VISUAL AND ACOUSTICAL INTERFERENCE IN A LETTER-MATCHING TASK AS A FUNCTION OF THE INTERSTIMULUS INTERVAL

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VISUAL AND ACOUSTICAL INTERFERENCE IN A LETTER-MATCHING TASK AS A FUNCTION OF THE INTERSTIMULUS INTERVAL

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INTRODUCTION

As early as the 19th century, psychologists were placing emphasis on mental operations or cognitive acts. It was felt that the cognitive acts of comparing, judging, and feeling were of primary interest to psychology. Difficulty in designing experiments to investigate these internal processes led psychologists to a dependent measure developed by Donders (1868). This measure, which is commonly referred to as reaction time (RT), was developed in an attempt to investigate cognitive acts such as detection, discrimination, and choice. Even today cognitive psychologists show a great deal of interest in "time" as a variable. Whether time is a dependent variable such as RT or an independent variable such as duration of interpolated activity, it is certainly of major interest.

With the use of a time variable, psychologists began breaking down cognitive acts into smaller discrete units or processes. One of the earliest and most well-known distinctions was that of primary memory (PM) and secondary memory (SM). James (1890) developed these two concepts to identify two separate memory stores. Waugh and Norman (1965), in a further elaboration, stressed the role of rehearsal as a maintenance and transfer process for items in PM.

In a further elaboration of the same general concepts, Atkinson and Shiffrin (1968, 1971) have proposed a model of memory which provides an excellent outline and further breakdown of information processing. According to the model, recall performance over brief retention intervals is often a joint function of several memory systems. The vertical division of memory that appears likely is (a) a very brief, limited capacity store which requires little effort on the part of the S, (b) an active store also of limited capacity which consists of initial representations and rehearsals of the information being stored and (c) a long-term store of unlimited capacity in which material is passively maintained. Present concern centers on the first two divisions of this model.

Sperling (1960) suggests that in the visual storage system there exists an iconic memory. That is, there appears to be a persistent trace of the visual stimulus (via continued receptor activity) after the external stimulus is terminated. Newell (1972), in his discussion of mechanisms for coding a stimulus, states that one of the mechanisms by which the perceptual system operates is iconic memory. The icon appears to be a stage of visual information processing which maintains the physical features of a stimulus for a brief period of time.

While iconic storage is certainly a part of visual information processing, the duration of the icon does not necessarily determine the amount of information processed. Gummerman and Gray (1972) report evidence suggesting age differences in the duration of the icon and rate of information processing. Young children's iconic storage appears to be longer than that of older children or adults, but young children process information from iconic storage more slowly than older children or adults.

Several investigators have addressed themselves to the question of the duration of physical feature information. This appears to be quite a different process from the existence of the stimulus physical features in the icon. Kroll, Parkinson, and Parks (1972) employed the interference task of shadowing auditory material while the S simultaneously received five memory items either visually, auditorily, or both visually and auditorily. Their results suggest that, when items are presented visually or both visually and auditorily, rehearsal is primarily visual due to the interference in acoustic rehearsal by the shadowing task. This visual rehearsal appears to be effective at retention intervals as long as 20 sec.

Posner, Boies, Eichelman, and Taylor (1969) compared "pure" and "mixed" lists in an effort to develop a condition that would enhance the efficiency of a visual code in a letter-matching task. A "pure" list refers simply to the fact that all paired stimuli were sampled from a list containing all upper-case items. A "mixed" list meant the items sampled to form the pairs were mixed upper and lower case. The authors felt that a "pure" list should provide more incentive for the S to attend to the visual code. The "physical" match RT for the "pure" list was faster after a delay than "physical" match RT for a "mixed" list. The results of the two studies suggest that an S can force himself to maintain a visual code for a later "physical" match.

More recent results of Parks, Kroll, Salzberg, and Parkinson (1972) and Kellicult, Parks, Kroll, and Salzberg (1973) are analogous to those of Kroll et al. (1972) and Posner et al. (1969). These data suggest that task demands and mode of presentation can influence the type of information used in rehearsal. Thus, visual information may be preserved for much longer than the approximate 250 msec. of iconic memory. In addition, Frost (1972), using pictoral stimuli, found that task demands (recognition vs. recall) affected whether Ss encoded the information visually or semantically. Parkinson (1972) reported data which strongly suggest that short-term storage for visual material is not strictly restricted to an auditory-verbal-linguistic (AVL) process, as suggested by Averbach and Sperling (1961).

