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SYMPTOM BASED CLASSIFICATION OF ENVIRONMENTALLY
ILL PATIENTS: AN EXPLORATORY STUDY

THESIS

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The purpose of the present study was to discern a symptom pattern for environmentally ill patients and provide evidence of the uniqueness of the resultant pattern to this population. Patients' environmental exposure was confirmed by the presence of toxins in the blood serum. All patients were administered psychological and physical symptom checklists, the Clinical Analysis Questionnaire, and a standardized intermediate neuropsychological examination.

Results indicate a response pattern of symptoms including fatigue, low energy, weakness, poor concentration, poor memory, poor comprehension, headaches, aches and pains, clumsiness, sinus discomfort, mucus, eye problems, restlessness, and present performance inferior to prior level of functioning. Presence of these symptoms, as well as the uniqueness of this symptom pattern was supported by comparisons of the patient and standardization groups on the two standardized tests.

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SYMPTOM BASED CLASSIFICATION OF ENVIRONMENTALLY
ILL PATIENTS: AN EXPLORATORY STUDY

One of the earliest attempts of systematic classification in psychology was that of Emil Kraepelin in the late 1800s. "Kraepelin noted that certain symptom patterns occurred with sufficient regularity to be regarded as specific types of mental disease" (Coleman, 1976, p. 47). This early classification system became the basis of classifying mental disorders. Currently, mental disorders are defined and classified in the Diagnostic and Statistical Manual of Mental Disorders, Third Edition-Revised (DSM III-R) (American Psychiatric Association, 1987).

In DSM III-R each of the mental disorders is conceptualized as a clinically significant behavioral or psychological syndrome or pattern that occurs in a person and that is associated with present distress (a painful symptom) or disability (impairment in one or more important areas of functioning) or with a significantly increased risk of suffering death, pain, disability, or an important loss of freedom. (p. xxii)

Symptom based classification is used for describing both physical and psychological diseases and disorders. The question of whether or not such a system can be used to

screen for individuals with environmental illness, however, has yet to be answered.

Environmental illness can be thought of as being the result of exposure to external elements. According to Bell (1982), "clinical ecologists propose that chronic exposure to common foods, environmental chemicals, and natural inhalants--in addition to physical and psychosocial stressors--can trigger a wide range of mental, emotional, and physical disorders in susceptible individuals" (p. 13). While Bell did not deny the contribution of physical and psychosocial stressors in environmental illness, she did emphasize the external exposures often given little attention in diagnoses by traditional psychologists and physicians. In fact, without clinical experience in the area of health psychology, one might easily overlook the possibility that environmental exposure could be a factor in causing commonly reported symptoms. For example, Bell (1982) stated that "patients are frequently debilitated by their chronic symptoms and have frequently received other diagnoses, including 'psychosomatic,' by the time they come to treatment by a clinical ecologist" (p. 14). This should not be too surprising as the manifestations of environmental illness often seem to fit into not only the general definition of a mental disorder mentioned earlier, but also they often mirror the symptoms found in specific disorders and syndromes. Another difficulty may in part

be due to the extremely diverse array of symptoms reported by those with environmental illness. In reporting on the multitude of possible symptomatic manifestations of environmental illness O'Bannion (1981) found the following:

Psychological or behavioral manifestations of reaction may include fatigue, apathy, depression, impaired attention, impaired concentration and comprehension, aphasia, learning disabilities, enuresis, delinquency, paranoia, delusions, hallucinations, amnesia, hyperactivity or hypoactivity, irritability, talkativeness, heightened emotional response, insomnia, alcoholism, obesity, aggression, anxiety, fearfulness and apprehensiveness, ravenous hunger, excessive thirst, pathological laughter, neurotic and psychotic syndromes, and muscle tension. (p. 30)

Rather than narrowing the field of a symptomatic picture of the environmental patient, it appears that almost any symptom may be resultant of environmental exposure.

Indeed, O'Bannion (1981) admitted that reported symptoms include nearly all those treated by those in the health care profession. There is, however, some hope of finding a core set of symptoms specific to environmental illness.

In discussing symptoms found in children with chemical sensitivities, Rapp and Bamberg (1986) reported the following:

Any type of symptom can be associated with chemical sensitivities but the most common include fatigue or hyperactivity, weakness, headache, 'a ballooned or fuzzy head,' poor recall, joint pains, or leg muscles which can weaken, burn or repeatedly cramp. Some children become dizzy, limp, act inordinately tired, hold their head, appear to be unable to walk, or simply cannot perform normally in school if they are exposed to a chemical odor to which they are sensitive. (p. 54)

There are other instances in the literature of health care professionals who have attempted to narrow the field of symptoms reported by the environmentally ill. As many of the substances are toxic to the central and peripheral nervous systems, it is not surprising to find that some of the work in this area has been carried out by neuropsychologists.

