INTERTEST INTERFERENCE AS A RESULT OF NATURE AND SEQUENCE OF TESTS

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STATEMENT BY AUTHOR

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ABSTRACT

This study was designed to investigate proactive interference between two psychodiagnostic tests, the first unstructured and the second structured. The specific hypothesis formulated for testing was that scores on three WAIS subtests would be lowered when presented immediately after the Rorschach test.

College students, to whom a short form of the WAIS had been given, were divided into three groups matched on the variables IQ, sex, and scores on three WAIS verbal subtests. Each of the three groups was given one of three treatments immediately preceding readministration of the subtests: the associative phase of the Rorschach, a modified administration of the Bender-Gestalt, or no preceding test.

Subtest difference scores between pre- and posttest administration of the WAIS subtests for the group receiving the Rorschach test were significantly below those of the two control groups, who had received either the Bender or no test preceding the second administration of the WAIS. The hypothesis was thus confirmed. The suggestion was made that psychodiagnostic test batteries designed to create the least amount of intertest interference should employ a WAIS-Rorschach sequence rather than the reverse.

INTRODUCTION

Though the literature contains many studies concerning the influence of situational factors upon psychodiagnostic test results, little consideration has been given to the question of sequence of tests of different types and their effect on test scores. A systematic investigation of possible proactive interference between tests might yield information pertinent to the construction of psychodiagnostic test batteries which would allow for more accurate assessment of an individual's personality, functioning, and capabilities. L'Abate (1964) acknowledges the need for such research: ". . . one of the cogent needs of applied research in our field (is) . . . the problem of how one test may affect the patient's performance on a subsequent test. Our knowledge of serial effects of this kind is practically nil, or at best unsatisfactory" (p. 176). It is implied, then, that when tests are placed together in a psychodiagnostic test battery, any given test within that battery might yield a score which would not be representative of the individual's performance on that test, had it been given in isolation from the others--i.e., under the conditions prevailing during standardization.

L'Abate (1964) takes this possibility into account when he suggests a three-stage sequence for test batteries:

(1) simple, innocuous tests (DAP, Bender); (2) more complex and informative tests (WAIS, MMPI); and (3) tests liable to create more anxiety (Rorschach, TAT). Thus he reasons that tests in stage two will not be affected by anxiety aroused by tests in stage three. Rapaport (1945) mentions that the Rorschach is usually not given as the first test in a battery, but he offers no specific rationale for this practice. Brown (1958) takes an opposite position. He advocates a sequence which progresses with relation to the degree and intensity of the interaction between the patient and the examiner as a result of the nature of the tests. He places the Wechsler-Bellevue after the Rorschach and TAT in this sequence, and he analyzes incorrect responses in the W-B with relation to projective data obtained in the previous tests. He does not discuss the possibility of intertest interference. Piotrowski (1958) also administers the Rorschach before the Wechsler-Bellevue (DAP or HTP, Rorschach, then W-B Similarities and Comprehension); he believes that to present the W-B subtests (which he describes as formal and impersonal) before the Rorschach would exert an inhibitory influence upon the patient's imagination, thus yielding a "less meaningful" Rorschach record.

Gibby, Stotsky, & Miller (1954) found that among 100 neurotics, the scores of a group given the Rorschach alone did not differ significantly--with respect to 11

Rorschach scoring variables and a number of content categories--from the scores of other subjects receiving the Rorschach following any one of four other tests: Bender-Gestalt, TAT, W-B, or Goldstein-Scheerer. Analyses of the variances of the 11 scoring variables under these five conditions yielded F ratios very close to 1, none even approaching significance. If one may use these 11 formal scoring categories as criteria for that which makes up a meaningful Rorschach, then it would appear that Piotrowski's speculation concerning the inhibitory effects of the formal and relatively structured Wechsler-Bellevue upon the Rorschach is unwarranted.