If one considers the situation for visual stimuli only, then it appears that three stages of processing occur other than long-term storage. First is the iconic storage suggested by Sperling (1960). Second, there appear to be two possibilities for active rehearsal of visual stimuli that are controlled by task demands. If AVL rehearsal is blocked (e.g., by a shadowing task), then it appears that Ss can maintain an active visual memory. It has been suggested by Kroll et al. (1972) that the prevalence of AVL storage in previous studies reflects an S's preference based on the ease of AVL rehearsal under many experimental conditions. Kroll et al. (1972) also found that if, during the shadowing task, memory items were presented auditorily, the Ss could not transform these auditory stimuli into a visual representation for rehearsal. The type of rehearsal available for memory items appears to be dependent on the mode of presentation and type of interference task used.

If one considers a task in which the Ss are given a set (via instructions and/or task demands) to process visual information for AVL rehearsal, then an interesting question arises: What is the time course of the transfer of visual feature information into a code for AVL rehearsal?

Several studies that provide some insight into this question have employed a judgment task in an attempt to investigate visual information processing. In these studies (e.g., Posner and Keele, 1967; Boies, 1969; Posner, Boies, Eichelman, and Taylor, 1969) an "inline display method" was used; that is, a single letter was presented for a certain duration, then a blank field was presented, followed by a second letter appearing in the position of the original.

The interstimulus interval (ISI) varied from 0 to 2 seconds. Subjects were instructed to respond "same" if the two letters had the same name (e.g., A-A, B-b, . . . etc.); if otherwise, "different." The stimuli were either physically identical (e.g., A-A, B-B, D-D, . . . etc.), identical in name (e.g., A-a, B-b, D-d, . . . etc.), or different (e.g., A-b, B-D, A-d, . . . etc.). A "physical" match was designated when two letters were physically identical and the S responded "same." A "name" match was designated when the stimuli were identical in name (e.g., A-a) and the S responded "same." Name match RT exceeded physical match RT, but the difference between "name" and "physical" matches decreased as a function of increasing the ISI (see Figure 1).

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Insert Figure 1 about here

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Analysis of Ss' RT for negative responses (i.e., "letters are different") showed a decrease of RT over increasing ISIs. Overall, however, negative responses were slower than responses to matching stimuli.

Since responses to the "physical" matches at the 0 sec. ISI were 90 msec. faster than those to a "name" match, Posner et al. (1969) proposed that the stimulus letters were matched on a visual code. This visual code could be information identifying the physical characteristics of the items, such as the visual distinctive features of letters proposed by Gibson (1967). Thus, a "physical" match of two physically identical items (e.g., A-A) would be faster than a "name" match (e.g., A-a).

Another proposition which follows from the Posner et al. (1969) data is that, with increasing ISIs, the visual code is transformed into some "name" representation. This "name" representation could simply be the implicit vocalization of an item's name. Such a process accounts for the decreasing difference in RT for "name" versus "physical" matches as ISIs increase.

If one considers the results of Posner and Konick (1966), it is surprising that the efficiency of the visual code is lost so quickly. Posner and Konick (1966) employed a task which involved the ability of Ss to preserve the position of a point on a line. After a brief exposure of the point and line, an interpolated task (designed to interfere with a visual code) was given to Ss. The results suggest S can maintain a visual code. The strength of the visual code is closely related to the amount of attention available during the retention interval.

The loss of an efficient visual code may not be as surprising in the Posner et al. (1969) data as it seems. First of all, the instructions explicitly stated that for a match to occur the letters must have the same "name." Thus, task demands created a need for AVL rehearsal. Posner (1969) also points out that for only 25% of the trials in those original studies (e.g., Posner and Keele, 1967 or Boies, 1969) was it most efficient for the S to maintain a visual code. Intuitively, it also appears that the visual code used for rehearsal of letters is much more complex than just "a special code" as in Posner and Konick (1966).