Perhaps the most defined and clarified group of psychoneurological symptoms was given by Hartman. In 1988, Hartman reported several symptoms that could result from environmental exposure including impairment in the areas of "attention, concentration, abstract reasoning, cognitive efficiency and flexibility, fine motor speed and coordination, gross motor coordination and strength, short and long-term memory (verbal and nonverbal information), constructional apraxias, anxiety, depression, anger,

tension, fatigue, and irritability" (p. 24). While this list was not meant to be exhaustive, it did provide a clearer picture of some of the more commonly reported symptoms of environmental illness.

Others have reported fewer, more specific clusters of symptoms, such as "red, itchy eyes; sneezing; and runny nose" (Dickey, 1976, p. 152), however, these are more specific to the traditional allergic reaction and may not appear in all patients. Dickey (1976) also stated that "systematic manifestations involving the cardiovascular, musculoskeletal, and nervous systems are readily related to a history of environmental exposures. After considerable clinical experience, the clinical ecologist will suspect these manifestations as the result of exposure to foods and environmental chemicals" (p. 152). Therefore, it appears that patterns indicating environmental exposure may be recognized by those with a great deal of experience in the area, however, a more readily recognizable symptom cluster, with utility for the less ecologically experienced professional is needed. This is especially true if earlier identification of environmentally ill patients, as well as a reduction in misdiagnoses, is to be achieved.

Currently, there are several methods available to test for environmental exposure. According to O'Bannion (1981), "most commonly used diagnostic techniques to assess food, chemical, and inhalant sensitivities include the

provocative skin test, the sublingual test, the cytotoxin blood test, the pulse test, the radioallergosorbent test (RAST), and variations of the elimination diet" (p. 139). While these tests can be very useful, many are either invasive, costly, or time consuming. Certainly, it is not the purpose of this paper to criticize the use of these tests, rather it is hoped that through the use of other procedures that a less costly, simpler, and faster method of screening might be developed to help determine the possibility of environmental illness, as well as when more complex diagnostic techniques are necessary. In order to accomplish this task it must be determined if the use of psychological symptom checklists and other paper and pencil tests can be used as a way to identify a pattern of dysfunction unique to the environmentally ill patient.

The usefulness of symptom checklists, both in clinical ecology and other areas of health care, can be found in recent literature. For example, DeGood, Buckelew, and Tait (1985) found that chronic pain patients exhibited a different symptom pattern than nonpatients. They also pointed out the need for specific norms for symptom endorsement for different types of patient populations.

In another study, which employed the use of the Symptom Checklist-90 (SCL-90), an instrument used to assess psychopathology, Evenson, Holland, Mehta, and Yasin (1980) found symptom clusters when the test was administered to

psychiatric outpatients. Evenson et al. (1980) factor analyzed their data and found 12 clusters of symptoms, and concluded that "many of the factors have been shown to be consistently replicable across a wide variety of patients, descriptively useful, consonant with clinical formulations, and sensitive to treatment changes" (p. 699).

In a later factor analytic study using the SCL-90, Shutty, DeGood, and Schwartz (1986) found symptom clusters in a population of chronic pain patients. Shutty et al. (1986) also found, however, that a different factor structure emerged when using the SCL-90 with chronic pain patients. This appears to support the notion that different populations of patients may demonstrate unique clusters of symptomatology.

The usefulness of symptom reporting has been demonstrated for many different patient populations. Additionally, the understanding of symptoms reported by environmentally ill patients can be of benefit to the health care provider. In discussing this issue as it relates to the clinical ecologist, O'Bannion (1981) stated that "a description of the total range of symptoms and data concerning the frequency, duration, and intensity of symptoms can give the health care provider a better understanding of the individual's problems and also provide a baseline to assess the effectiveness of treatment" (p. 124). Nevertheless, it remains to be seen if the

environmentally ill patient can be detected reliably on the basis of symptom reporting and if an identifiable pattern of symptoms unique to this type of patient can be used to achieve this goal.

One of the difficulties in finding a symptom cluster unique to environmental illness, however, is that the nature of such illness may preclude a standard set of symptoms for all patients. Randolph (1976) illustrated this point when he proposed that each person may react in a somewhat idiosyncratic manner dependent on the person's specific sensitivities, his or her degree of sensitivity, and his or her stage of reaction to environmental incitants. Although this may, on the surface, suggest that finding a symptom cluster for environmentally ill patients is not possible, one need only to look at a similar difficulty in describing mental illness. For example, in discussing this topic DSM III-R (American Psychiatric Association, 1987) reported the following:

Another misconception is that all people described as having the same mental disorder are alike in all important ways. Although all people described as having the same mental disorder have at least the defining features of the disorder, they may well differ in other important respects that may affect clinical management and outcome. (p. xxiii)

Therefore, it may well be possible to find a core set of symptoms in environmentally ill patients, just as with mentally ill patients, even though they may differ in other important ways.

