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Stimulus durations and stimulus characteristics in paired-associates learning.

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Table of Contents

List of Tables and Figures

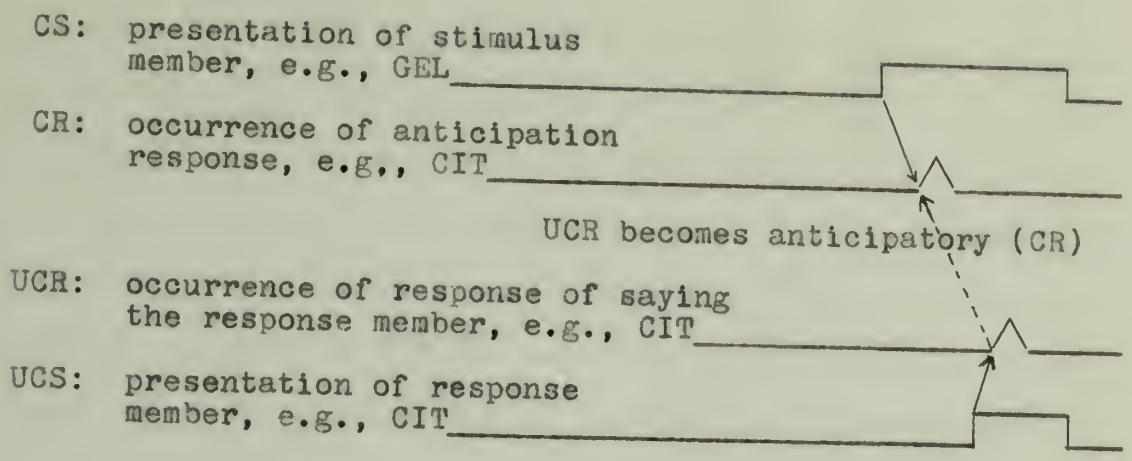
Introduction

Experiments on effects of temporal attributes of the presentation of stimulus and response members of paired-associate (PA) units have been infrequent and limited in scope. The primary objective of the present experiment, therefore, was to investigate PA learning as functions of duration of presentation of the stimulus member of each pair alone (St duration), and of duration of presentation of the stimulus member and response member of each pair together (R duration).

Both meaningfulness (M) and similarity (Sim) of stimulus and response members have pronounced effects on PA learning. On grounds noted subsequently, it was hypothesized that differences among acquisition rates for different combinations of M and Sim of stimuli would be functions of St and R durations. The secondary objective of the present experiment, therefore, was to obtain information about effects of stimulus characteristics under different combinations of durations.

St and R Durations

Various theorists have assumed a parallelism between the stimulus-response elements and relationships of classical conditioning and those elements and relationships involved in acquisition of the correct response of single PA units (e.g., Gibson, 1940; Goss, Morgan, & Golin, 1959; Spiker, 1960). Shown schematically for the anticipation technique of presentation, the assumed parallelism is:



The stimulus member of a pair, which is usually selected to have low or zero initial probability of evoking the response of saying the response member, can be considered a CS. When the stimulus member begins to evoke the response of saying the response member before the response member occurs, such anticipations can be considered CRs. The response member and response of saying that member can be considered analogous to the UCS-UCR relationship. More specifically, the particular relationship between exposure of stimulus and response members which is schematized could be considered homologous to classical delay conditioning in which the CS appears before and remains on during the occurrence of the UCS in contrast to classical trace conditioning in which CS onset and offset is before occurrence of the UCS (Kimble, 1961, pp. 47-48).

Temporal variables have been rather extensively explored in classical conditioning (Kimble, 1961, pp. 155-160). But, despite the parallelism between classical conditioning and the relationships of acquiring the correct response in PA

learning, the St and R durations of PA learning have received little attention. Regardless of the parallelism between PA learning and classical conditioning, within the framework of classical associationism as well as for practical purposes, such as design of teaching machines, information is desirable about PA learning as a function of St and R durations. However, in the last 50 years, only a few studies have been concerned with the effects of these and closely related temporal variables. In only three studies have both the St duration and the R duration been varied (Hovland, 1949; Goss, Morgan, & Golin, 1959; Wilcoxon, Wilson, & Wise, 1961).

Early attempts to investigate effects on PA learning of temporal aspects of the presentation of stimulus and response members were mainly concerned with strength of association as a function of the interval between presentation of the stimulus member and presentation of the response member using a "trace conditioning" procedure. The criterion for acquisition was number of responses correctly recalled. Wohlgemuth (1914) compared effects of simultaneous and successive presentation of stimulus and response members. He discounted a preliminary finding of the superiority of the successive method on grounds that the total time for successive presentation of each pair of stimulus and response members had been twice that for simultaneous presentation of pairs. Twenty-four color-figure pairs were presented under two conditions. One condition was simultaneous presentation for twice as long as successive presentation but with equal numbers of

presentations. The other condition was equal length of presentation but twice as many presentations under simultaneous as under successive. Under both conditions, simultaneous presentation produced better recall than successive. Unfortunately, Wohlgemuth presented either the stimulus member or the response member of a pair as the stimulus for recall and did not separate scores for backward recall from those for forward recall. Therefore, no general conclusions can be derived from these data.

Froeberg's (1918) objection to the first condition of presentation of Wolgemuth's main experiment was the apparent assumption that strength of an association depends only upon length of presentation of the stimuli regardless of contiguity or noncontiguity of stimulus and response members. In Froeberg's first experiment, each S learned different 5-pair lists of nonsense syllables under a simultaneous condition, and under six different intervals between disappearance of a stimulus member and presentation of its response member. The successive intervals were from 0 to 5 sec. in 1-sec. steps. Stimulus and response members of a pair were each exposed for .33 to .25 sec. Performance with the 5-sec. successive interval was as good as performance with the 0-sec. interval. However, on the average, there were 12% more correct recalls following experiences under the simultaneous than under the six successive conditions.

Though the superiority of simultaneous to successive presentation had not been significant, Froeberg considered it

sufficient to justify a second experiment in which colors and letters of the alphabet replaced the nonsense syllables. With these materials, successive presentation was slightly but not significantly superior to simultaneous. Froeberg attributed the superiority of successive presentation to the requirement that with colors and letters each member of a pair had to be attended to separately. In a further experiment with the same materials, Ss read aloud 2-digit numbers inserted between presentation of the stimulus and response member of a pair "to eliminate the persisting memory images during the interval" (p. 161). Simultaneous presentation was superior to successive with an irregular decrease in the number of correct responses for longer intervals between stimulus and response members.

Guthrie (1933), in an experiment similar to Wohlgemuth's, had each S practice seven trials with figure-word and word-figure series in counterbalanced order. These series were presented under successive intervals of 2.55, 3.33, and 4.93 sec. between onset of a stimulus member and onset of its response member. On the subsequent test, there was no difference between forward or backward recall of the words; the longer the interval, the better the recall. Another group of Ss was then run under simultaneous presentation of stimulus and response members for .41 sec. The mean number recalled after training under this condition was greater than the means for forward or backward recall after training with the 2.55-sec. interval but less than means for the longer intervals.

In the Wohlgemuth, Froeberg, and Guthrie experiments, Grier (1960) contends, effects of temporal intervals of stimulus and response terms were confounded with learning the terms as such. In order to minimize the latter process, he used seven letters of the alphabet as stimulus members and digits from 2 to 8 as response members. The list was learned with eight intervals between offset of stimulus members and onset of response members from -2 to +5 sec. Stimulus and response members of a pair were each presented for 2 sec. Length of interval had essentially no effect on correct responses in the recall trial which followed the one learning trial.

In these studies, acquisition was tested by one recall trial; consequently, there were no learning curves. Also, the "trace conditioning" presentation of stimulus and response members differs markedly from the currently conventional "delay conditioning" presentation of stimulus and response members. Thus, the resultant findings are primarily suggestive of the potential importance for PA learning of the interval between offset of the stimulus member and onset of the response member.

Suggestive of the importance of the St and R durations are findings of comparisons of learning under prompting and under confirmation conditions of presentation. Prompting has involved presentation of the stimulus member simultaneously or shortly before the response member. Confirmation resembles trace conditioning: the stimulus member is presented and

removed, Ss anticipate the response member, and the response member is presented. In order to compare acquisition under these two conditions, every nth trial is a recall test in which the stimulus members are presented alone. Thus, the two conditions represent variations in St durations with essentially equal R durations. In general, prompting has proved superior to confirmation (Cook, 1958; Cook & Kendler, 1956; Cook & Spitzer, 1960; Kopstein & Roshal, 1955; Sidowski, Kopstein, & Shillestad, 1961). Kopstein and Roshal interpreted their results which favor prompting over confirmation as due to longer R duration under prompting than under confirmation, which may also be the basis of Sidowski, Kopstein and Shillestad's finding of fewer errors under prompting than under confirmation. Cook and Spitzer note that the longer "S-R" delay with confirmation than prompting may be a source of interference with the association of paired stimulus and response members. Limiting the usefulness of these results for understanding effects of the St and R durations are the use of only two St durations, and no manipulation of R duration.

The St and R durations were varied jointly, but in confounded fashion, in three studies. Hovland (1949) used 1- or 2-sec. St durations with 1- or 2-sec. R durations, respectively, to yield combinations of 1-sec. St and 1-sec. R durations (1:1 sec.) and of 2-sec. St and 2-sec. R durations (2:2 sec.). His major concern was whether practice was due to differences in rate of responding. Under both distributed and massed practice about twice as many trials were required to reach

criterion under the 1:1-sec. duration than under the 2:2-sec. duration. No information was provided on the interaction of durations and distribution of practice.

Goss, Morgan, and Golin (1959) investigated PA learning as a function of percentage of occurrence of response members (%ORM) under 2:2- and 3:3-sec. durations. With 100%, 75%, 50% and 25% schedules, respectively, 51%, 85%, 103%, and 60% more trials were required to reach a 7/8 criterion under the 2:2-sec. duration than under the 3:3-sec. duration. The 7/8 criterion was less stringent than Hovland's two successive perfect trials and there were various other differences between conditions of the two studies. Durations accounted for 84% of the total variance of trials to criterion; but durations did not interact with %ORM.

Wilcoxon, Wilson, and Wise (1961) used lists of 4, 6 or 8 PA units which were each learned under 1:1-, 2:2-, and 4:4-sec. durations with 100%, 50%, and 25% ORM. For all combinations of length of list and %ORM, there was a direct relationship between speed of learning and length of St and R durations. In the analysis of variance of square-root transformations of trials to criterion, durations accounted for 76% of the total variance.

All three studies suggest that St and R durations may be important variables, at least with respect to trials to criterion, though not necessarily with respect to total learning time. Further, the results of the latter two studies suggest that the St and R durations may have greater relative effects

on trials to criterion than %ORM, length of list, or distribution of practice. However, the confounding of St and R durations precludes information about separate and joint effects of these two variables.

The primary objective of the present experiment was to investigate the effects of independent variations of St duration and R duration on PA learning. Thus both separate and joint effects of durations could be assessed.

Several analyses of PA learning (e.g., Sheffield, 1946; Underwood & Schulz, 1960) have distinguished the process of learning or integrating responses from the process of associating those responses with their paired stimulus members. In addition, Goss, Nodine, Gregory, Taub, and Kennedy (1962) have suggested that once responses are correctly associated with their paired stimulus members, latency of those stimulus-responses associations must be reduced so that a response can be evoked and completed in the St duration. Standish and Champion (1960) present curves which not only show a progressive increase in speeds but also suggest that curves for easy items are negatively accelerated throughout while those for hard items are first positively and then negatively accelerated. Brown and Huda (1961) report faster reduction of latency under spaced than under massed conditions.

St durations may be so short that, even though a response is correctly associated with a stimulus member, the response cannot be evoked and completed within the time available. Very short CS-UCS intervals in classical delay and classical

trace conditioning pose the same problem. Therefore, as in classical conditioning, some procedure is necessary to determine the degree to which responses have been associated with their paired stimulus members somewhat independently of latency of those associations and of limitations inherent in short anticipation intervals. The procedure of the present experiment was a recall test after every five acquisition trials with an anticipation technique of presentation. During recall tests each stimulus member alone was presented for 4 sec., the longest St duration. Interpolation of recall-test trials reduces %ORM from 100% to 83.3%; but available data suggest that this should have little or no effect on acquisition rate (Goss, Morgan, & Golin, 1959; Schulz & Runquist, 1960). In any event, the reduction was the same across conditions.

M and Sim of Stimulus and Response Members

M and Sim of stimulus and response members are known to influence rate of acquisition of correct responses of PA units (Goss, 1963; Goss, Nodine, Gregory, Taub, & Kennedy, 1962; Underwood & Schulz, 1960). Acquisition rate is related directly to M of stimulus and of response members with M of response members usually more potent than M of stimulus members. Acquisition rate is inversely related to Sim of stimulus and of response members with Sim of stimulus members usually more potent than Sim of response members.

Stimulus integration and response integration or strictly, integration of responses to stimulus and response members

are among the processes which presumably underlie effects of Sim and M of stimulus and response members on PA learning (Goss, 1963). The earlier and more complete the integration of response members, the sooner they are available for association with appropriate stimulus members and for reduction in the latency of resultant correct associations. The earlier and more complete the selection and integration of responses to the most distinctive features of stimulus members, the sooner maximum differentiation of those members is achieved. The more differentiated the stimulus members, the faster the formation of associations between response members and appropriate stimulus members.

Integration of stimulus and response members should vary directly with frequency and duration of experiences with those members. Meaningfulness is conceived as a direct indicant of integration of stimuli. Thus, the amount of further integration of stimuli required in PA learning should be less with stimuli of high M than with stimuli of low M. Increasing St and R durations provides more opportunity for integration of stimuli through rehearsal. Therefore, differences in acquisition rates due to M of stimulus and response members should decrease as functions of St and R durations.

With increasing Sim, more time should be necessary for selection and integration of responses to the most distinctive features of stimulus members and, perhaps, of response members. Therefore, differences in acquisition rates due to Sim of stimulus and response members should also decrease as

functions of St and R durations. For Sim and M combined, the expected effects are decreasing differences among pairs representing different combinations of Sim and M of stimulus and response members under progressively longer St and R durations.

Method

Subjects

Data are reported on 160 undergraduates drawn from the introductory psychology courses at the University of Massachusetts. A total of 10 Ss, five males and five females, were assigned to each of the 16 combinations of St and R durations in order of his or her appearance. Each S was run individually by one of two male Es. One E ran three counterbalanced cycles (48 Ss); the other E ran seven counterbalanced cycles (112 Ss).

Data on 12 additional Ss were discarded because of Es' errors (N = 3), apparatus failure (N = 2), Ss' failure to learn by the end of the experimental session (N = 6), or S's failure to follow instructions (N = 1). Since these Ss were distributed among the 16 combinations of durations there is little likelihood that the results were influenced by differential elimination of Ss from some few combinations.

Apparatus

The apparatus components consisted of an electronic memory drum (Gordon H. Stowe & Associates, Model 459B); a Hunter Klock Kounter (Model 120); a Gerbrands electronic voice key; and an Electro-Voice spherical microphone (Spherex 920).

Rotation of the memory drum and activation of the shutter mechanism were electronically controlled in a manner which permitted independent variation of St duration and R duration. The drum was driven by a constant-speed electric motor.

During the presentation of each pair, the drum was held in a stall position by a solenoid-operated escapement lever. Activation of the solenoid released this lever momentarily, allowing the drum to rotate one step. Simultaneously, activation of a second solenoid lowered the shutter for initial concealment of the response member of the next stimulus-response pair. After a specified duration had elapsed, deactivation of the second solenoid released the shutter which was returned to its original position by a spring to expose the response member. After the specified duration of exposure of stimulus member and response member together, the solenoids were again activated to present the next pair. When all pairs of the list had been presented the drum was stopped and, after the intertrial interval had elapsed, started for the next trial.

The voice key and microphone were used to obtain latencies of Ss' responses. A leaf-type microswitch was attached to the shutter housing so that downward excursion of the shutter started the clock. Since downward excursion of the shutter and rotation of the drum were simultaneous, the clock started as each stimulus member appeared. Speaking into the microphone, which S held just below his mouth, activated the voice key to stop the clock. When Ss failed to respond within the St duration, release of the microswitch by upward excursion of the shutter stopped the clock. The timer and voice key were reset manually during the R interval prior to rotation of the drum to the next pair.

List

The list was made up of 16 pairs of consonant-vowel-consonant (CVC) trigrams. Each pair represented one of the 16 possible combinations of high or low Sim and high or low M of both stimulus and response members. Table 1 shows these pairs.

Particular combinations of Sim and M of response members are coded by a letter code in which the first L or H indicates low or high Sim and the second L or H indicates low or high M. Combinations of Sim and M of stimulus members are coded in the same manner. Thus, any particular combination of M and Sim of stimulus and response members is coded L or H in each of the first two positions to indicate the values of M and Sim of stimulus members and L and H in each of the last two positions to indicate the values of M and Sim of response members. Also, Sim of stimulus and response members are, henceforth, abbreviated StSim and RSim, respectively, and M of stimulus and response members are abbreviated StM and RM, respectively.

Shown in parentheses after each trigram is its Archer (1960) M value. These values ranged from 6% to 95%. Means of the Archer M values for the trigrams representing the four combinations of M and Sim of stimulus members are in the last row. Means of Archer M values for the trigrams representing the four combinations of M and Sim of response members are shown in the extreme right-hand column. The means of from 86.00 to 92.25 for high M of stimulus and of response members

Table 1

Lists of PA Units Representing Combinations of Low or High Sim and M of Stimulus and of Response Members

Stimulus Members	Response Members				Mean M
	LH	HL	HH	LL	
LH	GEL (89)[a] TUF (89)	PIX (94) JEV (21)	MIN (94) KAW (80)	BAH (94) YED (26)	92.75
HL	FOV (27) CIT (93)	VOZ (27) QEJ (6)	VOF (10) WAK (87)	ZOV (15) GIC (19)	19.75
HH	DUC (90) HOB (90)	CUS (93) VEJ (22)	SUC (90) RAK (85)	CUD (95) ZAS (25)	92.00
LL	KUG (29) SOL (94)	YIB (16) JEQ (14)	WOY (22) KAR (92)	NAJ (18) FEP (14)	21.25
Mean M	91.50	15.75	86.00	21.00	

a. Archer M values.

were at or close to the maximum attainable within constraints imposed by the requirement that the stimulus and response members be high or low Sim. The means of from 15.75 to 21.25 for low M of stimulus and of response members were likewise at or close to the minimum attainable within the requirement of high or low Sim.

Within each of the two sets of four stimulus members of high Sim and of the two sets of four response members of high Sim, each member had a counterpart in reverse with which it had three letters in common. Each member of a set also had two letters in common with the remaining two members of that set. Within each of the two sets of four stimulus members of low Sim and of the two sets of four response members of low Sim, with three exceptions, no member had any letter in common with those of any of the other three members of the set. Except for vowels, there was no duplication of letters between sets of stimulus members of high Sim and of low Sim and likewise for the sets of response members. The overlap of vowels and consonants of the 16 stimulus members with those of the 16 response members was minimal. Interlist Sim was at or close to the minimum attainable within the requirement of stimulus and response members of low and of high M.

Serial learning was minimized by the use of five orders of the pairs for acquisition trials and four other orders for recall-test trials. These orders of the pairs were determined randomly within the constraint that no pair was preceded by or followed by any one of the other pairs more than

once.

The pairs in the five different orders for acquisition were typed in pica capitals in a column down the center of the right half of a continuous tape. The stimulus members alone in the four different orders for recall were typed in a column down the center of the left half of the tape. When not used, the pairs or the stimulus members alone were concealed by a sliding metal shutter which covered one-half of the aperture in front of the drum.

Procedure

The same list was acquired under all combinations of St and of R durations of 1/2, 1, 2 and 4 sec.[1] Intertrial intervals averaged 8 sec. Following instructions which described the task (see Appendix B), Ss were administered blocks of acquisition trials by the anticipation technique of presentation alternating with a recall-test trial. There were five trials in each of the four blocks of acquisition trials. During these trials, only complete occurrences of the paired response to each stimulus member during the St interval were considered correct.

Following the fifth trial of each block of anticipation trials, Ss were tested by presenting only the stimulus members alone for recall of response members. In order to maximize the number of responses recalled correctly, regardless

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1. Calibration of 1/2, 1, 2, and 4 sec. St durations and of R durations by an electronic timer yielded actual durations of 0.51, 1.05, 2.07, and 3.86 sec., respectively.

of the combination of St and R durations for acquisition, 4 sec. were allowed for recall of the response. On these trials, Ss spoke into the microphone so that latencies of recall responses could be obtained. Only occurrences of the paired response during the 4 sec. a particular stimulus member was exposed were considered correct.

In order to have an acquisition trial immediately before and immediately after each recall trial, following the last recall trial, there was one more acquisition trial. Thus, in all, Ss had 21 anticipation trials and four systematically interpolated recall-test trials.

Results

The three response measures were correct responses to each pair during each recall trial, mean number of correct responses to each pair during the anticipation trial immediately before and immediately after each recall trial, and latency of response to each pair during each recall trial. A latency of 4 sec. was assigned arbitrarily to failures to respond and to incorrect responses. Figure 1 shows the means for each of these measures for the entire list of 16 pairs under each of the 16 combinations of durations through the four recall trials and the four pairs of adjacent anticipation trials.

Each S's score could only be 0 or 1 for a recall trial and 0, 0.5 or 1 for adjacent anticipation trials. By combining the first two and last two recall trials and the first two and last two pairs of adjacent anticipation trials into first and second trial blocks, possible recall scores for each pair were extended to 0, 1, or 2, and possible anticipation scores to 0, 0.5, 1, 1.5 or 2. Means of numbers of responses recalled correctly and of responses anticipated correctly for each pair in each trial block are shown in Tables 2 and 3 for all combinations of St and R durations and of Sim and M of stimuli. Means of latencies of recall responses are presented in Table 4.

