

A STATISTICAL APPRAISAL OF THE A P T FORM  
OF THE WOMENLIC PERSONNEL TEST

by

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TABLE OF CONTENTS

INTRODUCTION .....	1
Statement of the Problem .....	3
Characteristics of the Sample .....	4
Instruments and Apparatus .....	4
Procedure .....	5
PART I	
Graphic Results .....	6
Summary .....	14
Conclusions .....	15
PART II	
Graphic Results .....	16
Summary .....	24
Conclusions .....	25
GENERAL SUMMARY .....	26
GENERAL CONCLUSIONS .....	28
ACKNOWLEDGMENT .....	30
BIBLIOGRAPHY .....	31

## INTRODUCTION

The spiral omnibus speed test of mental efficiency, in which items consisting mainly of the solution of various types of problems, have been in common use for many years. Wonderlic and Hovland (11) refined this type of test in the authorship of The Personnel Test, of which there are five forms. The Wonderlic tests are widely used by business and industrial organizations in the selection of personnel. They are adaptations of the Otis tests (4). It is one more tool to assist personnel workers to do a better job of placing the applicant where he will be a satisfied valuable employee doing the type of work he likes and is qualified to do best (2). The test is greatly abbreviated and can be run in twelve minutes as compared to thirty minutes for the Otis. In content, it is a scrambled omnibus arrangement of fifty items (Mursell, 5). The result of the careful selection of items is that for many industrial jobs the revision differentiates more satisfactorily than does the original form (Tiffin, 9). One study indicated that for the population concerned and for similar populations, the use of a longer time interval in the Wonderlic Personnel Test would result in a small increase in the obtained raw score. However, there is practically no change in rank from the use of the test in this manner (Wright and Lang, 12).

Since the creation of The Personnel Test, attention has been drawn in the scientific literature to the separate factors measured by different types of items. These items, hitherto lumped

together on the assumption that they all measured the same thing (viz: "Intelligence"), were found to have greater significance when grouped as to classification by type of item. Thus, Thurstone found that items having to do with numbers were different from items having to do with words or reasoning, and that separate individual differences could be better measured by separate instruments than by a single spiral-omnibus speed test. It should be noted that even if an individual can be described in terms of a limited number of independent reference abilities, it is still possible for each person to be different from any other person in the world (Thurstone, 7).

In an effort to obtain the measurement of separate verbal problem solving and quantitative problem-solving factors, the staff of Associated Personnel Technicians arranged with E. F. Wonderlic, author of The Personnel Test, to print a form of this test which would make possible research into the separate individual difference which might be measured; and possibly to break down, from one administration, scores for the separate verbal and quantitative abilities. Both of the factors mentioned in the preceding statements are included in an article by L. L. Thurstone appearing in volume 62 of Scientific Monthly, 1946 (8).

To date no statistical evaluation has been made of the A P T form of the Wonderlic Personnel Test.

Norms for the original Wonderlic tests were established on a group of 7090 individuals who had taken the thirty minute quick scoring gamma test. A group of 138 individuals selected through the range of the Otis scores was given form "A" of the Wonderlic

Tests in 1944 to develop comparable norms. Form "A" of the Wonderlic Tests has a correlation of 0.96 with the Otis.

The A P T form of the Wonderlic Test was developed in an effort to produce a test which could measure four types of differences in applicants, with a high degree of validity, through the use of one test. The authors wished to introduce a test which might be as widely used as the older forms of the Wonderlic Tests but which possessed a greater balance between the quantitative and the verbal components comprising the test.

The order of presentation of the items was held as nearly as possible to the order in which they appeared in their original setting.

#### Statement of the Problem

The objective of this study is to evaluate the internal consistency of each item in the A P T form of the Wonderlic Test.

In evaluating the internal consistency of analysis of each item in the A P T form of the Wonderlic Tests, the writer attempts to obtain satisfactory answers to the following questions.

1. Does each test item retain its level of difficulty when placed in a new setting?
2. Is there a sharp separate and individual distinction which can be measured between the verbal score and the quantitative on a test by an individual?
3. Is there a marked sex difference in the verbal and quantitative total scores on the test?

## Characteristics of the Sample

This study reflects the statistics of a random representative sample of 1423 applicants responding to an advertisement for work. The report includes two parts. Part I reflects the statistics of 1040 men, most of whom were applying for high level positions. Part II reflects the statistics for 383 women applying for stenographic and clerical work. The 1423 applicants participating in this study were tested in 155 cities in 43 states over a six months' period terminating in April 1952.

Because of the nature of the work for which they were applying, the applicants would be expected to score higher in the test than the general population.