If Posner and others are correct in their interpretation (i.e., short ISIs facilitate "physical" matches because of an existing visual code and a long ISI's matching is done on the basis of a "name" code), then one might be able to selectively interfere with the visual code by presenting items that are physically confusable. Also, one might be able to selectively interfere with "name" code by presenting items that are acoustically confusable.

Posner and Taylor (1969) investigated acoustic and visual confusability in a letter-matching task. Each S was first presented with a three-letter array for one second. This array was followed by a probe letter after an interval of either 0, .5, or 1 sec. The Ss judged the probe as having the same "name" as a member of the previous three-letter display. The probe was either physically identical (e.g., G-G) or identical in name (e.g., G-g). The center letter in the initial display was designated the target letter and was always the letter G, C, or D. The two end letters (first and third position) were considered context letters. A visually-confusable context was designated by the presence of the letters O and Q in the first and third position. An acoustically-confusable context was designated by the presence of the letters Z and V in the first and third position of the three-letter array. It was found that the visually-confusable context reduced the efficiency of a "name" match. While the results of the acoustically-confusable context were nonsignificant, Posner and Taylor (1969) interpreted the results as indicating a separate parallel store for visual and name codes.

The lack of a significant acoustic confusion effect could have been due to the fact that the letters used were not at a high level of acoustical confusability. Of the six possible combinations of context and target letters, the highest acoustic confusion value obtained by Conrad (1964) is 105, while the other five pairs range in acoustic confusion values from 3-31. As the method of the present experiment shows, these letters were rather low in acoustic confusability.

Dainoff (1970) employed a letter-matching task analogous to that used by Posner et al. (1969). In this study, S̲s were asked to judge two successive letters as being "same" if they had the same name. The ISIs employed were 0, 1.125, 1.500, and 2.00 sec. The letter pairs were either upper case, lower case, mixed upper-lower case, and either acoustically confusable or not confusable according to Conrad (1964). The results indicated that acoustic confusability increased RTs and this effect increased over ISIs. This is a replication of the findings of Dainoff and

Haber (1970). In light of these results, Dainoff (1970) proposed a model which predicts an increase in the likelihood of AVL processing over time while the likelihood of visual processing decreases over time.

The present study attempts to more directly investigate the nature of the coding process in a letter-matching task. To fully test the model proposed by Dainoff (1970), three conditions or types of stimuli are required. In one condition, the letters used should be visually confusable and not acoustically confusable. In a second condition, the stimuli should be acoustically confusable and not visually confusable; and the third condition should employ letters that are both visually and acoustically confusable.

There have been several attempts to determine what letters are visually confusable. Fisher, Monty, and Glucksberg (1969) review several attempts to construct a visual confusion matrix for the 26 letters of the alphabet. Fisher et al. (1969) conclude that there is little evidence for the common assumption that there exists a basic "pattern of confusions" between upper-case letters of the alphabet. It appears, however, that previous confusion matrices are a function of procedures and techniques (e.g., type of lettering, exposure duration, illumination, etc.) by which they are generated.

Since there is little agreement among the visual confusion matrices presently available, it seems that the physical confusability of two letters could be approximated by using Gibson's (1967) distinctive features. In other words, those letters that have a large number of common features could be considered physically similar and visually confusable. This does not assume exclusively a feature list storage or a template-type storage, since two letters sharing common physical features could reference either other physical features or similar templates.

In order to determine the acoustic confusability of two letters, Conrad's (1964) acoustic confusion matrix for the 26 alphabet letters can be easily employed. Conrad (1964) presents a 26 x 26 matrix with listening error values recorded in each cell. This matrix then enables one to judge letter pairs on their acoustic confusability and has been successfully used by Dainoff and Haber (1970) and Dainoff (1970).

Following from the data and interpretation of Posner et al. (1969) and Dainoff (1970), given the above methods for classifying the acoustic and visual confusability of letter pairs, three hypotheses were proposed. First, if during the ISIs of 0-1 sec., the efficiency of a "physical" match is due to a visual code, then one should be able to cause confusion (i.e., long RT) in "different" responses by presenting items that are physically similar (e.g., E-F). Second, if the lack of a difference between a "name" match and a "physical" match at ISIs of 1-2 sec. is because the items are then in a "name" or AVL representation, then one should be able to interfere with "different" responses to non-matches by presenting items that are acoustically similar and physically different. Last, if items are presented that are both physically and acoustically similar, the results should show difficulty (i.e., long RT) for non-matches at ISIs from 0-2 sec.