Table 5 shows Pearson product-moment correlations between means for recall frequencies and those for anticipation

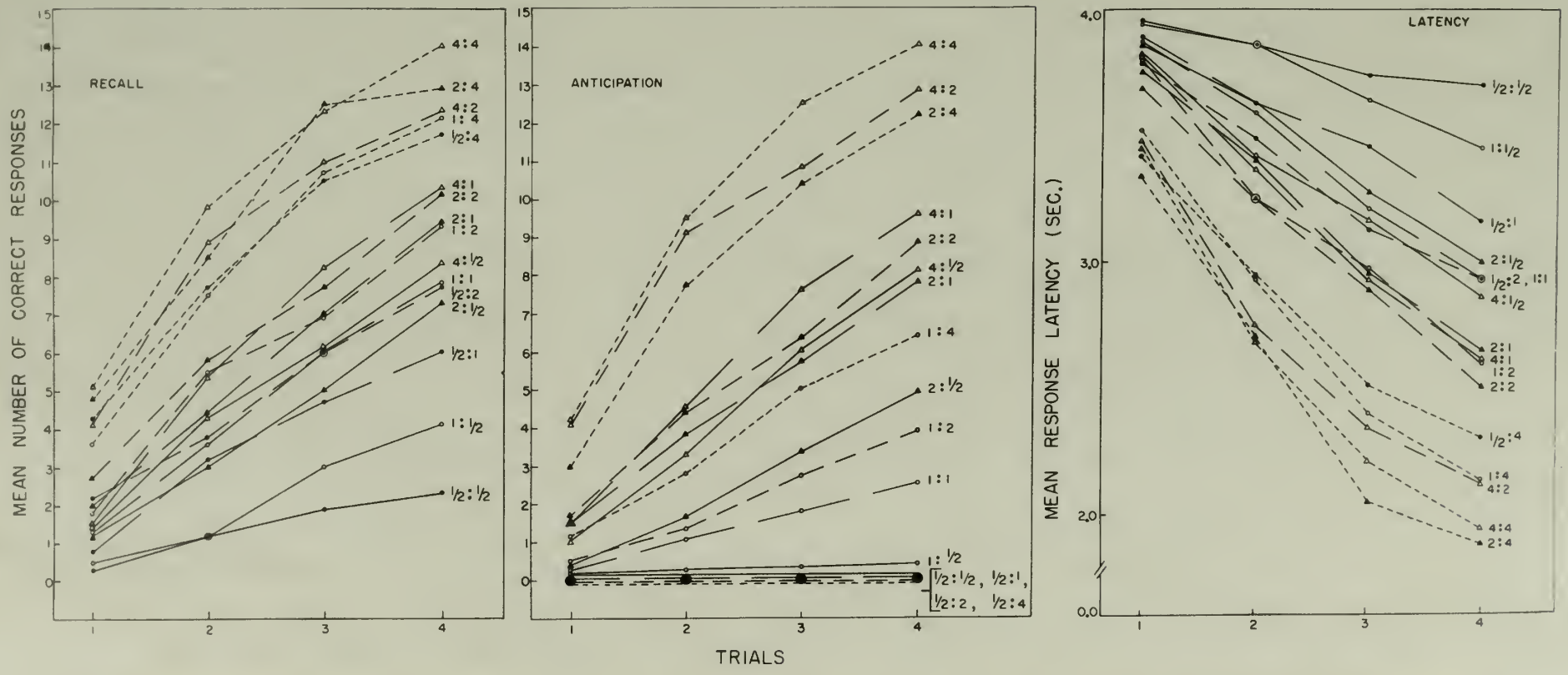

Fig. 1. Mean of numbers of correct responses for recall and anticipation trials and means of response latencies for recall trials.

Table 2

Means of Numbers of Responses Correct during Recall Tests of Trial Blocks 1 and 2 for Combinations of Durations and Stimulus Characteristics

St	R	Blocks	HLHH	LLHH	HLLH	LLLH	HLHL	LLHL	HLLL	LLLL	HHHH	LHHH	HHLH	LHLH	HHHL	LHHL	HHLL	LHLL
1/2	1/2	1	0.0	0.0	0.3	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.5	0.3	0.0	0.0	0.0	0.1
		2	0.0	0.0	0.6	0.3	0.2	0.0	0.0	0.3	0.1	0.3	1.1	0.6	0.0	0.1	0.0	0.6
	1	1	0.0	0.1	0.5	0.5	0.1	0.0	0.1	0.1	0.4	0.2	0.9	0.6	0.0	0.0	0.1	0.3
		2	0.3	0.8	0.9	1.4	0.2	0.2	0.1	0.3	1.2	0.5	1.4	1.3	0.4	0.2	0.6	0.9
	2	1	0.0	0.1	0.3	0.7	0.0	0.3	0.0	0.1	1.0	0.6	0.9	0.8	0.0	0.3	0.2	0.7
		2	0.1	0.5	0.5	1.4	0.4	0.4	0.2	1.4	1.3	1.3	1.7	1.5	0.3	0.7	0.5	1.5
	4	1	0.3	0.9	0.8	1.2	0.5	0.4	0.4	0.8	1.0	1.0	1.4	0.9	0.2	0.2	0.7	1.3
		2	0.7	1.6	1.5	1.7	1.1	1.0	1.1	1.7	1.8	1.6	1.8	1.9	0.6	1.1	1.3	1.7
1	1/2	1	0.0	0.0	0.4	0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.2	0.5	0.0	0.0	0.1	0.2
		2	0.2	0.2	0.8	0.6	0.5	0.3	0.3	0.3	0.3	0.5	1.1	1.0	0.0	0.2	0.3	0.5
	1	1	0.0	0.2	0.3	0.7	0.2	0.3	0.0	0.2	0.2	0.7	0.3	1.0	0.0	0.2	0.1	0.5
		2	0.5	0.7	1.1	1.6	0.4	0.1	0.2	0.9	1.3	1.2	1.5	1.4	0.1	0.6	1.0	1.2
	2	1	0.1	0.3	0.8	0.9	0.2	0.0	0.0	0.3	1.2	0.6	0.5	0.9	0.1	0.1	0.3	1.0
		2	0.2	1.1	1.8	1.8	0.6	0.3	0.4	0.9	1.5	1.3	1.3	1.7	0.2	0.5	0.8	1.8
	4	1	0.1	0.8	1.1	1.3	0.1	0.2	0.0	0.9	1.3	0.7	1.1	1.3	0.1	0.2	0.4	1.5
		2	0.7	1.5	1.6	1.8	1.3	0.8	0.7	1.4	1.8	1.7	2.0	1.7	1.1	1.3	1.6	1.8
2	1/2	1	0.0	0.4	0.2	0.6	0.2	0.0	0.0	0.3	0.5	0.5	0.6	0.4	0.0	0.2	0.2	0.1
		2	0.3	0.7	0.9	1.3	0.3	0.5	0.2	0.9	1.1	1.5	1.4	1.8	0.2	0.6	0.1	0.5
	1	1	0.2	0.0	0.5	0.9	0.1	0.2	0.4	0.0	0.3	0.7	0.7	1.1	0.0	0.8	0.1	0.4
		2	0.2	1.4	1.5	1.5	0.5	0.1	0.7	1.1	1.1	1.5	2.0	1.9	0.3	1.0	0.7	0.9
	2	1	0.0	0.3	0.8	1.0	0.6	0.2	0.3	0.2	0.9	0.9	1.1	1.3	0.1	0.2	0.1	0.5
		2	0.7	1.2	1.6	1.8	0.6	0.3	0.4	1.2	1.4	1.6	1.7	1.8	0.6	0.9	0.6	1.4
	4	1	0.4	0.7	1.3	1.6	0.4	0.3	0.1	0.9	1.1	1.6	1.3	1.6	0.3	0.3	0.2	1.2
		2	0.9	1.8	1.7	2.0	1.4	1.2	0.9	1.9	1.7	2.0	2.0	2.0	1.0	1.3	1.8	1.8
4	1/2	1	0.1	0.2	0.7	0.5	0.4	0.0	0.1	0.1	0.5	0.9	0.7	0.8	0.0	0.0	0.4	0.3
		2	0.6	1.1	1.1	1.4	0.5	0.1	0.5	0.9	1.1	1.3	1.7	1.8	0.1	0.7	0.7	0.8
	1	1	0.1	0.7	0.5	0.7	0.2	0.0	0.0	0.2	0.9	0.3	0.9	0.9	0.4	0.2	0.5	0.5
		2	0.4	1.5	1.2	2.0	0.7	0.2	0.3	1.0	1.5	1.7	1.9	1.8	0.4	1.2	1.1	1.6
	2	1	0.8	0.8	1.1	1.0	0.7	0.1	0.3	0.6	1.1	1.1	1.2	1.5	0.2	0.4	0.9	1.2
		2	1.0	1.4	1.6	2.0	1.3	0.7	0.8	1.5	1.6	1.9	1.9	2.0	0.8	1.1	1.7	2.0
	4	1	0.4	1.3	1.1	1.1	0.4	0.6	0.3	0.9	1.5	1.0	1.3	1.5	0.5	0.8	0.9	1.3
		2	1.5	1.7	1.7	2.0	1.3	1.2	1.0	1.5	2.0	1.7	2.0	1.9	1.4	1.5	1.9	2.0

Table 3

Means of Mean Numbers of Responses Correct during Anticipation Tests of Trial Blocks 1 and 2 for Combinations of Durations and Stimulus Characteristics

St	R	Blocks	HLHH	LLHH	HLLH	LLLH	HLHL	LLHL	HLLL	LLLL	HHHH	LHHH	HHLH	LHLH	HHHL	LHHL	HHLL	LHLL
1/2	1/2	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	1/2	1	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.10	0.00	0.00	0.00	0.00	0.00
		2	0.00	0.00	0.20	0.05	0.00	0.00	0.00	0.00	0.10	0.00	0.30	0.15	0.00	0.00	0.00	0.00
	1	1	0.05	0.10	0.00	0.20	0.00	0.00	0.00	0.00	0.15	0.25	0.05	0.30	0.00	0.00	0.00	0.15
		2	0.15	0.30	0.20	1.00	0.00	0.00	0.50	0.00	0.40	0.80	0.45	0.40	0.00	0.00	0.10	0.45
	2	1	0.00	0.15	0.30	0.40	0.00	0.00	0.00	0.00	0.10	0.20	0.10	0.25	0.00	0.10	0.00	0.25
		2	0.00	0.50	0.75	1.20	0.00	0.00	0.00	0.20	0.80	0.40	0.25	0.85	0.00	0.25	0.20	1.25
	4	1	0.15	0.20	0.45	1.00	0.00	0.00	0.00	0.25	0.20	0.15	0.50	0.55	0.00	0.05	0.05	0.50
		2	0.20	0.55	0.95	1.10	0.10	0.10	0.25	0.75	1.20	0.95	0.90	1.00	0.00	0.20	0.50	1.05
2	1/2	1	0.00	0.20	0.10	0.40	0.00	0.00	0.00	0.20	0.10	0.35	0.35	0.30	0.00	0.05	0.00	0.10
		2	0.10	0.75	0.55	1.10	0.05	0.20	0.00	0.85	0.70	0.95	1.05	1.35	0.05	0.30	0.05	0.30
	1	1	0.30	0.35	0.25	0.90	0.10	0.05	0.05	0.00	0.20	0.50	0.65	1.00	0.00	0.50	0.15	0.35
		2	0.35	1.15	1.15	1.40	0.30	0.05	0.45	0.85	0.95	1.40	1.60	1.60	0.25	0.85	0.50	0.75
	2	1	0.00	0.35	0.75	0.65	0.20	0.00	0.10	0.15	0.75	0.60	1.00	1.25	0.00	0.15	0.05	0.20
		2	0.35	1.15	1.35	1.70	0.50	0.25	0.35	0.75	1.25	1.45	1.70	1.80	0.30	0.55	0.75	0.85
	4	1	0.30	0.75	0.75	1.40	0.20	0.15	0.15	0.80	0.60	1.30	1.30	1.55	0.25	0.30	0.15	0.85
		2	0.80	1.60	1.75	1.95	0.80	0.80	0.65	1.85	1.55	1.85	1.95	1.95	0.80	1.20	1.45	1.70
4	1/2	1	0.10	0.15	0.50	0.40	0.20	0.00	0.10	0.05	0.40	0.65	0.45	0.75	0.00	0.05	0.30	0.20
		2	0.50	1.25	1.15	1.20	0.45	0.05	0.85	0.90	1.20	1.30	1.50	1.60	0.05	0.60	0.65	0.85
	1	1	0.00	0.90	0.35	1.00	0.00	0.00	0.00	0.10	0.60	0.30	0.85	0.70	0.40	0.15	0.25	0.40
		2	0.25	1.45	1.20	2.00	0.45	0.35	0.25	0.90	1.65	1.30	1.75	1.90	0.40	0.80	1.15	1.45
	2	1	0.55	0.95	0.75	1.30	1.00	0.05	0.10	0.65	1.00	1.10	1.40	1.55	0.30	0.40	0.65	0.95
		2	1.15	1.55	1.65	2.00	1.05	0.75	0.95	1.60	1.60	1.75	1.95	1.95	1.00	1.10	1.65	2.00
	4	1	0.30	1.25	0.90	1.40	0.35	0.45	0.30	0.75	1.10	0.85	1.30	1.55	0.65	0.90	0.65	0.95
		2	1.40	1.70	1.80	2.00	1.05	1.30	1.15	1.80	1.90	1.70	1.90	2.00	1.50	1.60	1.65	2.00

Table 4

Means of Response Latencies during Recall Tests of Trial Blocks 1 and 2 for Combinations of Durations and Stimulus Characteristics

St	R	Blocks	HLHH	LLHH	HLLH	LLLH	HLHL	LLHL	HLLL	LLLL	HHHH	LHHH	HHLH	LHLH	HHHL	LHHL	HHLL	LHLL
1/2	1/2	1	8.00	8.00	7.14	7.80	7.90	8.00	7.78	8.00	8.00	8.00	7.06	7.64	8.00	8.00	8.00	7.75
		2	8.00	8.00	6.65	7.30	7.88	8.00	8.00	7.48	7.70	7.46	5.49	6.66	8.00	7.73	8.00	6.72
	1	1	8.00	7.80	6.92	7.00	7.98	8.00	7.85	7.98	7.19	7.61	5.82	6.94	8.00	8.00	7.84	7.30
		2	7.61	6.48	5.88	5.00	7.72	7.79	7.77	7.28	5.62	6.76	4.75	5.08	7.36	7.78	7.15	5.87
	2	1	8.00	7.80	7.74	7.20	8.00	7.55	8.00	7.75	6.02	6.70	6.16	6.28	8.00	7.62	7.63	6.31
		2	7.73	6.80	7.40	4.54	7.32	7.62	7.70	4.60	4.86	4.59	3.72	4.10	7.56	6.69	7.22	4.48
	4	1	7.50	5.92	6.02	5.52	7.33	7.41	7.42	6.25	5.62	5.69	4.50	5.86	7.73	7.49	6.70	4.83
		2	6.41	4.22	4.57	3.75	5.90	6.27	5.92	4.13	4.11	3.54	3.19	3.20	7.02	5.50	5.84	3.40
1	1/2	1	8.00	8.00	7.34	8.00	7.90	8.00	8.00	8.00	7.50	8.00	7.50	7.00	8.00	8.00	7.84	7.64
		2	7.56	7.46	6.42	6.74	7.30	7.52	7.84	7.46	7.16	7.17	5.06	5.88	8.00	7.66	7.37	6.90
	1	1	8.00	7.76	7.64	6.76	7.67	7.57	8.00	7.84	7.12	6.92	7.68	5.65	8.00	7.57	7.90	7.23
		2	7.35	6.54	5.88	4.36	7.40	7.90	7.78	5.87	4.80	4.92	4.30	4.70	7.79	7.13	6.38	4.90
	2	1	7.91	7.28	6.18	5.86	7.76	8.00	8.00	7.64	5.56	6.58	6.92	6.03	7.90	7.71	7.56	5.97
		2	7.58	5.58	3.59	3.14	6.82	7.70	7.38	6.08	4.19	5.06	4.78	3.77	7.59	6.65	6.40	2.96
	4	1	7.80	6.57	5.28	4.86	7.87	7.60	8.00	5.82	5.30	6.52	5.62	5.10	7.76	7.83	7.15	4.10
		2	6.68	4.21	3.98	3.00	5.16	6.47	6.71	4.44	3.04	3.26	2.84	3.32	6.00	5.36	4.66	3.26
2	1/2	1	8.00	7.22	7.64	6.90	7.60	8.00	8.00	7.30	7.40	6.88	6.78	6.98	8.00	7.59	7.86	7.80
		2	7.43	6.30	6.00	5.02	7.26	7.15	7.67	5.96	5.90	4.68	4.51	3.58	7.44	6.74	7.88	7.02
	1	1	7.66	8.00	6.83	6.02	7.88	7.82	7.25	8.00	7.24	6.52	6.69	5.59	8.00	6.39	7.82	7.00
		2	7.72	4.90	4.62	4.54	6.94	7.99	6.45	5.71	5.38	4.06	2.93	3.64	7.28	5.39	6.56	5.68
	2	1	8.00	7.38	6.52	5.99	7.32	7.83	7.44	7.62	5.90	6.38	5.51	4.92	7.88	7.68	7.76	6.99
		2	6.57	4.97	4.60	3.50	7.07	7.51	7.51	4.89	4.28	4.17	3.44	3.37	6.77	6.12	6.73	4.67
	4	1	7.24	6.28	5.10	4.06	7.24	7.50	7.76	5.66	5.22	4.18	4.87	4.02	7.41	7.56	7.56	4.80
		2	5.98	3.50	3.52	2.34	4.68	5.36	5.93	3.32	3.16	2.41	2.56	2.56	5.96	4.70	3.90	3.02
4	1/2	1	7.76	7.50	6.30	7.21	7.40	8.00	7.90	7.84	6.80	6.32	6.44	6.28	8.00	8.00	7.18	7.24
		2	7.25	5.27	5.42	5.14	7.32	7.87	6.90	5.96	5.56	5.20	3.97	3.67	7.77	6.70	6.34	6.03
	1	1	7.78	6.53	6.75	6.81	7.70	8.00	8.00	7.52	6.20	7.40	6.42	6.14	7.40	7.83	7.18	7.19
		2	7.32	4.31	5.22	3.52	7.22	7.71	7.50	5.80	4.72	4.44	3.56	4.16	7.30	5.86	5.46	4.11
	2	1	6.76	6.12	5.55	5.78	6.96	7.84	7.64	6.76	5.38	5.56	4.73	4.22	7.64	7.10	6.32	5.42
		2	5.92	4.41	4.26	2.76	5.71	6.64	6.34	4.16	3.89	3.53	2.93	2.70	6.40	5.08	4.36	2.50
	4	1	7.23	5.56	5.94	5.72	7.41	7.19	7.61	6.06	4.86	6.15	5.26	4.63	6.90	6.20	6.37	4.96
		2	5.22	3.52	4.06	3.04	5.96	5.64	6.10	4.26	2.89	3.80	2.64	3.04	5.03	4.49	4.30	2.34

Table 5

Correlations between Means for Recall and those for Anticipation and Latencies for St Durations Singly and Combined

St	Recall-Anticipation	Recall-Latency
1/2	.00	-.98
1	.85	-.98
2	.96	-.99
4	.97	-.98
1, 2, 4	.88	—
1/2, 1, 2, 4	.87	-.98

frequencies and for recall latencies for the 512 cells of Tables 2, 3, and 4 for St durations separately and combined. No S was able to anticipate in less than 1/2 sec.; consequently, the r for the relationship between means of recall and anticipation frequencies for the 1/2-sec. St duration was .00. Difficulty in anticipating in less than 1 sec. may also account for the r of .85 for the 1-sec. duration in contrast to the rs of .96 and .97 for the 2- and 4-sec. durations. The r of .88 for the 1-, 2-, and 4-sec. durations combined was essentially unaffected by inclusion of the 1/2-sec. duration. The latency means are essentially means of weighted frequencies of correct recall, which, in part, contributes to the high rs of -.98 and -.99 for relationships between means of recall frequencies and recall latencies for durations separately and combined.

These correlations were between means for the combinations of stimulus durations and stimulus characteristics: they are theoretically independent of correlations between scores for response measures for individual Ss within each combination of conditions. To estimate the extent of relationships between scores for response measures for individuals within combinations, correlations for pairs of scores for individual Ss were computed for a sample of combinations. For the relationship between recall and anticipation frequencies, scores for individual Ss were correlated for one of the 16 combinations of stimulus characteristics under each of the 12 combinations of St and R durations, excluding St durations

of 1/2 sec. Such correlations were also computed between recall frequency and latency for one of the 16 combinations of stimulus characteristics under each of the 16 combinations of St and R durations. The particular combination of stimulus characteristics under each combination of durations was selected randomly within the constraint that each combination of stimulus characteristics be represented only once.

The rs for recall and anticipation frequencies ranged from .00 to .91. Only two were below .60, and six were .90 or above. All but one of the rs for recall frequency and latency were -.90 or above; the remaining r was .00. Both of the rs of .00 were with St duration of 1 sec. under which no Ss either anticipated correctly or recalled correctly. On the whole, for individual Ss within combinations of conditions, recall frequency was related strongly both to anticipation frequency and to recall latency.

Because conclusions based on means for combinations would be consistent with expected outcomes for individual Ss, and because of the very high correlations between means of recall frequencies and those for anticipation frequencies and recall latencies, only recall frequencies were treated by the analysis of variance summarized in Table 6. St and R durations were the variables of greatest importance; their effects, disregarding trials and then through trials (T), are examined before considering effects of Sim and M of stimulus and response members. Interactions of stimulus durations and stimulus characteristics are then considered.

