CHOICE REACTION TIME AND CONTEXTUAL EFFECTS OF STIMULUS DURATION

by

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INTRODUCTION

CRT and Contextual Effects of Stimulus Duration

The literature abounds with studies involving choice reaction time (CRT) cf., Smith (1968), but a series of unpublished studies (Christ and Gerjuoy 1965; Christ 1966, 1967a, 1967b) revealed unique findings concerning the effects of a random sequence of stimulus durations on CRT.

Christ and Gerjuoy (1965) required each of 38 Ss to press one of nine buttons in response to one of nine tachistoscopically presented arabic numerals. The stimuli were presented to 13 Ss at durations of 50, 60, 80, 100, and 120 msec. The order of stimuli and stimulus durations were independently randomized. The remaining Ss received the same order of stimuli and durations but with a 140 msec. duration condition replacing that of 50 msec. For both groups, each of the nine stimuli was presented equally often at each of the five durations. The data were analyzed for CRT's to the four stimulus duration levels that both groups had in common.

The results indicated the following: CRT decreased as the common durations increased; for both groups, CRT decreased with practice; and, while there was no difference in CRT between groups early in practice, CRT was lower for the 140 msec. extra duration group than for the 50 msec. extra duration group late in practice. This latter finding was interpreted as a context effect in that CRT to the common durations decreased more rapidly with practice when presented in series with the longer (140 msec.) extra duration than with the shorter (50 msec.) extra duration. It was suggested that the longer extra duration created an easy context, in terms of allowing the stimuli to be more easily discriminated, while the shorter extra duration created a harder context.

To investigate this effect further, Christ (1966) employed a four-choice task with the digits 1, 2, 3, and 4 as stimuli. The common durations were 80, 100, and 120 msec. These common durations were combined in a randomized series with extra durations of 50 or 150 msec. The stimuli were presented in four 16-trial blocks to two groups of 10 Ss each. One group had 50 msec. as their extra-duration level and the other had 150 msec.

The results of this second study yielded no significant main effects for durations within groups, common durations between groups, extra-durations groups, or practice. In addition, there were no significant interactions. No explanation is offered for the finding of no difference in CRTs. However, the finding of no practice effect using only four response buttons suggests that the practice effect found in Christ's 1965 study was attributable to the larger number (9) of response manipulanda employed and to a 3 X 3 layout of the manipulanda which was not considered optimal in terms of stimulus-response compatability.

In still another study, Christ (1967a) again used a four-choice task, but in order to increase the contrast between the common and extra-duration levels only a single common duration level of 100 msec. was used with extra durations of 50 or 150 msec. The number of trials was increased to explore the possibility that more trials were necessary before the context effect would appear.

Significant differences were found between the extra duration groups' CRT to the 100 msec. common duration although within each group there was no difference in CRT to the common and extra-duration levels. No practice effect or practice X durations interaction was found. These results support the earlier findings of Christ and Gerjuoy (1965) in that CRTs to a common duration were different when the common duration was presented in serial combination with relatively shorter and longer extra durations. The findings of no difference in CRT to the durations within each group and no practice effect agrees with the earlier four-choice study (Christ, 1966).

In the last of this series of studies, Christ (1967b) essentially replicated the above (1967a) study but he employed six-16 trial blocks and Ss were given instructions emphasizing speed in responding. Further, qualitative verbal feedback concerning accuracy was given following the response to each stimulus presentation. Again, the results indicated significant differences between the two groups' CRT to the 100 msec. common duration and no significant within-group or practice effects. Further, the obsolute levels of CRT obtained in this study are surprisingly similar to those found for corresponding stimulus conditions in the previous (1967a) study.

In a second but jointly run phase of this study, three additional groups of 10 Ss each were presented the same digital stimuli in the same order but at only one duration level each, either 50, 100, or 150 msec. These three constant-duration groups were employed to provide control data that would, first, determine the CRT-stimulus duration function independently of a context effect that might be operating as in the previous combined-durations groups. Second, these constant-durations data were to be compared with data from the combined-durations groups to determine the direction in which the extra durations influenced CRT to the common duration. That is, such a comparison might indicate whether CRT to the common duration was being pulled up when combined with the 50 msec. extra duration, pulled down when combined with the 150 msec. extra duration, or whether there were such effects in both directions.

Unexpectedly, the results showed no difference in CRT between the constant-duration groups. The implication is that when presented in serial combination, CRT to any one stimulus duration is affected by other durations, but when presented alone, these durations elicit CRTs that are not significantly different. Further, when comparing CRTs between groups, there is no difference in CRT between the 150 msec. extra-duration group in the first phase and the comparable (100 and 150) constant-duration groups in the second phase. Thus, it seems that the significant extra-duration effect results from the condition in which 50 and 100 msec. durations were presented in contrast. Christ concluded that this combination produced a context in which the shorter duration stimulus condition appeared even shorter and more difficult in contrast to the relatively longer and easier common duration condition. Thus, this context elicited longer CRTs by making the discriminations necessary for responses more difficult.

