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SAUNDERS, MINTA M. : A Cross-validation of the Welsh Origen-
Intelligence Keys for the Strong Vocational Interest Blank. (1968)
Directed by: Dr. V. Jean Spruill pp. 36

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An examination of the relationship of grade point average to key measures indicated that the keys are related to and predictive of

college performance. When measured by the keys, Ss identified as having Hi O, Lo I showed a significantly higher grade point average than those identified as having Lo O and Lo I; Hi O in combination with Hi I did not reflect a significantly better GPA than the Lo O, Hi I combination in the present study. Thus, guidance counselors should be able to obtain useful information from the converted key scores in addition to the information obtained from the Strong when it is used in the traditional way.

A CROSS-VALIDATION OF THE
WELSH ORIGENCE-INTELLIGENCE KEYS
FOR THE STRONG VOCATIONAL INTEREST BLANK

by

Minta M. Saunders

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Approved by

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Much progress has been made in developing intelligence tests and in developing an acceptable definition for the concept of intelligence.

In the area of creativity, however, testing and definition lag far behind; although, as early as 1883, Galton's Inquiries into Human Faculty explored the possibility of the study of individual variation in what he called "imagination." In the psychological literature we can trace some continuing interest in "imagination," "inventiveness," "creativity," or "originality," but this attribute of behavior did not attract the attention which intelligence and intelligence testing attracted, perhaps due to the upsurge of interest in the latter area that resulted from the needs of World War I. Perhaps another reason for the sparseness of research in "creativity" as opposed to "intelligence" was the strict behaviorism of the Watsonian era, which placed an elusive quality like "creativity" in the category of human behaviors too unscientific for psychological investigation.

Spearman's Creative Mind (1930) brought the subject of creativity to focus again, and it was followed by Thurstone's investigation of multiple factors in intelligence tests. Thurstone gave particular concern to the possibility that there were intellectual areas, such as creativity, not covered by intelligence as it was conceptualized.

In order to examine the subject of creativity in its historical perspective, it is necessary to consider the tremendous influence

of Guilford's three dimensional model, "The Structure of Intellect" (1956); his factor analysis of a large battery of creativity tests; and his American Psychological Association presidential address in 1950 on the subject of creativity. Guilford conceptualizes creativity as a kind of intelligence which emphasizes "divergent" rather than "convergent" thinking. Although he views creativity as a kind of intelligence he did point out in his APA presidential address (1950) that "...we must look well beyond the boundaries of the IQ if we are to fathom the domain of creativity." Following these contributions by Guilford, a vast amount of research, applying the scientific method to the exploration of creativity, is evidenced in research journals, symposia, and seminars (see the Stein and Heinze, 1960, annotated bibliographical volume, and the French and Italian bibliographies prepared by Bédard, 1959, 1960).

Thurstone (1952) took the view that "...to be extremely intelligent is not the same as to be gifted in creative work. This may be taken as an hypothesis." This same idea is expressed in slightly different ways by other researchers but with the same underlying concept. For example, Clark, et al. (1965) report evidence that there is a dimension of cognitive activity, labeled "divergent thinking," which is separate and distinct from convergent thinking. They used measures of divergent thinking which have one dimension in common: the ability to produce multiple, unique responses to a single stimulus.

Traditional IQ tests were used to measure convergent thinking: the ability to select a single correct response from a series of alternatives or to deduce it from multiple stimuli. Getzels and Jackson (1962) hypothesize two basic cognitive or intellectual modes. One mode "tends toward retaining the known, learning the predetermined, and conserving what is, toward the usual and the expected;" and a second mode "tends toward revising the known, exploring the undetermined and constructing what might be... [and] tends toward the novel and speculative. Both processes are found in all persons but in varying proportions."

As a result of the Terman studies (1947), the gifted child, who for so long had been described as unattractive and possibly neurotic, emerged as a healthier and more attractive personality. Although Terman described other qualities of the gifted, "giftedness" became equated with scores on intelligence tests, or the high IQ. So inextricably interwoven have high intelligence and "giftedness" become, despite repeated evidence that creativity may occur in varying proportions and may be different from intelligence that recognition of the latter fact has been slow. Consequently, identification and measurement of creativity have been slow.

It is very possible that it is incorrect to think of an individual as being intelligent or creative; probably both aptitudes exist to some degree in most individuals, but in varying proportions. It is highly improbable that an individual would be labeled as creative without a

fair share of intelligence. On the other hand, it is a recognizable fact that there are among individuals of comparable IQ some who are judged to be "more creative" than others.

