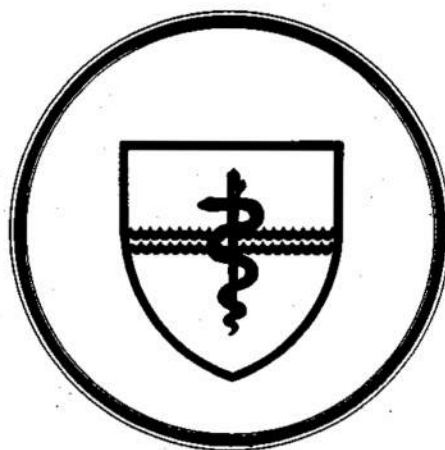


**NAVAL SUBMARINE MEDICAL
RESEARCH LABORATORY
SUBMARINE BASE, GROTON, CONN.**



REPORT NUMBER 959

HANDEDNESS IN NAVY AND STUDENT POPULATIONS

by

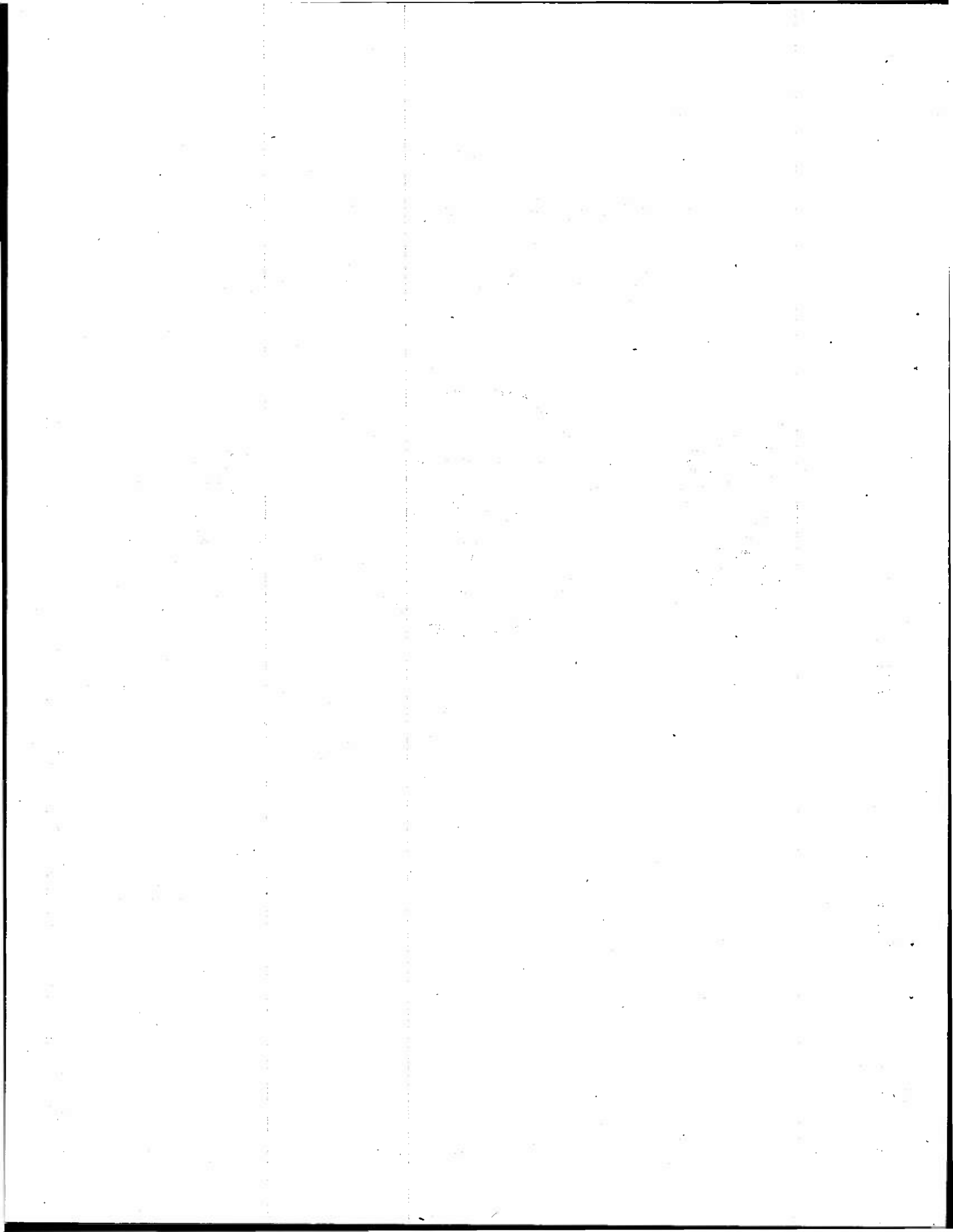
Christine L. Schlichting

Naval Medical Research and Development Command
Research Work Unit MR041.01.03-0155

