EFFECTS OF DIFFERENT COMPETING STIMULI ON LISTENING BEHAVIORS

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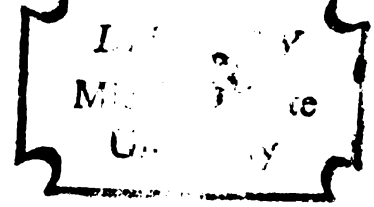

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ABSTRACT

EFFECTS OF DIFFERENT COMPETING STIMULI
ON LISTENING BEHAVIORS

by F. Edward Rice

Two of the factors which may affect the parameters of language are: (1) concurrent actions of the listener that occur in conjunction with listening, such as listening to another conversation, and (2) practice, or time spent in a given language interaction. These two factors were examined for their effect on the listener.

It was hypothesized that listeners may respond to a referent in different ways. A listener may simply record the referent (e.g., hearing a telephone number). Or he may direct the referent (e.g., hearing and then carrying out a request). Or he may modify the referent (e.g., hearing a statement and then making an association to it). Or he may stroke, or listen for the speaker to stop, rather than for the content of the referent (e.g., hearing a greeting).

Four groups, with 20 Ss each, heard a speech, throughout which different 2-digit numbers occurred 60 times. As each number was mentioned, two of five numbered (1-5) lights flashed on. Every third trial both digits mentioned

matched the numbers of the lights. Every third trial neither digits mentioned matched the numbers of the lights. And every third trial one of the digits matched one of the numbered lights and the other did not. The Ss were instructed to press any one of four identical paddles every time a number was mentioned in the speech. One of the paddles had a label "THE NUMBERS I HEARD WERE . . . ( )" (record); another had the label "THE NUMBERS I HEARD (matched, did not match, partly matched) THE LIGHTS" (direct); another had the label "THE NEXT NUMBERS WILL (match, not match, partly match) THE LIGHTS" (modify); and another had the label "DO ANOTHER ONE" (stroke). After each paddle-press, S wrote the appropriate number or phrase, depending on which paddle he had pressed. Reaction time latencies, frequency, and correctness of each response were recorded.

One group of Ss heard only the speech. A second group heard the speech and a tape-recorded conversation, but was instructed to attend only to the speech. A third group heard the speech and the tape-recorded conversation and was instructed to pay equal attention to both. A fourth group heard both, but was instructed to pay most attention to the tape-recorded conversation.

For Groups III and IV, reaction time latencies were shortest for referent modification responses and longest for stroke responses on the first 20 trials; for Group II they

were shortest for stroke responses. After the first 20 trials these differential effects were no longer present. Over the entire 60 trials, Groups III and IV made more recording than modifying responses, and Groups I and II made more modifying than recording responses. With practice, all Ss began making fewer recording responses and more modifying responses. All Ss made most errors for modifying responses, fewer for directing responses, and fewest for recording responses. With practice, errors decreased for all listening responses, but they decreased at the fastest rate for recording responses.

It was concluded that interfering concurrent actions have their greatest effect early in the listening situation and that listeners can quickly compensate for interference of this kind. Furthermore, listening activities occur partly as a function of the length of time the listener has spent in the situation. And, finally, there is good evidence that listening serves more than a unitary function.

EFFECTS OF DIFFERENT COMPETING STIMULI ON LISTENING BEHAVIORS

By

F. Edward Rice

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CHAPTER I

INTRODUCTION

In 1936 J. R. Kantor proposed an analysis of language behavior in terms of an interaction between a speaker, a listener, and a referent. The identifying characteristics of the speaker and the listener are fairly clear. Unless otherwise specified, both are assumed to be adult, intact humans, each with his unique behavioral history. The speaker is, of course, the person who is talking. The listener is less clearly identified, but may, in part, be characterized as a person who is not talking and who is attending to the speaker and to the referent. The third major feature of the Kantorian language model is the referent, and is the thing, action, or event being talked about, and it is, by its very nature, embedded in a given context, or situation. The construct of the referent is difficult to identify in analytic behavioral terms, but, loosely speaking, the referent may be thought of as the content of a conversation, or what is being talked about. To the extent that the behavior of both speaker and listener is affected by the referent, the language event is said to be referential. To the extent that the behavior of the speaker and listener is

not affected by the referent, the language event is said to be non-referential. Finally, in the Kantorian model, each of these three aspects of language behavior (speaker, listener, and referent) is assumed to have an effect on the other two.

In recent years other investigators have proposed other kinds of language analyses (e.g., Miller, 1951; Osgood, Suci, and Tannenbaum, 1957; Skinner, 1957), though little attention has been given by them to the listener aspects of the language event. Those investigations of listening behavior which have occurred have been most typically concerned with listener comprehension (e.g., Keller, 1960), with non-referential listener responses to the speaker (e.g., Matarazzo and Wiens, 1964; Brown, 1962), and with listener sampling of the referent (Rosenberg and Cohen, 1966). In none of these investigations, however, has the possibility been considered that there may be different listening activities, each activity a partial function of the listener's interaction with the referent, with the speaker, and with the listener's own behavioral history.

For example, some language interactions may demand only that the listener record the referent (hearing a telephone number). Other language interactions may demand that the listener perform certain immediate acts as a function of his interaction with the referent; that is, he must direct his behavior either by interacting with objects ("hand me

the book"; "Look this way") or by interacting with himself ("Think of the following . . ."). Still other language interactions may demand that the listener modify the referent in order to maintain the interaction (listening in a conversation or to a lecture). In this last situation the listener would actually change the referent to some extent without being called on by the speaker to do so. Finally, there is a certain kind of non-referential language interaction which is so frequently interspersed with referential language interactions that it deserves description. This is essentially ritualistic or "stroke" (Berne, 1964) listening, in which the listener does not attend to the referent, but listens for the speaker to stop speaking (attends only to the speaker). Such listening would occur in normal greetings or when the listener wished to "please" the speaker by behaving as though he were attending to the referent.

Sometimes the nature of the language interaction is such that one of the four above listener activities is demanded over others. For example, a certain referent-listener relationship may increase the probability that one of these listening activities will occur; a certain speaker-listener relationship may increase the probability that one of these listening activities will occur; or a certain situation (referred to by Kantor as the "setting") may increase the probability that one of these listening activities will occur. At other times the language interaction may be more

neutral (ambiguous) with respect to its effect on the listener's activities, and in these neutral interactions the listener's activities may be primarily a function of his history (practice). Here it is possible that a particular listening activity will change as a function of the length of time the listener spends in that interaction. Thus, as the listener habituates to (becomes practiced in) a given language interaction, he may come to record less frequently, and to modify more.

There are, of course, other variables which may affect the above four suggested listener activities. Ratner (1957), in a paper describing the speaker side of the language event, suggested that there are concurrent actions in which the speaker may engage while he is speaking, some of these actions facilitating speech and others interfering with it. Such concurrent actions may have relevance for the listener side of the language event as well. Though some concurrent actions (such as cupping one's ear) may facilitate listening, others (such as listening to two different speakers) may interfere with it. Studies in delayed speech feedback (cf. Ratner, Gawronski, and Rice, 1964) support an interpretation of double speech interference with listening. It is even possible that certain concurrent actions affect one kind of listening more than another. However, little is known about how strong a concurrent action must be in order

for it to interfere with listening to the extent that listening activities change as a result of the interference.

For example, a frequent interfering concurrent action for the listener involves auditory stimulation extraneous to the language interaction, and often the extraneous stimulus is itself of a referential nature (e.g., other conversations). In such cases the listener is simultaneously stimulated by two different sets of referential stimuli, and to this extent each set of referential stimuli may be thought of as competing with the other from the listener's viewpoint. Specifically, the responses of the listener to the one set of referential stimuli may in certain ways conflict, or compete, with his responses to the other set of referential stimuli. The conflict, then, is described in terms of the effect of two different sets of referential stimuli, simultaneously presented, on the listening responses of one listener. Thus, the stimuli are concurrent, and the listener is in a conflict situation.

Conflict may be said to have been produced if the listener's responses to a given set of referential stimuli are different when that set is presented alone from what his responses are when it is presented in conjunction with a second set of referential stimuli. What strength is required for this second, competing, referential stimulation to produce conflict in the listener, and in what direction this

conflict will be expressed (in terms of changes in the four listener activities described above) is then open to investigation.

Problem

The problem as posed for investigation, then, is two-fold. One aspect of the inquiry was directed toward an exploration of the effect of practice (the amount of time spent in a given language interaction) on listening activities. The other was directed toward an exploration of the effect of a competing stimulus (interfering concurrent actions) on listening activities.

This situation is concerned with the normal adult language event, in which the language itself is assumed to be fully developed and normally functioning. Beyond this, the present analysis assumes that the language interaction occurs in a given setting between at least two people talking about a specific topic. To the extent that the setting is artificial and the interaction non-referential, accurate analysis of the event cannot be made. Thus, the present experiment was conducted in as naturalistic a setting as possible, but with enough control to allow experimental manipulation. Though some analyses of language have been highly sophisticated (e.g., Rosenberg and Cohen, 1966), they have also been highly artificial and not based on observational field data. Such investigations describe major

language variables and their dimensions, but do not explore them.

Results of pilot studies preceding this investigation suggested that any experimental situation interferes to some extent with the event under consideration. Furthermore, listening behavior itself is manifest largely by an absence of behaviors that are gross enough for ready observation. Thus, measurement of listening is a major obstacle in the examination of listening. Several of these pilot studies (total N = 35), however, suggested that some responses showed, in general, markedly shorter latencies than others. These responses (identified in this paper as Response Alternatives) consisted of four identical paddles, each with a different label, and S could choose any one paddle on any trial. Fuller description of the Response Alternatives, and their relationship with the hypothesized four different types of listening, follows below. Furthermore, different competing stimuli (in terms of referential conflict) affected response latencies differently. The relationship between errors and competing stimuli was less clear, but in general more errors occurred with certain of the Response Alternatives. Finally, inquiry following each pilot session suggested that Ss worked diligently; that some Ss were less certain about the task than others; and that all Ss found the competing set of referential stimuli (a tape-recorded dummy therapy session) interesting.

The experimental task in the major study was set up so that four responses were available to S (one for each of four hypothesized listening activities: recording, directing, modifying, and stroking), and S could make any one of these four responses on any trial. The response made on each trial, the latency for that response, and its accuracy were recorded. Thus, if the three different kinds of referential listening activities described in the introduction are different listening behaviors, they may be differentially affected as a result of the amount of time spent in the listening interaction (practice). The fourth Response Alternative was presented to allow S the option of responding appropriately if he were not listening. That is, he would not have to make a referential response when he might not have been listening referentially.

It should be noted, too, that these hypothesized four different listening activities may also be described along a continuum of complexity, recording being the most simple, and modifying the most complex. Thus, it was possible that on the first few trials S could respond at one level of complexity, but with increased practice move to another, with no differential effect forthcoming. At this point the second aspect of the problem becomes relevant to the first: that is, the introduction of competing stimuli may differentially affect the response pattern and/or the response latency of the Response Alternatives. Two values

for the competing set of referential stimuli (strong and mild conflict) were utilized in an attempt to examine more closely the effect of this variable on the occurrence of frequency of Response Alternatives, response latency, and response accuracy. The degree of this conflict was determined in the way S was instructed to attend to the competing set of referential stimuli. Two controls were needed for the conflict situation. To determine if the conflict was due to referential listening and not simply to auditory noise, one group of Ss was simultaneously presented with the experimental task and the competing stimuli and told to attend only to the experimental task. To determine if conflict was produced at all by competing stimuli, one group of Ss was presented only with the experimental task, and then compared with the conflict groups. Of the two experimental groups, one was instructed to pay equal attention to the competing stimuli and to the experimental task; the other to concentrate on the competing stimuli but to keep responding to the experimental task.

In summary, four different responses were available to S, each response analogous to one of four hypothesized listening activities. In order to allow S to become practiced in the task (and in so doing, to change his response pattern), a large number of trials (60) was presented to each S. in order to investigate the effect of concurrent stimulation (viewed as a source of conflict), different

groups of Ss received different instructions for attending to the concurrent stimuli (a tape-recorded dummy therapy session). Each response to the experimental task (a speech presented by E about "business conditions") and its latency were recorded. The design of the experiment was such that only the conflict dimension was a manipulated independent variable.