There remains for research the problem of whether or not creativity should be identified as an independent dimension of behavior or whether it should be examined within the broader framework of what is conventionally defined and measured as intelligence; whether the two dimensions are so related that it would be impossible to identify individuals who are high in one and not concomitantly high in the other. Although it is difficult to determine the relationship between divergent thinking and creative behavior, whatever the latter may be, Torrance (1963) reports studies which indicate that measured intelligence and measured creative ability are by no means synonymous.

As early as 1898 we find Dearborn's suggestion that creativity and intelligence might not be closely related. This was evidenced before Binet's intelligence tests were developed. Dearborn (1898) studied the imaginative responses of Harvard students and faculty to a series of ink blots. Two of the "poorest records" of timed imaginative responses were those of a decidedly "intellectual type."

Colvin (1902) studied "inventiveness" in students' compositions and found that rhetorical correctness and organizational ability showed no pronounced relation to imagination and inventiveness,

except in the case of visual imagination. Colvin and Meyer (1906) repeated the study with the same results.

Chassel (1916), in devising tests of originality, reported that performance on IQ tests, word-building, and coding showed a very low correlation with performance on creativity tasks requiring unusual and original responses to novel situations.

Simpson (1922) developed a test to measure the capacity to produce original ideas and reported that any general intelligence test alone does not evaluate "creative energy." He maintained that only by joining a creative test with a typical "reproductive" intelligence test would it be possible to characterize an individual accurately.

The recent interest in creativity has produced a vast number of theoretical views of creativity. It is described as a normally distributed trait, an aptitude trait, and intrapsychic process, a style of life; as that which is seen in all children but few adults, as that which leads to innovation in science, performance in fine arts, or new thoughts; as related to, or equivalent to intelligence, productivity, positive mental health, and originality; it has been described as being caused by self-actualization, and by sublimation and restitution of destructive impulses (Golann, 1963).

It appears that most studies of creativity tend to adopt one of four approaches: the "products" as criteria approach; the "processes"

or stages of development approach; as a personality correlate approach; or through measurement or identification techniques approach (Golann, 1963). With emphasis on Welsh's "measurement technique" approach, this paper is concerned with presenting his theoretical view of creativity against the historical background just covered. Welsh developed scoring keys for the Strong Vocational Interest Blank which he hypothesizes will predict an individual's relative standing on the separate dimensions of creativity and intelligence. The present study was designed to cross-validate his scoring keys.

According to Welsh (1966, a) the present problem in examining creativity lies in the connotation of the word "creativity," and, to remove old views and biases, he suggests the term "origence" to replace the term "creativity." He views origence as completely independent of intelligence, theoretically, conceptually, behaviorally, and statistically. It is presumed to be independent of ability, skill, achievement, capability, talent, or aptitude. Welsh states that "the concept of origence implies a dimension of personality, best described as a temperamental disposition to see the world and deal with events in a perceptually open manner. The origent person appreciates things intuitively and aesthetically rather than rationally and logically; he seeks novelty and change rather than routine and system; he is non-conventional and non-conforming; he is imaginative and empathetic. The actual behavior of origent persons will vary greatly depending on

kinds of interest--scientific, literary, musical, artistic--and the level of competence, but it is hypothesized that an underlying common core of origence will be found in all creative persons no matter what their field of endeavor. "

Welsh (1966, a) also states that the Welsh Figure Preference Test, a nonverbal, nonintellective test which requires only the ability to have and state perceptual preferences, may be the only measuring device which currently evaluates origence independently. Welsh (1966, b) in a study of 368 high school students, reported a significant correlation between two measures of intelligence, the verbal Terman Concept Mastery Test, and the nonverbal D-48; but the correlation of both of these tests with a test of creativity, the Revised Art Scale (RAS) of the Welsh Figure Preference Test, was essentially zero.

Welsh (1966, a) has reported the development of a new measuring instrument, in addition to his Welsh Figure Preference Test, for assessing creativity and intelligence. He has devised four scoring keys for the Strong Vocational Interest Blank (Form M) **which** he believes identify origence (or creativity) and intelligence and predict an individual's relative standing on these two separate dimensions. The four new scoring keys were developed from research data obtained in the summers of 1963, 1964, and 1965 at The Governor's School of North Carolina, a residential summer program for talented adolescents selected from the junior and senior classes of high schools

throughout the state. The Carnegie Corporation Quarterly (1964) gives a complete description of the school.

