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AN EMPIRICAL ANALYSIS RELATING THE LEARNING STYLE INVENTORY TO MEMORY AND LOGICAL ABILITY

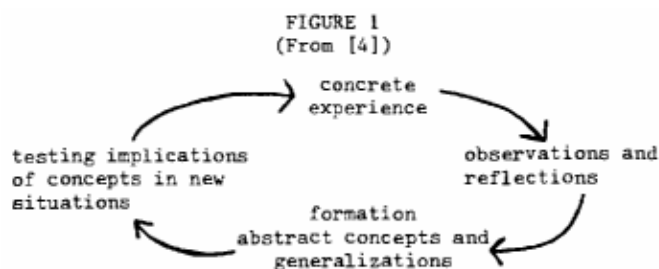Johanna S. Hunsaker, San Diego State University

ABSTRACT

The purpose of this study was to correlate the Learning Style Inventory to memorization and logical reasoning ability. The sample consisted of 64 armed forces en- listees. They were administered the Wechsler Memory Scale and the Learning Style Inventory. The enlistees' scores on the Armed Service Vocational Aptitude Battery were obtained. This study investigated the relationship between subjects' career choices, their LSI, and memory and logical reasoning scores.

BACKGROUND

Despite the recent controversy which suggests that Kolb's [41 Learning Style Inventory does not measure learning style [1;2], this paper will examine Kolb's theory and attempt to correlate the LSI with memory and logical reasoning ability.

The Learning Style Inventory [4] measures an individual's perception of his/her learning style. It asks the subject to rank sets of four words in the order that best describes their learning ability. The LSI measures an individual's relative emphasis on four learning abilities: concrete experience (CE); reflective observation (RO); abstract conceptualization (AC); and active experimentation (AE). Kolb suggests that people learn in a cyclic fashion, as shown in Figure 1.

FIGURE 1
(From [4])

To learn, one starts by experiencing something concrete, reflects on the experience, making observations. These observations are formed into a theory, which is used in testing a new situation. Kolb extends his theory to say that individuals learn by using different primary styles. The style most commonly used is the primary learning style.

According to Kolb [4] learning style is based on many factors, including heredity and past experiences. This leads us to postulate that learning style is a function of mental capability. This can be further broken down into two major components: memory and logical reasoning power. Different learning styles can be expected to coincide with either memory and/or logical ability.

If an individual's memory is powerful in comparison to his/her logical ability, it would be expected that he would utilize the concrete experience and reflective observation styles most often. This is due to the fact that CE and RO both involve thinking about past experiences. If, however, a persons ability exceeded his memory capacity, he/she would rely on active conceptualization and active experimentation. Both of these do not rely on past experience, and therefore are not related to memory. AE and AC rely predominantly on logical ability. The idea of active conceptualization is almost a definition for use of logical ability.

Several experimental studies have been performed to determine the effect of both past experience and present environment on LSI scores. Hudson [3] has shown that primary learning styles correlate with profession. Similarly, Kolb [5] maintains that undergraduate majors are correlated to LSI scores, as shown in Figure 2 (on the following page).

Plovnick [6] conducted an investigation of medical career choice using the LSI. Plovnick assumed the LSI would serve as a predictor of individual, career choice and also that it would reflect the individual receptiveness to different sources of information that influenced career choice. He offers a somewhat qualified acceptance of the LSI as a predictor of career choice.

The present study investigated eight hypotheses about scholastic courses of study and profession in relation to LSI scores. The hypotheses are presented in operational terms in the following section.

METHOD

Subjects

The sample consisted of 64 armed force enlistees attending the Broadened Opportunity for Officer Selection Training (BOOST) school at the Naval Training Center in San Diego, California.