METHOD

Subjects. The Ss were 16 volunteers (9 males and 7 females) from introductory psychology classes at Oklahoma State University and received extra credit for participation. The Ss were right-handed and reported normal vision without the use of corrective lenses.

Apparatus. A three-field Scientific Prototype tachistoscope with automatic slide changer was used to present the stimuli in an "inline display" manner. A relay was attached to the control system of the tachistoscope, providing a circuit to start a Hunter clock-counter at the onset of the second stimulus. The Ss, using a toggle switch, stopped the clock-counter.

Materials. The slides used each contained one letter. The letters were upper-case Para-Type (No. 11315), pressed on acetate and mounted for slides. The acoustic confusion condition (AC) consisted of 8 pairs of letters judged as highly acoustically confusable and not visually confusable. The 8 pairs of letters had acoustic confusion values in Conrad's (1964) confusion matrix ranging from 116 to 478 and 2 or fewer distinctive physical features in common according to Gibson (1967).

The visual confusion condition (VC) consisted of 8 letter pairs judged to be highly visually confusable and not acoustically confusable. The letter pairs in the VC condition had 3 or 4 distinctive features (Gibson, 1967) in common and acoustic confusion values ranging from 0-17 (Conrad, 1964).

The acoustic plus visual confusion (AC + VC) condition consisted of eight pairs of letters judged as being highly acoustically and visually confusable. Each letter pair shared 3-5 distinctive features (Gibson, 1967) and had acoustic confusion values of 46-512 (Conrad, 1964). Refer to Table 1 for the actual letter pairs used in each condition.

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Insert Table 1 about here

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Procedure. Each *S* was seated in front of the tachistoscope and asked to read the typed instructions in Appendix A. At the beginning of each trial, the *S* was shown a white field with 2 horizontal rows of black dots designating a fixation area. With the warning "ready," from the *E*, the *S* could then initiate the presentation series by using his thumb to press a button held in his non-preferred hand. A single capital letter was tachistoscopically presented to the *S* for a duration of .5 sec. Then the original white field reappeared for an ISI of either 0, .5, 1.0, or 2.0 sec. Next, the second letter appeared and the clock-counter started simultaneously. The *S* then responded whether the items were "same" or "different" via the toggle switch. The left-right position of these responses was counterbalanced between Ss, but was consistent within any single S.

The E then recorded the RT in milliseconds. After doing this, the E then reset the clock-counter and set a predetermined ISI for the next trial. Upon the completion of the above sequence of events (1 trial), the E advanced the slide trays to the next pair of stimuli and S initiated the next trial. A 5-minute rest period occurred halfway through the trials of each session while the E changed slide trays.

Design. A 3 x 4 completely within Ss analysis of variance design was employed which consisted of three types of confusion items (AC, VC, AC + VC) as the first factor and 4 ISIs (0, .5, 1.0, or 2.0 sec.) as the second factor. Each of the 8 possible letter pairs for each type of confusion was presented twice at each of the 4 ISIs. The dependent variable was the RT in msec. to the "different" items (i.e., RTs to those trials where the letters were not a match); practice trials and "same" trials were not analyzed.

There were 16 observations in each cell of the 3 x 4 design, making a total of 192 observations for each S. These trials were randomized, along with 192 trials in which the two letters presented were the "same." The 384 test trials were preceded by 30 practice trials. The trials for each S were conducted in two one-hour sessions on two successive days with practice trials occurring only on the first day.

RESULTS

The error rate for each S was approximately .006. These errors did not enter into the analysis, however, since each error trial was repeated at the end of the second session to provide an equal number of correct responses per cell.

A log transformation was performed on the raw data, averages within each cell for each S were calculated, and these averages were then reconverted to msec. by anti-logs. Figure 2 provides a graphic representation of the final cell means.

