the PRT, which change with increasing age. Specifically, an attempt was made to develop age scales for the PRT, using the normal adult data employed by Barnes (1955) as a criterion measure. Further, the possibility that normal adults, as they approach senility, again manifest deviant patterns on the PRT, similar to those of children, was also investigated. Accordingly, hypotheses of the present study were two:

1. the response patterns of normal children on the PRT will vary with age in such a way as to reflect maturity level as defined by chronological age, making possible the development of age scales based on group tendencies;

2. the response patterns of normal adults on the PRT will vary with age, when older age groups are considered, in such a way as to reflect decreases in scores on the age scales as they approach senility.

In short, a systematic development and decline in patterns of response on the PRT was hypothesized for children and aged persons. Normal children and elderly adults would be expected to manifest similar patterns of deviant responses to the PRT. This represents a test of the Deviation Hypothesis (Berg, 1957). The behaviors shared by normal children and elderly adults may be regarded as critically different from normal adults, ages 20 through 59 years. Such critical differences should be reflected in noncritical areas of behavior as PRT option selections.

METHOD

Subjects

A total of 2,253 subjects were used in the present study. Five hundred school children (divided equally by sex) from the Public and Parochial Schools of two Louisiana parishes, ages 6-0 through 6-11 served as subjects in the construction of the PRT age scales, with 850 normal adults (500 males; 350 females) from Barnes (1955) constituting the normal adult sample.

Five-hundred Public School children, from four Louisiana parishes, divided equally by age and sex, were used in developing norms for older children and in testing the validity of the PRT age scales at each of the following age levels: 7-0 through 8-11; 9-0 through 10-11; 11-0 through 12-11; 13-0 through 14-11; 15-0 through 16-11.

Two hundred three normal adults (105 males; 98 females) drawn from Berg's file of PRT records served as a sample of normal adults, ages 20 through 59 years. This sample included policemen, school teachers, housewives, adults in evening college classes, and the like. Two hundred elderly adults (50 males; 150 females) ranging in age from 60 to 83 years, formed the sample used in testing the second hypothesis of this study and in developing norms for elderly people. These subjects were all members of the Golden Agers

Organization of Orleans Parish, Louisiana and included individuals from various socio-economic backgrounds.

Procedure

The PRT was administered to the subjects in groups of 12 to 70. Standard instructions were used with adults; however, these instructions were modified somewhat, as in a previous study (Hesterly and Berg, 1958), for children, to insure their understanding the nature of the task required of them. The responses for each subject were transferred to the IBM answer sheets for tabulation and scoring. For each option, the percentage of the criterion (or normal adult) group was compared with the percentage of the experimental (or normal six-year-old) group and tested for statistical significance by use of a contingency table (Mainland and Murray, 1952). Age scales for males and females, taken separately, were then constructed by a cross-validation technique proposed by Katzell (1951). In this technique, the samples are divided into random halves with independent statistical analyses performed on each half and the resulting scales validated on the remaining half. Only those options which differentiated the groups beyond the .05 level of confidence on both scales were included in the final scales. Thus, the combined probabilities would yield a probability value of less than .0025. Each option preferred by normal adults was given a weight of one; each option

preferred by normal six-year-old children was given a weight of minus one. Each subject's PRT age scale score was computed by algebraic summation of the weights for the options he chose. Measures of central tendency, variability, and reliability were then computed for the various age groups. The variances for the groups appeared to be rather heterogeneous; therefore Bartlett's test for homogeneity of variance was applied to the five age groups of children and Fisher's test for homogeneity of variance between two groups was applied to children vs. adults, children vs. elderly adults, and adults vs. elderly adults. Since all of these tests yielded probabilities of less than .05, nonparametric techniques were used to compare the group PRT age scale scores. Specifically, the nonparametric median test was deemed appropriate for data of the type obtained, as this test is not dependent upon homogeneity of variance. The hypothesis tested is that the groups compared are random samples from a population with a common median. Finally, norms in the form of T-scale scores were computed and organized in tabular form for each age group.