Using the Revised Art Scale of the Welsh Figure Preference Test as a measure of creativity and the Terman Concept Mastery Test (Form T) as a measure of intelligence, Welsh obtained independent measures on approximately 400 students each summer, for a total of about 1200. Students in the Academic Division had been selected on the basis of high IQ, high scholastic records, and recommendations by school officials; those in the Arts Division had been selected on the basis of demonstrable talent and ability by means of auditions and performance.

Welsh found a correlation of zero between the Terman Scores and the Revised Art Scale scores, which supports his view of creativity, or origence, as a dimension independent of intelligence. As these two measures were not correlated, it was possible to represent the two dimensions on orthogonal axes. From the scatterplot of scores, four groups were formed that fell into the quadrants formed by the two axes. From these groups extremely high and extremely low scores on both dimensions, conjointly, were selected for a total of 240 subjects, with 60 subjects (30 boys and 30 girls) as representative of each of the four groups. Thus a group of 60, constituting approximately five percent of all the scores, represented

one of four combinations as follows:

Group I	Group II
High Origence	High Origence
Low Intelligence	High Intelligence
Group III	Group IV
Low Origence	Low Origence
Low Intelligence	High Intelligence

Welsh uses the term "low intelligence" in a relative sense only; all of these students were at least of average intelligence. Equal numbers of students from the three summers were chosen to comprise the total of 240 subjects, to control for possible changes in selection procedures.

All students were given the Strong Vocational Interest Blank, Form M, and, from a systematic analysis of all the Strong items, Welsh developed four scoring keys that appeared to differentiate the groups represented in the four quadrants. He concluded that these four scoring keys for the Strong should enable the scorer to score each Strong protocol and to predict an individual's relative standing on the measures of origence (creativity) and intelligence. If a subject scored extremely high on any one group key, this group designation could be made for this subject; or, if he scored in the middle of the distribution of scores on all four keys, he should be in the middle range in origence and intelligence.

What appeared to be the next step was a cross-validation of the Welsh keys on Strong data obtained from a new group of subjects

in which some independent assessment of creativity and intelligence could be obtained also. Ideally, a group of subjects representative of a wider range of abilities--a more "unselected sample," as opposed to the highly selected Governor's School students--should be used to reveal more information about the relationship between creativity and intelligence and to determine if the keys would be equally predictive in a more representative sample. If it could be demonstrated that these keys do have this predictive quality, they would be of considerable value as a measuring device.

The following study was designed for the purpose of testing the validity of the keys. The new sample was drawn from Rockingham Community College, where admission is based on a very liberal "open-door" policy. Such a sample would be expected to meet the criterion of an "unselected sample," as these students undergo much less rigorous selection procedures and presumably represent a wider range of abilities, particularly at the lower end of the intellectual distribution.

Subjects

Two hundred thirty-six subjects (126 males, 110 females) from the first year entering class of Rockingham Community College, Wentworth, North Carolina, volunteered for this study.

This group of Ss appeared to be an especially appropriate group for this particular cross-validation study. Although Welsh's sample was drawn from a selected group of students with either demonstrable academic or artistic ability, this sample was drawn from a college whose sole criterion for admission is graduation from high school. In fact, some students are conditionally admitted and are permitted to make up high school deficits while pursuing college work.

Materials

The Revised Art Scale of the Welsh Figure Preference Test was used to secure independent measures of origence or creativity, and the Terman Concept Mastery Test, Form T, to secure independent measures of intelligence. These measures were used to provide information against which the predictiveness of the Welsh scoring keys could be assessed.

The newer form, Form T 399, of the Strong Vocational Interest Blank for Men was chosen in preference to the old form of the Strong used in the original study. The decision to use the new Strong was made on the recommendation of Welsh (personal communication, 1967) who felt that the results would be more meaningful if secured on the

new Strong, which will be used in future research and testing, rather than on a form that is rapidly becoming obsolete.

A revision of the scoring keys for the new Strong has been accomplished by Johnson (1967). Essentially, the revision consisted of deleting items on the old Strong that do not appear on the new. This procedure has resulted in a slight reduction in the number of items for each key, but basically the keys are the same. Key I was reduced from 32 items to 26 items; Key II, from 56 items to 42; Key III, from 35 to 28; and Key IV, from 33 to 29.

