AN ANALYSIS OF LEARNING DATA WHICH DISTINGUISHES BETWEEN INITIAL PREFERENCE AND LEARNING ABILITY*

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* The author wishes to acknowledge financial assistance from the Social Science Research Committee of the University of Chicago in the completion of this study.

Several sets of learning data furnished by I. Krechevsky have been analyzed in terms of meaningful parameters of the learning curve, and the changes in the frequency distributions of these parameters with changes in the experimental conditions have been studied. One of the parameters represents the animal's initial preference for the light or dark, the other represents learning ability. The analysis shows that destruction of about ten or fifteen per cent. of the cortex, increases the animal's preference for the light and decreases the learning ability slightly. By ordinary methods of analysis, it is not possible to discover that both initial preference and learning ability have been changed by any given factor.

The purpose of this paper is to show how the psychological interpretation of learning records is facilitated by analyzing them in terms of certain parameters of a learning curve equation. Some of the difficulties in the conventional mode of analysis will be considered together with the attempt to overcome these difficulties by Ruch and Thorndike's method of "common points of mastery." A new method of analyzing learning data in terms of the parameters of the learning curve will then be presented and applied to some learning data gathered by Krechevsky. It is believed that this new method of analysis retains the advantages and avoids some of the disadvantages of the method of "common points of mastery."

Common Points of Mastery

Learning data are usually analyzed in terms of three different measures of the learning performance: (1) the total time taken by the subject to reach a given criterion of accuracy; (2) the total number of errors made in reaching this criterion; or (3) the total number of trials necessary to reach this criterion.

These three measures of learning performance all have the same defect—they are influenced by several different psychologically important factors. The subject's "score" whether measured in time, errors, or trials is influenced partly by the learning ability of the subject, partly by the subject's initial competence in the task, and

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partly by the criterion of excellence required by the experimenter. For example, if one subject takes fewer trials than another to learn a task, it may be because he started at a higher level of initial competence, or because he learned more rapidly, or because of some combination of both of these factors. A similar ambiguity obtains when subjects are compared in terms of total errors or total time.

In order to avoid this difficulty and obtain some indication of the subject's learning ability which is independent of the subject's initial competence, Ruch (7) and Thorndike (9) suggested the method of "common points of mastery." In using this method on a group of learning records the experimenter ignores all scores below the best initial performance. This insures that all persons will start at the same initial score. "Common" final scores are secured by discarding all records above the poorest final performance. Having "common" initial and final scores for a group of subjects, it is then possible to determine, the time, errors, or trials made by the subjects between these two common points of mastery.

It is clear that this procedure requires the experimenter to discard a great deal of the data, but advocates of the method maintain that the gain in the precision and meaningfulness of the measures obtained is more important than the loss of a certain amount of data. Ruch (7) has pointed out that the method assumes that the rate of progress a person makes from the initial common point of mastery is independent of the method by which he reached that point. In a typing-writing experiment, will a person who reaches twenty-five words per minute during the experiment, having started at ten words per minute progress beyond that rate more or less rapidly than he would if he began at twenty-five words per minute because he had had considerable previous experience in typing? As Ruch points out, this question is one of experimental fact and could be determined by proper experimental procedures.

Another weakness of the method is that it fails to take adequate account of the effect of differences in final level of performance which will be reached by different subjects. For example, one would expect a person whose top typing speed was seventy-five words per minute to take much longer to improve from sixty to seventy words per minute than would a person whose top typing speed was 120 words per minute. Yet relative to his own final performance both persons might be improving with equal rapidity.

**Derivation**

It is possible to retain the advantages of the method of "common points of mastery" and to overcome some of the disadvantages of this