

EFFECT OF PERSONAL TREATMENT OF NAVY SUBJECTS  
ON A HEARING DISCRIMINATION TASK

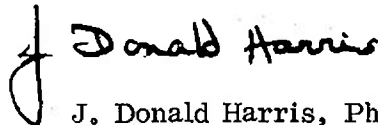
by

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## SUMMARY PAGE

### THE PROBLEM

To compare effects upon a hearing discrimination task (Speech Reception Ability) of a formal test environment (Unfavorable) with one in which subjects are treated pleasantly and given information about their progress (Favorable). Inferior performance was expected for the unfavorable condition.

### FINDINGS

Results were not as expected; there was no difference in the mean speech intelligibility scores between the favorable and unfavorable listening environments. Debriefing interviews of the listeners suggest an adaptation to degrees of regimentized military treatment.

### APPLICATION

Current personnel handling procedures at NAVSUBMEDRSCH-LAB need not be revised.

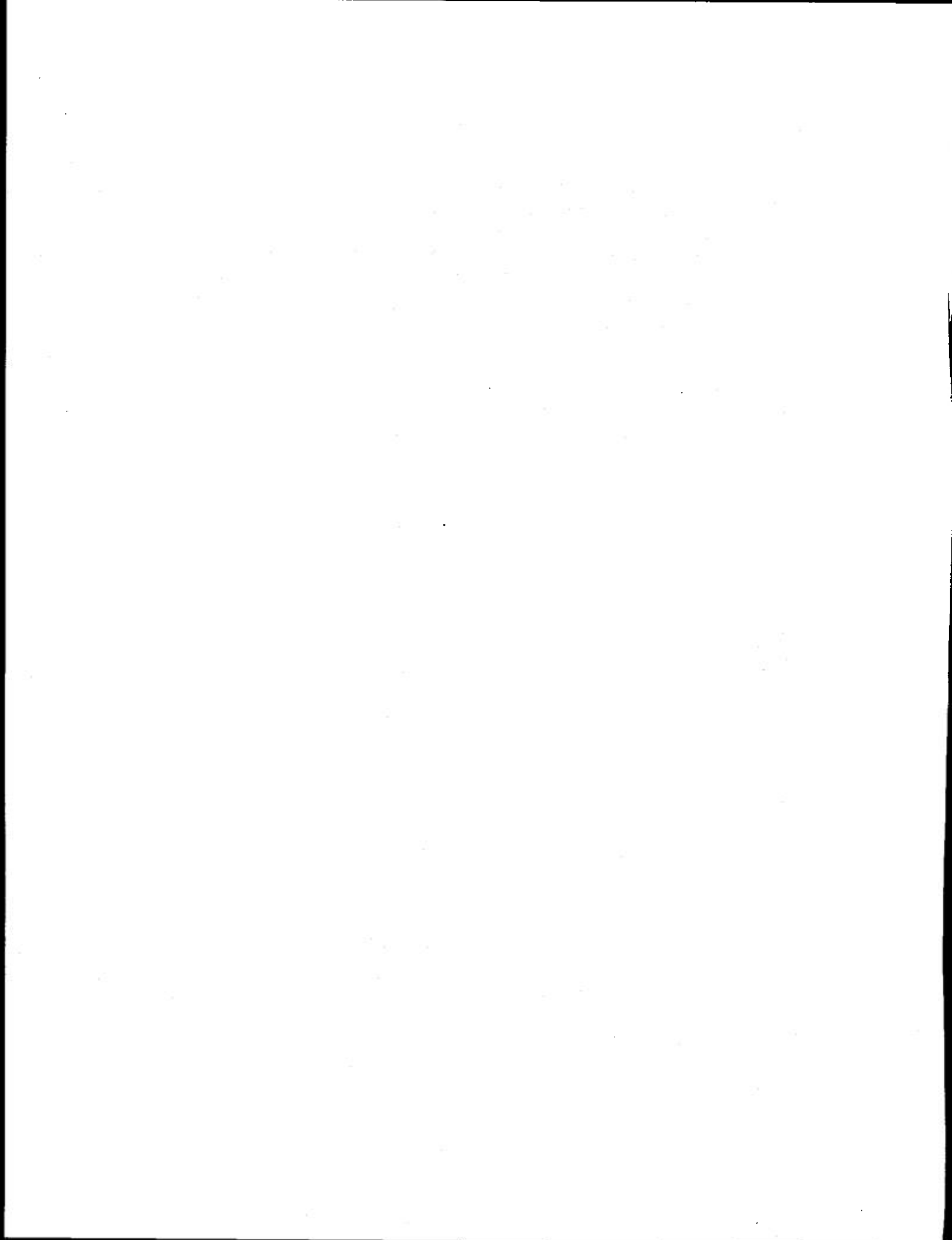
### ADMINISTRATIVE INFORMATION

This investigation was conducted as a part of Bureau of Medicine and Surgery Research Work Unit M4305.08-3003DAC9 - Validation of Speech Audiometry in Submarines. The present report was approved for publication on 14 March 1972, and designated as NAVSUBMEDRSCHLAB Report No. 704. It is No. 6 on the work unit.

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## ABSTRACT

Two groups of Navy enlisted men, 20 in each group, performed on a speech reception task at low intensity levels. The Ss of one group were handled circumspectly, apprised of their progress and run during duty time. The Ss of another group were treated in a formal manner, were not informed of progress and were run during free time with the possibility of missing a meal. The difference between the groups' mean scores was not significant at the .05 level. Debriefing interviews suggest that the results may reflect an adaptation to degrees of impersonal treatment occasionally present in military personnel interaction. Current personnel handling procedures at NAVSUBMEDRSCHLAB branches need not now be revised.



## EFFECT OF PERSONAL TREATMENT OF NAVY SUBJECTS ON A HEARING DISCRIMINATION TASK

### INTRODUCTION

A human being performing a task is an extremely difficult model to study. He brings with him a variety of attitudes, beliefs, and values about the task and his ability to perform it. At each stage in his performance he receives feedback, accurate or not, about his success and this in turn affects the set or orientation to the task and thus his performance. In reality no individual has ever performed exactly the same twice on any task, nor in any two persons have the same set of conditions ever been duplicated exactly. Therefore, any measure of the similarities or differences between various persons performing like tasks is at best only a close approximation to reality.

