

1953

## Motor Learning in College Students and Mental Defectives

Robert F. Boldt  
*Iowa State College*

*Let us know how access to this document benefits you*

Copyright ©1953 Iowa Academy of Science, Inc.

Follow this and additional works at: <https://scholarworks.uni.edu/pias>

---

### Recommended Citation

Boldt, Robert F. (1953) "Motor Learning in College Students and Mental Defectives," *Proceedings of the Iowa Academy of Science*, 60(1), 500-505.

Available at: <https://scholarworks.uni.edu/pias/vol60/iss1/65>

This Research is brought to you for free and open access by the Iowa Academy of Science at UNI ScholarWorks. It has been accepted for inclusion in Proceedings of the Iowa Academy of Science by an authorized editor of UNI ScholarWorks. For more information, please contact [scholarworks@uni.edu](mailto:scholarworks@uni.edu).

## Motor Learning in College Students and Mental Defectives\*

BY ROBERT F. BOLDT

One criticism of modern behavior theory is that it has not been tested over a wide range of human differences. Without experimental evidence, one cannot be sure that manipulations which produce effects observable in college students, for example, will produce similar effects over a wide range of human differences. However, theories are often tested on college students. Consequently, there is a need for evidence that effects observed in the performance of college students may be observed in other groups.

The main purpose of the present study is to test whether certain experimental variables produce similar effects over two individual difference variables. These individual difference variables are represented by samples of male and female college students and mental defectives. The experimental variables were effort per response, distribution of practice, and stage of practice.

It is felt that performance patterns will be similar in all samples, but that the amount of treatment effects may not be the same. It is also felt that some basis is available for predicting the nature of these quantitative differences.

Sloan (3) found that mental defectives perform less proficiently on a motor task than do normals. In his book, Whipple (5) reports several studies which demonstrate positive relationships between intelligence and tests of strength.

On the basis of Sloan's study, one would predict that mental defectives will not perform as well on a motor task as would normals. On the basis of Whipple's reports, one might infer that mental defectives must exert more effort relative to the subject in order to complete the same task, since they are weaker. For this reason, predictions of differential performance patterns between institutional groups, aside from the general rate of response, will be made as if the mental defectives were responding at a higher level of effortfulness than the college students.

---

\*Thanks are due to Dr. Grace Sawyer, and Miss E. J. Seymour, Chief Psychologist, of the Woodward State Hospital and to Dr. Don Charles of Iowa State College for their assistance. Special thanks are due to Dr. D. S. Ellis of Iowa State College whose guidance and encouragement are deeply appreciated.

For the sex variable, the prediction will follow a similar pattern. Investigation of norms of physical tests of gross strength, hand strength, etc., indicate that women are, in general, not as strong as men. Therefore, the predictions for sex differences in performance patterns will be made as if the females were responding at a higher level of effortfulness than the males.

From a behavior theory standpoint, the present study is concerned with the effects in the early stages of practice of variation of task effortfulness. Response modes of differing efficiency may be utilized in performance. Inefficient response modes will generate more fatigue than efficient modes. Consequently, inefficient response modes will tend to be discarded sooner than efficient ones. If the rate of generation of fatigue can be considered as being positively related to response effortfulness, inefficient response modes will be discarded sooner under high effort conditions than under low effort conditions. Therefore, performance curves under high levels of response effortfulness should be steeper in the early stages of practice than those under low conditions of response effortfulness. This prediction may also be derived more formally from Hull's theory (2).

This study, then, has three purposes:

(1) to determine whether or not some common experimental manipulations have similar effects for mental defectives and college students, and for males and females.

(2) to test the hypothesis that differences which may occur between levels of the individual difference variables are predictable on the basis of response effortfulness.

(3) to test the hypothesis that subjects performing at high levels of response effortfulness will have a steeper learning curve in the early stages of practice than subjects performing at lower levels of effortfulness.

#### METHOD

Thirty male and thirty female mental defectives were randomly selected from a group of patients at the Woodward State Hospital for Feebleminded and Epileptics at Woodward, Iowa. The group from which they were chosen consisted of patients of age 15 to 30 with a Wechsler-Bellevue (form 1) verbal IQ not under 50, estimated mental age not under 7 years, no organic involvement (which excluded the epileptics), and 5 useable fingers per hand.