Method

The experimenter (E) administered all tests. The necessary oral instructions were given to the Ss either individually or in small groups, and further printed instructions were pointed out. Following such instructions, E offered to answer any question relevant to the tasks. Questions asked usually concerned the kinds of marks, type of pencil or pen, etc., that should be used. E remained in the testing room at all times. The tests were administered over a period of several weeks, due to the intermittent availability of the Ss. Ss were informed that the data were to be used in a cross-validation study and that they would be given the results of the tests at a later date by their guidance counselors at the Ss' request.

Raw scores were computed for the Revised Art Scale (RAS) of the Welsh Figure Preference Test and for the Terman Concept Mastery Test (TCM), Form T. The means and standard deviation for the RAS measures are presented in Table 1; and data from Welsh's sample are given in Table 1 also, for comparative purposes. The TCM means and standard deviations for both samples are shown in Table 2.

For the present sample the Pearson product-moment correlation coefficient between intelligence and creativity, as measured by these two tests, is $+ .04$. This figure is not significantly different from zero. Such a lack of correlation corroborates Welsh's contention that origence (creativity) is a dimension independent of intelligence.

Welsh used the extreme scores in his sample for his item analysis to develop the new keys, but for the new sample there was no precedent for deciding where the axes should intersect in order to place each subject in a particular quadrant. A decision was made to designate anyone who fell above or below the mean for each dimension as high and low, respectively. The Welsh sample mean of 57 on the TCM was used to determine the cut-off point for the intelligence scores. Welsh (personal communication, 1967) felt that both his sample and the new sample had spuriously high origence means. He suggested for the origence dimension that a score of twenty-four (a half standard deviation below the obtained mean) be used, basing this

TABLE 1

MEANS AND STANDARD DEVIATIONS OF RAS

Rockingham Community College

	Male <u>Ss</u>	Female <u>Ss</u>	Total <u>Ss</u>
N	126	110	236
M	28	30.7	29.26
SD	14.87	13.14	14.16

Range: 1 to 59

Governor's School

	Male <u>Ss</u>	Female <u>Ss</u>	Total <u>Ss</u>
N	531	632	1163
M	28.06	32.84	30.65
SD	13.31	14.72	14.27

Range: 0 to 58

TABLE 2
MEANS AND STANDARD DEVIATIONS OF TCM

Rockingham Community College

	Male <u>Ss</u>	Female <u>Ss</u>	Total <u>Ss</u>
N	126	110	236
M	22.02	21.95	21.99
SD	22.02	25.24	23.57

Range: -26 to 124

Governor's School

	Male <u>Ss</u>	Female <u>Ss</u>	Total <u>Ss</u>
N	531	632	1163
M	61.09	53.90	57.18
SD	29.02	28.31	28.87

Range: -31 to 150

change on his experience with RAS scores obtained from Ss already identified and labeled "creative" in terms of their demonstrable products of a creative nature. For purposes of assigning Ss to quadrants to establish some designation against which the Welsh-Strong designation could be assessed quantitatively, this procedure did not allow for those Ss who were neither high nor low but who fell into a middle group. Thus a range of a half standard deviation above and below each axis was designated as a middle range for both dimensions. The following scores were used as cut off points: a score of 17 or less on the RAS was low O; a score of 31 or above on the RAS was high O; a score of 43 or less on the TCM was low I, a score of 72 or higher on the TCM was high I (see Table 3).

Raw scores on the Welsh-Strong keys were converted to standard scores developed from a sample of 301 Stanford University graduates. In determining how to assign subjects to a quadrant designation on the basis of the four key scores, it seemed legitimate to give a subject a quadrant designation if he scored extremely high on one of the four quadrant keys. If a subject scored in the middle of the distribution of scores on all four keys, however, he obviously should be in the middle range of creativity and intelligence, which did not place him neatly in one particular quadrant; accordingly he was omitted. If none of the four key scores was as much as a half standard deviation above the mean (50) the S was excluded. However, if a S had two or more scores that were a half standard deviation above the mean, the S was assigned