In sum, the results of Christ's studies indicate that: (a) stimulus duration, at the levels investigated, has no effect on CRT if each of the different durations are presented alone to independent groups of Ss in blocks of trials; (b) strong duration effects on CRT are found when two different durations are randomly presented in a series of trials in that when short durations (50 msec.) are mixed with moderately long durations (100 msec.) CRT to both is longer than to either when presented alone; and (c) no practice or practice X durations effects are evident, suggesting that the context effect found for the combined durations group is one which operates early in practice.

Simple RT and Stimulus Duration Effects

An intensive survey of the literature yielded no studies in addition to the above mentioned work by Christ that investigated the effects of stimulus durations on CRT. However, in a review of simple RT (SRT) Teichner (1954) reported a study by Froeberg (1907) in which SRT to stimuli presented at a constant intensity was found to decrease as stimulus duration increased in log steps from three to 48 msec. In the same article, Teichner reported that Wells (1913) determined SRT to stimulus durations of 12, 25, 64, 144, and 1000 msec. at a constant intensity. His results differed from those of Froeberg in that SRT did not decrease uniformly as stimulus duration increased but, rather, there seemed to be an optimal duration for each of the 10 Ss that ranged between 25 and 64 msec. Most importantly, these two studies found a durations effect on SRT when the stimulus durations were presented alone in blocks of trials.

More recently, Raab, Fehrer, and Hershenson (1961) determined SRT to stimulus durations of 10, 25, 50, 100, 250, and 500 msec. In this study, stimuli were presented either in blocks at single duration levels or at two durations which were serially randomized. The results indicated that for both conditions tested, SRT was independent of stimulus duration at the levels tested. As an explanation of the earlier findings that stimulus duration influences SRT, Raab et.al. suggest that these effects were mediated by attitudinal factors which could develop during a block of trials at the same stimulus duration.

Thus, there seems to be no real agreement between these studies about the effect of stimulus duration on SRT. Even if one were to use the SRT findings of Raab et. al. as a basis for interpreting Christ's CRT data, their methods are so different that almost any comparison would be highly speculative.

Hypotheses

The purpose of this study is to investigate several questions raised by Christ's studies: (a) whether or not a CRT-stimulus duration effect can be established for stimulus durations below 50 msec., and (b) if the extra-duration effect will operate at a lower range of durations.

Specifically, Phase I of this study will investigate CRT to five stimulus durations presented alone in blocks and ranging from five to 25 msec. in a four-choice task. It is predicted that CRT will decrease as these stimulus durations increase.

Phase II is designed to investigate Christ's extra-duration effect by determining CRT to randomly combined stimulus durations of 5 and 15, 5 and 25, and 15 and 25 msec. It is predicted that: (a) when short stimulus durations (harder) are presented in combination with moderate durations, the resulting CRTs will be longer relative to those from the other two conditions; (b) when longer durations (easier) are presented in combination with moderate durations the CRTs yielded will be shorter relative to those from the other two conditions; (c) when short durations (harder) are combined with longer (easier) durations, the resulting CRTs will be intermediate to those from the other two conditions; and (d) CRT to the two durations within each condition will not be significantly different.

Method

Apparatus and Subjects

A Gerbrands two-field, electronically controlled tachistoscope was used to present the stimuli at an intensity of approximately 13 ft. candles as measured by a photo-light meter placed in the eye-piece of the tachistoscope. The stimuli consisted of four Deca-Dry rub-on numerals (1, 2, 3, and 4) which were 1/2 in. high with a 3/32 in. stroke. The numerals were centered on a paper-roller attachment and presented individually on a 3 in. X 7/8 in. white background which was centered on a 7 1/4 in. X 7 1/4 in. black background. The inter-stimulus field of the tachistoscope was fitted with the same dual white-on-black background but of course no stimuli were presented there. A Mallory Sonalert tone (4500 hertz) sounded one sec. before and terminated .5 sec. prior to the presentation of each stimulus and served as a ready signal. Three Hunter interval timers were employed to control the duration of the ready signal, the lag between the ready signal and the stimulus presentation, and the total permissible CRT interval. Stimulus duration was controlled by a Tektronix waveform generator and could be adjusted between trials to produce durations ranging from five to 25 msec. in steps of 5 msec. At the end of the total permissible CRT (2000 msec.) or immediately after S's response, which ever came first, a second Tektronix waveform generator re-exposed the stimulus field of the tachistoscope for one sec. Four telegraph keys, set at 200 g. of pressure with an arc of 1/16 inc., served as response manipulanda. The keys were wired to four response indicator lights and to a Hunter Klockcounter which recorded reaction time in milliseconds.

The Ss were sixty male and female students between the ages of 17 and 25 with vision correctable to 20/20.

Procedure

On entering the test room S was seated before the tachistoscope and informed (see appendix A) that the experiment was concerned with choice reaction time. The stimuli and response manipulanda were explained and S was instructed not to anticipate the order of stimulus presentation since the order was randomized. It was explained that feedback would follow each response and that quickness of response rather than correctness of response was of primary concern. Practice included 10 response-terminated trials plus one trial at each of the five stimulus durations.

Phase I.--The stimuli in Phase I were sequenced into five independently randomized blocks of 20 trials each. Each digit occurred five times per block and no digit repeated itself more than twice. The same five sequences of stimuli were used for all Ss. The Ss were randomly assigned to five groups of 12 Ss each. Each group was presented the five blocks of stimuli under a different order of stimulus durations (see appendix B) thus forming a 5 X 5 group x order-of-durations Latin square. Each S was instructed that these trials would be like the last five practice trials. He was then presented a total of 100 trials lasting approximately 10 sec. each. Including instructions and a brief rest period after the third block of trials, the total time for this phase of the experiment was approximately 25 min. per S.