The college group consisted of 30 male and 30 female students randomly chosen from beginning psychology courses at Iowa State College.

The task was a block turning task with 10 blocks arranged in a

<https://scholarworks.uni.edu/pias/vol60/iss1/65>

single row. A trial was defined as the period required to turn 10 blocks. Each subject had 30 trials.

A massed and a distributed practice condition were included. The subjects assigned to the distributed practice condition had 30 seconds of rest between trials.

In order to vary effort per response, three conditions of block weight were introduced. The block weights were approximately 1 oz., 6 oz., and 11 oz.

RESULTS

Application of Bartlett's *chi-square* test (4) indicated that the variance was not homogeneous. For reasons too technical to be discussed in this paper, it was decided that the analysis could be considered adequate as it stands, with one exception. In order to compare treatment effects within institutions it was necessary to compute separate analyses of the data from each institution.

Since each subject worked at only one condition of each treatment over 30 stages of practice, the data were analysed as a split plot design. A description of this type of analysis may be found in *Experimental Designs* by Cochran and Cox (1). Due to limitations of space, the analyses of variance will not be presented. The results will be summarized.

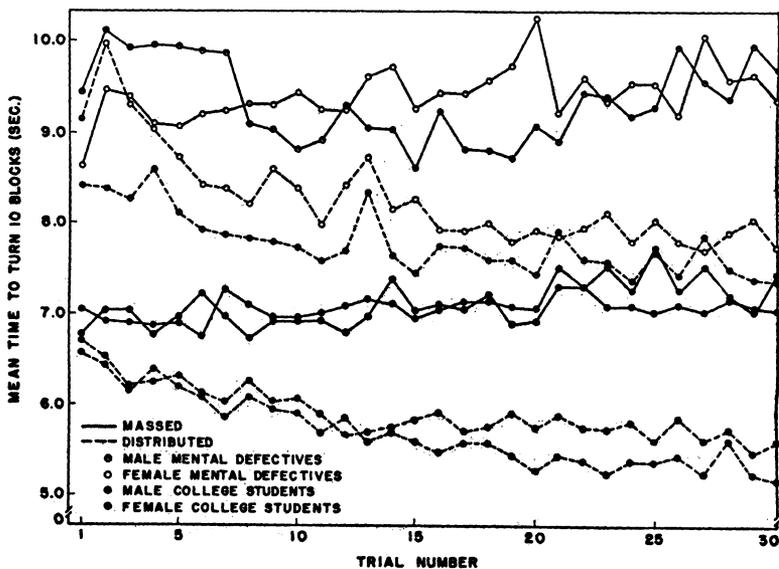


Fig. 1. Performance curves broken down by institution, sex, distribution, and stage of practice.

Figure 1 presents the performance curves broken down by insti-

tution, sex, distribution, and stage of practice. *N* for each point equals 15.

Distribution of practice had its usual facilitating effect. Although the mental defectives performed at a lower rate than the college students, distribution facilitated performance about the same at both institutions. However, it did not effect sex differences in the same manner at both institutions. The male mental defectives had an initial disadvantage under massed practice but gained the advantage later on, while the males under distributed practice had the advantage at almost all stages of practice. For the college students, there was no sex effect on distribution effects.

The main effect of effort, and its interactions were not sources of significant variation.

