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Social Intelligence: Fact Or Artifact?

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SOCIAL INTELLIGENCE: FACT OR ARTIFACT?

By

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LIFE

Edmund J. Nightingale was born in St. Paul, Minnesota, on January 10, 1941. He graduated from the Christian Brothers' Cretin High School, St. Paul, in 1959.

In 1963, he received his B.A. in philosophy from the Saint Paul Seminary. The S.T.B. and M.A. in theology were received at the Catholic University of Louvain, Belgium, in 1967. Further coursework, in psychology, was taken at the University of Minnesota prior to coming to Loyola to begin the program in clinical psychology.

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CHAPTER I

INTRODUCTION AND REVIEW OF RELATED LITERATURE

Social intelligence has proven as elusive for the personologist as it has seemed obvious to the man on the street. Jackson's observations in 1940 seem as timely now as they were then.

> One of the most impressive facts of today is that one is living in a period of great discovery and rapid social change. Social adaptations and adjustment lag behind material changes and modifications of social norms leaving many people, if not the majority, bewildered as to what is right and desirable in social situations in which they find themselves.
>
> The importance of this problem becomes all the more manifest when we observe persons of mediocre intelligence succeeding in positions where others possessing a much superior intelligence have failed (p. 422).

Twenty-eight years later, Hoepfner and O'Sullivan (1968) echoed the paradox when they concluded that tests of social intelligence may have their chief value "... in their capacity to identify those of relatively low IQ who are gifted in social perception. Many individuals having low general intelligence...may still be considered gifted for they have superior social understanding (p. 343)."

Since Thorndike's (1920) tripartite division of intelligence, investigators have examined a plethora of concepts hypothesized to relate to "...the ability to understand and manage men and women, boys and girls--to act wisely in human relations (Thorndike, 1920, p. 228)." In the light of his own construct, social proficiency, defined as "...the degree of one's effectiveness with other people, or the way in which one handles his relationships with others, (p. 423), " Jackson (1940) discussed and reviewed available

literature on "personality," social competence, social intelligence, sociability, social adjustment, factors in the choice of associates and in the ability to make friends, popularity, social maturity, social success, social recognition, social adaptation, social morality, extroversion, "temperament in harmonious human relationships," likeability, business social intelligence, knowledge of social usage, repulsiveness-attractiveness, successful social contacts, and status-role relationships. West (1958) added social effectiveness to the list. Walker and Foley, (1973) and Shanley, Walker, and Foley (1971) completed the roster with person perception, interpersonal processes, interpersonal competence, social perception, social sensitivity, social insight, role-taking and decentering, and empathy.

The definition of social intelligence, if not its measurement methods, has undergone a progressive convergent-discriminant sharpening process. Popa (1934) outlined the construct.

...The main operations of intelligence as a function of adaptation to social environment are: ability to resolve new problems, ability to memorize and learn, ability to perceive and observe, imagination, judgment, collaboration of certain special abilities and general sociability; social adaptation may be active or passive, that is, one adapts oneself to the social environment as it is, or one adapts the social environment to himself (Jackson, 1940, p. 430).

While Freyd (1924) asserted that social intelligence, like mechanical intelligence, was to be distinguished only behaviorally from conceptual intelligence, Allport (1937) argued for its essential differentiation from other members of Thorndike's (1920) trinity. He called it a trait which is "...developed through opportunity and through interest, upon the basis of a native general intelligence (p. 407)." Studies of early measures of social

intelligence failed to confirm Allport's distinction (cf. Walker & Foley, 1973). Thorndike and Stein (1937) pointed out the strong correlation between abstract intelligence and social intelligence as measured by the Moss Test, and concluded, "it seems doubtful whether any test which is predominately verbal can measure social ability (p. 284)." A more recent study (Bottrill, 1967) of the Moss Test has provided more sanguine hypotheses for similar data, but the face validity of Thorndike and Stein's (1937) objections remains.