## Instruments and Apparatus

The A P T form of the Wonderlic Personnel Test, a 12-minute time test of 50 items was used. Each odd-numbered item is verbal and each even-numbered item is quantitative. The arrangement of the items was determined by the statistical analysis of the items in the two Wonderlic Tests from which the A P T form was developed. As determined by the weight assigned to the items in the original Wonderlic Personnel Tests, any score through 25 on the A P T form of the Wonderlic Personnel Tests can be made comparable to scores made on either of the original two Wonderlic Tests by adding three.

To work with item analysis the writer used KS 811 B coded

punch cards. Punches were used to transfer the information from the individual tests to the coded cards. Needles were used in sorting the cards to obtain the desired statistics.

#### Procedure

The A P T form of the Wonderlic Personnel Test was administered by individuals trained by staff members of Associated Personnel Technicians. Standard administration instructions were used by each staff-trained administrator who was equipped with a stop watch. These tests were graded; correctly answered items by each individual were tabulated. The obtained results were transferred from the original test to the KS 811 punch cards. On each card was recorded: the name, sex, each correctly answered item, the total number of verbal items correctly answered by the individual, the total number of quantitative items correctly answered by the individual, age, and the first letter of the first and the last name.

The mean score and standard deviation for the men and for the women were calculated separately. The number of applicants obtaining each individual total of the verbal items and the number of applicants obtaining each individual total of the quantitative items were established. The number of applicants correctly answering each individual item was calculated. The coefficient of correlation was calculated for the total verbal and quantitative sub-scores by Pearson Product-Moment Formulae. In addition to the above, the validity coefficient of each verbal item with

the total quantitative score and the validity coefficient of each quantitative item with the total verbal score was calculated, using the bi-serial coefficient of correlation method.

## PART I

### Graphic Results

Part I reflects the statistics of 1040 male applicants applying for high-level work during the six months period terminating in April of 1952.

The percentage of items attempted which were correctly answered by the male applicants in this study, appears to the left of Fig. 1. The item numbers ranging from 1 to 50 appear at the bottom of Fig. 1.

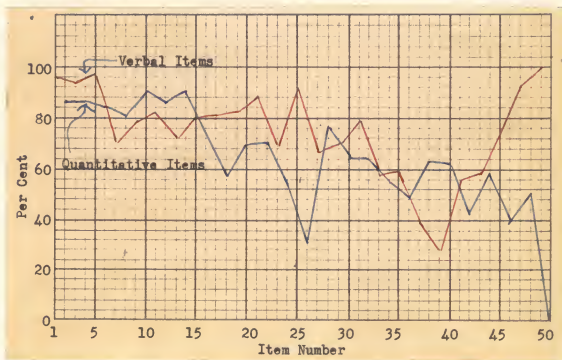


Fig. 1. Graph showing the percentage of items attempted which were correctly answered by the male applicants in this study. (N = 1040)



The calculated validity of each item is weakened as the total number of applicants attempting the items decreases; generally the decrease progresses from the first to the last item (Table 1).

Table 1 gives the number of male applicants attempting each test item. The number of applicants attempting item 1 through 9 appears on 0 line and below the item number. The number of applicants attempting items 10 through 19 appears on line 1 and below the item number above 10 in which one is interested. The number of applicants attempting items 20 through 29 appears on line 2 and below the item number above 20 in which one is interested. For example; the number of applicants attempting item 2 was 1040, the number attempting item 13 was 1039, the number attempting item 24 was 933, etc.

Table 1. List of frequencies showing the number of male applicants who attempted each item.

	Item number									
	: 0	: 1	: 2	: 3	: 4	: 5	: 6	: 7	: 8	: 9
0		1040	1040	1040	1040	1040	1040	1040	1040	1040
1	1039	1039	1039	1039	1039	1035	1030	1027	1024	1024
2	1013	1003	969	955	933	925	886	873	827	767
3	678	636	558	492	430	389	308	264	233	192
4	173	136	111	93	73	62	36	29	10	6
5	0									

The number of male applicants correctly answering each item ranges from 1018 correctly answering item 5 to less than 10 correctly answering items 48, 49, and 50. Of the 45 items correctly

answered by more than 1019 less than 10 applicants in 17 of 24 possible times, the number correctly answering each verbal item exceeded the number correctly answering the first following item.

Arranging the items in order from the item answered correctly by the highest percentage of male applicants to the item answered correctly by the lowest percentage of male applicants, the following balance of verbal and quantitative items was obtained in each group of five:  $3/2$ ,  $1/4$ ,  $4/1$ ,  $2/3$ ,  $3/2$ ,  $1/4$ ,  $2/3$ ,  $3/2$ , and  $0/1$ . The numerator in the preceding fractions represents the number of verbal items in each group of five, and the denominator represents the number of quantitative items in each group.