CHAPTER II

METHOD

Subjects. The Ss consisted of 80 MSU undergraduate students enrolled in the introductory Psychology course for the summer term of 1966. They were assigned randomly to one of four groups, with the restriction that the groups be composed of an equal number of Ss and that females be equally distributed among groups. Fortuitously, each group had the same number of males and females.

Apparatus. In a small room (about 10' x 10') were placed a table and two chairs, one on either side of the table. On the table stood a 1/4" plywood board, 2-1/2' x 3', painted a flat black. On the side of the board facing S, 3/4 of the way from the bottom of it (about eye-level) were 5, 12v lights, equidistant from one another and arranged in a horizontal row. Above each light was a number. These numbers were permanently attached and, ranged sequentially from left to right, read from one to five. On the table in front of S was a box, 7" x 5" x 1", painted a flat black. Four hinged paddles, 1" x 3", were mounted on the box, the free end of each resting on a microswitch underneath the box; that is, a microswitch for each paddle. The paddles were

identical, and above each was a slot for a removable identifying label (Fig. 1).

Behind the 2-1/2' x 3' plywood board (large enough to hide E's head, arms, and torso) was a 6v DC battery charger, serving as a power source for the lights. Wired into this circuit were five single pole, single throw switches (mounted side by side) on spring levers so that when a given lever was depressed a corresponding light went on and remained on until the lever was released. Wired to these switches was a 1/100 sec. clock (its power supplied from a wall outlet) so wired as to start when any of the light-control levers were depressed and stop when any one of the four paddles was depressed. In addition, four Christmas tree lights were wired, one to each of the four microswitches under the paddles,so that whenever a paddle was depressed one of these lights went on. Beneath these lights was a slot for labels corresponding to those on the paddles. To facilitate E's discrimination and recording, the Christmas tree lights were different colors.

A tape recorder, on the table and in view of S, was set to play a dummy therapy tape, recorded by two males. The off-on switch for the tape recorder was independent of its volume control, and its power supply was a wall outlet.

Finally, taped to the table in front of S and on either side of the paddle-box was an 8-1/2" x 11" piece of paper with a pencil.

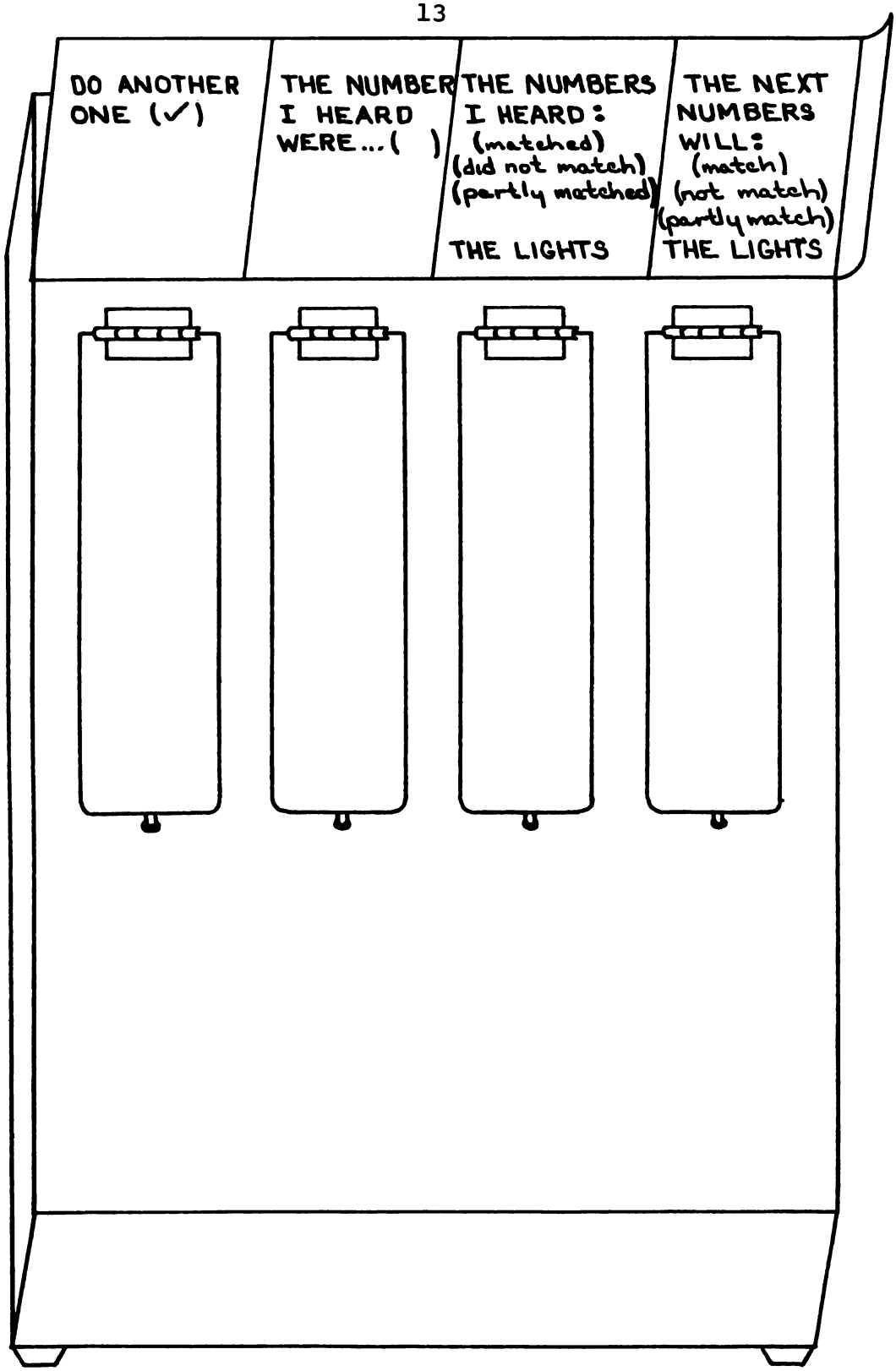

Figure 1. Paddle box with one of the Response Alternative labels (actual size).

Procedure. Each S was brought into the experimental room by E and asked to be seated in the chair. E then sat behind the plywood board and read the instructions (to be described below). The four groups of Ss were treated differently in the following ways: Group I received a given set of instructions, the tape recorder turned on but not played during the experiment. Group II received the same set of instructions as Group I, but the tape recorder was played throughout the experiment. Group III received a parallel, but different set of instructions (in which S was told essentially to pay equal attention to the tape and to E), and the tape recorder was played throughout the experiment. Group IV received a still different set of instructions, but in a form parallel to those for Group III, and the tape recorder was played throughout the experiment. (Ss in Group V were told essentially to listen to both the tape and to E, but to pay most attention to the tape.)

After the instructions had been read, the tape recorder was started for appropriate Ss and a stopwatch started. As the tape-recorded "conversation" began, E read an "essay" on the nature of prices and packaging. Within the text of this essay, different two-digit numbers occurred 60 times. The digits were selected so that they would all be composed of numbers between one and five. Within this context the numbers were selected so that they occurred randomly, with the restriction that no digit occur twice in

one number and that the digits occur in numerical sequence. (Pilot study results indicated that some Ss make inappropriate responses when spoken numbers do not occur in the same order as those on the board.) The numbers fit the context of the essay naturally, and they were scattered haphazardly through it so that there was no rhythmicity to their presentation. When E came to a number in the text, he simultaneously depressed the levers for two lights, holding them down for the length of time it took him to say the number. On one trial the lighted digits corresponded exactly with the spoken ones; on the next trial one of the lighted digits corresponded with one of the spoken ones and the other did not; on the third trial neither of the lighted digits corresponded with the spoken ones. Out of 60 trials (presentations of numbers), each of these three conditions occurred 20 times.

Every time the panel lights came on, S pressed one of the paddles, the labels for the four paddles being: "THE NUMBERS I HEARD WERE . . ." (record); "THE NEXT NUMBERS WILL: (match, not match, partly match) THE LIGHTS" (modify); "THE NUMBERS I HEARD: (matched, did not match, partly matched) THE LIGHTS" (direct); "DO ANOTHER ONE" (stroke). Since Ss may have shown a position preference, the left-to-right order in which the labels occur on the paddle-box was counterbalanced. When S had made the paddle response, he then wrote the rest of that response (a two-digit number; the

word "match," "not match," "partly match"; or a check-mark) on one of the pieces of paper provided. This writing and the paddle-pressing were done with the dominant hand.

Those Ss who were instructed to listen to the tape were also instructed to make a tally mark with their non-dominant hand on the other piece of paper every time the speaker shifted (every time one person stopped speaking and the other started in the tape-recorded "conversation").

When S made his paddle response E noted which paddle was pressed and the latency between the time the panel lights went on and the time the paddle response was made. The clock was then reset to zero by E. The essay did not begin again until S had indicated (by saying "ready") that he had completed his written response.

At the completion of the 60-trial essay E stopped the stopwatch and turned off the tape recorder. He then presented 30 trials in which S was instructed to press the paddle corresponding to the label that E called out. Only the three referential labels were used, and they were presented in random order. This procedure provided a partial control for each S's general (non-referential) reaction time to each of the referentially-tied paddles. Since pilot study results indicated a strong practice effect for response latencies, and since natural listening settings do not provide a "warm-up," this control measure was presented only at the end of the 60 trial essay. This end-of-trials

control, of course, resulted in some confounding with respect to practice, but less so than had these control trials been presented at the beginning of the experiment. These latencies and responses were recorded in the same manner described above, but this time S was instructed to disregard the lights.

At the end of these 30 trials, E got up and inspected S's written responses for legibility, thanked S for participating, and dismissed him.

Parenthetically it may be noted that there were several apparatus "noises" associated with the experiment. None, however, provided S with any response-cues. All noises (clicks) associated with the panel lights were identical; the resetting of the clock warned only that E was about to begin speaking again. The permanent positions of the panel-light numbers also warrant comment: if S had a "left-to-right" preference, it may have been that he would "see" lower numbers sooner than higher ones. Thus, all Ss were instructed to push their chairs back far enough from the table so that they could see all the numbers without moving their eyes. (Pilot study results had indicated that such a maneuver would be feasible.) Secondly, most Ss were already well habituated to the "left-to-right" numbering. To change this numbering order would have primarily forced S to relearn the order for the duration of the experiment.

Instructions. (All Ss were seated, facing the panel, and the instructions then read.)

Groups I and II

"First of all I would like you to push your chair far enough back from the table so that you can see all of the lights on the board at a glance--without having to more your eyes on your head . . . , but still close enough to the table to be able to write and to read the labels above the paddles.

"Before we begin I want you to know that even though the instructions may be complicated, and even though you may feel your task is not completely spelled out, there are no tricks. I am not going to try to fool you or surprise you.

"Now look at the row of paddles in front of you. Each paddle has a corresponding label. One label says 'The numbers I heard were . . .'; another says 'The numbers I heard: (matched, did not match, partly matched) the lights'; another says 'The next numbers will: (match, not match, partly match) the lights'; and the final label says 'Do another one,' and there is a check mark after it. Now notice that there is a piece of paper and a pencil on the table on either side of you. You will only need to use one of them. If you are right-handed, use the one on your right.

"What we are going to do is this: we will have a conversation in which I will do most of the talking. Whenever any of the lights on the board come on during this conversation, I would like you to talk to me by pressing whichever paddle you feel is most appropriate at that time and then follow this up by writing the appropriate comment (suggested by the labels) for that paddle. Note that for the 'Do another one' label you would make a check-mark. Please make your written comments in an orderly fashion on the paper. Use your preferred hand for both pressing and writing, and while you are waiting for the next set of lights to come on, keep your hand loosely clenched, resting on the paddle-box. Do not allow your hand to hover over the paddles. When you have finished writing each comment, say 'ready' and we will continue with the conversation.

"At the same time we are having our conversation, there will be other sounds that you will hear, but I

want you to pay complete attention to our conversation and to ignore the other sounds.

"This means, then, that your task will be to press any one of the paddles--the one that you feel is most appropriate--every time the lights come on, and then write the appropriate comment for that paddle. This may be difficult, but don't worry about it. Just do the best you can."