Table 6

Analysis of Variance of Correct Responses during Recall Tests of Trial Blocks 1 and 2

Source	df	MS	F
Between Ss			
St	3	36.34	15.73**
R	3	130.69	56.57**
St X R	9	1.42	
Error (b)	144	2.31	
Within Ss			
StM	1	80.00	190.48**
StM X St	3	0.48	1.14
StM X R	3	1.58	3.76*
StM X St X R	9	0.43	1.02
StM X Ss/[a]	144	0.42	
StSim	1	44.25	80.45**
StSim X St	3	1.13	2.05
StSim X R	3	1.73	3.14*
StSim X St X R	9	0.75	1.36
StSim X Ss/	144	0.55	
RM	1	250.28	510.78**
RM X St	3	2.64	5.18**
RM X R	3	1.29	2.63*
RM X St X R	9	0.72	1.47
RM X Ss/	144	0.49	
RSim	1	132.61	210.49**
RSim X St	3	0.15	
RSim X R	3	1.05	1.67
RSim X St X R	9	0.34	
RSim X Ss/	144	0.63	
T	1	402.75	1088.51**
T X St	3	3.23	8.73**
T X R	3	5.54	14.97**
T X St X R	9	0.33	
T X Ss/	144	0.37	
StSim X StM	1	0.85	1.52
StSim X StM X St	3	0.61	
StSim X StM X R	3	1.54	2.75*
StSim X StM X St X R	9	0.67	1.20
StSim X StM X Ss/	144	0.56	

* $p < .05$
** $p < .01$

a. Slash indicates nesting of between effects within each "within error."

Source	df	MS	F
StM X RM	1	11.06	15.58**
StM X RM X St	3	1.54	2.17
StM X RM X R	3	0.77	1.08
StM X RM X St X R	9	0.44	
StM X RM X Ss/	144	0.71	
StM X RSim	1	0.04	
StM X RSim X St	3	1.38	2.30
StM X RSim X R	3	0.14	
StM X RSim X St X R	9	0.26	
StM X RSim X Ss/	144	0.60	
StSim X T	1	4.17	15.44**
StSim X T X St	3	0.61	2.26
StSim X T X R	3	1.45	5.37**
StSim X T X St X R	9	0.43	1.59
StSim X T X Ss/	144	0.27	
StSim X RM	1	0.75	1.87
StSim X RM X St	3	0.93	2.32
StSim X RM X R	3	0.46	1.15
StSim X RM X St X R	9	0.18	
StSim X RM X Ss/	144	0.40	
StSim X RSim	1	6.76	14.38**
StSim X RSim X St	3	0.36	
StSim X RSim X R	3	1.55	3.30*
StSim X RSim X St X R	9	0.28	
StSim X RSim X Ss/	144	0.47	
StM X T	1	2.20	5.37*
StM X T X St	3	0.01	
StM X T X R	3	0.27	
StM X T X St X R	9	0.12	
StM X T X Ss/	144	0.41	
RM X RSim	1	5.46	12.53**
RM X RSim X St	3	1.03	2.29
RM X RSim X R	3	1.65	3.67*
RM X RSim X St X R	9	0.30	
RM X RSim X Ss/	144	0.45	
RM X T	1	5.91	19.06**
RM X T X St	3	0.07	
RM X T X R	3	4.23	13.64**
RM X T X St X R	9	0.49	1.58
RM X T X Ss/	144	0.31	
RSim X T	1	7.36	24.53**
RSim X T X St	3	0.01	
RSim X T X R	3	1.66	5.53**
RSim X T X St X R	9	0.21	
RSim X T X Ss/	144	0.30	
StM X StSim X RM	1	19.02	90.57**
StM X StSim X RM X St	3	0.20	
StM X StSim X RM X R	3	0.92	4.38**
StM X StSim X RM X St X R	9	0.38	1.81
StM X StSim X RM X Ss/	144	0.21	

Source	df	MS	F
StM X StSim X RSim	1	0.53	1.56
StM X StSim X RSim X St	3	0.74	2.18
StM X StSim X RSim X R	3	0.18	
StM X StSim X RSim X St X R	9	0.52	1.53
StM X StSim X RSim X Ss/	144	0.34	
StM X StSim X T	1	0.90	11.25**
StM X StSim X T X St	3	0.12	1.50
StM X StSim X T X R	3	0.30	3.75*
StM X StSim X T X St X R	9	0.33	4.12**
StM X StSim X T X Ss/	144	0.08	
StM X RM X RSim	1	24.76	60.39**
StM X RM X RSim X St	3	1.14	2.78*
StM X RM X RSim X R	3	2.86	6.98**
StM X RM X RSim X St X R	9	0.37	
StM X RM X RSim X Ss/	144	0.41	
StM X RM X T	1	0.01	
StM X RM X T X St	3	0.12	1.50
StM X RM X T X R	3	0.53	6.62**
StM X RM X T X St X R	9	0.44	5.50**
StM X RM X T X Ss/	144	0.08	
StM X RSim X T	1	0.04	
StM X RSim X T X St	3	0.03	
StM X RSim X T X R	3	0.14	1.00
StM X RSim X T X St X R	9	0.16	1.14
StM X RSim X T X Ss/	144	0.14	
StSim X RM X RSim	1	15.32	29.46**
StSim X RM X RSim X St	3	0.02	
StSim X RM X RSim X R	3	0.88	1.69
StSim X RM X RSim X St X R	9	0.30	
StSim X RM X RSim X Ss/	144	0.52	
StSim X RM X T	1	0.01	
StSim X RM X T X St	3	0.05	
StSim X RM X T X R	3	0.34	1.70
StSim X RM X T X St X R	9	0.17	
StSim X RM X T X Ss/	144	0.20	
StSim X RSim X T	1	0.04	
StSim X RSim X T X St	3	0.47	2.14
StSim X RSim X T X R	3	0.25	1.14
StSim X RSim X T X St X R	9	0.20	
StSim X RSim X T X Ss/	144	0.22	
RM X RSim X T	1	0.03	
RM X RSim X T X St	3	0.12	
RM X RSim X T X R	3	0.47	1.96
RM X RSim X T X St X R	9	0.17	
RM X RSim X T X Ss/	144	0.24	
StM X StSim X RM X RSim	1	9.61	15.25**
StM X StSim X RM X RSim X St	3	1.02	1.62
StM X StSim X RM X RSim X R	3	0.30	
StM X StSim X RM X RSim X St X R	9	0.13	
StM X StSim X RM X RSim X Ss/	144	0.63	

Source	df	MS	F
StM X StSim X RM X T	1	1.07	2.74
StM X StSim X RM X T X St	3	0.07	
StM X StSim X RM X T X R	3	0.41	1.05
StM X StSim X RM X T X St X R	9	0.11	
StM X StSim X RM X T X Ss/	144	0.39	
StM X RM X RSim X T	1	0.00	
StM X RM X RSim X T X St	3	0.22	
StM X RM X RSim X T X R	3	0.25	
StM X RM X RSim X T X St X R	9	0.29	
StM X RM X RSim X T X Ss/	144	0.41	
StM X StSim X RSim X T	1	3.51	9.00**
StM X StSim X RSim X T X St	3	0.49	1.26
StM X StSim X RSim X T X R	3	0.11	
StM X StSim X RSim X T X St X R	9	0.30	
StM X StSim X RSim X T X Ss/	144	0.39	
StSim X RM X RSim X T	1	2.54	10.16**
StSim X RM X RSim X T X St	3	0.32	1.28
StSim X RM X RSim X T X R	3	0.73	2.92*
StSim X RM X RSim X T X St X R	9	0.41	1.64
StSim X RM X RSim X T X Ss/	144	0.25	
StM X StSim X RM X RSim X T	1	1.66	27.67**
StM X StSim X RM X RSim X T X St	3	0.42	7.00**
StM X StSim X RM X RSim X T X R	3	0.36	6.00**
StM X StSim X RM X RSim X T X St X R	9	0.34	5.67**
StM X StSim X RM X RSim X T X Ss/	144	0.06	

St and R durations. As shown in Figure 1, the curves for the 4:4, 2:4, 4:2, 1:4, and 1/2:4 combinations of durations through the four recall trials are negatively accelerated. However, for the 4:4 combination, even with 20 anticipation and three recall trials the mean of 14.00 for the last recall trial and the mean of 14.05 for the last pair of anticipation trials were short of a perfect performance of 16 correct responses. The slope of the curve for the 4:4 combination between Recall Trials 3 and 4 was still relatively steep so that perfect or near-perfect performance might have been achieved with 5 or 10 more anticipation trials. The corresponding slopes for the 2:4, 4:2, 1:4, and 1/2:4 combinations were sufficiently less steep to preclude useful graphic or visual estimates of the number of additional anticipation and recall trials necessary for Ss to reach perfect or near-perfect recall.

The curves for the remaining 11 combinations, with the possible exception of the curve for the 1:1/2 combination, were still approximately linear. Further, none had risen sufficiently for satisfactory graphic or visual extrapolation. The small number of points, relatively limited segments of entire curves available for about half of the combinations, and lack of a satisfactory rational basis were considered sufficient grounds for not fitting the functions necessary to estimate number of trials to perfect or asymptotic performances under each of the combinations of conditions. Precluded, therefore, are comparisons among combinations

of durations with respect to total amount of time to reach either perfect or asymptotic performance.

In the analysis of variance, both St and R durations had highly significant effects with the latter the more potent factor. Within each St duration, increasingly faster learning occurred with R durations of 1/2, 1, 2, and 4 sec. Within each R duration, increasingly faster learning occurred with St durations of 1/2, 1, 2, and 4 sec. The very small mean square for the interaction of durations suggested that each doubling of St and of R durations produced essentially equal increments in numbers of correct responses. However, each doubling of the R duration produced increments about twice as large as those produced by each doubling of the St duration.

The significant St x T and R x T interactions reflect the greater differences among St durations and among R durations during the second trial block than during the first trial block. The T x St x R interaction was not significant.

Stimulus characteristics. Highly significant Fs indicated that responses recalled correctly were directly related to M of stimulus and of response members and inversely related to Sim of stimulus and of response members. The Fs for the interactions of StM with StSim and with RM were significant as were the interactions of StSim with RSim and with RM. The two interactions of particular importance are those for StM and RM and for StSim and RSim. The StM x RM interaction reflected increasing numbers of responses for combinations of

M of LL, HL, LH, and HH with progressively larger increments between each adjacent combination. The StSim x RSim interaction reflected increasing numbers of responses for combinations of Sim of HH, HL, LH, and LL with progressively larger increments between each adjacent combination.

The significant StM x StSim x RM interaction reflected a greater increment in numbers of correct responses from high to low StSim with LH and HL than with HH and LL combinations of M of stimulus and response members. A greater increment in numbers of correct responses from high to low RSim with LH and HL than with HH and LL combinations of M of stimulus and response members gave rise to the significant StM x RM x RSim interaction. Finally, the significant StSim x RM x RSim interaction was due to a greater increment in numbers of correct responses from high to low RSim with the LH, HH, and LL combinations than with the HL combination of M of stimulus and response members.

The significant interaction among all four stimulus characteristics could be interpreted as due to progressively larger differences among means for the four combinations of M within combinations of Sim in the order LL, LH, HH, HL and to progressively larger increments between adjacent combinations of Sim in the order HH, LH, HL, LL.

All of the first-order interactions of each stimulus characteristic with trials were significant from less than .05 to less than .01. Some of the interactions of combinations of stimulus characteristics with trials were also

significant. The pattern of relationships among means underlying most, if not all of these interactions, was increasingly large increments from the first to the second trial blocks for successively easier combinations of stimulus characteristics.

Durations and characteristics. Of the interactions involving durations and from one to all four stimulus characteristics, disregarding and with trial blocks, 6 of 13 first-order interactions, 6 of 10 second-order interactions, 5 of 8 third-order interactions, 3 of 4 fourth-order interactions, and 2 of 2 fifth-order interactions were significant from less than .05 to less than .01. The St x R x StSim x StM x RSim x RM x T interaction was significant at less than .01.

The various significant interactions below the highest-order interaction can be regarded as reflecting more prominent features of the pattern of relationships among means giving rise to the significant highest-order interaction. Accordingly, rather than considering each of the former interactions separately, the pattern of relationships underlying the highest-order interaction is described. Table 7 presents increments in means of responses recalled correctly from trial block 1 to 2 for the 256 combinations of durations and characteristics. The 16 combinations of durations are ordered downward in terms of increasing number of correct responses across all 16 combinations of characteristics. The 16 combinations are arranged from left to right in terms of increasing numbers of correct responses across all 16

Table 7

Increments in Means of Correct Responses from Trial Block 1 to 2 for Combinations of Durations and Stimulus Characteristics Arranged to the Right and Downward in Order of Increasing Ease of Learning

St	R	HHHL	HLLL	LLHL	HLHH	HLHL	LHHL	HHLL	LLLL	LLHH	HLLH	LHLL	LHHH	HHHH	LLLH	HHLH	LHLH	Mean
1/2	1/2	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.3	0.0	0.3	0.5	0.3	0.1	0.2	0.6	0.3	0.18
1	1/2	0.0	0.3	0.3	0.2	0.4	0.2	0.2	0.3	0.2	0.4	0.3	0.5	0.1	0.6	0.9	0.5	0.34
1/2	1	0.4	0.0	0.2	0.3	0.1	0.2	0.5	0.2	0.7	0.4	0.6	0.3	0.8	0.9	0.5	0.7	0.42
2	1/2	0.2	0.2	0.5	0.3	0.1	0.4	-0.1	0.6	0.3	0.7	0.4	1.0	0.6	0.7	0.8	1.4	0.51
1	1	0.1	0.2	-0.2	0.5	0.2	0.4	0.9	0.7	0.5	0.8	0.7	0.5	1.1	0.9	1.2	0.4	0.56
1/2	2	0.3	0.2	0.1	0.1	0.4	0.4	0.3	1.3	0.4	0.2	0.8	0.7	0.3	0.7	0.8	0.7	0.48
4	1/2	0.1	0.4	0.1	0.5	0.1	0.7	0.3	0.8	0.9	0.4	0.5	0.4	0.6	0.9	1.0	1.0	0.54
2	1	0.3	0.3	-0.1	0.0	0.4	0.2	0.6	1.1	1.4	1.0	0.5	0.8	0.8	0.6	1.3	0.8	0.62
1	2	0.1	0.4	0.3	0.1	0.4	0.4	0.5	0.6	0.8	1.0	0.8	0.7	0.3	0.9	0.8	0.8	0.56
4	1	0.0	0.3	0.2	0.3	0.5	1.0	0.6	0.8	0.8	0.7	1.1	1.4	0.6	1.3	1.0	0.9	0.72
2	2	0.5	0.1	0.1	0.7	0.0	0.7	0.5	1.0	0.9	0.8	0.9	0.7	0.5	0.8	0.6	0.5	0.58
1	4	1.0	0.7	0.6	0.6	1.2	1.1	1.2	0.5	0.7	0.5	0.3	1.0	0.5	0.5	0.9	0.4	0.73
1/2	4	0.4	0.7	0.6	0.4	0.6	0.9	0.6	0.9	0.7	0.7	0.4	0.6	0.8	0.5	0.4	1.0	0.64
4	2	0.6	0.5	0.6	0.2	0.6	0.7	0.8	0.9	0.6	0.5	0.8	0.8	0.5	1.0	0.7	0.5	0.64
2	4	0.7	0.8	0.9	0.5	1.0	1.0	1.6	1.0	1.1	0.4	0.6	0.4	0.6	0.4	0.7	0.4	0.76
4	4	0.9	0.7	0.6	1.1	0.9	0.7	1.0	0.6	0.4	0.6	0.7	0.7	0.5	0.9	0.7	0.4	0.71
Mean		0.35	0.37	0.30	0.36	0.44	0.57	0.59	0.72	0.65	0.59	0.62	0.68	0.54	0.74	0.81	0.67	

combinations of durations.

Proceeding downward, to the right, or diagonally, the increments are progressively larger. Shown in the last column are means of increments for durations, disregarding characteristics. Shown in the last row are means of increments for characteristics, disregarding durations. A rank-order coefficient of .90 was obtained for the relationship between means of increments and means of numbers of responses recalled correctly through all trials under each combination of durations. The rho was .81 for means of increments and responses recalled correctly for each combination of characteristics. The r between increments and means of responses recalled correctly for all 256 combinations was .54, which was significant at less than .01. Thus the highest-order interaction reflected a pattern of increasing increments from the first to the second trial block for increasingly easy combinations of both durations and characteristics. Most of the significant lower-order interactions involving durations and trials, characteristics and trials, and durations, characteristics, and trials can be regarded as special cases of this more general pattern. The pattern also appeared in most of the nonsignificant interactions but less markedly.

On the basis of an analysis of PA learning in terms of stimulus integration and response integration, the expectations were of decreasing differences in acquisition rates among combinations of Sim, of M, and of Sim and M with longer durations. When the same number of trials are administered

to all conditions, over-all acquisition rate can be expressed as means of total numbers of correct responses. Instantaneous or "local" acquisition rate is indicated by increments in means of correct responses from one trial block to the next. Within each combination of stimulus durations, differences among combinations of stimulus characteristics in either over-all or local rates can be expressed as ranges or variances of means of numbers of correct responses or of increments in means.

In Table 8, combinations of durations are arranged downward in order of increasing means of responses recalled correctly. This order deviates slightly from the order for total time of the sum of St and R durations, but the two orders are highly correlated. Further, the order employed allows for the relatively greater potency of R durations than of St durations. Ranges and standard deviations of means of correct responses for combinations of stimulus characteristics within each combination of durations are shown, as are means and standard deviations of increments in means from trial block 1 to 2.

Contrary to expectations, as combinations of durations became less difficult, ranges and standard deviations of means of correct responses increased. Rank-order coefficients of correlation of .66 and .53 were obtained for ranks with respect to difficulty of durations and, respectively, ranges and standard deviations for means of correct responses. The ranges and standard deviations for increments in means of

Table 8

Ranges and Variances of Means of Correct Responses for All Recall Tests and of Increments in Means of Correct Responses from Trial Block 1 to 2 for Combinations of Stimulus Characteristics within Combinations of Durations of Decreasing Difficulty

St	R	Means of Correct Responses		Increments in Means	
		Range	SD	Range	SD
1/2	1/2	1.6	4.48	0.6	1.87
1	1/2	1.5	4.32	0.9	2.16
1/2	1	1.7	7.09	0.9	2.62
2	1/2	2.0	7.13	1.5	3.70
1	1	2.3	7.23	1.4	3.78
1/2	2	2.5	8.75	1.2	3.25
4	1/2	2.5	7.66	0.9	3.25
2	1	2.7	8.57	1.5	4.39
1	2	2.5	9.77	0.9	2.83
4	1	2.6	8.74	1.3	3.97
2	2	2.6	8.96	1.0	2.99
1	4	2.6	9.06	0.9	2.94
1/2	4	2.2	7.69	0.6	1.15
4	2	2.7	8.44	0.8	1.93
2	4	2.8	9.74	1.2	2.10
4	4	2.2	6.89	0.7	2.03

correct responses from trial block 1 to 2 first increased with decreasing difficulty of durations and then increased. Consequently, the rank-order coefficients between ranks with respect to difficulty and those for ranges and standard deviations were, respectively, -.17 and -.26, neither of which was significant.

Discussion

The primary objective of the present experiment was to determine the effects of St and of R durations on PA learning. The secondary objective was, within combinations of durations, to determine the effects of M and Sim of stimulus and response members on PA learning. Findings for durations are discussed first, then those for stimulus characteristics, and, finally, those for durations and characteristics combined.

Durations

Means of frequencies and latencies of responses recalled and of frequencies of anticipations on trials adjacent to recall trials were approximately direct functions of St duration and of R duration. Each doubling of St and of R durations produced approximately equal increments in means of responses recalled. The increments produced by doubling R duration were approximately twice those produced by doubling St duration; thus, R duration was more potent than St duration.

Three details of these results are of interest: relationships among response members, consistency between present and previous findings, and the significance of these and previous findings for theoretical interpretations of PA learning.

Relationships among response measures. For St and R durations, disregarding Sim and M of stimulus and response members, the family of curves through the four recall trials for recall frequency and the family of curves for recall latency were mirror images. The relationship between the

family of curves for recall frequency and the family for frequency of anticipations was more complex. For the level of performance achieved in 25 anticipation and recall trials, the 1/2-sec. St duration was simply too short for complete anticipation responses to occur. Indeed, Ss were rarely able to begin an anticipation response in 1/2 sec. With the 1/2-sec. St duration regardless of R durations, no correct anticipations occurred. Whether at least some Ss would eventually be able to shorten their anticipation latency to the 200-300msec. necessary for occurrence of a complete anticipation response prior to exposure of response members is conjectural. The shortest latency of recall responses achieved in 25 trials was 800 msec.

Failure to anticipate did not mean that no learning had occurred. In the 1/2:1/2-sec. and 1/2:1-sec. combinations, some correct responses were obtained on recall trials, and their frequency increased slightly over trials. More marked increases in responses recalled correctly were obtained in the 1/2:2- and 1/2:4-sec. combinations. Thus, even with very short St durations, with sufficient time to respond, there is evidence of some, though slight, learning. Furthermore, for progressively longer St durations, the curves for anticipation responses for the four R durations were increasingly closer to the corresponding curves for recall responses so that, for the 4-sec. St duration, there were essentially no differences between pairs of curves for anticipation and recall responses in the 4:1/2-, 4:1-, 4:2-, and 4:4-sec.

combinations. Although no formal statistical test was employed, comparison of the families of curves for recall and for anticipation responses suggests an interaction among durations, characteristics, trials, and response measures in the form of greater divergence through trials of curves for anticipation responses than of those for recall responses.

