A META-ANALYSIS OF THE RELATIONSHIP BETWEEN EXTRAVERSION-INTROVERSION AND FIELD DEPENDENCE-INDEPENDENCE

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A Meta-Analysis of the Relationship Between Extraversion-Introversion and Field Dependence-Independence

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by

Robert R. Johannes

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To the Graduate and Research Council:

I am submitting herewith a Research Paper, written by Robert R. Johannes: "A Meta-Analysis of the Relationship Between Extraversion-Introversion and Field Dependence-Independence." I have examined the final copy of this paper for form and content, and I recommend that it be accepted in partial fulfillment of the requirements for the degree Master of Science, with a major in Guidance and Counseling.

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William H. Ellis

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CHAPTER 1

Introduction

Numerous investigators have studied the relationship between the perceptual-cognitive variables of field-dependence-independence and the personality dimensions of extraversion-introversion.

A typical extravert is gregarious, has many friends and people to talk to, craves excitement and is generally impulsive, carefree and optimistic. He is also seen as a mover, tending to be aggressive and not always reliable.

A typical introvert is rather quiet, introspective and fond of books rather than people. He is also distant and reserved except with intimate friends. The introvert may be distrustful of momentary impulses, takes life seriously and keeps his feelings under close control. He is seen by others as reliable, somewhat pessimistic and places great value on ethical standards. Extraverts may generate inhibition faster than introverts thereby loosing interest in tasks more quickly. Extraverts also bear pain better and acquire conditioned responses less readily than do introverts (Eysenck, 1983).

According to Loo (1978), introverted persons have been described as being socially withdrawn. Riding and

Dyer (1983), researched the extraverts performance on cognitive tasks, they did not say how but found that extraversion had been shown to affect the learning of programed materials. They also found that using questioned rather than free recall improved the performance of extraverts more than that of introverts. They also discovered that extraverts prefer a different presentation order of learning tasks consisting of visual and verbal material than do introverts.

In discussing the social aspects of introversion, Fine (1972), states that not enough experimental data is available, probably due to the fact that the term itself defines the behavior in such a seemingly obvious way that few investigators have bothered to explore the social phenomena relative to it. He states that introversion is indicative of social withdrawal, lack of contact with the outside world, and over reactive to stress. For whatever the reasons, Fine (1972) states that the introverts incapacity to interact with others keeps him in his own personal isolation chamber.

In their book, Psychological Differentiation Studies of Development, Witkin, Dyk, Faterson, Goodenough and Karp (1962), state that people differ in

the way they orient themselves in space. They further state that, "how individuals orient themselves in space is based upon their preferred mode of perception, which, in turn is linked to a broad and varied array of personal characteristics involving a great many areas of psychological functioning" (1962, pp. 2-4). On the basis of their own studies as well as those of other investigators, it is possible to give a fairly comprehensive psychological characterization of people who have been classified either field dependent or field independent.

Witkin, et el., (1962), characterized field dependent individuals as, those requiring a rather long time to locate a familiar figure hidden in a complex design. They are less likely to attempt to structure ambiguous stimuli since they experience the stimuli as vague and indefinite. They find difficulty with block design, picture completion and object assembly on parts of intelligence tests, yet are no different from more field independent people on other parts of intelligence tests requiring concentrated attention. The authors state that in a perceptual situation field dependent subjects find it difficult to overcome the influence of the surrounding field or separate an item from its

context. Witkin's theme of overcoming embeddedness as being central to all of the tasks purportedly measuring field dependence was later confirmed by Fine & Danforth (1975) in their study on field dependence, extraversion and perception.

Fine, (1972) characterized field dependent individuals as being intolerant of isolation, having better memory of human faces, and being oriented toward social approval.

Chatterjea & Paul (1980) concluded that field dependent individuals constantly require information cues from the field and respond according to the nature of the stimuli. They further categorize field dependent individuals as liking to be with others and affiliation oriented, while field independent persons were described as liking solitary activities and being cold in relation to people.

Chatterjea & Paul (1980) stated that various research shows that field dependent individuals tend to be rather attentive to social information obtained from others behavior and desire to conform to social norms by showing the overly perfectionist view of one's ideal self. It would appear that field dependent individuals use external standards in the formation and maintenance of judgement.