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Insert Figure 2 about here

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The results of the two-way analysis of variance are presented in Table 2. The interstimulus interval was

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Insert Table 2 about here

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significant $F_{(3, 45)} = 18.984$, $p < .001$. The RTs were fastest at the 0 sec. ISI and slowest at the 2.0 sec. ISI. The interaction of ISI and type of confusion was also significant, $F_{(6, 90)} = 20.403$, $p < .001$. In other words, the effect of type of interference (acoustic or visual) was related to the ISI. At short ISIs, VC items produced longer RTs than AC items. At long ISIs, AC items produced longer RTs than VC items. The AC + VC items produced longer RTs than the AC items at short ISIs and longer RTs than the VC items at the 2.0 sec. ISI. The main effect of type of confusion was nonsignificant, $F_{(2, 30)} = 3.258$, $p > .05$.

The HSD (Honestly Significant Differences) multiple comparisons test revealed the following results. At the 0 sec. ISI, the difference between the AC and the AC + VC condition was significant, $p < .01$. Also, the difference between the AC condition and the VC condition was significant, $p < .01$ and likewise the difference between the VC condition and the AC + VC condition was significant, $p < .01$. At the .5 sec. ISI, the difference between the AC and AC + VC conditions was significant, $p < .05$. Also, the difference between the AC and VC conditions was significant, $p < .05$. At the 2.0 sec. ISI, the difference between the AC and VC conditions and the difference between the VC and AC + VC conditions was significant, $p < .01$. All other possible comparisons were nonsignificant, $p > .05$.

The results indicate that long RTs resulting from items that are physically similar are most likely to occur during the first 1000 msec. of processing. After the first 1000 msec., long RTs resulted from items that were acoustically confusable. Items which were both visually and acoustically confusable showed long RTs at all levels of ISI.

DISCUSSION

The hypothesis that one can interfere with the S's response to different letters at short ISIs by presenting letters that have a large number of distinctive features (Gibson, 1967) in common was supported. It is interesting to note that the efficiency (i.e., short RTs) of responses to the physically dissimilar items in the AC condition is present even at the .5 sec. interval. This is long after the duration of the icon estimated by Sperling (1960). This suggests that there is a maintenance of visual physical feature information for some time after the icon disappears.

Kroll, Parkinson, and Parks (1972) have shown that, by manipulating task demands, Ss can be forced to maintain this physical feature information as long as 20 secs. In the present study, however, the Ss were explicitly told to judge the letters on an acoustic code, the "name." In this situation, it appears that the maintenance of physical feature information persists until approximately 1.0 sec. (refer to Fig. 2). At the 2.0 sec. interval, however, it appears that visual feature information is lost. This is indicated by (1) the efficiency of judgments made on letters that are visually confusable and (2) the rapid increase in RT to letters that are acoustically confusable.

The long RTs to acoustically-confusable items supports the second hypothesis that acoustic confusability and not visual confusability will interfere with "different" responses at long ISIs. The fact that acoustically-confusable items required more time for a "different" response than did visually-confusable items is indicative that at 2.0 sec. the S has transformed the visual information into an acoustic code, perhaps for AVL rehearsal as suggested by Averbach and Sperling (1961).

The last hypothesis to be considered is that dealing with the combined AC and VC conditions. One point at which the AC + VC items differ significantly from the VC items in the first second of processing is at the 0 sec. ISI. This significant difference between the AC + VC and the VC conditions at the 0 sec. ISI could be due to some discrepancies in the distinctive feature overlap of the two conditions.

Since the AC + VC condition had to consist of items that were acoustically and visually confusable, the visual distinctive feature overlap could not be as precise as that for the VC condition. In the VC condition, letters were not only chosen according to the number of common distinctive features, but also the common position of the shared distinctive features. Gibson (1967) does not consider the position of shared distinctive features as a relevant variable. However, it seems intuitively plausible that if two letters shared three common features in the same position of the visual field, these two letters would be more visually confusable than two letters that shared three common features with no feature position overlap. This is essentially the discrepancy between the feature characteristics of the VC and AC + VC items. Both the VC and the AC + VC items had a mean of 3.625 shared distinctive features. However, while many of the items in the VC condition shared common features plus common feature position (e.g., E-F, T-I, or P-R), many of the items in the AC + VC condition shared only common features and little or no common feature position (e.g., K-A, T-P, or B-T).