Phase II.--Three min. following the termination of Phase I, each S was instructed (see appendix A) that in Phase II he would be presented 40 more trials using the same stimuli and feedback and that he should respond as in Phase I. Speed in responding was again emphasized as being most important. The four digital stimuli were each presented 10 times in a random sequence with no digit repeating itself more than twice and all Ss receiving the same order. The Ss from each of the five groups in Phase I were divided into three subgroups (A, B, and C) of four Ss each. Each subgroup was presented each digit five times under two different stimulus durations such that the stimulus digits and the durations under which they were presented varied singularly and jointly. The stimuli were presented to the Ss in subgroup A at durations of 5 and 15 msec., to B at 25 and 15 msec., and to C at 25 and 5 msec. Each trial was approximately 10 sec. long and the total 40 trial session per S, including instructions, lasted about 10 min.

Results

For each S the log median CRT for each duration condition in both Phase I and Phase II was determined. The data was analyzed independently for all responses and for correct-only responses in each duration condition in both phases of the experiment. The results of analyses performed on these two types of data and plots of these data were essentially identical. To simplify this report, only the data representing all-responses will be presented. When relevant the error data will be discussed.

Phase I.--Figure 1 shows geometric mean CRT over all 60 Ss as a function of the stimulus durations employed in Phase I. This plot of the data reveals a general trend where CRT decreases slightly as stimulus durations increase. A more extensive investigation showed that this effect holds for four of the five orders of durations employed. This more detailed effect may be seen in the histograms presented in Figure 2 which show geometric mean CRT of each group of Ss as a function of stimulus durations. Figure 2 also shows that CRT over all durations is much higher for groups IV and V than for groups I, II, and III. Figure 3, which shows geometric mean CRT as a function of trial blocks indicates no apparent or consistent practice effect for any of the five groups. It should be noted that trial block and duration effects are confounded in the design employed.

The data from this phase of the experiment were analyzed according to a 5 X 5 Latin square design for repeated measures. From Table 1, which summarizes this analysis, it can be seen that none of the main effects were statistically significant. Thus, the hypothesis that CRT will decrease as stimulus duration increases was not supported. Further, the effects seen in Figures 1, 2, and 3 are shown not to be reliable.

The error data indicated no difference in the number of incorrect responses to stimuli under either of the five different durations. Also, there were no consistent differences in errors between the five groups of Ss.

An extra-experimental analysis revealed that on 17 of 20 possible intertrial block comparisons, each group's geometric mean CRT on any trial block was shorter than the group's geometric mean CRT on the first trial in the next block. However, a more extensive analysis of these data suggests that the intertrial changes in CRT were not consistent over Ss. Furthermore, neither the magnitude of change in CRT or the proportion of Ss showing such a change in CRT was consistently related to the magnitude