RESULTS AND DISCUSSION

The results of the present investigation indicate that the response patterns of normal children on the PRT vary with age in such a way as to reflect maturity level as defined by chronological age, making possible the development of age scales based on group tendencies. Further, the results indicate that the response patterns of normal adults, aged 60 through 83, on the PRT vary with age in such a way as to reflect decreases in scores on the age scales as they approach senility. Thus it appears that there are systematic changes in the differential response pattern biases of normal individuals as they grow from childhood to adulthood. These patterns are relatively stable from age 20 to 59; however, additional changes tend to occur in later adulthood so that the differential response pattern biases of elderly adults resemble those of normal children, insofar as the evidence of the present study indicates. These findings support the hypotheses stated in the Introduction.

Table 1 shows the Male PRT age scale developed in this study, by the Katzell (1951) technique. Of 300 responses, 176 were found to differentiate normal six-year-old males from normal adult males beyond the .0025 level of confidence. Sixty-four of these were each given a weight of minus one, since they were preferred by six-year-olds, and 112 were

TABLE 1

The Male PRT Age Scale*

<u>Item No.</u>	<u>Options Keyed Plus</u>					<u>Options Keyed Minus</u>				
	<u>LM</u>	<u>LS</u>	<u>DS</u>	<u>DM</u>	<u>NR</u>	<u>LM</u>	<u>LS</u>	<u>DS</u>	<u>DM</u>	<u>NR</u>
1.		***	***			***				
2.			***			***				
3.		***	**			***				
4.		***	***			***				
5.		***	***			***				
6.		***	***			***				
7.			***	**		***				
8.		***	***			***				
9.		***	***			***			***	
10.		***	***			***				
11.		***	*			***				
12.			**	***		***				
13.			***			***				
14.		**				***				
15.			***	***		***				
16.		***	***			***			**	
17.		***	***			***				
18.		***	***			***				
19.		***	***			***				
20.		***	***			***				

TABLE 1 Cont'd.

<u>Item No.</u>	<u>Options Keyed Plus</u>					<u>Options Keyed Minus</u>				
	<u>LM</u>	<u>LS</u>	<u>DS</u>	<u>DM</u>	<u>NR</u>	<u>LM</u>	<u>LS</u>	<u>DS</u>	<u>DM</u>	<u>NR</u>
21.			***			***				
22.		***	***			***				
23.		***								
24.		***	***			***				
25.		***	**			***				
26.		***	**			***				**
27.		*	***			***				
28.		***								
29.		***	**			***				
30.		***	***			***				
31.			***			***				
32.		***	***			***				
33.		***	***			***				
34.		***	***			***				
35.		***	***			***				
36.		***	***			***				
37.		***	***			***				
38.		**	***			***				
39.		***	***			***				
40.			***	**		***				

TABLE 1 Cont'd.

Item No.	Options Keyed Plus					Options Keyed Minus				
	<u>LM</u>	<u>LS</u>	<u>DS</u>	<u>DM</u>	<u>NR</u>	<u>LM</u>	<u>LS</u>	<u>DS</u>	<u>DM</u>	<u>NR</u>
41.		***	***	***		***				
42.			***	***		***				
43.			***			***				
44.		*	***			***				*
45.		***	***	*		***				
46.			***			***				
47.		***	***			***				
48.		***	***			***				
49.		***	***			***				
50.		***	**			***				
51.		***				***				
52.		*	***			***				*
53.		***	***	***		***				
54.		***	***			***				
55.			***	*		***				
56.			***	***		***				**
57.		***				***				
58.		***	***			***				
59.		***	***			***				
60.		***	***			***				

*Asterisks in Table 1 denote levels of confidence as follows:

 *significant beyond .0025

 **significant beyond .0005

 ***significant beyond .0001

preferred by normal adults and thus, each was given a weight of plus one. Thirty-seven other options, which differentiated beyond the .05 level of confidence on only one random-half scale, were eliminated in the cross-validation.

Similarly, as shown in Table 2, the Female PRT age scale is composed of 135 options. A weight of minus one was assigned to the 55 of these which were preferred by six-year-old females, and a weight of plus one was assigned to the 80 options preferred by adult females. Forty-three other options were eliminated in the cross-validation.

A summary of measures of central tendency, variability, and reliability for the various age groups on the PRT age scales is presented in Table 3. It should be noted that although the variability within the various age groups is rather large, the reliabilities are such, that the standard errors of estimate are rather small.