Intertest interference has been noted in at least two other studies, however. Berkun & Burdick (1964) observed that among a group of normal subjects given the Rosenzweig PF test after the TAT, the mean score of extra-punitive hostility on the PF was significantly greater (and the score on intrapunitive hostility significantly lower) than for another group who received the PF prior to the TAT. The authors offer no explanation for their findings. Cassell, Johnson, & Burns (1962) gave the HTP, Wechsler-Bellevue II (short form), and the reading, spelling, and arithmetic portions of an achievement test to six groups of normal subjects, each group receiving a different sequence of the three tests. Sequence had no significant effect on mean scores for any of the tests. Of the six W-B II group

means, however, two of the three lowest mean scores occurred in the only two sequences wherein the W-B II followed the HTP.

To summarize, the preceding literature cited presents contradictory suggestions. One author (L'Abate, 1964) favors administering the WAIS prior to the Rorschach, while two others (Brown, 1958; Piotrowski, 1958) take an opposite position. One experimental study (Gibby et al., 1954) shows no interference on the Rorschach by any one of four preceding tests. But two other studies (Berkun & Burdick, 1964; Cassell et al., 1962) suggest that relatively unstructured tests may interfere with performance on subsequent tests.

The present study was designed to provide additional information with respect to the problem of test sequence by studying the possible effects of the administration of an unstructured projective test upon performance on a subsequently administered structured test. The Rorschach and the Wechsler Adult Intelligence Scale (WAIS) have been used for two reasons: first, they are in standard use in most psychodiagnostic test batteries; and second, these tests conform to the criteria necessary to the investigation--i.e., they are unstructured and structured, respectively.

The rationale for believing that intertest interference may occur in an unstructured-structured sequence is

based on the nature of the tests themselves, the types of responses they elicit, and the processes involved in the production of these responses. The WAIS is a structured test inasmuch as it is highly definitive concerning what is expected of the subject. Proper functioning on the WAIS depends on the degree to which ego processes are responsible for the subject's formation of his responses; these allow him to be more adaptive in his responses, more oriented to reality, more selective, and more able to delay unmodulated discharge of impulses (Schafer, 1954). This type of adaptive functioning is required on the WAIS because the realization of the fact that there are right and wrong answers to the questions asked imposes an objective criterion which the subject must meet. Unstructured, projective tests, on the other hand, place much less demand on the subject to be adaptive or selective; the stimuli of the Rorschach, for instance, are much less definitive than those of the WAIS, with respect to indicating any sort of rigid, external criteria for the formation of responses. Freed from the requirements of logical thought organization, the subject is more likely to produce responses which are more regressive, autistic, and impulsive in nature (Holt & Havel, 1960). Not only are the Rorschach stimuli responsible for this phenomenon, but the instructions as well favor a tendency toward less organized modes of cognition (Schafer, 1954).

The above can account for proactive interference in an unstructured-structured test sequence in at least two ways. First, if the two types of functioning mentioned above are viewed as extremes of a continuum (Holt & Havel, 1960), then movement from an unstructured task to a structured task should require movement along this continuum, if maximum performance on the latter test is to be expected. Until this shift is completed, impaired scores on the structured test may be expected due to persistence of a less organized mode of thinking. Second, the regressive type of thinking produced on the unstructured test, due to less explicit external criteria, may favor the emergence of primary content and consequent anxiety; as suggested by L'Abate (1964), the persistence of this anxiety may lower scores on the structured test which follows. Thus it is hypothesized that if the Rorschach, an unstructured and projective test, immediately precedes administration of the WAIS, a very structured test, then proactive interference will occur which will lower scores significantly on the structured test.

METHOD

Subjects

Subjects were 60 college students (36 females, 24 males) enrolled in introductory psychology classes at the University of Arizona. All subjects were volunteers. During solicitation of classes, the students were told that volunteers must attend two testing sessions, that the first session would include a short intelligence test, that they would receive their estimated IQ scores at the end of the second testing session, and that all test scores would be strictly confidential. Prospective subjects were asked not to volunteer if they had taken an intelligence test within the last three years.

Class standings of the subjects were as follows: 29 freshmen, 21 sophomores, 7 juniors, 2 seniors, and 1 unclassified. Ages ranged from 18 to 49 years of age (mean = 20.63 years), and IQ scores ranged from 98 to 140 (mean = 115.6, σ = 8.64).