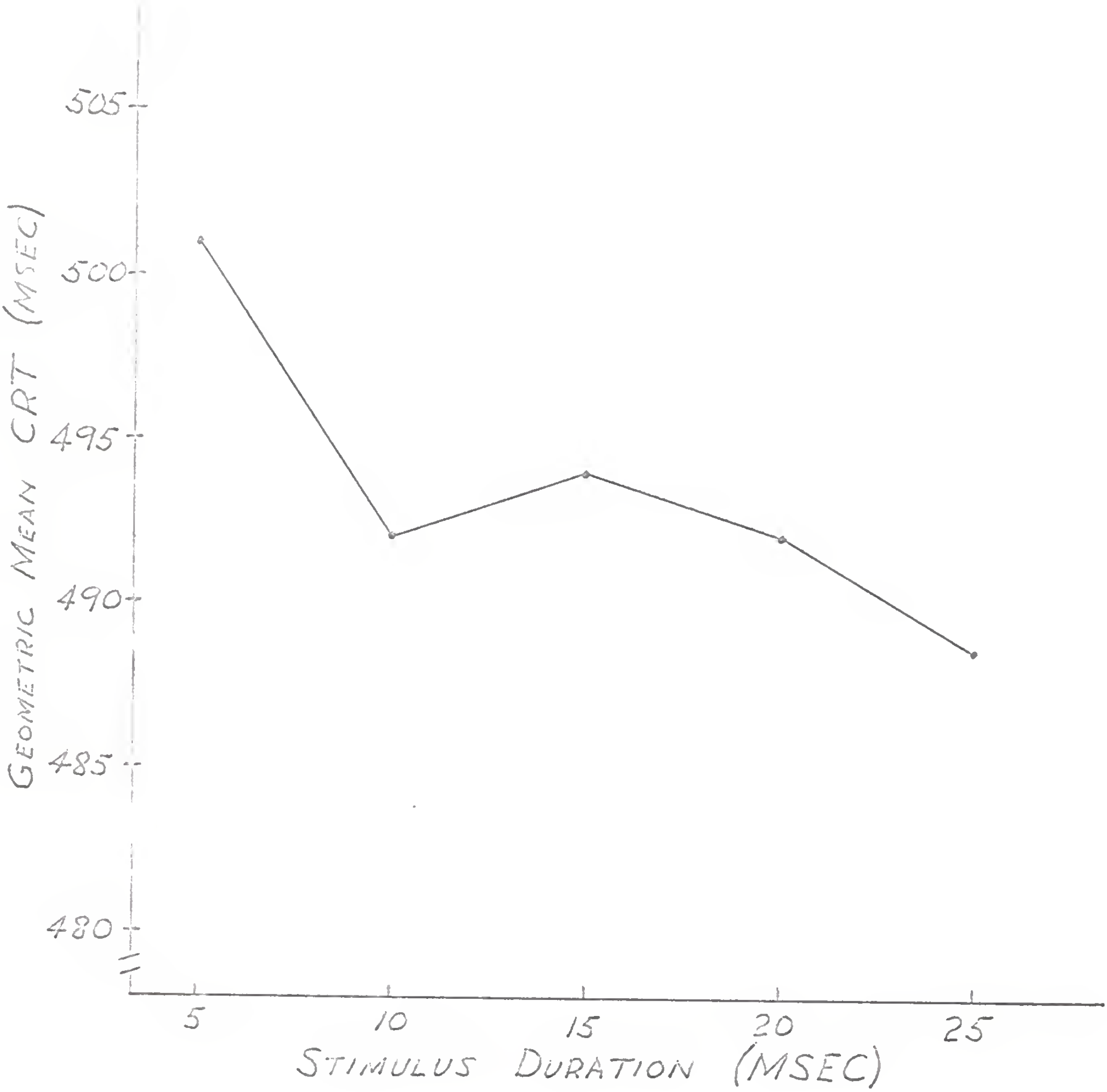

Figure 1: Geometric Mean CRT Over All Ss as a Function of Stimulus Durations in Phase I