From such considerations it is clear that as we examine the role of motivation in the performance of a listening task, we face ambiguity, for motivation is a complex construct which defies meaningful definition. A motive has been defined as a set which predisposes the individual for certain activities and for seeking certain goals. Certainly motivation can affect performance profoundly, but in creating an operational definition the experimenter is in a quandary, since a set of factors which has bearing on the performance of tasks can hardly be made an independent variable.

A specific problem faced by the Auditory Research Branch in the area of motivation is whether the manner of

treating Navy enlisted men as subjects for acoustic experiments might influence their performance. It is possible to treat them in a cold, abrasive fashion, or quite the opposite. We seized the opportunity to vary this treatment in an ongoing study of normal speech reception, in the expectation that if variations in personal treatment made a significant difference in performance, the results might be general enough to cover many other behavioral test situations in the Navy as well as the specific one used here as an example.

One of the current studies in the Auditory Research Branch is the determination of the most appropriate type of speech material to use in specifying an individual's ability to hear speech. Among others under consideration, one set of materials is the so-called C. I. D. Colloquial Sentences Lists,<sup>1</sup> slightly revised to equate sentence length (see Appendix A). We sought to specify the curve of performance (per cent words correct) as the speech was raised progressively in intensity (a so-called "Articulation Function"). From such a curve on any man, one can interpolate to find the physical intensity of speech at which he can correctly repeat 50% of the words.

In routine scheduling of men to this Branch for auditory testing, groups of 50 appear in the morning and are at once given a group pure-tone audiometric hearing test. From those whose audiograms reveal normal hearing for the frequencies important in speech

reception (500-3000 Hz), a number can be asked to stay, during what would usually be free time before lunch, or return in the afternoon, at which time the men would normally be assigned to duties generally considered boring and even unpleasant.

