

SOME PERSONALITY CORRELATES OF THE CONJUGATE
LATERAL EYE - MOVEMENT PHENOMENON

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MICHAEL R. BARNAT

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MICHAEL R. BARNAT

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ABSTRACT

SOME PERSONALITY CORRELATES OF THE CONJUGATE LATERAL EYE-MOVEMENT PHENOMENON

By

Michael R. Barnat

Researchers have reported on a conjugate eye-movement phenomenon (CLEM) which they relate to subjects' "characteristic deployment of attention," as well as perceptual and cognitive differences (cf. Day and Bakan). Individuals are classified as left- or right-eye-movers on the basis of their uni-directional eye movements in response to questions requiring reflective thought. The criterion which classifies a subject is uni-directional eye movement at least 66.6 per cent of the time. Special subgroups are isolated consisting of those subjects whose uni-directional eye movement exceeds 85 per cent (i.e., "strong-movers").

The present study was designed to link this phenomenon to a body of conceptually related, dichotomous personality typologies. The author wished also to extend the range of observations, relevant to CLEM, to include projective test performance.

The general hypothesis predicted that left-moving subjects, LM, would demonstrate perceptual and cognitive qualities suggested by William James' term "tender-minded" and that right-moving subjects, RM, would show qualities characterized as "tough-minded."

To test this hypothesis, E obtained a measure of performance on an Embedded Figure test, subjects' academic majors, occupational preferences and Rorschach responses. Ninety-six subjects, evenly divided between males and females, left and right movers, participated. Standard procedures were utilized for all measures.

Specific hypotheses predicted that (1) RM would perform more quickly than LM on the Embedded Figure task, (2) RM would show more interest in scientific majors and LM would favor the humanities, (3) RM would favor scientific and technical occupations while LM would choose artistic options, and (4) RM would evidence higher levels of conventionality and preciseness than LM in their projective responses. The latter variables included form-level, location, use of "populars," color responsiveness and indices of primary process thinking.

The results were as follows:

1. Among males, significantly more RM successfully completed the Embedded Figure task in the allotted time. Contrary to the hypothesis, LM of both sexes were somewhat faster than RM as measured by

time to completion. The difference was not statistically significant.

2. The hypothesis that LM would show more humanistic majors was considered unconfirmed. In the present sample there was a high percentage of semi-technical and applied majors.
3. On the Kuder test, only the music scale was related to CLEM to a significant degree for males. This was interpreted as a chance finding. Among females, no scale was related to CLEM. However, for a subsample (the extreme ends of the eye-movement continuum), LM of both sexes fell below RM in the endorsement of scientific interests.
4. Some Rorschach variables were marginally related to CLEM: Organization and the production of "popular" responses (also, Holt's variable group "Condensation") tended to favor RM males. Productivity (R) favored LM males. For females CLEM was significantly related to color responsiveness (favoring LM) and to a measure of verbal fluency (favoring RM).

Form-level, as measured by Friedman's "developmental" scoring system, was significantly related to CLEM for a subsample of "strong-movers": LM of both sexes produced more vague, "oceanic" responses than RM. Among

males, however, LM accounted for more high-level, organized responses as well.

The author concluded that the above results were not sufficient to relate CLEM to previous typologies, but that discernible differences between LM and RM, particularly at the extreme ends of the eye-movement continuum, warranted further study. Future research should utilize "strong-mover" samples. Research should also attempt to clarify the relationship between CLEM and the types of reflective questions utilized to elicit it (e.g., arithmetic vs. proverbs).

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SOME PERSONALITY CORRELATES OF THE CONJUGATE
LATERAL EYE-MOVEMENT PHENOMENON

By

Michael R. Barnat

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INTRODUCTION

General Background

In the history of psychological observation and theorizing a variety of personality typologies have been developed, some stressing physiognomy and others the behavioral correlates of different developmental stages. Each approach has made legitimate claim to a certain amount of validity as well as popularity in the scientific community. The following study fits in this general area of descriptive personology and stresses differences in the cognitive aspect of individual psychological functioning. It will attempt to relate, to a body of clinical and experimental work, a dichotomous eye movement phenomenon (CLEM).

An informal typology was suggested by Williams James (1907, p. 12) in his discussion of the differences between the "rationalist" and the "empiricist." The former he described by a number of characteristics including intellectuality, idealism, optimism, dogmatism, and "tender-mindedness." The latter he characterized as irreligious, naturalistic, skeptical, pessimistic and

"tough-minded." The present research is addressed to some possible empirical bases for James' philosophical observations concerning approaches to intellectual material. The phrases "tough-minded" and "tender-minded" are sometimes used in psychology--where the experimentalist is defined by the former and the clinician is seen as tending toward the latter.

Such a dichotomy in the intellectual community was suggested by C. P. Snow (1959) in his influential essay "The Two Cultures and the Scientific Revolution." Here he stressed what he considered a dangerous rift between two different intellectual mentalities: the scientist and the literary-social intellectual. He described " . . . two groups, comparable in intelligence, identical in race, not grossly different in social origin . . . income . . . who in intellectual, moral and psychological climate had . . . little in common" (p. 2). He described them as two "polar" groups differing not only in intellectual but in practical life as well. While the author's purpose was not to suggest a personality typology, some of his observations fit more or less well with those of James, at least in the area of the approach to cultural and scientific matters.

The scientist is described as impatient, pragmatic and exact. In conversation he uses terms that have concrete referents. The scientist knows what he means by what he says. On the other hand he is likely to miss the

meanings of terms lacking concrete referents and to see them as irrelevant. The literary intellectual is essentially the opposite. According to Snow, he is likely to boast about his lack of scientific knowledge and this lack is revealed in his literary production (presumably by technical inaccuracy, though Snow does not make this clear).

While Snow admits that scientists in separate fields differ in obvious respects, he notes that they share common attitudes, patterns of behavior and basic assumptions. However divergent the discipline (e.g., biology and physics) a scientist is more like other scientists than he is like the non-scientist. This idea is given support in the work of Eiduson (1962, p. 122 ff). According to Snow, this phenomenon is multiply determined by factors including " . . . the inner dynamic of the mental activity themselves" (p. 23).

It would seem that the Jamesian "rationalists" are in some ways like Snow's literati and that the scientist fits the picture of the empiricist. The characteristics of tough-mindedness, exactness, skepticism, and the use of concrete referents on the one hand and, on the other, tender-mindedness, idealism and technical ignorance suggest measurable differences in cognitive approaches to a variety of stimuli.

A Clinical Typology

Clinical theory and observation provides further support for the general validity of the dichotomy suggested above. Shapiro (1965) describes some of the cognitive characteristics associated with different "neurotic styles," the labels for which are drawn from contemporary nosology. Relevant to the present work are his descriptions of the "obsessive compulsive" and "hysterical" styles.

Before describing the characteristics of these styles, a brief sketch of Shapiro's theoretical model should be presented. This is provided because of a theoretical link between the clinical work and a body of empirical work by Gardner, Holzman, Klein, Linton and Spence (1959; see below). He posits that there exists innately some "initial organizing configuration." This refers to a rudimentary " . . . configuration of innate psychological equipment" which "imposes some form and organization . . . on drives and external stimuli and, in general, on all psychological tensions" (1965, p. 176 ff).

Shapiro further suggests that the "initial organizing configuration" provides the basis for what in clinical terms becomes the "neurotic style." By "style" the author refers to " . . . a form or mode of functioning--the way or manner of a given area of behavior--that is identifiable, in an individual, through a range of his

specific acts." Among these acts and most important to the study are "ways of thinking and perceiving"--in short, styles of cognition. To Shapiro these "ways of thinking . . . must in themselves represent psychological structures of importance, and these structures might be of a more general type than the specific traits or mechanisms that could be inferred from them." According to him, "the simple fact of human consistency over broad areas of functioning argues for such a concept" (p. 1 ff).

Drawing on the work of Gardner et al. (1959), Shapiro states that "it is possible . . . to demonstrate that individuals possess relatively stable cognitive tendencies that determine the form of the influence that a motive or need exerts on their cognition" (p. 13). These forms may be relatively general, more stable or even "os-sified" in the case of neurosis and character disorder.

