

THE RELATIONSHIP OF INTROVERSION-EXTRAVERSION
AND NEUROTICISM
TO FIELD DEPENDENCE-INDEPENDENCE

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An Abstract
Presented to
the Graduate Council of
Austin Peay State University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science
in Guidance and Counseling

by
Vicki Lynn Morris

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ABSTRACT

The purpose of this study was to determine the relationship between field dependence-independence and the personality variables of introversion-extraversion and neuroticism. Two hypotheses were tested. The first hypothesis was that field-dependent people are more likely to be extraverted and that field-independent people tend to be introverted. The second hypothesis was that field-dependent introverts have a greater incidence of neuroticism.

One hundred five students in undergraduate psychology classes at Austin Peay State University in Clarksville, Tennessee, volunteered to participate in this study. Of these subjects, 79 were females and 26 were males. The subjects ranged in age from 18 to 56. Each subject was given the Hidden Figures Test and then Form A of the Eysenck Personality Inventory.

There was not a significant relationship between extraversion-introversion and field dependence-independence. A significant negative relationship was found between introversion-extraversion and neuroticism, which indicated that introverts were more likely to be neurotic than extraverts. The t-statistics showed that females were significantly more neurotic than males.

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To the Graduate Council:

I am submitting herewith a Thesis written by Vicki Lynn Morris entitled "The Relationship of Introversion-Extraversion and Neuroticism to Field Dependence-Independence." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Guidance and Counseling.

Barland E. Blair
Major Professor

We have read this thesis
and recommend its acceptance:

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CHAPTER 1

Introduction

This study describes the relationship of the Eysenck Personality Inventory dimensions of introversion-extraversion and neuroticism to the cognitive styles of field dependence and field independence.

According to Engle (1970), the term extraversion indicates the centering of a person's interests in his external environment and in social phenomena. Eysenck and Eysenck (1968) report that extraversion refers to the outgoing, uninhibited, impulsive, and sociable inclinations of a person. Engle (1970) defines introversion as the centering of a person's interests in himself and his own experiences. Mwamwenda, Dionne, and Mwamwenda (1985) contend that extraverts enjoy the company of friends and make friends more easily than introverts. The term neuroticism refers to a disorder in which high levels of anxiety cause personal discomfort and the development of self-defeating and maladaptive behavior patterns (Coon, 1977). Neuroticism is equivalent to emotional instability and maladjustment (Gleitman, 1981). Eysenck and Eysenck (1968) define neuroticism as the general emotional overresponsiveness and liability to neurotic breakdown under stress.

According to Eysenck (1967), introverts withdraw from social contacts and from arousing stimulation because their nervous systems are particularly sensitive to excitation, and they need to avoid stimulus overload. The typical introvert is introspective, is socially distant except from certain

intimate friends, keeps feelings under tight control, and seldom behaves in an angry or aggressive manner. Eysenck (1967) believes that, because of their higher levels of cortical arousal, introverts are more attentive to details and do not need a great deal of stimulation from outside. They are described as having sensitive nervous systems. On the other hand, extraverts have stable and sluggish nervous systems. They need strong stimuli to achieve cortical arousal and excitation. The extravert seeks social contacts and physical arousal, likes parties, takes chances, and is easygoing (Eysenck, 1967).

According to Eysenck and Eysenck (1968), a great amount of research has been conducted relating dimensions of extraversion and neuroticism to learning theory and behavior.

In the Eysenck Personality Inventory Manual Eysenck and Eysenck (1968) cite studies by various investigators who have done research on the important part played by introversion-extraversion and neuroticism in the success and failure of university students. A study by Furneaux (cited in Eysenck & Eysenck, 1968) investigated the relationship between these personality dimensions and failure rate on examinations by students in various branches of engineering. The examination failure rate varied greatly, with the neurotic introvert group showing the lowest failure rate and the stable extravert group showing the highest failure rate. A study of Lynn and a study by Lynn and Gordon (cited in Eysenck & Eysenck, 1968) found that good academic achievers were characterized by high neuroticism and by introversion.

Lynn's study (cited in Eysenck & Eysenck, 1968) reported that university students as a group scored higher on neuroticism and lower on extraversion than a control group.