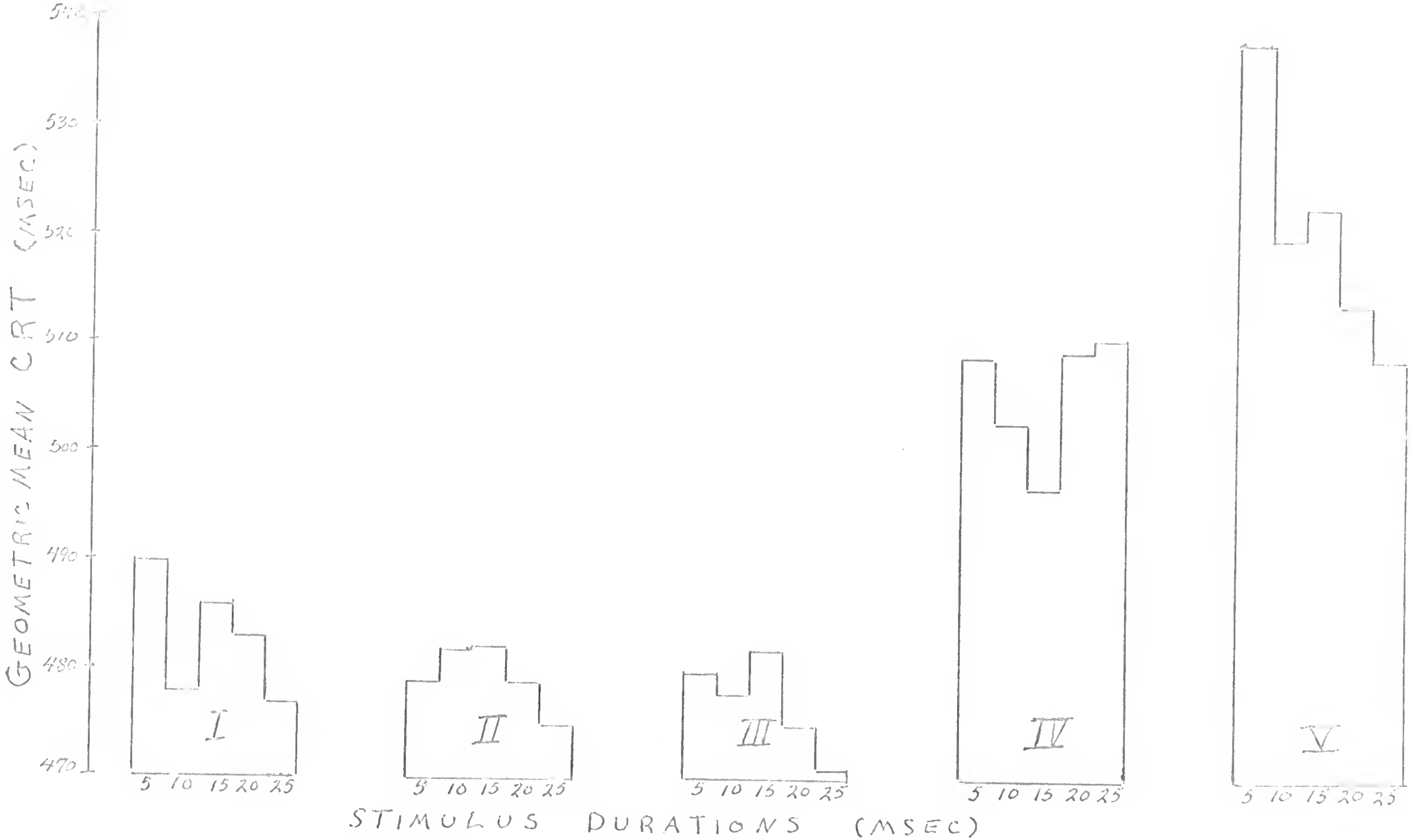

FIGURE 2: GEOMETRIC MEAN CRT OF EACH GROUP AS A FUNCTION OF STIMULUS DURATIONS IN PHASE I

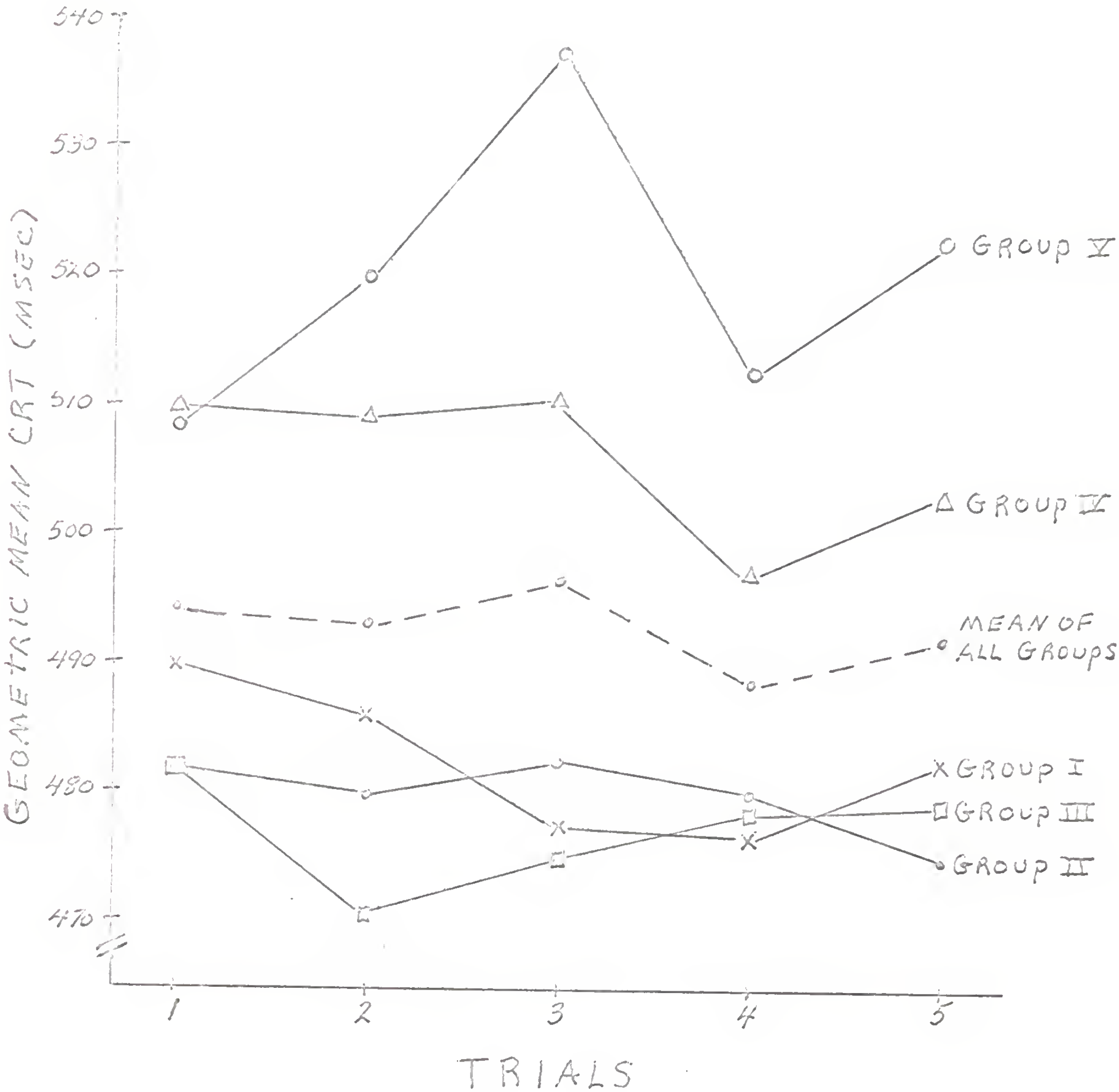

FIGURE 3: GEOMETRIC MEAN CRT AS A FUNCTION OF TRIAL BLOCKS AND GROUPS IN PHASE I

Table 1

Summary of the Analysis of Variance for Log Median CRTs in Phase I

Source of Variation	df	SS	MS	F
Between Subjects	59	4667980298		
Groups	4	673050110	168262527	2.32 NS
Ss within Groups	55	3994930188	72635094	
Within Subjects	240	1490855700		
Trials	4	14338822	3584706	<1.0
Durations	4	26187248	6546812	1.02 NS
Trials x Durations	12	34004471	2833706	<1.0
Error	220	1416325158	6437842	

or direction of change in stimulus duration. Table 2 presents the proportions of Ss showing such an increase in CRT within each group at each level of duration change.