Shapiro suggests that the stylistic modes reflect something more than learned behavior patterns. Rather, what is learned will be modulated by " . . . a biologically rooted nucleus of psychological structure that influences characteristic form tendencies of both adaptive and defensive functioning from the beginning" (p. 10). He draws on the theoretical formulations of Hartmann for support.

Two of the styles described by Shapiro appear to fit to some degree with both James' and Snow's character descriptions. These are the obsessive compulsive and the hysterical style.

The former is characterized primarily by rigidity and dogmatism. A crucial feature of this rigidity according to Shapiro is "a special restriction of attention" which makes difficult the inclusion of new facts. This restriction is manifested by an intense, sharp focus of attention on details that others seem to miss. To some degree such a style is appropriately related to technical work where accuracy is called for, and in scientific work where the logical intricacies of theory are important. According to the author, the people who manifest this style " . . . seem always to be concentrating [and] some aspects of the world are simply not to be apprehended by a sharply focused and concentrated attention" (p. 27). Thus this style precludes responses to "hunches" and "passing impressions." In genuinely pathological instances "the normal capacity for smooth and volitional shifts between sharply directed and more relaxed, impressionistic cognition is absent . . . " (p. 30).

The second style of relevance here is the hysterical one and it stands in relatively clear opposition to that described above. In Shapiro's words, the "hysterical cognition in general is global, relatively diffuse, and lacking in . . . sharp detail. In a word, it is impressionistic" (Shapiro's italics, p. 111). This style is characterized by a diffuse focus of attention and a quick responsiveness to what is "immediately impressive, striking

or merely obvious." Just as original perceptions are based on impression, recall is also vague and nebulous. To the question "what made it look like that?," this style fosters the answer: "It just did . . . " This stand in contrast to the detailed and factual recall characteristic of the obsessive-compulsive style. In addition, the hysterical mode is reflected in a difficulty in intense concentration, distractibility and non-factual reporting. In many cases, the "impression" or "hunch" is not the beginning of problem solution, but the "final, conscious cognitive product." Where reliance is placed heavily on hunches, curiosity is truncated. Shapiro suggests that a negative association exists between the degree to which this style is manifested and the amount of accumulated, factual information.

What is implied in the hysterical mode of cognition is a "holistic," global approach to stimuli which would seem characteristic of James' "tender-minded" individual and Snow's literati. On the other hand the "tough-minded" empiricist (Snow's scientist) in some ways reflects the obsessive-compulsive style which is manifested in a precise approach to stimuli.

Experimental Bases for the Concept of Cognitive Styles

The notion of individual consistencies in cognitive behavior has received theoretical and experimental support

in the work of Gardner et al. (1959). These authors suggest that relatively few dimensions of cognitive organization encompass a wide variety of perceptual and cognitive behavior. Central to their work is the concept of "cognitive controls" or structures which, like Shapiro's "initial organizing configuration," lend consistency to the individual's perception and cognition.

To Gardner et al., a number of cognitive controls coexist within the personality and their idiosyncratic arrangement (Gestalt) constitutes the "cognitive style." The latter concept in turn forms a measurable manifestation of Shapiro's "neurotic style." It should be added that the concept of "controls" does not imply a pathologic dimension. The differences in cognition and perception reflect adaptive approaches to reality.

The authors specify five control principles: Leveling-Sharpening (a holistic dedifferentiation of the cognitive field vs. maximal complexity and differentiation of the field); Tolerance for unreal experiences (reaction to the apparent-movement ["phi"] phenomenon); Equivalence range (exact standards for detailed categorization of stimuli vs. acceptance of inexact categorization); Focusing (a tendency to narrow awareness and keep ideas distinct); and Constricted vs. Flexible control (comfort vs. discomfort with intrusive stimuli). In addition they considered Field Independence vs. Dependence (Witkin, 1954).

To these principles the authors applied fourteen tests measuring perceptual and cognitive functions (Rorschach, Embedded Figures, Stroop Color-Word Test, etc.). The data was subjected to factor analysis.

Results showed that among males, clear factors were (1) scanning and (2) tolerance for unrealistic experiences. Among women factors were (1) field-articulation, (2) leveling-sharpening, and (3) equivalence range. Field-articulation was further interpreted as a composite of two principles: Field Dependence-Independence and Constricted-Flexible control.

The finding of factors does not imply that cognitive styles are simple matters. The control principles in Gardner et al. were found to be independent, i.e., within a subject, knowing his relative emphasis within one control principle (e.g., leveling-sharpening) does not allow prediction to his emphasis in another (e.g., equivalence range).

Finally, the work of Witkin and his associates (1954, 1962), incorporated in the above, deserves separate mention. These investigators developed the terms Field Dependence and Field Independence to cover individual differences in response to a variety of perceptual-cognitive tasks. The latter include the rod and frame test, tilting-room-tilting-chair test and the Embedded Figures Test.

The investigators have found much consistency in subjects response over time.

In essence, these tests provide indices of the extent to which a subject may analyze and differentiate components of a stimulus-field in order to resolve perceptual ambiguities, e.g., whether S or the room is tilted. Some subjects are well-oriented to their body cues and thus relatively proficient in determining a reality situation, e.g., their relative tilt vs that of the room. These subjects are labeled Field-Independent as are those who perform relatively efficiently on the Embedded Figures tests (Witkin, 1950).

Those aspects of the work of James, Snow, Shapiro, Gardner, and Witkin which bear an affinity to each other and to the correlates of CLEM (see below) can be summarized in tabular form.

James

"Tender-minded"
Intellectualistic
Idealistic
"Free willed"

"Tough-minded"
Sensationalistic
Naturalistic
Skeptical

Snow

Literary intellectual
Uses words with conceptual referents
Linguistic style inexact

Scientist
Uses words with concrete referents
Linguistic style exact

Shapiro

Hysteric
Diffuse focus of attention

Obsessive-Compulsive
Narrow, exact focus of attention

Global feeling re-
sponsiveness
Inadequate recall

Fact-and-event orien-
tation
Fine-edged recall

Gardner et al.¹

Holistic perception
Inexact categorization
of stimuli
Broad awareness
Comfort with intrusive
stimuli

Differentiated perception
Exact categorization
of stimuli
Narrow awareness
Discomfort with intrusive
stimuli

Witkin

Field-Dependent
Judgement dependent
on stimulus field
Holistic perception

Field-Independent
Judgement dependent
on subject
Differentiated perception

In the following section a small body of empirical literature will be presented. It is suggested that this may be a point of convergence of the above literary, clinical and experimental work.

The Conjugate Lateral Eye Movement Phenomenon

Description. Day (1964) reports the observation of an eye-movement phenomenon which was thought to be related to the shifting of attention. This phenomenon is described, again by Day (1968), quite succinctly:

If you obtain another person's attention as evidenced by this head orientation [directed toward the experimenter] and eye fixation [on the experimenter's eyes]; and if you ask him a question which requires affective self expression or reflective thought; and

¹Inclusion in this tabular form may appear to contradict the findings of intra-subject variability on each control principle. The above should be interpreted as simply the conceptual extremes of each principle.

if you observe his right eye, you will notice a quick lateral eye movement in which the person appears to momentarily break eye fixation while thinking or in preparation for answering. On repeated observations the direction of the movement may be seen to be relatively reliable and the individual may be classified as a "right mover" or "left mover."

In the light of the variety of personality correlates suggested by Day (see below), as well as the implication of wide general validity (Day, 1967a), Duke (1968) performed an empirical study to add research documentation to the clinical observations.

Duke administered orally a ten-item questionnaire to a sample of summer school psychology students. Five of the questions required reflective thought (e.g., "How many letters are in the word 'Montana'?") and five did not (e.g., "How many brothers and sisters do you have?").

Only the eye movement was recorded and a trial was declared invalid if the subject and experimenter did not share gazes immediately following the phrasing of the question.

In essence, Duke validated Day's observation. On the average, 86 per cent of these subjects' eye movements were horizontally directional. In addition, males were found to reflect the lateral eye movement phenomenon more consistently than females.

The importance of requiring "reflective thought" questions was upheld in this study. Where questions could be answered by simple factual reporting, no eye movement

was noted. The phenomenon was found to be unrelated to eye dominance. In addition there were no sex-related trends in directionality.