In separate studies Broadbent and Bendig (cited in Eysenck & Eysenck, 1968) also report that introverted university students tend to do well academically. Eysenck and Eysenck (1968) further state that this finding is what one would expect in view of the extravert's preferences for speed rather than accuracy and his comparatively poor performance at tasks demanding prolonged vigilance under boring conditions. Bakan's study (cited in Eysenck & Eysenck, 1968) found that the performance of extraverts decreases rapidly on vigilance tasks.

Lynn and Gordon (cited in Eysenck & Eysenck, 1968) conclude that there are at least four major characteristics in which introverts differ from extraverts in a way which would be expected to have an effect on educational achievement. These characteristics are (1) learning speed, with introverts appearing to form conditioned responses more quickly than extraverts, (2) intelligence, with neurotic introverts tending to be more intelligent than neurotic extraverts, (3) work decrement, with introverts being superior to extraverts in tasks requiring sustained work or attention, and (4) accuracy and speed, with introverts undertaking tasks slowly and accurately while extraverts are quick and inaccurate.

People differ in their cognitive style, the way in which they approach situations, what they look for in them, and how

they plan their actions. One dimension of cognitive style is the degree to which people rely on internal or external cues in solving problems. Field dependence and field independence are two approaches related to this dimension. Field-independent people tend to rely on internal cues to place responsibility on themselves for solving problems. Field-dependent people are attentive to external cues and look to the environment for help in solving problems (Smith, Sarason, & Sarason, 1982).

Witkin (1964) says that field dependence is the extent to which a person's perceptions are influenced by the visual field that surround the perceived object. The term field dependent indicates that an individual's perception is strongly dominated by the prevailing field. The term field independent is used when the person experiences items as more or less discrete from the surrounding field (Chatterjea & Bhaskar, 1981). Chatterjea and Bhaskar (1980) state that extraverts seem to be more field dependent than introverts because extraverts constantly require information clues from the environment and respond according to the nature of the stimuli. Witkin (1964) contends that field-dependent persons are more people-oriented than field-independent ones.

Witkin and Goodenough (1977) characterized field-dependent people as being sensitive to social cues, having an interpersonal orientation, having a strong interest in people, preferring to be with others, and displaying emotional openness. According to Witkin and Goodenough (1977), field-independent people are good at solving

problems, they prefer solitary activities, they value intellectual pursuits, and they are concerned with ideas and principles rather than with people.

The cognitive styles of field dependence and field independence can be measured with several perceptual devices, of which the most commonly used is the Embedded Figures Test (Weiten, 1986). With the Embedded Figures Test the subject is shown a figure and, after it has been removed, is asked to find the figure embedded in a complex field (Smith et al., 1982). Witkin (1964) found that field-independent people, being less involved in external stimuli, were less confused by the complexity of the field in which the figure was embedded than were field-dependent people.

Fine (1972) viewed field dependence as reflecting a person's general social orientation. The field-dependent person is characterized as being intolerant of isolation, having better memory for human faces, and being oriented toward social approval and toward other people. Fine (1972) described the field-dependent person as having a strong need for external stimuli. He believed that introversion was indicative of social withdrawal and lack of contact with the outside world. He stated that the extreme introvert is incapable of interacting with people. According to Fine (1972), the field-dependent introvert has a strong need for external stimulation but is unable to get it. He argued that neurotic behavior can be one possible outcome of the conflict between two incompatible personality dimensions within an individual.

There have been conflicting findings among researchers studying the relationship between field dependence-independence and the personality variables of introversion-extraversion and neuroticism. This paper will compare and contrast the various studies of these relationships and report the findings of each study.

In his first study, Fine (1972) verified the hypothesis that field-dependent introverts would be composed of a higher percentage of neurotic subjects. He found a slight but significant relationship between extraversion and neuroticism in his second study. Fine's (1972) third study found a low significant correlation between field dependence and neuroticism. A fourth study by Fine (1972) revealed that the field-dependent-introvert quadrant had more neurotics than the other three quadrants combined. According to Fine (1972), as one increases in both field dependence and introversion, there is a greater likelihood of being above the 70th percentile on the neuroticism dimension. Fine (1972) reported several studies which indicated an antagonistic or unhealthy relationship between the introversion and field-dependence dimensions. The individuals who scored both as introvert and field-dependent on the Eysenck Personality Inventory and the Embedded Figures Test also scored significantly higher on neuroticism than those who scored any other combination of introversion-extraversion and field dependence-independence.