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W. C. Milroy, CAPT, MC, USN
Commanding Officer
Naval Submarine Medical Research Laboratory

November 1982



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Christine L. Schlichting, Ph.D.

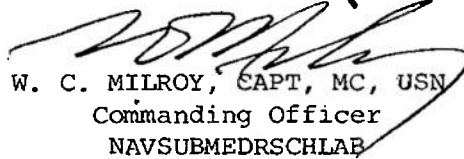
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SUMMARY PAGE

Problem

To determine whether the distribution of handedness differs among various Navy and student populations.

Findings

Three different groups of Navy men all differ significantly from a student population in that the Navy groups have more mixed-handed individuals.

Application

These results address the use of handedness questionnaires to form conclusions about the patterns of cerebral dominance required for different occupations and suggest caution is advised.

ADMINISTRATIVE INFORMATION

This investigation was undertaken under Naval Medical Research and Development Command Work Unit MR041.01.03-0155 -"Prediction of the performance of submarine watch standers by various indices of cortical functioning." This report was submitted for review on 29 July 1981 and approved for publication on 1 Sep 1981. It was designated as NavSubMedRschLab Report No. 959.

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HANDEDNESS IN NAVY AND STUDENT POPULATIONS¹

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Summary.—Briggs and Nebes' (1975) handedness questionnaire was administered to three different groups of Navy men. Analysis showed fewer left-handers and more mixed-handers than the data from Briggs and Nebes' study. Possible reasons for the differences and their implications are discussed.

Many researchers have investigated the relationship between handedness and cerebral dominance for various language and visuospatial tasks (Carter-Saltzman, 1979; Kocel, 1977; McGlone & Davidson, 1973). In general the approach used has been to administer a handedness questionnaire or series of motor tests to subjects and similarly to test their performance on a perceptual or cognitive test of interest. Conclusions are then drawn as to the pattern of hemispheric dominance for that task and its relationship to handedness. There appears to be, however, very little research that has examined the distribution of handedness across different groups of subjects. If it can be shown that different groups show different patterns of response on the same handedness questionnaire, then researchers must be particularly cautious in drawing conclusions relating handedness as measured by questionnaires to cerebral dominance across different groups.

This study began, in line with Levy's work (1974), with the observation that very few U. S. Navy sonar operators were classified as left-handed by a standard handedness questionnaire. Because the job performed by these men consists mainly of visuospatial tasks (Kinney & Luria, 1980), this seemed to support Levy's hypothesis (1969) that left handers are less clearly lateralized and suffer from deficits in some perceptual tasks. To examine this question the Briggs and Nebes' (1975) handedness questionnaire was administered to 289 Navy sonarmen; essentially all of those sonar operators receiving training at a local Navy Sonar School. The results did suggest that fewer Navy sonar operators were classified as left-handed.

One criticism of this finding, however, addressed the question of whether the student population in the Briggs and Nebes' paper (1975) was an appropriate comparison group. This study, therefore, examines this criticism. The Briggs and Nebes' questionnaire was administered to two additional U. S.

¹This work was done under Naval Medical Research and Development Command Work Unit MR041.01.03-0155. The author acknowledges the help of the men of the United States Naval Submarine School, the Naval Submarine Medical Center, and the USS *Fulton* in obtaining the completed questionnaires.

²Reprint requests from Dr. C. Schlichting, Naval Submarine Medical Research Laboratory, Naval Submarine Base, Groton, CT 06349-0900.

Navy subpopulations, Navy corpsmen and a selection of similarly-aged men serving on board a Navy surface ship in job categories that do not have the same strict intelligence requirements as the former two Navy job categories.