There is a precedent supporting this argument in the literature. In a study of pesticide exposure by Rea, Butler, Lasiter, and DeLeon (1984), the following was reported:

While the clinical patterns of these patients were usually similar, not all of the patients showed all of the symptoms. They exhibited central and peripheral nervous system (cognitive, perceptual, motor) symptoms and signs including recent-memory deficits, paresthesias, headache, dizziness, and motor instability. (p. 149)

Thus, while it may indeed be a difficult task identifying a unique set of symptoms for environmental illness, this should not discount the possibility of doing so. It is the purpose of this paper to discern a cluster of psychological symptoms in a sample of environmentally ill patients. It is hypothesized that certain symptoms will be reported a high percentage of the time, and that the presence of these symptoms can be verified by two objective tests. As this is a pilot study, comparison with the standardization groups of the objective measures will be used to provide initial

support for the uniqueness of the symptom pattern to the environmentally ill patient.

Method

Subjects

The subjects were chosen from patients seeking treatment at the Environmental Control Unit in Dallas, Texas (ECU), and the Northeast Healthcare Center in Hurst, Texas (NHC). All subjects had known exposure to environmental incitants. The group was composed of 45 subjects (12 males and 33 females). Their ages ranged from 13 to 74 years and the mean age was 44.6.

Instruments

Four clinical instruments were used in the test battery from which the items for symptom analysis were drawn. Those chosen included the Clinical Analysis Questionnaire (CAQ) (Cattell, 1973), the Comprehensive Neuropsychological Screen (CNS) (Butler & Harrell, 1988), The Clinical Ecology Symptom Checklist-Psychological (CESC-Ps) (Butler, 1986), and the Clinical Ecology Symptom Checklist-Physical (CESC-Ph) (Butler, 1986).

The CAQ was developed to measure both normal and pathological personality factors. The validity of this instrument was determined by eight major factor analytic studies, all of which reported significant results (Krug, 1980). The validity of the CAQ is reported to range

from .45 to .86 and the reliability is reported to range from .51 to .90.

The CNS is a 42-item test designed to measure multiple areas and types of neuropsychological dysfunction. The test measures skills and abilities in the areas of attention, concentration, cognition, verbalization, gross and fine motor, perceptual learning, and memory. As an intermediate exam, the test was designed to assess a wide range of skills in a relatively short period of time (approximately 45 minutes), and was "patterned after techniques used in such batteries as the Wechsler intelligence and memory scales, Halstead-Reitan battery of neuropsychological tests, Benton visual retention test, and other mental status assessment techniques" (Baldrige, 1989, p. 11). The CNS is currently undergoing validation studies at the University of North Texas (see Appendix A).

The CESC-Ps is a 37-item self-administered questionnaire designed to measure a wide range of psychological symptoms. Endorsement of each item is divided into both frequency and severity of symptom occurrence. The frequency section is responded to by checking: (1) seldom or never, (2) occasionally, or (3) frequently. The severity section is responded to by checking: (1) mild, (2) moderate, or (3) severe (see Appendix B).

The CESC-Ph is a 55-item self-administered questionnaire designed to measure a wide range of physical symptoms. Endorsement of each item is divided into both frequency and severity of symptom occurrence. The frequency section is responded to by checking: (1) seldom or never, (2) occasionally, or (3) frequently. The severity section is responded to by checking: (1) mild, (2) moderate, or (3) severe (see Appendix C).

Procedure

The clinical instruments (CAQ, CNS, CESC-Ps, and the CESC-Ph) were administered to the ecological patients by professionals, trained in psychometric procedures, within seven to ten days of initial consultation. They were administered and scored under the recommended test standardization procedures. All measures were taken before treatment was begun. The demographic data was obtained from the psychological histories gathered at the time of the initial consultation at ECU and NHC. Environmental exposure was confirmed by the presence of chemicals in the blood serum. The blood analysis was undertaken in a manner similar to that described in a study by Rea et al. (1984) where "pesticides were measured in serum using high resolution glass capillary gas chromatographic methods following extraction with residue analysis grade hexane. Detection was by electron capture" (p. 146). Exposure to other chemical contaminants was confirmed using similar methods.

Results

All data were subjected to descriptive statistics including frequencies, means, percentiles, and standard deviations. Percentage of subject responses was used to determine a pattern of symptoms most often reported. Symptoms derived for defining this pattern included only those endorsed as being experienced "frequently" by more than 40% of the patient group. Patients reported 27.02% of the total number of symptoms from the CESC-Ps, and 15.63% from the CESC-Ph at this cut-off rate. The pattern included a total of 10 symptoms from the CESC-Ps (see Table 1). The pattern of most frequently reported symptoms on the CESC-Ph also included a total of ten items reported by 40% or more of the patients (see Table 2).

Percentage of subjects responses were also used to discern a pattern of dysfunction on the CNS. Items determining this pattern were those answered either partially or fully incorrect by more than 50% of the patient group. Patients responded incorrectly to 41.30% of the test items. The pattern of dysfunction included a total of 19 items (see Table 3). The means for the total score and selected individual items included from the pattern of dysfunction appeared to be significantly higher for the patient group than the standardization group. These items have been presented for initial comparison to aid in discerning the difference in symptomatology and

Table 1

Most Frequently Reported Symptoms of Environmentally Ill Patients on the Clinical Ecology Symptom Checklist- Psychological

Item	Description
10	Overwhelming exhaustion or weariness--very easily fatigued.
11	Difficulty in getting started in the morning.
14	Difficulty concentrating on work or study.
15	Present performance inferior to prior performance or level of functioning.
19	Feelings that "I'm not myself," or "What is happening to me?"
24	Frequent headaches.
33	Feelings of losing control of one's destiny.
35	Poor memory.
36	Poor comprehension.
37	"This is not me."