A novel approach to the measurement of social intelligence was generated by Guilford's (cf. 1967) development over the last decade of his "structure of intellect" model. Guilford hypothesized some 120 distinct abilities, of which some 30 were identified as behavioral. "The kinds of information subsumed in this content area include feelings, motives, thoughts, intentions, attitudes, or other psychological dispositions which might affect an individual's social behavior (O'Sullivan, Guilford & deMille, 1965, p. 4)." In 1966, The Six Factor Tests of Social Intelligence (listed in Buros [1972] as Tests of Social Intelligence) was published with normative data (O'Sullivan & Guilford, 1966). They defined social intelligence as "behavioral cognition ...the ability to understand the thoughts, feelings, and intentions of other people as manifested in discernible expressional cues (O'Sullivan et al., 1965, p. 6)."

Reviewers' reactions to the new instrument have been mixed (Birbaumer, 1970; Cronbach, 1970; Jackson, 1972; Walker & Foley, 1973). Some have strongly urged that the proof of Guilford's six factors would lie in the gauntlet of Campbell and Fiske's (1959) multitrait-multimethod matrices (Jackson, 1972; Walker & Foley, 1973).

Historically, the most frequent criticism leveled against social intelligence has been its apparent lack of distinction from general or abstract

intelligence (Strang, 1930, 1932; Thorndike & Stein, 1937) and verbal ability (Thorndike, 1936). An acid test would involve measuring a unitary aspect of social intelligence by two independent methods (e.g. verbal and nonverbal) while measuring in like manner the trait with which it has remained confounded --abstract intelligence.

The present study investigates the relationship of one of Guilford's six factors, cognition of behavioral transformations (CBT), and general or abstract intelligence. CBT may be defined as the understanding of behavioral flexibility (cf. O'Sullivan et al., 1965). O'Sullivan et al. (1965) stated "the transformations or redefinition factor (CBT) indicated that the ability to interpret either a gesture, facial expression, a statement, or a whole social situation is unique (p. 30)." CBT was chosen for this study because it lends itself particularly well to the kind of analysis intended (cf. Fiske, 1971). There are two tests, one verbal (Social Translations), the other nonverbal (Picture Exchange), for measuring this factor.

CHAPTER II

TWO MEASURES OF ABSTRACT INTELLIGENCE

Raven (1938, 1941) developed one of the earliest successful nonverbal measures of abstract intelligence, the Progressive Matrices - 1938 test (hereafter, PMT). The literature on the original instrument and its revised successors has been extensive, running to 387 references in Buros (1972). A review of the literature can be found in Burke (1958).

The PMT was derived in principle from Spearman's (1923) Two-Factor theory of intelligence. Spearman considered it the "best of all non-verbal measures of g (1946, p. 202)." PMT seems to have been almost universally regarded as a pure measure of g (Anastasi, 1968; Hall, 1957; Shipley, 1949; Vernon, 1947; Westby, 1953).

Orme (1968) further defined PMT's target construct as being not only a quantitative kind of intelligence, but also

...a qualitative manifestation which corresponds to "impetus" intelligence, i.e., to a higher level of superior capacity characterized by the ability to conceive of that "certain something" above and beyond exerting heightened quantitative effort in problem-solving (p. 95).

Burke and Bingham (1969) used a factor analytic method to further identify g as measured by the PMT.

A varimax rotation, in summary, showed that the Raven Progressive Matrices was positively related to a general factor of intellectual functioning..., negatively related to an age factor, unrelated to a perceptual organization factor (p. 251).

Earlier demonstration (Bingham, Burke, & Murray, 1966) of PMT's measurement of an underlying reasoning ability comes from the high correlation

(.79) with a verbal comprehension factor in the WAIS, first identified by Cohen (1967). Burke's (1958) review of PMT reported a range of g loadings from .84 to .42.

From the literature then, it seems evident that PMT measures "...a person's capacity to form comparisons, reason by analogy, and develop a logical method of thinking...(Westby, 1953, p. 418)."