Loo & Townsend (1977) studied the relationship between personality and cognitive style and found that field dependent individual's psychosocial qualities are more directed toward objective reality in the direction of the extraverted temperament. Field dependent individuals are said to be better at recognition of human faces than field independent individuals. Because of poor impulse control and strong adaptation with the social situation, field dependent individuals perform better in the social than non social cognitive activity (Chatterjea & Paul, 1981).

Because of the similarity between the descriptions of various aspects of the constructs of Introversion-extraversion and Field dependence-independence, there is a continuing interest in the possibility of a relationship between the constructs. This paper is a meta-analysis of the literature.

Evans (1967) predicted a positive relationship between field dependence and extraversion. He administered two different measures of field dependence (EFT & DAP) and one measure of extraversion (MPI) to 59 college undergraduates and obtained a Pearson correlation of .39. Evans stated there was a relationship but did not specify a type. Since then

many researchers have tried to establish if a linear or non linear relationship exists between the two constructs.

Fine (1972) hypothesized an antagonistic relationship between dimensions of the two constructs extroversion-introversion and field dependence-independence in that, incidences of measured neuroticism would be significantly greater among field dependent introverts than among any other combination of field dependent and independent dimensions.

To test this Hypothesis he used the Maudsley Personality Inventory (MPI) to measure extraversion and the Gottshaldt Hidden-shapes test to measure field dependence in a sample of male soldiers. Later he administered the MPI and Gottshaldt to 49 male soldiers and determined that field dependent extraverts were the least accurate of four groups at altitude in target detection. The authors concluded that both constructs influenced the accuracy of target detection as they had predicted.

Doyle (1976) used the same sample from a previous study (Doyle, 1975) and found that the field dependent introverts obtained significantly higher neuroticism scores. In 1975 he used the Rod-and-frame test for the

field dependent measure and the Eysenck Personality Inventory (EPI) as the measure of extraversion. He compared the neuroticism scores from the field dependent extravert group of the 1975 study to scores from the Personal Orientation Inventory which is supposed to measure self-actualization. Field dependent extraverts appeared to experience less conflict and to have greater self-actualization potential. Doyle concluded that this present finding meant that field dependent extraverts were more at ease and content in their present situation and more likely to accept their human frailties than field dependent introverts.

Sell & Duckworth (1974) administered the rod and frame test, the embedded figures test (EFT) and the Maudsley personality inventory (MPI) to 66 male undergraduates. They correlated the measure of field dependent-independence with the extraversion score of the Maudsley personality inventory and obtained a Pearson correlation of .27.

Loo & Townsend (1977) hypothesized that covariation between scores of paper-and-pencil tests of field dependence and Eysenk's scale possibly exist because of impulsivity. They suggested that greater field independence is associated with less impulsivity.

They also thought that field independence is associated with slow decision time. Slow decision time would logically go hand in hand with low impulsivity. The authors gave three samples of college students the EPI and the Group Embedded figures test. Different items from each test measured impulsivity, sociability, sensation seeking and decision time. For this paper we will only be concerned with the correlations for field dependence and extraversion. The relationships were nonsignificant in all three samples (see table 1). They state that larger samples with males included may show different results and that the relationship between extraversion and field dependence may have been a function of the timed tests (rod and frame) of field dependence.

Loo (1978) predicted greater introversion would be associated with greater field independence. He administered the GEFT and the EPI to 66 females in undergraduate psychology courses. He found a negative correlation (-.24) indicating that greater introversion was associated with greater field independence.

Pearson (1972) hypothesized that field dependent individuals have a need to gain social approval based

on lie scale scores from the EPI. Lie scale scores have been considered to measure social desirability response set. He administered the Jackson Short Form of the Embedded Figures Test (JSFEFT) to measure field dependence and the EPI to measure extraversion to 30 neurotic patients (15 males, 15 females). He found that field dependent persons have a greater need for social approval (r = .48). He did not find a significant correlation between field dependence and extraversion (.04).

Hughes, Hall and Chambers (1978) replicated Loo's 1976 study using a different population (33 males and 34 females). They administered the EFT and the EPI but did not find a significant correlation between field dependence and extraversion (.05). The authors failed to confirm Loo's results and suggested considerable more research. They attributed their failure to confirm Loo's results to either differences in the GEFT and EFT, inclusion of male subjects or the use of form B of the EPI.