METHOD

Subjects

There were three groups of male subjects. The first group was comprised of 289 U. S. Navy sonarmen. This group included all of the sonarmen who participated in an advanced sonar training school over a period of several months. The second group was comprised of 113 U. S. Naval corpsmen working in several hospital services at a Regional Navy Medical Center.

The third group was comprised of 238 U. S. Navy enlisted men stationed aboard a U. S. Navy submarine tender. This group included men with several different job rates, such as hull technician, ship serviceman, and machinery repairman, and includes all the men with those rates on board the ship. There was no overlap of this group with the above two groups.

Procedure

Each subject was asked to fill out the Briggs and Nebes' (1975) handedness questionnaire. Hand use on 12 tests was assessed. On each item subjects could answer either always right, usually right, no preference, usually left, or always left. A plus two, plus one, 0, minus one and minus two were scored, respectively, for each answer.

Questionnaires were administered to small groups of subjects. The size of these groups averaged about 10 men, and each of these small groups was comprised totally of men from one of the above three groups.

RESULTS

Briggs and Nebes (1975) divided their subjects into three handedness categories based on the scoring system described above. An individual was considered right-handed if his total score on the 12 items was $\geq +9$ or above, left-handed if ≤ -9 or below, and mixed handed if the total score fell between -8 and $+8$.

Table 1 presents the breakdown into handedness groups of the male subjects in the Briggs and Nebes (1975) and the Navy groups. There are no significant differences among the three Navy groups as measured by a chi squared ($2.91, df = 4, p = .57$). The three groups were therefore combined. This combined Navy group differs from the Briggs and Nebes group ($\chi^2 = 11.92, df = 2, p < .003$) in that there is a large percentage of individuals whose handedness scores fall in the mixed handedness category. Both the right-handed and the left-handed categories are reduced to achieve this increase in mixed handedness of the combined Navy group.

TABLE 1
NUMBER OF SUBJECTS AND PERCENTAGE OF TOTAL GROUP IN EACH
OF THREE HANDEDNESS CATEGORIES

Handedness Category	Briggs & Nebes		Combined Navy		Navy Subgroups					
	M	%	M	%	Sonarmen		Corpsmen		Submarine Tender	
					M	%	M	%	M	%
Right	710	85.4	523	81.7	242	83.7	94	83.1	187	78.5
Mixed	47	5.7	67	10.5	27	9.3	12	10.6	28	11.8
Left	74	8.9	74	7.8	20	6.9	7	6.2	23	9.7
Total	831		640		289		113		238	

Note.—Data are shown for a population of male students (Briggs & Nebes, 1975) and for a group of U. S. Navy men and three subgroups.

DISCUSSION

There are several possible reasons why two large groups of male individuals will show significantly different patterns of answers on the same handedness inventory. First is the fact that, although the men were comparable in age at the time of testing, eight years separate the data collection from the two groups. Differences among cohort-groups in cross-sectional studies are common (Anastasi, 1976; Damon, 1965). Second, although it is impossible to determine at this stage, the groups may be drawn from different geographical areas: the Navy population probably comes from a wider area.

Finally, one group is a university sample while the other is not. However, it is unlikely that differences in intellectual abilities as measured by intelligence tests are the reason; two of the Navy sub-groups (the sonar operators and the corpsmen) are selected on the basis of their intelligence-test scores, but they did not differ from the third Navy group.

The important conclusion is that the measurement of differences in handedness using questionnaires and the subsequent relation of these differences to cognitive functions may lead to spurious conclusions since all of the relevant variables affecting this measure have not been determined.

A related problem is the use of several different questionnaires by investigators (Oldfield, 1971; Annett, 1970; White & Ashton, 1976). In this vein, recent research (Provins, Milner, & Kerr, 1982) indicates that reported handedness will vary considerably depending upon the set of questions asked. The measurement of left-handedness seems to be particularly affected by the method of measurement. At the very least an attempt should be made to use one standardized questionnaire and a consistent scoring method. The reliability and validity of particular handedness questionnaire items have been assessed by several authors (Annett, 1970; Raczkowski, Kalat, & Nebes, 1974; White & Ashton, 1976), and in general these studies suggest that a shortened version of

existing questionnaires would yield greater validity. Provins, Milner, and Kerr (1982), however, suggest that a longer questionnaire may be more appropriate. As yet no such questionnaire has been developed and tested. Development of such a standardized test should certainly be pursued.

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advised in relating results on handedness questionnaires to the cognitive functioning required by different occupations.

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