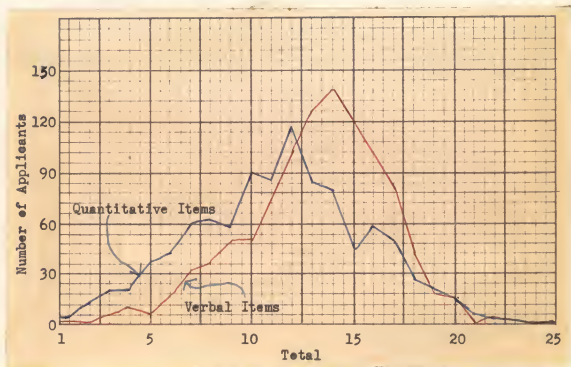


Fig. 2. Graph showing the number of male applicants in this study obtaining each individual total number of verbal or quantitative items correct. (N = 1040)

The number of male applicants in this study obtaining each individual total number of verbal or quantitative items correct, is scaled to the left of Fig. 2. The individual verbal and quantitative totals obtained by the male applicants in this study ranging from 1 to 25, appear at the bottom of Fig. 2.

The verbal score of greatest frequency for male applicants was 14. The calculated mean for verbal items answered correctly by the male applicants was 13.1606, with a standard error of .109. The individual total of the verbal items obtained by more male applicants than any other was one of 0.9 of an item higher than the calculated average number of verbal items correctly answered.

The quantitative score of greatest frequency for male applicants was 12. The calculated mean for quantitative items answered correctly by the male applicants was 11.5336, with a standard error of .0904. The difference between these two means is 1.6270 with a standard error of .9105 and a t ratio of 1.787. The individual total of the quantitative items obtained by more male applicants than any other one was 0.5 of an item above the calculated average total number of quantitative items obtained.

The scale showing the number of male applicants obtaining each individual total number of items correct appears to the left of Fig. 3. The total scores ranging from 1 through 46 appears at the bottom of Fig. 3. The score of greatest frequency for male

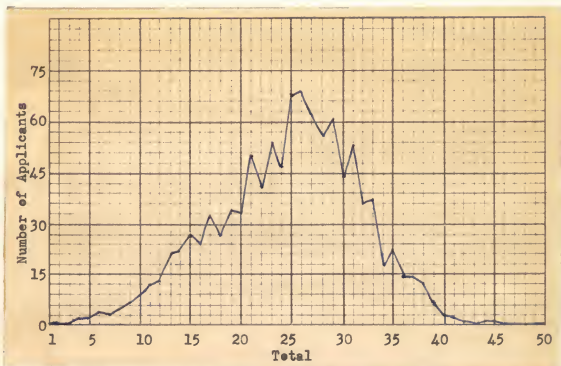


Fig. 3. Graph showing the number of male applicants in this study obtaining each individual total number of items correct. (N = 1040)

applicants was 26 (modal point of distribution in Fig. 3). The calculated average total number of items obtained by the male applicants was 23.8. Figure 3 reflects the number of male applicants in this study obtaining each individual total number of items correct, without regard to what part of each total number of items answered correctly were verbal and what part of each total number of items answered correctly were quantitative items. The distribution of the individual totals tends to produce a normal distribution curve.

The bi-serial correlation coefficients of each verbal item with the total quantitative score and of each quantitative item with the total verbal score of all male subjects in this study

can be found through use of the scale to the left of Fig. 4. The item numbers ranging from 1 through 50 appear at the bottom of Fig. 4 (3).

The bi-serial method for linear correlation is useful for situations in which one of the bi-variates is dichotomized rather than continuously distributed. The method is based on the assumption that the variable which is dichotomized would, if quantitatively differentiated, yield the normal, bell type of distribution. The continuously distributed variable that is correlated with the dichotomized one is not, however, assumed to be normally distributed. Thus, by means of bi-serial  $r$  the most effective items can be selected for any abbreviation or revision of the test itself. (6)

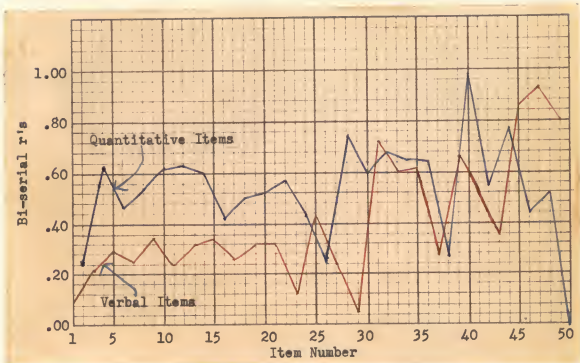


Fig. 4. Graph showing the bi-serial correlations of each verbal item with the total quantitative score and of each quantitative item with the total verbal score, as reflected on the tests of the male applicants in this study. (N = 1040)

The number of positions each item moved up or down from its location in the original test, as established by the male subjects

in this study, is scaled to the left of Fig. 5. The item numbers ranging from 1 through 50 appear at the bottom of Fig. 5.