Another aspect of the data that should be considered is the apparent rapid availability of a "name" code with the onset of the second letter. Looking at the overall data, one would assume that it takes over 1 sec. for an item to be fully transformed to a name code. However, at the 2 sec. ISI where "name" matches are supposedly occurring, the longest RT was 694 msec. in the AC condition and 592 msec. in the VC condition. This would suggest one of two possibilities. Either the S does need to transform the second letter completely to a "name" code before he can make a "different" judgment or possibly the name code is available almost immediately, along with the visual code. If this is the case, the evidence presented here could then represent the S's preference for visual rehearsal at short intervals and acoustic rehearsal at long intervals.

The concept that a code in which an item is presented gradually changes from a visual representation into an acoustic representation might reasonably lead to the argument that the slopes of the VC and AC curves should be reciprocals. However, in the present study, it is conceivable that the Ss could develop a strategy for processing particular items. In other words, the reason that the AC curve does not rise more rapidly across ISIs is due to the initial stimuli in the AC condition alerting the Ss that the most likely second letter to appear would be acoustically confusable. Therefore, when a S was presented with the initial AC items, he delayed acoustic processing longer than if presented with items in the VC condition. This could explain the apparent rapid acoustic processing of VC items and the slower acoustic processing of the AC items.

In summary, the results of the present study are consistent with that of Posner (1969) and Posner and Keele (1967) and Dainoff (1970). These studies indicate that the name code of a word is extracted from its physical code. It does not appear, however, that the name code replaces the physical code immediately. Rather, the physical code and the name code are maintained simultaneously for a period of time. Posner and Warren (1972) point out that the characteristics of the S and task demands will determine which code the S will choose to emphasize and maintain. In the present study, the results indicate that a physical code is primarily maintained until approximately 1 second. At this point, there appears to be no predominance of either a name or a physical code as indicated by similar RTs to the AC, VC, and AC + VC conditions at the 1 sec. ISI. At the 2 sec. interval, however, the "name" code appears to be the predominant code for rehearsal as evidenced by long RTs to the AC and AC + VC condition items at the 2 sec. ISI. It should be apparent from Posner and Warren (1972) and Kroll, Parkinson, and Parks (1972) that the present results are not generalizable to every situation employing visual stimuli. However, the present results can be easily applied to future studies that employ similar task demands.

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APPENDIX A

INSTRUCTIONS

INSTRUCTIONS

This is an experiment concerned with simple judgments about verbal materials. It is not an intelligence test of any kind and should not be interpreted as such. Also, there is no electric shock or any other unpleasant stimulus involved. Although the task may seem to be a very simple one, our research indicates that it can provide important information about the way in which people use and understand verbal material. Therefore, your very close cooperation is absolutely necessary for the success of the experiment. If for any reason during the course of the experiment you feel that you cannot fully cooperate, please let the E know. What follows is a description of your part in the experiment. Please hold your questions until the instructions are over; the E will then be glad to answer any questions which you might have.

Your task in this experiment is simply to judge whether or not two letters that you see sequentially (i.e., one after the other) have the same name. When you look into the viewer you will see two rows of dots. Each letter will appear centered between the two rows. When you press the thumb button, you will immediately see one letter for a brief period. When that letter disappears, another letter will rapidly appear. If the two letters have the same name (e.g., D-D), push the switch in front of you to the right (left) (labeled "same"). If the two letters have a different name (e.g., A-O) then push the switch to the left (right) (labeled "different"). It is very important that you respond as rapidly and as accurately as possible. This can be done only if you attend fully to each item on every trial. When the slide tray has advanced to the next set of items, you can then begin the next trial by pushing the thumb button (E will demonstrate). Remember, since the presentation of the two items follows immediately after you press the thumb button, it is very important that you have your eyes focused on the designated area and that your right hand is on the toggle switch, ready to respond.

Are there any questions?

APPENDIX B

TABLES

Table 1

LIST OF LETTER PAIRS MAKING UP THE THREE TYPES OF CONFUSION CONDITIONS; ACOUSTICALLY CONFUSABLE (AC), VISUALLY CONFUSABLE (VC), AND ACOUSTICALLY + VISUALLY CONFUSABLE (AC + VC)

AC list	VC list	AC + VC list
A - O	P - R	M - N
E - D	E - F	K - A
E - P	X - Y	E - B
F - S	M - W	T - P
F - X	T - I	B - D
N - A	Y - V	T - E
P - Q	X - V	B - T
X - S	K - X	B - P

Table 2

ANALYSIS OF VARIANCE SUMMARY TABLE

Source	SS	d.f.	M.S.	F
S	456,794.875	15	30,452.988	
I	48,517.125	3	16,172.375	18.984*
SI	38,334.582	45	851.879	
C	15,257.945	2	7,628.973	3.258
SC	70,235.750	30	2,341.192	
IC	213,503.625	6	35,583.938	20.403*
SIC	156,964.188	90	1,744.046	
Total	999,608.063	191		

Note: S = Subjects, I = ISI, C = Type of confusion.