PMT - 1938 was faulted by a number of investigators for having a ceiling too low to discriminate among those of superior ability (Hall, 1957; Wechsler, 1949; Westby, 1953). In 1947, Raven responded with the Advanced Progressive Matrices - Sets I and II, which he claimed to provide "...a means of assessing all the ordinal, analytical, and integral operations involved in higher thought processes (Wechsler, 1949, p. 420)," differentiating clearly even among those of superior ability. Test-retest reliabilities reportedly ranged from .91 in superior adults to .76 in children aged eleven or less (Wechsler, 1949). Burke and Bingham (1969) reported an odd-even reliability of .92, and correlations with the WAIS of .70 for FSIQ and .76 for PIQ. They failed to indicate whether their instrument was PMT - 1938 or a revised version. Set II was again revised in 1962, eliminating twelve items which contributed little or nothing to the obtained scores of above average adults. The norms provided in the manual are estimated rather than based upon empirical testing (Raven, 1965).

Terman and Oden (1947, 1959) used a verbal method of measuring intellectual capacity or g, in the Concept Mastery Test (CMT). Little work has been done with this instrument outside of the gifted child study for which it was developed. The latest edition of Buros (1972) no longer lists CMT. The previous edition (1965) offered only twelve references.

Two forms of the CMT were produced. The first, later named Form A

(cf. Terman & Oden, 1959) was constructed as a quick and easy method of estimating intellectual ability in the gifted (Terman & Oden, 1947). Experience showed its floor to be too high for use with control groups of normals. A second edition, Form T, (Terman, 1950) was put together, adding simpler items at the top of the scale which had failed to differentiate subjects (Terman & Oden, 1959).

CMT deals chiefly with abstract ideas. Abstractions are the shorthand of the higher thought processes, and a subject's ability to function at the upper intellectual levels is determined largely by the number and variety of concepts at his command and on his ability to see relationships between them (Terman & Oden, 1947, p. 128).

Taylor (1959) described CMT as "...an excellent test for its initial purpose of measuring at a high level, and over a wide range, the ability to recognize (not necessarily produce) verbal concepts and abstractions (p. 322)."

The CMT is an ideal "trait-mate" for use with the PMT. In different ways, both instruments measure the same trait, variously described as abstract intelligence, g, analytic ability, or general intelligence. Cronbach (1970) identified g with fluid or analytic intelligence and divided the ability in hierarchical fashion. The primary divisions were labeled "verbal analytic" and "figural analytic."

Terman and Oden (1947) to the contrary, one caution must be observed in using the CMT. Obtained scores tend to correlate positively with educational level (Anastasi, 1968; Keats, 1959). Hence the design must control for the level of education in studies using this test.

Form T has been found to correlate with Form A .94 to .86 in a test-retest format after a lapse of twelve years (Terman & Oden, 1959). The correlation would probably have been higher if the two forms were of equal diffi-

culty. The concurrent criterion validity of Form A is quite well established. For example (Terman & Oden, 1947), in a sample of Stanford undergraduates having a mean S-B IQ of 136, the CMT correlated .49 with G.P.A. The figure would have been higher if restriction of range had not been operative, as is evident in the Wilson College sample (mean S-B IQ 128), where CMT scores correlated .66 with G.P.A. Correlations with other tests of intelligence ran as high as .76 in the same sample (Terman & Oden, 1947).

The relationship between abstract intelligence and the Tests of Social Intelligence has been investigated in a series of studies (cf. Walker & Foley, 1973). While the obtained correlations have not accounted for a truly substantial portion of the variance, the nagging suspicion of artifactual differences has remained. It is the purpose of the present study to apply heterotrait-heteromethod strategy to discriminate methodological artifact from true trait differences, and to look at the stability of the traits themselves--cognition of behavioral transformations and analytic intelligence.

CHAPTER III

METHOD

Subjects

The subjects were 60 Loyola undergraduates (31 males and 29 females), enrolled in the introductory psychology course. Students in this class fulfill a course requirement by participating in psychology experiments. The students were chosen from the subject pool on the basis of their availability at the time of testing.

Measures

Two tests of cognition of behavioral transformations were administered, Picture Exchange and Social Translations. The tests correlate .38 with one another, and load .51 on the same factor, CBT (O'Sullivan et al., 1965). When their scores are arithmetically summed, the two measures together, in the revised form, have a Spearman-Brown reliability of .67. Taken together in the unrevised form, they load .60 on CBT (O'Sullivan & Guilford, 1966). The loading in the revised form is assumed by the present author to be higher, since it eliminated the weaker items, thus increasing the internal consistency of the measure.

