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THE STABILITY OF FIELD DEPENDENCE AMONG ALCOHOLICS IN  
TREATMENT AND THE RELATIONSHIP BETWEEN EMBEDDED FIGURES  
TEST PERFORMANCE AND COGNITIVE IMPAIRMENT

*The University of Arizona*

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TEST PERFORMANCE AND COGNITIVE IMPAIRMENT

by  
PATRICIA LAFFERTY

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DEPARTMENT OF PSYCHOLOGY  
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For the Degree of  
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1985

STATEMENT BY AUTHOR

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## ABSTRACT

The relationship between alcoholism and field dependence has been discussed using two competing hypotheses - the predisposition hypothesis and the consequence hypothesis. The predisposition hypothesis views the field dependence of the alcoholic as a stable trait which may contribute in some way to the development of alcoholism. The consequence hypothesis suggests that field dependence among alcoholics is a result of the cognitive dysfunction produced by alcoholism. This study examines the stability of both field dependence and cognitive impairment among an inpatient alcoholic population and finds a significant decrease in both variables during a five week period. In addition, significant moderate level correlations between the field dependence measure, the Embedded Figures Test (EFT), and measures of cognitive impairment are found. These results suggest that field dependence, as measured by the EFT, is confounded by this measure's sensitivity to cognitive impairment. The findings of this study are interpreted as supporting the consequence hypothesis. Differences in measurement instruments and experimental designs may account for the conflicting findings of previous studies.

## CHAPTER 1

### BACKGROUND AND PURPOSE

This study is concerned with the nature of field dependence in an alcoholic population. The stability of field dependence and cognitive impairment among inpatient alcoholics is examined, as is the relationship between a measure of field dependence - the Embedded Figures Test - and measures of cognitive impairment. This is done to determine whether field dependence among alcoholics can be interpreted as reflecting a stable cognitive style or a manifestation of the cognitive deficits associated with the neuropathology of alcoholism. Cognitive deficits are deficiencies in perceptual or intellectual functioning resulting from damage to the brain. Cognitive styles, on the other hand, are as "... the characteristic, self-consistent modes of functioning which individuals show in their perceptual and intellectual activities. These cognitive styles are manifestations in the cognitive sphere of still broader dimensions of personal functioning which cut across diverse psychological areas" (Witkin, Oltman, Raskin and Karp, 1971, p.3). In specific, a field dependent cognitive style is seen as reflecting the broader dimension of differentiation (Witkin, et al., 1971).

#### Changes in the Field Dependence Construct

The nature of the construct underlying field dependence research has been changed by Witkin over the course of his work. At first, field

dependence referred just to the perceptual abilities involved in perception of the upright and in overcoming an embedding context. When performance on the Embedded Figures Test (EFT) was found to be related to performance on nonperceptual intellectual tasks, the underlying construct was broadened to a "global-articulated" dimension; individuals with a more global style of cognition were seen as processing information in a diffuse and global way, while individuals with a more articulated style were seen as using a more analytic, delineated and structured mode of cognition. Finally, with the demonstration that performance on the EFT was related to performance on personality measures, the construct of differentiation was introduced. Most of the literature on field dependence is concerned with differentiation and many researchers conceptually equate the two terms. (Goldstein & Blackman, 1978).

#### Field Dependence and Psychological Differentiation

The more field independent an individual is assessed to be, the more differentiated he is seen as being. Differentiation may be understood as the capacity to distinguish gradations of a stimulus dimension (Goldstein & Blackman, 1978) or the ability to "keep things separate in experience" (Witkin, et al., 1971). Differentiation may also be understood as referring to the complexity of psychological systems, wherein the less differentiated the system, the more homogenous is its structured state and the less specialized is its functioning. Conversely, the more highly differentiated a system is, the more it is divided into subsystems, each of which mediate specific functions (Witkin, H.A., Dyk, R.B., Tateron, H.F., Goodenough, D.R. & Karp, S.A.,

1962). Witkin noted that there is a tendency for an individual who is differentiated in one area to be differentiated in other areas. He suggested that the dimension of differentiation "... pervades the individual's perceptual, intellectual, emotional, motivational, defensive, and social operations" (Witkin, et al., 1962). Thus, studies which have related a more field independent EFT performance to a more developed sense of separate identity, a more articulated body concept, and the use of more specialized defense mechanisms, have interpreted these relationships as reflecting similar levels of differentiation which are manifest in diverse spheres.