Figure 1 presents the means and standard deviations for the different age groups in graphic form. Inspection of this figure suggested that the variances among the different age groups of children, ages 7-0 through 16-11, might be heterogeneous. Accordingly, Bartlett's test for homogeneity of variance was applied, and the results of this test are shown in Table 4.

Since the results of the Bartlett's test were statistically significant, the nonparametric median test was used to

TABLE 2

The Female PRT Age Scale*

Item No.	<u>Options Keyed Plus</u>					<u>Options Keyed Minus</u>				
	<u>LM</u>	<u>LS</u>	<u>DS</u>	<u>DM</u>	<u>NR</u>	<u>LM</u>	<u>LS</u>	<u>DS</u>	<u>DM</u>	<u>NR</u>
1.		***	***			***				
2.			***			***				
3.		***							**	
4.		***	***			***				
5.										
6.		***								
7.		*	***			***				
8.						***				
9.		***							***	
10.			***			***				
11.		***				***				
12.						***				
13.			***			***				
14.										
15.			***	***		***				
16.		***							***	
17.			***			***				
18.		**	***			***				
19.		**				***				
20.		***								

TABLE 2 Cont'd.

<u>Item No.</u>	<u>Options Keyed Plus</u>					<u>Options Keyed Minus</u>				
	<u>LM</u>	<u>LS</u>	<u>DS</u>	<u>DM</u>	<u>NR</u>	<u>LM</u>	<u>LS</u>	<u>DS</u>	<u>DM</u>	<u>NR</u>
21.			***			***				
22.		***	***			***				
23.		***								
24.		**								
25.		***				***				
26.		***								
27.			***			***				
28.		***	**			***				
29.		***	***			***				
30.			***			***				
31.			***			***				
32.			***			***				
33.		***	***			***				
34.		***				***				
35.		**	***			***				
36.		***	***			***				
37.		***	***			***				
38.			**			**				
39.		*	***	***		***				
40.			***	***		***				

TABLE 2 Cont'd.

Item No.	<u>Options Keyed Plus</u>					<u>Options Keyed Minus</u>				
	<u>LM</u>	<u>LS</u>	<u>DS</u>	<u>DM</u>	<u>NR</u>	<u>LM</u>	<u>LS</u>	<u>DS</u>	<u>DM</u>	<u>NR</u>
41.			***			***				
42.			***	**		***				*
43.			***			***				
44.		*	***			***				
45.		*	***	***		***				
46.			***			***				
47.			***			***				*
48.		***	***			***				
49.		***	***			***				
50.									*	
51.		***	***			***				
52.		**	***			***				
53.			***	**		***				
54.			***			***				
55.			***	***		***				
56.			***	**		***				*
57.										
58.		***	***			***				
59.						***				
60.			***			***				

* Asterisks in Table 2 denote levels of confidence as follows:
 *significant beyond .0025
 **significant beyond .0005
 ***significant beyond .0001

TABLE 3

Summary of Measures of Central Tendency, Reliability, and Variability
of PRT Age Scores by Age Groupings

<u>Age Group</u>	<u>Males</u>					<u>Females</u>				
	<u>Median</u>	<u>Mean</u>	<u>S.D.</u>	<u>r_{tt}</u>	<u>S.E._{est}</u>	<u>Median</u>	<u>Mean</u>	<u>S.D.</u>	<u>r_{tt}</u>	<u>S.E._{est}</u>
6 - 6-11	-19.3	-21.0	23.80	.97	4.04	-15.4	-15.6	18.30	.96	3.66
7 - 8-11	- 8.0	-12.5	30.64	.98	4.29	- 7.6	-10.3	19.52	.98	2.76
9 -10-11	+ 4.0	- 0.3	23.39	.95	5.23	+ 1.6	+ 0.4	16.45	.99	1.64
11 -12-11	+ 7.5	+ 5.5	13.09	.99	1.31	+ 3.6	+ 5.3	15.68	.99	1.57
13 -14-11	+11.6	+13.9	18.55	.99	1.86	+10.5	+11.0	15.71	.98	2.22
15 -16-11	+22.7	+23.1	16.85	.97	2.92	+17.4	+18.2	10.68	.90	3.37
7 -16-11	+ 7.9	+ 5.9	23.96	.99	2.40	+ 5.7	+ 5.6	18.02	.99	1.80
20 -59	+34.2	+29.1	15.29	.95	3.42	+24.4	+22.4	12.86	.93	3.40
60 -83	+ 4.5	+ 2.1	27.15	.99	2.72	- 0.9	- 4.1	19.93	.91	6.00

