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Sex Differences and Reliabilities on Two Tests of Distance Judgment

By James A. Stone and Lewis R. Vavra

Introduction

There are relatively few studies on distance judgment cited in the psychological literature. Allgaier (1) developed a test of depth perception involving movable pegs. He found that color and size of the pegs had little effect on judgments. However, induced visual defects and astigmatism materially decrease the ability to judge distance. Visual acuity seems to be the only factor reported which is significantly correlated with distance judgment.

The purpose of the present study was to investigate sex differences in the ability to judge distance. The hypothesis set up for testing was that sex differences exist in distance judgment as measured by two tests. The experiment was an attempt to answer the following questions:

1. Will one sex group score better on the two tests used?
2. Will persons who have driven a great deal and those with good visual acuity have better distance judgment scores?

Apparatus, Method and Procedure

Groups of 20 male and 20 female college students were given eight trials each on each of two tests of distance judgment. Order of presentation of the two tests, designated as Test I and Test II, was alternated to minimize practice effects. The vision of each subject was tested before the experiment. In both tests the subject observes miniature model cars through a mirror and lines up a specified point of the cars with pegs. Each score was recorded according to the number of errors.

In Test I, an adaptation of Allgaier's technique, the mirror can be set for three different distances from the eye of the observer, spaced as follows:

Near reading	62 inches
Middle reading	84½ inches
Far reading	108 inches

For these three readings, the distance of the center peg to the mirror is 39 inches, 62 inches, and 86 inches, respectively. Four toy cars are used, each 3½ inches long, which are manipulated by strings underneath the floor of the apparatus. Three pegs are spaced at intervals across the board. The overall length of the apparatus is 123 inches. (Figure I.)

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In Test II the mirror is stationary at 71 inches from the eye of the observer. Six toy cars, colored red, green, white, black, blue and yellow, and each 4 inches long, are manipulated by means of six knobs, three on each side of the apparatus. The cars run on a light friction pulley. Three pegs, colored white, red, and blue, are all located at the left-hand side. The distance of the mirror to the nearest peg is 32 inches, to the middle peg is 36 inches, and to the far peg 40 inches. The overall length of the apparatus is 71 inches. (Figure II.)

Results

T-tests were run between the scores of the men and women. The results are shown in Table 1.

Table 1

Tests of Significance Between Scores of Men and Women for Test I, Test II, and Total Score

	Men	Women	M diff.	σmd	t	DF
Total Score	133.90	156.00	22.10	16.05	1.37	38
Test I	40.84	54.14	13.30	5.03	2.64*	38
Test II	93.06	101.86	8.80	15.79	.56	38

*Significant at the 5% level of confidence.

Each sex group was ranked according to the number of miles driven, and was then divided into a low and a high mileage group. For the men the mileage driven ranged from 100 to 15,000 miles for the low group, and 15,000 to 400,000 miles for the high group. For the women, the range was 10 to 1,500 miles for the low group, and 3,000 to 80,000 miles for the high group. Tests of significance revealed no difference in favor of the high mileage groups.

Biserial correlations between scores on the two tests were +.38 for the men and —.44 for the women. When visual acuity was correlated with test scores for men and women the r's ranged from —.04 to —.26; none of these correlations was significant. Odd-even reliabilities for the two tests were found, using the Pearson Product Moment method. The reliability of Test I was +.69 and of Test II +.86. When corrected by the Spearman-Brown formula for tests with half the number of trials, the reliabilities became +.52 for Test I and +.76 for Test II.

Discussion

Men did significantly better than women on Test I. Mean differences for Test II and for total score favored the men, but the differences were not statistically significant. These differences may be

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due to some mechanical component in the tests which favored the men's performances.

Another possible explanation for the better scores of the men was that they had driven more miles than the women. But since no significant difference in scores was found between low and high mileage groups for either men or women, mileage driven does not seem to affect test performance. Likewise, the fact that no significant differences were found between high and low acuity groups indicates that visual acuity does not affect performance. However, it must be pointed out that the groups were relatively homogeneous in these characteristics.

The odd-even reliabilities for the two tests, corrected by the Spearman-Brown formula, indicates that if Test II was used with half the number of trials, i.e., four, it would still be quite reliable. But the reliability of Test I would be cut substantially if its length were halved; therefore it should be used with the full eight trials.

The negative correlation for women's scores on the two tests is not understood and a repetition on a relatively small group of other female subjects gave similar results. Further study of this problem is being made and until this is completed no explanation can be made. This result is contrary to all logic and expectations.

Summary and Conclusions

A study was made to determine sex differences on two tests of distance judgment, using 20 men and 20 women subjects. The tests involved lining up midget cars with pegs. A significant difference in favor of the men was found for scores on Test I. It was found that the number of miles driven and visual acuity did not significantly correlate with scores on the tests.

Although the number of cases was limited it seems in order to make the following tentative conclusions subject to the other limitations of the experiment.

1. Scores made on apparatus designed to measure this ability seem to be a function of the apparatus used.
2. Women are more sensitive to these effects of the apparatus than men.
3. Further study of the correlates of this function need to be made.

Literature Cited

1. Allgaier, Earl. Visual Factors in Space Perception. Unpublished M.S. thesis. Ames, Iowa, Iowa State College library. 1935.

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