Two tests of abstract or analytic intelligence were used, the Concept Mastery Test - Form T (1950), and the Advanced Progressive Matrices - Sets I and II (1962).

Measuring Procedure

The tests were administered and scored by the author according to the instructions given in the respective manuals except for the usually untimed CMT, upon which a limit of 30 minutes was imposed. Four testing sessions were scheduled. Prior to testing an effort was made to elicit the S's cooperation with the following statement:

The present study is designed to investigate the inter-relationships of certain mental abilities. The results of this study will be shared with you and with others interested in the study of personality, although individual scores will not be identified. Some of the items in these tests will be quite difficult. No one is expected to succeed in all the items. Do as well as you can.

After the testing, S's were debriefed and given a one page explanation of the study with appropriate references.

CHAPTER IV

RESULTS

Table 1 provides the descriptive statistics. A correlation matrix (Table 2) was constructed to examine the relationships of nine variables: age, sex, year in college, Social Translations, Picture Exchange, Advanced Progressive Matrices, Concept Mastery Test (Part I: Synonyms-Antonyms), Concept Mastery Test (Part II: Analogies), and total CMT score. Of these only certain relationships were predicted to be of importance. The other variables were included for heuristic reasons.

The mean sample age was 19.75 years (SD=3.52), with no significant difference in age between the sexes. The males in the group had about a third of a year more schooling than the females, a finding significant at the .05 level. The males performed significantly better ($p<.05$ in a two-tailed test) on the analogies section of the CMT, a finding consistent with the fact that the males had more education than the females. There were no significant differences between male and female Ss on the Social Translations test, unlike the results of Shanley, Walker, and Foley (1971).

The correlation between Picture Exchange and Social Translations replicated the figure of O'Sullivan et al.(1965) of .38 for the unrevised form. Applying the correction for attenuation to the correlation reported for the unrevised form resulted in a figure of .67. Using the revised form reliabilities in a similarly corrected correlation produced a figure of .73 for the present data.

From Table 2 the more limited heterotrait-heteromethod matrix (Table 3) was extracted and closely examined after the manner of Campbell and Fiske (1959). It was anticipated prior to the collection of data that analy-

TABLE 1

Descriptive Statistics for Sample Size, Age, School Year, Social Translations Scores, Picture Exchange Scores, Progressive Matrices Scores, Concept Mastery Parts I, II, and Total Scores, in Means and Standard Deviations.

	Males	Females	Total
N	31	29	60
Age			
M	19.81	19.69	19.75
SD	3.32	3.77	3.52
School year			
M	1.65	1.28	1.47
SD	1.58	.59	1.21
Social Translations			
M	17.32	17.28	17.30
SD	4.12	5.82	4.97
Picture Exchange			
M	10.38	10.28	10.33
SD	2.49	2.15	2.31
PMT			
M	20.23	24.48	22.28
SD	5.17	7.20	6.30
CMT-I			
M	27.83	24.62	26.28
SD	15.41	14.83	15.09
CMT-II			
M	32.13	26.10	29.21
SD	9.77	11.53	10.99
CMT-total			
M	59.95	50.70	55.50
SD	23.29	24.20	23.98

TABLE 2
Full Correlation Matrix

	Variables								
	Sex	Soc. Trans.	Pic. Exchg.	PMT	CMT-I	CMT-II	CMT	Age	School Year
	1	2	3	4	5	6	7	8	9
1	-	.0047	.0242	.1933	.1075	.2762[b]	.1942	.0167	.2651[b]
2		-	.3777[c]	.2782[b]	.2549[b]	.2126	.2578[b]	.0742	.0843
3			-	.4519[c]	.1702	.2359[a]	.2152[a]	-.1689	-.0052
4				-	.2084	.5546[c]	.3853[c]	-.1888	.1248
5					-	.6831[c]	.9423[c]	.2623[b]	.2928[b]
6						-	.8881[c]	-.0187	.2557[b]
7							-	.1565	.3014[b]
8								-	.5242[c]
9									-

[a] $p \leq .05$, one-tailed test.