Experimental studies have since been performed supporting Day's original observation and deriving a number of personality correlates (Day, 1967a, 1967b; Bakan & Svorad, 1969; Bakan & Shotland, 1969; Bakan, 1969).

Empirical and theoretical foundations for a typology based on eye-movement directionality. The Conjugate Lateral Eye-Movement Phenomenon (CLEM) is thought by Day to reflect attentional processes. In this regard it has cognitive implications. As a matter of individual differences, directionality serves as an index of the manner in which a person's attention is characteristically deployed (Bakan & Svorad, 1969). The reasoning behind this is provided by Day (1964) who categorized attentional processes into four separate modes. The first is "passive-internalized" defined as "awareness of one's feelings or internal state." The second is "active-internalized" which refers to the awareness of intended action or self expression. Third is the "passive-externalized" mode referring to the awareness of the meaning of someone else's expressed behavior. Last is the "active-externalized" mode involving awareness of acting in behalf of another person or in attending to his feelings. Day relates the eye-movement phenomenon to the shift from one of the above

attentional modes to another. In brief, between the time an experimenter stops asking his question and the verbalization of the subject's answer, the latter turns "inward" to the necessary cognitive operations, then back to the experimenter.

Notice that the phenomenon is defined in social (dyadic) terms. This means that the direction of the movement is related to the social versus private aspects of attention. Support for this interpretation is offered by the observation that when a subject mentally asks and answers his own question, his characteristic eye-movement direction is reversed (Day, 1968). A "Left Mover" LM is defined as one whose characteristic direction in a dyadic context is predominantly left and a "Right Mover" RM one whose characteristic movement is right.

Granting that Day's assumptions are correct and that the phenomenon does reflect a subject's characteristic deployment of attentional processes, what are the implications for differences in cognitive styles? That is to say, what are the behavioral correlates associated with characteristic right or left movement?

According to Day (1967b) the "direction seems most clearly related to differences in the experience of anxiety, language styles, cognitive styles and thus to personality variables."

Bakan (1969) found that a predominance of left eye movement was associated with greater susceptibility to hypnosis as measured by the Stanford Hypnotic Susceptibility Scale. In addition, LM was associated with clearer imagery, humanistic interests and relatively poorer mathematical versus verbal performance on the Scholastic Aptitude Test.

The differences between LM and RM are also suggestive of the "styles" observed by James, Snow and Shapiro (1965) and the patterns of Field Independent vs. Dependent subjects demonstrated by Witkin et al. (1962).

Day (1967a) reports differences in language usage between RM and LM. He gives the example of different responses to the same stimuli. Where the RM says: "I've got to get something to eat," the LM says: "I'm terribly hungry." These phenomenal and syntactical differences relate, according to Day, to the deployment of attention. LM is characterized by a "subjective internalized distribution" whereas RM is characterized by an "objective, reactive externalized" mode, or "visual-haptic" (touch) distribution.

Day makes the interesting comment that, in therapy, RM tends to dwell on "facts" (actions) while the LM emphasizes his subjective, affective reactions. While this is clinical observation, it fits well with Shapiro's (1965) comments concerning obsessive-compulsive versus hysterical styles.

Further suggested is that anxiety is experienced differently by left and right movers. The left mover describes anxiety as a "tensional-jittery state with definite internal locus" (Day, 1968). In extreme cases, the left mover is "obsessional" about the kinds of impulses which threaten to emerge and may show an inability to maintain visual attention because of obsessional intrusions (Day, 1967a).

The RM describes anxiety as having an "external locus" or "fear in search of an object quality" characteristically labeled as diffuse anxiety. In general the Lateral Eye-Movement Phenomenon disappears in periods of intense anxiety or embarrassment.

Other differences between RM and LM have been demonstrated empirically. Citing the differences in the distribution of attention between right and left movers, Bakan and Shotland (1969) hypothesized that RM would do better than LM on tasks requiring visual attention. To test this the authors employed the Stroop Color-Word Test.

The investigator's hypothesis was confirmed. Right movers were subject to significantly less interference than LM. In addition, RM were found to read faster than LM, a list of color names printed in black on white. The authors attribute this to the enhanced ability of RM to make use of covert reading responses, i.e., to read the interfering words faster before naming the colors.

These empirical and clinically derived correlates can be summarized in tabular form.

<u>LM</u>	<u>RM</u>
Passive-internal, auditory distribution of attention.	Active-external, visual-haptic distribution of attention.
Anxiety characterized as having <u>internal</u> locus.	Anxiety characterized as having <u>external</u> locus.
Emphasizes emotive aspects of past experiences.	Emphasizes factual aspects of past experiences.
Syntactical emphasis on passive experience.	Syntactical emphasis on active intentionality.
Clearer imagery.	Imagery less clear.
Humanistic interests ("soft" majors).	Scientific interests ("hard" majors).
Greater susceptibility to hypnosis.	Less susceptibility to hypnosis.
Poorer SAT math performance than language performance.	Less discrepancy between math and verbal SAT scores.
Less resistance to intrusion of extraneous stimuli.	Greater resistance to distraction.

Statement of the Research Problem and Major Hypotheses

There appears to be a correspondence between the behavioral and conceptual correlates of the Conjugate Lateral Eye-Movement Phenomenon and the informal typologies suggested by James, Snow and Shapiro. Witkin's (1954) typology also seems to bear an affinity to the "right" versus "left" eye mover dichotomy.

The general theoretical question is as follows:
Does the Conjugate Lateral Eye-Movement Phenomenon, as reported by Day (1964), provide an empirical basis for the typologies described above?

The general hypothesis of the present research is that RM will show evidence of "tough-mindedness," and LM will show evidence of "tender-mindedness." Specific hypotheses will be presented for each of the variables outlined below.

METHODS AND PROCEDURES

Selection of Subjects

Subjects for the present study were volunteers from introductory psychology classes at Michigan State University. Approximately 250 subjects, male and female, were screened with respect to eye-movement characteristics. The large number of subjects screened was due to a combination of unclassifiable subjects (see below) and periodic excesses in each of the four categories. Of this number, 96 subjects provided data used in the final analysis: LM males = 24; RM males = 24; LM females = 24; RM females = 24.

The study was advertised simply as "Personality and Perceptual" in order to avoid any connection with the growing interest in CLEM (e.g., Bakan, 1971). Because other researchers were working with this variable, "feedback" did not mention CLEM but provided the option for further subject inquiry (see Appendix A).

One male and one female undergraduate ran all subjects to obtain data on CLEM, sex, major, handedness and Embedded Figures Test performance. Both assistants had

had prior research experience but were naive with respect to the present study, its purposes and hypotheses.

Determination of Eye-Movement Characteristics

The subjects' status as LM or RM was determined in accord with Day (1968). Left-movers were those subjects whose left-eye movements accounted for 66.6 to 100 per cent of the total number of directional eye movements. Those subjects whose left-movement accounted for 33.3 per cent or less of the directional eye movements were RM. The formula is simply:
$$\frac{L}{L + R} = \text{CLEM}.$$

Subjects who responded with no lateral eye movements, consistent upward or downward movement or an equal number of left and right movements were not considered in the present research. Unclassifiable subjects constituted approximately 45 per cent of the total number screened.

To determine eye movement, the following questions were asked for each subject:

1. Interpret the proverb: "The tongue is the enemy of the throat."
2. What is the square root of 72?
3. How many letters are in the word "California"?
4. What is the square root of 90?
5. Interpret the proverb: "When they offer you a heifer, come running with a halter."
6. What is 17 x 22?
7. What are the implications of having a woman president?

8. Subtract 39 from 57.
9. A person dreams he attends the metropolitan opera dressed in rags. What do you think this means?
10. How many letters are in the word: "Montana"?
11. What is the square root of 42?
12. Interpret the proverb: "Penny-wise, pound-foolish."
13. If Kennedy were alive, how would we stand in Viet Nam?
14. What is 11×18 ?
15. What do you think this experiment is all about?

Items 4, 6, 10 and 15 are from Duke (1968). The distributions of eye-movement characteristics of this sample may be seen in Table 1.

Bakan (1971) altered the empirical definition of RM and LM to include at least ten movements in fifteen trials (questions). Prior to this consideration, it was possible for a student to be a subject on the basis of only three CLEMs in fifteen trials. Two left movements and one right movement would equal 66.6 per cent left movement, even if the subject failed to respond to the remaining twelve questions.