Table 2

Most Frequently Reported Symptoms of Environmentally Ill Patients on the Clinical Ecology Symptom Checklist-Physical

Item	Description	Item	Description
1	Headaches	23	Low energy
4	Aches and pains	24	Weakness
8	Sinus discomfort	25	Restlessness
14	Clumsy	33	Mucus
22	Easily fatigued	40	Eye problems

Table 3

Most Frequent Incorrect Responses by Environmentally Ill Patients on the Comprehensive Neuropsychological Screen

Item	Description	Area of Dysfunction
2	Recall four words (5 minute trial)	Immediate verbal recall
3	Recall four words (15 minute trial)	Short-term verbal recall
5	Repeat digits backward	Immediate and short-term verbal recall
7	Repeat these 3 hand positions	Perceptual-motor learning and sequencing
9	Stand on one foot, then the other	Gross-motor coordination
10	Walk this straight line	Gross-motor coordination
13	Repeat 3 movements with your mouth	Oral apraxia
16	Tap your pencil on the table when you hear the letter A following the letter E	Vigilance, Attention, and Concentration
22	Name the numbers written on your fingertips (patient blindfolded)	Sensory-tactile
23	Tell me the number for the two fingers I am touching (patient blindfolded)	Sensory-tactile
24	How many fingers are between the two I am touching (patient blindfolded)	Sensory-tactile
29	Please figure these math problems in your head	Arithmetic logic and concentration

31	Please remember as much of this story as you can	Logical memory
33	Draw picture from memory (picture #2)	Visual-motor recall
34	Draw picture from memory (picture #3)	Visual-motor recall
36a	How are the following similar: lion-flower	Abstract thinking ability
37b	How are the following different: peanut-acorn	Abstract thinking ability
41	Please recall the story you were read a few minutes ago	Short-term memory
42	Fill in the empty boxes by matching the one on top with the master key, work as quickly as you can (symbol-symbol)	Psychomotor speed, concentration, and symbol associative and Perceptual-motor learning

Note. Some item descriptions have been abbreviated.

level of functioning present between the environmentally ill patient group and the normative group from the standardization sample. The means and standard deviations for the remaining items were not available for comparison at this time (see Table 4). The means of the total or global score and selected individual items for the patient group and standardization group were subjected to a t test. The means and standard deviations for the remaining items were not available for use in t test calculations at this time. The t values for the total or global score, as well as those for the selected items were all found to be significant at the .005 level (see Table 5).

Table 4

Means and Standard Deviations on the Comprehensive Neuropsychological Screen: Total Scores and Selected items for Patient and Standardization Groups

Item	Environmental Group		Standardization Group	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
Total Score	35.04	12.43	22.00	8.00
7	1.28	0.83	0.60	0.70
9	1.74	0.62	0.40	0.50
10	1.30	0.96	0.90	0.70

Table 5

t test Values for Differences Between Means of Patient and Standardization Groups on the Comprehensive Neuropsychological Screen: Total Score and Selected Items

Item	<u>t</u> test value
Total Score	41.94**
7	5.12**
9	13.88**
10	2.83**

**p < .005.

CNS scores were subjected to z-score calculations to determine an ideal cut-off score for differentiating the patient and standardization groups. The ideal cut-off score was found to be 28, and results indicate that this will correctly identify 81.06% of the patient group and 77.34% of the standardization group. This score was chosen for the ability to minimize the number of incorrect decisions concerning the placement of subjects, thereby keeping the number of false positives and false negatives as small as possible. Each possible score for the CNS will have different probabilities of correctly identifying each group, and can be used to help determine the probability that a given client is environmentally ill (see Table 6).

Standardization CAQ scores of the patient group were compared to the normative data of the CAQ. The patient group was not found to be significantly different from the normative group on the 16 normal personality traits. The patient group was found to be elevated on three of the clinical factors when compared to the normative group. The patient group was elevated on the hypochondriasis, anxious depression, and low energy depression scales (see Table 7).