Group III

"First of all I would like you to push your chair far enough back from the table so that you can see all of the lights on the board at a glance--without having to move your eyes on your head . . . , but still close enough to the table to be able to write and to read the labels above the paddles.

"Before we begin I want you to know that even though the instructions may be complicated, and even though you may feel your task is not completely spelled out, there are not tricks. I am not going to try to fool you or surprise you.

"Now look at the row of paddles in front of you. Each paddle has a corresponding label. One label says 'The numbers I heard were . . .'; another says 'The numbers I heard: (matched, did not match, partly matched) the lights'; another says 'The next numbers will: (match, not match, partly match) the lights'; and the final label says 'Do another one,' and there is a check-mark after it. Now notice that there is a piece of paper and a pencil on the table on either side of you. You will need to use both of these, but if you are right-handed use the paper on the right to write down the appropriate answers to the lights, and vice-versa if you are left-handed.

"What we are going to do is this: we will have a conversation in which I will do most of the talking. Whenever any of the lights on the board come on during this conversation, I would like you to talk to me by pressing whichever paddle you feel is most appropriate at that time and then follow this up by writing the appropriate comment (suggested by the labels) for that paddle. Note that for the 'Do another one' label, you would make a check-mark. Please make your written comments in an orderly fashion on the paper. Use your preferred hand for both pressing and writing, and while you are waiting for the next set of lights to come on,

keep your hand loosely clenched, resting on the paddle-box. Do not allow your hand to hover over the paddles. When you have finished writing each comment, say 'ready' and we will continue with the conversation.

"At the same time we are having our conversation, there will be another conversation between two people on the tape recorder. Every time the speakers change in that conversation--that is, every time one person stops speaking and another one starts, I would like you to make a tally mark on the other piece of paper with your left (or non-preferred) hand. These marks do not need to be orderly or neat--just make a mark that is legible each time the speaker shifts in the tape recorded conversation. You will need to keep on making tally marks for the recorded conversation the whole time. Since there are only two people in the recorded conversation, you will only have to listen for two people. Just make a mark every time one person stops speaking and another one starts.

"This means, then, that you will have two simultaneous tasks: one is to press the appropriate paddle every time the lights come on and then write the appropriate comment for that paddle. The other is to make a mark on the other piece of paper every time the speaker shifts from one person to the other in the tape-recorded conversation. Though you may find that one of these tasks is easier than the other, both are equally important, so pay equal attention to both of them. This will probably be difficult, but don't worry about it. Just do the best you can."

Group IV

"First of all I would like you to push your chair far enough back from the table so that you can see all of the lights on the board at a glance--without having to move your eyes or your head . . . , but still close enough to the table to be able to write and to read the labels above the paddles.

"Before we begin I want you to know that even though the instructions may be complicated, and even though you may feel your task is not completely spelled out, there are no tricks. I am not going to try to fool you or surprise you.

"What we are going to do is this: on the tape recorder you will hear a conversation between two people. Every time the speakers change in that conversation--

that is, every time one person stops speaking and another one starts, I would like you to make a tally mark on the piece of paper that is on your non-preferred side (for most people, the left) with your non-preferred hand. These marks do not need to be orderly or neat--just make a mark that is legible each time the speaker shifts in the tape-recorded conversation. You will find that no matter what else you are doing, you will need to keep on making tally marks for the recorded conversation the whole time. Since there are only two people in the recorded conversation, you will only have to listen for two people. Just make a mark every time one person stops speaking and another one starts.

"Now look at the row of paddles in front of you. Each paddle has a corresponding label. One label says 'The numbers I heard were . . .'; another says 'The numbers I heard: (matched, did not match, partly matched) the lights'; another says 'The next numbers will: (match, not match, partly match) the lights'; and the final label says 'Do another one', and there is a check mark after it. Now notice that there is a piece of paper and pencil on your preferred (usually the right) side. You will need this to make comments suggested by the labels above the paddles.

"At the same time you are listening to the tape-recorded conversation we are going to have a conversation of our own in which I will do most of the talking. Whenever any of the lights on the board come on during this conversation of ours, I would like you to talk to me by pressing whichever paddle you feel is most appropriate at that time and then follow this up by writing the appropriate comments (suggested by the labels) for that paddle. Note that the 'Do another one' label, you would make a check mark. Please make your written comments in an orderly fashion on the paper. Use your preferred hand for pressing and for writing, and while you are waiting for the next set of lights to come on, keep your hand loosely clenched, resting on the paddle-box. Do not allow your hand to hover over the paddles. When you have finished writing each comment, say 'ready,' and we will continue with the conversation.

"This means, then, that you will have two simultaneous tasks: one is to make a tally mark every time the speaker shifts from one person to another in the tape-recorded conversation. The other is to press the appropriate paddle every time the lights come on and then write the appropriate comment for that paddle. Though

> you may find that one of these tasks is easier than the other, your main job is to concentrate on the tape-recorded conversation, so pay most attention to it. This will probably be difficult, but don't worry about it. Just do the best you can."

The written responses to the "essay" stimuli provide a measure of the accuracy of S's listening responses.

Comments made by S during instructions were noted by E in one of three categories: (1) no comments; (2) statements of understanding by S; and (3) questions or statements of non-understanding concerning the instructions. Pilot study results suggested that Ss who fall in the last category demonstrate the least appropriate responses.

At the end of the instructions, Ss' questions were answered by rereading the relevant part of the instructions.

At the end of the 60-trial essay, the stopwatch and tape recorder were stopped, and Ss were read the following set of instructions:

> "That was good. Now this time you will only need to press the paddle that corresponds to the label I call out. You do not need to do anything else, and you may also disregard the lights. Please remember to keep your hand loosely clenched and resting on the paddle-box while you are waiting for me to speak."

The 30 reaction-time trials were then given in random order, using the three referentially-tied paddles. At the end of these trials E said "Good" and then looked over S's written responses to check them for legibility. He then dismissed S by saying:

> "That's all. Thank you for coming. Please do not discuss what we did with anyone else in your class."

CHAPTER III

RESULTS

Three major dependent variables are available for analysis: response latencies, response frequencies, and number of (percent) errors. Each of these three variables was examined in an analysis of variance design, following Winer's (1962) model for a three-factor experiment, with repeated measures on one factor.

Response Latencies. The 60 trials were analyzed over three blocks of 20 trials each. The 30 control trials were included in the analysis as a fourth block. Mean latencies for each Treatment group across the entire 60 trials are shown in Table 1. The analysis of the effect of Treatment (high vs. low or no conflict), Sex, and Blocks of Trials (time spent in the situation) on response latencies is shown in Table 2. Results of this analysis show that response latencies were affected only by Blocks of Trials. The *F*-ratio for this condition was 116.80 with 3 and 216 df, which is significant beyond the .001 level of confidence. Results of *t* tests, using Tukey's procedure for comparing individual means of blocks of trials (Edwards, 1960), are

Table 1. Mean individual response latencies (in sec.) for Treatment groups by Response Alternatives

Treatment	HEARD Latencies	MATCHED Latencies	NEXT Latencies	DO ANOTHER Latencies	$\bar{X}$[1]
I	3.01	2.90	4.03	2.67	2.57
II	2.78	2.92	1.95	1.48	2.56
III	3.59	3.23	2.09	5.30	2.87
IV	2.89	2.76	2.31	4.44	2.54

[1]Marginal values will not, in all cases, reflect the average of cell values for the following reason: Marginal values represent means obtained from the analysis of variance. The means derived from that analysis reflect the summation of scores across all Ss, this sum divided by the total number of scores. This procedure is inherent in the analysis of variance routine. Cell values in this table, on the other hand, are means derived from summing the scores for each S, dividing by the total number of scores for that S, then summing these means across Ss and dividing that sum by the number of Ss.

Normally, these two different procedures for obtaining means will yield the same value. In this particular instance, however, the number of scores for any particular Response Alternative need not necessarily be the same for all Ss (i.e., frequencies may be unequal). Thus, if scores are summed across all Ss, equal weight is given each score in the resulting mean, and each S will be weighted according to the number of responses he has made for a given Response Alternative. That is, scores will be equally weighted, but Ss will not. However, if mean values are obtained for each S, and a second mean for all Ss then derived from the first set of means, equal weight will be given to the Ss, but actual scores will be unequally weighted.

These apparently minor procedural differences thus reflect an important metasystematic issue: is psychological inquiry concerned primarily with scores (i.e., the behavior of frequencies) or with Ss (i.e., the behavior of individuals)? For this study the question is resolved in favor of examining the behavior of individuals on the grounds that this inquiry is primarily exploratory in nature and is thus concerned with what a typical listener might do in a particular listening interaction. The procedure used for deriving cell means will reflect this position. Marginal means, however, will not, because the analysis of variance procedure permits equal weighting of scores only.

summarized in Table 3. Response latencies for control trials were significantly shorter (.05 level of confidence) than for test trials, and response latencies for the second and third blocks of test trials were significantly shorter (.05 level of confidence) than for the first block of test trials.

Table 2. Summary table of analysis of variance: response latencies (in sec.)

Source of Variation	df	Sum of Squares	Mean Square	*F*
Treatment	3	6.086	2.029	0.49
Sex	1	2.257	2.257	0.54
Treatment x Sex	3	4.026	1.342	0.32
Error	72	300.757	4.177	...
Blocks of trials	3	370.385	123.462	116.20*
Blocks x Treatment	9	4.011	0.446	0.42
Blocks x Sex	3	2.391	0.797	0.75
Blocks x Treatment x Sex	9	4.696	0.522	0.49
Error	216	228.311	1.057	...
Total	319	922.920	2.893	...

*Significant beyond the .001 level of confidence.

Table 3. Comparison of trial and control blocks for response latency measures using Tukey's Procedure for Multiple Comparisons

Trial Blocks	Difference (in sec.)
1st - 2nd	1.52*
1st - 3rd	1.89*
1st - control	3.01*
2nd - 3rd	0.37
2nd - control	1.49*
3rd - control	1.12*

*Significant at the .05 level of confidence.

Response latencies in this analysis were examined over all four Response Alternatives combined. Examination of response latencies for each separate Response Alternative is not permitted in the analysis of variance because these measures violate the assumption of statistical independence on which the analysis of variance design rests. That is, on any given trial, once one Response Alternative is chosen, values for the other three Alternatives become fixed at zero. Nonetheless, examination of the relation between latencies and each Response Alternative is desirable. Figure 2 shows the mean latencies of the combined Treatment groups for Response Alternatives. Figure 3 shows the latencies of the four Treatment groups for each Response Alternative, and response latencies as a function of Trial Blocks are shown