Carter and Loo (1979) used the GEFT and the Eysenk Personality Questionnaire (EPQ) to investigate Fine's hypothesis that field dependent introverts have a higher rate of neuroticism . They did not find a

significant relationship between field dependence and extraversion for either sex. There was a slight significance in that the ratio of field dependence to introversion in females was 7/10, much higher than any of the other four combinations.

Chatterjea & Paul (1980), attempted to verify their assumptions that, (a) perhaps there are significant differences between sexes, and that (b) perhaps there were significant differences between field dependent and field independence on either social desirability or extraversion-introversion. The authors state that their samples were all drawn from psychology courses of Calcutta University and were all highly cooperative volunteers. The students were administered the EPI and the EFT. Differences in scores of men and woman were nonsignificant for social desirability (I-E and lie scale). They did report a positive Pearson correlation (.47), suggesting that field dependence is related to extraversion. The correlation for men between EFT and I-E was significant (.58). It was not significant for women.

Chatterjea and Paul (1981) stated that field dependent persons have a tendency to be attentive to and use prevailing social frames of references since

their perception is supposedly dominated by their prevailing visual field. This tendency of being field dependent correlated higher with extraversion in this study than any other (.61). field dependent individuals are perceived as better liked, warm, touchful and socially outgoing. They stated that these qualities contribute to greater skill in getting along with others and that extraverted temperaments have a similar skill. They stated that further more field dependent and extraverted subjects used more cues from those stimuli related to interpersonal affairs, while field independent and introverted individuals used cues more from those stimuli having impersonal abstract aspects. The authors chose their samples from 112 undergraduate male college students who had previously taken the EFT. They selected the 20 most field dependent and 20 most field independent individuals. These 40 subjects were also administered the EPI, HFR and GFR. They also mentioned that all subjects were free from any severe physical and mental illness and came from essentially the same socioeconomic class.

Fine (1982) examined some research relative to the relationship between field dependence and extraversion. He disagreed with Eysenk who held that there was a

relationship between field dependence and extraversion. Fine lists 18 studies, (seven of those 18 were published and will be part of this paper), only one of which had a moderately significant relationship. Fine goes on to say that the two constructs may be independent of one another and may have an apparent asymmetric interaction.

Eysenck (1982) replied to the above article by Fine (1982), making several strong points. He stated that Fine was not comprehensive in summarizing all the available data. He lists three other papers that Fine left out. One of those papers authored by Bone & Eysenck (1972), utilized the rod-and-frame test to measure FD and the Stroop Test to measure extraversion. Eysenck accuses Fine of throwing together findings from different measures which may not measure the same underlying personality dimensions. Eysenck also points out that impulsivity may underlie a relationship between field dependence and extraversion. He states that Fine's data are incomplete and in parts incorrect and maintains a relationship between field dependence and extraversion which may in part, be influenced by the personality trait of impulsivity, a component of extraversion.

Thomas (1983), administered the Hidden Figures Test as the measure of field dependence and the Myers-Briggs scales as the measure of extraversion. The Pearson correlation for field dependence and extraversion was not significant, but there was a significant relationship between field independence and thinking and a significant relationship between field dependence and feelings.

Riding and Dyer (1983) administered the Junior Eysenck Personality Inventory (JEPI) to sixty male and sixty female twelve year old students to measure extraversion. They also gave them the GEFT to determine their level of field dependence and field independence. They did not find that extraversion and field independence were significantly correlated.

Mwamwenda, Dionne and Mwamwenda (1985), administered the GEFT and the EPI to 192 high school juniors and seniors (109 girls, 83 boys). They did not find a significant difference in extraversion between field dependent-independent subjects. They state that if there is a relationship it is probably non-linear. However, the females were more field dependent than the males and the males were more extraverted than the females.

Having briefly discussed the published literature covering the theoretical and empirical relationships between psychological differentiation and extraversion-introversion, a brief look at the most frequently used instruments may be helpful. Eight different instruments were used to measure field dependence-independence and six different tests or variations of a test were used to measure extraversion-introversion.

Group Embedded Figures Test (GEFT)

The GEFT is a pencil and paper test measuring field dependence-independence. It can be administered either individually or in a group. The test contains three sections with seven, nine and another nine problems arranged in ascending order of difficulty. The subject is allowed to look at the simple figures then try and locate each simple figure within a more complex one. The total score is the number of simple figures correctly found. The higher the score, the more field independent the subject is. The lower the score, the more field dependent the subject is (Witkin, et el., 1971).