Table 6

Probability of Correctly Identifying Patient and Nonpatient
Subjects with Specific Scores on the Comprehensive
Neuropsychological Screen

Cut-Off	Percentage of Patients Correctly Classified	Percentage of Nonpatients Correctly Classified
23	26.43	55.17
24	30.85	59.87
25	35.20	64.80
26	40.13	69.15
27	44.83	73.57
28	50.00	77.34
29	55.17	81.06
30	59.87	84.13
31	64.80	87.08
32	69.15	89.44
33	73.57	91.62
34	77.34	93.32
35	81.06	94.84
36	84.13	95.99
37	87.08	96.99
38	89.44	97.72
39	91.47	98.34
40	93.45	98.78

Table 7

Means and Standard Deviations of Elevated Clinical Analysis
Questionnaire Standardized Scores for Patient Group

CAQ Scale	<u>M</u>	<u>SD</u>	Number
Hypochondriasis	8.72	1.54	45
Anxious Depression	7.04	1.90	45
Low Energy Depression	7.36	2.13	45

Discussion

The results provided support for the hypothesis that environmentally ill patients would exhibit a high frequency response pattern of symptom reporting. Additionally, the two objective measures (CAQ and CNS) appear to confirm the presence of dysfunction commensurate with the reported symptoms and provide initial support for the uniqueness of the symptom pattern to the environmental patient.

Results indicate that the main cluster of symptoms reported includes fatigue, low energy, weakness, poor concentration, poor memory, poor comprehension, headaches, aches and pains, clumsiness, sinus discomfort, mucus, eye problems, restlessness, and present performance inferior to prior performance or level of functioning.

The presence of many of these symptoms was confirmed by performance on the CNS, where the main areas of dysfunction were found to be immediate and short-term

verbal recall, visual-motor recall, perceptual and symbol associative learning, sequencing, gross motor coordination, oral apraxia, vigilance, attention and concentration, arithmetic logic, sensory-tactile, logical memory, abstract thinking ability, and psychomotor speed. All of these areas of dysfunction are part of the overall symptom pattern found including difficulties with gross motor control which is represented by the symptom "clumsy."

Additional support for presence of reported symptoms was found on the CAQ. Elevation of the low energy depression and anxious depression scales are as expected for the extremely high rate of fatigue, weakness, low energy, exhaustion, and restlessness reported. One would also expect elevation of the hypochondriasis scale due to the chronic nature of environmental illness and reporting of multiple symptoms, however, these patients meet only one of the criteria for this disorder. According to the DSM III-R, the environmentally ill patients meet the criterion of "duration of the disturbance is at least six months," however, this is not sufficient for a diagnosis of hypochondriasis (American Psychiatric Association, 1987, p. 261).

The subjects in this study seem to have a discrete set of psychological, neuropsychological, and physical symptoms similar to what would be expected from the symptoms and types of dysfunction due to chemical and environmental

exposure reported in the introduction. The uniqueness of the pattern to the patient group is supported by the results comparing this group to the standardization groups, which demonstrated initial confirmation of the differences between these groups.

As this is an exploratory study, the purpose of determining if a pattern of symptoms for the environmentally ill exists has been met and preliminary evidence suggests that the symptom cluster is unique to the environmental patient. Additional study is needed to further support this hypothesis. Such research might include the comparison of symptom reporting on the CESC-Ps and CESC-Ph with a control group having no known environmental exposure. Also, comparisons of environmental patients with other patient groups, such as those with known head injuries may prove fruitful in giving a clearer picture of the types and causes of dysfunction found as a result of exposure to environmental toxins.

APPENDIX A
COMPREHENSIVE NEUROPSYCHOLOGICAL SCREEN

Comprehensive Neuropsychological Screen

- ___ 1. Remember these words: yellow, truthfully, pliers, wheelbarrow. Please repeat them. Now count to 100 by ones outloud (allow 30 seconds). What were the four words you were asked to remember? (0 errors=0, 1 error=1, 2+ errors=2, same for next two items).

___yellow ___truthfully ___pliers ___wheelbarrow

- ___ 2. Five minute recall.

- ___ 3. Fifteen minute recall.

- ___ 4. Repeat these numbers after I say them.

- a. 3-7 ___
 b. 2-4-9 ___
 c. 8-5-2-1 ___
 d. 2-9-6-8-3 ___
 e. 5-7-1-9-4-6 ___
 f. 8-1-5-9-3-6-2 ___
 g. 3-9-8-2-5-1-4-7 ___

(6 digits or more=0, 5 digits=1, 4 or less=2)

- ___ 5. Repeat these digits backwards, after I say them (example 541).

- a. 3-5 ___
 b. 7-3-9 ___
 c. 4-3-7-9 ___
 d. 1-8-6-3-5 ___
 e. 7-5-2-9-8-6 ___
 f. 9-7-3-6-1-5-3-4 ___

(5 digits or more=0, 4 digits=1, 3 or less=2)

- ___ 6. Repeat these numbers after I say them. I will repeat the same number over several times. Please try to repeat as many as you can in sequence each time (Repeat this sequence each time and record clients response: 3-1-7-9-4-3-5-2-8).

Record responses on following page.