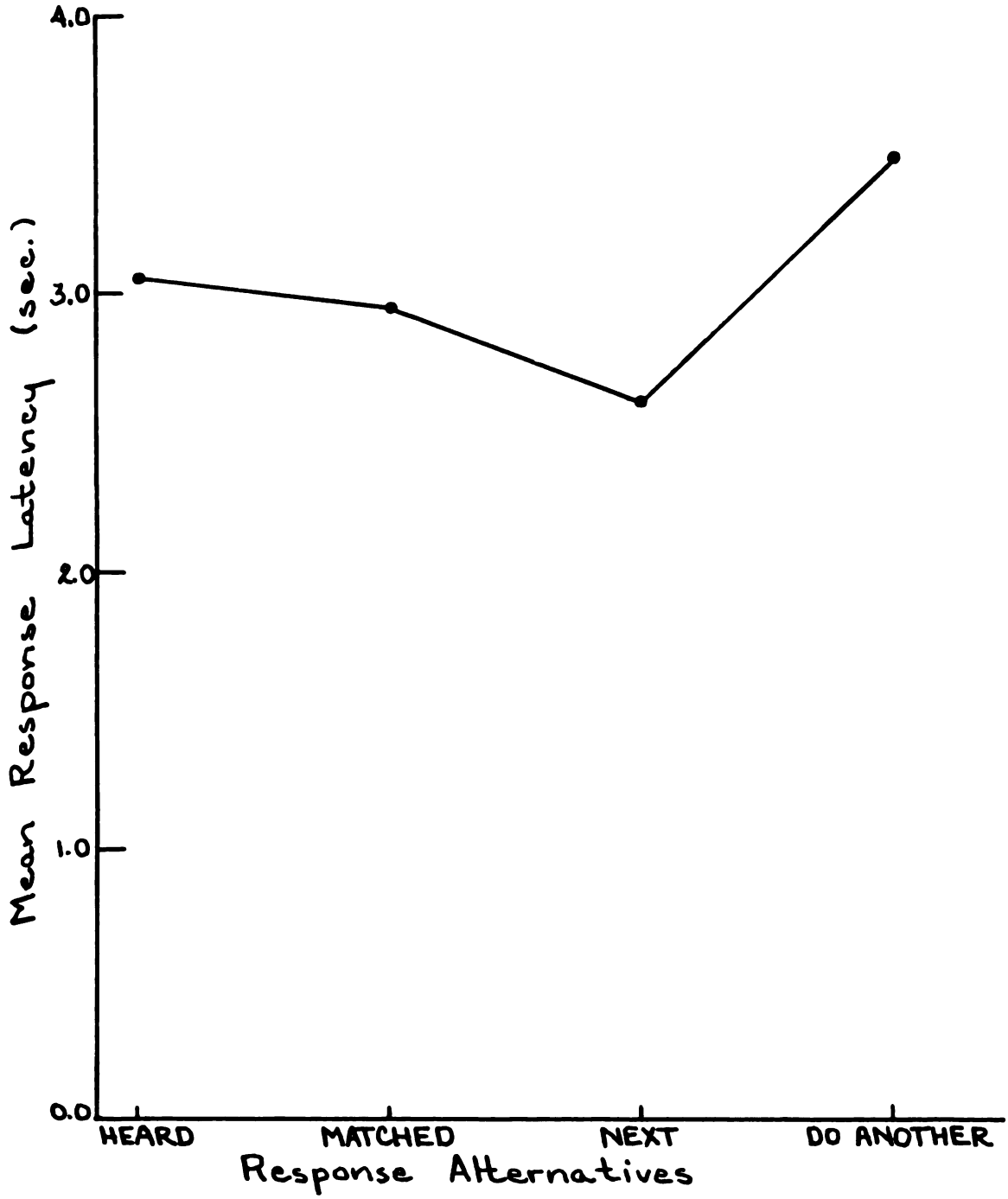

Figure 2. Response latencies as a function of Response Alternatives collapsed across Treatment groups.

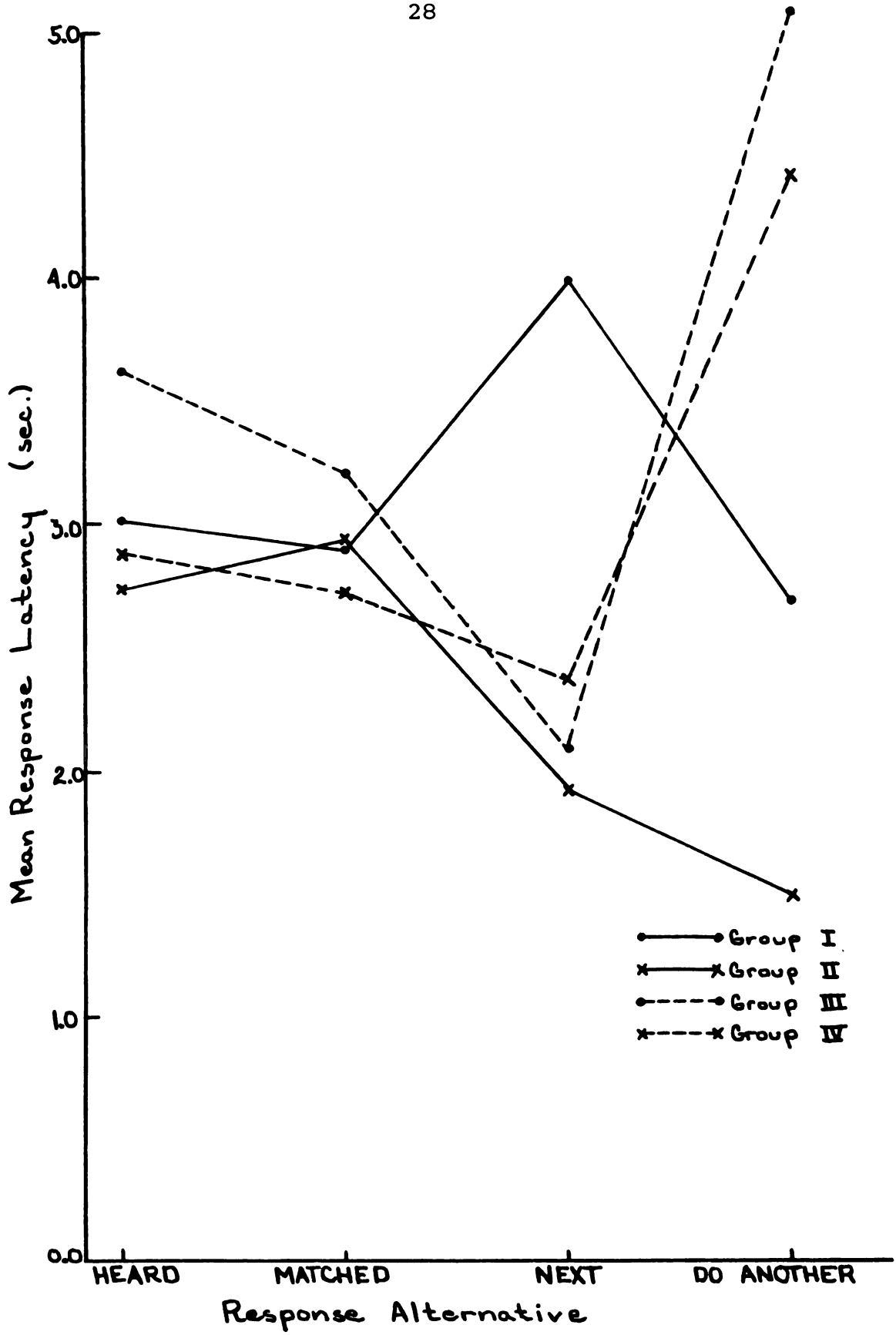

Figure 3. Response latencies as a function of Response Alternatives for Treatment groups.

in Appendix A. This relationship is summarized (collapsed across Treatments) in Table 4. Figure 3a shows the latencies of the four Treatment groups for each Response Alternative across the first block of 20 trials. The values shown in these tables represent mean latencies in sec. for individual Ss. Examination of Table 4 reveals that response latencies for each Response Alternative are decreasing over Blocks of Trials and that the decrease in latency from Block 1 to Block 2 is greater than the decrease from Block 2 to Block 3. The DO ANOTHER Response Alternative was not presented on control trials.

Table 4. Summary table of mean individual response latencies (in sec.) for Response Alternatives

Trial Block	HEARD Latencies	MATCHED Latencies	NEXT Latencies	DO ANOTHER Latencies	$\bar{X}^2$
1	3.27	4.00	2.56	3.48	4.24*
2	1.05	2.61	1.53	0.44	2.72*
3	0.88	2.19	1.38	0.36	2.35*
Control	4.01	2.56	3.49	...	1.23*

*At the .05 level of confidence: Block 1 > Block 2 = Block 3 > control.

[2] Ibid.

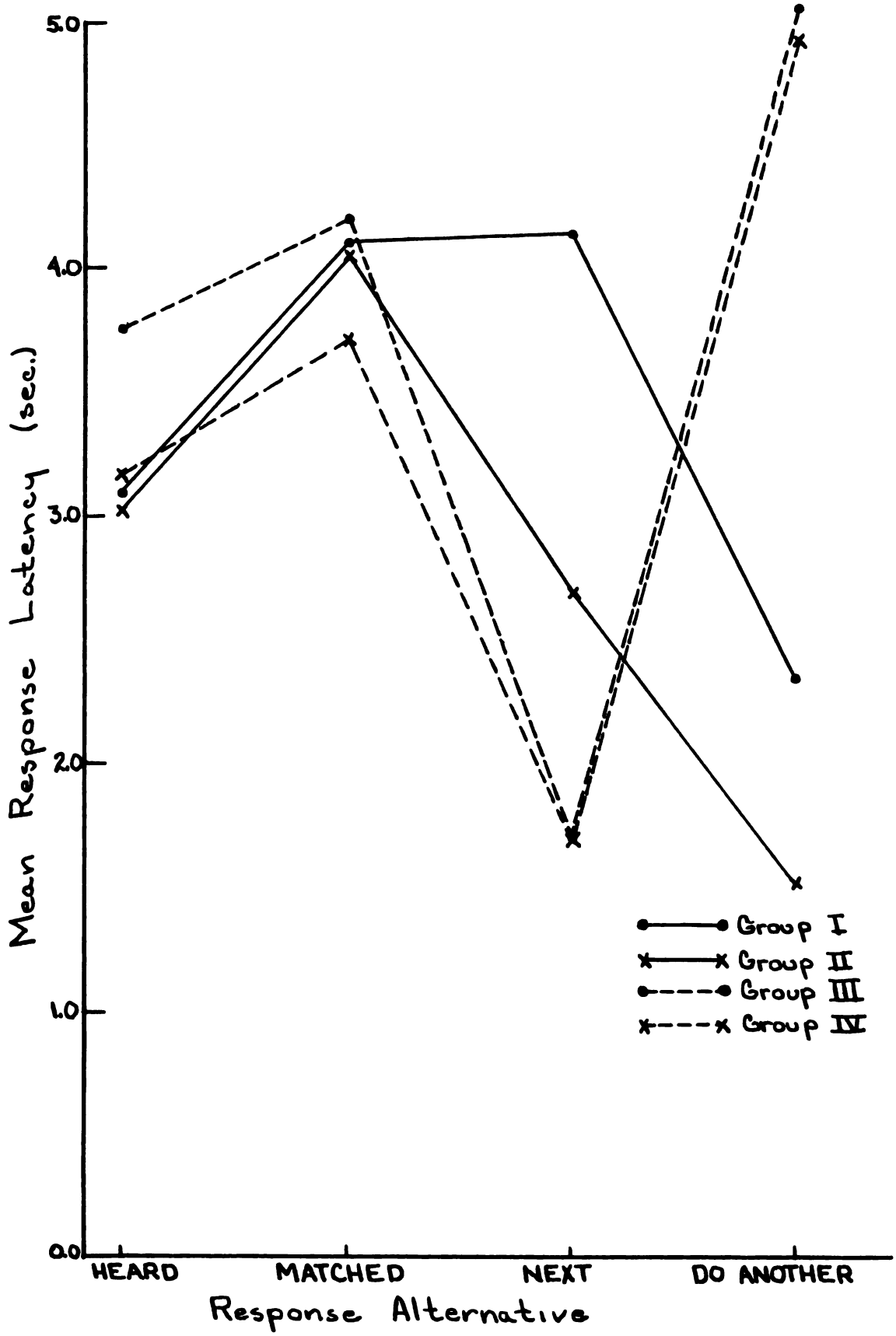

Figure 3a. Response latencies as a function of Response Alternatives for the first 20 trials.

Response Frequencies. The Analysis of Variance with Repeated Measures design used to examine latencies was also used to examine response frequencies. Because response frequencies are free to vary only over Response Alternatives (every S, regardless of Treatment, Sex, or Trial Block, made a fixed total number of responses), only the Response Alternatives main effect and its interaction with the other main effects provide a meaningful analysis. Mean frequencies for each Treatment group across the entire 60 trials are shown in Table 5. Analysis of the effects of the Response Alternative condition and its interaction with the Treatment and Sex conditions on response frequencies are shown in Table 6. Results of this analysis show that response frequencies are affected only by Response Alternatives. The F-ratio for this condition is 200.25 with 3 and 216 df, which is significant beyond the .001 level of confidence. Results of t-tests (Table 7) indicate that response frequencies for the MATCHED Alternative significantly exceed those frequencies for HEARD and NEXT Alternatives, and all three significantly exceed the frequencies for the DO ANOTHER Alternative. Figure 4 describes the relative position of the Treatment groups for each Response Alternative. The analysis of variance did not permit examination of a Trial Block effect on response frequencies, but response frequency values over Trial Blocks are shown in Appendix B. This relationship is summarized in Table 8. Again, all values shown represent

Table 5. Mean individual response frequencies for Treatment groups by Response Alternatives

Treatment Group	HEARD Frequencies	MATCHED Frequencies	NEXT Frequencies	DO ANOTHER Frequencies	$\bar{X}$[3]
I	4.50	43.25	11.10	1.15	15.00
II	5.10	47.40	7.05	0.45	15.00
III	11.40	41.20	6.50	0.90	15.00
IV	10.55	43.20	4.95	1.30	15.00
$\bar{X}$	7.89*	43.76*	7.40*	0.95*	

*At the .05 level of confidence: MATCHED > HEARD = NEXT > DO ANOTHER.