Fig. 1. Mean and S.D. of PRT Age Scores as a Function of Chronological Age

TABLE 4

Bartlett's Test for Homogeneity of Variance of PRT
Age Scale Scores Among Male and Female Children

<u>Groups</u>	<u>Corrected Chi Square</u>	<u>df</u>	<u>p</u>
Males Ages:			
7-0 to 8-11			
9-0 to 10-11			
11-0 to 12-11	40.866	4	.001
13-0 to 14-11			
15-0 to 16-11			
Females Ages:			
7-0 to 8-11			
9-0 to 10-11			
11-0 to 12-11	16.837	4	.01
13-0 to 14-11			
15-0 to 16-11			

test the significance of the age trends in children. The results are presented in Table 5. From this analysis, it can be inferred that a statistically significant increase in PRT age scale score occurs among normal children, ages 7-0 through 16-11. With increasing age, these age scale scores increasingly resemble those of normal adults, ages 20 through 59. This suggests that the scales would be correlated with a number of critical behavioral changes which occur during the process of growing to adulthood, e.g., those response modifications which are related to physical and intellectual maturation.

Inspection of Table 3 suggested that the variances for the different age groups (7-0 through 16-11; 20 through 59; 60 through 83) might be heterogeneous. Thus, Fisher's test for homogeneity of variance between two groups was applied to each pair of age groups. The results of these tests are shown in Table 6.

Since all of the tests for homogeneity resulted in F-values with probabilities of less than .05, a number of nonparametric median tests were performed. The results are presented in Table 7. It will be observed that the PRT age scales significantly differentiated children, aged 7-0 through 16-11, from normal adults, aged 20 through 59. Further, the female PRT age scale significantly differentiated children from elderly adults, with the latter obtaining a significantly lower median score. The male PRT age

TABLE 5

Nonparametric Median Test for PRT Age Score Differences
Between Age Groups of Children

<u>Groups</u>	<u>Below median</u>	<u>Above median</u>	<u>Sub-group median</u>	<u>Group median</u>	<u>Chi Square</u>	<u>df</u>	<u>p</u>
Males Ages:							
7-0 to 8-11	38	12	-8.0				
9-0 to 10-11	28	22	+4.0				
11-0 to 12-11	25	25	+7.5	+7.9	43.63	4	.001
13-0 to 14-11	18	32	+11.6				
15-0 to 16-11	7	43	+22.7				
Females Ages:							
7-0 to 8-11	38	12	-7.6				
9-0 to 10-11	32	18	+1.6				
11-0 to 12-11	22	22	+3.6	+5.7	227.85	4	.001
13-0 to 14-11	21	29	+10.5				
15-0 to 16-11	5	45	+17.4				

TABLE 6

Fisher's Test for Homogeneity of Variance Between
Two Groups Applied to Paired Age Groups

<u>Age Groups</u>	<u>F</u>	<u>df</u>	<u>P</u>
Males:			
7 - 16-11 vs. 20 - 59	1.923	249 104	.02
7 - 16-11 vs. 60 - 83	1.493	49 249	.05
20 - 59 vs. 60 - 83	2.814	49 104	.02
Females:			
7 - 16-11 vs. 20 - 59	1.496	249 97	.05
7 - 16-11 vs. 60 - 83	1.588	149 249	.02
20 - 59 vs. 60 - 83	2.376	149 97	.02

TABLE 7

Nonparametric Median Test for PRT Age Score Differences Between Paired Age Groups