Preliminary Session

All subjects were seen individually by one examiner over a period of two weeks. Subjects were seated across a table from the examiner in a small, well-lighted, and quiet room. Age and class standing were asked, and then the

subject was told he would be taking portions of an intelligence test. The Digit Span, Comprehension, Similarities, Picture Completion, and Block Design subtests of the WAIS were then administered. Before leaving, the subject was informed that he would be contacted in his psychology class at a later date to schedule a time for his second session.

After all 60 subjects had been seen, the examiner scored the protocols and recorded each subject's raw scores on the five subtests. Estimates of IQ were calculated by converting raw scores to scaled scores, dividing the sum of a subject's five scaled scores by 5, multiplying this quotient by the number of subtests in the WAIS, and referring to the WAIS manual (Wechsler, 1955) to find the corresponding IQ score. IQ scores calculated with the pentad used have been shown to yield a correlation of .964 with full scale WAIS IQ score (Maxwell, 1957). (Picture Completion and Block Design scores were used only to contribute to IQ score, and were not further analyzed, nor used in obtaining the main results of this study.)

Treatment Groups

Subjects were then matched as closely as possible, with relation to five variables, so that 20 matched triplets of subjects were formed. Each subject in a triplet was randomly assigned to one of three treatment groups, to form three relatively well-matched groups of 20 subjects each.

The five matching variables used were sex, IQ, and raw scores on the Digit Span, Comprehension, and Similarities subtests. Perfect matching was not possible (except for sex) due to the sample size, extent of variability of scores, and the number of variables used. Nevertheless, except for subjects scoring at the extremes of the distribution of scores, any subject was within 6 points on IQ, 2 points on Digit Span, 4 points on Comprehension, and 4 points on Similarities from either of the other two subjects in the triplet.

Means and standard deviations for the four scoring variables for each of the three groups are shown in Appendix A, Table 6. To test for accuracy of matching, analyses were made of the variances of the three WAIS subtests for the three groups formed by matching procedures. The results appear in Appendix A, Tables 7, 8, and 9. All three F's were non-significant; thus the matching was judged to be satisfactory.

Treatment Session

Subjects were once again seen individually, in the same room, and by the same examiner, as during the preliminary session. Times between the preliminary and treatment session ranged from 28 to 35 days. Each subject was seen whenever his schedule would allow, regardless of the group to which he had been assigned. Each subject was once

again administered the Digit Span, Comprehension, and Similarities subtests of the WAIS; at the end of the session he was given his estimated IQ score, as well as a short discourse on its meaning and interpretation.

Differential treatment of the three groups was as follows:

Group X was first given the associative phase of the Rorschach, using all 10 cards. Subjects received instructions suggested by Klopfer & Davidson (1962, p. 28), and they were not questioned concerning their responses. Times for the associative phase ranged from 11 to 18 minutes. Immediately after the last response to card 10, subjects received the three WAIS subtests.

Group C1 first received the Bender-Gestalt, then the three WAIS subtests. The Bender was chosen as a control test because it was judged to be relatively innocuous (Bender, 1946). In addition, when a subject had completed the drawings, he could be asked to draw them again when they were presented upside-down or at some other angle. By continuing the task in this way until the subject had worked well into the range of the time required for the associative phase of the Rorschach, the treatment for Group C1 offered a control for the time variable and its possible effects upon performance on the WAIS subtests.

Group C2 received the three WAIS subtests only. This group represented, essentially, a control for recall

and practice effects from the first administration of the WAIS.

The WAIS protocols were scored by the examiner without knowledge of the group to which any protocol belonged, and raw scores were recorded. Means and standard deviations of subtest scores during the treatment session are shown in Appendix B.

RESULTS

Difference (D) scores were computed for each subject on each subtest by subtracting a subject's original subtest score (raw score) from his score on the same subtest subsequent to the experimental or control treatments. Thus the effect of the Rorschach upon performance on any WAIS subtest was indicated by the discrepancy between the mean D score for Group X and those for Groups C1 and C2.