Doyle (1976) found that field-dependent introverts obtained a significantly higher neuroticism score than

field-dependent extraverts, which is consistent with Fine's (1972) hypothesized unhealthy relationship between introversion and field dependence. According to Doyle (1976), field-dependent extraverts tend to be more content and at ease in their present life situation, more flexible, and more likely to accept their perceived human frailties than are field-dependent introverts. Doyle's (1976) study confirms to a limited degree Fine's (1972) thinking that field-dependent extraverts are more likely to experience less personal conflict and are more likely to exhibit various personal characteristics considered to evidence psychological health than are field-dependent introverts.

A study of Loo (1976) describes the relationship between field dependence as measured by the Group Embedded Figures Test and the dimensions of extraversion and neuroticism as measured by Form A of the Eysenck Personality Inventory. Loo (1976) obtained a significant Pearson correlation between scores on the Group Embedded Figures Test and the extraversion scale of the Eysenck Personality Inventory. His finding indicated that field-dependent persons were more extraverted than field-independent persons. The results of Loo's (1978) second study supported the hypothesis that the combination of field-dependent introvert is associated with a higher ratio of neuroticism than is field-independent extravert of field-independent introvert. However, the hypothesis was not supported for the category of field-dependent extravert. The only significant correlation was between extraversion and field dependence, indicating that

greater introversion is associated with greater field independence. This finding agreed with the results from Loo's (1976) previous study.

Several studies (Evans, 1967; Loo, 1976) have reported moderate correlations between scores on paper-and-pencil tests of field dependence and scores on Eysenck's extraversion scales indicating that field independence is associated with introversion. According to Loo and Townsend (1977), the reported relationship between field dependence and extraversion may be a function of the administration of the timed tests of field dependence rather than a function of the construct, field dependence.

Evans (1967) reported the relation of the cognitive style of field dependence-independence to the Maudsley Personality Inventory dimensions of neuroticism and extraversion. He found that field dependence was significantly correlated with extraversion. Taft and Coventry (1968) also found a positive correlation between extraversion and field dependence.

A study by Sell and Duckworth (1974) investigated the relationship between field dependence, as measured by the Embedded Figures Test and the Rod-and-Frame Test, and the dimensions of neuroticism and extraversion on the Maudsley Personality Inventory. According to them, earlier similar studies have yielded contradictory results, depending upon the measure used to describe field dependence. The results of this study indicate a significant relation between extraversion as measured by the Maudsley Personality

Inventory and field dependence on the Embedded Figures Test. These results corroborate the finding of Evans (1967) who discovered a significant correlation between extraversion and Embedded Figures Test scores.

In a study of field dependence and introversion-extraversion, Chatterjea and Bhaskar (1980) found a significant relationship between field dependence on the Embedded Figures Test and introversion-extraversion on the Eysenck Personality Inventory. They report that this significant relationship show significantly more extraverted temperamental quality of a field-dependent individual than field-independent counterparts. This extraverted trend of field dependence agrees with the findings of various investigators who say that individuals having affiliation oriented and outer directed temperamental quality manifest a field-dependent cognitive style (Chatterjea & Bhaskar, 1980).

There are other investigators who did not find a significant relationship between field dependence and extraversion, between introversion and neuroticism, between field dependence and neuroticism, and between field dependence-independence and introversion-extraversion and neuroticism.

In his first study, Fine (1972) found the correlation between field dependence and extraversion to be low. The results of Fine's (1972) second study showed that field dependence and extraversion were not related and that field dependence and neuroticism were unrelated. In a third study conducted by Fine (1972), the relationship previously

between extraversion and neuroticism was not observed. In this study field dependence and extraversion were again unrelated. A study by Loo (1976) found that the correlation between the Group Embedded Figures Test and Eysenck's neuroticism scale score was not significant. The correlation between the two Eysenck scales of extraversion and neuroticism also was not significant (Loo, 1976).

Taft and Coventry (1968) studies the relationship between field dependence-independence and extraversion and neuroticism. They tested American university students and found no relationship between neuroticism and field dependence. Evans (1967) and Sell and Duckworth (1974) also found no relationship between neuroticism scores and scores on the Embedded Figures Test.