<u>Groups</u>	<u>Below median</u>	<u>Above median</u>	<u>Sub-group median</u>	<u>Group median</u>	<u>Chi Square</u>	<u>df</u>	<u>p</u>
Males Ages:							
7-0 to 16-11	165	85	+7.9	+15.40	78.95	1	.001
20 to 59	15	90	+34.2				
7-0 to 16-11	121	129	+7.9	+7.10	2.21	1	.05
60 to 83	30	20	+4.5				
20 to 59	36	69	+34.2	+27.50	25.89	1	.001
60 to 83	39	11	+4.5				
Females Ages:							
7-0 to 16-11	150	100	+5.7	+11.98	42.92	1	.001
20 to 59	21	77	+24.4				
7-0 to 16-11	108	142	+5.7	+3.50	9.76	1	.01
60 to 83	89	61	-0.9				
20 to 59	15	83	+24.4	+9.00	83.62	1	.001
60 to 83	112	38	-0.9				

scale did not significantly differentiate children from elderly adults; however, the median for elderly adults was somewhat below that for children. Inspection of the means and medians for the different age groups, reveals that the elderly adults in the present study responded to the PRT in a manner similar to that of children, aged 9-0 through 10-11. The Deviation Hypothesis (Berg, 1957) would lead us to infer from these results that elderly adults and children, aged 9-0 through 10-11, share common behavior patterns in a critical area.

Table 7 also indicates that the normal adults used for the present investigation differed significantly from elderly adults in their scores on the PRT age scales, with the latter obtaining a significantly lower median score. From this it may be inferred that a decline in PRT age scale scores exists which is associated with the critical behavioral changes occurring during later adulthood, e.g., those response modifications related to physical and intellectual decline. A more intensive account of the growth and decline in various critical areas during the life span is presented in the Appendix.

The results of the present study, when compared with those of previous investigations (Barnes, 1955; Harris, 1958; Hesterly and Berg, 1958), indicate that normal children, elderly adults, and adult schizophrenic patients

respond to the PRT in very similar ways. In addition, all three groups differ significantly from normal adults, aged 20 through 59. This suggests that some common critical behaviors are shared by these groups.

Norms in the form of T-scale scores were computed and organized in tabular form for various age groups. The norms for males are presented in Table 8. Similarly, Table 9 presents the norms for females. It should be noted, that since the PRT age scales were based upon differences between the response patterns of six-year-old children and adults, aged 20 through 59, the raw score distributions for these age groups tended to be skewed. With six-year-old children, the distributions are positively skewed. This tends to limit the usefulness of the scales as measures of immaturity in six-year-old children since the lowest possible T-scores are within one or two standard deviations of the means. In the case of adults, aged 20 through 59, the distributions are negatively skewed, with the highest possible T-scores falling within three standard deviations of the means. Thus, the scales would be of limited value in attempting to differentiate any sort of "superior" maturity in adult subjects.

TABLE 8

T-Scale Conversions for Male PRT Age Scores

<u>T</u> <u>Score</u>	<u>Inclusive Age Groups</u>			<u>T</u> <u>Score</u>	<u>Inclusive Age Groups</u>		
	<u>6</u>	<u>7-16</u>	<u>20-59</u>		<u>6</u>	<u>7-16</u>	<u>20-59</u>
82	54-60			61	5-6	31-32	46
81	50-53			60	3-4	28-30	45
80	46-49			59	1-2	26-27	44
79	43-45	60		58	-1-0	24-25	43
78	40-42	58-59		57	-3 - -2	22-23	42
77	38-39	57		56	-5 - -4	20-21	41
76	35-37	56		55	-8 - -6	18-19	40
75	30-34	54-55	60	54	-11 -9	16-17	39
74	28-29	53	59	53	-14 -12	14-15	38
73	26-27	51-52	58	52	-16 -15	12-13	36-37
72	25	49-50	57	51	-18 -17	10-11	35
71	24	48	56	50	-21 -19	8-9	34
70	22-23	46-47	55	49	-24 -22	6-7	33
69	20-21	45	54	48	-27 -25	4-5	31-32
68	18-19	43-44	53	47	-30 -28	2-3	30
67	16-17	42	52	46	-33 -31	0-1	28-29
66	15	40-41	51	45	-36 -34	-2 -1	27
65	13-14	39	50	44	-43 -37	-5 -3	25-26
64	11-12	37-38	49	43	-48 -44	-7 -6	23-24
63	9-10	35-36	48	42	-52 -49	-10 -8	21-22

TABLE 8 Cont'd.