[3] Ibid.

Table 6. Summary table of analysis of variance: response frequencies

Source of Variation	df	Sum of Squares	Mean Square	F
Response type	3	90,642.525	30,214.175	200.24*
Response type x Treatment	9	1,601.775	177.975	1.18
Response type x Sex	3	76.675	25.558	0.17
Response type x Treatment x Sex	9	1,174.025	130.447	0.86
Error	216	39,593.000	150.894	...
Total	319	126,088.000	395.260	...

*Significant beyond the .001 level of confidence.

Table 7. Comparison of Response Alternatives for response frequency measures using Tukey's Procedure for Multiple Comparisons

Response Alternatives	Difference
HEARD - MATCHED	-35.87*
HEARD - NEXT	0.49
HEARD - DO ANOTHER	6.94*
MATCHED - NEXT	36.36*
MATCHED - DO ANOTHER	42.81*
NEXT - DO ANOTHER	6.45*

*Significant at the .05 level of confidence.

Table 8. Summary table of mean individual response frequencies for Response Alternatives

Trial Block	HEARD Frequencies	MATCHED Frequencies	NEXT Frequencies	DO ANOTHER Frequencies
1	3.58	14.06	1.65	0.71
2	2.30	15.03	2.53	0.14
3	2.01	14.66	2.73	0.10

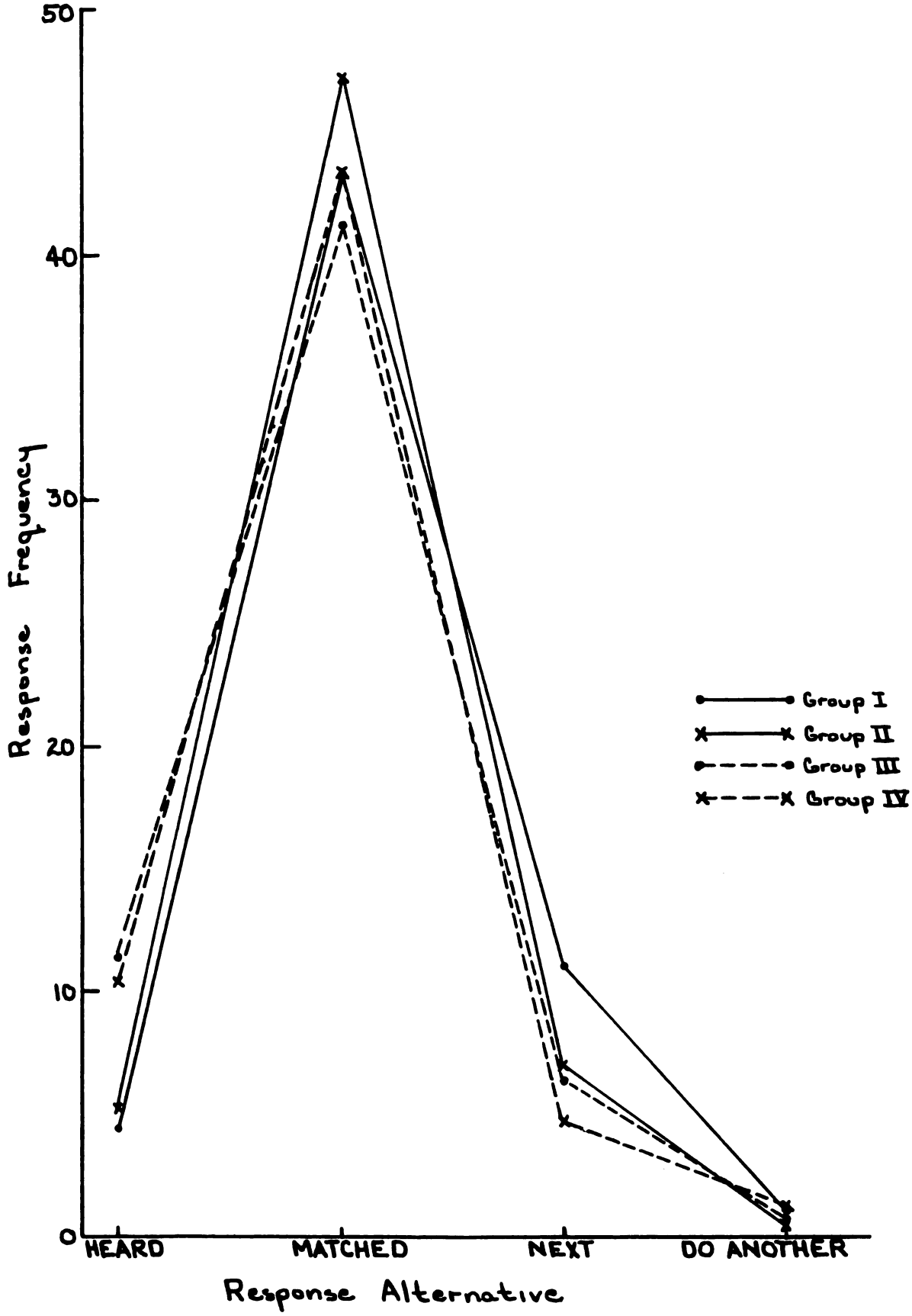

Figure 4. Response frequencies as a function of Response Alternatives for Treatment groups.

means for individual Ss. Figure 4 suggests that the four groups are behaving almost identically with respect to their relative frequencies for the Response Alternatives. Figure 5 shows the composit frequency of the Treatment groups for each Response Alternative. Looking at absolute frequencies, however, examination of Table 5 reveals that Groups I and II are making fewer HEARD responses (4.50 and 5.10) than Groups III and IV (11.40 and 10.55), but more NEXT responses (11.10 and 7.05 vs. 6.50 and 4.95). Examination of Table 8 reveals that response frequencies for the HEARD and DO ANOTHER Response Alternative are decreasing over Trial Blocks, while response frequencies for the NEXT Response Alternative are increasing. Response frequencies for control trials are not shown since they were predetermined and identical for all Ss on each trial.

Errors. The Analysis of Variance with Repeated Measures design was also used to examine errors. An error occurred if S's written response did not correctly identify the stimulus-presentation selected by S on his paddle response. Mean errors for each Treatment group across the entire 60 trials are shown in Table 9. The effect of Treatment, Sex, and Blocks of Trials on errors is shown in Table 10. Results of this analysis show that errors were affected only by Blocks of Trials. The F-ratio for this condition is 17.51 with 2 and 144 df, which is significant beyond the .001 level of confidence. Results of t-tests (Table 11) show that

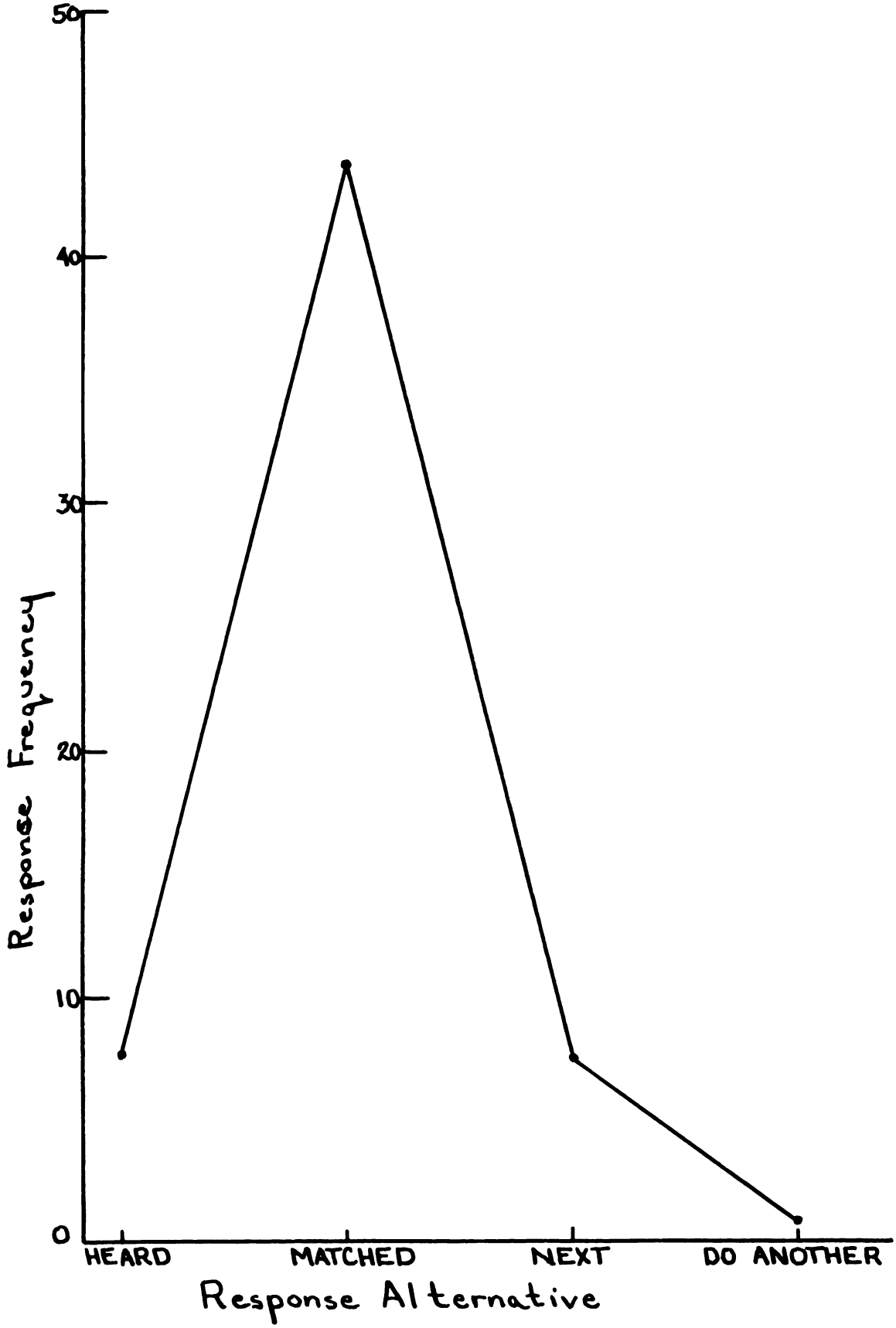

Figure 5. Response frequencies as a function of Response Alternatives collapsed across Treatment groups.

Table 9. Mean individual percent errors for Treatment groups by Response Alternative

Treatment Group	HEARD % Error	MATCHED % Error	NEXT % Error	$\bar{X}$[4]
I	20.6	31.9	45.1	31.0
II	10.4	19.1	27.2	17.9
III	17.6	27.5	27.9	28.8
IV	21.2	22.6	34.4	26.3
$\bar{X}$	17.5	25.3	33.6	

[4] Ibid.

Table 10. Summary table of analysis of variance: errors

Source of Variation	df	Sum of Squares	Mean Square	F
Treatment	3	235.113	78.371	2.46**
Sex	1	7.704	7.704	0.24
Treatment x Sex	3	21.879	7.293	0.23
Error	72	2,292.433	31.839	...
Blocks of trials	2	181.608	90.804	17.51*
Blocks x Treatment	6	47.125	7.854	1.51
Blocks x Sex	2	25.508	12.754	2.46
Blocks x Treatment x Sex	6	55.558	9.260	1.79
Error	144	746.867	5.187	...
Total	239	3,613.795	15.120	

*Significant beyond the .001 level of confidence.