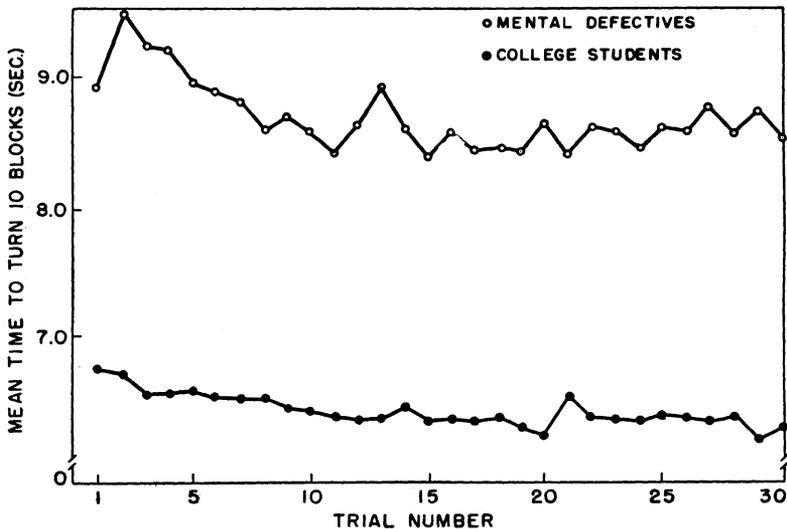


Fig. 2. Performance curves of the institutional groups.

Figure 2 present performance curves for the two institutions. *N* for each point equals 60. Note that in the early stages of practice there is a steeper slope in the curve for the mental defectives than there is for the college students.

DISCUSSION

The major results of this study may be summarized as follows:

(1) the mental defectives performed at a lower rate at almost all stages of practice but improved faster than the college students in the early stages of practice.

(2) the experimental manipulation of task effortfulness did not

(3) distribution of practice had the same effect in both institutional groups, but sex differences in response to distribution were not the same at both institutions.

The steeper slope of the performance curve of the mental defectives presents some evidence that response effortfulness is a variable which may be used to predict differential performance between college students and mental defectives, since it is in agreement with the hypothesis based on variation of task effort. However, the study has not shown the operational validity of the prediction of differential performance slopes due to variation of task effort. Perhaps the reason is that the experimental variation of task effortfulness was not large enough to produce the desired effects. This points up a need for research with greater variation of task effort.

The sex differences noted are certainly not in accord with the hypothesis based on response effortfulness. The inference is that, for light tasks of this sort, response effortfulness does not provide an adequate basis for predicting differential sex patterns in performance.

Within samples, the experimental manipulations had the same effects, or lack of effects. This suggests that motor performance is subject to the same general principles over a wide range of human differences. At the same time, however, one must be cautious in generalizing these results to other experimental manipulations. Probably, there are experimental manipulations which will produce different effects in different populations. This implies a need for similar experimentation with other variables.

#### SUMMARY

The present study has three main purposes:

(1) to determine whether or not some common experimental manipulations have similar effects for mental defectives and college students, and for males and females.

(2) to test the hypothesis that those differences which might occur between levels of the individual difference variables are predictable on the basis of response effortfulness.

(3) to test the hypothesis that subjects performing at high levels of effortfulness relative to the subject have a steeper performance curve in the early stages of practice than subjects performing at lower levels of effortfulness.

The experimental manipulations chosen were effortfulness of response, indexed by block weight, distribution of practice, and stage of practice. Early in practice the learning curve of the mental de-

fectives was steeper than that of the college students, as predicted. However, the experimental manipulation of effort per response was ineffective. It was felt that this might be due to the small amount of difference of block weight.

Performance differences between the sexes were not the same at both institutions. The pattern of this effect was not in accord with the prediction based on response effortfulness, however. The inference was that for tasks of this sort, effort relative to the individual is not a good basis for predicting sex differences in performance patterns.

In general, the interactions of the individual difference variables were such that this study may be considered evidence that principles of motor learning derived on college students need not be restricted in their application to that group alone. However, the danger of extrapolation of the results to other experimental manipulations was pointed out. Further research was suggested.

#### References

1. Cochran, W. G., and Cox, G. M., *Experimental Designs*, New York, John Wiley and Sons, Inc., 1950.
2. Hull, C. L., *Principles of Behavior*, New York, Appleton-Century-Crofts, Inc., 1943.
3. Sloan, William, Motor proficiency and intelligence, *Am. J. Ment. Def.*, 1951, 55, 394-406.
4. Snedecor, G. W. *Statistical Methods*, Ames, Ia., Iowa State College Press, 1946.
5. Whipple, G. M., *Manual of Mental and Physical Tests*, Baltimore, Warwick and York, 1910.

DEPARTMENT OF PSYCHOLOGY

IOWA STATE COLLEGE

AMES, IOWA