<u>T</u> <u>Score</u>	<u>Inclusive Age Groups</u>			<u>T</u> <u>Score</u>	<u>Inclusive Age Groups</u>		
	<u>6</u>	<u>7-16</u>	<u>20-59</u>		<u>6</u>	<u>7-16</u>	<u>20-59</u>
62	7-8	33-34	47	41	-58 -51	-13 -11	19-20
40		-16 -14	17-18	29		-57 -56	-11 -9
39		-20 -17	15-16	28		-58	-14 -12
38		-23 -21	13-14	27			-18 -15
37		-27 -24	11-12	26			-21 -19
36		-31 -28	9-10	25			-24 -22
35		-38 -32	6-8	24			-28 -25
34		-43 -39	4-5	23			-31 -29
33		-49 -44	1-3	22			-36 -32
32		-51 -50	-2-0	21			-41 -37
31		-53 -52	-5 -3	20			-48 -42
30		-55 -54	-8 -6	19			-58 -49

TABLE 9

T-Scale Conversions for Female PRT Age Scores

<u>T</u> <u>Score</u>	<u>Inclusive Age Groups</u>			<u>T</u> <u>Score</u>	<u>Inclusive Age Groups</u>		
	<u>6</u>	<u>7-16</u>	<u>20-59</u>		<u>6</u>	<u>7-16</u>	<u>20-59</u>
88		53		67	13	33	42
87		52		66	12	31-32	41
86		51		65	11	30	40
85	50-53	50		64	10	29	39
84	45-49	49		63	8-9	28	38
83	41-44	-		62	7	26-27	37
82	38-40	48		61	6	25	36
81	35-37	47		60	4-5	23-24	35
80	32-34	46		59	3	22	34
79	30-31	45	53	58	1-2	20-21	32-33
78	28-29	44	-	57	0	19	31
77	26-27	43	52	56	-2 -1	17-18	30
76	24-25	42	51	55	-4 -3	16	29
75	22-23	41	50	54	-5	14-15	28
74	21	40	49	53	-7 -6	13	27
73	20	39	48	52	-9 -8	11-12	26
72	19	38	47	51	-12 -10	9-10	24-25
71	17-18	37	46	50	-14 -13	8	23
70	16	36	45	49	-16 -15	6-7	22
69	15	35	44	48	-19 -17	4-5	20-21
68	14	34	43	47	-21 -20	3	19

TABLE 9 Cont'd.

<u>T</u> <u>Score</u>	<u>Inclusive Age Groups</u>				<u>T</u> <u>Score</u>	<u>Inclusive Age Groups</u>			
	<u>6</u>	<u>7-16</u>	<u>20-59</u>			<u>6</u>	<u>7-16</u>	<u>20-59</u>	
46	-23	-22	1-2	18	33	-52	-35 -30	-2 -1	
45	-26	-24	-1-0	16-17	32		-39 -36	-3	
44	-28	-27	-3 -2	15	31		-41 -40	-5 -4	
43	-31	-29	-5 -4	13-14	30		-43 -42	-7 -6	
42	-33	-32	-7 -6	12	29		-44	-10 -8	
41	-36	-34	-9 -8	11	28		-46 -45	-12 -11	
40	-38	-37	-11 -10	9-10	27		-47	-15 -13	
39	-41	-39	-13 -12	8	26		-48	-18 -16	
38	-44	-42	-16 -14	6-7	25		-49	-20 -19	
37	-46	-45	-19 -17	5	24		-51 -50	-24 -21	
36	-48	-47	-22 -20	3-4	23		-52	-28 -25	
35	-49		-25 -23	2	22			-32 -29	
34	-51	-50	-29 -26	0-1	21			-37 -35	
					20			-52 -38	

SUMMARY

The present study was undertaken to assess the feasibility of using the changes in the PRT response patterns of normal children as reflections of maturity level, as defined by chronological age. This would make possible the development of PRT age scales based on group tendencies, as predicted by Berg's Deviation Hypothesis. In addition, the investigation included comparisons among normal children, adults, and elderly adults, in order to determine whether elderly adults might respond like children, thus reflecting in noncritical test behaviors, the critical behaviors associated with the altered responses which occur during the life span. Significant differences were found on the resultant PRT age scales between the response patterns of normal children and normal adults, and also between those of normal adults and elderly adults. Elderly adults tended to score like children, rather than adults, on the PRT age scales.