[b] $p \leq .025$, one-tailed test.

[c] $p \leq .005$, one-tailed test.

TABLE 3

Heterotrait-Heteromethod Matrix

		Verbal (V)				Nonverbal (NV)	
		Soc. Trans. (CBT) 1	CMT-I (AI) 2	CMT-II (AI) 3	CMT (AI) 4	Pic. Exchg. (CBT) 5	PMT (AI) 6
	1	-					
	2	.2549[b]	-				
(V)							
	3	.2126	.6831[c]	-			
	4	.2578[b]	.9423[c]	.8881[c]	-		
	5	.3777[c]	.1702	.2359[a]	.2152[a]	-	
(NV)							
	6	.2782[b]	.2084	.5546[c]	.3853[c]	.4519[c]	-

[a] $p \leq .05$, one-tailed test.

[b] $p \leq .025$, one-tailed test.

[c] $p \leq .005$, one-tailed test.

tic intelligence might be a unitary trait, as pointed out by Cronbach (1970), who suggested a primary dichotomy between verbal and figural analytic intelligence, with a further subdivision of verbal analytic intelligence into verbal-educational and other heretofore unlabeled factors. The correlation of CMT-Part I with Part II was found in this study to be .68, a figure comparable to those reported by Terman (1956) for his normative study (.75) and for the gifted at .76. It seems evident that the CMT is measuring more than one aspect of verbal analytic intelligence, one factor reflecting vocabulary more, the other measuring the ability to use vocabulary in analogies. Terman's own description cited above (Terman & Oden, 1947, p. 128) supports this distinction. Since PMT and CMT-Part II both measure the ability to see relations among abstract items (Anastasi, 1968; Terman, 1956) a more precise matrix (Table 4) may be drawn up, using only these two measures of AI, now more rigorously defined. In this matrix, it is clear that (a) correlations in the validity diagonal are highly significant, (b) the validity values are higher than the other values found in their columns and rows, and (c) the variables correlate more highly with another measure of the same trait than with another trait similarly measured, thus fulfilling the requirements for the convergent and discriminant validation of the construct (Campbell & Fiske, 1959). Further, with the exception of CMT-Part II, in both Tables 3 and 4, the presence of significant method factors is found, apart from the traits investigated.

TABLE 4

Heterotrait-Heteromethod Matrix
Revised

		Verbal (V)		Nonverbal (NV)	
		Soc. Trans. (CBT)	CMT-II (AI)	Pic. Exchg. (CBT)	PMT (AI)
		1	2	3	4
(V)	1	-			
	2	$.2126_{a}$	-		
	3	$\underline{.3777}_{ab}$	.2359	-	
(NV)	4	$.2782_{ac}$	$\underline{.5546}_{b}$	$.4519_{bc}$	-

Note. Coefficients showing same subscripts do not differ from one another at the .05 level (two-tailed).

$\underline{p} \leq .05$ at the obtained value of .2150, one-tailed test.

$\underline{p} \leq .025$ at the obtained value of .2546, one-tailed test.

$\underline{p} \leq .005$ at the obtained value of .3308, one-tailed test.

CHAPTER V

DISCUSSION

From Thorndike (Thorndike, 1936; Thorndike & Stein, 1937) to the present day, the distinct character of social intelligence has been questioned. The possibility of measuring it verbally has been in doubt. Often the measurement paradigms available were simply not powerful enough to tease out the sought distinctiveness. When the measures of social and abstract intelligence were both verbal, for example, and were found to be correlated, the investigator was left with rival hypotheses: (a) he could assume that the two instruments measured the same trait, with obtained differences being due to measurement error, e.g.,differences in test forms using parallel content or completely different content; (b) that one or both instruments was inadequate as a measure of its own construct; or (c) that the obtained correlation was an artifact of identity of method, e.g., the use of words to mediate meaning being the same task in both formats. Such an investigator would have been hard-pressed to choose among these interpretations.