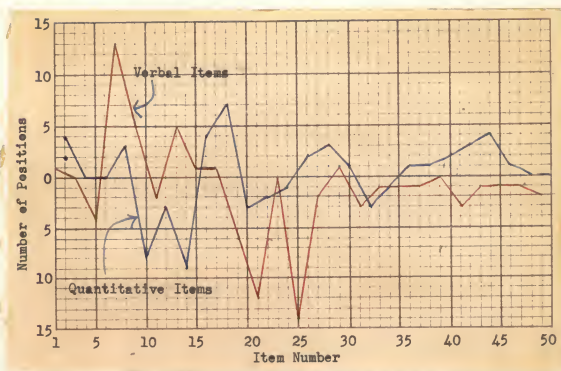


Fig. 5. Graph showing the number of positions each item moved up or down from its location in the original test, as established by the male applicants in this study. (N = 1040)

Of the 50 items included in the test, 20 moved up from where they appeared in their original test, 23 moved down, and 7 appeared in the same respective location in this test as they appeared in their original test.

Of the 25 verbal items, 7 moved up from where they appeared in the original test, 13 moved down, and 3 appeared in the same respective position in this test as they appeared in their original test.

Of the 25 quantitative items, 11 moved up from their location

in their original test, 10 moved down, and 4 appeared in the same respective position in this test as they appeared in their original test.

The number of male applicants, at each respective age, of the 670 male applicants giving their age is scaled to the left of Fig. 6. The ages ranging from 18 to 61 years appear at the bottom of Fig. 6.

Of the male applicants giving their ages, 89.4 per cent were more than 22 years of age. Of the remaining 10.6 per cent, 4.3 per cent were less than 23 years of age and 6.3 per cent were older than 36 years of age.

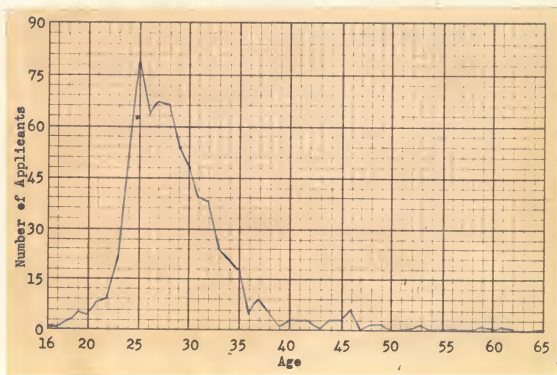


Fig. 6. Graph showing the number of applicants at each respective age, of the 670 male applicants giving their age.

### Summary

The balance obtained between the verbal and the quantitative items in each group of five, after arranging the items in order, from the item answered correctly by the highest number of male applicants to the item answered correctly by the lowest number of male applicants, tends to offset the impression made by the number correctly answering each verbal item exceeding the number correctly answering the first following item in 17 of 24 possible times. The obtained curve affords a contrast to the number correctly answering each verbal item exceeding the number correctly answering the first following item in only 7 of the 24 possible times.

It is interesting to note that the total number of verbal items obtained by more male applicants than any other one, like the total number of quantitative items obtained by more applicants than any other, varied less than one item from their respective calculated average total of items obtained by the male applicants in this study.

Of the 25,975 possible correct answers to the verbal items, 13,585 correct answers were given. The correct answers to the verbal items were 52.1 per cent of the total possible. Of the 25,975 possible correct answers to the quantitative items, 11,953 correct answers were given, which was 46 per cent of the total possible.

Male subjects correctly answered 1.14 times more verbal items than quantitative items. The preceding statement indicates



that the verbal items were easier for the male subjects than the quantitative items.

The Mean number of items answered correctly by the male subjects was 24.6942 with a standard deviation of 6.89 (10).

The correlation of the quantitative scores with the verbal scores for the male subjects was 0.665 (1).

### Conclusions

While in the main, the items retained their level of difficulty in this test, the extreme deviations would seem to indicate that additional work should be initiated and directed toward more accurately establishing the level of difficulty of each item. As determined by the number of male applicants correctly answering each item and the bi-serial correlations of each item, this test might be improved by rearranging the order of the items.

It appears that measured individual differences through the use of quantitative sub-scores have established that for this sample of male applicants, the verbal items are easier for male subjects than the quantitative items.

The A P T form of the Wonderlic Tests represents a step forward in screening instruments designed to measure verbal and quantitative differences in individuals.