The test subjects belong to three sections of the armed forces. Seventy-eight percent of the sample were Navy personnel, 19% were Marines, and 5% were Coastguard personnel. The majority (95%) of the Naval and Coastguard personnel held the rank of Petty Officer. The Marines were all sergeants. The sample included 6.3% women, all of whom were Naval personnel. The subjects ranged in age from 18 to 25 years, with 91.1% falling between the ages of 18 and 21 years of age. The average level of education in the sample was 11.9% years.
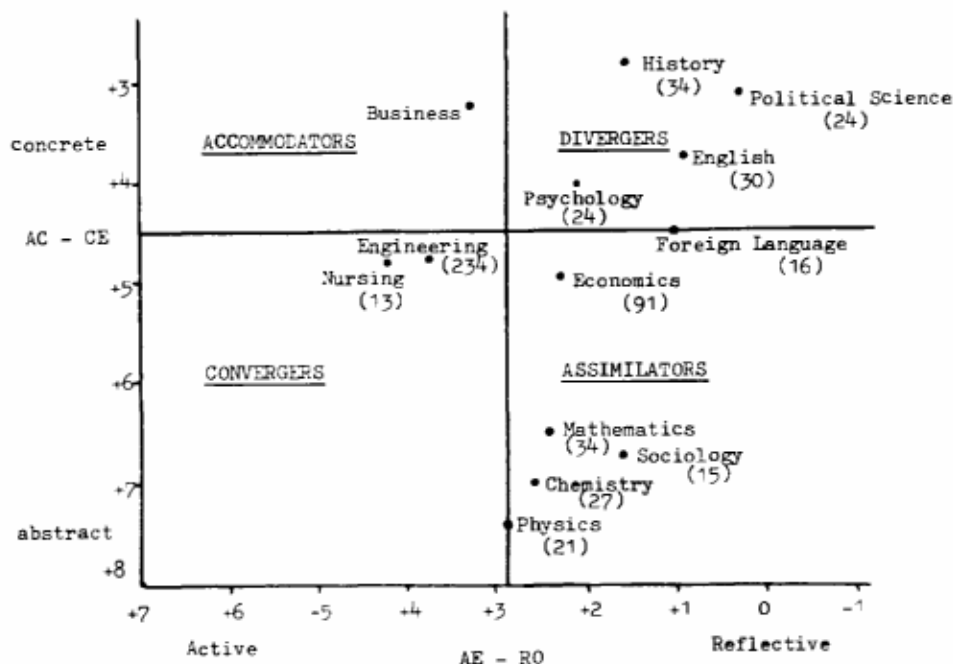
Test Instruments

Two test instruments were employed: the Wechsler Memory Scale, adapted for mass administration, and the Learning Style Inventory. The Wechsler Memory Scale is usually administered orally, and the test consists of seven sub sections designed to evaluate both short and long term memory. The Learning Style Inventory consists of nine sets of four words, which the subjects are to rank in the order that they believe characterize their learning style.

In addition to the two tests, the subjects were asked for demographic background, their career objectives and the "currently enrolled class in which their performance was the highest."

FIGURE 2
Average LSI Scores on Active/Reflective (AE - RO)
and Abstract/Concrete (AC - CE) by
Undergraduate College Major [5]

Procedure

Both the Wechsler Memory Scale and Learning Style Inventory were administered during scheduled class time. Proctors were used to prevent viewing of adjacent answer sheets, to ensure that the testees followed test design and to enforce the "pencil up, pencil down" commands.

Ancillary Data

Armed Service Vocational Aptitude Battery (ASVAB) scores were obtained for all subjects. The ASVAB inventory is composed of two general aptitude and several vocational tests.

The two general tests are :   1) Arithmetic Reasoning (AR): a test of numerical aptitude, consisting of arithmetic reasoning and logical problem solving items; 2) Word Knowledge (WK): a measure of the ability to define and comprehend words (vocabulary items).

Additional Variables

Before obtaining results, a composite variable to represent the relative importance of memory and logical ability had to be developed. The logic score was determined by the AR section of the ASVAB. Memory ability is represented by the Wechsler Memory Scale score. Thus, in order to state which variable memory or logical ability dominates, and by how much, a third variable was required. This variable had to be free of effects due to the differences in means and standard deviations in test scores. Two simple possibilities exist....
      mean = mean score of respective test S.D.

$$\text{memory} - \text{logical ratio} = \frac{\text{mem} - \text{mean mem}}{\text{S.D.}_{\text{mem}}} \div \frac{\text{log} - \text{mean}}{\text{S.D.}_{\text{log}}}\text{log}$$

and
$$\text{memory} - \text{logical diff.} = \frac{\text{mem} - \text{mean mem}}{\text{S.D.}_{\text{mem}}} - \frac{\text{log} - \text{mean}}{\text{S.D.}_{\text{log}}}\text{log}$$

where
      mem = memory scale score
      log = logical score (AR)

standard deviation of respective test

Both scores represent the relative amount of dominance of memory over logical ability. The memory-logical difference is probably a more desired measure when using linear regression, because the measure itself is linear. Both measures were used in analyzing the data for this project.