If, on the other hand, his measures did not correlate to any significant degree, he was still left with more than one possible explanation: (a) that his instruments measured truly unrelated traits; or (b) that the methods he used were different enough so as to have masked any real trait similarity or dissimilarity. Once again the experimenter would be limited in his post hoc analysis to speculation with little solid ground for preferring one conclusion over another.

The present study was undertaken in an effort to separate methods from traits in investigating the relationship of social intelligence to abstract intelligence. It depended upon the logic of the Campbell and Fiske

(1959) convergent-discriminant construct validation strategy. Their method required the choice of two traits assumed to be similar, but distinct (in this case SI and AI), and that they be measured simultaneously by means of similar and dissimilar instrumentation. Then the correlation of the single unitary trait was examined across methods, thus testing for trait identity versus similarity of methods (convergent validation). At the same time, the distinction of similar traits within similar methods was sought (discriminant validation). In summary, it required that the same trait measured by different methods correlate more highly with itself than with a similar, but distinct, trait measured by a similar method.

Following Fiske's (1971) refinement of the method, a subconstruct, cognition of behavioral transformations, was chosen as a unitary target narrower than the broad construct of SI. Abstract intelligence, identified with analytic intelligence, was similarly narrowed to the more specific subconstruct of "education of relations" (Spearman, 1923), based upon Cronbach's presentation (1970), Anastasi's (1968) comments about the PMT, and Terman's (1956) description of the CMT. The present data seemed to confirm that distinction.

CBT was found to correlate more highly with itself across methods (verbal and nonverbal) than with AI, a trait thought to be distinct, measured within the same method. Similarly, AI (as measured by PMT and CMT-Part II) correlated more highly with itself across methods than with CBT within methods. The strength of the latter effect was diminished, however, when the full CMT score was used, hence the substitution of Part II for the whole. Some justification for distinguishing the parts of CMT as measures of distinct subconstructs can be found in Futterer's (1973) correlation matrix, though his factor analysis does not support it. Further justification may be had in Fiske's

(1971) distinction of subconstructs according to measuring operations. Subconstructs may be distinguished on the bases of modes, conditions, tasks, and stimuli with increasing precision. In CMT Parts I and II, the tasks differ and may thus be construed as measuring distinct subconstructs.

Thus CBT, a subconstruct of social intelligence after the Guilford structure of intellect model, has been shown to be distinct from eduction of relations, a subconstruct of analytic intelligence; and the distinction seems to be free of measurement artifact.

At the outset, it was not known if SI, or any aspect thereof, could be shown to be distinct from AI or its aspects through the use of the demanding heterotrait-heteromethod matrix. Nor was it forseen that AI, as measured by CMT was not unitary, but duplex. The present study was primarily heuristic in intent. The results prescribed the operational refinement of AI to the eduction of relations, or ability with analogies, in order to avoid weakening the intra-trait correlations. The post hoc logical substitution of the Part II scores on CMT for the whole scores was understandable, but lacked scientific rigor. Prediction has power and elegance not to be found in postdiction. A second study utilizing the suggested refinement of measure would be necessary for complete acceptability of the present author's findings.

CHAPTER VI

SUMMARY

The study of social intelligence, as a trait distinct from abstract intelligence, has been complicated by methodological problems which left the status of the variable in doubt.

In the present study heterotrait-heteromethod construct validity strategy was applied to the problem. An aspect of social intelligence, cognition of behavioral transformations, was measured using verbal and non-verbal instrumentation. Abstract intelligence, narrowly defined as the ability to deal with analogies, was similarly measured. It was hoped that the two traits would be shown distinct on grounds other than measurement artifact.

The subjects were 31 male and 29 female Loyola undergraduates.

Although there were some unforseen difficulties introduced into the results by the nature of one of the instruments, the overall picture seemed to confirm the distinct character of the traits from one another. The author suggested that another study using a more unitary measure of analytic intelligence would lead to unequivocal findings.

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APPROVAL SHEET

The thesis submitted by Edmund J. Nightingale has been read and approved by members of the Department of Psychology.

The final copies have been examined by the director of the thesis and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the thesis is now given final approval with reference to content and form.

The thesis is therefore accepted in partial fulfillment of the requirements for the degree of Master of Arts.

5/17/1973
Date

Signature of Advisor