- | | |
|----|----|
| a. | e. |
| b. | f. |
| c. | g. |
| d. | h. |

(4 trials to complete=0, 5 to 6=1, 7 to 8=2)

- ___ 7. I am going to put my hand in three positions. I want you to repeat them and in exactly the same order but wait until I finish. (0 errors=0, 1=1, 2 or more=2).
- ___ 8. Show me how you would use a pair of scissors (Score 0 correct, 2 incorrect).
- ___ 9. Stand on one foot with your eyes closed. Now stand the other (0 balance on each, 1 error=2).
- ___ 10. Walk this straight line (0 or 2).
- ___ 11. Follow my fingers with your eyes without moving your head (0 or 2).
- ___ 12. I want you to make three movements with your mouth. First stick out your tongue, then purse your lips, then place your tongue between your lower lip and gum (Demonstrate). (Score 0 or 2).
- ___ 13. Now repeat these same movements as quickly as you can until I say stop (Allow 10 seconds and score as passed if the number of sequences exceeds 3, Score=0 otherwise score=2).
- ___ 14. I am going to ask you to make a series of movements with your hand. I want you to touch your nose, left ear, hair, mouth and nose in that order. Listen carefully once more before you make the movements. I want you to touch your nose, left ear, hair, mouth and nose (Score 0 or 2).
- ___ 15. I want you to tap a rhythm with your hands. Watch me first (Demonstrate two taps with right then two with the left in a smooth rhythm and allow practice). Now do this movement as quickly as you can until I tell you to stop. Allow 10 seconds (8 or more score=0, 5 to 7=1, 4 or less=2).
- ___ 16. Tap your pencil on the desk when I say the letter A following an E (Correct if client taps on first A and explain once more). (0 errors=0, 1 = 1, 2+ = 2).

ATPLEARACTIAEAAAXWAPKALYDEAXEPJYEAEAEPQAEGEAVRMEANTEIROEAARQOA

- ___17. Now I am going to knock on the table. If I knock once you knock twice and if I knock twice you knock once (No errors Score=0, 1 error=1, 2 or more=2).

1___ 2___ 1___ 2___ 2___ 2___ 1___ 2___

- ___18. Draw a cube (Score 0, 1, 2).
- ___19. Draw a clock with numbers and make the hands show 9:28 (Score 0 or 2).
- ___20. Point to my right eye with your left hand (Score 0 or 2).
- ___21. Make up a speech about education (Time to first response). (7 sec=0, 8 to 10 sec=1, over 10 sec=2).
- ___22. Blindfold client and say I am going to write some numbers on your fingertips. For example this is a 2, 3,4,5,6,7,8,9. (Write 4 of these on the palm of each hand, 1 error=0, 2 errors=1, 3 or more=2).

Right				
T	I	M	R	L
2	3	4	6	5

Left				
T	I	M	R	L
4	5	3	6	4

- ___23. Work out a numbering system for identifying the fingers with the clients (Thumb=1, Index=2, etc.). Tell me by number for which two fingers I am touching (1 error=0, 2 errors=1, 3 or more=2).

Right				
1,5	2,4	1,3	3,5	4,5

Left				
3,5	2,4	4,5	1,3	1,5

- ___24. Tell me how many fingers are between the two I am touching (1 error=0, 2 errors=1, 3 or more=2).

Right				
1,5	2,4	1,3	3,5	4,5

Left				
3,5	2,4	4,5	1,3	1,5

REMOVE BLINDFOLD

- ___25. Repeat this sentence: "We all went to the Methodist Episcopal Church" (Score 0 or 2).
- ___26. Read this sentence: Francis was able to finish the test because he was intelligent (Score 0 or 2).

- ___27. Write this sentence: Government that exists for the people will be less government (Score 0 or 2).
- ___28. Explain what this proverb means: "Rome wasn't built in a day" (abstract response=0, concrete=1, other=2)
- ___29. Please answer the following and figure the answer in your head (Allow 7 seconds per item, Score 0 or 2).
- 12 + 7 - 4, 14 x 5, 84 - 23
- (Score 0 errors=0, 1 error=1, 2 or 3 errors=2).
- ___30. Subtract the top number from the bottom number (Allow 10 seconds and score 0 or 2).
- ___31. I am going to read a short story to you. When I am finished, I want you to tell as much as you can remember.

John Samuels/ an immigrant/ from Austria/ came to Philadelphia/ in September 1978/ and applied for American citizenship./ He was employed/ by the city/ as a clerk/ and after 5 years/ was promoted to assistant manager/ because of his hard work./ He won citizenship/ in December/ 1984/ and sent for his parents/ who lived in Vienna./ They brought with them/ his lifelong sweetheart/ whom he married,/ following a short engagement.