Hypotheses

The following hypotheses were proposed in the present study.

1.   A positive correlation exists between the memory to logical relationships and RO.

2.   A positive correlation exists between the memory to logical relationships and CE.

3.   A negative correlation exists between the memory to logical relationship and AC.

4.   A negative correlation exists between the memory to logical relationship and AE.

5.   A negative correlation exists between the memory to logical relationship and AC/CE.

6.   A negative correlation exists between the memory to logical relationship and AE/RO.

Two other hypotheses were proposed to verify others' results. They were:

7.   Subjects stating a desire for a liberal arts profession will have low AE/RO and AC/CE scores.

8.   Subjects stating a desire for a scientific profession will have   high   AC/CE   scores.

RESULTS

The presentation of test data centers on individual test data and analysis to provide information concerning the above hypotheses.

Test Data

The Arithmetic Reasoning section of the ASVAB test scores was used as a measure of logical reasoning ability. Results of the test ranged from 47 to 68, with a mean of 59.2. The reliability of this test is suspect. "In general, the ASVAB's five subtests are too short, and therefore their reliabilities are very low.. Median reliability for the subtests is .82. Reliabilities in this range are inappropriate for individual measurement." [7] However, additional tests for logical reasoning were foregone due to time constraints.

The subjects' memories were tested using the Wechsler Memory Scale, Form 1. The mean score was 106.464. When compared to the adjusted national average of 100, the difference is statistically significant beyond the .01 level.

LSI means were: CE, 14.0; RO, 13.9; AC, 17.0; and AE, 16.5. The means for the difference terms were: AC/CE, 2.9 and AE/R0, 2.6. This indicates that the sample falls in the diverger section of the LSI diagram.

Hypotheses

To assist in the presentation of results, each of the hypotheses has been restated, followed by the method of analysis and results obtained.

1.   A positive correlation exists between the memory to logical relationship and RO.

2.   A positive correlation exists between the memory to logical relationship and CE.

3.   A negative correlation exists between the memory to logical relationship and AC.

4.   A negative correlation exists between the memory to logical relationship and AE.

5.   A negative correlation exists between the memory to logical relationship and AC/CE.

6.   A negative correlation exists between the memory to logical relationship and AE/R0.

Pearsonian zero-order correlations were calculated. The T statistic was used to verify statistical significance. Using a 90% confidence level, none of the correlations were statistically significant. Therefore, the relationship between the LSI and the memory-logic measures has not been determined. More accurate experimental procedures are warranted, however, as the variables tended toward a slight correlation in the direction of hypotheses.

T statistics were computed to determine the validity of hypotheses 7 and 8. Those students with low AE/RO and AC/CE scores tended to anticipate a career in the field of liberal arts. The T statistic was 2.94 ($p < .005$). Thus hypothesis 7 has been verified. The relationship between those choosing a scientific profession and having high AE/R0 and AC/CE scores is not as clear. The related T statistic is .72. This figure is only significant to a 75% confidence level.

Summary

No statistically significant correlation between memory to logical ability and LSI scores was found to exist. Significant correlation does exist, however, between LSI scores and career choice.

Several sources of error might have influenced the first attempted correlation. First, the LSI has limited value for those with a limited vocabulary. Secondly, the Arithmetic Reasoning section of the ASVAB did not appear to be an accurate indication of logical ability. There was only a slight correlation between the AR test and grades in the subjects' physics class, a logical reasoning course of study.

Continued testing is warranted to determine if a statistically significant correlation exists between the relative power of memory and logical ability, and LSI scores. Further testing should concentrate on using a better test for logical reasoning ability, and to better match the vocabulary of the subjects to the descriptive words used in the LSI.

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