A two-way analysis of variance of D scores was computed to assess the effect among groups across all subtests. The results, which appear in Table 1, indicate that there is clearly a significant difference between groups ($F = 17.94$, $df = 2$ and 57, $P < .001$).

Three one-way analyses of variances of D scores were computed to assess the effects among groups on each subtest individually. The results for the Digit Span subtest appear in Table 2, for Comprehension, Table 3, and for Similarities, Table 4. Each test yielded F's which were highly significant (Digit Span: $F = 8.35$, $df = 2$ and 57, $P < .001$; Comprehension: $F = 11.72$, $df = 2$ and 57, $P < .001$; Similarities: $F = 5.85$, $df = 2$ and 57, $P < .01$). The results of Scheffé tests on all possible pairs of means indicated that the above significant results for all three subtests was attributable to the difference between the

Table 1

Summary of Analysis of Variance of Pre-Post Difference Scores on Three WAIS Subtests

Source	df	MS	F	P
Between Ss	59			
Groups (G)	2	51.205	17.994	.001
Error (b)	57	2.853		
Within Ss	120			
Subtests (S)	2	23.339	13.113	.001
SXG	4	.689	.387	
Error (w)	114	1.780		
Total	179			

Table 2

Summary of Analysis of Variance of Pre-Post Difference Scores on Digit Span

Source	df	MS	F	P
Between Groups	2	11.850	8.349	.001
Within Groups	57	1.419		
Total	59			

Table 3

Summary of Analysis of Variance of Pre-Post Difference Scores on Comprehension

Source	df	MS	F	P
Between Groups	2	23.017	11.724	.001
Within Groups	57	1.963		
Total	59			

Table 4

Summary of Analysis of Variance of Pre-Post Difference Scores on Similarities

Source	df	MS	F	P
Between Groups	2	17.716	5.845	.01
Within Groups	57	3.031		
Total	59			

means for Group X and those of both the control groups; Groups C1 and C2 did not differ significantly from each other on any subtest ($P \geq .25$, on all subtests).

Means of the D scores for the three groups appear in Table 5. On all subtests the mean pre-post difference scores for Group X were well below those for the control groups. Whereas control group means were all positive except for that of Group C2 on Digit Span, means for Group X were all negative. Subjects taking the Rorschach before the WAIS subtests, then, showed performance on all subtests which was significantly inferior to that of the subjects in the control groups, who were matched with them with relation to several variables.

The Digit Span was the only subtest in which the difference between the Group X mean and those of the control groups was clearly due to a lowering of scores among subjects in Group X, with control subjects remaining, for the most part, at about the same level as in preliminary WAIS performance. In the Comprehension and Similarities subtests, differences between Group X means and control means were due to failure of most Group X subjects to improve over original scores as much as did control subjects, in addition to some actual lowering of scores among Group X subjects. Individual D scores for control subjects were predominantly zero or positive on all subtests. Subjects in Group X produced primarily negative

Table 5

Means of Pre-Post Difference Scores on Three WAIS Subtests

Group	Digit Span	Comprehension	Similarities
X	-1.15	-.60	-.20
C1	.35	1.35	1.50
C2	-.10	1.15	1.35

difference scores on Digit Span, zero or negative difference scores on Comprehension, and roughly an equivalent number of positive and negative scores on Similarities.

Pearson product-moment correlations were computed between IQ and total D scores (i.e., Digit Span + Comprehension + Similarities D scores) for each group individually. Correlations were as follows: Group X, .043; Group C1, -.142; Group C2, -.317 ($t = 1.418$, $df = 18$, $P < .20$). A non-significant point biserial correlation of .159 was found between total D score and sex of subjects in Group X: i.e., males in Group X tended to make slightly better D scores than females in Group X.

DISCUSSION

The influence of the Rorschach upon WAIS performance was apparently considerable for some subjects. Though the mean decreases of the experimental group on Comprehension and Similarities were not impressive, over half the experimental group subjects showed decreased scores, D scores for these subjects ranging from -1 to -4. Since this might amount to a decrease of from -1 to -4 WAIS scaled scores, these results alone would seem to have implications concerning sequence of tests in a test battery.