Furthermore, some groups are approached by a civilian experimenter and some by an enlisted petty officer on behalf of the experimenter. At times the men are instructed to participate with no further explanation offered, and at times they are asked to volunteer, are told the nature of the experiment, and are made to feel that it is a privilege to participate. In short, it is entirely possible in the usual course of things to have, as members of the same experimental group, men who are told to participate with no explanation as to usurption of their free time, and on the other hand, men who are told the nature of the experiment, are made to feel important to have been selected, and who participate on a purely volunteer basis during a time period that would otherwise be spent in unpleasant duties. It is quite plausible that such differences in manner of selection and treatment could significantly affect the men's motivation and thus, their performance. If such were the case, the current practices of the Branch would require revision.

#### A Prediction of Improved Performance through Favorable Conditions.

Woodworth and Marquis<sup>2</sup> define "purpose" as a goal-directed activity in which the individual has foresight of the end to be accomplished. To improve motivation in practical situations they recommend avoiding negative sugges-

tions and encouraging self competition by making available the results of each trial. On these bases, one would predict superior performance for the volunteer well-treated group.

#### A Prediction of Improved Performance through Unfavorable Conditions.

On the other hand, a case can be made for the obverse effect: the Yerkes-Dodson law states that for every level of anxiety there is an appropriate level of activation. Experiments replicated many times have demonstrated that a low level of anxiety is best for complex tasks, while a high anxiety level also improves performance on simple tasks, but hinders performance on more complicated ones. A speech reception task at low levels of intensity over a period of 20-30 min. may well be one which would be assisted by a high level of anxiety, or, if the task could be considered complex, perhaps the level of anxiety created in the experimental subjects would be low and not detrimental. Thus, while some effect of the motivation factors might be expected, it is difficult to predict the direction it would take.

One recent related study (Rowe<sup>3</sup>) studies the effect of manifest anxiety on tasks of attention using the Stroop Color Word test and the Mirror-Tracing task. It was found that situational stress facilitated performance on the word task but impaired performance for the tracing task. It was concluded that stress tended to narrow the field of attention. This single experiment is of no assistance in predicting the results of an unknown level of anxiety on a task whose complexity is uncertain.

## METHOD

### Subjects

Groups of 50 enlisted Submarine School candidates were detailed to this Branch for group hearing tests. From these, a pool of potential subjects was determined by applying a Hearing Level criterion of 10 dB or better at all frequencies through 4000 Hz, and 20 dB or better at 6000 and 8000 Hz (ANSI, 1969 standards). All 50 men in a group passed their audiometric answer sheets at random to the experimenters, who selected as subjects for that day the first 3 men whose hearing met the criterion.

From 50-man groups which came earlier in the morning, the experimenter selected 20 subjects over a period of weeks for a Favorable Conditions Group, and from similar 50-man groups which came later in the morning, 20 subjects for an Unfavorable Conditions Group.

### Favorable Conditions Group.

For this group, the civilian experimenter was present at scoring and asked those who met the criteria if they would volunteer to participate in a 20-min. listening experiment later in the afternoon. They were told that they were selected due to their superior hearing but that only genuine volunteers were desired. It was stressed that the experiment was a very important one which might help people handicapped with hearing loss and that they would be run at any time in the afternoon convenient to them. They were reminded that they would probably be missing only some unpleasant duty. Those who agreed

were given appointment slips to return in the afternoon.

### Unfavorable Conditions Group.

Members of this group were instructed by an enlisted petty officer in a business-like manner to report to the experimenter in another room for more tests. They were not told whether they had passed the hearing tests, what the next tests were about, or how long it would take. For this group, the time period would otherwise have been free.