But it would be inappropriate to consider them comparable to subjects who responded with twelve CLEMs in fifteen trials. In the present sample, 94.8 per cent of the subjects met the criterion of at least ten CLEMs in fifteen trials.

TABLE 1
 Conjugate Lateral Eye Movement:
 Sample Characteristics

CLEM	N	Per cent Uni-directional Movement			
		66-84	85-99	100	
M	<u>LM</u>	24	20.8	37.6	41.6
	<u>RM</u>	24	58.3	25.0	16.7
F	<u>LM</u>	24	29.2	29.2	41.6
	<u>RM</u>	24	45.9	20.8	33.3

Determination of Hand Preference

The E used three questions to determine handedness: (1) "Which hand do you write with?" (2) "Which hand do you generally open doors with?" (3) "Are you considered left- or right-handed?" When discrepancies existed in subjects' reports, they were placed in a middle category. Handedness data may be found in Appendix B.

Measures

Occupational interests. One implication in Shapiro's (1965) theoretical scheme is that cognitive modes are consistent with general adaptive or maladaptive "styles." Presumably, attitudes and occupational interests relate to the way a person thinks--the obsessive individual applying himself to tasks demanding of concentration and the hysteric to activities which reward intuitive impressionality. Along this line, RM can be seen as being more oriented to the scientific majors while LM show more humanistic interests (Bakan, 1969).

The Kuder Preference Record--Vocational (Form CM) (Kuder, 1934) has been, for many years, used as an interest inventory the major purpose of which is to indicate "relative interest in a small number of broad areas . . . " (Anastasi, 1961, p. 536 ff). From a large number of forced-choice, triad type items, ten interest scales plus

a verification (validity) scale are derived. The interest scales include: (1) Outdoor, (2) Mechanical, (3) Computational, (4) Scientific, (5) Persuasive, (6) Artistic, (7) Literary, (8) Musical, (9) Social Service and (10) Clerical.

Profiles, drawn for each subject, reflect percentile ranks for each factor. It was predicted that left movers LM would score higher than RM on the following scales: Artistic, Literary. In addition, where the music scale involves passive listening, LM were expected to show greater interest than RM. Zytowski, Mills and Paepe (1969) attempted to relate Field Independence to social service using standard tests of the former variable and the Strong Vocational Interest Blank. Their hypothesis, that interest in social service would be positively associated with Field Dependence was not confirmed. Social service may be seen as reflecting humanistic interests, an appreciation of scientific methodology and an emphasis on personal activity and involvement. Given this complexity, eye-movement directionality was not expected to bear a relationship with interests in social service.

RM were expected to score higher than LM on Scientific, Mechanical, Computational, Clerical, and that part of the music scale involving active participation.

Academic major. To some degree a subject's academic preferences, based in part on what he knows or

perceives those preferences to entail, should be consistent with standardized test performance. Thus, in accord with the above and with Bakan (1969), LM were expected to show more interest in "soft," humanistic majors; RM to show an inclination toward "hard," scientific majors.

Embedded Figures Test (Witkin, 1950). The use of this device was expected to provide a link between the typology of Witkin et al. (1954, 1962) and CLEM. The figure employed here was, empirically, the most difficult of the series used by Witkin (1950). The figure and a practice figure may be seen in Appendix C.

The subject was expected to trace a simple figure from a more complex one. The dependent variable was time to completion. Because of the analytic concentration necessary for solution, RM were expected to show a lower mean time than LM in solving the problem.

Projective responses. Right- and left-eye movers were compared using selected variables from two Rorschach scoring systems (Beck et al., 1961; Holt, 1956, 1960). The former is a standard scoring technique. The latter has been specifically designed with reference to two key concepts in psychoanalytic theory; secondary and primary process (Holt, 1956). The applicability of these concepts to CLEM will be discussed below.

From the Beck system (Beck, Beck, Levitt & Molish, 1961), the following variables were utilized.

1. $F+\%$. This refers to "perceptual accuracy," i.e., the extent to which a subject's percept agrees with normative data regarding the stimulus card under question. It is "socially" defined and as such indicates the extent of reality testing utilized by a given subject. It also serves as an index of "conventionality." RM were expected to show a higher per cent of this variable than LM.
2. Closely related to $F+\%$ is $P\%$ or the percentage of "popular" responses. This variable is also based on normative data and refers to the production of modal responses such as "bat" to cards I and V. RM were expected to produce higher percentages than LM on this variable.
3. Lambda or "L" refers to the extent that the collection of percepts are dominated by intellectual functions. It is defined by the proportion of Form (F) determined responses of the total Record:

$$L = \frac{(F+) + (F-) + (F)}{R - [(F+) + (F-) + (F)]}$$

This definition makes it central to the present conceptualization of the right mover as one who, "tough-minded" is dominated by intellectual

functions. RM were expected to be greater than LM with respect to this variable.

4. Approach (Ap) refers to the extent to which a subject's record reflects attention to details (D, Dd) or emphasis on "whole" responsiveness (W). In the words of Beck (1945) this variable refers to the extent intelligence can serve as an "elastic tool" (p. 13 ff), for example, to shift from "general-abstract" to the "minute" aspects of the stimulus. It was expected that RM records would favor "D" and "Dd" and that the records of LM would reflect an emphasis on "W." This is in line with Shapiro's (1965) description of the differences in cognitive emphasis.
5. Color responses are an index of the extent to which the subject's perception are dominated by the affectively salient characteristics of a stimulus. In Rorschach theory they are thought to reflect the management of impulses. In line with Shapiro's (1965) description of the hysterical style as a responsive to the immediately salient, LM were expected to be greater than RM in the production of pure C and CF over FC. This hypothesis is also in indirect agreement

with the findings of Bakan and Shotland (1969)
with respect to the Stroop Color Word Test.

Holt (1956, 1960) has developed a "supplementary" method for scoring the Rorschach in terms of the psycho-analytic notions of primary and secondary process thinking. The former type refers to non-logical, image-dominated and primitive modes of thought whereas the latter refers to organized, logical, "rational" and reality-oriented processes. In clinical work, a relatively complete assessment of the extent to which one or the other mode is dominant is important. The relative dominance of primary or secondary process is central to the issue of adaptive functioning. For example, the extreme obsessive-compulsive subject, in an attempt to cope with the potential emergence of threatening impulses, stresses structure, systematization and logical control in thinking. The productions of the extreme hysteric and the schizophrenic on the other hand, reflect the poorly organized and the drive-dominated nature of their thinking.

Some empirical correlates of CLEM suggest that LM may be associated with some level of primary-process influence while RM reflects the relative dominance of secondary processes. Associated with LM is an internalized distribution of awareness (Day, 1964, 1968), greater hypnotizability (Bakan, 1969)--which may reflect a subject's ability to "relax" secondary processes--clearer

imagery and less resistance to the intrusion of irrelevant stimuli (Bakan & Shotland, 1969). On the other hand, is associated with "hard" majors--physical sciences and math (Bakan, 1969) which presumably involve, among other things, the ability to concentrate and attend actively to the relationships between technical or theoretically intricate details. RM is also associated with greater resistance to the intrusion of distracting stimuli (Bakan & Shotland, 1969). In short, RM would appear to rely heavily on secondary process thinking.

Due to the low expectancy of occurrence of primary process ideation in (1) a relatively non-pathological sample, and (2) a limited protocol (see below), hypotheses were not made for each variable in the Holt system separately. Rather, the general expectation was that LM would be associated with greater amounts of primary process thinking than RM. That is, RM and LM were compared on the summation of the following "formal" primary process indices, rather than on each variable: condensation, displacement, symbolism, contradictions of reality, verbal slips and a miscellaneous group of variables sharing an autistic quality (Holt, 1960).

Coding

Rorschach. Three coders, working independently and without knowledge of the subjects' eye-movement characteristics, were involved in scoring Rorschach

protocols. Two assistant coders, one a Ph.D. level Clinical Psychologist and the other a graduate student in psychology, each scored ten protocols, one assistant scoring by the Beck system and one by the Holt system. In establishing coding reliabilities, protocols were drawn at random from the sample; no protocol was used more than once for reliability. In addition, a measure of intra-rater reliability was performed by the E rescoreing ten protocols by the Beck system and ten by the Holt system. Reliabilities are presented in Tables 2 and 3.