Though the methodology of this study necessarily makes this test session dissimilar in many respects to clinical testing situations, the results still afford valuable theoretical and practical implications. The study by Gibby et al. (1954) showed that several other standard psychological tests do not influence scoring variables on a subsequent Rorschach; the present study indicates that the reverse sequence does produce proactive interference, at least when the subsequent test is a structured one. The two studies used different populations, Gibby working with neurotics and this study using a normal, college sample. Pending further studies on abnormal populations which might lead to contrary implications, a structured-unstructured

test sequence is suggested if one wishes to create the least amount of intertest interference. This supports L'Abate's (1964) type of sequence and his rationale for it, but suggests a sequence different from those of the type reportedly used by Brown (1958) and Piotrowski (1958). This is not to say that all psychodiagnostic test batteries should proceed from structured to unstructured tests. Hutt (1958) has wisely emphasized the importance of selecting tests, and designing sequences, for test batteries to fit the conditions of the particular patient and the type of information sought. Nevertheless, the present data indicate that sequences should be selected on the basis of experimental results, rather than on clinical "hunch."

The question arises concerning why different subtests more readily differentiated the experimental subjects from the control subjects than did others. Reflection upon the nature of the tasks may afford some possible answers. Digit Span is a rather highly structured task and, as such, represents a distinct shift from the Rorschach just taken by experimental subjects; this, in addition to any tension which might have arisen during the Rorschach, might account for lowered scores. The Comprehension subtest, which produced the greatest difference between experimental and control subjects, is probably the least structured of the three subtests given, and the most susceptible to impulsive

and autistic responses, the scoring system being very sensitive to slight differences in content and wording of responses. It is possible that this subtest displayed persistence of regressive thought patterns and/or anxiety from the Rorschach experience and that this was responsible for the difference between the experimental group mean and those of the control groups. Why the Similarities subtest was the least differentiating of the three subtests used is much less clear; it is possible that whatever effects were produced by the Rorschach were by then partially overcome by the experimental subjects, since Similarities was the last subtest administered.

In addition to anxiety and persistence of regressive thought patterns, a third explanation for lowered scores among experimental subjects might be lowered motivation to do well on the WAIS. The Rorschach offers fewer rigid, external criteria for formation of responses than does the Bender, thus possibly creating a set for lower motivation. This may have persisted and affected the performance of experimental subjects on the subsequent WAIS subtests.

A further analysis may provide some suggestions as to possible variables which differentiated subjects whose functioning was more subject to interference from subjects who were less subject to interference. Two groups of experimental subjects were formed by selecting the seven

subjects with the least interference apparent in the WAIS subtests and seven subjects with the most interference, according to total difference scores. Their Rorschach records were partially analyzed and their means on six Rorschach scoring variables computed; scoring in some cases was only approximate, since no inquiry was available. The means, as well as mean IQ's and mean total difference scores, appear in Appendix C. Subjects showing the most interference on the WAIS produced more constricted and conventional Rorschach protocols, in general, than did those showing less interference. The six variables scored are proposed as indices of anxiety (Phillips & Smith, 1953). The directions of the means indicate somewhat more anxiety among high interference subjects in the cases of all six indices, but it should be emphasized that the cases were too few for significance tests. Degree of anxiety, then, may have been one important factor responsible for interference with WAIS performance.

Correlations for each treatment group were computed between IQ and total difference score to discover whether or not greater intelligence was an asset to a subject in the experimental group in minimizing the inhibitory affects of the Rorschach. As noted in the results of this study, the correlation for the experimental group was near zero, indicating no observable advantage for more intelligent subjects. The non-significant negative correlations for

the control groups are explained by the principle of regression, discussed in terms of test-retest with an intelligence test by Goodenough & Maurer (1940). This principle disallows drawing conclusions about differential gains in scores on retest when comparing groups distinguished by high and low scores on the original test; regression toward the mean by subjects at each end of the distribution occurs due to "correction" of chance errors of measurement, on retest, which had originally contributed to the formation of the groups. This principle has little bearing upon the main results of the present study, since the original groups were matched with relation to high and low scores on IQ, as well as on the three subtests.