The findings of Lotwick, Simon, and Ward (1984) support the views of Taft and Coventry (1968), Evans (1967), and Loo (1976) that there is no relationship between neuroticism and field dependence, but they do support the conclusion that a significant correlation exists between extraversion and field dependence. According to Lotwick et al. (1984), conflicting studies indicate the need for more data and for data not confined to university students.

Hughes, Hall, and Chambers (1978) replicated Loo's (1976) study with the addition of male as well as female subjects. The Embedded Figures Test and Form B of the Eysenck Personality Inventory were administered to 33 male and 34 female psychology students ranging in age from 17 to 31 years. No significant Pearson correlation was found

between field dependence and either extraversion or neuroticism. Two-tailed *t* tests indicated a small but significant sex difference in embedded-figures performance but no difference on the Eysenck measures of extraversion or neuroticism. The greater field independence in males verified previous findings. The lack of a significant correlation between scores on the Embedded Figures Test and extraversion scores failed to confirm Loo's (1976) findings, which suggests that either relationships established with the individual Embedded Figures Test do not apply to the group version, or the inclusion of male subjects or the use of Form B somehow interfered with any correlation. Hughes et al. (1978) state that their results do not maintain relationships reported earlier by Loo (1976), and they suggest that more research is required.

Mwamwenda et al. (1985) administered the Group Embedded Figures Test and the Eysenck Personality Inventory to 109 girls and 83 boys from grades 11 and 12 of high schools in Ontario, Canada. The statistical analysis of their study did not support the hypothesis that field-dependent persons are more extraverted than field-independent persons. This is consistent with other studies in which researchers reported no relationship between the measures. However, this finding contradicts other findings. Fine (1972) observed why some researchers have not confirmed a relationship between field dependence and extraversion. He suggested that the relationship between the two variables may be nonlinear. According to Mwamwenda et al. (1985), most of the evidence

reported in the literature points toward a linear relationship.

In a study by Riding and Dyer (1983), the correlation between extraversion and field dependence was found to be very low for twelve-year-old boys and girls. For the field-independent subjects, the mean level of neuroticism was lowest for the introverts, while for the field-dependent it was least for the extraverts. While this finding generally agrees with Fine's (1972) study with adult subjects and agrees with his view that a mismatch between introversion and field dependence is related to neuroticism, the differences were slight, and a two-way analysis of variance did not show either the interaction between field dependence and introversion or the main effects to be significant. Riding and Dyer (1983) point out that their data do not really support Fine's (1972) belief that neuroticism is related to a mismatch between introversion and field dependence. They found that field-dependent introverts had a higher mean neuroticism score than field-dependent extraverts, with the reverse pattern for field-independents. However, the level of neuroticism was highest for the ambiverts for both field independence and dependence, although the differences were not significant. According to Riding and Dyer (1983), the extraversion-field-independence mismatch may be a contributor to neuroticism, but in twelve-year-old children it does not seem to be the only cause. They conclude that the results of their study support the view that extraversion and field independence are separate dimensions.

Carter and Loo (1979) used the Group Embedded Figures Test and the Eysenck Personality Inventory to replicate earlier findings which showed both a covariation in scores between measure of field dependence and extraversion and an antagonistic relationship in which field-dependent introverts have a greater incidence of neuroticism. Their results failed, in part, to replicate earlier findings. No significant covariation was found between scores on the Group Embedded Figures Test and the extraversion scale from the Eysenck Personality Inventory. Support for the hypothesized antagonistic relationship between field dependence and introversion was found for females but not for males.

There are other investigators who did not find a significant relationship between field dependence and extraversion. Thomas (1983) administered the Hidden Figures Test and the Myers-Briggs scales to 42 college undergraduates in technology. The Hidden Figures Test was the measure of field independence, and the Myers-Briggs scales were the measure of extraversion and thinking. Thomas (1983) found no significant relationship between field dependence and extraversion. Mayo and Bell (1972) tested college-of-education students by using the Eysenck Personality Inventory and field dependence-independence tests, and they failed to find any relationship between field dependence and extraversion. Lester (1976) conducted a study of female college students and did not find a relationship between field dependence and extraversion. Mayo and Bell (1972) and Lester (1976) conclude that the dimensions of field

dependence-independence and introversion-extraversion are discrete or only slightly and insignificantly related.