**Significant at the .07 level of confidence.

Table 11. Comparison of Trial Blocks for error measures using Tukey's Procedure for Multiple Comparisons

Trial Blocks	Difference
1st - 2nd	1.36*
1st - 3rd	2.10*
2nd - 3rd	0.74*

*Significant at the .05 level of confidence.

significantly more errors were made on the first 20 trials than on the second 20, and more errors were made on the second 20 than on the third 20 trials. The measures in this analysis are based on the number of errors made. Appendix C shows errors as a function of Response Alternative for each Treatment, and this relationship is summarized in Table 12. In these two tables, errors have been converted to percentages based on the number of responses made for a given Response Alternative. Again, because Response Alternatives are not statistically independent from one another, the values presented for each Alternative are not derived from the analysis of variance. The marginal values, of course, are statistically independent, and are derived from the analysis of variance, but have been converted in these two tables to percentage values. Tables in Appendix C indicate that percent errors are increasing from the HEARD to MATCHED

to NEXT Response Alternatives in each of the four Treatment groups, and Table 12 indicates that percent errors are decreasing for the four combined Treatment groups over Trial Blocks. The DO ANOTHER Alternative is not presented in these tables because responses in this category are, by definition, not subject to errors. Again, all values represent means for individual Ss. Figure 6 shows the relative position of the four Treatment groups, in terms of percent errors, across three of the Response Alternatives. The same relationship is shown in Figure 7, values shown representing mean percent errors for the Treatment groups combined.

Table 12. Summary table of mean individual percent errors for Response Alternatives

Trial Block	HEARD % Errors	MATCHED % Errors	NEXT % Errors	$\bar{X}$[5]
1	16.4	33.3	33.8	31.8*
2	7.8	22.7	18.7	25.0*
3	4.9	19.5	19.9	21.3*

[5] Ibid.

*At the .05 level of confidence: Block 1 > Block 2 > Block 3.

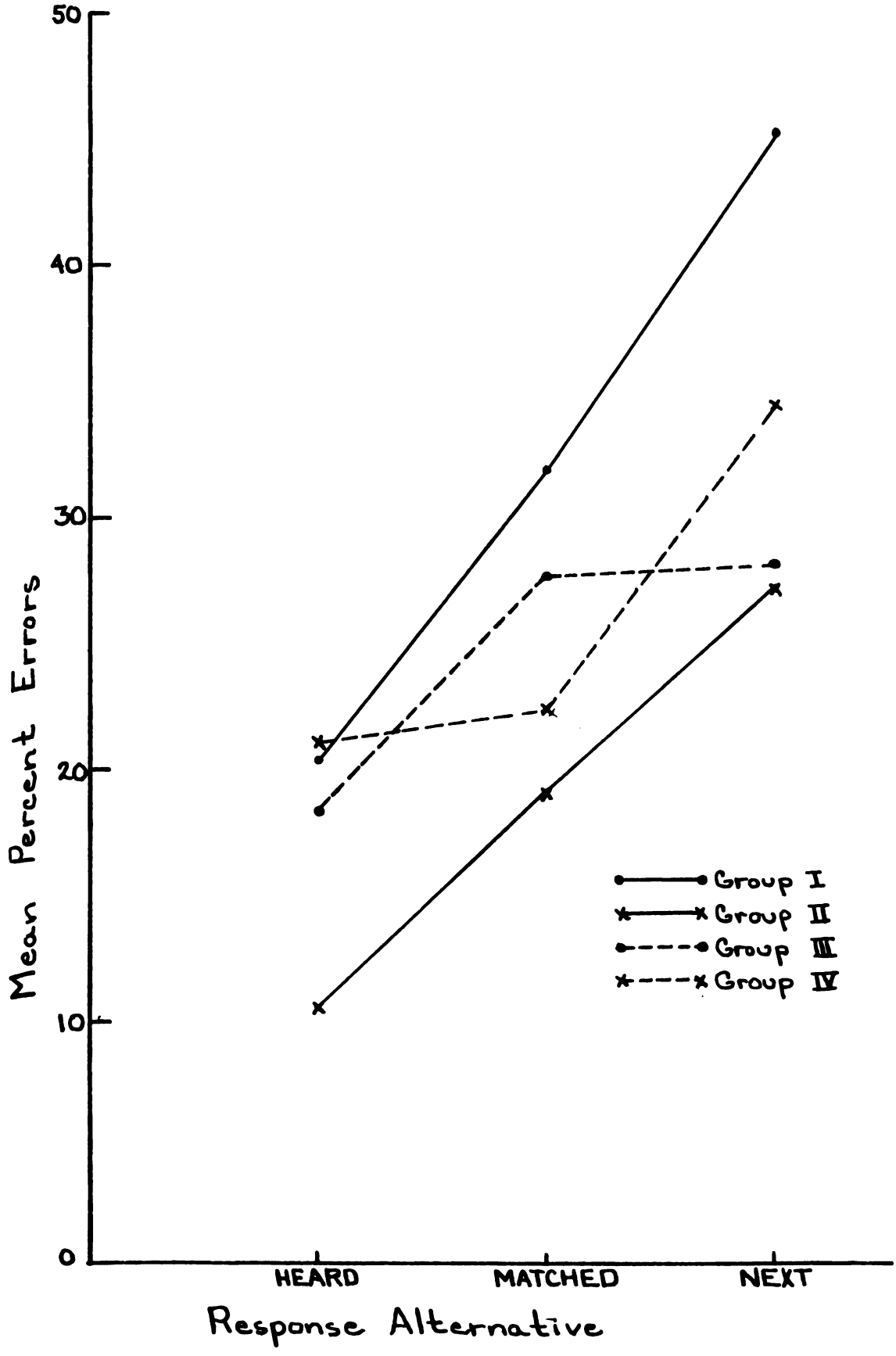

Figure 6. Percent errors as a function of Response Alternatives for Treatment groups.

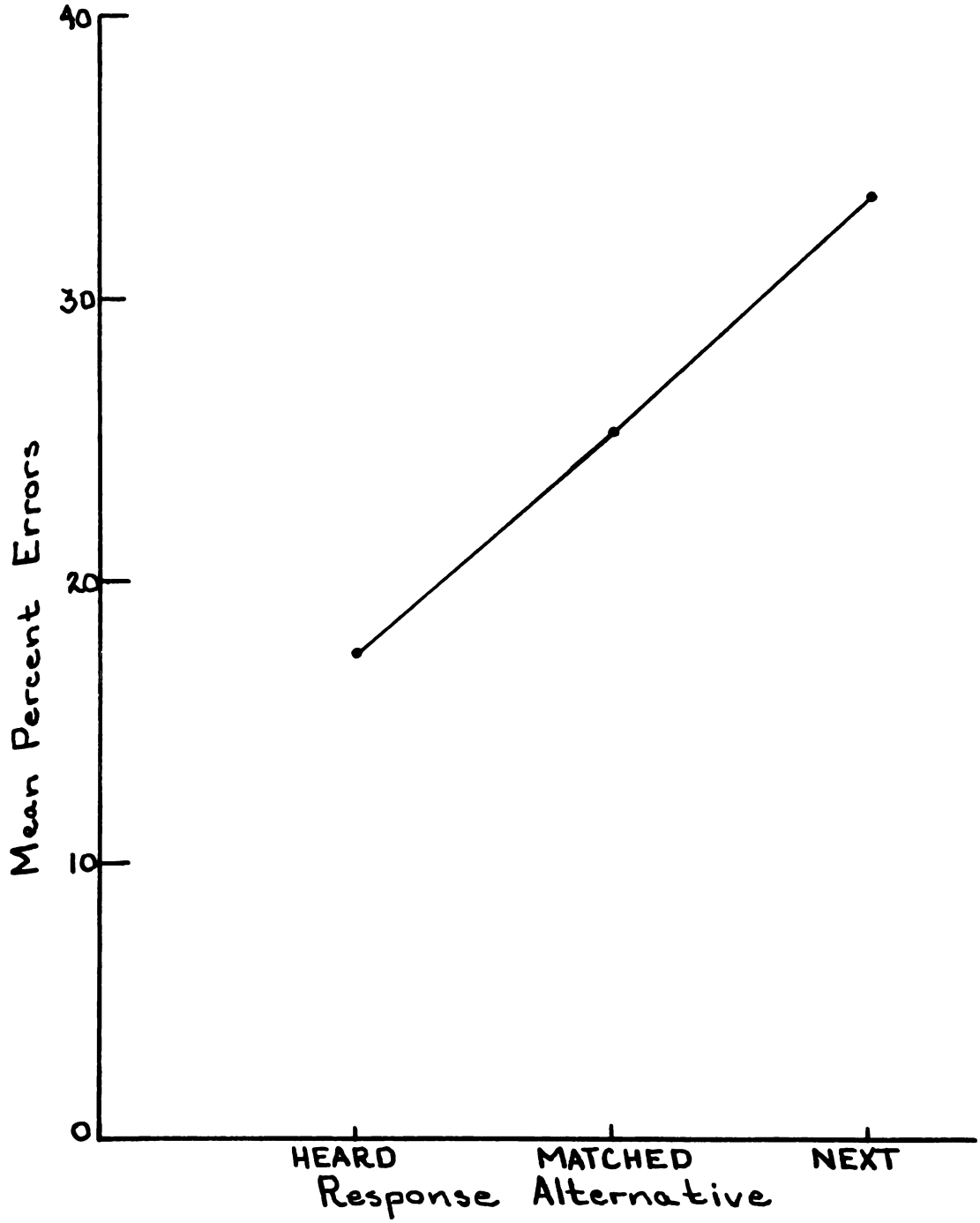

Figure 7. Percent errors as a function of Response Alternatives collapsed across Treatment groups.

All Ss were free to select any one of the four Response Alternatives on any trial. Some Ss may thus have used one Response Alternative more than another by selecting it over a long period of time or by alternating that Response Alternative with other ones. The number of times each S, on the average, changed his selection of Response Alternatives is as follows: Group I, 18.75; Group II, 12.30; Group III, 17.75; Group IV, 12.45. The average time required for each S to complete the 60 test trials was as follows: Group I, 929 sec.; Group II, 857 sec.; Group III, 925 sec.; Group IV, 919 sec. Groups III and IV were required to make a tally mark every time the speaker changed in the tape-recorded conversation. Their tallys corresponded to the actual number of speech changes to the following extent: Group III, 76%; Group IV, 72%. In Group III, 8 Ss under-estimated the number of speaker changes, and 8 more over-estimated them. In Group IV, 2 Ss under-estimated, and 10 others over-estimated. In spite of the fact that Ss in Group IV actually made fewer tally errors than did Ss in Group III, a Chi Square test of independence (5.15, with 2 df) shows that this difference between these two groups is not significant at the .05 level of confidence.

A simple check was made to gauge S's understanding of the instructions. Of the 20 Ss in Group I, 10 had no comment concerning the instructions; 10 had questions. Of those in Group II, 16 had no comment; 4 had questions. In

Group III, 9 had no comment; 11 had questions. In Group IV, 9 had no comment; 11 had questions.

It is apparent that response latencies and errors were affected only by Blocks of Trials, and response frequencies were affected only by Response Alternatives. Neither Treatment nor Sex had any significant effect on the dependent variables, (though the Treatment effect did approach significance for the errors variable), nor were any of the interaction effects significant. However, examination of the figures shows that Treatment did have an effect on different Response Alternatives, depending on the measure under consideration.

Characteristics of Response Alternatives. All three major measures (latencies, frequencies, and errors) give, in general, different values for the different Response Alternatives. Figure 3 shows that Treatment is interacting with the Response Alternatives in terms of latencies, and this interaction is especially pronounced for the DO ANOTHER alternative, whereby the high conflict groups are taking much longer to respond than are the no- and low-conflict groups. Figure 3a shows an even more pronounced effect in this direction, suggesting that the Treatment effect is beginning to dissipate sometime after the end of the first 20 trials, as can be seen by comparing Figures 3 and 3a. Results of t-tests indicate that differences between high

and no- and low-conflict groups for the DO ANOTHER Alternative are significant at the .01 level of confidence over the first 20 trials (t = 3.01, with 38 df). Figures 5 and 7 show that Response Alternatives are being responded to differently in terms of frequencies and errors. Frequencies are greatest for the MATCHED Alternative, and errors are increasing across Alternatives.