TABLE 3

INTERPRETATION AND EXAMPLES OF RAW SCORES
OF RAS AND TCM

RAS Scores (0)	TCM Scores (I)	
35	3	When plotted on orthogonal axes these scores fall in Quadrant I.
15	7	Scores fall in Quadrant III.
39	86	Scores fall in Quadrant II.
6	124	Scores fall in Quadrant IV.
		(The above examples fall above the mean or below the mean and above or below the average ranges and present no problem for assignment to quadrants.)
22	40	This score falls below the 0 mean and below the I mean. Using the axes only (i.e. the mean) as cut-off, this <u>S</u> would be assigned to Quadrant III; for a more stringent quantitative analysis this <u>S</u> was excluded as the scores both fall in the "average range".
55	48	A very Hi 0; "average" I, <u>S</u> excluded.
15	64	A Lo 0; "average" I, <u>S</u> excluded.

to a quadrant only if one of the scores was at least a half standard deviation from the other(s); otherwise, the S was excluded and his score regarded as a tie (see Table 4).

There were 117 Ss who had distinct quadrant placements for both the criterion measures and the Welsh-Strong (W-S) keys. On the Welsh-Strong measures 24% of the Ss place in Quadrant III; 64% in Quadrant I, 5% in Quadrant IV, and 7% in Quadrant II. If the Welsh-Strong keys were not measuring origence and intelligence, then one could assume the Ss were assigned to the key quadrant designations by chance and the above percentages were chance probabilities. Thus the chance probability that the 35 Ss identified in III by the RAS and TCM would also be identified on the Welsh-Strong keys as being in III was 24% of 35, or 8.4 Ss; and so on. Table 5 gives the chance probabilities for agreement and disagreement for all four quadrants.

A chi-square analysis (Table 5) of the degree of agreement between independent measures and key designations proved to be significantly different from chance for Quadrants II and III (.05 level). A binomial test (Table 5) also showed significant agreement ($p < .01$) for Quadrant II. There were no Ss assigned to Quadrant IV by the criterion measures.

TABLE 4

INTERPRETATION AND EXAMPLES OF WELSH-STRONG
 CONVERTED Z-SCORES

III	IV	I	II	
50	31	69	52	<u>S</u> assigned to Quadrant I.
53	41	51	47	S excluded; neither score a half SD above the mean.
64	56	72	54	<u>S</u> assigned to Quadrant I (three scores are above the mean, but 72 is more than a half SD above the score of 64).
56	43	62	65	S excluded; less than a half SD difference between 62 and 65 so score is regarded as a tie.

Note — The key measures are presented in the order shown above when scored by National Computer Service.

TABLE 5
CHI-SQUARE AND BINOMIAL ANALYSIS OF AGREEMENT

Quadrant III (Lo O, Lo I)

N = 35 (RAS-TCM)

	Agree	Disagree
Observed frequencies	15	20
Expected frequencies	8.4	26.6

$$x^2 = 6.84^*$$

Quadrant I (Hi O, Lo I)

N = 75 (RAS-TCM)

	Agree	Disagree
Observed frequencies	58	17
Expected frequencies	48	27

$$x^2 = 5.75^*$$

Quadrant IV (Lo O, Hi I)

N = 0

Note — No Ss assigned to Quad. IV on the basis of RAS-TCM scores.

(cont. next page)

 Quadrant II (Hi O, Hi I)

N = 7 (RAS-TCM)	Agree	Disagree	
Observed frequencies	6	1	Binomial test**
Expected frequencies	.49	6.51	

(P = .07; Q = .93)

*
 ** P < .05
 p < .01

Note--Agree classifications mean the RAS-TCM, and W-S keys place the Ss in the same quadrant (e. g. Quad. III); the disagree classification means the RAS-TCM placed the Ss in a particular quadrant (e. g. Quad. III) but the W-S placed them in another quadrant.

The W-S keys had placed 24% of the total N of Ss in Quad. III; therefore, 24% of the 35 Ss in Quad. III (identified by RAS-TCM), or 8.4 might be expected in Quad. III by chance, and to agree; 76% of 35, or 26.6 might be expected to place in other quadrants, by chance, and to disagree. The same logic applied to the other quadrants; however, with a very small expected frequency for Quad. II a binomial test is required.

The results of the chi-square analysis indicate that there is significantly better than chance agreement (.05 level), and the binomial test indicates significant agreement ($p < .01$) between the RAS-TCM and Welsh-Strong measures and in the key's ability to predict the relative standing of Ss on origence and intelligence. Thus the Welsh-Strong keys, when evaluated against independent measures of origence and intelligence, seem to have some concurrent validity. However, it should be noted that no analysis could be computed for Quadrant IV. E did not test any Ss who could be identified as Lo O, Hi I on the independent measures. There are possibly two reasons for this: the population did not contain many Lo O, Hi I Ss, and/or they did not volunteer. Also, the results for Quadrant II are based on an N of 7. This is, of course, too small an N for adequate determination of validity.