A significant trend in PRT age scale scores for normal children as a function of chronological age was found when five consecutive age groups were compared. Norms in the form of T-scale scores were prepared for the age groups included in the study. Thus, it was concluded that response patterns on the PRT are related to maturity as reflected by

chronological age, in the case of normal children, and that there is a significant tendency for the scores of adults, as they approach later adulthood, to approximate those of normal children. Finally, the results of the present study, together with previous research indicated that some common critical behaviors are shared by children, elderly adults, and adult schizophrenic patients.

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APPENDIX

APPENDIX

In the main portion of this paper, we have noted changes in PRT response patterns which are associated with increases in chronological age up to age twenty. Most other functions associated with human maturation also reach a peak or asymptote at about the same age. Jones and Conrad (1933), for example, found most mental abilities reach a peak between the eighteenth and twenty-first years. Beyond this age level, increases in age seem to bring a positively accelerated decrease in ability. The losses are generally not important between the ages of 20 and 50 years, but as the individual enters old age, a definite decline becomes evident (Ruch, 1953). The present study included only broad age groupings in the adult range (20 through 59 years and 60 through 83 years), so that no clear picture of the nature of the decline in PRT age scores was obtained. However, when means were computed for ages 20 through 29 and 30 through 59, they were found to be approximately equal, suggesting that the decline is slight within these age limits. In any case, the mean and median PRT age scores for elderly adults, aged 60 through 83, were significantly lower than those for younger adults and were quite similar to those for children, aged nine through 10-11.

The Deviation Hypothesis (Berg, 1957) would lead us to predict that since elderly adults and ten-year-old children

share common response patterns in non-critical areas (PRT deviant response patterns), they should also share common behavior patterns in critical areas. Common experiences with these age groups tend to confirm this prediction, as both groups are frequently described as immature, childish, weak, egocentric, et cetera. In addition, a number of investigators have found the growth and decline of various abilities to result in similar behavior patterns for elderly adults and ten-year-old children. Miles (1931), for example, found that sixty-year-old adults and ten-year-old children obtain equal scores on speed tests involving manual movements, rotary mobility, and finger movements. Tests for strength of grip (Cathcart, et al., 1935) and strength of pull (Ruger and Stoessiger, 1927) have shown similar age trends. Other studies (Pearson, 1925; De Silva, 1935) have demonstrated that reaction time also varies with age; however, the decline, in this case, seems to be somewhat slower so that the performance of a typical seventy-year-old is equal to that of an average child of ten. Further, studies on changes in intelligence (Jones and Conrad, 1933; Miles, 1931; Wechsler, 1944) and in learning ability (Miles, 1933; Ruch, 1934) have shown similar patterns of growth and decline. Thus, it is clear that there are many ways in which the behavior patterns of ten-year-old children resemble those of elderly adults.

In the bibliography which follows, references related to this problem and to the general area of response sets are presented.

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VITA

Name: Sidney Otho Hesterly

Birth: November 29, 1931; Prescott, Arkansas

Education: B.S., Henderson State Teachers College, 1955

M.A., Louisiana State University, 1957

Professional Experience: (All positions were on a part-time basis except as indicated).

Research Statistician, Department of Institutions, State of Louisiana, 1955-1956

Psychological Assistant, Monroe Area Guidance Center, Monroe, Louisiana, 1956

Graduate Assistant, Department of Psychology, Louisiana State University, 1956-1957

Assistant, Department of Psychiatry and Neurology, Louisiana State University Medical School (full-time), 1957-1958

Psychological Assistant, Louisiana Evaluation Center, New Orleans, Louisiana, 1957-1958

Psychological Assistant, Evangeline Area Guidance Center, Lafayette, Louisiana, 1958

Psychological Assistant, Donaldsonville Guidance Center, Donaldsonville, Louisiana, 1958-1959

Clinical Psychology Fellow, Southeast Louisiana State Hospital, Mandeville, Louisiana (full-time), 1959-1960

Director of Diagnostic Services, Department of Psychology, East Louisiana State Hospital, Jackson, Louisiana (full-time), 1960

EXAMINATION AND THESIS REPORT

Candidate: Sidney Otho Hesterly

Major Field: Psychology

Title of Thesis: Deviant Response Patterns as a Function of Chronological Age

Approved:

Major Professor and Chairman

Dean of the Graduate School

EXAMINING COMMITTEE:

Date of Examination:

28 June 1960