From the findings described in this paper, it is evident that a number of investigators have studied the relationship between field dependence-independence and the personality variables of introversion-extraversion and neuroticism. The purpose of this study is to test the hypothesis that field-dependent people are more likely to be extraverted and that field-independent people tend to be introverts. This study will also test the hypothesis that field-dependent introverts have a greater incidence of neuroticism, as measured by personality tests, than any other combination of the field dependence and extraversion dimensions. In this study the scores of individuals on the Hidden Figures Test for field dependence-independence will be correlated with the same individuals' scores on Form A of the Eysenck Personality Inventory for introversion-extraversion and neuroticism.

CHAPTER 2

Method

Subjects

The subjects who volunteered to participate in this study consisted of 102 undergraduate students and three graduate students from Austin Peay State University in Clarksville, Tennessee. The subjects were enrolled in at least one undergraduate psychology course at the university. Of these subjects, 79 were females and 26 were males. The subjects ranged in age from 18 to 56.

Instruments

The Hidden Figures Test, a measure of field dependence-independence, and the Eysenck Personality Inventory, a measure of introversion-extraversion and neuroticism-stability, were used to test the subjects in this study. The Hidden Figures Test examined the subjects' ability to tell which one of five simple figures could be found in a more complex pattern. The subjects were asked to identify which figure was in 32 different patterns. Form A of the Eysenck Personality Inventory consisted of 57 questions, to which the examinee answered "Yes" or "No." A response distortion (Lie) scale was included to detect attempts to falsify responses.

Procedures

Each subject was administered the Hidden Figures Test and then Form A of the Eysenck Personality Inventory. The two tests were given to the subjects according to the instructions provided in the corresponding manuals. There were nonnorm groups for the Hidden Figures Test. Norm tables

for the Eysenck Personality Inventory were used to categorize subjects as introvert or extravert and neurotic or stable.

CHAPTER 3

Results

Descriptive statistics were obtained for the total sample on each of the scales of the Eysenck Personality Inventory (EPI) and the field dependence score of the Hidden Figures Test. The mean score for introversion-extraversion (I-E) on the EPI was 11.895, and the standard deviation was 4.007. The mean for neuroticism was 12.257, and the standard deviation was 4.756. The lie scale on the EPI had a mean of 2.286 and a standard deviation of 1.453. The mean for the field dependence-independence (FD-I) variable was 8.333 with a standard deviation of 4.694.

Each of the variables (introversion-extraversion, neuroticism, lie scale, and field dependence-independence) was correlated with every other variable. The Pearson product-moment correlations were as follows:

| | |
|----------------------------|---------------------------|
| I-E with Neuroticism | $r = -.254$ ($p < .01$) |
| I-E with Lie Scale | $r = -.175$ ($p > .05$) |
| I-E with FD-I | $r = -.066$ ($p > .05$) |
| Neuroticism with Lie Scale | $r = -.174$ ($p > .05$) |
| Neuroticism with FD-I | $r = .050$ ($p > .05$) |
| Lie Scale with FD-I | $r = .104$ ($p > .05$) |

For the 26 males in the sample, the mean for introversion-extraversion was 11.692, and the standard deviation was 4.389. The mean neuroticism score for males was 10.231 with a standard deviation of 4.893. The lie scale for males had a mean of 2.308 with a standard deviation of 1.408. The mean for field dependence-independence was 8.346,

and the standard deviation was 4.841. The following correlation coefficients for males were obtained:

| | |
|----------------------------|---------------------------|
| I-E with Neuroticism | $r = -.293$ ($p > .05$) |
| I-E with Lie Scale | $r = -.237$ ($p > .05$) |
| I-E with FD-I | $r = .073$ ($p > .05$) |
| Neuroticism with Lie Scale | $r = .080$ ($p > .05$) |
| Neuroticism with FD-I | $r = -.198$ ($p > .05$) |
| Lie Scale with FD-I | $r = .336$ ($p > .05$) |