The range of means of anticipation responses was greater than that for means of recall frequencies; but rank-orders of means for durations, disregarding characteristics, and of means for durations and characteristics combined were comparable. The correlations between these means of recall and anticipation responses for 1-sec., 2-sec., and 4-sec. St durations both separately and combined were from .85 to .96. Most of the correlations between recall and anticipation scores for individual Ss within a sample of combinations of durations and characteristics were above .60 and half were .90 or above. Thus, except for combinations involving the 1/2-sec. St durations, recall and anticipation frequencies for groups of Ss and for Ss within groups were highly related. Even stronger relationships were obtained between recall frequency and recall latency. On the whole, these correlations were sufficiently high to suggest that only responses on recall trials need be recorded. Furthermore, for short St durations, recall trials provide evidence of the formation of associations which cannot be obtained under an anticipation technique of presentation.

Present and previous findings. The previous findings of

greatest pertinence are those of Hovland (1949) for 1:1- and 2:2-sec. durations, of Goss, Morgan and Golin (1959) for 2:2- and 3:3-sec. durations, and of Wilcoxon, Wilson and Wise (1961) for 1:1-, 2:2-, and 4:4-sec. durations. For these confounded St and R durations, trials to criterion was an inverse function of durations. Totals of times to criterion, however, were essentially invariant.

In the present experiment, disregarding stimulus characteristics, 57, 187, 263, and 412 correct responses were obtained through all four recall trials with, respectively, the 1:1-, 2:2-, 3:3-, and 4:4-sec. combinations. The eightfold increase in length of exposure to members of pairs of the 4:4-sec. combination, relative to pairs of the 1/2:1/2-sec. combination, produced slightly less than an eightfold increase in total number of responses recalled. However, by the third recall trial, the curve for the 4:4-sec. combination showed negative acceleration and, by the fourth recall trial, was fairly close to a criterion of perfect performance. In contrast, the curves for the 1/2:1/2-, 1:1-, and 2:2-sec. combinations were not sufficiently high to show negative acceleration and hence diminishing returns per unit of practice. With more trials, therefore, numbers of trials to perfect performance with 1/2:1/2-, 1:1-, and 2:2-sec. combinations might increase over those for the 4:4-sec. combinations more than 2, 4, and 8 times, respectively. For reasons noted previously, extrapolation of the curves obtained in the present study to estimate trials at which asymptotic or perfect

performance might be reached was not considered feasible. Whether or not trials to criterion are inversely related to St and to R durations, but total time to criterion is invariant, must be determined by carrying Ss under each combination of St and R durations to asymptotic or to perfect performance.

The 2:2-sec. combination is the conventional one for investigations of PA learning. The curve for this combination was slightly above the middle of the families of curves for recall and anticipation measures. A 2:2-sec. combination, therefore, produces relatively representative performance. However, should total time to criterion prove essentially invariant over a wide range of combinations of St and of R durations, considerable savings in Es' recording efforts can be achieved by using combinations of longer durations which should entail fewer trials.

Theoretical significance. The present findings of effects of St and R durations are of theoretical significance in terms of relationships between classical conditioning and PA learning, and with respect to interpretations of the processes which enter into PA learning.

Parallels can be suggested between the elements and relationships among elements of classical-conditioning situations and the elements and relationships among elements of single units of PA learning situations. However, the present findings do not suggest parallel effects of essentially the same temporal variable, the CS-UCS interval in classical conditioning and St duration in PA learning. For the purpose of

comparison, the only satisfactory data from classical conditioning are those on frequency of conditioned eyelid closures by human Ss as functions of the CS-UCS interval in delay and short trace conditioning. A 1/2-sec. interval has generally proved optimal (Kimble, 1961). The 20 anticipation trials of PA learning of the present experiment are only one-third to one-fifth of those usually administered in classical conditioning of eyelid closure. Nonetheless, by the second block of 10 trials of eyelid conditioning, most Ss make one or more CRs. In contrast, anticipatory nonsense-syllable responses were not even beginning to occur by the end of 20 anticipation trials of PA learning. Moreover, in terms of nonsense-syllable responses anticipated and recalled correctly in the same number of trials, acquisition rate and, possibly, asymptotic performance were directly related to St duration.

One direction of reconciliation of findings of effects of the CS-UCS interval and of St duration is to assume that longer St durations allowed more frequent rehearsal of the relationship between stimulus members and responses to paired response members. Thus, lengthening St duration in PA learning would have the same effect as increasing the number of trials in classical conditioning with a 1/2-sec. CS-UCS interval. Unfortunately for the purpose of comparison, time within a trial in PA learning is then equated with number of trials in classical conditioning. Furthermore, this interpretation of within-trial events in PA learning provides no reconciliation of findings of acquisition as a direct function

of St duration with findings of poorer eyelid conditioning as the CS-UCS interval increased beyond 500 msec. Finally, at least in the present experiment, most Ss did not report any type of rehearsal during the interval in anticipation trials when stimulus members were presented alone.

Implicit in the suggested reconciliation by means of a direct relationship between St duration and amount of rehearsal is the problem of definition of a trial. Definition of a trial as a single observed or inferred occurrence of a particular response during or immediately after the presence of a particular stimulus may approximate the most satisfactory theoretical criterion of a trial. However, until some better means of empirical or inferential specification of single stimulus and response sequences is developed, the most feasible criterion for a trial in PA learning is overlapping or immediately successive occurrences of stimulus and response members or occurrences of one or the other alone for some minimum duration, just as the most feasible criterion for a trial in classical conditioning is paired presentation of the CS and UCS or presentation of one or the other alone. By these criteria of trials in PA learning and classical conditioning, achievement for anticipatory responses during 20 trials of PA learning lags behind achievement for anticipatory CRs during 20 trials of classical eyelid conditioning.

Underwood and Schulz (1960) propose two overlapping stages of PA learning: response integration and association of a particular response to a particular stimulus. Goss

(1963) suggests a third stage: reduction of latency of the association between a particular stimulus and a particular response.

With respect to response integration, it was suggested earlier that lengthening R duration should give Ss more time per trial to rehearse each response member and thus hasten integration and increase availability of response members. Of Ss who experienced R durations of 1/2, 1, 2, and 4 sec., 45%, 55%, 62%, and 82%, respectively, reported that, at some time during acquisition, they rehearsed during the period stimulus and response members were presented together. About 90% of Ss who said they rehearsed, reported rehearsing the response member, rather than the stimulus member or both. Thus, an important if not the primary basis of the direct relationship between acquisition and R duration is probably greater response integration and availability due to more opportunity to rehearse response members, and greater use of this opportunity.

The data of the present experiment are of little value for explicating the course of formation of associations between integrated, available response members and the stimulus members with which they were paired. However, the discrepancy between responses recalled and responses anticipated with, particularly, the 1/2-sec. St duration, but also the 1-sec. St duration, is corroborative of the notion of a latency-reduction stage in PA learning. Although none of the Ss were able to anticipate in 1/2 sec., during the longer time for

response of the recall trial some correct responses did occur: correct associations had been formed but could not be revealed in very short anticipation intervals. The superiority of recall to anticipation frequencies diminished with 1- and 2-sec. St durations and essentially disappeared with the 4-sec. St duration. However, the greater number of recall than of anticipation responses with the two intermediate St durations suggests that stronger associations between stimuli and responses had been formed than were indicated by frequencies of anticipatory responses.

The greater potency of R duration than of St duration, and also the tendency to rehearse response members, rather than stimulus members or both, may have reflected essentially the same weighting of factors presumed to underlie the greater potency of M of response members than of M of stimulus members. In conventional PA learning, all that is required is differential recognition responses to stimulus members. Such differentiation may oftentimes be merely noticing and responding to the particular one of the three letters of a member which is different from the letters of most or of all of the other stimulus members. But response members must be differentiated from each other and differential recognition responses must be integrated into units which can be rehearsed readily and can be said during short anticipation intervals. Because lengthening R durations allows greater opportunity both for differentiation and for integration, R duration should be more potent than St duration.

Stimulus Characteristics

In the present experiment, effects of Sim and M of stimulus and response members on acquisition were less important *per se* than as providing a range of differences among the combinations in a rank-order reasonably consistent with other findings for those same combinations. Disregarding Sim, the direct relationships between M of stimulus and of response members and the greater potency of M of response members were consistent with previous findings for mixed, partly-mixed, and unmixed lists (Goss & Nodine, 1962) as were, disregarding M, the inverse relationships between Sim of stimulus and response members. Contrary to previous findings, Sim of stimulus members was less potent than Sim of response members.

The mixed list of the present study was the first in which all 16 combinations of high and low M and Sim of stimulus and response members were realized. The rank-order for these combinations in a mixed list might be compared to their rank-order in Goss, Nodine, Gregory, Taub and Kennedy's (1962) Experiments IA and IB, in which each combination was represented by a different four-pair list. The correlation coefficient obtained in this comparison was .68. The most important difference in ranks was the much greater relative difficulty of the combination of low M and high Sim of both stimulus and response members among the unmixed lists than of the pair representing this combination within the mixed list. Sampling of pairs representing particular combinations is the probable basis for this and other discrepancies between ranks

of particular combinations of Sim and M of stimulus and response members in mixed and unmixed lists.

There were, however, differences in the joint actions of stimulus characteristics. With the unmixed lists, most of the interactions among various combinations of Sim and M of stimulus and response members were nonsignificant. In the present experiment with a mixed list, several of these interactions, including the interaction of all four characteristics, were significant: their pattern was progressively larger differences between adjacent combinations for successively easy combinations.

The processes presumed to underlie effects of M and Sim of stimulus and response members were described briefly earlier; they are described more extensively elsewhere (Goss, 1963; Goss, Nodine, Gregory, Taub, & Kennedy, 1962). The significance of effects on acquisition rate of stimulus characteristics as such is primarily as confirmation and extension of Goss, Nodine, and Levitt's (1961) findings of differences in effects of Sim and M of stimulus and response members of single paired associates (Experiments IV, V).

Durations and Characteristics

Examination of the basis of the highest-order interaction, the interaction involving St and R durations, all four stimulus characteristics, and trials, revealed a relatively simple pattern. All 256 combinations of durations and characteristics were arranged in order of increasing numbers of correct responses through all four recall trials for the combina-

tions of durations, and similarly for the combinations of stimulus characteristics. Increments from trial block 1 to 2 were then calculated for each of the 256 combinations as arranged in this manner (Table 7). For progressively easier combinations of durations, of characteristics, and of both, the increments increased. The 256 combinations could be viewed as producing differences among means during the first block of trials which were even greater during the second block. While the StM x StSim x RM x RSim interaction was significant, within each of the combinations of durations rank-orders of combinations of stimulus characteristics were essentially the same. Thus, for progressively longer durations, all 16 combinations of stimulus characteristics were displaced upward, and differences among them became more pronounced.

Most of the significant lower-order interactions involving trials also reflected increasing increments from trial block 1 to 2 for progressively easier combinations of durations, of characteristics, or of both. Except for degree, the same pattern of relationships among means was apparent in many of the nonsignificant interactions. R duration entered into more significant interactions than did St duration. The relationships producing significant interactions in combinations of conditions involving R duration often occurred in the same form in combinations involving St duration, but were sufficiently attenuated to preclude significant interactions.

The direct effects of M of stimulus and response members on acquisition rate have been interpreted as due to degree of

integration of recognition responses to those members. Greater integration of recognition responses to stimulus members is viewed as allowing Ss more time for anticipation and for rehearsal. Greater integration of recognition responses to response members presumably provides a more complete unit for anticipation earlier in acquisition and also allows more time for rehearsal. Sim of stimulus and of response members are also conceived as influencing recognition responses: the greater the Sim, the greater the difficulty of forming stable, different recognition responses.

Lengthening St duration, R duration, or both can be regarded as providing increased opportunity for Ss to form stable, different recognition responses to stimulus members and to response members. Therefore, as durations lengthen, all pairs representing combinations of stimulus characteristics should benefit. In the present experiment, the combinations which benefitted most from longer durations were those which during the first half of the trials seemingly had the most stable, discriminable recognition responses.

Most PA learning tasks, as noted above, require only differentiations among stimulus members; but recognition responses to response members must be both integrated and differentiated. Accordingly, concentration on response members and, as a consequence, relatively greater potency of R durations and of M of response members would be anticipated. Supporting this anticipation were Ss' reports that their rehearsals were primarily of response members during exposure

of stimulus and response members together.

St duration was probably of some importance with respect to opportunity to develop stable, differential recognition responses to stimulus members. However, the marked discrepancies between frequency of anticipation responses and frequency of recall responses with the 1/2-sec. and 1-sec. St durations, which diminished with the 2- and 4-sec. St durations, suggest that the particular significance of St duration is simply providing sufficient time for associations which exist in some strength to occur. More generally, opportunity for single responses and chains of responses to occur to stimuli is an obvious and important, but often overlooked, prerequisite to occurrence of correct responses.

Effects of M and Sim of stimulus and response members on acquisition rates were analyzed in terms of underlying processes of stimulus integration and response integration. The expectations based on this analysis were decreasing differences in acquisition rates due to Sim, M, and Sim and M combined for longer St and R durations. Some interactions of St duration, and particularly of R duration, with stimulus characteristics alone were significant; but the pattern of these interactions which was of increasing differences with longer durations was opposite that predicted.

The interactions of one or both durations with two or more of the stimulus characteristics were interpreted within the pattern of the significant interaction among St and R durations, the four stimulus characteristics, and trials.

Differences among means of correct responses indicated by the ranges and standard deviations of their distributions increased with decreasing difficulty of St and R durations. Differences among increments from trial block 1 to 2 increased and then decreased with decreasing difficulty of durations. Thus, the findings for differences among means of correct responses for the combinations of stimulus characteristics were directly contrary to expectations; and those for increments of a form which had not been anticipated.

Other aspects of the findings, such as Ss' reports of rehearsal during the period stimulus and response members were presented together, are consistent with a response integration analysis of PA learning. In order to maintain a stimulus integration and response integration analysis of PA learning of simple form, the most plausible explanation of the contrary findings is that Ss' mastery of the list under the shorter St and R durations had not progressed sufficiently to reveal maximum differences among means of correct responses and among increments in means of correct responses for successive trial blocks.

Summary

Acquisition of a list of 16 paired associates was investigated as functions of orthogonal combinations of duration of stimulus members alone and of duration of stimulus and response members together, of meaningfulness of stimulus and of response members, and of similarity among stimulus and among response members. Each of the paired associates represented one of the combinations of high or low meaningfulness and similarity of stimulus and response members. The durations of stimulus members alone were 1/2, 1, 2, and 4 sec. and the durations of stimulus and response members together were also 1/2, 1, 2, and 4 sec. Ten Ss were assigned to each of the combinations of durations.

Four blocks of five acquisition trials with the anticipation technique of presentation were each followed by a recall trial in which stimulus members alone were presented for 4 sec. The last recall trial was followed by one additional acquisition trial.

The three response measures were number of correct responses and latency of responses on recall trials, and also number of correct responses on the acquisition trial just before and just after each recall trial. Because high correlations obtained between recall and anticipation frequencies and between recall frequencies and latencies, statistical analyses were performed only on recall scores.

Responses recalled correctly were a direct function of

duration of stimulus members, duration of stimulus and response members together, meaningfulness of stimulus members and meaningfulness of response members; they were an inverse function of similarity among stimulus members and of similarity among response members. Duration of stimulus and response members together was more potent than duration of stimulus members alone. Similarity among response members had a more pronounced effect than similarity among stimulus members. The same relationship held for meaningfulness of stimulus and response members.

Various significant interactions among durations, characteristics and trials were obtained, including the interaction among the two duration variables, the four stimulus variables, and trials. Both this highest-order interaction and many of the lower-order interactions involving trials were interpretable as increasing increments in correct responses through trials for combinations of durations, of characteristics, and of both which led to progressively larger means for all trials.

The results were considered consistent with an analysis of paired-associates learning in which meaningfulness and similarity of stimulus and response members are conceived as acting through stable, discriminable recognition responses to stimulus and to response members. Lengthening durations of stimulus members alone and lengthening durations of stimulus and response members together are presumed to provide greater opportunity for occurrence and rehearsal of such recognition responses.

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Appendix A

Data for Number Correct on Recall and Anticipation Trials and Latencies for each S on Trial Blocks 1 and 2 for each Combination of Stimulus Characteristics and Stimulus Durations

Listed below are the numbers used in the Tables which follow to designate each of the 16 combinations of high or low Sim and M of St and R.

	St		R	
Code	Sim	M	Sim	M
1	H	L	H	H
2	L	L	H	H
3	H	L	L	H
4	L	L	L	H
5	H	L	H	L
6	L	L	H	L
7	H	L	L	L
8	L	L	L	L
9	H	H	H	H
10	L	H	H	H
11	H	H	L	H
12	L	H	L	H
13	H	H	H	L
14	L	H	H	L
15	H	H	L	L
16	L	H	L	L

Correct Responses on Recall Trials

1/2 - 1/2

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	2
2	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
	2	0	0	2	0	1	0	0	0	0	0	1	0	0	1	0	1
3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0
	2	0	0	0	2	0	0	0	2	0	2	0	2	0	0	0	0
5	1	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	1
	2	0	0	1	1	0	0	0	0	1	0	0	2	0	0	0	1
6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	2	0	1	0	0	1	0	0	2	0	0	0	0	0
8	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
10	1	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	2

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0	0	2	1	0	0	0	0	2	1	2	0	1	0	1	1
	2	2	2	2	2	0	0	0	0	2	0	2	2	0	1	2	2
2	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	1
	2	0	0	2	2	1	0	0	0	0	0	0	0	0	0	0	2
3	1	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0
	2	1	1	1	2	0	0	0	0	2	2	2	2	0	0	2	0
4	1	0	0	1	1	1	0	1	1	0	1	1	1	0	0	0	0
	2	0	1	0	2	1	1	0	2	1	2	2	2	0	0	0	2
5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	1	0	0	0	0	0	2	0	0	0	2	0	0	0
6	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
	2	0	0	0	1	0	0	0	0	0	0	2	1	0	0	0	0
7	1	0	1	1	0	0	0	0	0	1	0	1	0	0	0	0	0
	2	0	0	1	1	0	0	0	0	2	1	2	0	0	0	0	1
8	1	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	1
	2	0	0	2	1	0	0	0	1	0	0	0	2	0	0	2	2
9	1	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0
	2	0	2	0	1	0	1	1	0	2	0	2	2	0	0	0	0
10	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	2	0	2	0	2	0	0	0	0	1	0	2	2	2	1	0	0

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0	0	0	2	0	0	0	0	1	0	1	1	0	0	0	0
	2	0	2	0	2	1	0	0	2	1	0	2	2	2	0	1	2
2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	1	0	1	0	0	0	2	0	0	0	1	0	1
3	1	0	0	1	2	0	0	0	0	2	0	0	1	0	1	0	1
	2	0	0	1	2	1	0	0	2	2	2	2	2	0	1	0	1
4	1	0	0	0	0	0	1	0	1	0	2	2	0	0	0	0	0
	2	1	0	1	1	0	0	0	2	0	2	2	2	0	1	0	1
5	1	0	0	1	2	0	0	0	0	1	0	1	1	0	0	1	1
	2	0	0	1	2	0	1	1	1	2	1	2	2	1	0	1	2
6	1	0	0	0	1	0	0	0	0	1	1	2	2	0	1	1	2
	2	0	1	0	2	0	0	0	2	2	2	1	0	0	1	2	2
7	1	0	1	1	0	0	1	0	0	1	2	1	0	0	0	0	1
	2	0	2	1	2	0	0	0	2	2	2	2	1	0	0	0	2
8	1	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	1
	2	0	0	1	0	1	1	0	0	2	0	2	2	0	1	0	2
9	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
	2	0	0	0	0	1	0	0	1	0	0	2	2	0	0	0	0
10	1	0	0	0	0	0	0	0	0	1	1	2	2	0	1	0	1
	2	0	0	0	2	0	1	1	2	2	2	2	2	0	2	1	2

Sub-jects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0	0	1	0	0	0	1	0	2	1	0	1	0	0	0	1
	2	0	0	1	0	0	1	1	1	2	1	2	1	0	0	2	1
2	1	1	0	0	1	0	0	0	0	0	0	2	1	0	0	0	0
	2	2	0	0	1	0	0	0	0	2	1	1	2	0	0	0	0
3	1	0	1	1	2	1	1	0	2	1	2	2	2	0	0	2	2
	2	0	2	2	2	2	2	1	2	2	2	2	2	0	2	2	2
4	1	0	2	2	2	0	1	2	2	2	2	2	1	2	0	1	2
	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2
5	1	0	1	0	2	2	1	0	0	0	2	0	0	0	1	0	1
	2	1	2	2	2	2	2	1	2	2	2	1	2	1	2	1	2
6	1	0	2	0	2	0	0	0	1	1	0	2	2	0	0	1	2
	2	0	2	0	2	2	0	2	2	1	1	2	2	1	0	1	2
7	1	1	1	0	1	0	0	0	1	1	2	2	1	0	1	1	2
	2	1	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2
8	1	1	0	0	2	0	0	1	0	1	0	2	0	0	0	1	2
	2	1	2	2	2	0	1	2	2	2	2	2	2	0	2	1	2
9	1	0	1	2	0	2	0	0	1	1	1	1	1	0	0	1	1
	2	0	2	2	2	1	0	1	2	2	2	2	2	0	0	2	2
10	1	0	1	2	0	0	1	0	1	1	0	1	0	0	0	0	0
	2	0	2	2	2	0	1	0	2	1	1	2	2	0	1	0	2