(Score 7 or more=0, 5 or 6=1, less than 4=2)

- ___32. I am going to show you a picture for 10 seconds. When I remove it I want you to draw it (Present picture No. 1).
- ___33. Repeat the instructions and present picture No. 2.
- ___34. Repeat the instructions and present picture No. 3.
- ___35. Earlier in the testing I asked you to make three movements with your mouth in order. Can you make those three movements now in the same order as before (Score 0 or 2).
36. How are the following similar: (Score abstract=0, concrete=1, other=2).
- ___ a. lion-flower
- ___ b. bark-coat
- ___ c. agony-ecstasy

37. How are the following different: (Score abstract=0, concrete=1, other=2).
- ___ a. tree-rock
 - ___ b. peanut-acorn
 - ___ c. silk-nylon
- ___38. What should you do if you see an armed robbery in progress (Score 0=obtain help or get a description, 2=intervene).
- ___39. What should you do if while traveling on the interstate someone is tailgating you very closely and honking, but there are cars beside you preventing a change of lanes (Score 0=some reasonable strategy, 1=some vague idea, 2=other).
- ___40. Who weighs more if John is lighter than Mark but heavier than Sam (Score 0 or 2).
- ___41. You were just read a short story a few moments ago about an immigrant. Tell as much as you can remember of that story now (Score 7 or more=0, 5 or 6=1, less than 4=2).
- John Samuels/ an immigrant/ from Austria/ came to Philadelphia/ in September 1978/ and applied for American citizenship./ He was employed/ by the city/ as a clerk/ and after 5 years/ was promoted to assistant manager/ because of his hard work./ He won citizenship/ in December/ 1984/ and sent for his parents/ who lived in Vienna./ They brought with them/ his lifelong sweetheart/ whom he married,/ following a short engagement.
- ___42. Point to the sample and say "Notice the symbol in upper box with a blank box below. The first sample box has this mark which in the code box has this mark below". Fill in the first three boxes and then let the client complete the sample boxes to the double line giving help if needed. Then say "Now complete the remaining boxes as quickly as you can without making errors. Complete the boxes in order without skipping any, when you reach the end of one line go to the beginning of the next. Continue until I say stop". Allow 90 seconds.

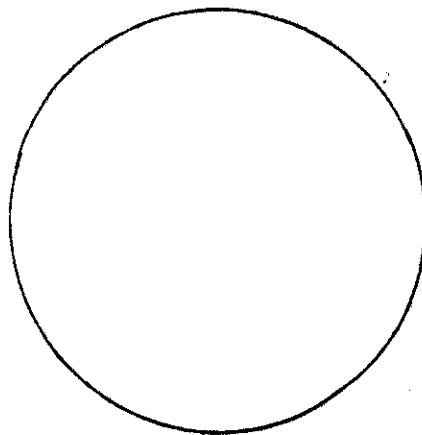
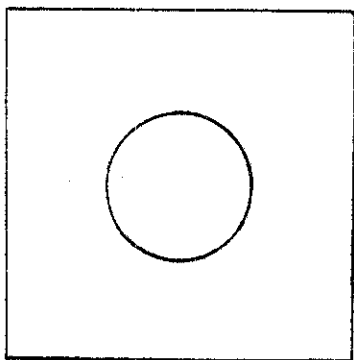
___18. Draw a cube.

___19. Draw a clock.

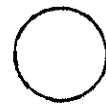
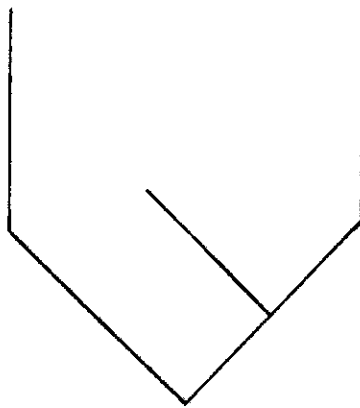
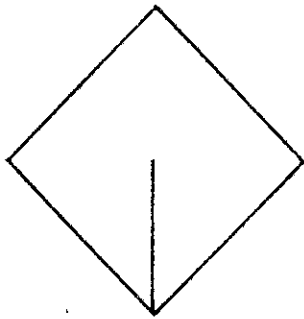
___27. Francis was able to finish the test because he was intelligent.

___28. Government that exists for the people will be less government.

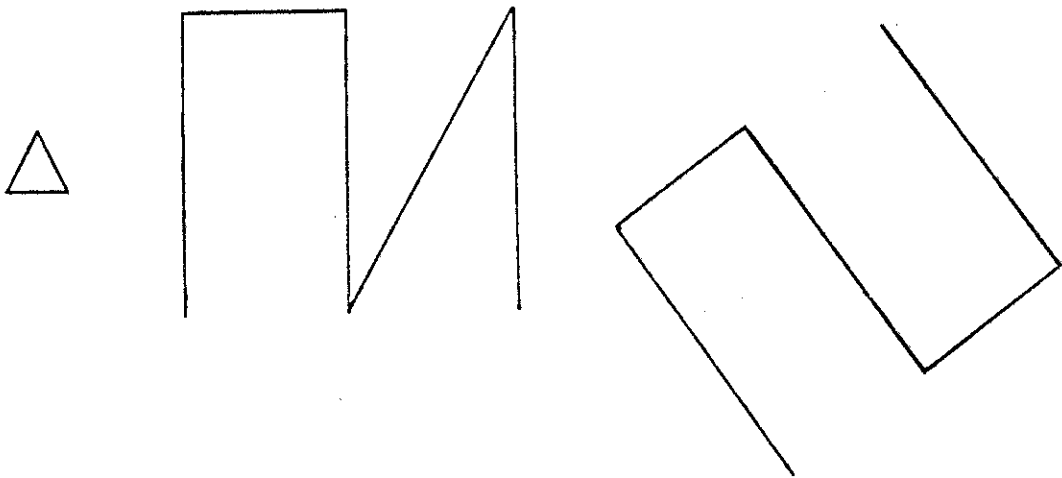
___31. 58
 ± 76



___32.



___33.



___34.

APPENDIX B
CLINICAL ECOLOGY SYMPTOM
CHECKLIST-PSYCHOLOGICAL

CLINICAL ECOLOGY SYMPTOM CHECKLIST-PSYCHOLOGICAL

Date _____

Name _____

Please check the appropriate answer box as to frequency and severity for each of the following symptoms:

	Frequency			Severity		
	seldom or never	occasionally	frequently	mild	moderate	severe
1. Irritability						
2. Exquisite sensitivity (overly sensitive to remarks and actions of others)						
3. Negation of joy						
4. Pervading pessimism - Emphasis on the negative; failure to see the positive						
5. A feeling that life is not worth living; wishing to die						
6. A feeling that problems and task are insurmountable						
7. Inability to cope well with daily stresses						
8. Unexplained anger or annoyance with (significant) others						
9. Dwelling on real or imagined hurts perceived to be caused by others						
10. Overwhelming exhaustion or weariness - very easily fatigued.						
11. Difficulty in getting started in the morning						
12. Overwhelming sadness or depression with no apparent external cause sufficient to warrant such sadness or depression						
13. Feelings of elation or good mood followed by sadness or depression						
14. Difficulty concentrating on work or study						
15. Present performance inferior to prior performance or level of functioning						
16. Withdrawal from loved ones						
17. Feelings of being unloved or unlovable						
18. Feelings of being misunderstood by others						
19. Feelings that "I'm not myself", or "What is happening to me"						
20. Free-floating anxiety						
21. Talkative						
22. A sense of apprehension of foreboding; worry over events that may never occur						
23. Ideas of suicide						
24. Frequent headaches						
25. Dizziness or black-outs						

	Frequency			Severity		
	seldom or never	occasionally	frequently	mild	moderate	severe
26. Unexplained fears						
27. Mood swings seemingly associated with changes in the weather						
28. Feelings of needing to punish or get back at others						
29. Blurred vision						
30. Loss of interest in sexual activity						
31. Making "mountains out of molehills"						
32. Increased need for tenderness and affection						
33. Feeling of losing control of one's destiny						
34. Feeling of being constantly on the verge of tears						
35. Poor memory						
36. Poor Comprehension						
37. "This is not me"						

APPENDIX C
CLINICAL ECOLOGY SYMPTOM
CHECKLIST-PHYSICAL

CLINICAL ECOLOGY SYMPTOM CHECKLIST-PHYSICAL

Date _____

Name _____

Please check the appropriate answer box as to frequency and severity for each of the following symptoms:

	Frequency			Severity		
	seldom or never	occasionally	frequently	mild	moderate	severe
1. Headaches						
2. Migraines						
3. Disturbances in Appetite:						
a. Excessive Appetite						
b. Poor Appetite						
4. Aches and Pains						
Describe:						
5. Edema						
6. Bloating						
7. Sleep Disturbances:						
a. Trouble Falling Asleep						
b. Trouble Remaining Asleep						
8. Sinus Discomfort						
9. Hay Fever						
10. Often Use Painkillers						
a. Prescription Painkillers						
b. Over-the-Counter Painkillers						
11. Respiratory Problems						
Describe:						
12. Take Sedatives						
List:						
13. Take Tranquilizers						
List:						
14. Clumsy						
15. Groggy						
16. Accident Prone						

	Frequency			Severity		
	seldom or never	occasionally	frequently	mild	moderate	severe
17. Bowel Disturbances:						
a. Constipation						
b. Diarrhea						
c. Gas						
18. Stomach Troubles						
Describe:						
19. Seizures or Convulsions						
Describe:						
20. Weight Gain						
21. Weight Loss						
22. Easily Fatigued						
23. Low Energy						
24. Weakness						
25. Restlessness						
26. Excessive Perspiration						
27. Dizziness						
28. Numbness						
Describe:						
29. Tingling						
30. Restless Legs						
31. Cough						
32. Itching						
33. Mucus						
34. Sore Throat						
35. Muscle Spasms						
36. Twitches						
37. Circulation Difficulty						
38. Hear Problems						
Describe:						

	Frequency			Severity		
	seldom or never	occasionally	frequently	mild	moderate	severe
39. Skin Problems Describe:						
40. Eye Problems Describe:						
41. Ear Problems Describe:						
42. Speech Problems Describe:						
43. Paralysis						
44. Arthritis						
45. Asthma						
46. Tremors						
47. Bruising						
48. Burning Sensation Describe:						
49. Urinary Tract Problems Describe:						
50. Yeast/Fungal Infections						
51. Flu-Like Symptoms						
52. Fever						
53. High Blood Pressure						
54. Low Blood Pressure						
55. Sexual Dysfunction Describe:						

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