A RECRUITMENT THEORY OF SIMPLE BEHAVIOR*

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A statistical theory of choice is developed using a sequential sampling assumption. Response latency distributions for certain simple reaction-time situations are derived and tested. Both response probability and response latency measures are developed for a two-alternative judgment situation and the relationship between the two measures explored. The sampling parameter is proposed as a means of representing incentive conditions in choice situations and ROC curves are obtained by appropriate manipulations of this parameter. A solution to the overlap problem in simple discrimination-learning situations is also derived.

The distinctive features of the present theory arise from considerations of the sequence of stimulus events perceived by the organism when it is confronted with a choice. The theoretical framework representing the accumulation of stimulus events of the input process yields its predictions most directly in terms of temporal aspects of responding, while derivations of frequency aspects of responding follow secondarily. It is hoped that this approach may provide a somewhat richer base for describing behavior than has been the case when theories are formulated mainly to describe behavior in terms of relative frequencies of responses.

In its present form, the theory is intended to apply to simplified situations in which the subject responds in a prompt manner, without encountering delays produced by orienting responses, hesitation responses, and the like. If initial tests of the theory prove favorable, then we may consider extensions which seem necessary to account for more complicated situations, such as those involving a series of preparatory responses prior to the occurrence of the choice response.

In the present exposition of the theory, we will be concerned chiefly with stable behavior situations, such as are typically attained after a series of learning trials has brought responding to asymptote. Although we may point out particular implications for learning theory in the ensuing discussions, a comprehensive development of theoretical consequences for the learning process will be postponed at this time.

The plan of the paper is to begin with a general description of the basic

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assumptions of the theory. Following this, the theory will be applied first to simple reaction-time experiments, and then to a particular class of choice situations. We will derive predictions for several important relationships in each of these situations and test some of these predictions against empirical findings.

Definitions and Assumptions

This theory is intended initially to apply to simple judgment situations in which the subject is presented with a single stimulus and is required to make a judgment by responding with one of a set of response alternatives. A typical example of this situation is a simple two-choice intensity discrimination where the subject judges the intensity of a light by pressing one button to indicate the higher intensity, and a second button to indicate the lower intensity. Applications of the theory to the other large category of choice situations, the preference experiment, will not be considered at this time. Preference experiments, which involve a choice among several stimuli presented on a given trial, typically induce the subject to make more than one response per trial. That is, he usually performs several orienting, or VTE, responses toward the various stimuli before he makes a terminal choice response. In this paper we will be interested in the detailed analysis of the characteristics of a single response, and therefore it would seem appropriate to postpone the more complex analysis of the sequence of responses of the preference situation.

In this presentation a trial will involve the following events. Initiating the trial will be a stimulus, followed by one of a set of response alternatives. Following the response, there will occur typically one of a set of outcomes, such as the flashing of a red light over one of the response keys to indicate a correct response. These three events of a trial will be designated in the traditional manner [10] as follows.

\[ S_i \] \quad i\text{th stimulus alternative.} \\
\[ A_j \] \quad j\text{th response alternative.} \\
\[ E_k \] \quad k\text{th outcome alternative.}

Stimulus assumptions

The stimulus on a given trial is broadly conceived as the total of all input components to the organism's decision process. We represent these input stimuli in the theory by a finite set of elements. This set is partitioned typically into subsets of elements as follows.

\[ C_i \] The subset of elements connected to the \( j \text{th response} \) \((j = 1, 2, \ldots)\).

\[ C_0 \] The subset of neutral elements which are connected to none of the response alternatives.