#### Evidence for the Predisposition and Consequence Hypotheses

Field dependence has been studied more in alcoholism than in any other area of psychopathology, and it has been studied in alcoholism to the virtual exclusion of other cognitive styles (Sugerman & Schneider, 1976). A large number of investigators (Bailey, Hustmeyer & Kristofferson; 1961; Chess, Neuringer & Goldstone, 1971; Karp, Poster & Goodman, 1963; Witkin, Karp & Goodenough, 1959) have found alcoholics to be more field dependent than non-alcoholic individuals. The relationship between alcoholism and field dependence has been discussed using two competing hypotheses. The first hypothesis, which is supported by a series of studies by the Witkin group (i.e., Karp & Konstadt, 1965; Karp, Witkin & Goodenough, 1965 a + b) regards field dependence as a stable cognitive style which is frequently characteristic of individuals who later become alcoholics. In other words, the "predisposition hypothesis" suggests that an individual's pre-alcoholic field dependent mode of functioning may, in some way

contribute to the development of alcoholism. Conversely, the "consequence hypothesis" suggests that individuals perform in a field dependent manner on perceptual tests because of the debilitating effects of alcoholism on perception.

Investigators who favor the predisposition hypothesis describe field dependence as a stable trait. Thus the Witkin group has undertaken to demonstrate that field dependence is unaffected by a state of intoxication, the duration of one's abuse, or abstinence from alcohol. In the first of a series of studies, Karp, Witkin, and Goodenough (1965a) compared the perceptual field dependence scores obtained by male alcoholics before and after acute alcohol intoxication. These authors found that intoxication did not markedly affect performance on two different tests of field dependence: the Rod and Frame Test (RFT) and the Body-Adjustment Test (BAT). However, field dependence as measured by the Embedded Figures Test (EFT) did significantly increase after intoxication. Since the EFT is based on perceptual reaction time, Karp, et al. attributed this fluctuation in performance to the subjects' decreased ability to concentrate rather than to a change in perception per se.

Using a similar experimental paradigm, Kristofferson (1968) obtained different results. She found that, after alcohol consumption, the RFT performance of male non-alcoholic students became significantly more field dependent. Furthermore, alcohol consumption did not differentially affect subjects classified as more or less field dependent before consumption. Kristofferson suggests that persons who

become alcoholic might attain a high level of field dependence regardless of their pre-alcoholic perceptual mode.

Kristofferson's (1968) findings that field dependence can be affected by alcohol consumption can be interpreted as supporting the consequence hypothesis, in that relative field dependence did not remain stable, as predicted by those who regard field dependence as an enduring trait. Although Karp, Witkin and Goodenough (1965a) had previously found a stable level of performance following alcohol consumption, they had used an alcoholic population as subjects, while Kristofferson's study was done with college students. Kristofferson suggests that previous research has failed to demonstrate state-altered performance because the field dependence of alcoholic subjects may become stabilized after years of drinking. She suggests that field dependence may become invariant by the time an individual is classified as an alcoholic. The present study utilized alcoholics with extensive drinking histories as subjects in an attempt to obtain data more directly comparable to the influential studies of the Witkin group.

In the second of a series of studies, Karp & Konstadt (1965) directly investigated the effects of duration of alcohol abuse on field dependence. Using the BAT, the RFT and the EFT, the authors found no relationship between field dependence and length of drinking history, when differences in age among subjects were controlled. In the third study of the series, Karp, Witkin and Goodenough (1965b) examined the effect that length of abstinence from drink had upon field dependence. Alcoholics who were still drinking were compared with alcoholics who had been sober for at least 15 months. Again using the RFT, BAT, and EFT,

no significant differences in field dependence were found among drinking and abstaining alcoholics.

The results of the studies conducted by the Witkin group indicate that field dependence is a stable perceptual mode; this has led Karp, Witkin and Goodenough (1965b) to conclude that the predisposition hypothesis is more plausible than one which proposes that field dependent performance is a consequence of alcoholism. More recently, however, some studies (Chess, Neuringer , & Goldstein, 1971; Danahy & Kahn, 1981; Goldstein & Chotlos, 1966) have found that alcoholics perform in a significantly less field dependent manner following an alcoholism treatment program. Unfortunately, other studies (Jacobson, Pisanía & Berenbaum, 1970; McWilliams, Brown & Minard, 1975) have not been able to replicate this finding. However, it is important to note that studies on the stability of field dependence during the alcoholic cycle have varied with regard to the duration of time between pre- and post-testing. For example, Goldstein and Chotlos (1966) found a significant decrease in RFT scores following an 8-10 week inpatient treatment program. Chess (1969), cited by Danahy & Kahn (1981), reports a decline in field dependence after seven weeks of treatment. Chess, Neuringer and Goldstein (1971) found that the most significant change in RFT performance among a population of inpatient alcoholics took place between the first and third weeks after their subjects had been admitted to the hospital. Jacobson, Pisanía and Berenbaum (1970), however, found no significant change in alcoholic RFT performance following a treatment program of 33 days.