Phase II.--The results of Phase II are presented in Figure 4, which shows geometric mean CRT as a function of stimulus durations for all three combined-duration groups. This figure indicates that in terms of overall CRT, Group A (5 and 15) had longer CRTs than Group B (5 and 25) and that the overall CRT of Group B was longer than that of Group C (15 and 25). Table 5 shows the analysis of variance summary in which the average log median CRT of conditions A, B, and C were tested for differences. The results indicate no difference between the CRTs of the three groups. Thus, the hypothesis that the overall CRTs of the three groups would differ was not supported. Figure 4 also suggests that Ss within each group responded differently to the two stimulus durations they encountered. This is indeed the case as shown in Table 3 which summarizes the analysis of variance of log median CRT to the durations within each condition. Therefore, the hypothesis of no within-subject duration effects was not supported. Table 4 presents a summary of the analysis of variance of log median CRT to the same durations and reveals no significant differences between each group's CRT to these durations. Thus, it appears that Ss in different combined stimulus duration conditions responded similarly to the same common stimulus duration even though they were presented in context with different durations. Analyses of the error data reveal no differences between the three groups or between the stimulus durations used.

Table 2

Proportion of Ss in Each Group Showing an Increase in CRT From the Median on Any Trial Block to the First Trial on the Next Trial Block in Phase I

Groups

I		II		III		IV		V	
Duration Change (msec)	Proportion of Ss	Duration Change (msec)	Proportion of Ss	Duration Change (msec)	Proportion of Ss	Duration Change (msec)	Proportion of Ss	Duration Change (msec)	Proportion of Ss
10 to 15	1/12 (75%)	10 to 20	7/12 (58%)	15 to 25	7/12 (58%)	20 to 5	10/12 (83%)	25 to 10	4/12 (33%)
15 to 10	8/12 (67%)	20 to 15	4/12 (33%)	25 to 20	8/12 (67%)	5 to 25	9/12 (75%)	10 to 5	9/12 (75%)
10 to 25	7/12 (58%)	15 to 4	8/12 (67%)	20 to 10	5/12 (42%)	25 to 15	4/12 (33%)	5 to 20	3/12 (25%)
25 to 20	7/12 (58%)	5 to 25	8/12 (67%)	10 to 5	10/12 (83%)	15 to 10	6/12 (50%)	20 to 15	6/12 (50%)