CHAPTER IV

DISCUSSION

None of the response measures used in this study were statistically affected by the amount of listening conflict. Inspection of the analysis of variance summary tables reveals that the error terms are accounting for a large proportion of the variance. Since subject variance is the major part of the total error variance, there is a large amount of subject variability in this study. Hence, individual differences appear to play an important role in this particular listening task, and these differences may be overriding the effects of the four treatments. Because of the attempt to provide a naturalistic setting, this listening task is a complex one in terms of the number of variables it involves. As this kind of complexity increases, subject variables have an ever-increasing effect on the dependent variables, and may thus nullify the effect of the independent variables. If subject (here meaning personality) variables are having a major effect on the dependent variables, then some kind of personality assessment would be important for predicting listening behavior. Insofar as sex variables contribute to personality, it is apparent from the

results of this study that sex variables in personality do not have a major effect on listening.

It was originally assumed that the conflict situation (attending to two sets of competing auditory stimuli) would provide a difficult task for the two high-conflict treatment groups (III and IV). Introspective reports obtained during pilot studies confirmed this assumption. Yet Groups III and IV behaved no differently than Groups I and II in terms of the analyzed measures. This fact suggests that Ss in Groups III and IV may have responded to the conflict (tape-recorded) listening task by increasing their efforts to attend to the experimental task, thus canceling out the hypothesized deleterious effects of the conflict task. That is, the more difficult the situation, the harder S works to overcome the difficulty. This is particularly apparent by the end of the entire 60 trials. Over the first block of 20 trials, however, there is good reason to suspect that conflict is making itself felt in terms of the way the different groups are responding to the different Alternatives. Such a process bears some resemblance to the effects reported in the Hawthorne Study (Homans, 1947), where any change in the experimental setting resulted in improved subject performance. For example, Group I was exposed to only the experimental task; Group II was exposed to the set of competing stimuli and was told to ignore it. Yet inspection of Figures 3 and 6 shows that Ss in Group II had shorter

latencies and made fewer errors than Ss in Group I. The implication is that the set of competing stimuli served not as a distraction, but as a cue for increased attention to the experimental task. By inference, then, Ss in Group I are not performing at their optimal rate. This happened in spite of the fact that the listening task was constructed to provide maximum difficulty. Subjects presented with the set of conflicting stimuli took no longer to respond to the experimental task stimuli than did Ss presented with only the experimental stimuli; they distributed themselves no differently over Response Alternatives; and they made no more errors. That is, there were no significant differences between Treatments.

Treatment not only had no overall effect on latencies, frequencies, or errors, but Ss in all groups changed their selection of Response Alternatives about the same number of times; took about the same amount of time to complete the task; and Ss in Groups III and IV produced a similar number of percent-correct tally marks. It is interesting to note that no- and low-conflict Ss had fewer questions about their set of instructions than did Ss in the high-conflict groups. Assuming from this behavior that instructions for high-conflict Ss were less clear than those for no- and low-conflict Ss, it appears that high-conflict Ss were able to overcome not only the set of competing stimuli, but less clear instructions as well. Group II, who actually heard

the tape-recorded conversation though not required to respond to it, was less affected by the instructions than Group I, who did not even hear the tape-recorded conversation. This discrepancy occurred between these groups over the same set of instructions and before the set of conflicting stimuli was presented. That Group II had (non-significant) shorter latencies and fewer errors than Group I may be partly a function of their (by implication) better understanding of the instructions.

At the same time, practice (in terms of Trial Blocks) had a pronounced effect on S's listening behavior. Both latencies and errors decreased as a function of the time S spent in the listening situation. Furthermore, latencies are not only decreasing across trials, but, as examination of Table 4 shows, they are decreasing at different rates. That is, over the 60 trials, MATCHED responses always have the longest latencies, but by the end of the 60 trials, HEARD responses are shorter than NEXT responses, thus demonstrating a change in the rank order of these two Alternatives. Practice does, then, have a (non-significant) differential effect on this particular listening measure. This same pattern occurs with the frequency measure (Table 8). Errors (Table 12) present a different picture, but errors for HEARD responses are decreasing at a faster rate than they are for MATCHED or NEXT responses. Thus, though not subject to statistical analysis, there is a clear trend

which suggests that practice has a differential effect on all of the listening behaviors examined in this study.

In general, these findings are not in accord with those of other listening-conflict studies (Poulton, 1953; Poulton, 1956; Ratner, Gawronski and Rice, 1964; Sumby, 1962). Though it is interesting to note that Ratner, Gawronski, and Rice, examining their data over Trial Blocks, also found a differential practice effect which they interpreted as being due to the different ages (range: 6-13 years) of their Ss. In all of these other studies, however, the design of the experiments was such that conflict was examined only as it affected correct recall or proper identification of the referent, and the conflicting stimulus was identical to the experimental stimulus in that they both varied along the same dimensions. Although two sets of stimuli were often presented simultaneously in these studies, the listening tasks were presented in an interrupted rather than continuous manner. As described in the introduction to the paper, the present investigation cast listening behavior in a continuous, multi-dimensional framework, nor did conflicting stimuli require the same response as experimental stimuli. That differences in results between this and other listening-conflict studies can be attributed to differences in experimental design is not certain. It is certain, however, that the design of this study is different from those of the studies mentioned above.

For example, a major design consideration of this investigation was that people might listen differently (i.e., respond differently to a referent) under different conditions. In order to allow for the occurrence of this possibility, several Response Alternatives were permitted, allowing S to make one of four different responses. It is important to note that these Alternatives were not independent variables in the sense that they were experimentally manipulated. They were, however, independent in that S was free to choose among them. Thus, though they are not a major part of the analysis, they do provide a way of looking at the dependent variables.

Response Latencies. It will be recalled that the HEARD Alternative is equated (in terms of its function) with referent recording; the MATCHED Alternative with referent directing; and the NEXT Alternative with referent modification. The order in which these functions are here listed is also the order of their conceived complexity (from least to most). The logical extension of this conception suggests, then, that response latencies would be increasing across these three Alternatives. If anything, they decreased (as is shown in Fig. 2). The fourth Response Alternative (DO ANOTHER) was included to allow Ss to stroke, or to indicate that they did not wish, or were not able to respond to one of the other three Alternatives. Results of pilot studies

suggested that Ss were using this fourth Alternative as an indication that they did not know what to do, or had not heard or seen the stimulus presentation. Thus, responses to the DO ANOTHER Alternative would occur with relatively long latencies (Fig. 2) and infrequently (Fig. 5), as they did. The latencies across all of the Response Alternatives as shown in Fig. 3, however, reveal such great variability across Treatments that few meaningful conclusions can be drawn concerning the speed of responding with respect to a given type of listening. Certainly there is more difference between "no conflict" and "auditory noise" (Groups I and II) than there is between two kinds of "high conflict" (Groups III and IV). Furthermore, Ss exposed to both sets of stimuli (Groups II, III, and IV) are modifying faster than those exposed only to one (Group I). As the discussion of the Treatment effect suggested, there is some indication from Fig. 3 that increased demands on the listener (here in terms of listening conflict) results in more efficient (faster) listening activities.

Response Frequencies. The frequency pattern over Response Alternatives was remarkably stable (Fig. 4). Listening, as formulated in this paper, would have been predicted to occur with greater emphasis (frequency) in the less complex kinds of listening. Thus, referent recording would occur more often than referent directing, and referent

directing more often than referent modification. Within this conceptual framework it was acknowledged that these relative frequencies would be highly dependent on the situation, or setting, in which the language interaction occurred. Consequently, this experimental task was designed to offer as neutral a setting as possible. Examination of Fig. 5 suggests that either the task was not a very neutral one, or that complexity has no monotonic relationship with frequency. The very low frequency of stroke responses, in the face of an initially ambiguous task, and introspective reports from Ss suggest that the listeners in this particular setting attempted to identify and then conform with E's (presumed) expectations. To do this, Ss would have had to spend a relatively large amount of time in referent directing activities, as they did. In this regard, the setting was obviously not a neutral one. That is, Ss apparently felt that certain kinds of listening activities were more appropriate than others in this setting.

It was further felt that the nature of the different Treatments might result in differential responding to the four Response Alternatives. That is, with the increased demand for S's attention in the conflict situations, he would spend more time in the less complex listening activities. Fig. 4 shows that the high-conflict groups (III and IV) distributed themselves across Response Alternatives very much the way the low- and no-conflict groups (I and II) did.

Note, however, that Groups III and IV are making a few more HEARD (referent recording) responses and a few less NEXT (referent modification) responses than Groups I and II. Table 5 shows these differences more clearly than the figure. To this extent, then, conflict does appear to drive listeners to less complex listening activities. They record more frequently and modify less frequently than do listeners in the no-conflict situation. These relative differences do support the notion that listening is not a unitary function.

Errors. Judging from Figs. 6 and 7, the evidence is fairly clear that modifying is more difficult than either directing or recording, regardless of treatment. Again, evidence--though slight--is present to suggest that listening is composed of several activities. However, the conflict groups (II, III, and IV) are not making more errors than the no-conflict group (I), though the prediction is that they would. The unequal relative response frequencies for each of the three Response Alternatives does not contaminate the curves in Figs. 6 and 7, since they are presented in terms of percent of errors based on the number of responses made for that Alternative. The relative position of the four curves in Fig. 6 is, again, interpreted in terms of the Hawthorne phenomenon. That is, the three conflict groups may be attending more closely to the experimental stimuli because of the added variable in their task.

Trial Blocks had a pronounced effect on both response latencies and errors. That trials were examined in three blocks of 20 trials was, in part, an arbitrary decision. That trials were examined by blocks, however, was not. Casual observation and introspective considerations suggested that listener activities may vary as a function of the length of time spent in the listening interaction, that time reflected by the Trial Block.

Response Latencies. Table 4 shows that response latencies, collapsed across Response Alternatives, decreased as a function of the length of time spent in the listening situation. It is noteworthy that this decreasing trend occurred for every Response Alternative and that the rate of change is negatively accelerated. This latter observation suggests that listeners may be approaching an asymptote in terms of the speed of their response. Thus, the practice effect in this task appears to be a strong one, but listeners do begin to habituate to the task between the 41st and the 60th trial, since the difference between Blocks 2 and 3 is smaller than the difference between Blocks 1 and 2.

That control trials were administered at the conclusion of the experimental task is contrary to standard experimental procedures because it is not clear whether their latencies reflect the effect of additional practice or the effect of the experimental variables. Thus, the relatively short response latencies (Table 4, marginal values) for

these control trials may be a function of the additional amount of time the listener spent in the situation, or they may reflect the absence of true language activities, since S was essentially instructed as to which paddle to press on control trials. Two comments are relevant: (1) Values over the three blocks of experimental trials are decreasing at an increasingly slower rate. The difference in value between control trials and Block 3 trials, however, is greater than the difference between Block 2 and Block 3 trials. If control trial values do reflect additional practice only, then they would likely be closer in value to the Block 3 latency means than they are. (2) Because it was suspected that practice might have a strong effect on listening activities, presentation of control trials at the beginning of the experiment may well have affected (distorted) latencies made in response to the actual language event. That is, since every language interaction must have a beginning, it is important to know what a listener does at the beginning of that interaction. It was felt that the presentation of control trials at the end of the experimental task would provoke less confounding than would the presentation of control trials at the beginning of the task.

Response Frequencies. Response frequencies were not subject to analysis by Trial Blocks. Looking at frequencies over Response Alternatives for each Trial Block, as seen in Table 8, it becomes apparent that there is a trend of change

for frequencies as a function of the length of time the listener spent in the situation. For example, frequencies for the HEARD Alternative (referent recording) are decreasing with increasing numbers of stimulus exposures, while NEXT Alternative (referent modification) frequencies are increasing. This particular trend suggests that the more time a listener spends in a given language interaction (at least, up to the point that is equivalent to 60 trials), the more frequently he modifies the referent rather than records it. Table 8 also suggests that listeners are becoming habituated to the situation in that their DO ANOTHER (stroke) responses are becoming less frequent. The amount of directing activity, however, seems to remain fairly constant, regardless of the amount of time spent in the situation.