### Measurement Issues

Variability also exists with regard to how field dependence is measured in studies on its stability among alcoholic populations. The Witkin group has frequently used a composite index of field dependence obtained by converting the scores of each subject on the RFT, the BAT, and the EFT to standard scores and averaging them. Other studies on the stability of alcoholic field dependence have used only the RFT. Danahy and Kahn (1981) found a significant decrease in field dependence using pre- and post-treatment performance on the EFT. Arbuthnot (1972) who reviewed 40 studies in which more than one measure of field dependence was used recommends using the RFT and the EFT together.

Based on a review of the literature on the relationship between the EFT and the RFT, Goldstein and Blackman (1978) found the correlations between these measures to be statistically significant and between the .30 and .65 range. However, although the RFT and the EFT are significantly correlated, they seem to account for only 20% of the common variance (Witkin, H.A., Oltman, P.K., Raskin, E., & Karp, S.A., 1971). Additionally, these two tests seem to be differentially related to measures of cognitive impairment. For example, Goldstein, Neuringer, and Klappersack (1970) found that both the RFT and the EFT correlated significantly with the Block Design and the Object Assembly subtest of the WAIS, however, the EFT correlated significantly higher with these tests than did the RFT. Several studies (e.g., Donovan, Queisser & O'Leary, 1976; O'Leary, Donovan & Chaney, 1977) have shown that the performance on the Group Embedded Figures Test (GEFT) is positively and significantly related to performance on tests of cognitive dysfunction (e.g., the Trail Making Test, the Shipley Institute of Living Scale),

while in a factor analytic study, Goldstein and Shelly (1971) found that performance on the RFT, as compared to performance on the WAIS & the Halstead-Reitan Neuropsychological Battery, defined a different and independent factor. Goldstein and Shelly suggest that the RFT may measure an ability which is less affected by changes in mental status than are measures of cognitive impairment.

As Goldstein, Welch, Remnick, and Shelley (1973) note, a task which requires integration between visual and motor brain mechanisms and memory components might be expected to provide a sensitive measure of brain damage. Both the individual and group forms of the EFT are speed-dependent tasks which require visual search, the ability to overcome distracting stimulus cues, integrated perceptuomotor activity, and the use of short-term memory. Moreover, the abilities required by EFT and GEFT performance are those that have been found to be impaired by chronic alcoholism (Lezak, 1983). Chronic alcoholics tend to manifest difficulty maintaining a cognitive set, defective visual search behavior, impaired ability to organize perceptuomotor responses and to synthesize spatial elements, and subtle but consistent short-term memory deficits. Chronic alcoholics characteristically perform relatively poorly on speed-dependent visual scanning tasks, such as the Digit Symbol subtest of the Wechsler Intelligence Scales or the Trail Making Test, on tests of motor speed, and on tests of visuospatial organization of which the Wechsler Block Design subtest and the Tactual Performance Test are representative examples (Kapur and, Butter, 1977; Parson and Farr, 1981; Tarter 1975; all cited by Lezak, 1983). Moreover, chronic

alcoholics tend to sustain subtle but consistent short-term memory and learning deficits that become more evident as task difficulty increases.

Goldstein, Neuringer, and Klappersack (1970) posit that field dependence as measured by the EFT and GEFT may be confounded by the EFT's sensitivity to cognitive dysfunction. Goldstein suggests that the level of cognitive dysfunction becomes progressively more severe, as field-dependence increases. O'Leary, Donovan and Chaney (1977) found that the field dependent alcoholics in their study were the most cognitively impaired subjects. Furthermore, the field independent alcoholics, while not as high functioning as field independent non-alcoholics, consistently performed at a level equal to or better than the field dependent non-alcoholics. Using a multiple regression analysis, O'Leary, Calsyn and Tauria (1980) found that 32% of the common variance was accounted for by the GEFT, the Shipley Institute of Living Scale and the Trail Making Test. Based on these results and the findings of previous researchers, these authors conclude that the GEFT may be more of a measure of cognitive impairment than cognitive style.

#### Purpose of This Study

This study was concerned with assessing the stability of field dependence, as measured by the Embedded Figures Test, among an alcoholic population. Pre- and post-testing was conducted with the Embedded Figures Test (EFT) to determine whether EFT performance can be said to measure a stable cognitive style among chronic alcoholics. The Witkin group has posited that field dependence is a stable trait which is unaffected by abstinence from alcohol, the duration of an individual's alcohol abuse, or a state of intoxication. They have hypothesized that,

as a stable cognitive style, field dependence may predispose an individual toward becoming an alcoholic. As Karp, Witkin, and Goodenough (1965a) point out, while evidence of stability would not directly prove the predisposition hypothesis, it would make this hypothesis more plausible than would the finding of instability. A significant change in EFT performance in this study will be interpreted as indicating that field dependence, as measured by the EFT, is not a stable trait within this population and, thus, that the predisposition hypothesis is not a viable one.