PART II  
Graphic Results

Part II reflects the statistics of 383 female applicants applying for stenographic or clerical work during the six months period terminating in April of 1952.

The percentage of items attempted, which were correctly answered by the female applicants in this study, appears to the left of Fig. 7. The item numbers ranging from 1 through 50 appear at the bottom of Fig. 7.

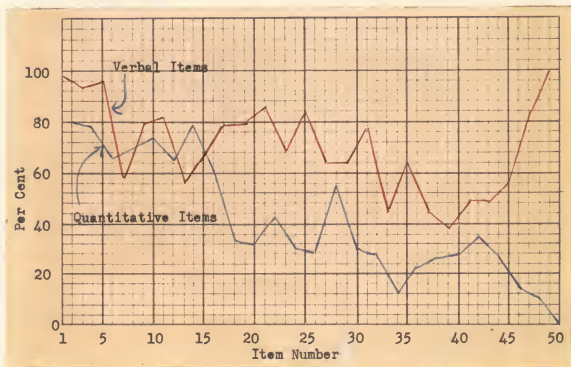


Fig. 7. Graph showing the percentage of items attempted which were correctly answered by the female applicants in this study. (N = 383)

The calculated validity of each item is weakened as the total number of applicants attempting the items decreases; generally the

decrease progresses from the first to the last item (Table 2).

Table 2 gives the number of female applicants attempting each test item. The number of applicants attempting item 1 through 9 appears on 0 line and below the item number. The number of applicants attempting items 10 through 19 appears on line 1 and below the item number above 10 in which one is interested. The number of applicants attempting item 20 through 29 appears on line 2 and below the item number above 20 in which one is interested. For example: the number of applicants attempting item 2 was 383, the number attempting item 13 was 382, the number attempting item 24 was 333, etc.

Table 2. List of frequencies showing the number of female applicants who attempted each item.

	Item number									
	0	1	2	3	4	5	6	7	8	9
0			383	383	283	383	383	383	383	383
1	383	383	381	381	379	379	379	378	370	
2	368	362	342	333	320	317	288	283	265	
3	244	213	155	157	121	120	97	86	65	
4	56	45	33	27	16	14	11	10	1	
5	0									

The number of female applicants correctly answering each item ranges from 378 applicants correctly answering item 1 to less than 3 correctly answering items 46, 48, 49, and 50. Of the 46 items correctly answered by more than 3 but less than 371, in 22 of 24 possible items, the number correctly answering each verbal item

exceeded the number correctly answering the first following item. In 2 of 24 possible times, the number correctly answering each verbal item was exceeded by the number correctly answering the first following item.

Arranging the items in order from the item answered correctly by the highest number of female applicants to the item answered correctly by the lowest number of female applicants, the following balance of verbal and quantitative items was obtained in each group of five:  $3/2$ ,  $2/3$ ,  $3/2$ ,  $4/1$ ,  $0/5$ ,  $3/2$ ,  $2/3$ ,  $2/3$ , and  $1/0$ . The numerator in the preceding fractions represents the number of the verbal items in each group and the denominator represents the number of quantitative items in each group.

The number of female applicants in this study obtaining each individual total number of verbal or quantitative items correct is scaled to the left of Fig. 8. The individual verbal and quantitative totals obtained by the female applicants in this study ranging from 1 to 25, appear at the bottom of Fig. 8.

The verbal score of greatest frequency for female applicants was 13. The calculated mean for verbal items obtained by the female applicants was 11.9948. The standard error of this mean was .1850. The individual total number of verbal items obtained by more female applicants than any other was 0.9 of an item higher than the calculated average number of verbal items correctly answered.

The quantitative score of greatest frequency for female applicants was 8. The calculated mean for quantitative items

answered correctly by the female applicants was 8.3759. The standard error of this mean was .2921. The difference between the two means was 3.6191, with a standard error of .3457 and a t ratio of 10.469. This ratio is significant at the 1 per cent level of confidence. The individual total of the quantitative items obtained by more female applicants than any other one was 0.3 of an item below the calculated average total of the quantitative items obtained.