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
	2	0	0	0	1	0	0	0	1	0	1	2	2	0	2	0	2
2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0
3	1	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0
	2	0	0	2	1	0	0	0	0	0	0	2	2	0	0	0	0
4	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	1	0	0	0	1	0	0	1	1	0	0	0	0	0
5	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	2	0	0	0	0	0	0	1	0	0	2	2	2	0	0	0	0
6	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
	2	0	0	0	1	1	2	1	1	2	0	2	1	0	0	1	1
7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
	2	2	0	1	0	1	0	0	0	0	0	0	0	0	0	2	2
8	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	1	1	2	0	0	0	0	0	0	2	0	0	0	0
9	1	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0
	2	0	2	2	0	0	1	0	1	0	0	2	1	0	0	0	0
10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1
	2	1	1	0	2	0	0	1	0	0	0	2	0	0	1	1	1
2	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	2	0	0	2	0	1	0	0	1	0	1	0	0	0	0	0	0
3	1	0	1	0	1	0	0	0	0	0	2	0	2	0	0	0	1
	2	0	1	0	2	0	0	0	1	2	1	1	2	0	0	1	2
4	1	0	0	1	2	0	0	0	0	0	2	1	1	0	1	0	0
	2	0	1	2	2	0	0	0	0	1	2	2	2	0	1	2	1
5	1	0	0	1	2	0	1	0	0	1	1	0	2	0	0	0	2
	2	2	0	2	2	0	1	1	1	2	2	2	2	0	0	2	2
6	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	2	0	1	1	2	0	0	0	2	2	1	0	0	0	0	0	0
7	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
	2	0	0	1	2	0	0	0	0	2	0	2	2	0	0	0	1
8	1	0	0	0	2	0	0	0	0	0	1	0	1	0	0	0	0
	2	2	2	2	2	0	0	0	0	2	1	2	2	0	2	0	2
9	1	0	0	1	0	2	0	0	0	0	1	1	1	0	0	0	1
	2	0	1	1	0	2	0	0	2	1	2	2	2	0	2	2	2
10	1	0	0	0	0	0	0	0	1	0	0	0	2	0	1	1	0
	2	0	0	0	2	1	0	0	2	1	2	2	2	1	0	2	1

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0
	2	0	1	1	2	0	0	0	1	1	2	2	2	0	0	0	1
2	1	0	2	2	0	0	0	0	2	0	0	0	1	0	0	0	1
	2	0	2	2	0	1	0	0	1	0	1	0	2	0	0	0	2
3	1	0	0	0	1	0	0	0	0	1	1	1	1	1	1	0	1
	2	1	1	2	2	2	0	0	0	2	1	2	2	1	2	0	1
4	1	0	0	1	0	0	0	0	0	2	0	1	1	0	0	0	2
	2	0	1	2	2	0	0	1	0	2	2	2	2	0	1	0	2
5	1	0	0	2	2	1	0	0	0	0	0	0	1	0	0	0	2
	2	0	0	2	2	0	0	0	2	0	1	1	2	0	1	2	2
6	1	0	0	0	0	0	0	0	0	1	1	2	1	0	0	2	1
	2	0	1	2	2	0	1	1	2	2	2	2	2	0	0	1	2
7	1	0	1	1	2	0	0	0	0	1	2	0	0	0	0	0	0
	2	0	2	2	2	0	0	1	0	2	1	1	0	0	0	2	2
8	1	0	0	1	1	1	0	0	0	2	0	0	1	0	0	0	1
	2	0	0	2	2	2	1	1	1	2	1	1	2	0	0	0	2
9	1	1	0	1	2	0	0	0	1	2	2	1	1	0	0	1	1
	2	1	2	2	2	1	1	0	2	2	2	2	2	1	1	2	2
10	1	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	1
	2	0	1	1	2	0	0	0	0	2	0	0	1	0	0	1	2

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0	2	2	2	0	0	0	1	1	0	2	2	0	0	0	2
	2	0	1	2	2	1	0	1	2	2	1	2	2	2	2	2	2
2	1	1	1	2	1	0	0	0	2	1	1	0	0	1	0	0	2
	2	2	2	2	2	1	0	2	2	2	2	2	1	2	2	2	2
3	1	0	2	1	2	0	1	0	1	2	1	2	2	0	0	1	2
	2	1	2	1	2	0	2	0	1	2	2	2	2	1	1	2	2
4	1	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0
	2	0	0	0	2	1	0	0	0	0	0	2	0	0	0	0	1
5	1	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	2
	2	1	0	2	1	1	2	0	2	2	2	2	2	0	0	1	2
6	1	0	1	1	0	0	0	0	0	2	1	2	1	0	0	0	1
	2	1	2	2	1	2	0	0	1	2	2	2	2	2	1	1	1
7	1	0	0	1	2	0	0	0	0	2	0	0	1	0	1	0	2
	2	0	2	2	2	2	0	0	0	2	2	2	2	2	2	2	2
8	1	0	0	0	1	1	0	0	1	1	1	1	2	0	0	0	0
	2	0	2	1	2	2	0	1	2	2	2	2	2	0	1	2	2
9	1	0	1	2	2	0	0	0	2	2	0	2	1	0	1	1	2
	2	0	2	2	2	2	2	1	2	2	2	2	2	0	2	2	2
10	1	0	1	2	2	0	1	0	2	1	1	1	2	0	0	2	2
	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0	0	0	0	0	0	0	2	0	0	1	0	0	1	1	0
	2	0	0	1	2	0	1	0	2	0	1	2	2	0	0	0	0
2	1	0	1	0	2	1	0	0	1	1	2	2	2	0	0	0	1
	2	0	2	2	2	2	2	1	2	2	2	2	2	0	2	0	2
3	1	0	0	0	2	0	0	0	0	1	0	2	1	0	1	1	0
	2	0	1	1	1	0	1	0	1	1	2	2	2	0	2	0	1
4	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
	2	1	0	1	0	1	0	0	1	0	2	0	0	0	0	0	0
5	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	2	1	0	0	0	0	0	2	2	2	2	2	0	0	0
6	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
	2	0	1	2	2	0	0	0	1	0	0	2	2	0	0	0	0
7	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	2	0	0	0	0	1	2	1	2	0	0	0	0
8	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
	2	0	0	0	1	0	1	0	0	2	2	1	2	0	0	0	2
9	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	1	0	0	1	0	1	0	0	2	0	0	0	0
10	1	0	1	1	0	0	0	0	0	2	2	0	0	0	0	0	0
	2	2	1	1	2	0	0	0	2	2	2	2	2	0	2	1	0

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0	0	1	2	0	1	2	0	0	1	1	0	0	1	0	0
	2	0	0	2	2	0	0	2	2	0	1	2	2	0	2	0	0
2	1	0	0	0	1	0	0	1	0	1	0	1	1	0	2	1	0
	2	0	2	2	2	0	0	2	1	2	0	2	2	0	2	2	1
3	1	0	0	0	1	0	0	0	0	0	1	1	2	0	0	0	0
	2	1	0	2	2	2	0	0	0	2	2	2	1	1	0	2	0
4	1	0	0	1	0	1	0	0	0	0	1	0	0	0	2	0	0
	2	0	1	2	1	2	0	0	1	1	2	2	2	0	2	0	1
5	1	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0
	2	0	2	0	0	1	1	0	0	0	2	2	2	0	1	0	0
6	1	0	0	0	2	0	0	0	0	0	1	1	2	0	2	0	0
	2	1	1	1	0	0	0	0	2	0	2	2	2	2	2	0	1
7	1	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	1
	2	0	2	0	2	0	0	1	2	1	1	2	2	0	0	0	2
8	1	0	0	0	0	0	0	0	0	2	1	1	2	0	1	0	2
	2	0	2	2	2	0	0	0	1	2	2	2	2	0	1	2	2
9	1	2	0	1	1	0	0	0	0	0	0	0	2	0	0	0	0
	2	0	2	2	2	0	0	0	1	1	1	2	2	0	0	0	0
10	1	0	0	2	2	0	0	1	0	0	1	0	0	0	0	0	1
	2	0	2	2	2	0	0	2	1	2	2	2	2	0	0	1	2

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1
	2	0	0	2	2	1	1	1	0	2	2	2	1	0	0	0	1
2	1	0	0	0	1	1	1	0	0	0	2	1	2	0	1	1	0
	2	0	0	2	2	0	0	0	2	1	2	1	2	0	2	1	0
3	1	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0
	2	2	2	0	2	0	0	0	0	0	2	1	2	0	0	0	0
4	1	0	2	2	2	1	0	2	1	2	2	2	2	0	0	0	1
	2	2	2	2	2	1	1	1	2	2	2	2	2	2	2	2	2
5	1	0	0	1	0	0	0	0	0	2	0	2	2	1	0	0	1
	2	0	2	2	2	2	1	0	2	2	1	2	2	2	1	1	2
6	1	0	0	0	1	0	0	0	1	1	0	0	0	0	1	0	0
	2	0	0	1	2	0	0	0	2	0	0	2	2	0	2	1	1
7	1	0	0	0	2	0	0	0	0	1	0	0	2	0	0	0	1
	2	0	2	2	2	0	0	0	0	2	2	1	2	1	0	0	2
8	1	0	0	2	0	2	0	1	0	1	2	1	1	0	0	0	0
	2	1	2	2	1	2	0	1	2	2	2	2	2	0	1	0	2
9	1	0	0	2	2	0	0	0	0	1	1	2	2	0	0	0	0
	2	1	1	1	1	0	0	0	0	1	2	2	1	1	1	1	2
10	1	0	0	1	0	2	0	0	0	1	0	2	1	0	0	0	1
	2	1	1	2	2	0	0	1	2	2	1	2	2	0	0	0	2

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	2	1	2	2	1	0	1	2	2	1	1	1	2	1	0	1
	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2
2	1	0	0	1	1	1	0	0	0	1	2	1	2	0	0	0	0
	2	0	2	1	2	1	0	0	1	2	2	2	2	1	0	1	0
3	1	1	0	2	2	0	0	0	1	2	2	2	2	1	0	1	2
	2	1	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2
4	1	0	0	1	1	1	0	0	0	0	0	0	2	0	0	0	1
	2	0	1	2	2	0	1	0	2	0	2	2	2	0	0	2	2
5	1	0	0	1	2	0	0	0	1	0	2	1	2	0	1	0	1
	2	0	1	2	2	1	0	1	2	2	2	2	2	1	2	2	2
6	1	0	0	2	2	0	0	0	0	2	2	2	1	0	0	0	2
	2	0	2	2	2	2	1	0	2	2	2	2	2	0	0	2	2
7	1	1	2	2	2	0	2	0	1	1	1	2	2	0	1	1	2
	2	2	2	2	2	1	2	1	2	2	2	2	2	1	2	2	2
8	1	0	2	0	1	1	0	0	1	1	2	1	1	0	0	0	0
	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2
9	1	0	0	0	2	0	1	0	1	0	2	2	1	0	0	0	2
	2	0	2	0	2	2	1	0	2	1	2	2	2	0	1	1	2
10	1	0	2	2	1	0	0	0	2	2	2	1	2	0	0	0	1
	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2

Sub-jects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0	0	0	0	2	0	0	0	0	0	1	1	0	0	0	0
	2	0	0	0	0	1	0	0	0	0	0	2	2	0	0	0	0
2	1	0	0	1	2	0	0	1	0	0	0	2	1	0	0	0	0
	2	0	2	1	2	0	0	0	2	0	0	2	2	1	0	0	2
3	1	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0
	2	2	0	2	2	1	0	1	0	0	0	2	1	0	0	0	1
4	1	0	0	1	0	0	0	0	0	0	2	2	1	0	0	0	2
	2	1	1	0	2	0	0	2	2	2	2	2	2	0	2	0	2
5	1	0	0	1	0	1	0	0	0	1	2	0	1	0	0	1	0
	2	1	2	2	1	1	0	0	0	2	2	2	2	0	0	2	0
6	1	0	0	2	1	0	0	0	0	0	1	0	1	0	0	1	0
	2	0	2	2	2	0	1	2	1	2	2	2	2	0	0	2	1
7	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	2	0	0	2	0	0	0	0	2	1	2	0	2	0	2	0	0
8	1	0	0	0	0	1	0	0	1	2	2	0	2	0	0	0	1
	2	0	1	0	2	0	0	0	2	2	2	2	2	0	1	0	2
9	1	1	0	0	1	0	0	0	0	1	0	0	1	0	0	2	0
	2	2	1	0	2	0	0	0	0	1	1	1	1	0	2	2	0
10	1	0	2	1	0	0	0	0	0	1	1	1	0	0	0	0	0
	2	0	2	2	1	2	0	0	0	1	2	2	2	0	0	1	0

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0	1	1	1	1	0	0	1	2	1	2	0	0	0	1	1
	2	0	2	2	2	2	1	0	2	2	2	2	1	0	1	2	2
2	1	0	0	0	1	0	0	0	0	0	0	1	2	0	0	0	0
	2	0	0	0	2	0	0	1	0	0	2	2	2	0	1	1	0
3	1	0	0	0	1	0	0	0	0	2	1	1	0	2	0	0	1
	2	0	2	2	2	1	1	0	0	2	2	2	2	2	2	1	2
4	1	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0
	2	1	0	0	2	1	0	0	0	1	0	1	2	0	1	1	2
5	1	1	1	0	0	0	0	0	0	0	0	1	1	0	1	1	0
	2	0	2	2	2	0	0	0	0	2	2	2	2	0	1	2	2
6	1	0	2	2	0	0	0	0	1	1	1	1	1	0	0	0	0
	2	1	2	2	2	1	0	1	2	2	2	2	2	0	2	1	2
7	1	0	1	1	1	0	0	0	0	0	0	1	1	0	1	1	0
	2	0	2	2	2	1	0	0	2	1	2	2	2	0	2	2	2
8	1	0	0	1	0	0	0	0	0	2	0	0	1	1	0	0	1
	2	0	1	2	2	0	0	1	1	2	1	2	2	0	0	0	2
9	1	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	1
	2	0	2	0	2	0	0	0	2	1	2	2	1	0	1	0	0
10	1	0	0	0	1	1	0	0	0	1	0	2	2	1	0	2	1
	2	2	2	0	2	1	0	0	1	2	2	2	2	2	1	1	2

Sub-jects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0	2	0	0	0	0	1	1	0	0	1	0	0	0	0	1
	2	0	2	1	2	0	0	0	0	0	1	2	2	0	0	1	2
2	1	0	0	1	1	2	0	0	0	0	2	0	1	0	0	0	0
	2	0	1	1	2	2	0	0	1	0	2	1	2	0	1	1	2
3	1	2	1	2	2	0	0	0	1	1	2	2	2	2	1	2	2
	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2
4	1	0	0	1	0	0	0	0	0	1	1	1	2	0	0	1	2
	2	0	0	2	2	0	0	0	2	2	2	2	2	0	0	1	2
5	1	0	1	2	0	0	0	0	1	1	1	1	2	0	1	2	1
	2	1	2	2	2	2	1	1	2	2	2	2	2	2	2	2	2
6	1	1	1	0	2	2	0	0	0	1	1	2	2	0	0	0	1
	2	2	2	0	2	1	2	0	2	2	2	2	2	0	1	2	2
7	1	2	0	1	2	1	0	1	1	2	0	1	2	0	0	0	1
	2	2	1	2	2	2	0	2	2	2	2	2	2	2	2	2	2
8	1	2	2	1	1	0	1	1	0	2	1	1	1	0	0	1	1
	2	2	2	2	2	2	2	2	2	2	2	2	2	0	1	2	2
9	1	1	1	2	1	2	0	0	2	2	2	2	2	0	2	1	2
	2	1	2	2	2	2	1	0	2	2	2	2	2	2	2	2	2
10	1	0	0	1	1	0	0	0	0	1	1	1	1	0	0	2	1
	2	0	0	2	2	0	0	1	0	2	2	2	2	0	0	2	2

Sub-jects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0	2	0	1	0	2	0	2	2	1	1	2	1	1	0	1
	2	0	2	1	2	1	2	0	2	2	2	2	2	2	1	1	2
2	1	0	0	1	2	0	0	0	0	2	0	0	1	0	0	0	1
	2	2	0	1	2	1	0	0	2	2	0	2	2	1	1	2	2
3	1	0	1	2	1	1	0	1	0	1	0	1	0	0	0	1	2
	2	1	1	2	2	1	2	2	2	2	2	2	1	2	2	2	2
4	1	1	1	2	2	0	0	0	0	2	2	2	1	1	2	2	2
	2	2	2	2	2	2	2	1	1	2	2	2	2	2	2	2	2
5	1	1	1	1	1	0	0	0	0	1	1	1	2	0	0	0	2
	2	2	2	2	2	0	0	0	0	2	2	2	2	0	0	2	2
6	1	1	2	0	0	0	0	0	1	1	0	1	2	0	0	0	1
	2	2	2	1	2	0	1	2	2	2	1	2	2	0	1	2	2
7	1	0	2	1	2	1	1	1	2	2	2	2	2	1	1	1	0
	2	1	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2
8	1	1	2	2	2	2	2	1	1	2	2	2	2	2	2	2	2
	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2
9	1	0	1	0	0	0	0	0	2	1	1	1	2	0	2	2	0
	2	1	2	2	2	2	0	0	2	2	2	2	2	1	2	2	2
10	1	0	1	2	0	0	1	0	1	1	1	2	1	0	0	1	2
	2	2	2	2	2	2	1	2	1	2	2	2	2	2	2	2	2

Mean Numbers of Correct Responses on Anticipation Trials

1/2 - 1/2

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.0	0.0	0.0	0.0	0.0
3	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.5	0.0	0.0	0.0	0.0
5	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
2	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5
	2	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	2.0	0.0	1.0	1.5	0.0	0.0	0.0	1.0
4	1	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5	0.5	0.0	0.0	0.0	0.0
	2	0.0	0.5	0.5	1.5	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.5	1.0
5	1	0.5	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.5	0.5	0.0	1.0	0.0	0.0	0.0	1.0
	2	1.5	0.0	1.5	1.5	0.0	0.0	0.5	0.0	1.5	2.0	1.5	0.5	0.0	0.0	0.5	1.5
6	1	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	2.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
7	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
8	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.5	0.0	1.5	0.0	0.0	0.0	0.0	0.5	2.0	0.5	0.5	0.0	0.0	0.0	0.5
9	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	1.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	1.5	0.0	0.0	0.0	0.5
10	1	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5
	2	0.0	2.0	1.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	2.0	0.0	0.0	0.0	2.0
2	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5	1.0	0.0	1.0	0.0	0.0
	2	0.0	0.5	0.0	2.0	0.0	0.0	0.0	0.0	1.0	1.5	1.5	2.0	0.0	2.0	0.0	1.0
4	1	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0
	2	0.0	0.0	1.5	1.5	0.0	0.0	0.0	0.0	1.0	0.0	0.5	1.5	0.0	0.5	0.0	0.5
5	1	0.0	0.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5
	2	0.0	0.0	1.5	2.0	0.0	0.0	0.0	0.5	0.0	1.0	0.5	1.0	0.0	0.0	0.0	2.0
6	1	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
7	1	0.0	0.5	0.5	1.5	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	1.0	2.0	2.0	0.0	0.0	0.0	0.0	2.0	1.0	0.0	0.0	0.0	0.0	0.5	2.0
8	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0
	2	0.0	0.5	0.5	2.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	1.0	0.0	0.0	0.0	1.5
9	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.5	0.0	0.0	0.0	0.0	1.5	1.0
10	1	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
	2	0.0	1.0	0.5	2.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	1.0	0.0	0.0	0.0	2.0

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0.0	0.0	1.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	2.0	0.0	0.0	0.0	2.0
	2	0.0	0.5	2.0	2.0	0.0	0.0	0.0	2.0	2.0	0.0	1.5	2.0	0.0	0.0	0.0	2.0
2	1	0.5	0.5	1.0	1.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
	2	2.0	2.0	2.0	2.0	0.0	0.0	2.0	2.0	2.0	1.5	1.0	0.0	0.0	0.5	2.0	2.0
3	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0
4	1	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0
5	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	2.0	2.0	0.5	1.5	0.0	0.0	0.0	1.5
6	1	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	1.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	2.0	0.0	0.0	0.0	0.0	1.0	1.0	2.0	1.0	2.0	0.0	0.0	0.0	0.0
7	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.5	1.0	0.0	0.0	0.0	0.0	0.0	1.5	1.5	0.0	0.0	0.0	1.0	1.0	1.0
8	1	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.5	0.5	0.0	1.0	0.0	0.0	0.0	0.0
	2	0.0	0.5	0.0	2.0	0.0	0.0	0.0	1.0	1.5	2.0	0.0	2.0	0.0	0.0	0.0	1.0
9	1	1.0	0.5	1.0	2.0	0.0	0.0	0.0	1.0	1.0	0.0	2.0	0.0	0.0	0.5	0.0	1.5
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0
10	1	0.0	1.0	1.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	0.0	0.0	1.5
	2	0.0	2.0	2.0	2.0	1.0	1.0	0.5	1.0	2.0	0.5	2.0	2.0	0.0	0.5	2.0	2.0

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.5	0.0	0.0	0.5	0.0	0.0
	2	0.0	0.5	0.0	1.5	0.0	1.0	0.0	2.0	0.0	0.5	2.0	1.5	0.0	0.0	0.0	0.0
2	1	0.0	1.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	2.0	1.0	2.0	0.0	0.0	0.0	1.0
	2	0.0	2.0	2.0	2.0	0.0	1.0	0.0	2.0	1.5	2.0	1.5	2.0	0.0	1.0	0.0	2.0
3	1	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	1.0	2.0	0.0	0.0	0.0	1.5	0.0	0.5	2.0	2.0	0.0	0.5	0.0	1.0
4	1	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	1.0	0.5	2.0	0.0	0.5	0.0	0.0	1.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.5	2.0	1.5	0.5	0.0	0.0	0.0
6	1	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	1.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	0.0	0.0
7	1	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0
8	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0
9	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	2.0	0.0	0.0	0.0	0.0
10	1	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	1.5	0.5	1.5	0.0	0.0	0.0	2.0	2.0	1.5	1.0	1.5	0.0	1.5	0.5	0.0