*p < .001

APPENDIX C

FIGURES

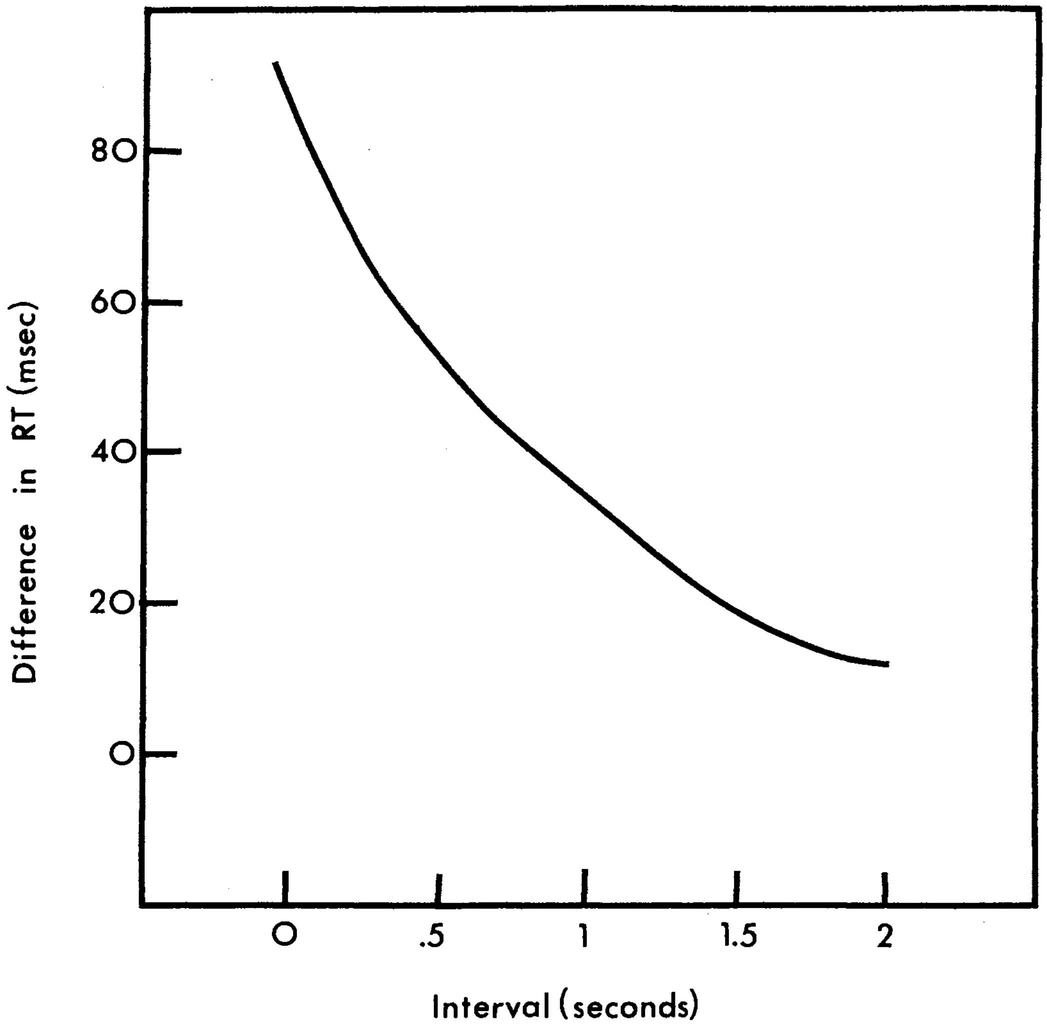

Figure 1. Difference in RT Between Name and Physical Identity "Same" Responses as a Function of ISI Between Two Successive Letters. The Data Represents a Study Using an Inline Display, .5 Sec. Exposure of the First Letter, and Appearance of the Second Letter in the Same Spatial Position (After Posner and Keele, 1967, Posner et al., 1969)