### Apparatus.

A professional quality tape recording of Revised C.I.D. Sentence Lists A, C and E was used. Playback was on an Ampex AG 600-2 recorder with a Hewlett-Packard 350-D attenuator, a Ballantine VTVM and monaural Maico Auraldome headsets for subject and experimenter. Subject sat alone in an I.A.C. booth in a quiet room.

The tape's calibration tone (1 kHz at VU=0) was adjusted with the use of a General Radio sound level meter and NBS 9A coupler to be 85 dB SPL at 10 dB attenuation. Thereafter, the voltmeter confirmed linear attenuation to the lowest limit of the voltmeter. A sound level meter check was made before each day's session.

### Procedure.

Four playback levels, 11, 13, 15, and 17 dB SPL were used on each of the three lists; 5 subjects from each group were run at each level, for a total of 20 subjects in each group. Each subject was tested on all three lists at his

specific level. The order of lists was counterbalanced among the 5 subjects of each sub-group. The counterbalancing design was, of necessity, incomplete since there were only 5 subjects in each sub-group; however, the order is not important for this design, and the counterbalancing was designed for the articulation function data. The counterbalancing design was the same for each sub-group.

Before participating, members of the Favorable Conditions Group were shown the equipment and were told the nature and purpose of an articulation function; after completing the first list, they were encouraged and informed that they were doing fine for the intensity level used.

Before participating, members of the Unfavorable Conditions Group were told by the experimenter that they would be finished in time to get lunch if they were lucky. They were told nothing of the nature of the experiment, nor were they informed of their progress at any time. They were given only enough instructions to carry out the task.

For all 40 subjects, each was seated alone in a student chair in the sound booth with the right earphone on the ear which had met the criterion, and was told that he would hear sentences which he must recall and write down. He was given practice on Revised C.I.D. List B, consisting of the first three sentences played at a level 10 dB above the test level of his sub-group, the next two played at 5 dB above test level, and the

last 5 played at the test level. The subject was then given a pencil and 3 numbered 5" by 8" cards for writing his responses. He was told to write down whatever he heard of each sentence after it was played. He was informed that the experimenter outside could be seen through the window and would signal the beginning of each sentence, and that he would be given as much time as necessary to record his response. If nothing at all could be recalled, a line was to be drawn across that space. After each list was completed, there was a 2-min. break during which the door was opened and the subject could remove the earphones if he wished.

Upon completion of the last list, each subject was given a debriefing.

The Revised C.I.D. Sentence Lists are scored on the basis of key words correct. Each subject's average score for all three lists was computed. The mean of the average scores was computed for each group.

## RESULTS

The data are summarized in Table I. The predetermined level of probability for significance was .05. The group means were statistically analyzed for significance of difference using the t-test for two randomized groups.

The method of selection and treatment of enlisted men was varied but did not significantly affect performance on a listening task.



Table I. Mean Correct Recalls of Revised C.I.D. Lists A, C, & E  
and t-value for 38 Degrees of Freedom

GROUP CONDITION	MEAN SCORE	OBTAINED t-value
UNFAVORABLE	14.7	.021*
FAVORABLE	15.7	
		*t-value required for significance to .05 level is .675.