In order to have more reliable and valid results, the study needs to be repeated with more Ss in Quadrants II and IV. Nevertheless, the results of the present study are indicative of a small measure of validity. The ultimate criterion is the usefulness and relation to origent, intelligent behavior. It should of course be kept in mind that whatever validity these keys may have derives from the validity of the RAS and TCM. Therefore, all other factors being equal, the best predictors of origence and intelligence are the RAS and TCM themselves.

In order to evaluate the Welsh-Strong keys further, E was interested in the validity of the keys in predicting college performance.

Accumulative grade point averages (GPA) based on the freshman year plus the first (fall) quarter of the sophomore year were available. There were 79 Ss whose names no longer appear on the college records. Some of these had completed a one year course; a few students had transferred to other schools; others had left due to academic deficiencies.

Although the sample size is small there are a few observations that can be made from this sample by examining grade point averages in relation to the students' scores, and designations, on the Welsh-Strong keys. Accordingly, Table 6 gives the tabulations for the GPA for subjects placed in the various quadrants based on the Welsh-Strong designations only. The trend is seen to be in the expected direction. An analysis of variance (Table 7) showed an F value of 3.79, significant beyond the .05 level. Scheffé comparisons (Ferguson, p. 296) indicate that Ss identified as having Hi I scores on the keys have significantly better mean grade point averages than those identified as having Lo I scores on the keys. The combination of Hi O with Lo I shows a significantly higher mean grade point average than the Lo O, Lo I combination, but Hi O with Hi I does not show a significantly higher GPA than Lo O in combination with Hi I in this sample. It appears that in combination with high intelligence scores, variations in creativity scores reflect very little differences in performance. It is evident, however, that the key designations are related to and

TABLE 6

MEAN GRADE POINT AVERAGE FOR S_s ASSIGNED TO
QUADRANTS BY THE WELSH-STRONG KEYS

No. of S_s	Quadrant	Mean GPA ¹
42	III (Lo O, Lo I)	.94
78	I (Hi O, Lo I)	1.78
7	IV (Lo O, Hi I)	2.14
11	II (Hi O, Hi I)	3.11

¹GPA based on 4.0 scale.

TABLE 7

ANALYSIS OF VARIANCE: GPA FOR FOUR QUADRANTS

Source	dF	SS	MS	F
Between Groups	3	17.99	5.996	3.79*
Within Groups	134	212.98	1.580	
Total	137	229.97		

*P < .05

predictive of college performance.

Experience with the key-converted scores in this sample has led this researcher to feel that it would be possible to develop some skill in evaluating point differences between the key scores and in evaluating the extent of differences above or below the mean (50) for each key score such that more qualitative information about the students would be available.

A guidance counselor using the Welsh-Strong keys would have more information about a student than would be available using the Strong profile in the traditional way. In examining the four key converted Z scores, the counselor would have valid information about a student's relative standing on the dimensions of origence and intelligence.

SUMMARY

The purpose of the present study was to cross-validate Welsh's keys for scoring the Strong Vocational Interest Blank for Men. Welsh hypothesizes that the keys will identify and predict a subject's relative standing, high or low, on the dimensions of origence (creativity) and intelligence.

Independent measures of origence and intelligence were obtained on 117 Ss, and on the basis of these measures Ss were identified as being in one of four quadrant combinations, Lo O, Lo I; Hi O, Lo I; Lo O, Hi I; or Hi O, Hi I. A chi-square analysis of the agreement between the Ss' independent measures (relative standing on O and I) and their placement on the Welsh-Strong keys in one of the four quadrants was significantly different from chance (.05 level) for the Lo O, Lo I and Hi O, Lo I combinations. A binomial test also showed significant agreement ($p < .01$) for the Hi O, Hi I combination. No results could be reported for the key which identifies Lo O, Hi I Ss as there were no Ss assigned to that quadrant by the independent measures. Also, it should be noted that an N of 7 for the Hi O, Hi I Ss is too small to determine validity. The results of the present study do indicate, however, that the keys have some concurrent validity and suggest that the study warrants replication.