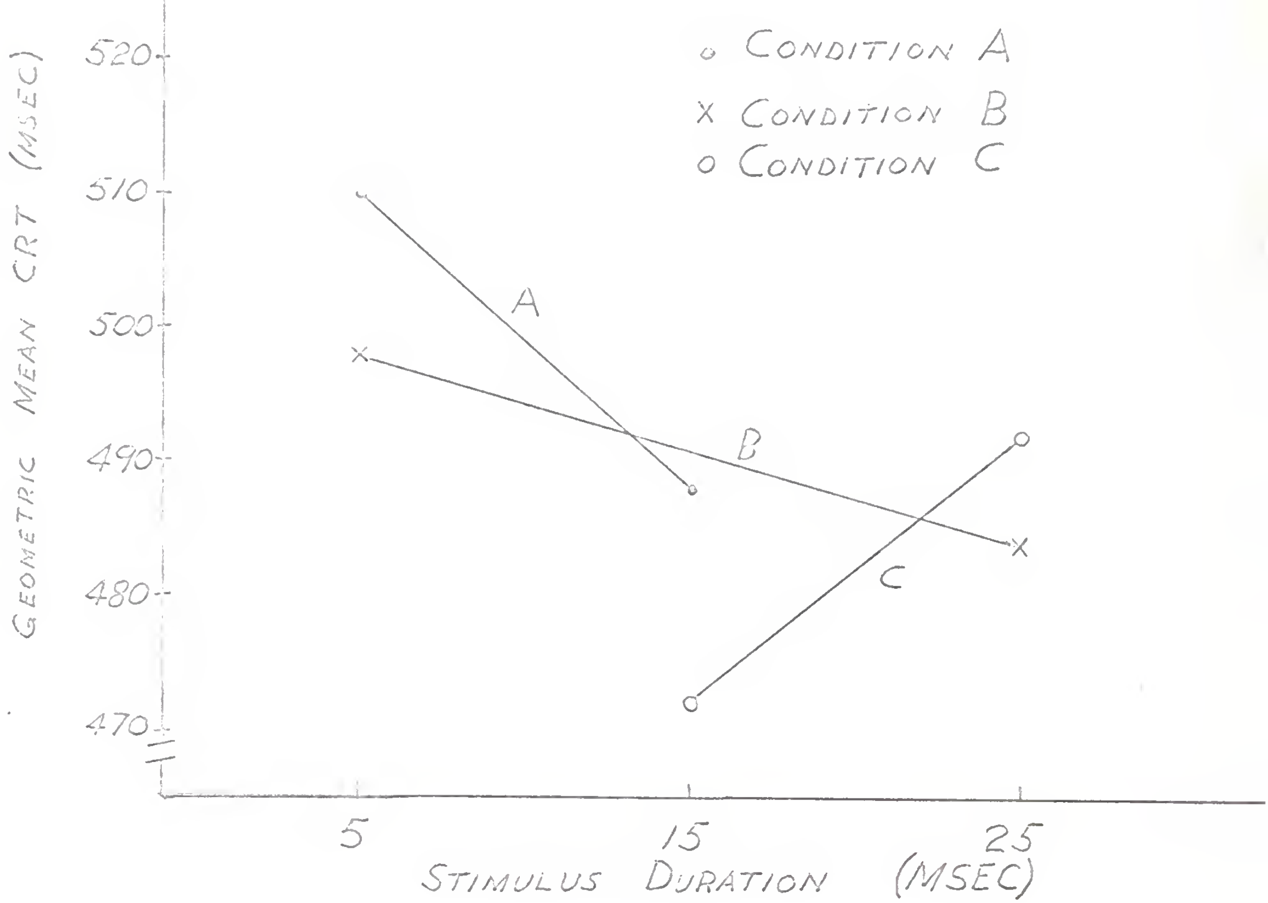

Figure 4: Geometric Mean CRT as a Function of Stimulus Duration and Condition in Phase II

Table 3

Summary of the Analysis of Variance of Log Median CRT
Within Conditions A, B, and C in Phase II

Condition	Source	df	MS	F
A 5/15 durations	Between Subjects Within Subjects Durations Durations x *Ss* Total	19 20 1 19 39	 60695433 3205085	 18.9 $p<.01$
B 5/15 durations	Between Subjects Within Subjects Durations Durations x *Ss* Total	19 20 1 19 39	 15982016 2509194	 6.4 $p<.05$
C 15/25 durations	Between Subjects Within Subjects Durations Durations x *Ss* Total	19 20 1 1	 28692974	 4.39 $p<.05$

Table 4

Summary of the Analysis of Variance of Log Median CRT
to the Same Durations in Conditions
A, B, and C in Phase II

Durations	Source	df	MS	F
5/5	Groups	1		
	Ss x Groups	38	218414919	<1.0
	Total	39		
15/15	Groups	1	8477805	
	Ss x Groups	38	191322812	<1.0
	Total	39		
25/25	Groups	1	4846944	
	Ss x Groups	38	18747974	<1.0
	Total	39		

Table 5

Summary of the Analysis of Variance of the Average of Log Median CRT Between Conditions A, B, and C in Phase II

Source	df	MS	F
Groups	2	34642902	<1.0
Groups x Ss	57	58944630	
Total	59		

Discussion

Phase I. It was predicted that for the range of stimulus durations employed CRT would decrease as the durations of stimuli increased. As seen in Figure 1, the data reveal such a trend but the effect was small (about 12 msec. overall) and not significant. Thus, the main hypothesis was not supported by the data. This finding is in conflict with those of Froeberg (1907) and Wells (1913) in which stimulus durations presented alone in blocks of trials were found to be a determinant of SRT. However, the results of the present study, Christ (1967b), and Raab et. al. (1961) all indicate that stimulus durations when presented alone in blocks of trials are not the main determinants of response times in either SRT or CRT tasks.

The extra-experimental analysis showed that on 17 of 20 possible inter-trial block comparisons, where a change in durations occurred, there appeared to be an accompanying increase in geometric mean CRT from trial blocks X to the geometric mean CRT on the first trial in trial block X + 1. This finding suggests that Ss are responding with increased CRT to any change in stimulus duration. This interpretation agrees with that of Raab et. al. (1961) in which they explained that the effect of stimulus duration may be mediated by attitudinal factors which may develop during a block of trials at one duration level. Also, such an interpretation would be in agreement with adaptation level theory (cf. Helson, 1965) which would predict an increase in CRT to any change in stimulus context. Adaptation level theory also would predict that CRT would increase proportionately to the magnitude of change in durations. However, results of the present study indicate no such monotonic change in CRT or any consistent changes over Ss in these inter-trial block comparisons.

Phase II. It was predicted that the randomly sequenced stimulus durations employed in Phase II would produce a context in which: (1) there would be no within-S differences in CRT to the two stimulus durations in each condition; and there would be significant differences between groups in (2) CRT to the same durations and (3) in the mean CRT. However, the results yielded significant within-S differences in each condition and no between group differences to the same durations across conditions nor between mean CRT across conditions.

The findings of significant differences in CRT to the two durations within each condition when no between group differences exist is surprising in that: (a) the results of Phase I show no difference in CRT to any of the five different stimulus durations; and (b) Christ (1967a, 1967b) found no differences in CRT to the two different durations within any combined-duration condition.

To account for this within-S duration effect, several possible alternatives come to mind. First, it is possible that the extra durations effect found in Christ's earlier studies does not operate at a stimulus duration range below 50 msec. Second, an optimal stimulus duration effect such as suggested by Wells' (1913) data could be operating. That is, Ss would have shorter CRT to the 15 msec. stimulus duration than to either the 5 msec. or 25 msec. durations. Such an explanation would assume that a stimulus duration of 15 msec. is easier to discriminate because it is closer to S's optimum discriminable duration than either those of 5 msec. or 25 msec. Evidence in support of this interpretation can be seen in the three individual group functions shown in Figure 4. A last explanation concerns the reliability of CRTs between Phase I and Phase II. That is, with increased practice any differences in CRT in Phase I may have become more reliable in Phase II and thus appeared as significant duration effects within each condition in Phase II. Indeed, when the average within-*S* standard deviations were computed for all *S*s in Phase I and Phase II, the results indicated overall decreases. Hence, the significant within-*S* difference which has been attributed to a possible contrast-type effect, may have been due to an error in the design of the experiment. That is, the order of running Phase I and Phase II should have been counterbalanced over *S*s.