In addition, subjects were randomly divided into two groups, which differed only with regard to when post-testing occurred. Performance on the EFT during the first week of inpatient treatment was compared to performance after three weeks of treatment for one group of subjects, while EFT performance during the first week was compared to performance during the fifth week for a second subject group. This was done to ascertain when change in field dependence occurred during a five week period, if change did occur.

The relationships between performance on the EFT and performance on two tests of cognitive impairment were also investigated. The Tactual Performance Test and the Trail Making Test were used because of their demonstrated sensitivity to the cognitive deficits of chronic alcoholism and because they measure abilities which are involved in EFT performance. The relationship between EFT performance and both of these measures was examined to provide additional data about the validity of using the EFT as a measure of a stable cognitive style (rather than as a measure of cognitive impairment) among an alcoholic population. Pre-

and post-testing were also conducted on the Tactual Performance Test and the Trail Making Test to determine whether there were any significant changes in cognitive functioning during the course of the treatment program.

## CHAPTER 2

### METHOD

#### Subjects

The subjects were inpatients at the Tucson Veteran's Administration Hospital Alcoholism Treatment Program who voluntarily completed pre- and post-test procedures. A total of 41 subjects comprised the pre-test subject pool, while only 24 of these subjects completed post-testing on all measures. Almost all subjects were middle-aged, white males (mean age 40.6, range 23-66) with long histories of excessive drinking (mean 15.3 years, by self-report). The average education level was 10.4 years and the occupational level was skilled to semi-skilled.

The alcoholism program was conducted over an average inpatient stay of approximately 5 weeks. The general approach was reality-oriented with group and individual therapy, and educational lectures and films on the effects of alcoholism.

#### Procedures

All 41 subjects were pre-tested on Form A of the Embedded Figures Test (EFT), to measure field dependence, and the Trail Making Test and the Tactual Performance Test (TPT), to measure different dimensions of cognitive impairment. At post-testing, all 41 subjects were required to complete an alternate form (Form B) of the EFT, while only 25 subjects completed re-testing on the TPT, and only 24 subjects

re-took the Trail Making Test. This occurred because of difficulties with some subjects' compliance that were handled by encouraging them to complete post-testing by reducing the amount of time required by post-testing. This was also done because EFT performance was the post-testing variable of primary interest and because taking the TPT could be seen to be stressful for subjects who required a long time to complete this test. Thus, the results of this study on changes in cognitive functioning, based on a test/re-test experimental design, should be interpreted with caution because of possible bias created by subjects who self-selected out of post-testing and because of the probability that practice effects confound post-test performance on the TPT and the Trail Making Test. In retrospect, it seemed that a better design would have included these tests only in pre-testing.

### Measures

#### I. The Embedded Figures Test (the EFT)

The EFT (Witkin, 1950) is a perceptual test on which the subject's task is to locate a previously seen simple figure within a larger complex figure which obscures or embeds the simple figure. In the strictest interpretation EFT performance is seen as measuring competence at perceptual disembedding. Some (e.g., Witkin, Oltman, Raskin, & Karp, 1971) have also seen EFT performance as assessing a broader psychological dimension, that of differentiation. Numerous studies have validated the construct that the EFT is a measure of extent of competence at disembedding in both perceptual and intellectual functioning (Fenchel, 1958, cited by Witkin et al., 1971;

Gardner, 1961; Gardner, Jackson & Messick, 1960; Goodenough & Karp, 1971; Karp, 1963; Loeff, 1961, cited by Witkin et al., 1971; Pascual-Leone, 1969, cited by Witkin et al., 1971; Witkin, Dyk, Taterson, Goodenough & Karp, 1962). A number of studies have contributed to the construct validity of the EFT as a measure of psychological differentiation.

These include studies that have related EFT performance to social behavior (e.g., Zuckerman, 1968), to the nature of the body concept (e.g., Witkin et al., 1954, 1962), to the nature of defenses (e.g., Witkin, Dyk, Taterson, Goodenough, & Karp, 1962), to forms of pathology (e.g., Karp, Kissen & Hustmyer, 1970), to physiological reactivity (e.g., Luborsky, 1965), and to differences in family and cultural experiences (e.g., Winestine, 1969).

This study used Form A of the EFT for pre-testing and Form B for post-testing. Scores for these alternate forms of the EFT show high correlations; Witkin, Dyk, Taterson, Goodenough and Karp (1971) report that, for a group of college men, scores for these two forms correlated .78. Additionally, both Form A and Form B utilize the 12-trial, 3 minute format of the test which is now the most widely used format. Reliabilities for these shortened forms of the original test are based on data obtained by recomputing the scores obtained from the original 24-figure, 5 minute form. High odd-even reliabilities have been found for the original test in many studies (e.g. Longenecker, 1956 cited by Witkin et al., 1971, obtained a .90 for college men; Gardner, Jackson & Messick, 1960, obtained a .95 for college women).