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0.0	0.0	0.0	2.0	0.0	0.0	0.5	0.0	0.0	0.0	1.0	0.5	0.0	1.0	0.0	0.0
	2	0.0	0.5	1.0	2.0	0.0	0.0	1.5	2.0	0.0	1.0	2.0	2.0	0.5	2.0	0.0	0.0
2	1	0.0	0.0	0.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.5	0.0	0.5	1.0	0.0
	2	0.0	2.0	1.5	2.0	0.0	0.5	1.5	0.0	1.5	0.0	2.0	2.0	0.0	2.0	1.5	1.0
3	1	0.0	0.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.5	0.5	2.0	0.0	0.0	0.0	0.0
	2	1.0	0.0	1.5	2.0	2.0	0.0	0.0	0.0	1.0	2.0	1.5	2.0	0.5	0.0	1.5	0.0
4	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	2.0	0.0	0.0
	2	0.0	0.0	2.0	0.0	1.0	0.0	0.0	0.0	1.0	1.5	2.0	2.0	0.0	2.0	0.0	0.5
5	1	0.0	1.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	1.5	0.5	0.0	0.0	0.0	0.0	0.0
	2	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	2.0	1.0	1.0	0.0	0.5	0.0	0.0
6	1	1.5	0.5	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5	1.0	0.0	1.5	0.0	0.0
	2	1.0	1.0	0.0	0.5	0.0	0.0	0.0	1.5	0.0	2.0	1.0	2.0	1.5	2.0	0.5	0.5
7	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5	0.0	0.0	0.0	1.5
	2	0.0	1.5	0.0	2.0	0.0	0.0	0.0	1.5	0.5	1.0	2.0	1.5	0.0	0.0	0.0	1.5
8	1	0.0	0.5	0.0	1.0	0.0	0.0	0.0	0.0	2.0	1.0	1.0	1.5	0.0	0.0	0.5	1.5
	2	0.5	1.5	2.0	1.5	0.0	0.0	0.0	1.0	2.0	2.0	2.0	0.5	0.0	0.0	1.0	2.0
9	1	1.5	0.5	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0
	2	1.0	1.5	2.0	2.0	0.0	0.0	0.0	1.0	1.0	0.5	0.5	2.0	0.0	0.0	0.0	0.0
10	1	0.0	1.0	1.0	2.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0	0.0	0.0	0.5
	2	0.0	2.0	1.5	2.0	0.0	0.0	1.5	1.0	2.0	2.0	2.0	1.0	0.0	0.0	0.5	2.0

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0.0	0.0	0.5	1.0	0.0	0.0	0.0	0.0	1.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	1.5	2.0	0.5	0.5	0.0	0.0	1.5	1.5	2.0	0.5	0.0	0.0	0.5	0.5
2	1	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	2.0	0.0	0.0	0.5	0.0
	2	0.0	0.0	2.0	2.0	0.0	0.5	0.0	1.5	0.5	1.5	1.5	2.0	0.0	1.5	1.5	0.0
3	1	0.0	1.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.0
	2	1.0	2.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.5	1.5	0.0	0.0	0.0	0.0
4	1	0.0	1.5	2.0	1.5	1.0	0.0	1.0	0.0	1.5	1.0	2.0	2.0	0.0	0.0	0.0	0.5
	2	0.5	2.0	2.0	2.0	1.5	1.0	0.5	1.5	2.0	2.0	2.0	2.0	1.0	1.5	1.0	1.5
5	1	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	2.0	2.0	0.0	0.0	0.0	1.0
	2	0.0	2.0	2.0	0.0	1.5	0.0	0.0	0.0	2.0	1.5	2.0	2.0	1.0	0.5	1.0	2.0
6	1	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.5	1.0	0.0	1.0	0.0	0.0
	2	0.0	0.5	0.0	2.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	2.0	0.0	2.0	1.0	0.0
7	1	0.0	1.0	0.0	0.5	0.0	0.0	0.0	0.0	1.5	0.5	0.0	2.0	0.0	0.0	0.0	0.0
	2	0.0	1.0	1.0	2.0	0.0	0.0	0.0	0.0	1.5	1.0	1.5	2.0	0.5	0.0	0.0	1.0
8	1	0.0	0.0	2.0	0.0	1.0	0.0	0.0	0.0	1.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	2.0	2.0	1.5	1.5	0.0	1.5	1.0	2.0	2.0	2.0	2.0	0.0	0.0	0.0	0.5
9	1	0.0	0.0	0.5	2.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	2.0	0.0	0.0	0.0	0.0
	2	0.0	1.0	1.5	2.0	0.0	0.5	0.5	0.0	1.0	2.0	1.5	2.0	0.5	0.0	1.5	1.0
10	1	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.5	1.0	0.0	1.5	1.0	0.0	0.5	0.0	0.5
	2	2.0	1.0	1.5	1.5	0.0	0.0	1.0	1.5	2.0	1.0	2.0	2.0	0.0	0.0	1.0	2.0

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	1.5	1.5	1.5	2.0	1.0	0.5	1.0	2.0	1.0	0.5	1.0	1.5	2.0	0.0	0.0	0.0
	2	2.0	2.0	2.0	2.0	2.0	0.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	2.0
2	1	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	1.0	2.0	1.0	1.5	0.0	0.0	0.0	0.0
	2	0.0	2.0	2.0	1.5	0.5	0.0	0.0	0.5	2.0	2.0	2.0	2.0	0.0	0.0	1.0	0.0
3	1	0.0	1.0	1.5	2.0	0.0	0.0	0.5	1.0	0.5	1.0	2.0	2.0	0.5	0.0	0.5	1.5
	2	1.5	2.0	2.0	2.0	1.5	1.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
4	1	0.0	0.0	0.5	1.0	0.0	0.0	0.0	0.0	0.0	0.5	1.0	1.5	0.0	0.0	0.0	1.0
	2	0.0	0.0	2.0	2.0	0.0	0.0	0.0	2.0	0.0	2.0	2.0	2.0	0.0	0.0	0.5	2.0
5	1	0.0	0.0	0.5	1.0	0.0	0.0	0.0	0.5	0.0	1.5	1.0	1.5	0.0	0.5	0.0	1.0
	2	0.5	1.0	1.5	2.0	1.0	0.5	0.0	2.0	1.0	1.5	2.0	2.0	0.5	1.0	2.0	1.0
6	1	0.0	0.0	1.0	2.0	0.0	0.0	0.0	0.5	1.0	2.0	2.0	0.5	0.0	0.0	0.0	2.0
	2	0.0	1.5	2.0	2.0	0.0	0.5	0.0	2.0	2.0	1.0	2.0	1.5	0.0	0.5	1.5	2.0
7	1	0.5	2.0	1.5	2.0	0.0	0.5	0.0	0.5	1.0	2.0	2.0	2.0	0.0	1.0	1.0	1.0
	2	2.0	2.0	2.0	2.0	0.5	2.0	0.0	2.0	2.0	2.0	2.0	2.0	0.5	2.0	2.0	2.0
8	1	0.0	1.5	0.0	1.0	1.0	0.0	0.0	1.0	0.5	1.0	0.0	1.5	0.0	1.0	0.0	0.0
	2	1.0	2.0	2.0	2.0	2.0	1.0	1.5	2.0	2.0	2.0	1.5	2.0	1.0	1.5	1.5	2.0
9	1	0.0	0.0	0.0	1.5	0.0	0.5	0.0	1.0	0.0	1.0	1.0	1.5	0.0	0.0	0.0	0.5
	2	0.0	1.5	0.0	2.0	0.0	0.0	0.0	2.0	0.5	2.0	2.0	2.0	0.0	1.0	0.5	2.0
10	1	1.0	1.5	1.0	1.0	0.0	0.0	0.0	1.5	1.0	1.5	2.0	2.0	0.0	0.5	0.0	1.5
	2	1.0	2.0	2.0	2.0	0.5	2.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	0.0	0.0
2	1	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	2.0	0.5	2.0	0.0	0.0	1.5	2.0	0.5	0.0	2.0	1.0	0.0	0.0	0.0	1.5
3	1	0.0	0.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	1.5	1.5	2.0	2.0	0.0	0.0	2.0	0.0	0.0	0.0	2.0	0.5	0.0	0.0	0.0	1.0
4	1	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	1.0	1.0	1.5	0.0	0.0	0.0	2.0
	2	1.0	1.0	0.0	2.0	0.0	0.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	0.0	2.0
5	1	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	2.0	0.0	2.0	0.0	0.0	0.5	0.0
	2	0.5	2.0	2.0	1.0	0.0	0.0	0.0	0.0	1.5	2.0	0.5	2.0	0.0	0.0	1.5	0.0
6	1	0.0	0.0	2.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0	0.5	0.0	0.0	0.5	0.0
	2	0.0	2.0	2.0	2.0	0.0	0.5	2.0	1.0	2.0	2.0	2.0	2.0	0.0	0.0	2.0	1.0
7	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.0
	2	0.0	0.0	2.0	1.0	0.0	0.0	1.0	1.5	1.0	2.0	0.0	2.0	0.0	0.5	0.0	1.0
8	1	0.0	0.0	0.5	0.0	0.5	0.0	0.0	0.0	1.5	0.5	0.0	1.5	0.0	0.0	0.0	0.0
	2	0.0	1.5	0.5	1.0	1.5	0.0	0.0	2.0	2.0	2.0	1.5	2.0	0.5	1.5	0.0	2.0
9	1	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.5	2.0	0.0
	2	2.0	0.5	0.5	1.0	0.0	0.0	0.0	0.5	1.0	1.0	1.0	1.5	0.0	2.0	1.5	0.0
10	1	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.5	0.5	0.0	0.0	0.0	0.0
	2	0.0	2.0	2.0	0.0	2.0	0.0	0.0	0.0	2.0	2.0	2.0	1.0	0.0	0.0	1.5	0.0

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0.0	0.5	1.0	1.0	0.0	0.0	0.0	0.0	1.0	1.0	2.0	0.0	0.0	0.0	0.5	1.0
	2	0.5	2.0	2.0	2.0	0.5	1.0	0.0	2.0	2.0	2.0	2.0	1.0	0.0	0.0	1.5	2.0
2	1	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.5	0.0	0.5	0.0	0.0
	2	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	1.5	1.0	0.0
3	1	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.5	0.0	1.0	0.5	2.0	0.0	0.0	1.0
	2	0.0	2.0	1.0	2.0	0.0	0.5	0.5	0.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5	2.0
4	1	0.0	0.5	0.5	1.5	0.0	0.0	0.0	0.0	1.0	0.0	0.0	1.0	0.5	0.0	0.0	0.0
	2	0.0	0.0	0.5	2.0	0.0	0.0	0.0	0.0	2.0	0.5	1.0	2.0	0.0	0.0	0.0	0.5
5	1	0.0	1.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.0	0.0	0.5	0.0	0.0
	2	0.0	2.0	2.0	2.0	0.0	0.0	0.5	0.0	2.0	0.5	2.0	2.0	0.0	1.0	2.0	2.0
6	1	0.0	2.0	1.0	1.0	0.0	0.0	0.0	1.0	1.5	0.0	1.0	1.0	0.0	0.0	0.0	0.5
	2	0.5	2.0	2.0	2.0	2.0	1.0	1.0	2.0	2.0	2.0	1.5	2.0	0.0	1.0	1.5	2.0
7	1	0.0	1.0	0.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.5	1.0	0.0
	2	0.5	2.0	2.0	2.0	0.0	0.5	0.0	2.0	1.0	2.0	2.0	2.0	0.0	2.0	2.0	2.0
8	1	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	1.0	0.0	0.5	0.0	0.0	0.0	0.0	1.0
	2	0.0	0.5	1.5	2.0	0.0	0.5	0.0	1.0	2.0	0.0	1.5	2.0	0.0	0.0	0.0	2.0
9	1	0.0	2.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	2.0	1.0	2.0	0.0	0.0	0.5	1.0	1.5	2.0	1.5	2.0	0.0	1.0	0.0	0.0
10	1	0.0	1.5	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0	1.5	0.0	1.0	0.5
	2	1.0	2.0	0.0	2.0	2.0	0.0	0.0	1.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0.5	2.0	0.0	1.0	1.5	0.0	0.0	0.5	0.0	0.0	1.0	0.0	0.0	0.0	0.5	0.0
	2	0.0	2.0	0.0	2.0	0.0	1.0	0.0	0.5	0.0	0.0	2.0	1.5	0.0	0.0	1.5	2.0
2	1	0.0	0.5	0.5	1.0	2.0	0.0	0.0	0.5	0.0	2.0	0.0	1.0	0.5	0.0	0.0	0.5
	2	0.0	1.0	1.5	2.0	2.0	0.0	1.0	1.5	0.0	2.0	1.5	2.0	1.0	0.0	1.0	2.0
3	1	2.0	0.5	1.5	2.0	0.0	0.0	0.0	1.0	1.5	2.0	2.0	1.5	2.0	0.5	1.5	2.0
	2	2.0	2.0	2.0	2.0	2.0	1.5	1.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
4	1	0.0	0.5	1.0	0.5	0.5	0.0	0.0	0.0	0.0	1.0	1.0	2.0	0.0	0.0	0.5	1.0
	2	1.0	0.0	2.0	2.0	0.0	0.0	0.0	2.0	2.0	2.0	2.0	2.0	0.0	1.0	0.5	2.0
5	1	0.0	1.5	1.0	1.0	2.0	0.0	0.0	1.0	0.0	1.0	1.0	2.0	0.0	1.0	1.0	1.0
	2	1.0	2.0	2.0	2.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0	1.5	2.0	2.0	2.0
6	1	0.0	1.5	0.0	2.0	1.5	0.0	0.0	0.5	2.0	1.0	2.0	2.0	0.0	0.0	0.0	1.5
	2	2.0	2.0	1.0	2.0	1.0	1.0	0.0	2.0	2.0	2.0	2.0	2.0	0.5	1.5	2.0	2.0
7	1	1.0	0.0	1.5	1.5	1.0	0.0	0.0	1.0	2.0	0.0	2.0	2.0	0.0	0.0	0.0	0.5
	2	2.0	2.0	2.0	2.0	1.5	0.5	2.0	2.0	2.0	1.5	2.0	2.0	1.5	1.5	1.5	2.0
8	1	1.0	1.5	1.0	1.0	0.0	0.5	1.0	0.5	2.0	1.0	2.0	2.0	0.0	0.5	1.0	0.0
	2	2.0	2.0	2.0	2.0	1.0	0.5	1.5	2.0	2.0	2.0	2.0	2.0	1.0	1.0	2.0	2.0
9	1	1.0	1.5	1.0	1.5	1.5	0.0	0.0	1.5	2.0	2.0	2.0	2.0	0.5	2.0	0.0	1.0
	2	1.5	2.0	2.0	2.0	2.0	2.0	1.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
10	1	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.5	1.0	1.0	1.0	0.0	0.0	2.0	2.0
	2	0.0	0.5	2.0	2.0	0.0	0.0	1.0	0.0	2.0	2.0	2.0	2.0	0.5	0.0	2.0	2.0

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0.0	1.5	0.5	2.0	0.0	1.0	0.0	2.0	0.5	1.0	1.0	2.0	1.0	1.0	0.0	1.0
	2	0.5	2.0	2.0	2.0	1.0	2.0	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
2	1	0.5	0.0	0.0	1.5	0.0	0.0	0.0	0.0	1.0	0.0	0.0	1.5	0.0	0.0	0.0	0.5
	2	1.0	0.0	1.5	2.0	0.0	0.0	0.0	2.0	2.0	0.0	1.0	2.0	1.0	1.5	1.0	2.0
3	1	0.0	0.0	2.0	0.0	0.5	0.0	0.5	0.5	0.5	0.0	0.5	0.0	0.0	0.5	0.0	1.5
	2	2.0	1.0	2.0	2.0	0.5	1.5	2.0	2.0	2.0	1.5	2.0	2.0	1.0	1.5	2.0	2.0
4	1	0.0	1.5	2.0	2.0	0.0	0.5	0.5	0.0	1.5	2.0	2.0	2.0	1.0	1.5	1.0	2.0
	2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
5	1	1.0	0.5	0.0	1.5	0.0	0.0	0.0	0.0	1.0	1.5	1.5	2.0	0.0	0.0	0.0	1.5
	2	1.5	2.0	2.0	2.0	0.0	0.0	0.0	0.0	2.0	2.0	2.0	2.0	0.0	0.0	2.0	2.0
6	1	1.0	2.0	0.0	1.0	0.0	0.0	0.0	0.5	1.0	0.5	1.0	1.5	0.0	0.0	0.0	0.0
	2	2.0	2.0	1.5	2.0	0.0	2.0	2.0	2.0	1.5	2.0	2.0	2.0	1.0	1.0	0.5	2.0
7	1	0.0	1.5	1.0	2.0	0.5	1.0	0.5	1.5	2.0	1.5	2.0	2.0	1.5	1.0	1.0	0.0
	2	1.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
8	1	0.5	2.0	1.5	2.0	2.0	1.0	1.0	1.0	2.0	1.0	2.0	2.0	2.0	2.0	2.0	1.5
	2	1.5	2.0	2.0	2.0	2.0	1.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
9	1	0.0	1.5	0.5	1.0	0.5	0.0	0.0	2.0	0.5	0.5	1.0	2.0	1.0	2.0	1.5	0.0
	2	0.5	2.0	1.0	2.0	2.0	0.0	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
10	1	0.0	2.0	1.5	1.0	0.0	1.0	0.5	0.0	1.0	0.5	2.0	0.5	0.0	1.0	1.0	1.5
	2	1.5	2.0	2.0	2.0	1.0	2.0	1.5	2.0	1.5	1.5	2.0	2.0	2.0	2.0	2.0	2.0

Response Latencies on Recall Trials

1/2 - 1/2

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	6.50	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
2	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	7.90	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	5.57	3.05	8.00	8.00	8.00	8.00	3.80
3	1	8.00	8.00	8.00	6.02	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	8.00	3.80	8.00	8.00	8.00	4.60	8.00	5.11	8.00	4.32	8.00	8.00	8.00	8.00
4	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	3.95	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	2.34	8.00	8.00	8.00	8.00	8.00
5	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	2.80	6.25	8.00	8.00	8.00	8.00
	2	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	2.69	3.82	8.00	8.00	8.00	2.79
6	1	8.00	8.00	4.99	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	3.88	8.00	6.86	8.00	8.00	6.21	8.00	8.00	3.76	8.00	8.00	8.00	8.00	8.00
7	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
8	1	8.00	8.00	2.36	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	6.20	8.00	8.00	8.00	5.52
	2	8.00	8.00	5.14	5.20	8.00	8.00	8.00	8.00	5.05	8.00	8.00	2.46	8.00	8.00	8.00	5.42
9	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	5.40	8.00	8.00	8.00	8.00	8.00
10	1	8.00	8.00	8.00	8.00	7.00	8.00	5.76	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	3.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	5.66	8.00	8.00	5.30	8.00	7.27

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	8.00	8.00	5.94	6.90	7.88	8.00	6.52	7.80	8.00	6.70	5.84	6.16	8.00	8.00	8.00	8.00
	2	8.00	6.22	8.00	5.48	6.91	7.42	8.00	3.52	7.12	3.23	3.39	3.95	8.00	8.00	8.00	4.03
2	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	6.80	8.00	8.00	8.00	8.00
	2	8.00	2.92	8.00	4.53	8.00	8.00	8.00	8.00	5.46	8.00	6.91	4.12	4.10	7.46	8.00	8.00
3	1	8.00	6.04	6.89	8.00	8.00	8.00	8.00	8.00	6.90	8.00	5.49	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	7.02	5.40	8.00	8.00	8.00	8.00	5.34	5.88	3.11	8.00	8.00	8.00	8.00	5.69
4	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	6.43	8.00	8.00	8.00	8.00	8.00	4.66	8.00	8.00	8.00	5.50	8.00	8.00	8.00
5	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	3.14	5.72	8.00	8.00	8.00	8.00
	2	8.00	4.69	8.00	5.46	8.00	6.50	5.70	8.00	4.21	8.00	2.26	3.65	8.00	8.00	8.00	8.00
6	1	8.00	8.00	8.00	5.38	8.00	8.00	8.00	8.00	8.00	8.00	5.27	5.58	8.00	8.00	8.00	8.00
	2	7.30	6.67	5.37	3.61	8.00	8.00	8.00	8.00	2.59	2.47	2.45	1.88	8.00	8.00	6.65	8.00
7	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	5.92	7.70	8.00	8.00	8.00	8.00
	2	8.00	8.00	8.00	5.83	8.00	8.00	8.00	8.00	8.00	8.00	3.15	6.22	8.00	8.00	8.00	8.00
8	1	8.00	8.00	5.80	3.94	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	5.90
	2	8.00	8.00	2.60	2.69	6.31	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	2.70
9	1	8.00	8.00	2.63	5.81	8.00	8.00	8.00	8.00	3.15	5.42	3.08	8.00	8.00	8.00	6.43	5.48
	2	4.80	4.32	2.70	3.35	8.00	8.00	8.00	8.00	2.85	8.00	2.27	3.21	8.00	6.35	3.98	3.96
10	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	5.88	8.00	5.50	5.45	8.00	8.00	8.00	5.60
	2	8.00	8.00	2.67	5.66	8.00	8.00	8.00	5.35	8.00	8.00	8.00	3.77	8.00	8.00	4.87	2.32