Conclusions

The results of Phase I indicate that increasing stimulus durations over blocks of trials at a range of 5 to 25 msec. do not operate to decrease CRTs as the durations increase. The inter-block changes in CRT were not consistent and lend no real support for the operation of adaptation level type effects.

The data from Phase II show no between group effects in that CRTs to a given duration (5, 15, or 25 msec.) are not significantly affected by the context in which they were presented. However, the data do suggest the operation of a contrast effect within groups in that the *S*s in each group responded differently to the two different durations when they were presented in a randomly mixed order.

Appendix A

Instructions

Phase I

This is a reaction time experiment. That is, it is an experiment to find out how fast you can recognize a number that I will show you at a fast speed.

This is the equipment we will use (point out). It may look complex but it does one simple job. It shows you a number, either a 1, 2, 3, or 4 at a fast speed. These numbers will be presented to you in random order so there is no system or order for you to figure out. Try not to anticipate which number will be presented next. Are there any questions?

If you will look through the eyepiece (point out), you will see a rectangular field on which the numbers will be flashed. Notice the four keys in front of you. These keys correspond to the 1, 2, 3, and 4. Your task, for example, is to press the number four key when you see a 4 flashed on the field. Are there any questions?

Remember, speed is of the most importance so just as soon as you recognize the number, press the correct key as quickly as you can. The task is quite easy, so do not worry about mistakes because you will not make very many. Try to press only one of the keys at a time and if you are sure which number flashed, make a quick guess and press the corresponding key. I will give you several practice trials on which you will press the key corresponding to the number flashed. The number will remain on the field until you press the correct key. Ready?

Now, I will give you a second set of practice trials and they will be just a bit different from the first ones. You will hear a tone (demonstrate) that tells you that a number will be flashed immediately after the tone ends. Next, you will press the corresponding key and when you have responded, the same number will come back on. This second presentation of the number is simply so you can tell if you made the correct choice. You should not respond to the number this second time. Remember, the sequence is tone, flashed number, your response, and the number comes back on as a check. Any questions? Ready?

Now let us proceed with the experiment. It will be just like the last set of practice trials, only more. Any final questions? Ready?

Phase II

The second part of the experiment will be just like the first except much shorter. Are there any questions? Ready?

Appendix B

Presentation Order of Stimulus Durations in Phase I

Trial Block

Groups of Ss	1	2	3	4	5
I	5	15	10	25	20
II	10	20	15	5	25
III	15	25	20	10	5
IV	20	5	25	15	10
V	25	10	5	20	15

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AN ABSTRACT OF A THESIS

submitted in partial fulfillment of the

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A series of unpublished studies (Christ and Gerjuoy 1965; Christ 1966, 1967a, 1967b) revealed unique findings concerning the effects of a random sequence of stimulus durations on choice reaction time (CRT). The results of these studies indicated that: (a) stimulus duration, at the levels investigated, has no effect on CRT if each of the different stimulus durations are presented alone to independent groups of Ss in blocks of trials; (b) strong duration effects on CRT are found when two different stimulus durations are randomly presented in a series of trials in that when short durations (50 msec.) are mixed with moderately long durations (100 msec.) CRT to both is longer than to either when presented alone; and (c) no practice or practice X durations effects are evident indicating that the stimulus durations effect found in the combined durations groups is one which operates early in practice.

The purpose of the present experiment was to investigate several questions raised by Christ's studies: (a) whether or not a CRT-stimulus duration effect can be established for stimulus durations below 50 msec., and (b) if the extra-duration effect will operate at a lower range of durations. Specifically, Phase I of this study investigated CRT to five stimulus durations presented alone in blocks of trials and ranging from five to 25 msec. in a four-choice task. It was predicted that CRT would decrease as these stimulus durations increased. Phase II was designed to investigate Christ's extra-duration effect by determining CRT to randomly combined stimulus durations of 5 and 15, 5 and 25, and 15 and 25 msec. It was predicted that: (a) when short durations (harder) are presented in combination with moderate durations, the resulting CRTs would be longer relative to those from the other two conditions; (b) when longer durations (easier) are presented in combination with moderate durations the CRTs yielded would be shorter relative to those from the other two conditions; (c) when short durations (harder) are combined with longer (easier) durations, the resulting CRTs would be intermediate to those from the other two conditions; and (d) CRT to the two durations in each condition would not be significantly different within the Ss of each condition.

For Phase I, the results did not support the hypothesis. The data revealed a trend in which CRT decreased as stimulus durations increased but this trend was not statistically significant. This finding was viewed as support for those of Christ (1967b) and Raab, Fehrer, and Hershenson (1961) in which reaction time was found to be independent of stimulus durations.

The results of Phase II yielded significant within Ss differences in each condition and no between group differences to the same durations across conditions or for mean CRT between conditions. Thus, the hypotheses were not supported. However, the data do suggest the operation of a contrast effect within groups in that the Ss in each group responded differently to the two different stimulus durations when they were presented in a randomly mixed order.