Embedded Figures Test (EFT)

This test consists of eight simple figures and twelve complex colored designs. For each simple figure

there are one or more complex figures that contain the simple figures. A letter designates which figure the subject is to look for. Performance is scored in term of the time taken by the subject to locate the simple figure in the more complex one. Maximum time per figure is three minutes. The subjects score is the average time taken for all twelve cards (Witkin, 1968).

Rod-and-Frame Test (RFT)

This test evaluates an individuals perception of position in relation to an item being upright within a limited visual field. The test uses a luminous square frame pivoted at its center so that it may be tilted left or right. A luminous rod moves independently of the frame. The room is completely dark and the subject is required to adjust the rod to the upright in relation to himself and the frame. Subjects are seated in a movable chair with feet off the floor. A large tilt of the rod when it is reported to be straight indicates adherence to the visual field. A small tilt indicated independence of the field and reliance on body position or internal cue. The test consists of three series of eight trials at different degrees of tilt (Witkin, et el., 1962).

16 Personality Factor Inventory (16PFI)

This test is part of the Cattell battery of tests. It is used to measure 16 multidimensional personality attributes. Extraversion is a second order factor including items on Warmth, impulsivity, boldness and group dependence (Wholeben, 1984).

Eysenck Personality Questionnaire (EPQ)

This is the latest of the Eysenck Personality Inventories which includes a scale to measure psychopathy. It also measures extraversion, neuroticism and has a lie scale which is used to measure social desirability. It is considered a clinical instrument used to measure fundamental dimensions of personality (Friedman, 1984).

Eysenck Personality Inventory (EPI)

This is a paper-and-pencil test that can be administered either individually or to a group. It essentially measures two dimensions of personality, extraversion-introversion and neuroticism stability. Of fifty-seven questions, twenty one measure extraversion, nine comprise a lie scale and the rest measure neuroticism. The Junior Eysenck Personality Inventory is similar but designed for younger people. For this study the main interest in these tests are the

extraversion-introversion relationships. The higher the score on the extraversions scale the more extraverted the subject is. The lower the score the more introverted the subjects is.

Myers Briggs Type Indicator (MBTI)

It appears that the MBTI classifies individuals along four theoretical dimensions based on the persons perceptions and judgements. These dimensions are attitude toward the world (E-I), perception, judging and judging versus perceiving (Willis, 1984).

Draw a Person test (DAP)

This test was combined with the Maudsley Personality Inventory by Evans in his 1967 study. It allows the examiner to describe the subjects behavior while subject is drawing. A check list is used to keep track of behavior and its significance. This test is classified as a projective test allowing interpretation by the subject. This test supposedly reveals unconscious features of the personality, behavioral syndromes and dispositional qualities (Buros, 1972).

Maudsley Personality Inventory (MPI)

Developed by Eysenck in 1962, It attempts to measure extraversion-introversion and neuroticism stability. It is not a comprehensive measurement of personality. Eysenck argues that this test measures two

relatively independent factors accounting for most of the variance in the personality domain. A low scoring person is characterized as retiring, introspective and reserved suggesting a stable personality structure. High Neuroticism scores indicate over responsive individuals. The test consists of a manual, test sheets and two overlays for scoring. It has forty-eight items, twenty-four for each trait. It takes ten to fifteen minutes to complete a test. It has been stated as being highly reliable in measuring neuroticism and extraversion.

CHAPTER 2

Method and Results

In 1976, six meta-analytic publications were available. In 1982, there were one hundred and twenty. During the 1980's, several new texts describing meta-analytic theory, problems and procedures were published (Rosenthal, 1987).

This study uses meta-analytic procedures (Rosenthal, 1987) to compare the effect sizes of 23 studies of the relationships between introversion and field dependence-independence. Table 1 is a summary of the tests, correlations and probabilities of the data.

Twenty three effect size estimates from nineteen different studies (see table 1) were compared using meta-analytical statistical procedures. Each Pearson r was converted to Fisher's Z and a weighted mean was computed. The weighted mean Z was .117 indicating a small positive relationship between introversion-extraversion and field dependence-independence. The Chi square statistic was used to evaluate the consistency of the findings across studies. The results (X^2 = 70.001, df = 22, $P < .001$) indicated significant heterogeneity. The degree of relationship between introversion-extraversion and field dependence-independence varied widely from study to study.