An examination of the relationship of grade point average to key measures indicates that the keys are related to and predictive of

college performance. When measured by the keys, Ss identified as having Hi O, Lo I showed a significantly higher grade point average than those identified as having Lo O and Lo I; Hi O in combination with Hi I did not reflect a significantly better GPA than the Lo O, Hi I combination in the present study. Thus, guidance counselors should be able to obtain useful information from the converted key scores in addition to the information obtained from the Strong when it is used in the traditional way.

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APPENDIX A

1. The first part of the report is devoted to a description of the

methodology used in the study. This includes a discussion of the

sample and the data collection process.

2. The second part of the report presents the results of the

1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
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3. The third part of the report discusses the implications of the findings for policy and practice. It also includes a conclusion and a list of references.

4. The fourth part of the report contains a list of tables and figures.

5. The fifth part of the report contains a list of abbreviations and a glossary.

APPENDIX A

6. The sixth part of the report contains a list of footnotes and a list of appendices.

7. The seventh part of the report contains a list of references.

8. The eighth part of the report contains a list of tables and figures.

9. The ninth part of the report contains a list of abbreviations and a glossary.

10. The tenth part of the report contains a list of footnotes and a list of appendices.

WELSH SCORING KEYS FOR SVIB

"L" indicates subject likes that kind of work

"I" indicates the subject is indifferent, that is, doesn't care one way or the other

"D" indicates the subject dislikes that kind of work

Part I	III	IV	I	II
<u>Occupations</u>	Lo O, Lo I	Lo O, Hi I	Hi O, Lo I	Hi O, Hi I

Artist-----	I-----	L
Astronomer-----		L
Athletic Director-----	L-----	D
Author of novel-----		L
Author of technical bk.-----		D
Auto Racer-----	D-----	
Bank Teller-----		D
Building Contractor-----	D-----	I
Cartoonist-----		L
Cashier in Bank-----		D
Civil Engineer-----	D-----	
College Professor-----		L
Editor-----	I-----	L
Employment Manager-----	D-----	
Factory Manager-----		D
Foreign Correspondent-----		L
Laboratory Technician-----	L-----	
Lawyer, Corporation-----	I-----	
Machinist-----	I-----	
Magazine Writer-----		L
Music Teacher-----	L-----	
Office Manager-----	L-----	D
Orchestra Conductor-----	I-----	
Pharmacist-----	L-----	
Playground Director-----	L-----	D
Poet-----	D-----	L
Politician-----	L-----	
Reporter, General-----		L
Scientific Research Worker-----	L-----	
Sculptor-----		L
Statistician-----	L-----	D
Worker in Y.M.C.A.-----	L-----	L

Part II

School Subjects

Algebra-----	L-----	
Arithmetic-----	L-----	
Bookkeeping-----	L-----	
Calculus-----	L-----	D
Chemistry-----		D
Dramatics-----	L-----	
English Composition-----		L

III	IV	I	II
Lo O, Lo I	Lo O, Hi I	Hi O, Lo I	Hi O, Hi I

Geometry ----- L
 Literature----- L
 Mathematics----- L ----- D
 Philosophy----- L
 Physical Education----- L
 Physics----- L----- D

Part III
Amusements

Chess ----- D ----- L
 Poker----- D
 Bridge----- L ----- D ----- I
 Solving Mechanical Puzzles----- L ----- D
 Amusement Parks----- L
 Formal dress affairs----- L
 Art Galleries----- L
 Poetry----- L
 Popular Mechancis magazines-L
 Making a radio or hi-fi set----- D

Part IV
Activities

Operating Machinery----- D
 Giving "first-aid"
 assistance----- L
 Arguments----- D----- L
 Interviewing men for a
 job----- D
 Organizing a play----- L
 Teaching Adults----- D
 Being called by a nickname----- L
 Meeting and directing people----- D
 Acting as cheer-leader----- L
 Methodical work----- L----- D
 Regular hours for work-----L
 Continually changing activities----- I----- L
 Saving money-----L
 Contributing to charities---L
 Climbing along the edge of
 a precipice----- L

Part V
Types of people

Optimists----- L
 People who are natural
 leaders----- L
 People who assume leadership----- I

III	IV	I	II
Lo O, Lo I	Lo O, Hi I	Hi O, Lo I	Hi O, Hi I

Irreligious people----- I
 Very old people-----L
 Fashionably dressed people--L ----- I
 Carelessly dressed people----- I

Activities the subject thinks he would like to
 do most in a series of ten items are marked (1);
 least liked marked (3), remaining items marked (2).