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	8.00	8.00	8.00	5.32	8.00	8.00	8.00	8.00	5.07	6.70	3.35	3.26	8.00	6.05	5.81	2.68
	2	8.00	5.58	8.00	2.09	8.00	8.00	8.00	4.16	2.18	3.05	6.97	8.00	8.00	6.20	3.41	2.21
2	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	5.11	5.55	4.70	3.98	8.00	7.00	8.00	5.80
	2	8.00	8.00	8.00	3.16	8.00	7.10	7.50	2.46	3.00	3.00	2.11	2.55	8.00	2.96	6.78	2.96
3	1	8.00	8.00	8.00	6.68	8.00	8.00	8.00	8.00	6.56	8.00	6.81	5.16	8.00	8.00	6.53	5.66
	2	8.00	8.00	5.67	3.02	8.00	7.36	5.48	5.82	3.74	5.27	4.35	2.89	6.05	8.00	7.12	3.67
4	1	8.00	8.00	8.00	8.00	8.00	6.66	8.00	5.50	8.00	2.62	2.48	8.00	8.00	8.00	8.00	8.00
	2	5.30	8.00	7.90	7.02	8.00	8.00	8.00	2.45	8.00	2.16	2.25	2.64	8.00	6.68	8.00	6.02
5	1	8.00	8.00	7.50	4.55	8.00	8.00	8.00	8.00	4.39	8.00	8.00	5.06	8.00	7.18	8.00	5.18
	2	8.00	8.00	7.48	3.28	6.43	8.00	8.00	2.98	3.79	3.36	3.85	2.15	8.00	5.91	8.00	5.38
6	1	8.00	8.00	8.00	7.54	8.00	8.00	8.00	8.00	6.80	8.00	6.22	6.76	8.00	8.00	8.00	8.00
	2	8.00	3.53	8.00	2.39	6.90	8.00	8.00	2.92	5.87	8.00	2.22	2.99	5.63	8.00	6.89	4.57
7	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	6.77	8.00	8.00	6.53	8.00	8.00	8.00	8.00
	2	8.00	8.00	8.00	8.00	5.58	8.00	8.00	6.16	8.00	8.00	2.75	3.57	8.00	8.00	8.00	8.00
8	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	8.00	5.65	8.00	7.70	8.00	8.00	8.00	2.96	8.00	8.00	8.00	5.94	8.00	6.42
9	1	8.00	8.00	8.00	8.00	8.00	5.40	8.00	8.00	3.59	8.00	8.00	8.00	8.00	8.00	8.00	5.88
	2	8.00	8.00	5.20	8.00	6.35	6.00	8.00	8.00	3.76	8.00	2.83	2.78	8.00	7.24	8.00	3.32
10	1	8.00	6.04	5.90	8.00	8.00	7.47	8.00	8.00	5.87	4.17	6.10	8.00	8.00	8.00	8.00	5.90
	2	8.00	2.88	7.84	2.79	8.00	8.00	8.00	3.00	2.33	2.14	1.94	5.44	8.00	8.00	8.00	2.30

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	11	8.00	5.76	2.66	8.00	8.00	6.50	8.00	8.00	6.53	8.00	6.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	3.36	4.55	5.88	8.00	6.28	8.00	2.45	6.05	5.70	3.48	3.08	8.00	5.73	8.00	3.46
2	1	8.00	5.68	2.30	8.00	4.58	8.00	8.00	5.82	5.42	5.06	5.12	5.93	8.00	8.00	5.80	5.66
	2	8.00	3.12	3.15	2.63	5.85	8.00	5.85	3.00	3.99	2.26	2.30	3.02	8.00	8.00	3.50	2.93
3	1	6.20	8.00	8.00	5.80	8.00	8.00	7.90	8.00	6.00	8.00	4.08	8.00	8.00	8.00	7.84	3.17
	2	5.38	6.62	4.70	2.90	8.00	7.06	6.93	5.77	3.55	4.01	2.94	2.87	8.00	5.65	6.90	2.87
4	1	5.93	5.63	8.00	6.83	8.00	8.00	8.00	5.78	5.67	3.98	3.04	5.55	8.00	5.25	5.57	2.31
	2	6.58	2.96	3.43	2.98	5.77	7.06	3.91	2.98	2.03	2.57	2.60	2.55	6.21	3.19	3.23	2.47
5	1	8.00	4.14	8.00	3.10	8.00	8.00	8.00	5.03	5.09	8.00	2.05	2.39	8.00	8.00	5.66	2.62
	2	8.00	2.96	8.00	2.06	4.00	8.00	3.19	2.04	8.00	2.34	1.79	1.79	6.42	8.00	7.64	2.00
6	1	6.90	8.00	8.00	6.94	8.00	8.00	8.00	8.00	8.00	8.00	3.66	7.00	8.00	8.00	8.00	8.00
	2	3.74	8.00	8.00	5.88	8.00	8.00	8.00	8.00	4.54	6.50	6.76	4.58	8.00	8.00	8.00	8.00
7	1	8.00	5.22	8.00	3.14	5.43	6.93	8.00	8.00	8.00	3.66	8.00	8.00	8.00	5.67	8.00	5.07
	2	5.23	1.96	2.85	2.32	3.06	4.36	5.89	5.48	2.91	1.91	4.93	2.51	6.76	2.84	7.30	2.32
8	1	8.00	2.09	3.67	2.27	8.00	5.99	2.83	2.83	2.16	4.10	2.42	5.61	5.31	8.00	5.16	3.43
	2	3.17	2.67	2.34	2.44	4.60	2.92	5.13	2.32	2.01	2.20	2.13	3.38	2.87	3.26	4.20	2.03
9	1	8.00	6.65	5.96	3.16	7.31	6.68	8.00	3.08	5.43	2.72	2.67	2.91	8.00	8.00	4.99	2.56
	2	8.00	2.61	2.96	2.41	3.72	4.16	6.55	2.46	2.57	2.25	2.15	2.46	8.00	2.29	4.18	2.24
10	1	8.00	8.00	5.60	8.00	8.00	8.00	7.50	8.00	3.98	5.40	8.00	5.25	8.00	8.00	8.00	7.49
	2	8.00	8.00	5.73	8.00	8.00	6.89	5.81	6.80	5.48	5.73	2.83	5.80	8.00	8.00	5.40	5.76

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	5.05	5.40	8.00	8.00	8.00	8.00	8.00	8.00
2	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	7.85	6.29	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
3	1	8.00	8.00	4.10	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	2.93	8.00	8.00	8.00	8.00
	2	8.00	2.60	2.08	5.92	8.00	5.14	8.00	5.52	8.00	8.00	2.14	7.00	8.00	8.00	8.00	8.00
4	1	8.00	8.00	8.00	8.00	6.98	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	5.57	6.93	5.04	8.00	8.00	8.00	8.00	8.00	8.00	3.31	8.00	8.00	8.00	8.00
5	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	6.38	4.35
	2	3.60	8.00	5.25	8.00	6.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	4.00	3.31
6	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	5.11	5.03	8.00	8.00	8.00	8.00
	2	8.00	8.00	8.00	5.29	8.00	8.00	8.00	5.95	8.00	5.93	2.59	2.54	8.00	4.64	8.00	2.73
7	1	8.00	8.00	5.80	8.00	8.00	8.00	8.00	8.00	8.00	8.00	5.90	7.80	8.00	8.00	8.00	8.00
	2	8.00	8.00	5.01	5.31	8.00	8.00	8.00	8.00	8.00	8.00	2.16	3.15	8.00	8.00	8.00	8.00
8	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	3.09	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	8.00	5.69	5.92	6.04	8.00	7.22	2.55	8.00	2.85	7.35	8.00	8.00	5.72	6.92
9	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	6.33	8.00	8.00	8.00	8.00
	2	8.00	8.00	8.00	8.00	8.00	8.00	7.80	8.00	8.00	6.41	3.09	3.48	8.00	8.00	8.00	8.00
10	1	8.00	8.00	7.50	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	6.50	8.00	8.00	8.00	6.60	8.00	8.00	6.00	5.86	8.00	8.00	8.00	8.00	8.00

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	8.00	8.00	5.75	6.00	8.00	8.00	8.00	8.00	8.00	3.04	6.02	5.56	8.00	6.30	8.00	8.00
	2	8.00	5.96	3.19	3.07	8.00	8.00	8.00	8.00	6.24	2.24	3.41	2.95	8.00	7.50	5.30	5.86
2	1	8.00	8.00	7.00	4.99	8.00	5.88	8.00	8.00	4.75	7.00	8.00	2.90	8.00	8.00	8.00	3.74
	2	3.96	8.00	2.41	2.11	8.00	6.96	5.85	6.37	2.43	2.26	1.99	6.12	8.00	8.00	2.98	1.98
3	1	8.00	6.85	8.00	8.00	8.00	6.40	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	5.34	7.70	2.40	8.00	8.00	8.00	2.42	2.60	5.85	8.00	8.00	8.00	8.00	8.00	8.00
4	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	6.90	6.85	8.00	8.00	8.00	8.00
	2	8.00	8.00	6.69	4.98	8.00	8.00	8.00	8.00	4.82	8.00	2.92	2.89	8.00	8.00	8.00	5.34
5	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	6.88	8.00	4.81	8.00	8.00	8.00	8.00	8.00	8.00	5.67	8.00	8.00	8.00	5.85	7.43
6	1	8.00	8.00	8.00	2.78	8.00	8.00	8.00	8.00	8.00	5.50	8.00	5.49	8.00	8.00	8.00	8.00
	2	5.57	3.16	3.07	3.24	8.00	8.00	8.00	8.00	2.62	4.32	2.66	2.84	8.00	2.57	8.00	2.46
7	1	8.00	8.00	7.73	8.00	4.73	8.00	8.00	8.00	8.00	5.64	7.90	4.98	8.00	8.00	8.00	6.84
	2	8.00	6.21	5.25	8.00	7.00	8.00	8.00	3.30	5.66	2.12	2.37	1.77	8.00	5.25	5.88	2.45
8	1	8.00	8.00	8.00	8.00	8.00	7.42	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	6.54	8.00	5.52	8.00	8.00	6.24	8.00	5.90	8.00	8.00	8.00	8.00	8.00	8.00
9	1	8.00	6.76	8.00	5.90	8.00	8.00	8.00	8.00	2.46	8.00	8.00	3.54	8.00	8.00	8.00	5.74
	2	8.00	5.89	8.00	2.72	8.00	8.00	8.00	5.74	2.14	5.77	5.07	3.29	8.00	8.00	7.03	2.30
10	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	6.45	8.00	8.00	8.00	3.18	8.00	5.40	7.00	8.00
	2	8.00	8.00	8.00	4.36	5.50	8.00	8.00	2.66	5.52	4.72	2.90	3.21	5.94	8.00	4.77	5.18

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	8.00	8.00	8.00	5.32	8.00	8.00	8.00	8.00	7.63	5.20	5.23	5.26	7.08	5.11	8.00	7.18
	2	6.25	7.33	2.69	1.88	3.64	8.00	8.00	8.00	2.48	6.50	3.76	2.30	6.29	2.07	8.00	5.48
2	1	8.00	8.00	5.47	8.00	8.00	8.00	8.00	8.00	2.50	8.00	5.90	5.81	8.00	8.00	8.00	4.51
	2	8.00	5.08	3.15	2.80	8.00	8.00	7.10	8.00	2.23	3.07	2.93	2.55	8.00	5.25	8.00	2.29
3	1	8.00	8.00	8.00	5.85	8.00	8.00	8.00	8.00	6.70	8.00	8.00	6.40	8.00	8.00	8.00	8.00
	2	8.00	5.94	5.15	2.82	8.00	8.00	8.00	6.04	5.35	5.38	2.45	4.42	8.00	8.00	8.00	5.40
4	1	8.00	8.00	4.20	3.90	7.20	8.00	8.00	8.00	8.00	8.00	8.00	5.10	8.00	8.00	8.00	1.98
	2	8.00	8.00	3.00	1.90	8.00	8.00	8.00	2.96	8.00	6.00	4.94	2.04	8.00	5.88	4.50	2.20
5	1	8.00	6.21	5.60	2.24	8.00	8.00	8.00	8.00	5.71	2.95	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	2.97	2.78	2.11	8.00	8.00	6.63	8.00	3.49	5.72	5.75	8.00	8.00	8.00	3.12	2.05
6	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	6.52	7.04	4.69	5.56	8.00	8.00	5.89	5.80
	2	8.00	7.44	4.71	1.80	8.00	6.49	6.01	2.98	3.17	3.23	2.65	3.90	8.00	8.00	7.30	1.95
7	1	8.00	8.00	5.84	5.49	6.43	8.00	8.00	8.00	2.52	8.00	8.00	5.51	8.00	8.00	8.00	6.98
	2	8.00	8.00	2.27	3.02	2.75	7.90	6.09	7.82	3.52	5.25	6.70	2.85	8.00	8.00	8.00	2.82
8	1	7.14	8.00	5.19	3.80	8.00	8.00	8.00	6.37	3.83	2.56	5.34	6.02	8.00	8.00	5.67	5.80
	2	5.56	2.91	3.39	3.94	6.80	6.58	8.00	3.88	1.93	2.10	2.70	3.19	5.62	5.34	2.21	2.03
9	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	4.18	8.00	8.00	7.35	8.00	8.00	8.00	6.22
	2	8.00	5.62	5.96	3.22	8.00	8.00	8.00	8.00	3.76	8.00	8.00	5.83	8.00	8.00	6.85	2.69
10	1	8.00	2.61	3.56	8.00	8.00	8.00	8.00	6.12	8.00	8.00	8.00	5.32	8.00	8.00	8.00	5.26
	2	8.00	2.48	2.82	8.00	7.05	8.00	8.00	5.21	8.00	5.33	8.00	2.62	8.00	8.00	8.00	2.69

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	8.00	8.00	8.00	5.10	6.74	8.00	8.00	7.50	5.18	5.50	7.50	2.25	8.00	8.00	8.00	8.00
	2	8.00	1.93	5.92	2.03	4.48	8.00	7.53	3.25	2.29	2.02	4.58	2.01	8.00	7.34	2.80	3.12
2	1	8.00	7.04	3.19	4.15	8.00	8.00	8.00	2.79	3.08	8.00	3.16	5.92	8.00	7.40	5.44	2.31
	2	8.00	2.69	2.25	1.89	4.19	4.82	5.99	2.92	1.91	3.42	1.95	2.23	8.00	2.59	2.58	1.90
3	1	6.09	6.94	2.43	5.20	8.00	8.00	8.00	2.92	5.82	5.24	8.00	8.00	5.61	8.00	8.00	2.90
	2	4.04	2.55	1.89	2.50	5.25	8.00	4.88	1.95	2.03	1.99	2.53	6.15	2.56	3.73	2.20	1.86
4	1	8.00	8.00	8.00	5.25	8.00	8.00	8.00	8.00	8.00	7.80	8.00	6.20	8.00	8.00	8.00	8.00
	2	8.00	8.00	8.00	2.64	5.22	8.00	8.00	8.00	8.00	8.00	4.06	8.00	8.00	8.00	8.00	7.95
5	1	8.00	4.80	2.17	2.83	8.00	5.88	8.00	2.74	5.31	6.12	5.01	4.06	8.00	8.00	3.13	2.46
	2	4.44	1.92	2.16	2.01	5.46	3.56	2.83	4.12	2.16	2.76	1.83	2.02	3.63	2.20	2.22	1.76
6	1	8.00	4.62	6.36	3.07	8.00	6.15	8.00	5.32	5.20	5.41	4.44	3.53	8.00	8.00	6.96	2.39
	2	5.99	2.76	7.20	2.87	8.00	5.31	8.00	5.48	4.37	2.43	3.00	3.10	7.69	6.86	3.45	2.06
7	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	5.18	5.13	5.96	5.36	8.00	8.00	8.00	2.63
	2	6.21	8.00	3.35	5.10	5.81	3.05	8.00	2.77	2.82	1.77	2.23	2.40	8.00	8.00	6.14	2.86
8	1	8.00	6.91	6.35	8.00	8.00	8.00	8.00	8.00	4.94	6.09	3.86	5.90	8.00	8.00	8.00	5.85
	2	6.14	4.92	3.78	5.51	3.99	8.00	8.00	5.59	2.34	2.20	3.23	2.03	3.45	6.85	6.93	6.70
9	1	8.00	8.00	6.01	4.65	8.00	8.00	8.00	8.00	4.18	8.00	8.00	7.70	8.00	6.90	8.00	4.56
	2	8.00	3.41	2.79	3.41	3.57	8.00	8.00	8.00	2.35	2.57	3.06	3.18	5.52	3.98	5.52	2.51
10	1	8.00	3.42	2.29	2.35	8.00	8.00	8.00	4.94	6.17	8.00	2.34	2.05	8.00	8.00	8.00	1.95
	2	8.00	5.96	2.50	2.11	5.65	8.00	5.87	2.37	2.17	5.44	1.89	2.14	5.19	4.01	6.79	1.86

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	8.00	8.00	5.43	8.00	8.00	8.00	8.00	8.00	8.00	5.63	8.00	8.00	8.00	8.00	8.00	8.00
	2	7.21	8.00	5.25	8.00	6.28	8.00	8.00	8.00	8.00	3.61	8.00	8.00	8.00	8.00	8.00	8.00
2	1	8.00	3.20	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	1.79	6.43	8.00	8.00	8.00	8.00	8.00	4.19	3.51	1.94	2.75	2.46	8.00	8.00	8.00
3	1	8.00	7.28	6.95	8.00	8.00	8.00	8.00	8.00	3.84	3.18	8.00	8.00	8.00	8.00	8.00	8.00
	2	3.12	5.61	5.34	2.62	8.00	8.00	8.00	2.86	2.86	3.04	4.00	2.09	8.00	3.74	6.84	8.00
4	1	8.00	5.71	8.00	2.31	6.10	8.00	8.00	5.83	7.80	3.94	2.71	2.35	8.00	8.00	8.00	6.00
	2	8.00	2.70	2.30	2.26	2.40	3.39	6.20	1.97	3.07	2.57	2.50	2.07	8.00	3.22	8.00	2.78
5	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	3.13	8.00	8.00	5.90	8.00	8.00	6.00	7.65	8.00
	2	8.00	8.00	6.00	2.80	8.00	6.00	8.00	2.40	8.00	6.00	2.70	4.00	8.00	8.00	8.00	8.00
6	1	8.00	8.00	8.00	5.78	8.00	8.00	8.00	8.00	8.00	8.00	8.00	5.67	8.00	8.00	8.00	8.00
	2	8.00	5.27	3.83	2.44	8.00	8.00	8.00	6.73	8.00	8.00	2.62	2.20	8.00	8.00	8.00	8.00
7	1	8.00	8.00	8.00	5.80	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	8.00	3.86	8.00	8.00	8.00	8.00	6.90	3.12	6.96	4.40	8.00	8.00	8.00	8.00
8	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	6.82	8.00	8.00	5.90	8.00	8.00	8.00	8.00
	2	8.00	8.00	8.00	6.60	8.00	6.98	8.00	8.00	4.67	3.52	6.20	2.80	8.00	8.00	8.00	6.26
9	1	8.00	8.00	8.00	8.00	5.95	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	8.00	7.06	8.00	8.00	6.51	8.00	5.43	8.00	8.00	3.15	8.00	8.00	8.00	8.00
10	1	8.00	8.00	8.00	7.11	8.00	8.00	8.00	8.00	7.57	8.00	3.14	7.85	8.00	5.94	6.92	8.00
	2	8.00	7.63	6.80	6.65	8.00	7.15	8.00	5.65	7.84	5.43	2.19	4.38	8.00	4.41	8.00	5.24

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	8.00	8.00	8.00	8.00	8.00	6.37	8.00	8.00	8.00	5.05	8.00	5.95	8.00	8.00	8.00	8.00
	2	8.00	3.63	8.00	8.00	7.30	7.90	8.00	8.00	8.00	2.16	1.99	3.10	8.00	5.84	8.00	8.00
2	1	8.00	8.00	5.62	8.00	6.81	8.00	8.00	8.00	8.00	6.22	8.00	8.00	8.00	3.41	8.00	8.00
	2	8.00	5.92	2.62	6.70	3.70	8.00	8.00	7.00	5.56	3.17	2.19	4.78	8.00	2.55	8.00	5.53
3	1	8.00	8.00	5.98	3.54	8.00	7.85	3.22	8.00	8.00	7.67	5.75	8.00	8.00	6.01	8.00	8.00
	2	8.00	8.00	6.09	2.70	8.00	8.00	3.86	2.77	8.00	6.03	2.79	4.05	8.00	2.43	8.00	8.00
4	1	8.00	8.00	8.00	5.49	8.00	8.00	8.00	8.00	8.00	5.20	6.20	1.83	8.00	8.00	8.00	8.00
	2	6.65	8.00	2.25	2.51	1.95	8.00	8.00	8.00	2.85	2.09	2.44	6.09	5.50	8.00	4.10	8.00
5	1	8.00	8.00	8.00	4.73	8.00	8.00	8.00	8.00	8.00	5.95	6.09	5.19	8.00	3.40	8.00	8.00
	2	6.54	5.28	6.38	8.00	8.00	8.00	8.00	3.42	8.00	2.25	4.13	2.74	3.39	2.41	8.00	6.56
6	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	4.81	5.67	8.00	8.00	8.00	5.42
	2	8.00	3.48	8.00	3.04	8.00	8.00	5.70	4.40	6.24	5.80	2.51	2.57	8.00	8.00	8.00	2.56
7	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	2.75	5.35	5.50	4.61	8.00	5.67	8.00	3.03
	2	8.00	4.17	3.16	5.33	8.00	8.00	8.00	5.55	2.05	2.46	3.26	4.14	8.00	5.96	4.83	2.32
8	1	4.68	8.00	6.20	5.50	8.00	8.00	8.00	8.00	8.00	8.00	8.00	2.85	8.00	8.00	8.00	8.00
	2	8.00	2.81	2.42	2.94	8.00	8.00	8.00	5.81	5.66	6.31	4.47	2.48	8.00	8.00	8.00	8.00
9	1	8.00	8.00	8.00	6.10	8.00	8.00	5.78	8.00	5.70	8.00	6.57	5.84	8.00	5.42	6.22	8.00
	2	8.00	3.42	4.69	3.90	8.00	8.00	4.06	6.91	4.10	8.00	2.95	3.44	8.00	2.73	3.14	5.22
10	1	8.00	8.00	2.54	2.89	8.00	8.00	7.50	8.00	8.00	5.84	8.00	8.00	8.00	8.00	8.00	5.55
	2	8.00	4.37	2.55	2.34	8.00	8.00	2.90	5.28	3.35	2.34	2.61	2.98	8.00	8.00	5.61	2.63