It will be noted that the reliability for the Holt formal variables is low. This is due in large part to the infrequency of these variables in a relatively normal sample: where there are few observations (e.g., in symbolic activity as measured by the Holt system), it takes even fewer "misses" to lower reliability considerably.

Occupational interests. Kuder answer sheets were scored by hand using a set of templates from the Michigan State Counseling Center. All other data was recorded as supplied by assistants running subjects.

CLEM reliability. E and an assistant sat on opposite sides of a one-way mirror. The E presented ten subjects with fifteen questions (see above) and the two raters independently recorded eye movements. The level of agreement achieved in this way was 86 per cent.

TABLE 2
Inter-rater Reliability for Rorschach
Variables Based on Ten Protocols

Variable	r^b
Beck:	
Form level	.74
Location	.93
Color usage	.80
Popular (P)	.85
White space (S)	.76
Organization (Z)	.70
Holt:	
Level 1 Libido	.50
Level 2 Libido	.69
Level 1 Aggression	.65
Level 2 Aggression	.72
Condensation	.52
Displacement	.24
Symbolism	.47
Contradiction	.24
Miscellaneous	.36
Verbal ^a	.37
Control and Defense	.66

^aOnly the category "verbal slips" (i.e., slips of the tongue) was scored (refer to Holt, 1970).

^bNecessary for significance: $P < .01 = .77$;
 $P < .05 = .63$.

TABLE 3

Intra-rater Reliability for Rorschach
Variables Based on First and Second
Scoring of Ten Protocols

Variable	r^c
Beck:	
Form level	.86
Location	.88
Color usage	.76
Popular (P)	.93
White space (S)	.88
Organization (Z)	.82
Holt:	
Level 1 Libido	1.00
Level 2 Libido	.70
Level 1 Aggression	1.00 ^a
Level 2 Aggression	.86
Condensation	.46
Displacement	.34
Symbolism	1.00 ^a
Contradiction	.65
Miscellaneous	.51
Verbal ^b	.48
Control and Defense	.65

^aThese correlations are based on few or no observations, are thus thought to be chance occurrences.

^bOnly the category "verbal slips" (i.e., slips of the tongue) was scored (refer to Holt, 1970).

^cNecessary for significance: $P < .01 = .77$;
 $P < .05 = .63$.

Procedures

Subjects sat on the opposite side of a standard office desk, directly facing the assistant. The latter recorded sex, handedness and academic major. If, to the last question, the subject answered "no preference," he was asked what he thought it would "probably be." If the subject still indicated "no preference" this was accepted. All recording was done out of the subject's view.

To obtain eye-movement characteristics, the assistant used the following instructions:

I'm going to ask you some questions and you should answer to the best of your ability. You aren't expected to answer them all easily and don't be afraid to guess.

Assistants answered subsequent questions only with reference to these instructions. At the end of the series, the assistant computed CLEM.

If the resultant per cent was in the range 33.4 to 66.5, the assistant thanked the subjects for their participation, gave \$3.00 or five research credits and asked them not to discuss the experiment with their friends. The assistant also explained that feedback would be supplied at a later date.

If the subject met the established criterion for LM or RM, the assistant proceeded with the Embedded Figures Test. The following instructions, based on Witkin (1950), were used:

I'm going to show you a design. I want you to describe the over-all pattern that you see in it. After you examine it, I'll show you a simpler figure that is contained in it. You will then be given the larger design again and you will locate the smaller figure in it. Let's go through a practice.

After the assistant presented the practice figures, he gave the following additional instructions:

This is how you'll do it. The smaller figure will be present in the larger design. It will be upright. There may be many of the smaller figures in the larger design but you look for the one in the upright position. Work quickly as you are timed. But be sure the figure you find is exactly the same as the original in size and proportion. Tell me as soon as you have found the figure. If you forget what the small figure looks like, you may see it again. Are there any questions?

Questions were answered only with reference to the above instructions. Performance was timed with a stop watch from the presentation of the simple figure. Figures were not shown simultaneously and subjects were discouraged from taking more than ten seconds to re-examine the figures. False tracing was included in a subject's final score. The score recorded for the EFT was the time for discovery. All recorded data was placed in an envelope inside the subject's manila data packet. Prior to coding and scoring, each packet was renumbered by drawing number slips from a hopper. The subject's phone and identification number were on the envelope. E contacted all subjects by phone. They were told the date, time and how long they would be needed.

Subjects were administered the Rorschach in one of the consultation rooms at the MSU Psychology Clinic. These rooms provided optimal conditions for administering this test. There was little or no opportunity during the period of subject contact to observe eye-movements. During the entire administration the E sat behind and to the subject's right. Only the first three scoreable responses were used in the final data analysis. In accordance with Beck (1961) unproductive subjects were encouraged only through card III.

At the end of the inquiry, E presented a Kuder packet (booklet, answer sheet and pencil) and explained its proper use. Subjects were permitted to complete the Kuder at their leisure and boxes were provided for data-return in the Olds Hall office. E thanked the subject for his participation, gave remuneration for participating, explained how feedback would be obtained and asked that subjects not discuss the research with their friends.

Statistical analyses. Virtually all hypotheses were tested using a chi-square statistic. Means and standard deviations are presented in Appendices E and F in order that the reader can compare present sample characteristics against previous standardized samples. In addition, other statistical tests have been utilized to augment exploration of these variables.

Summary of Operational Hypotheses

Academic Major. Left-movers evidence more interest in humanistic majors; RM show more interest in scientific majors.

Embedded Figures Test. Right-movers perform more rapidly to solution than LM.

Vocational Preferences. Left-movers score higher than RM on artistic and literary interest; RM score higher than LM on scientific, mechanical, computational, clerical, and musical participation interest.

Projective Variables. Right-movers produce a higher degree of good form (F+%), intellect (form), dominated percepts (L), and popular percepts (P%) than LM.

Right-movers produce a greater number of detail and rare-detail responses than LM; LM produce greater numbers of whole responses than RM.

Left-movers produce more pure color and color-dominated responses than RM.

Left-movers show more evidence of primary process thinking than RM.

RESULTS

Embedded Figures Test

RM were expected to perform more rapidly to solution than LM on this task. Following Witkin (1950), subjects were given five minutes to discover the embedded figure. Passing scores ranged from one to 300 seconds over the total sample. A zero was recorded for "failing" subjects (i.e., those who were not successful by the end of five minutes). EFT data is presented in Table 4.

A t-test performed on the means of the LM and RM (both sexes) "passing" scores was not significant, contrary to the hypothesis, LM tended to perform more rapidly than RM (Mean LM = 115 seconds; mean RM = 140 seconds).

When the data was subjected to a rank-order procedure, the Mann-Whitney "U" test, the medians of the two male groups did not differ significantly (Mdn LM = 212.5 seconds; RM = 164.5 seconds). The medians of the two groups of females differed significantly (Mdn LM = 232.0 seconds; RM = 300+ seconds; $P < .01$). Among females RM show a predominance of scores over 300 seconds, and are, therefore, slower as a group.

TABLE 4
Performance on Embedded
Figures Test

		N	Success- ful	<u>LM</u>		Success- ful	<u>RM</u>		t p ^a	
				Mean Time (Sec)	SD		Mean Time (Sec)	SD		
Total Sample	M	48	15	115.3	86.2	20	141.6	87.1	.84	.25
	F	47	14	147.2	86.0	10	150.1	83.7	.10	.50
"Strong-M Mover" Sub- Sample	M	20	5	129.0	78.9	7	157.1	104.2	.48	.50
	F	20	5	127.0	66.3	5	161.0	88.0	.62	.25

^aLevel of significance for directional (one-tailed) tests.

^bA "strong-mover" demonstrates eye-movement uni-directionality of 85 to 100 per cent.

On the basis of a test of the difference between proportions "passing," significantly more RM males than LM males successfully completed the task ($Z = 2.28$, $P < .05$). LM and RM females differed in the opposite direction from males though the difference was not significant.

For a subsample of "strong-movers" (i.e., those demonstrating eye-movement uni-directionality over 85 per cent, LM of both sexes performed somewhat faster than RM. The difference was not significant. Thus the hypothesis was not confirmed.