Finally, performance on Form B during re-testing has been found to be subject a practice effect (Witkin et al., 1971).

The Tactual Performance Test (Halstead, 1947) uses a modification of the Seguin-Goddard Form Board and requires the subject to manipulate ten differently shaped blocks into their appropriate spaces on the form board, as quickly as possible while blindfolded. Three trials were given, in accordance with the standard method of administration, the first two with the preferred and non-preferred hands, respectively, the third with both hands. The score for each trial is the time to completion, their sum is the "total time" score. On completion of the Form Board trials, and only after the form board has been concealed, the examiner removes the blindfold and instructs the subject to draw the board from memory, indicating the shapes and their placement relative to one another. The drawing trial gives two scores: the memory score is the number of shapes reproduced with reasonable accuracy; the location score is the total number of blocks placed in proper relationship to the other blocks and the board (Lezak, 1983).

## II. The Tactual Performance Test (the TPT)

The Tactual Performance Test is a complex test in terms of its requirements. The ability to place the variously shaped blocks in their proper spaces on the board depends upon tactile form discrimination, kinesthesia, coordination of movement of the upper extremities, manual dexterity and visualization of the spatial configuration of shapes in terms of their spatial inter-relationships on the board. In general, the Tactual Performance Test is considered

to be a test of visuospatial organization, motor speed, and memory (Lexak, 1983). The TPT was part of the original Halstead (1947) battery which was comprised of tests selected for their power to discriminate between brain injured patients and controls. Evaluations of the Halstead-Reitan Battery, that have focused on its effectiveness in correctly identifying organic patients and distinguishing them from neurologically intact controls, have reported high rates of correct predictions (Boll, 1981; Reitan, 1955).

### III. The Trail Making Test

The Trail Making Test (Reitan, 1958) is an easily administered test of conceptual and visuomotor tracking. Like most other tests involving motor speed and attention functions, the Trail Making Test is highly vulnerable to the effects of brain injury (Armitage, 1946; Reitan, 1958; Spreen & Benton, 1965). The Trail Making Test is considered to be among those that are most sensitive to presence of brain damage (Lewinsohn, 1973, cited by Lezak, 1983). It is given in two parts, A and B. On part A, the subject is required to draw lines to connect 25 consecutively numbered circles, as quickly as possible. On part B, the subject is required to alternate between consecutively numbered and lettered sequences, as quickly as possible. The scores obtained are the number of seconds required to complete each part. Since the score from part B is considered to be more sensitive to impairment than part A, only this score was used in this study's data analyses. However, both parts of the Trail Making Test were administered, as is standard procedure.

Lezak (1982), cited by Lezak (1983), found the reliability of Part B, as measured by the coefficient of concordance to be .67, across three administration to 19 normal control subjects at six and twelve month intervals. In this study, Lezak also found a significant practice effect on the third administration for Part A but did not find a significant practice effect for Part B.

## CHAPTER 3

### RESULTS

Analyses of variance found no significant initial difference between the two groups on field dependence, as measured by the EFT, and on cognitive impairment, as measured by the Trails B component of the Trail Making Test, and the total time, memory, and location scores of the Tactual Performance Test (TPT), at pre-testing. Also, there were no significant differences between the groups on age of subjects or length of drinking history, as measured by self-report. As indicated by Table 1, both groups were normatively high on field dependence and both groups obtained mean scores on Trails B, TPT total time and TPT location, during pre-testing, that would be classified as mildly impaired performances by the Russell, Neuringer, and Goldstein (1970) rating system. The mean TPT memory scores of both groups at pre-testing would be classified as within normal limits by Russell, Neuringer, and Goldstein (1970).

As indicated by Table 2, a significant and substantial decrease in field dependence was found by t test for each group at post-testing. In addition, an analysis of variance revealed no significant between group difference in the amount of change on the EFT, indicating that the decrease in field dependence appears to occur within the first three weeks of treatment and to remain stable within the fourth and fifth weeks.