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	8.00	8.00	5.76	2.52	8.00	8.00	8.00	8.00	5.10	5.46	5.12	2.46	8.00	8.00	8.00	8.00
	2	6.28	5.10	6.58	4.89	8.00	8.00	8.00	8.00	4.82	2.02	1.33	5.39	6.06	6.15	5.22	2.15
2	1	8.00	5.35	8.00	5.19	8.00	8.00	8.00	8.00	8.00	7.80	8.00	5.25	8.00	8.00	8.00	8.00
	2	3.13	2.87	8.00	3.71	8.00	8.00	8.00	8.00	8.00	4.12	5.88	2.98	8.00	8.00	8.00	8.00
3	1	8.00	8.00	4.32	8.00	5.40	8.00	6.60	8.00	6.50	2.88	5.76	6.00	8.00	8.00	8.00	8.00
	2	5.45	2.76	3.41	5.46	4.80	8.00	7.48	3.01	3.00	2.42	3.68	3.20	8.00	6.87	8.00	3.87
4	1	8.00	8.00	5.80	8.00	8.00	8.00	8.00	8.00	3.58	8.00	2.70	2.80	6.75	8.00	8.00	5.20
	2	8.00	2.73	3.10	3.52	4.14	6.67	8.00	3.04	2.30	6.39	2.37	2.30	3.97	7.00	6.50	2.60
5	1	8.00	8.00	5.48	8.00	6.78	8.00	8.00	8.00	5.59	8.00	2.45	5.98	8.00	8.00	8.00	5.42
	2	6.02	5.77	5.28	2.36	8.00	8.00	5.94	2.27	3.60	5.70	2.03	2.23	8.00	8.00	8.00	2.54
6	1	8.00	4.51	3.88	4.03	6.19	8.00	3.80	6.67	3.21	3.92	3.39	3.24	8.00	8.00	8.00	6.10
	2	4.86	2.36	3.16	2.41	5.94	4.86	5.88	2.47	2.05	2.21	2.16	2.19	3.05	2.98	3.89	2.93
7	1	8.00	8.00	8.00	5.90	8.00	8.00	8.00	5.56	5.60	8.00	8.00	8.00	8.00	5.80	8.00	8.00
	2	8.00	8.00	6.64	3.26	8.00	8.00	8.00	3.16	8.00	8.00	2.78	3.57	8.00	3.11	5.81	6.00
8	1	8.00	8.00	8.00	6.98	8.00	7.90	8.00	8.00	8.00	6.80	6.20	8.00	8.00	8.00	8.00	7.19
	2	8.00	8.00	2.99	2.58	7.82	7.60	7.80	8.00	3.57	3.46	3.18	5.83	8.00	8.00	8.00	6.24
9	1	8.00	8.00	8.00	5.63	8.00	8.00	8.00	8.00	5.43	8.00	8.00	4.34	8.00	8.00	8.00	6.01
	2	8.00	4.14	3.62	4.21	8.00	8.00	8.00	8.00	2.73	3.91	5.80	3.25	6.62	8.00	8.00	4.38
10	1	8.00	8.00	8.00	5.67	6.87	6.42	8.00	8.00	8.00	4.90	5.50	3.14	8.00	7.04	5.57	8.00
	2	8.00	8.00	3.20	2.62	8.00	8.00	8.00	2.97	4.80	3.49	5.15	2.77	8.00	3.04	5.89	8.00

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	3.11	5.18	3.01	3.14	5.33	8.00	5.61	2.72	3.30	5.63	5.52	5.47	3.69	6.90	8.00	6.50
	2	2.31	2.58	2.49	1.76	3.14	5.99	2.41	2.03	2.25	2.14	2.46	1.77	2.26	2.44	2.89	2.99
2	1	6.04	2.91	3.00	2.41	8.00	4.86	8.00	5.49	4.94	5.43	2.36	2.34	8.00	6.89	6.29	2.42
	2	3.64	2.78	3.00	2.25	6.19	3.19	6.29	2.53	2.42	3.08	1.85	2.01	5.82	2.26	3.86	2.00
3	1	8.00	8.00	5.63	6.76	6.74	8.00	8.00	8.00	8.00	8.00	8.00	4.12	8.00	8.00	8.00	5.26
	2	8.00	8.00	2.87	2.34	8.00	6.19	8.00	5.56	5.84	2.30	3.28	4.05	8.00	8.00	6.17	2.53
4	1	8.00	8.00	6.36	2.82	8.00	8.00	8.00	5.64	8.00	3.57	5.03	2.48	8.00	5.80	8.00	5.11
	2	8.00	5.67	2.56	1.99	4.79	8.00	4.97	2.69	2.71	1.87	2.47	1.35	7.26	2.18	1.95	1.83
5	1	8.00	8.00	3.23	3.20	8.00	8.00	8.00	8.00	2.62	3.29	3.39	5.96	8.00	8.00	8.00	2.38
	2	8.00	2.95	3.36	2.73	3.98	7.32	8.00	3.15	2.13	2.39	2.40	4.01	8.00	8.00	3.33	2.09
6	1	8.00	3.46	8.00	5.11	5.90	8.00	8.00	6.06	5.93	4.59	6.94	5.20	8.00	8.00	8.00	8.00
	2	3.45	2.77	2.74	2.60	2.64	3.20	5.55	3.45	2.14	3.28	2.28	2.22	4.24	4.44	2.94	2.22
7	1	8.00	8.00	8.00	2.90	8.00	6.09	8.00	5.24	8.00	3.17	3.22	5.22	8.00	8.00	8.00	2.22
	2	8.00	2.59	8.00	2.57	3.03	6.19	8.00	2.15	6.37	2.09	2.83	2.36	8.00	5.31	6.78	4.22
8	1	8.00	8.00	7.13	6.00	6.50	8.00	8.00	8.00	5.00	2.14	5.72	3.66	8.00	8.00	8.00	8.00
	2	8.00	1.94	5.00	2.77	5.24	8.00	8.00	7.00	3.27	2.30	2.57	2.71	6.99	8.00	5.00	8.00
9	1	8.00	3.33	3.62	5.03	8.00	8.00	8.00	2.41	2.97	2.21	5.44	2.28	8.00	8.00	8.00	5.13
	2	4.60	2.56	2.18	2.18	3.37	2.90	4.69	2.17	2.39	2.36	3.34	2.34	5.71	3.83	2.56	2.22
10	1	7.28	8.00	3.06	3.20	8.00	8.00	8.00	5.10	3.42	3.82	3.12	3.45	6.43	8.00	5.37	3.03
	2	5.85	3.15	3.01	2.17	6.40	2.66	3.42	2.49	2.08	2.33	2.14	2.33	3.36	2.56	3.53	2.16

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	8.00	8.00	8.00	8.00	7.11	8.00	8.00	6.35	2.93	4.26	8.00	2.59	8.00	8.00	8.00	5.89
	2	8.00	5.29	8.00	5.37	8.00	8.00	8.00	3.24	2.45	1.69	3.86	2.31	8.00	6.86	8.00	2.74
2	1	5.63	8.00	8.00	7.90	8.00	8.00	8.00	8.00	5.83	8.00	8.00	6.80	8.00	8.00	3.64	8.00
	2	4.83	6.41	8.00	3.34	8.00	8.00	8.00	8.00	7.05	5.52	6.26	5.75	8.00	3.53	3.76	8.00
3	1	8.00	8.00	6.21	5.14	8.00	8.00	7.05	8.00	8.00	8.00	2.76	7.42	8.00	8.00	8.00	8.00
	2	8.00	3.25	6.84	3.72	8.00	8.00	8.00	3.02	8.00	8.00	2.97	5.27	5.74	8.00	8.00	3.93
4	1	8.00	8.00	5.41	5.50	8.00	8.00	8.00	8.00	8.00	8.00	5.60	8.00	8.00	8.00	8.00	8.00
	2	5.71	8.00	3.23	2.32	6.20	8.00	5.86	8.00	8.00	8.00	2.70	5.39	8.00	8.00	8.00	5.98
5	1	8.00	8.00	6.50	8.00	8.00	8.00	8.00	8.00	8.00	5.27	3.17	5.32	8.00	8.00	8.00	2.57
	2	7.47	5.13	8.00	4.48	8.00	8.00	3.27	2.80	2.26	2.67	2.16	2.69	8.00	2.84	8.00	2.42
6	1	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	6.22	8.00	8.00	8.00	8.00	8.00	8.00
	2	8.00	8.00	4.13	8.00	8.00	8.00	8.00	4.16	6.61	3.32	8.00	2.90	8.00	5.73	8.00	8.00
7	1	8.00	8.00	5.23	8.00	7.08	8.00	8.00	8.00	5.73	2.46	8.00	5.24	8.00	8.00	5.70	8.00
	2	6.51	3.01	2.55	5.73	7.80	8.00	8.00	8.00	4.99	6.19	5.64	2.61	8.00	8.00	2.84	8.00
8	1	8.00	8.00	8.00	8.00	3.85	8.00	8.00	8.00	8.00	8.00	7.43	5.41	8.00	8.00	8.00	8.00
	2	8.00	8.00	8.00	8.00	5.93	8.00	8.00	8.00	8.00	8.00	2.40	3.17	8.00	8.00	8.00	8.00
9	1	8.00	3.00	5.10	8.00	8.00	8.00	8.00	8.00	5.59	8.00	5.50	8.00	8.00	8.00	8.00	8.00
	2	8.00	2.10	3.15	7.90	5.30	8.00	8.00	8.00	5.21	5.68	2.16	4.08	8.00	8.00	6.40	8.00
10	1	8.00	8.00	2.55	5.56	8.00	8.00	8.00	8.00	8.00	4.96	8.00	6.06	8.00	8.00	6.51	8.00
	2	8.00	3.53	2.30	2.53	8.00	6.72	3.82	6.33	3.03	2.96	3.55	2.55	8.00	8.00	2.41	5.25

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	8.00	2.94	8.00	6.44	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	7.25
	2	8.00	3.40	8.00	2.93	8.00	8.00	8.00	5.83	5.69	3.67	2.80	6.00	8.00	6.34	8.00	8.00
2	1	8.00	6.46	5.31	6.24	6.69	8.00	8.00	5.84	4.81	5.59	3.98	8.00	8.00	8.00	5.91	7.09
	2	8.00	2.37	2.95	2.07	5.10	6.94	8.00	2.20	3.25	2.38	2.45	6.12	8.00	7.39	2.82	2.27
3	1	8.00	8.00	8.00	6.84	6.37	8.00	8.00	8.00	6.83	8.00	4.23	3.31	6.15	8.00	4.68	5.54
	2	2.81	3.09	8.00	3.04	7.12	8.00	8.00	5.62	5.14	4.00	3.18	2.27	5.62	7.24	5.40	2.61
4	1	8.00	8.00	8.00	5.91	8.00	8.00	8.00	8.00	2.60	5.68	6.51	8.00	4.61	8.00	8.00	6.33
	2	8.00	3.99	3.41	3.74	6.62	6.19	8.00	8.00	2.03	2.65	2.94	4.49	3.37	2.68	5.49	2.60
5	1	8.00	8.00	8.00	5.60	8.00	8.00	8.00	8.00	7.62	8.00	8.00	5.74	8.00	8.00	8.00	8.00
	2	7.02	8.00	8.00	6.40	6.10	8.00	8.00	8.00	7.27	8.00	7.10	4.97	8.00	6.24	6.80	6.19
6	1	8.00	8.00	8.00	7.31	8.00	8.00	8.00	8.00	8.00	8.00	5.47	3.30	8.00	8.00	8.00	8.00
	2	8.00	8.00	8.00	3.01	8.00	8.00	6.46	8.00	8.00	5.50	2.96	2.69	8.00	6.88	5.90	8.00
7	1	5.80	5.50	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	7.90	6.03	8.00	7.90	6.65	8.00
	2	8.00	2.54	4.08	2.76	8.00	8.00	8.00	8.00	4.39	4.61	3.10	3.42	8.00	6.14	3.31	4.33
8	1	8.00	3.04	2.53	8.00	8.00	8.00	8.00	5.44	5.23	6.81	5.36	5.79	8.00	8.00	8.00	8.00
	2	7.34	2.47	2.33	3.50	7.51	8.00	5.68	2.68	2.20	3.28	1.79	2.89	8.00	4.77	5.94	2.66
9	1	8.00	7.40	6.08	5.78	8.00	8.00	8.00	8.00	8.00	8.00	6.84	7.12	8.00	6.40	6.57	8.00
	2	8.00	3.25	3.59	4.75	7.79	8.00	8.00	3.22	6.88	4.46	3.65	3.73	8.00	2.93	3.02	2.49
10	1	8.00	8.00	5.60	8.00	8.00	8.00	8.00	8.00	2.86	8.00	8.00	6.17	7.19	8.00	8.00	5.70
	2	8.00	6.03	3.82	3.09	8.00	8.00	6.94	6.50	2.40	5.90	5.66	5.07	8.00	8.00	8.00	1.98

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	8.00	5.63	3.50	8.00	8.00	8.00	8.00	6.83	7.05	6.29	5.19	2.68	8.00	6.25	4.04	5.46
	2	5.91	2.59	3.33	2.47	4.56	5.69	6.98	2.54	3.79	3.64	3.12	2.70	3.85	2.37	3.23	2.54
2	1	7.72	3.07	8.00	8.00	8.00	8.00	8.00	7.21	8.00	8.00	5.88	8.00	8.00	8.00	8.00	6.40
	2	8.00	2.70	7.33	3.35	8.00	8.00	8.00	8.00	8.00	7.20	2.16	4.41	8.00	8.00	6.40	2.72
3	1	4.46	5.36	3.56	5.38	8.00	8.00	8.00	5.36	5.40	3.32	2.72	3.45	4.35	5.73	4.64	2.20
	2	3.22	2.14	2.78	2.76	3.54	5.43	2.94	2.65	2.45	2.14	2.05	2.27	2.75	2.41	3.23	2.16
4	1	8.00	8.00	5.80	5.39	8.00	8.00	8.00	8.00	5.50	6.04	5.97	6.01	8.00	8.00	3.05	5.37
	2	8.00	8.00	4.00	2.70	8.00	8.00	6.71	8.00	3.28	3.37	2.81	3.30	8.00	8.00	2.81	2.53
5	1	8.00	8.00	5.24	8.00	8.00	8.00	8.00	8.00	5.94	5.29	5.43	3.52	8.00	8.00	7.13	3.66
	2	8.00	8.00	2.10	3.55	8.00	8.00	8.00	5.02	2.93	2.76	2.61	2.55	8.00	8.00	7.63	2.39
6	1	6.61	5.60	4.59	5.70	4.90	8.00	8.00	2.77	3.39	4.79	3.19	2.20	8.00	2.97	6.50	6.45
	2	5.50	3.82	3.01	3.20	4.18	5.46	8.00	2.88	3.43	4.81	2.25	2.56	3.65	2.37	4.55	2.99
7	1	4.23	3.27	5.44	5.71	8.00	6.43	5.61	8.00	3.18	5.98	3.14	5.76	8.00	8.00	5.86	6.15
	2	3.96	2.06	2.70	2.35	5.57	4.92	2.44	2.00	2.41	2.51	2.96	2.66	8.00	5.04	2.51	2.87
8	1	5.29	8.00	5.41	3.27	6.48	8.00	6.79	5.43	2.10	8.00	4.99	2.19	8.00	8.00	8.00	5.25
	2	3.07	5.45	3.59	1.92	5.94	8.00	4.32	2.24	1.93	4.32	2.03	1.79	5.83	2.60	4.56	2.30
9	1	7.33	6.28	8.00	2.79	5.69	8.00	8.00	8.00	5.32	5.32	2.81	2.60	8.00	8.00	8.00	5.34
	2	5.49	3.51	8.00	2.54	6.14	4.86	8.00	2.86	2.71	2.38	3.49	2.29	8.00	5.80	3.21	2.44
10	1	8.00	8.00	6.00	5.62	4.49	8.00	8.00	8.00	8.00	2.64	8.00	5.80	8.00	8.00	8.00	8.00
	2	8.00	5.83	5.80	2.76	3.20	8.00	8.00	5.49	8.00	2.17	5.83	2.56	8.00	6.28	5.43	2.11

Subjects	Trial Block	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	8.00	8.00	7.70	6.14	8.00	8.00	8.00	8.00	5.22	8.00	8.00	5.52	8.00	8.00	8.00	6.44
	2	7.06	8.00	7.70	2.81	7.60	8.00	8.00	4.20	3.06	8.00	3.49	3.24	7.77	5.98	6.35	2.77
2	1	8.00	6.88	3.84	5.22	7.50	8.00	6.22	8.00	6.50	8.00	6.53	8.00	8.00	8.00	7.20	2.99
	2	5.77	5.29	2.47	2.15	5.46	6.21	3.76	2.94	2.58	3.38	2.31	5.80	3.98	5.22	3.08	1.86
3	1	6.42	5.88	2.95	3.59	8.00	8.00	8.00	8.00	3.35	3.25	3.30	5.62	5.42	3.63	3.95	2.20
	2	3.12	2.32	2.17	2.81	4.67	3.56	6.23	5.30	2.38	1.99	2.06	2.72	3.90	1.90	3.39	1.79
4	1	8.00	5.99	3.67	8.00	8.00	6.75	8.00	6.19	5.86	6.09	4.12	6.12	8.00	8.00	5.59	2.53
	2	4.87	3.31	4.92	2.84	5.15	6.23	3.87	6.12	4.12	3.70	3.01	3.24	4.00	4.34	3.65	2.37
5	1	8.00	4.84	8.00	5.73	8.00	4.43	8.00	2.84	4.33	6.15	5.49	4.06	5.51	6.56	8.00	5.19
	2	8.00	2.73	5.08	2.98	5.90	3.26	8.00	2.29	2.57	3.59	2.15	3.30	2.93	5.68	5.58	2.15
6	1	8.00	5.90	8.00	8.00	8.00	8.00	8.00	4.48	5.65	7.77	6.82	2.95	8.00	3.92	4.52	8.00
	2	5.75	2.82	4.52	4.88	5.29	8.00	8.00	3.91	2.94	4.07	4.63	2.40	5.94	2.53	3.35	2.91
7	1	6.50	5.16	8.00	8.00	8.00	8.00	8.00	6.24	5.77	8.00	6.45	6.42	8.00	8.00	8.00	7.14
	2	4.60	3.84	5.36	5.09	8.00	6.80	5.75	2.41	3.77	6.58	2.15	2.99	8.00	6.12	5.38	2.97
8	1	8.00	4.80	6.00	3.50	7.00	6.50	6.00	3.40	3.50	4.50	3.03	2.90	7.10	5.10	6.40	8.00
	2	5.70	2.30	2.80	2.70	3.90	2.90	5.20	2.20	2.50	2.30	2.30	2.50	3.40	3.20	3.10	2.50
9	1	6.20	5.42	6.10	5.39	8.00	8.00	8.00	8.00	5.80	6.37	4.80	2.43	8.00	8.00	8.00	3.64
	2	3.83	3.34	2.22	2.13	8.00	8.00	8.00	8.00	2.31	2.45	1.78	2.27	8.00	8.00	5.88	2.16
10	1	5.18	2.72	5.14	3.69	3.62	6.22	7.90	5.52	2.66	3.37	4.01	2.30	2.92	2.82	4.04	3.46
	2	3.47	1.23	3.35	2.05	5.66	3.51	4.26	5.20	2.67	1.92	2.59	1.95	2.38	1.96	3.19	1.88

Appendix B

Instructions

This is an experiment in learning nonsense syllables and not a psychological test. We are interested in certain complex relationships of the learning process common to all people, and are not concerned with your personal reactions.

When the task begins a shutter will drop covering the right half of this window. At the same time you will see a nonsense syllable in the left half of the window. After a short period, the shutter will go up presenting a second nonsense syllable. The two syllables together represent a pair with the first or left-hand syllable as the stimulus and the second or right-hand syllable as the response. You are to learn to associate the two syllables so that when the stimulus appears you can spell the response as quickly as possible before the syllable for that response is exposed. There are several pairs of syllables. These pairs do not follow each other in any regular order. The two syllables which make up each pair, however, are always paired together.

An example is the nonsense syllable XYZ which first appears alone for a short time, after which its paired response, PQR, is exposed. Your task is to spell PQR as soon as possible after seeing XYZ and before the shutter goes up to expose PQR. Try to say each letter as distinctly as possible.

Occasionally, there will be a trial on which only the first or left-hand stimuli appear. On such trials, keep responding as before by spelling out the response to each of those stimuli as quickly as possible. No responses will appear.

When you see each stimulus, if you think you know what the response should be, but are not sure, guess because it will not hurt your score any more than to say nothing and if you are correct it will be counted a success. If you don't guess, or if you guess wrong, correct yourself by spelling the correct response out loud as soon as it appears.

Please do not make up fanciful connections between the two syllables of a pair to assist your learning. Do not try to use any special system in your learning; simply learn to spell the response of each pair as soon as you can after seeing the stimulus. Do you have any questions?

Remember, as each stimulus appears, spell the response to that stimulus as quickly as possible. If you are wrong,

correct yourself by spelling the response aloud as soon as the response appears on the right.

Prior to each recall trial:

Now, only the stimuli will appear on the far right side of the window. Respond as before by spelling the response to each stimulus aloud as quickly as you can. You will see no responses.

Approved by:

Albert Elgoss

Claude O. Nott

J. W. Swanson

Date: July 27, 1962