For the 79 females in the sample, the mean score for the introversion-extraversion variable was 11.962, and the standard deviation was 3.901. The mean neuroticism score for females was 12.924 with a standard deviation of 4.545. The lie scale on the EPI for females had a mean of 2.278 with a standard deviation of 1.476. The mean for the field dependence-independence variable for females was 8.329 and the standard deviation was 4.676. The correlation coefficients for females were as follows:

| | |
|----------------------------|---------------------------|
| I-E with Neuroticism | $r = -.260$ ($p < .05$) |
| I-E with Lie Scale | $r = -.154$ ($p > .05$) |
| I-E with FD-I | $r = -.118$ ($p > .05$) |
| Neuroticism with Lie Scale | $r = -.209$ ($p > .05$) |
| Neuroticism with FD-I | $r = .141$ ($p > .05$) |
| Lie Scale with FD-I | $r = .031$ ($p > .05$) |

Differences between males and females on the four variables (introversion-extraversion, neuroticism, lie scale, and field dependence-independence) included on the EPI and the Hidden Figures Test were assessed using the t-statistic. The following t-statistics were obtained:

| | |
|------------------------|-----------------------|
| Gender and I-E | $t = .294 (p > .05)$ |
| Gender and Neuroticism | $t = 2.576 (p < .01)$ |
| Gender and Lie Scale | $t = .090 (p > .05)$ |
| Gender and FD-I | $t = .020 (p > .05)$ |

CHAPTER 4

Discussion

The hypothesis that field-dependent people are more likely to be extraverted and that field-independent people tend to be introverts was not supported. There was not a significant relationship between introversion-extraversion and field dependence-independence. The lack of a relationship is in agreement with Fine's (1972) first, second, and third studies and studies conducted by Hughes et al. (1978), Mwamwenda et al. (1985), Riding and Dyer (1983), Carter and Loo (1979), Thomas (1983), Mayo and Bell (1972), Lester (1976), and Lotwick et al. (1984).

The finding that there was not a significant relationship between introversion-extraversion and field dependence-independence disagrees with the findings of Loo (1976), Loo (1978), Evans (1967), Loo and Townsend (1977), Sell and Duckworth (1974), Chatterjea and Bhaskar (1980), and Taft and Coventry (1968). As can be seen, the nature of this relationship appears to be variable and controversial.

A significant negative relationship was found between introversion-extraversion and neuroticism. This finding would indicate that introverts are more likely to be neurotic than extraverts. In the sample of psychology students, the mean for neuroticism was 12.257, which is equivalent to approximately the 70th percentile on the norms for American college students taking Form A of the Eysenck Personality Inventory. Since the subjects scored in the 70th percentile on the neuroticism scale, it is evident that they were

considerably more neurotic than the norm group. The mean score for introversion-extraversion was 11.895, which falls at approximately the 50th percentile of the American college student norms on extraversion. In other words, approximately half of the subjects were extraverts and half were introverts.

As in Thomas' (1983) study, the Hidden Figures Test was used to measure field dependence-independence. In Thomas' (1983) study, the mean for field dependence-independence was 22.76, and in this study the mean for field dependence-independence was 8.333. Although there were no norms for the field dependence-independence variable on the Hidden Figures Test, it is obvious from comparing the means that there were considerably more field-dependent subjects in this sample than in Thomas' (1983) sample.

The predominance of field-dependent subjects could be the reason for the significant negative relationship found between introversion-extraversion and neuroticism. Apparently, there is a higher incidence of neuroticism in field-dependent people. Another reason for the significant relationship could be because the sample was predominantly composed of females, and the t-statistics showed that females were significantly more neurotic than males. There was a significant negative relationship between introversion-extraversion and neuroticism for females but not for males.

Gender may be an important variable in the relationship between introversion-extraversion and neuroticism. Fine

(1972) found a significant relationship between introversion-extraversion and neuroticism for males in one of his studies, but in another study he did not find a significant relationship for males. Other researches (Loo, 1976; Hughes et al., 1978) also did not observe a significant relationship. These different findings do not solve the problem of uncertainty that surrounds the relationship between introversion-extraversion and neuroticism.

The findings of various investigators who have studied the relationship between field dependence-independence and the personality variables of introversion-extraversion and neuroticism are controversial. There is a need for more research on the subject and for studies not limited to university students only.

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