Table 1  
 Comparison of pre-test means on all measures

	<u>Number of Cases</u>	<u>Pre-Mean</u>	<u>SD</u>	<u>t</u>
EFT				
Group 1	20	91.51	41.75	NS
Group 2	21	80.80	44.37	
Trails B				
Group 1	20	99.10	71.80	NS
Group 2	21	114.90	73.29	
TPT TIME				
Group 1	20	1052(secs)	830	NS
Group 2	21	983(secs)	486	
TPT MEMORY				
Group 1	20	6.05	1.23	NS
Group 2	21	6.90	1.70	
TPT LOCATION				
Group 1	20	3.00	1.84	NS
Group 2	21	3.71	2.57	
Subject Age				
Group 1	20	39.00	13.36	NS
Group 2	21	42.23	11.52	
Length of Drinking History (self-report)				
Group 1	20	16.70	12.60	NS
Group 2	21	14.04	9.35	

Table 2

Comparison of pre-test with post-test means on all measures

	<u>Number of Cases</u>	<u>Pre-Mean</u>	<u>SD</u>	<u>Post-Mean</u>	<u>SD</u>	<u>t</u>	<u>P</u>
<u>EFT</u>							
Group 1 (post-test at 3 weeks of treatment)	20	91.51	41.75	68.81	45.96	4.10	.001
Group 2 (post-test at 5 weeks of treatment)	21	80.80	44.37	57.25	36.71	4.72	.001
<u>Trails B</u>							
Group 1	11	87.36	63.61	63.61	23.46	1.53	NS
Group 2	13	84.92	54.71	59.00	19.41	1.93	.05
<u>TPT Time</u>							
Group 1	11	882(sec.)	500	770(sec.)	610	1.48	NS
Group 2	14	766(sec.)	294	654(sec.)	275	2.63	.01
<u>TPT Memory 1</u>							
Group 1	11	6.27	1.35	7.18	1.99	-2.65	.01
Group 2	14	7.35	1.55	8.35	1.39	-2.55	.01
<u>TPT Location</u>							
Group 1	11	3.18	2.04	3.90	2.95	-1.34	NS
Group 2	14	4.64	2.49	5.42	3.18	-1.08	NS

The results are less clear with regard to these subjects' changes in cognitive functioning. This may be due to the fact that not all subjects completed post-testing on these measures. As Table 2 shows, significant improvement was found just on Trails B, TPT time and TPT memory for group 2, and on TPT memory for group 1, when a group distinction was retained. However, as indicated by Table 3, significant improvement was found on all the measures of cognitive functioning at post-testing, when all the subjects who completed post-testing were included in the t test comparison, without making a group distinction. Ignoring the group distinction for this analysis appeared to be plausible because initial analyses of variance found no significant between group differences at pre-testing. Providing a larger number of cases to analyze resulted in the finding of statistically significant change toward improved performance on these measures.

As indicated by Table 4, the relationship between field dependence, as measured by the EFT, and cognitive functioning was examined with Pearson product moment correlations. The most revealing correlations were those between EFT performance during pre-testing and performance on each of the cognitive measures during pre-testing, for all subjects (N=41). The largest correlation was obtained between pre-EFT scores and pre-TPT time scores ( $r=.70$ ,  $p=.001$ ), indicating that the relationship between EFT and TPT time can be used to account for 49% of the variance on these measures. A significant correlation between EFT performance and performance on Trails B, during pre-testing, also emerged ( $r=.54$ ,  $p=.00$ ), as did a significant correlation between pre-EFT and pre-TPT memory scores ( $r=.47$ ,  $p=.001$ ), and a significant correlation

Table 3

Comparison of pre-test with post-test means on all measures for all subjects

	<u>Number of Cases</u>	<u>Pre-Mean</u>	<u>SD</u>	<u>Post-Mean</u>	<u>SD</u>	<u>t</u>	<u>P</u>
EFT	41	86.03	42.91	62.89	41.37	6.30	.00
TRAILS B	24	86.04	57.64	62.25	21.19	2.52	.01
TPT TIME	25	817(secs)	394	705(secs)	447	2.79	.01
TPT MEMORY	25	6.88	1.54	7.84	1.75	-3.67	.001
TPT LOCATION	25	4.00	2.38	4.76	3.11	-1.64	.05

between pre-EFT and pre-TPT location scores ( $r=-.38$ ,  $p=.01$ ). Each of these correlations reveals a relationship between a more field dependent EFT performance and a more impaired performance on the measure of cognitive functioning.

Table 4

Pearson product-moment correlations between EFT and TPT time, TPT memory, TPT location, and Trails B scores during pre-testing

	<u>Number of Cases</u>	<u>r</u>	<u>P</u>
Pre-EFT with Pre-TPT Time	41	.70	.001
Pre-EFT with Pre-Trails B	41	.54	.001
Pre-EFT with Pre-TPT Memory	41	-.47	.001
Pre-EFT with Pre-TPT Location	41	-.37	.01

Subject age and length of self-reported drinking history were also correlated with pre-EFT performance. A significant relationship was found between pre-EFT performance and age ( $r=.41$ ,  $p=.01$ ) but not between pre-EFT scores and length of drinking history, as indicated by self-report ( $r=.08$ ,  $p=.29$ ). The relationship between EFT performance and age is probably best explained by the known relationship between increased reaction time and increased age. The well-known dangers of self-report measures may be involved in the lack of relationship between length of drinking history and EFT performance.