Academic Major

The hypothesis that LM would show more humanistic majors and RM more scientific majors was not confirmed by the present data. In fact, there was a trend for more scientific majors among LM males. This was not significant.

In the present sample there is a heavy emphasis for both sexes on "practical" majors such as business, medical technology and special education. Academic majors are presented in Appendix D.

A minor trend was noted in the distribution of "psychology" majors. LM of both sexes exceeded RM in the number of psychology preferences. The differences were non-significant. This data is presented in Table 5.

TABLE 5
Academic Major Preferences^a

Category	Males		Females	
	<u>LM</u>	<u>RM</u>	<u>LM</u>	<u>RM</u>
Psychology	7	3	5	2
Other	17	21	19	22
Total	24	24	24	24
No Pref ^b	3	7	7	3

^aSee Appendix D for raw data, all subjects.

^bGiven as the first or only response.

Occupational Interest

Among the ten scales of the Kuder Vocational Preference Record, only the Music scale was related to CLEM to a significant degree. Right-movers (males), more often scored above the median in musical interest, LM low. The distribution of subjects scores yielded a chi square of 4.86 ($P < .01$). This data is presented in Table 6.

None of the Kuder scales related to CLEM to a significant degree, nor differentiated between LM and RM females when the whole sample was considered. Thus the hypotheses were not confirmed.

To explore the data further, E examined key scales, comparing only those subjects whose uni-directional eye movement was 85 per cent or greater (i.e., "strong-movers"). Because RM males produced more invalid (non-scorable) records, the N for this subsample was 6. For each of the other "strong-mover" groups, N was 10. Comparison of the "strong-movers," i.e., the extremes of the uni-directional groups, gives an index of the degree to which subjects on the weak end of the eye-movement continuum (below 85 per cent uni-directional movement) are influencing the outcome. Results are presented in Table 7.

Among males, LM and RM were differentiated on the Science scale in accord with the hypothesis that RM would

TABLE 6

Relationship Between Conjugate Lateral
Eye-Movement Phenomenon and
Vocational Preferences

Kuder Variables ^b	Males		High Scores	Females		High Scores
	χ^2	p^a		χ^2		
Mechanical	.00			.00		
Computational	.00			.21	.32	
Scientific	.00			.60	.22	
Artistic	.88	.17		.00		
Literary	.00			.00		
Musical	4.86	.01	<u>RM</u>	.00		
Clerical	.00			.56	.23	

^aLevel of significance for directional (one-tailed) test.

^bComputations are based on N=38 for males; N=42 for females. Chi squares corrected for continuity (see Siegel, 1956, p. 110).

TABLE 7

Differences Between Left- and Right-Moving
Subjects on Selected Vocational
Preferences for Subsample of
"Strong-Movers"^b

Variable	<u>LM</u>		<u>RM</u>		t	p ^a
	N	Mean Percentile	N	Mean Percentile		
Art						
Males	10	68.7	6	53.5	.75	.25
Females	10	71.5	10	74.0	.22	.50
Science						
Males	10	29.3	6	58.0	2.17	.03
Females	10	40.8	10	52.9	1.01	.25

^aLevel of significance for directional (one-tailed) test.

^bA "strong-mover" demonstrates eye movement unidirectionality of 85 to 100 per cent.

show greater endorsement of scientific options. The difference between LM and RM was significant at the .03 level (one-tailed).

Among females, "strong-movers" differed in scientific interest though to non-significant degree. The difference was in accord with the hypothesis.

RM males slightly favored mechanical interests over LM (Mean LM = 26.5, RM = 33.0) though the difference was not statistically significant. There was negligible differences between LM and RM on the computational and literary scales. For males of both groups, clerical items were notably unpopular. Contrary to hypotheses LM females showed a somewhat higher endorsement (14.8 percentile points; difference not significant) of clerical items than RM females.

On the art scale, LM males showed more endorsement, than RM, but not significantly so. The art scale did not relate to CLEM for the "strong-mover" females.

Thus for the total sample of male and female RM and LM, the major hypotheses relevant to occupational interest were not confirmed. When the samples were limited to subjects at the extreme ends of the eye-movement continuum, some differentiation appeared, relevant to interest in science. These differences were in accord with predictions.

Projective Responses

Hypotheses for Rorschach performance predicted that RM of both sexes would evidence higher levels than LM of the following variables: good form (F+), banal popular responses (P), intellect-dominated responses (Lambda). With respect to the use of space, LM were expected to emphasize whole responses (W); RM to produce more D and Dd (detail) responses. Left-movers were also expected to produce more pure C and CF over FC responses.

Using the Holt system, LM were expected to produce more primary process indices among the formal variables. Results are presented in Table 8.

For LM and RM of both sexes, F+% (an index of perceptual adequacy) and Lambda (L) (the percentage of R which is strictly form-determined) were both unrelated to CLEM.

Among males, R, the total record, was related to CLEM though to a marginally significant degree ($\chi^2 = 2.08$, $P < .07$). Productivity favored LM males who tended to produce adequate responses more freely.

Likewise, the percentage of popular responses (P%) related to CLEM at the .07 level and, in accord with hypotheses (for males only), favored RM over LM. P frequency (independent of R) related to CLEM for males at the .06 level and favored RM.

TABLE 8

Relationship Between Conjugate Lateral Eye-Movement and Rorschach Variables

Variable ^d	Males		High Scores	Females		High Scores
	χ^2 ^b	p ^a		χ^2	p	
Productivity	2.08	.07	LM	.00		
Word Frequency	.08	.61		3.19	.04	RM
Organization (Z)	2.08	.07	RM	.36	.27	
Good Form (F+%)	.08	.61 ^c		.00		
Lambda (F%)	.08	.39 ^c		.08	.38	
Popular (P%)	2.08	.07	RM	.00		
Color (C)	.08	.39		.13	.36	
Form-Color (FC)	.09	.38		1.46	.11	
Color-Form (CF)	.39	.27		.91	.17	
Sum Color	.33	.28		3.01	.04	LM
Whole (W%)	.75	.19		.08	.39	
Detail (D%)	.08	.61		.00		
Rare Detail (Dd%)	.75	.19		.08	.61	
Holt:						
Condensation	2.08	.07	RM	.77	.19	
Displacement	.75	.19		.08	.61 ^c	
Contradictions of Reality	.09	.61		.08	.39 ^c	
Symbolism	.00			.00		
Miscellaneous	.00			.00		
Verbalization ^d	.09	.38		.09	.39	
Sum Pri Pro Formal	.08	.61		.08	.39	
Sum Pri Pro Content	.08	.61		.08	.61	
Sum Pri Pro Defense	.33	.28		.08	.39	

^aLevel of significance for directional (one-tailed) test.

^bComputations are based on N=48 for these variables. Chi squares corrected for continuity (see Siegel, 1956, p. 110).

^cMinor variations in cell frequencies are associated with these fluctuations in probabilities.

^dOnly the category "verbal slips" (i.e., slips of the tongue) was scored (refer to Holt, 1970).

A supplementary variable, Organization (Beck's Z) is an index of the extent to which subjects analyze and resynthesize the blot. This variable related to CLEM for males and favored RM ($\chi^2 = 2.08$, $P < .07$).

It should be added that the only variable group from the Holt system which showed a relationship to CLEM ($P < .07$) was "Condensation." This variable involves, among other things, the fusion of percepts, composition of hybrid percepts, arbitrary linkage and impossible combinations, i.e., organizational activity. Z and Condensation are measuring the same thing (Holt, 1970, pp. 23 ff). None of the other variables which constitute the formal aspect of the primary process scoring system (i.e., Displacement, Contradictions of Reality, Symbolism, Verbal Slips and Miscellaneous categories) related to CLEM. Neither were indices of primary process content or defensiveness related. Thus the hypothesis relative to primary process was not confirmed.

For females, only two Rorschach variables, one a major variable, the other a supplementary variable, were related to CLEM. The first was the total amount of color responsiveness, which, in accord with the hypothesis, favored LM ($\chi^2 = 3.01$, $P < .04$). The variables FC (Form over Color) and CF (Color over Form) were not related to CLEM. Thus, for females, there was partial confirmation of the color hypothesis.