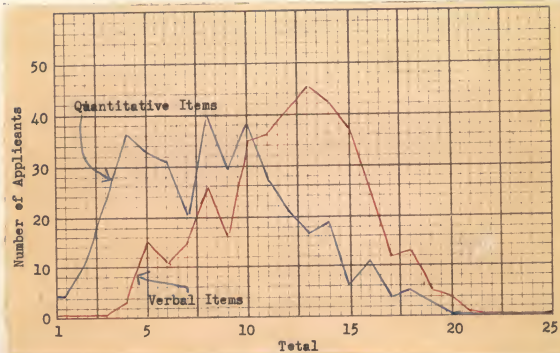


Fig. 8. Graph showing the number of female applicants in this study obtaining each individual total number of verbal or quantitative items correct. (N = 383)

The number of female applicants obtaining each individual total number of items correct appears to the left of Fig. 9. The two equally high individual total numbers of items obtained by more female applicants than any others were 24 and 26. The

calculated mean for total number of items obtained by the female applicants was 20.3707, with a standard error of .3735. Figure 9 reflects the number of female applicants in this study obtaining each individual total number of items correct, without regard to what part of each total number of the items answered correctly were verbal items and what part of each total number of the items answered correctly were quantitative items.

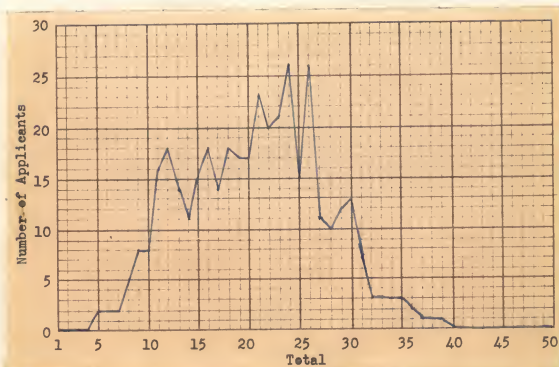


Fig. 9. Graph showing the number of female applicants in this study obtaining each individual total number of items correct. (N = 383)

The bi-serial correlation coefficients of each verbal item with the total quantitative score and of each quantitative item with the total verbal score, of all female subjects in this study

can be found through use of the scale to the left of Fig. 10. The item's number ranging from 1 through 50 appears at the bottom of Fig. 10.

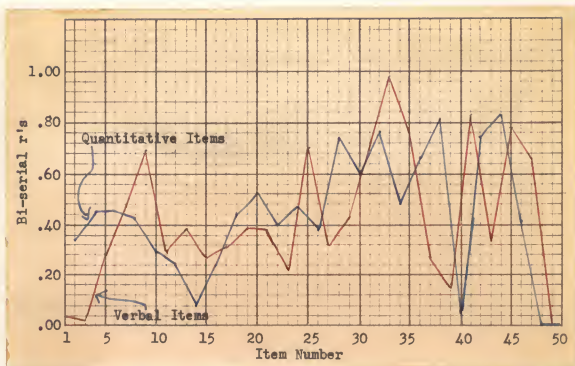


Fig. 10. Graph showing the bi-serial correlations of each verbal item with the total quantitative score and of each quantitative item with the total verbal score, as reflected on the tests of the female applicants in this study. (N = 383)

The bi-serial method for linear correlation is useful for situations in which one of the bi-variates is dichotomized rather than continuously distributed. The method is based on the assumption that the variable which is dichotomized would, if quantitatively differentiated, yield the normal bell type of distribution. The continuously distributed variable that is correlated with the dichotomized one is not, however, assumed to be normally distributed. Thus, by means of bi-serial  $r$  the most effective items can be selected for any abbreviation or revision of the test itself. (6)

The number of positions each item moved up or down from its location in the original test, as established by the female

subjects in this study, is scaled to the left of Fig. 11. The item's number ranging from 1 through 50 appears at the bottom of Fig. 11.

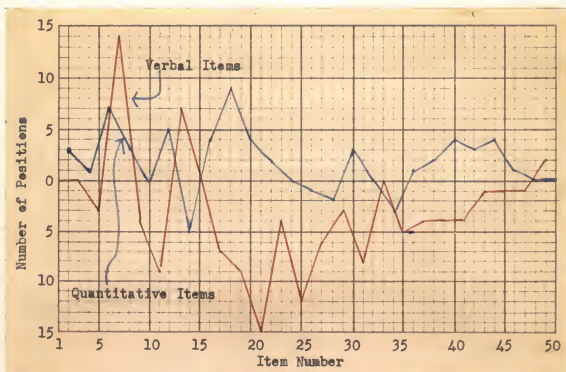


Fig. 11. Graph showing the number of positions each item moved up or down from its location in the original test, as established by the female applicants in this study. ( $N = 383$ )

Of the 50 items, 20 moved up from where they appeared in their original test, 22 moved down, and 8 appeared in the same respective location in this test as they appeared in their original test.

Of the 25 verbal items, 4 moved up from where they appeared in their original test, 18 moved down, and 3 appeared in the same respective position in this test as they appeared in their original test.

Of the 25 quantitative items, 16 moved up from where they



appeared in their original test, 4 moved down, and 5 appeared in the same respective positions in this test as they appeared in their original test.