Lastly, product moment correlations were computed between EFT performance during post-testing and performance on each of the cognitive measures during post-testing, for all subjects ( $N=25$ ). Results which

parallel those found by the correlational analyses on the pre-test data were obtained as shown by Table 5; post-EFT performance correlated significantly with all of the post-test measures of cognitive functioning and, in each case, the relationship involved the association of a more field dependent EFT performance with a more impaired performance on the measure of cognitive functioning. The largest correlation was again obtained between EFT scores and TPT time scores ( $r=.66$ ,  $p=.01$ ); the next largest correlation was found between post-EFT performance and post-test performance on the Trails B test ( $r=.43$ ,  $p=.01$ ). Product moment correlations of  $-.43$  ( $p=.05$ ) and  $-.36$  ( $p=.05$ ) were found between post-EFT and post-TPT memory scores and between post-EFT and post-TPT location scores, respectively. The pattern formed

Table 5

Pearson product-moment correlations between EFT and TPT time, TPT memory, TPT location, and Trails B scores during post-testing

	<u>Number of Cases</u>	<u>r</u>	<u>P</u>
Post-EFT with Post-TPT Time	25	.66	.001
Post-EFT with Post-Trails B	24	.43	.01
Post-EFT with Post-TPT Memory	25	-.43	.05
Post-EFT with Post-TPT Location	25	-.36	.05

by ordering these correlation coefficients by size is the same as that revealed by the analyses of the same relationships among the pre-test data. This seems to strengthen the validity of this study's finding of a strong and substantial relationship between the EFT and the total time

component of the TPT, and progressively less strong associations between the EFT and Trails B and the EFT and the memory and location components of the TPT.

## CHAPTER 4

### DISCUSSION

These results do not support the predisposition hypothesis which is predicated upon the stability of field dependence as a cognitive style among alcoholics. These results show a clear and substantial decrease on field dependence, as measured by the Embedded Figures Test, among an alcoholic population within a three week treatment period. These findings are amenable to interpretation using the consequence hypothesis, which suggests that the widely observed relative field dependence of alcoholics results from the perceptual and cognitive deficits which alcoholism produces. This hypothesis receives additional support in this study from the finding that field dependence was highly correlated with degree of cognitive impairment and from the finding that the decrease in the field dependence of this population was accompanied by a decrease in cognitive impairment. (Although, as previously discussed, this latter finding must be regarded with some caution because of methodological problems that make its interpretation more difficult).

This study's finding of a significant decrease in field dependence among inpatient alcoholics replicates the same finding by Danahy and Kahn (1981), who used the same population and the same measure of field dependence as the present study. Both the mean pre- and post-test response times on the EFT are very similar for both of these studies, which serves to further support the results of the Danahy

and Kahn study. Moreover, while the significant change in field dependence which Danahy and Kahn measured was obtained after nine weeks of treatment, a similar amount of change was measured after only three weeks of treatment in the present study. This suggests, as does this study's finding of no significant difference in the amount of change in field dependence for the group of subjects post-tested at 5 weeks as compared to those post-tested at 3 weeks, that a rapid decrease field dependence occurs among this population and then, appears to become somewhat stabilized. It is important to note that the rapid improvement and subsequent leveling-off in EFT performance found by this study is consistent with data (e.g. Ryan & Butters, 1982) that indicate that the greatest amount of improvement in cognitive functioning takes place in the first week of abstinence from alcohol and appears to remain stable after three to six weeks. Thus, both this study's finding of a significant change in field dependence and its finding about the course of this change may be best understood by utilizing the consequence hypothesis, as were Danahy and Kahn's results.

#### Methodological Issues Involved in Present and Previous Findings

The similarity between the methodology used by both the present study and Danahy and Kahn's (1981) study may be an important factor underlying the similarity of the studies' findings. Both studies employed a test/re-test design among the same alcoholic population in treatment and both used the EFT as the measure of field dependence. However, other studies (e.g. Chess, Neuringer, & Goldstein, 1971; Goldstein & Chotlos, 1966), that have examined the stability of field dependence among alcoholics in treatment using the RFT have also

obtained a significant decline in field dependence after treatment. This is important because performance on the RFT appears to be less affected by cognitive impairment than the EFT (Goldstein & Shelly, 1971). The use of different measures of field dependence by studies on the stability of field dependence during treatment, thus, increases the generalizability of their findings.