Errors. Errors, too, decreased significantly over Trial Blocks, and Table 12 shows that this decrease over Trial Blocks holds up for each Response Alternative. The implication of both the marginal and cell decrements is that listeners more accurately identify the referent to which they are responding as they are more frequently exposed to that class of referents. Furthermore, this accuracy tends to increase regardless of the particular referential activity (recording, directing, or modifying). Parenthetically, it may be noted from Table 12 that regardless of the amount of time spent in the situation, errors are generally occurring with greater frequency as the referential activity

becomes more complex (i.e., as one goes from recording to directing to modifying).

Characteristics of Response Alternatives. Results described under this heading show good substantiation for the view that there are different kinds of listening. Frequencies for some of the Response Alternatives are greater than others; errors differ as a function of Response Alternatives; and latencies differ among some of the Alternatives on the first block of 20 trials. It appears that the Alternatives are differentially sensitive to latencies only early in the task, and with increased practice listeners are reaching a latency asymptote. It is also interesting to note that although errors are increasing as one goes from recording to directing to modifying, the other two measures are not affected in this linear pattern (frequencies are greatest for directing and latencies are greatest for stroking). Such differential effects suggest that to describe the Response Alternatives along a complexity continuum only is to over-simplify the nature of the alternatives. Taking all the response measures into consideration, it appears that each Response Alternative serves a unique listener function.

CHAPTER V

SUMMARY AND CONCLUSIONS

This study was designed to explore the effect of some of the postulated dimensions that control listening behavior. The design reflected the postulate that ongoing behavior occurs, and is subject to accurate analysis, in a given, naturalistic situation, that situation described in the paradigm "A-talking-to-B-about X" (Herman, 1951). The amount of experimental literature on the speaker-dimension of this paradigm is small; the amount of literature on its listener-dimension is almost nil. Thus, this study was an investigation of one of these dimensions (concurrent actions, here seen as competing, or conflicting with, ongoing listening behavior) as it might affect listener behavior in the language event. Other variables (the effect of practice and listener functions) were also explored, but were not experimentally manipulated. Two points are to be made: (1) because of the exploratory nature of the investigation, no formal hypothesis were offered; and (2) because of meta-systematic considerations, the investigation was designed to allow all variables to reflect and to vary along naturalistic dimensions. Since the inquiry was seen as a preliminary

and an ecologically representative one, many variables were not rigorously controlled.

Because this inquiry was an exploratory one other, minor, variables and their interactions warrant comment, with a view toward evaluating their relevance for the control of listening behavior. It is, first of all, clear that listeners preferred some Response Alternatives over others. Since these Alternatives provide motorically identical responses, the inference is that differences which occur between them are a reflection of different listening activities, or different ways of responding to the referent. The evidence for this interpretation becomes more clear in view of the fact that: (1) listeners exposed to little or no conflict tended to spend more time using a more complex Alternative (modifying) and less time using a less complex Alternative (recording) than did listeners exposed to relatively high conflict; and (2) the longer the listener spent in the situation, regardless of the amount of conflict he was exposed to, the more time he, again, tended to spend modifying instead of recording. Since these changes are trends, rather than significant differences, it is important to view them primarily in terms of questions to be raised in an inquiry more specifically directed to the differentiation of listening activities.

The effect of the Trial Blocks also provides some clues for the description of listening behavior. In this study the three blocks of 20 trials primarily represent the length of time the listener spent in the language interaction. From the analysis it is clear that this time had a pronounced effect on how long it took the listener to respond to the referent, and on how accurately he responded to it. And there are trends to suggest that the types of listening responses S makes are differentially affected by this practice. This effect may be attributed to practice, or more accurately, habituation, and it suggests that listening is not a static activity, but a changing one, that change partly a function of the type of listening one is engaged in. Thus, certain dimensions (measures) of listening change as a function of the length of time that interaction continues. There is even some suggestion that the type of listening activity changes emphasis as a function of this time. Consequently, to obtain an accurate description of listening, a time dimension must be taken into consideration in any investigation of listening behavior.

Finally, though not experimentally investigated, there is some suggestion that the setting of the language interaction is itself an important variable in listening behavior. Earlier discussion indicated that the task was designed so as to be essentially neutral with respect to Ss' Response Alternative selections. That is, some care was

given the make-up of the "essay" and the instructions so that Response Alternatives would not be differentially reinforced (either overtly or covertly). In spite of these precautions, Ss made the majority of their responses using the MATCHED Alternative, nor did they stop listening (stroke) with anything approaching the frequency that casual observation suggested they would. In this sense the task was obviously not a neutral one. The explanation offered for this unpredicted behavior is that the setting of the experiment had a strong affect on what S did. That is, the experiment was offered as part of a course (extra credit was received for participating); it occurred in an academic building in an academic environment; and E could easily have been perceived as a teacher. Thus, Ss may well have felt that certain kinds of behaviors were expected, not the least of which is that students are not expected to tell teachers to "Do Another One" (i.e., "I choose not to respond to that statement, and, by implication, am thereby falling short of your expectations of me"). The teacher-student hypothesis need not be belabored, but that S perceived certain expectations on the part of E is a possibility which is difficult to disregard. Provision for a more ambiguous setting (though even this one was designed to be ambiguous) may alleviate the "expectation" problem.

The conclusion from this study, then, is not that conflict has no effect on listening behavior. Furthermore,

listening appears to be a highly malleable behavior, withstanding extreme distractions, changing over time, and (probably) highly dependent on the situation. Furthermore, there is the suggestion that listening is not a unitary function, that different kinds of listening activities may occur as a function probably of the amount of conflicting activity and of time spent in the situation and as a function possibly of the setting in which the interaction occurs.

Needless to say, the variables that do affect listening are many. The manner in which these variables can be controlled without distorting the event itself poses a vexing problem. One could present the same task in different settings for a closer analysis of the way in which listening activities distribute themselves and attempt to determine if the setting does affect this distribution. Or one might survey a particular kind of language interaction (e.g., psychotherapy) as a method of empirically classifying listening activities and obtaining their frequencies.

It is noteworthy that measures of listening are very difficult to obtain, partly because listening involves primarily the absence of readily observed behaviors. The present investigation clearly reveals the methodological problems that are posed in the analysis of listening, but it equally clearly reveals that listening is not unidimensional.

Different Response Alternatives display unique characteristics, and these characteristics are differentially affected by both conflict and practice. Thus, there does appear to be different kinds of listening activities. To treat listening as a one-dimensional function may distort the event under consideration.

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APPENDIX A

Table A1. Mean individual response latencies (in sec.) for Treatment groups by Response Alternatives in the first 20-trial block

Treatment Group	HEARD Latencies	MATCHED Latencies	NEXT Latencies	DO ANOTHER Latencies	$\bar{X}$ [6]
I	3.10	4.01	4.06	2.38	4.13
II	3.03	4.09	2.71	1.54	4.29
III	3.77	4.21	1.74	5.08	4.50
IV	3.18	3.71	1.73	4.94	4.05
$\bar{X}$	3.27	4.00	2.56	3.48	4.24*

*Values differ at .05 level of confidence.

[6] Ibid.

Table A2. Mean individual response latencies (in sec.) for Treatment groups by Response Alternatives in the second 20-trial block

Treatment Group	HEARD Latencies	MATCHED Latencies	NEXT Latencies	DO ANOTHER Latencies	$\bar{X}$ [7]
I	0.62	2.51	2.07	0.75	2.54
II	0.84	2.51	1.36	0.19	2.69
III	1.57	2.92	1.87	0.49	3.14
IV	1.16	2.48	0.84	0.32	2.52
$\bar{X}$	1.05	2.61	1.53	0.44	2.72*

*Values differ at .05 level of confidence.

[7] Ibid.

Table A3. Mean individual response latencies (in sec.) for Treatment groups by Response Alternatives in the third 20-trial block

Treatment Group	HEARD Latencies	MATCHED Latencies	NEXT Latencies	DO ANOTHER Latencies	$\bar{X}$[8]
I	0.71	2.25	1.85	0.11	2.41
II	0.75	2.00	1.12	0.24	2.17
III	0.86	2.41	1.69	0.34	2.58
IV	1.20	2.10	0.85	0.74	2.26
$\bar{X}$	0.88	2.19	1.38	0.36	2.35*

*Values differ at the .05 level of confidence.

[8] Ibid.

Table A4. Mean individual response latencies (in sec.) for Treatment groups by Response Alternatives in the control-trials block

Treatment Group	HEARD Latencies	MATCHED Latencies	NEXT Latencies	DO ANOTHER Latencies	$\bar{X}$[9]
I	4.01	4.06	2.38	...	1.18
II	4.09	2.71	1.55	...	1.11
III	4.22	1.74	5.08	...	1.29
IV	3.71	1.73	4.94	...	1.36
$\bar{X}$	4.01	2.56	3.49	...	1.23*

*Values differ at the .05 level of confidence.

[9] Ibid.

APPENDIX B

Table B1. Mean individual response frequencies for Treatment groups by Response Alternatives in the first 20-trial block

Treatment Group	HEARD Frequencies	MATCHED Frequencies	NEXT Frequencies	DO ANOTHER Frequencies	$\bar{X}$[10]
I	2.00	14.20	2.95	0.85	5.00
II	2.30	15.60	1.80	0.30	5.00
III	5.80	12.60	0.90	0.70	5.00
IV	4.20	13.85	0.95	1.00	5.00
	$\bar{X}$ 3.58	14.06	1.65	0.71	

[10] Ibid.

Table B2. Mean individual response frequencies for Treatment groups by Response Alternatives in the second 20-trial block

Treatment Group	HEARD Frequencies	MATCHED Frequencies	NEXT Frequencies	DO ANOTHER Frequencies	$\bar{X}$[11]
I	1.10	15.00	3.70	0.20	5.00
II	1.65	15.60	2.65	0.10	5.00
III	3.30	14.20	2.40	0.10	5.00
IV	3.15	15.35	1.35	0.15	5.00
	$\bar{X}$ 2.30	15.03	2.53	0.14	

[11] Ibid.

Table B3. Mean individual response frequencies for Treatment groups by Response Alternatives in the third 20-trial block

Treatment Group		HEARD Frequencies	MATCHED Frequencies	NEXT Frequencies	DO ANOTHER Frequencies	$\bar{X}$[12]
I		1.40	14.05	4.45	0.10	5.00
II		1.15	16.20	2.60	0.05	5.00
III		2.30	14.40	3.20	0.10	5.00
IV		3.20	14.00	2.65	0.15	5.00
	$\bar{X}$	2.01	14.66	2.73	0.10	

[12] Ibid.

APPENDIX C

Table C1. Mean individual percent errors for Treatment groups by Response Alternatives in the first 20-trial block

Treatment Group	HEARD % Errors	MATCHED % Errors	NEXT % Errors	DO ANOTHER % Errors	$\bar{X}$[13]
I	19.6	39.3	54.0	...	36.8
II	10.6	30.5	23.9	...	28.8
III	18.1	31.0	29.2	...	31.8
IV	17.2	32.3	28.2	...	29.8
$\bar{X}$	16.4	33.3	33.8	...	31.8*

*Values differ at .05 level of confidence.

[13] Ibid.

Table C2. Mean individual percent errors for Treatment groups by Response Alternatives in the second 20-trial block

Treatment Group	HEARD % Errors	MATCHED % Errors	NEXT % Errors	DO ANOTHER % Errors	$\bar{X}$[14]
I	0.0	29.6	28.1	...	30.3
II	0.5	14.8	14.0	...	14.3
III	14.6	26.0	24.1	...	29.5
IV	16.1	20.5	8.5	...	25.8
$\bar{X}$	7.8	22.7	18.7	...	25.0*

*Values differ at .05 level of confidence.

[14] Ibid.

Table C3. Mean individual percent errors for Treatment groups by Response Alternatives in the third 20-trial block

Treatment Group	HEARD % Errors	MATCHED % Errors	NEXT % Errors	DO ANOTHER % Errors	$\bar{X}$[15]
I	3.3	26.9	26.7	...	26.0
II	0.0	10.8	12.8	...	10.8
III	6.6	22.0	21.4	...	25.0
IV	9.8	18.3	18.7	...	23.3
$\bar{X}$	4.9	19.5	19.9	...	21.3*

*Values differ at the .05 level of confidence.

[15] *Ibid.*