The number of female applicants, at each respective age, of the 179 female applicants giving their age is scaled to the left of Fig. 12. The ages ranging from 18 to 61 years appear at the bottom of Fig. 12.

Of the female applicants giving their age, 90 per cent were more than 17 and less than 27 years of age. Of the 10 per cent outside of this age range, less than 1 per cent were less than 18 years of age and over 9 per cent were older than 26 years of age.

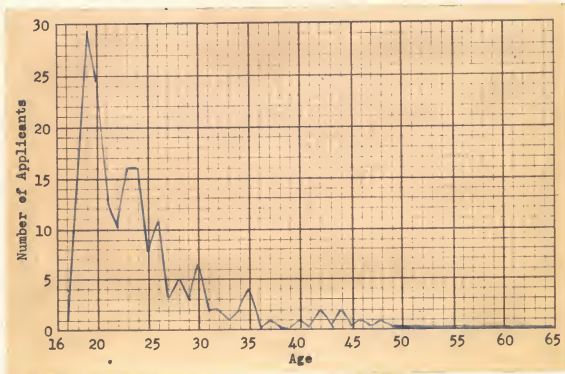


Fig. 12. Graph showing the number of applicants at each respective age of the 179 female applicants giving their age.

### Summary

The balance obtained between the verbal and the quantitative items in each group of five, after arranging the items in order, from the item answered correctly by the highest number of female applicants to the item answered correctly by the lowest number of female applicants, tends to offset the indication made by the number correctly answering each verbal item exceeding the number correctly answering the first following item in 22 of 24 possible times. The obtained curve affords a contrast to the number correctly answering each verbal item exceeding the number correctly answering the first following item in only 2 of the 24 possible times.

It is interesting to note that the total number of verbal items obtained by more female applicants than any other one, like the total number of quantitative items obtained by more applicants than any other one, varied less than one item from the respective calculated average total of items obtained by the female subjects.

Of the 9,575 possible, 4,635 verbal items were answered correctly. The correct answers to the verbal items were 48.3 per cent of the total possible. Of the 9,575 possible, 3,174 quantitative items were answered correctly which was 33.1 per cent of the total possible.

Female subjects correctly answered 1.45 times more verbal items than quantitative items. This would indicate that the

verbal items were easier for the women than the quantitative items.

The Mean of the combined scores for the female subjects was 20.3707 with a standard deviation of 7.29 (10).

The correlation of the quantitative scores with the verbal scores for the female subjects was 0.574 (1).

### Conclusions

While in the main, the items retained their level of difficulty in this test, the extreme deviations would seem to indicate that additional work should be initiated and directed toward more accurately establishing the level of difficulty of each item. As determined by the number of female applicants correctly answering each item and the bi-serial correlation of each item, this test might be improved by rearranging the order of the items.

It appears that measured individual differences through the use of quantitative sub-scores have established that for this sample of female applicants, the verbal items are easier for female subjects than the quantitative items.

The A P T form of the Wonderlic Tests represents a step forward in screening instruments designed to measure verbal and quantitative differences in individuals.

## GENERAL SUMMARY

The distribution polygon, for both the male and female subjects, connecting the coordinates representing the number of subjects correctly answering each item, produces a curve approximating the normal curve of distribution which supports the representative nature of this sample.

The weight of the items selected to be used in the A P T form of the Wonderlic Tests totaled three items more than the weight of the items in the original tests totaled, through item 25. Beyond item 25, no significant weight difference was established. The variation in total weights was confirmed by small sample by utilizing other forms of the Wonderlic in the preliminary procedures.

The  $t$  ratio of the verbal scores of the men with the verbal scores of the women was 5.440. This is over twice as large as necessary to be significant at the 1 per cent level of confidence. The distribution polygon connecting the coordinates of the individual totals of the verbal items obtained by the male subjects deviates radically from the normal distribution curve due to the heavy concentration of individual verbal item totals obtained toward the center of the range.

The  $t$  ratio of the quantitative scores of the men with the quantitative scores of the women was 10.292 which is over four times greater than necessary to be significant at the 1 per cent level of confidence.

number of quantitative items obtained was 0.5 of an item for the male subjects and 0.3 of an item for the female subjects. However, the variation in the case of the male subjects was 0.5 of an item above the computed average and the variation in the case of the female subjects was 0.3 of an item below the computed average.

It is interesting to note that in neither case of the male subjects nor the female subjects did the individual verbal score of greatest frequency for more applicants than any other one or the individual quantitative score of greatest frequency for more applicants than any other one vary as much as one whole item.

To further explore whether each item really measured an independent problem solving difference, the writer computed the bi-serial correlation for each item. To establish whether each verbal item really measured an independent verbal problem-solving difference, the bi-serial correlation of each verbal item with the total quantitative score was computed. To establish whether each quantitative item really measured an independent quantitative problem-solving difference, the bi-serial correlation of each quantitative item with the total verbal score was computed.