Table 1

Summary of tests, correlations and probabilities

Author	Date	FD	E	Sex	N	r	P
Evans	1967	EFT & DAP	MPI	M	40	.39	.005
Fine	1972	Gottshaldt	MPI	M	54	-.15	NS
		Gottshaldt	MPI	M	53	-.02	NS
		Gottshaldt	MPI	M	54	.18	NS
		Gottshaldt	MPI	M	17	.01	NS
		16PF	MMPI	M	147	.25	.01
Fine & Kobrick	1976	Gottshaldt	MPI	M	49	-.32	.05
Sell &	1974	EFT	MPI	M	66	.27	.025
Duckworth		RFT	MPI	M	66	.07	NS
Loo &	1977	GEFT	EPI	F	23	.26	NS
Townsend		GEFT	EPI	F	23	-.21	NS
		GEFT	EPI	F	18	-.34	NS
		GEFT	EPI	F	66	-.24	.05
Loo	1978	GEFT	EPI	M	15)	.04	NS
Pearson	1972	JSFEFT		F	15)		
Hughes, Hall & Chambers	1978	EFT	EPI	M	33	.05	NS
				F	34		

Table 1 Continued

Author	Date	FD	E	Sex	N	r	P
Carter & Loo	1979	GEFT	EPQ	M	91	-.02	NS
				F	101	-.11	NS
Chatterjea & Paul	1980	EFT	EPI	M	20	.47	.01
				F	20		
Chatterjea & Paul	1981	EFT	EPI	M	40	.61	.01
Thomas	1983	HFT	MBTI	M	38	.23	NS
				F	4		
Mwamwenda	1985	GEFT	EPI	M	83	.32	NS
				F	109		
Dionne & Mwamwenda							
Riding, Dyer	1983	GEFT	JEPI	M	60	.09	NS
				F	60	.07	NS

CHAPTER 3

Discussion

On the basis of the results of comparing data from all studies about the relationship between field dependence and extraversion, several points should to be made.

The meta-analysis tends to verify Fines position that extraversion-introversion and field dependence-independence may relate in a non-linear way but appear to be independent dimensions. Seven of the twenty-three studies reported significant correlations, but only two of the studies reported a coefficient of determination above .2. Both studies were done by the same authors (Chatterjea & Paul, 1980; 1981) and an examination of their procedures indicate serious methodological problems. They chose their forty subjects from 112 undergraduate male college students and picked the 20 most field dependent and 20 most field independent. This selection procedure could explain the high relationship that they reported. The resulting sample sizes were small. One wonders why they did not report the relationships for all 112 subjects.

Evans (1967) had the next highest correlation (r = .39) but did not expound on his results. His sample consisted of male undergraduates and did not adequately reflect the general population.

Fine & Kobrick (1976) and Loo (1978) found a significantly negative correlation between field independence and introversion. Fine and Kobrick's samples were all male soldiers, again not characteristic of the normal population.

Sell and Duckworth (1974) report a significant relationship (r = .27). Again their sample consisted of male undergraduates, not representative of the overall population and hardly a robust correlation.

Overall, sample sizes in all cases would appear to be too small. In studies where adequate samples were used, (e.g. Carter & Loo, 1979, N = 192; Mwamwenda, Dionne & Mwamwenda, 1985, N = 192) there was not a significant relationship between any of the dimensions. Both of the above studies use male and female subjects.

When combining samples from all the significant studies it is interesting to note that 362 of the subjects were male while only 86 were female. Very little sex difference was found over all but the available information suggests that males are more

field dependent and extraverted than females (Chatterjea & Paul, 1980, 1981; Mwamwenda, et. el., 1985).

This analysis indicates that there is not enough evidence to support a hypothesis of a strong relationship between introversion-extroversion and field dependence-independence. Most of the studies of this relationship have used small, non-representative samples. Tests which purport to measure the same constructs seem to be measuring different things. One should be cautious when making statements about individual personality dimensions based on inadequate populations and unreliable or invalid instruments. Future research would benefit from standardization of measurement with larger samples that are more representative of society.

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