SUMMARY

The purpose of this study was to investigate proactive interference occurring between tests when the Rorschach preceded administration of the WAIS.

Three groups of 20 college students each were formed, the groups being matched for estimated IQ score, sex, and Digit Span, Comprehension, and Similarities subtest scores achieved during a preliminary session. Subjects were seen again approximately one month after this session and received tests as follows: the experimental group was administered the associative phase of the Rorschach, then the three WAIS subtests mentioned above; a control group received the Bender-Gestalt, then the three WAIS subtests; the second control group received only the three subtests. Difference scores were computed by subtracting a subject's original score on a subtest from his score on the same subtest when taken the second time.

The experimental group, which received the Rorschach prior to the WAIS, obtained difference scores which were significantly below those of the control groups on all subtests, thus lending support to the hypothesis; the mean difference scores of the two control groups did not differ significantly from each other.

The results, along with those of previous research, suggest that psychodiagnostic test batteries designed to create the least amount of intertest interference should incorporate a sequence of tests proceeding from the WAIS to the Rorschach. Further investigations using neurotic samples are needed, however, to determine the generality of these results with respect to clinical populations. Possible reasons for the intertest interference and the nature of the inhibitory effects of the Rorschach were discussed, with emphasis upon the possible anxiety-producing properties of the Rorschach experience and persistence of regressive thought patterns from an unstructured to a structured test.

APPENDIX A

DATA RELEVANT TO THE MATCHING OF SUBJECTS TO FORM MATCHED TREATMENT GROUPS

Table 6

Means and Standard Deviations of Matched Groups for Estimated IQ and WAIS Subtest Scores Achieved During Preliminary Session

Groups		IQ	Digit Span	Comprehension	Similarities
X	M	115.75	11.55	20.45	19.05
	σ	8.13	1.69	3.27	4.06
C1	M	115.65	12.00	20.50	18.85
	σ	8.76	2.23	3.39	2.81
C2	M	115.40	12.10	20.40	18.35
	σ	8.86	1.97	2.35	3.30

Table 7

Summary of Analysis of Variance of Digit Span Raw Scores For Matched Groups During Preliminary Session

Source	df	MS	F	P
Between Groups	2	1.716	.439	> .25
Within Groups	57	3.907		
Total	59			

Table 8

Summary of Analysis of Variance of Comprehension Raw Scores For Matched Groups During Preliminary Session

Source	df	MS	F	P
Between Groups	2	.050	.0054	> .25
Within Groups	57	9.241		
Total	59			

Table 9

Summary of Analysis of Variance of Similarities Raw Scores For Matched Groups During Preliminary Session

Source	df	MS	F	P
Between Groups	2	2.600	.221	> .25
Within Groups	57	11.755		
Total	59			

APPENDIX B

POST TREATMENT MEANS AND STANDARD DEVIATIONS OF WAIS SUBTEST SCORES FOR THE THREE GROUPS

Groups		Digit Span	Comprehension	Similarities
X	M	10.35	19.85	18.85
	σ	1.66	3.44	4.16
C1	M	12.35	21.85	20.35
	σ	2.03	2.99	2.54
C2	M	12.00	21.28	19.70
	σ	1.75	2.28	2.23

APPENDIX C

MEANS OF SIX RORSCHACH SCORING VARIABLES FOR HIGH-INTERFERENCE AND LOW-INTERFERENCE GROUPS IN GROUP X

Variables	Low-Interference	High-Interference
Number of Responses	22.00	19.71
Popular Responses	4.28	5.42
M	3.42	1.85
A%	36.71	52.57
Cloud Responses	.42	1.28
m Responses	.85	1.28
(Estimated IQ from WAIS, short form)	115.15	113.71
(Mean Total D Score on WAIS)	1.14	-5.00

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