Part VI

Order of
preference of
activities

III	IV	I	II
Lo O, Lo I	Lo O, Hi I	Hi O, Lo I	Hi O, Hi I

Create a new artistic
 effect (that is,
 improve the beauty
 of the machine)----- 2

Steadiness and
 permanence of work----- 3

Opportunity to understand
 just how one's superior expects
 work to be done----- 3

Freedom in working out
 one's own methods of
 doing the work----- 3----- 1

Treasurer of a
 Society or Club----- 1

Chairman, Entertainment
 Committee----- 3-----1

Chairman, Program
 Committee----- 1

Choose item on left or right or mark undecided

Part VII

Preference between Two Items

Headwaiter (III)-----Lighthouse keeper
 Selling things house to house-----Gardening (II)
 Activity that produces tangible returns (III)-----Activity that is
 enjoyed for its own
 sake (II)

III	IV	I	II
Lo 0, Lo I	Lo 0, Hi I	Hi 0, Lo I	Hi 0, Hi I

Taking a chance (II)----- Playing safe (III)
 Selling something for less
 than others sell it----- Selling something
 for more than others
 sell it (I)
 Physical activity (I)----- Mental activity
 Reading a book (II)----- Watching TV or going
 to a movie
 A few close friends (II)----- Many acquaintances (I)

The subject indicates if the item describes him (yes);
 if not, (no); if not sure (?).

Part VIII
Your Abilities and
Characteristics

Have more than my
 share of novel ideas----- no ----- yes
 Plan my work in detail----- no
 Put drive into the organization----- yes
 Stimulate the ambition
 of my associates----- yes _____?

Phrases that best describe:

Complaints annoy me	Rarely	Sometimes(IV)	Quite a bit
Make bets	Often	Sometimes	Rarely (IV)

WILSON COUNTY - INTERCOMMITTEE AND NEWS

STANDARD-BEARING CONTRACTORS YEARLY

1901 Standard Bearer Yearly Contract

1901	1902	1903	1904	1905	1906	1907	1908	1909	1910
1911	1912	1913	1914	1915	1916	1917	1918	1919	1920

APPENDIX B

WELSH ORIGENCE - INTELLIGENCE SVIB KEYS
STANDARD SCORE CONVERSION TABLES

(301 Stanford University Graduates) *
1967

Key I
High Origence
Low Intelligence

Key II
High Origence
High Intelligence

<u>Raw Score</u>	<u>Standard Score</u>	<u>Raw Score</u>	<u>Standard Score</u>
0	31	0	18
1	34	1	20
2	37	2	22
3	40	3	24
4	43	4	25
5	47	5	27
6	50	6	29
7	53	7	31
8	56	8	33
9	59	9	35
10	62	10	37
11	66	11	39
12	69	12	41
13	72	13	42
14	75	14	44
15	78	15	46
16	81	16	48
17	85	17	50
18	88	18	52
19	91	19	54
20	94	20	56
21	97	21	58
22	100	22	59
23	103	23	61
24	107	24	63
25	110	25	65
26	113	26	67
		27	69
		28	71
		29	73
		30	75
		31	76
		32	78
		33	80
		34	82
		35	84
		36	86
		37	88
		38	90
		39	92
		40	93
		41	95
		42	97

WELSH ORIGENCE - INTELLIGENCE SVIB KEYS

STANDARD SCORE CONVERSION TABLES

(301 Stanford University Graduates)
1967

Key III
Low Origence
Low Intelligence

Key IV
Low Origence
High Intelligence

<u>Raw Score</u>	<u>Standard Score</u>	<u>Raw Score</u>	<u>Standard Score</u>
0	22	0	12
1	25	1	15
2	28	2	18
3	30	3	21
4	33	4	24
5	36	5	27
6	39	6	31
7	42	7	34
8	44	8	37
9	47	9	40
10	50	10	43
11	53	11	47
12	56	12	50
13	58	13	53
14	61	14	56
15	64	15	59
16	67	16	62
17	70	17	66
18	72	18	69
19	75	19	72
20	78	20	75
21	81	21	78
22	84	22	82
23	86	23	85
24	89	24	88
25	92	25	91
26	95	26	94
27	98	27	97
28	100	28	101
		29	104