The series of studies by the Witkin group (Karp & Konstadt, 1965; Karp, Witkin & Goodenough, 1965 a & b), that were most responsible for advancing the predisposition hypothesis, used a composite index to measure field dependence, based on scores from the RFT, the BAT, and the EFT. In addition, these studies did not use a test/re-test paradigm with alcoholics in treatment but rather looked at the field dependence of alcoholics following alcohol consumption and in relation to length of drinking history and length of sobriety. Thus, two of these important studies (the one on length of drinking history and the one on length of sobriety) have used between-subjects experimental designs as opposed to the within-subjects, test/re-test designs used by studies that have looked at the stability of field dependence during treatment for alcoholism. Since the between-subjects designs have not revealed significant differences in field dependence while the test/retest designs have, this might be attributable to the increased power of the test/re-test experimental design. The between-subjects designs used by the Witkin group are statistically less sensitive to the differences which would have supported the consequence hypothesis, than are the test/re-test designs used by others. In addition, a between-groups design is logically less appropriate than a test/re-test design, because

the variable under question is the intraindividual one of the stability of field dependence for an individual over time. Thus, the inability of the Witkin group to refute the null hypotheses of their studies may say more about the way in which they studied the stability of field dependence than about the intrinsic truth of their null hypotheses. Conversely, a strength of the Witkin studies (as compared to the stability during treatment studies) is their use of a composite index to measure field dependence. The composite index seems to be a better way to measure the field dependence construct than performance on a specific test, such as the EFT, which appears to be a less than pure measure of what is meant by field dependence.

Overall, studies which have addressed the predisposition-consequence question appear to obtain results which reflect the method used to answer the question. It is the opinion of this author, that a test/re-test paradigm is the most appropriate to use in addressing a question about stability of an intraindividual phenomenon. In addition, a composite index of field dependence seems to be the best way to measure the field dependence variable itself. The present study, thus, provides additional data to support the data provided by the four other test/re-test studies (e.g. Chess, 1969, cited by Danahy & Kahn, 1981; Chess, Neuringer & Goldstein, 1971; Danahy & Kahn, 1981; Goldstein & Chotlos, 1966) that have found that field dependence declines over the course of treatment for alcoholism. A limitation of the present study is the use of the EFT alone, to measure field dependence. The EFT appears to be the measure of field dependence which is most sensitive to cognitive impairment; thus, had the present

study used a composite index to measure field dependence, the results obtained might be more applicable to cognitive style issues rather than issues of cognitive deficit.

With regard to the relationships which this study investigated between EFT performance and cognitive deficits, this study found that more field dependent EFT performances were highly correlated with more impaired performances on four different measures of cognitive functioning. The strongest relationship existed between EFT and TPT time scores, the next strongest relationship was found between EFT and Trail B scores, and two smaller, but still significant, correlations were found between EFT and TPT memory scores and EFT and TPT location scores. The same pattern of relationships was obtained for both the pre- and post-test data. The consistency of the pattern that was obtained seems to strengthen the validity of the finding of a large and significant relationship between the EFT and the total time score of the TPT, and significant but less large relationships between the EFT and the other measures. None of these relationships were surprising because of the similar abilities which are required by the EFT and the neuropsychological measures. Both EFT and the timed component of the TPT are speed-dependent tasks of visuospatial organization, while the EFT shares a speed-dependent visual scanning component with Trails B, and a memory component with TPT memory and location indices. Since both the TPT and the Trail Making Test have been found to be sensitive measures of the cognitive deficits produced by chronic alcoholism (Lezak, 1983), these results suggest that field dependence, as measured by the EFT, is confounded by the EFT's sensitivity to cognitive

dysfunction in an alcoholic population, as posited by the consequence hypothesis.

#### Summary and Conclusions

The construct of field dependence which underlies the consequence hypothesis is quite different from the construct of field dependence which underlies the predisposition hypothesis. These constructs are sufficiently different that it would actually be helpful to use a different label to describe the phenomenon to which the consequence hypothesis refers. Field dependence, by definition, refers to a cognitive style which is indicative of the degree of an individual's cognitive differentiation. The consequence hypothesis uses the term field dependence in a much more limited sense, as meaning competence at perceptual disembedding. This study suggests that competence at perceptual disembedding is exactly what EFT performance measures in an alcoholic population. Furthermore, this study found this competence to be impaired but to improve over the course of a three week period; these findings are consistent with both the kind of impairments that have been shown to be associated with the neuropathology of alcoholism and their course. Thus, while competence at perceptual disembedding has been associated with broader dimensions of personal functioning for cognitively intact subjects, this does not appear to be appropriate with subjects whose basic perceptual abilities are impaired. The lack of competence at perceptual disembedding among this alcoholic population seemed to reflect the cognitive impairment produced by chronic alcoholism rather than a stable characterological tendency with implications for personality functioning.

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