#### DISCUSSION

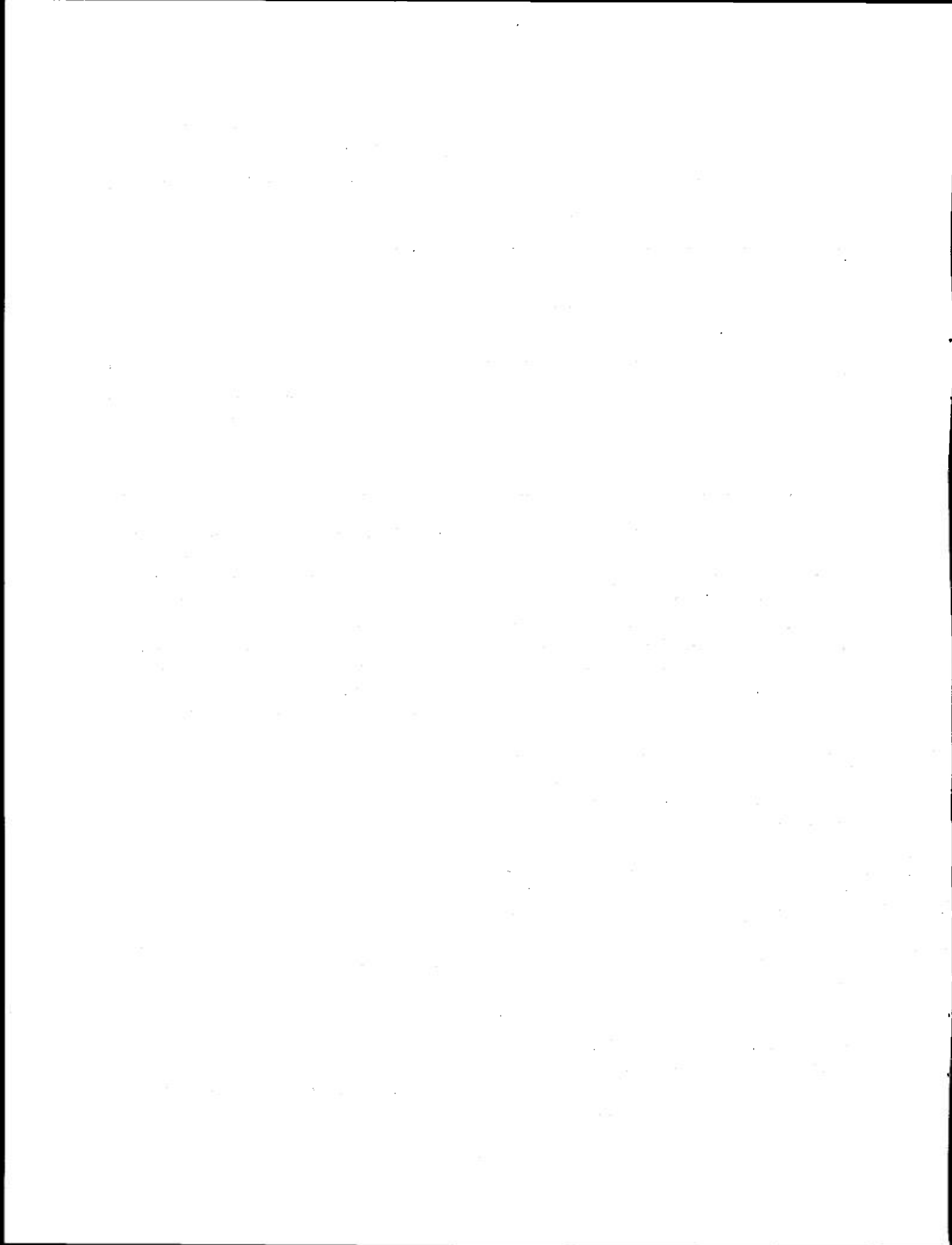
It is not clear why the quite different methods of handling men did not significantly affect performance. However, the debriefing interviews reveal that the attitudes of the members of the two groups may well be, for all practical purposes, identical. During discussions at debriefing, members of the Unfavorable Group suggested that they have been treated so impersonally at recent recruit training that they had become "conditioned" to receiving such treatment in the military service and that no at-all-reasonable personnel interactions could distress them. Also, many commented that they were so highly motivated about the prospects of entering Submarine School that no such activities as we engaged in would bother them.

Thus, while for the direction of personnel in the Auditory Research Branch the results suggest that no special inquiry need be made into personnel procedures, it is true that the

assumptions underlying the hypothesis may not have been adequately tested. A real lowering of motivation might still prove detrimental to the performance demanded here, though it is likely that on tasks of this type, not necessarily confined to the auditory sphere, generally well-motivated men are practically immune to occasional mishandling.

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3. Rowe, A. S. The effect of manifest anxiety and situational stress on tasks of attention. Unpubl. Ph.D. theses, The Catholic University of America, 1969.



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