The supplementary variable was a measure of verbal fluency, the median number of words per card. This related to CLEM and favored RM females ($\chi^2 = 3.19$, $P < .04$).

Hypotheses relative to "Location" (i.e., W, D, Dd) were not confirmed for the total sample of males and females. The distributions of subjects on these variables yielded non-significant chi squares.

Form-level scoring. To explore the form-level variable further, E employed a more complex system of form scoring (Friedman, 1953; see Hemmendinger in Rickers-Ovsiankina, 1960, pp. 58 ff) on a subsample of strong uni-directional movers, in this case, the five strongest subjects in each group.

This system has been designed to test the hypothesis that projective responses will reflect, by their composition, the simultaneous increases in cognitive complexity and integration which occur as some function of maturation.

In this system, vague, undifferentiated, holistic responses (Wv, Dv) represent immature cognitive development; finely wrought, complex and intricate percepts (W++, D++) reflect a high level of development.

In line with the major hypotheses, LM were expected to produce more percepts on the immature end of the continuum (Fv), the opposite for RM. Results are presented in Table 9.

TABLE 9

Scoring of Form-Level with the Developmental
Scoring System Based on Subsample
of "Strong-Movers"^a

		v ^b	a	-	DW	M	+	++ ^b	Cor	Fac
Male	R	5	2	24	1	51	23	4	0	0
	L	15	3	23	1	59	23	11	0	0
Fem	R	2	2	18	0	60	24	10	1	3
	L	7	4	11	0	56	22	9	0	3
Total	R	7	4	42	1	111	47	14	1	3
	L	22	7	44	1	115	45	20	0	3

^aCells are frequencies of each scoring category from twenty protocols.

^bThe Fisher test, based on high and low scoring subjects in each category, shows a significant relationship among both sexes between CLEM and the production of "V" (all subjects, $P < .01$; females, $P < .05$). The relationship between CLEM and the production of "++" responses is significant for males ($P < .01$).

The frequency of Fv (i.e., vague "oceanic" responses) favored LM as a group. Examination of the distribution of productive subjects indicated that a few LM subjects accounted for the high levels of Fv responses. When subjects were categorized in this high-low fashion, a Fisher test (Siegel, 1956) was significant for the female sample ($P < .05$), marginally significant for males and significant ($P < .01$) when the total sample of LM and RM was considered. The probability that LM subjects would account for all of the excessive Fv scorers was below chance. Thus one aspect of the hypothesis was confirmed.

Contrary to the hypothesis, LM males accounted for more of the high (i.e., "mature") level percepts as well. There were no excessive scorers in this category (median number of "++" responses per protocol = 2). Using the Fisher test, the relationship between CLEM and high form scoring favored LM and was significant at the .01 level.

No variable representing an intermediate stage on this form-level continuum was related to CLEM.

Subsample of "strong-movers." The above results were essentially unchanged when a subsample of "strong-mover" males and females was considered. This data is presented in Table 10.

Handedness. Due to the small number of cases of non-right-handedness for the total sample, it was impossible

TABLE 10

Differences Between Left- and Right-Moving
Subjects on Selected Projective Variables
for a Subsample of "Strong-Movers"^c

Variable	Males		t	p ^a	Females		t	p ^a
	LM Mean (N=10)	RM Mean (N=10)			LM Mean (N=10)	RM Mean (N=10)		
F%	66.2	71.7	1.03	.25	67.3	66.6	.15	.50
L (F%)	64.4	66.0	.25	.50	57.2	62.8	.88	.25
P%	18.4	21.7	1.62	.07	20.2	20.2	.00	
W%	25.5	30.7	.71	.20	25.4	27.1	.30	.50
D%	62.5	61.3	.19	.50	69.8	67.9	.34	.50
Dd%	7.6	2.5	1.81	.05	4.2	4.2	.00	
Sum C ^b	2.4	3.1	.89	.25	3.7	2.7	1.01	.25
Z	10.7	12.9	.83	.25	10.8	10.8	.00	
Pri Pro Formal	6.9	5.5	.93	.25	6.5	6.5	.00	

^aLevel of significance for directional (one-tailed) test.

^bColor responses in the Beck system are coded: C=1.5, CF=1.0, FC=.5. The above are presented in absolute values for the sake of clarity.

^cA "strong-mover" demonstrates eye-movement unidirectionality of 85 to 100 per cent.

to compare subjects of different hand preferences on measures of cognitive style. In fact it was necessary to combine the male and female data to obtain a minimal sample of cases. This data is presented in Appendix B.

DISCUSSION

Both Bakan (1971) and Day (1964) have provided empirical evidence which suggests that there are cognitive and other personality differences between left- and right-looking subjects. Sometimes empirically, and other times intuitively, the correlates of eye-movement directionality appear to bear an affinity to components of other theorists' dichotomies: James "tender-minded" rationalist vs. "tough-minded" empiricist, C. P. Snow's literary intellectual vs. scientist and some aspects of Shapiro's hysteric vs. obsessive-compulsive styles. Gardner et al. (1959) and Witkin (1954) have also based research on the notion that styles of perception and cognition are organized around relatively few dimensions.

The present research was designed to test the nature of the apparent relationship between the correlates of CLEM and other dichotomies. Strong positive findings could lend support to the notion that the eye-movement dichotomy is a simple, testable phenomenon which could subsume the dimensions suggested in the above sources.

The over-all results of the present study, via an assessment of academic and occupational interests, perceptual facility and projective responses were not strong enough, where they did occur, to support the notion that there are major differences in cognitive styles between left- and right-lookers. Nor do the results help resolve the nature of the relationship between CLEM correlates as reported and earlier dichotomous typologies.

In some cases (Embedded Figures Test and the Kuder) results were dependent on restricting the sample to "strong" uni-directional movers, i.e., scale extremes. This limits the population to which results may be generalized.

The small findings may, however, reflect subtle group differences in cognitive style which are worthy of further research. The findings include the following trends: RM of both sexes took somewhat longer to resolve an embedded figure and for a subsample, RM showed more endorsement of scientific options on the Kuder. Male RM scored higher than male LM in the production of Rorschach "populars" and organized responses, but scored somewhat lower in over-all productivity. For a subsample, LM (both sexes) produced more vague "oceanic" responses in the Rorschach, though for males, LM also produced more finely wrought "mature" responses. For females, LM showed more color responsiveness on the Rorschach.

Given the limitations of the findings and the descriptive nature of the present study, the following attempts at explanation are considered speculative.

Embedded Figures Test. The finding that RM males tend more often to complete the task successfully is in accord with the findings of Bakan and Shotland (1969) and, indirectly, with the present hypothesis. Bakan and Shotland concluded that RM were less distractible (as measured by performance on the Stroop Color-Word Test).

Lower distractibility may mean that RM subjects spend more of the allotted time attending to the task at hand. Performance for these subjects would be less hampered by extraneous or conflicting stimuli than it would be for the relatively more distractible LM. Thus they more often persist to the resolution of the embedded figure. It is unclear, however, why females differ in this respect.

For the subsample, RM of both sexes performed somewhat more slowly than LM. This may be simply an extension of the above; attending to the task and persisting to resolution takes time. It is possible, though not conclusive from the present research, that RM are too attentive to be maximally efficient (i.e., achieve more solutions in less time than LM). From the E's experience with the embedded figure, a temporary relaxation of attentional focus was necessary to facilitate solution.

The edge in speed of performance by LM may be due to a more fluid attentional focus.

Future research could aim at clarifying any differences in performance by having LM and RM subjects describe their cognitive experiences after the completion of the task or end of the allotted time.

Occupational interest. The finding which for males (total sample) related CLEM to the music scale could have occurred by chance. This interpretation is strengthened by a second finding: for the subsample of strong uni-directional movers, the relationship disappeared.

For the subsample, RM subjects more strongly endorsed scientific interests (significantly for males). This was predicted and is in accord with other experimental findings. While the sample was small, the results indicate that caution be exercised in accepting the null hypothesis.

It may be that college freshmen and sophomores are most unsure of occupational orientations and that any relationships were confounded by the variables of age and academic level. Restricting a study to seniors and graduate students or to subjects in defined occupational groupings could control for the age factor.

An added hypothesis is that CLEM does not relate as much to the occupational choice as it would to the manner in which LM and RM would perform in a given area.