Of the 50 items, 20 items moved up compared to the 23 items moving down.

The male applicants correctly answered 52.1 per cent of the total possible verbal items, while the female applicants correctly answered 48.3 per cent. The male applicants correctly answered 46 per cent, while the female applicants correctly answered 33.1 per cent of the total possible quantitative items.

Although the male subjects exceeded the female subjects in the percentage of correct answers given to each of the verbal items and the quantitative items, the female subjects more closely approached the male subjects in the percentage of correct answers given to the verbal items.

The correlation of the quantitative scores with the verbal scores is 0.665 for the male subjects and 0.574 for the female subjects.

#### GENERAL CONCLUSIONS

While in the main, the items retained their level of difficulty in this test, the extreme deviations would seem to indicate that addition work should be initiated and directed toward more accurately establishing the level of difficulty of each item. The bi-serial correlations of each verbal item with the total quantitative score and each quantitative item with the total verbal score would seem to indicate that this test could be improved by rearranging the item order.

A sharp, separate, and individual distinction appeared between the verbal score on this test by the individuals and the quantitative score made on this test by the same individuals. The measured individual differences through the use of the quantitative sub-scores have established that for the applicants in this study, the verbal items are easier than the quantitative items. In this study, the female applicants much closer approached the male applicants in the number of correct answers

given to verbal items than in the number of correct answers given to quantitative items.

There is a marked group difference in the verbal and quantitative total scores on this test. The male subjects correctly answered 1/7 again as many verbal items than quantitative items, and the female subjects correctly answered 9/20 again as many verbal items as quantitative items.

The A P T form of the Wonderlic Tests represents a step forward in screening instruments designed to measure verbal and quantitative differences in individuals, with a high degree of validity through the administration of only one test. The A P T form of the Wonderlic Tests, when improved (as indicated above) can become an excellent example of this type of measurement.

## ACKNOWLEDGMENT

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A STATISTICAL APPRAISAL OF THE A P T FORM  
OF THE WONDERLIC PERSONNEL TEST

by

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AN ABSTRACT OF A THESIS

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## STATEMENT OF THE PROBLEM

The objective of this study is to evaluate the internal consistency of each item in the A P T form of the Wonderlic Tests.

In evaluating the internal consistency of each item in the A P T form of the Wonderlic Tests, the writer attempted to obtain satisfactory answers to the following questions.

1. Does each test item retain its level of difficulty when placed in a new setting?
2. Is there a sharp, separate, and individual distinction which can be measured between the verbal score and the quantitative on a test by an individual?
3. Is there a marked sex difference in the verbal and quantitative total scores on the test?

## PROCEDURE

The A P T form of the Wonderlic Personnel Test was administered by individuals trained by staff members of Associated Personnel Technicians.

The obtained results were transferred from the original test to KS 811 punch cards. The mean score and standard deviation for the men and for the women were calculated separately. The number of applicants obtaining each individual total of the verbal items and the number of applicants obtaining each individual total of the quantitative items were established. The number of applicants correctly answering each individual item was calculated. The

coefficient of correlation was calculated for the total verbal and quantitative sub-scores by the Pearson Product-Moment Formulae. In addition to the above, the validity coefficient of each item was calculated using the bi-serial coefficient of correlation methods.

#### SUMMARY

The distribution polygon, for both the male and female subjects, connecting the coordinates representing the number of subjects correctly answering each item, produces a curve approximating the normal curve of distribution.

The difference between the individual total of the verbal items obtained and the computed individual average total of the verbal items obtained was 0.9 of an item for both the male and female subjects. The distribution polygon connecting the coordinates of the individual total number of verbal items obtained by the male subjects deviates radically from the normal distribution curve due to the heavy concentration of individual verbal item totals obtained toward the center of the range. The distribution polygon connecting the coordinates of the individual totals of the verbal items obtained by the female subjects approximates the normal curve of distribution.

The difference between the individual total of the quantitative items obtained and the computed individual average total number of quantitative items obtained was 0.5 of an item for the male subjects and 0.3 of an item for the female subjects.

However, the variation in the case of the male subjects was 0.5 of an item above the computed average and the variation in the case of the female subjects was 0.3 of an item below the computed average.

Of the 50 items, 20 items moved up compared to 23 moving down.

Although the male subjects exceeded the female subjects in the percentage of correct answers given to each of the verbal items and the quantitative items, the female subjects more closely approached the male subjects in the percentage of correct answers given to the verbal items.

The correlation of the total verbal and quantitative sub-scores was 0.665 for the male subjects and 0.574 for the female subjects.