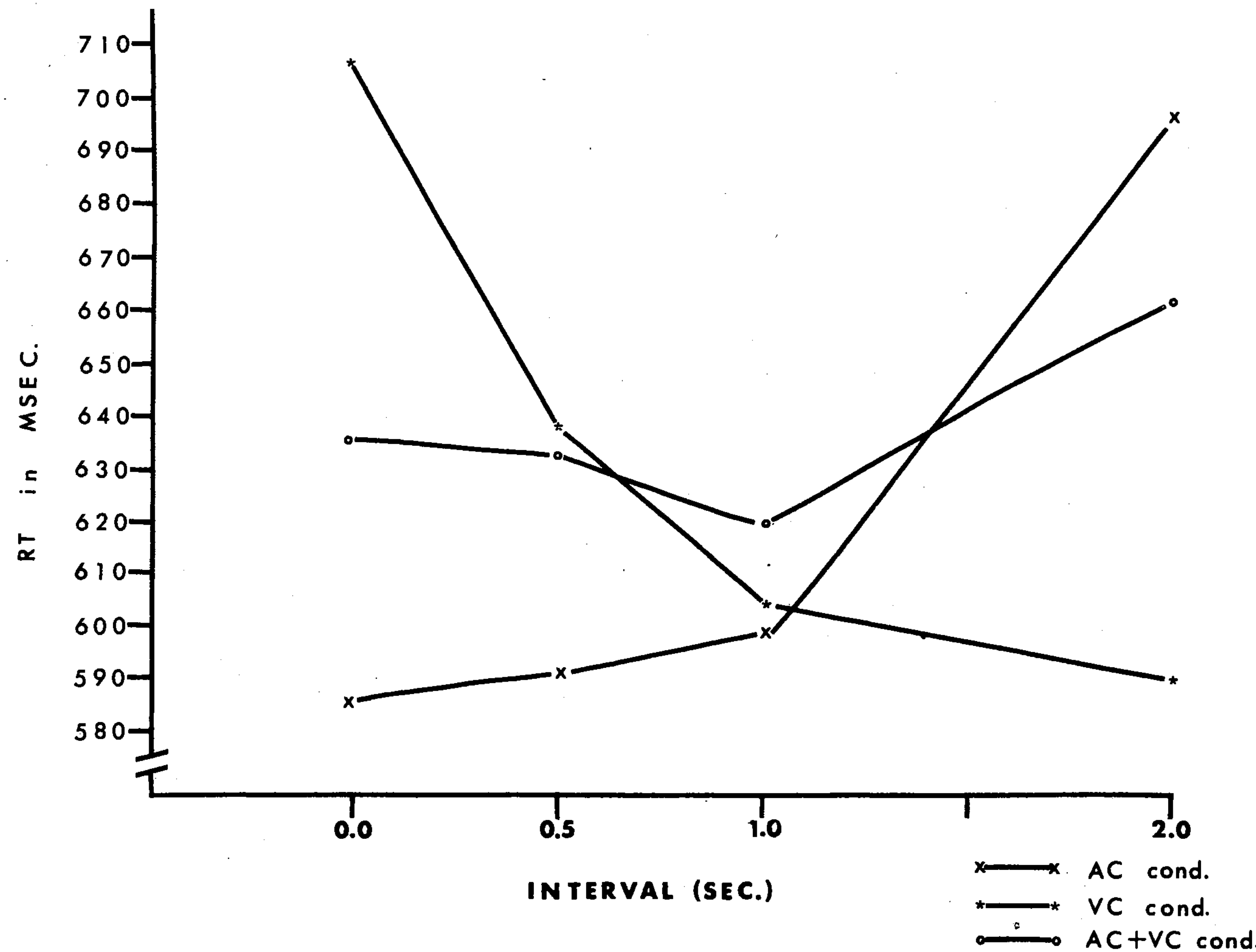

Figure 2. Mean RT of 16 Ss to the Three Types of Stimuli at the Four ISIs.

VITA

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