Status as LM or RM need not preclude, for example, interest in research, but only tend to specify (alá Gardner et al., 1959) the characteristic solutions LM and RM subjects might apply to problems.

Projective responses. One of the major purposes of the present research was to extend the body of observations, relative to CLEM, to include a major projective device. While the Rorschach can be put to many uses, the formal aspects (vis-a-vis content material) lend themselves well to the study of cognitive style differences.

Form level. Form level and quality (F) is a "corner-stone" of the Rorschach experiment. "Its usefulness [is] in appraising the S's ability to perceive accurately, and hence to know realities. . . ." (Beck, et al., 1961, p. 130).

There were no gross indices of differences in perceptual adequacy between LM and RM. Using Friedman's scoring system (see Rickers-Ovsiankina, 1960), however, LM were found to produce more vague Rorschach responses.

These findings relate CLEM (though somewhat weakly) to the developmental theories of Werner (1948). Werner hypothesized that cognitive and perceptual development proceeds from a relatively global diffuseness to higher levels of complexity and integration.

The present findings suggest, in these terms, that LM cognition is relatively immature (i.e.,

"undeveloped"). But this was complicated by the finding that LM account for not only the least but the most articulated percepts as well.

One hypothesis is that the combination of vague and well-articulated percepts reflect a greater capacity on the part of LM to "regress in the service of the ego" (Kris, 1952). This involves among other things, a "letting go" of secondary process (possibly including perceptual focus) for the sake of creation and recreation.

Pending replication with a larger sample, this interpretation is in accord with Bakan (1969) who found that LM were more susceptible than RM to hypnosis (could "regress in the service of the ego") as measured by the Stanford Hypnotic Susceptibility Scale.

Productivity. Possibly in line with the hypothesis concerning "regression in the service of the ego" are some other findings for these subjects.

The first is total productivity which tended to favor LM. The attempt was made to limit R to the first three scoreable responses. However, subjects could fall below this number. In accord with Beck et al. (1961), E encouraged resistant subjects for more productivity only for cards I through III. If a subject remained reticent or (very rarely) rejected a card, this was accepted. The results suggest that more LM freely produce adequate responses.

Use of Populars. A moderate level of "Populars" (e.g., "bats" and "butterflies" for cards I and V) is indicative of not only perceptual adequacy but a conventionally realistic perception. Excessive production of "P" is indicative of defensive hyperconventionality, RM tended to produce higher levels of "P" than LM suggesting an RM emphasis on the maintenance of secondary process thinking.

Organization (Z). RM males also tended to produce higher levels than LM of organized, integrated percepts. This seems to be in accord with personality differences suggested by Bakan (1971): RM have "active" and "analytic" characteristics.

This finding may be a reflection of the performance on the Embedded Figure Test where RM males more often completed the task, but tended to be slower as a group. In the Rorschach, a relatively "fluid" cognition lends itself well to higher productivity. While this is speculative, the relatively higher levels of "Z" may be indicative of aspects of RM cognition which would tend to inhibit the free-flowing production of responses.

One apparent contradiction should be clarified. The finding of more of Friedman's "W++" among "strong" uni-directional males seems to contradict the relation of Beck's Z to CLEM. However, these variables are not strictly comparable. The latter involves conjunctive percepts

irrespective of quality (note Holt's pri-pro category "Condensation"). The former reflects a combination of superior form and organization. The over-all results may suggest that RM "put things together" more for the sake of the activity than for the artistry of the product.

Color usage. Color responses in the Rorschach involve affective immediacy, a tendency to respond to the emotionally salient aspects of the card. Female LM tended to favor such responsiveness.

The present finding fits the interpretation that RM females share some aspects of the "male cognitive style" (in this case, less emotional ability as measured by Beck's "C"). According to Fischer (1971):

. . . the personality variables which Bakan (1971) ascribed to . . . left moving people (synthetic, emotional, subjective, passive, etc.) seemed more "role appropriate" for the female of our society . . . variables ascribed to . . . right moving people (analytic, rational, objective, active, etc.) seemed more role appropriate for the male.
. . .

Because of the limited number of statistically significant relationships for females, caution should be exercised in interpreting this finding. The finding of more affective responsiveness among LM females does, however, fit well with Fischer's interpretation.

SUMMARY

Researchers have reported on a conjugate eye-movement phenomenon (CLEM) which they relate to subjects' "characteristic deployment of attention," as well as perceptual and cognitive differences (cf. Day and Bakan). Individuals are classified as left- or right-eye-movers on the basis of their uni-directional eye movements in response to questions requiring reflective thought. The criterion which classifies a subject is uni-directional eye movement at least 66.6 per cent of the time. Special subgroups are isolated consisting of those subjects whose uni-directional eye movement exceeds 85 per cent (i.e., "strong-movers").

The present study was designed to link this phenomenon to a body of conceptually related, dichotomous personality typologies. The author wished also to extend the range of observations, relevant to CLEM, to include projective test performance.

The general hypothesis predicted that left-moving subjects, LM, would demonstrate perceptual and cognitive qualities suggested by William James' term "tender-minded"

and that right-moving subjects, RM, would show qualities characterized as "tough-minded."

To test this hypothesis, E obtained a measure of performance on an Embedded Figure test, subjects' academic majors, occupational preferences and Rorschach responses. Ninety-six subjects, evenly divided between males and females, left and right movers, participated. Standard procedures were utilized for all measures.

Specific hypotheses predicted that (1) RM would perform more quickly than LM on the Embedded Figure task, (2) RM would show more interest in scientific majors and LM would favor the humanities, (3) RM would favor scientific and technical occupations while LM would choose artistic options, and (4) RM would evidence higher levels of conventionality and preciseness than LM in their projective responses. The latter variables included form-level, location, use of "populars," color responsiveness and indices of primary process thinking.

The results were as follows:

1. Among males, significantly more RM successfully completed the Embedded Figure task in the allotted time. Contrary to the hypothesis, LM of both sexes were somewhat faster than RM as measured by time to completion. The difference was not statistically significant.

2. The hypothesis that LM would show more humanistic majors was considered unconfirmed. In the present sample there was a high percentage of semi-technical and applied majors.
3. On the Kuder test, only the music scale was related to CLEM to a significant degree for males. This was interpreted as a chance finding. Among females, no scale was related to CLEM. However, for a subsample (the extreme ends of the eye-movement continuum), LM of both sexes fell below RM in the endorsement of scientific interests.
4. Some Rorschach variables were marginally related to CLEM: Organization and the production of "popular" responses (also, Holt's variable group "Condensation") tended to favor RM males. Productivity (R) favored LM males. For females CLEM was significantly related to color responsiveness (favoring LM) and to a measure of verbal fluency (favoring RM).

Form-level, as measured by Friedman's "developmental" scoring system, was significantly related to CLEM for a subsample of "strong-movers": LM of both sexes produced more vague, "oceanic" responses than RM. Among males, however, LM accounted for more high level, organized responses as well.

The author concluded that the above results were not sufficient to relate CLEM to previous typologies, but that discernible differences between LM and RM, particularly at the extreme ends of the eye-movement continuum, warranted further study. Future research should utilize "strong-mover" samples. Research should also attempt to clarify the relationship between CLEM and the types of reflective questions utilized to elicit it (e.g., arithmetic vs. proverbs).

REFERENCES

REFERENCES

- Anastasi, A. Psychological testing. New York: Macmillan, 1961.
- Bakan, P. Hypnotizability, laterality of eye-movements and functional brain asymmetry. Perceptual and Motor Skills, 1969, 38, 927-932.
- Bakan, P. The eyes have it. Psychology Today, 1971, 4(11), 64 ff. (a)
- Bakan, P. Personal communication (1971). (b)
- Bakan, P., & Shotland L. Lateral eye movement, reading speed and visual attention. Psychonomic Science, 1969, 15, 93-94.
- Bakan, P., & Svorad, D. Resting EEG alpha and asymmetry of reflective lateral eye movement. Nature, 1969, 223, 975-976.
- Beck, S. Rorschach's test II. A variety of personality pictures. New York: Grune and Stratton, 1945.
- Beck, S., Beck, A., Levitt, E., & Molish, H. Rorschach's test I. Basic processes. New York: Grune and Stratton, 1961.
- Day, M. An eye-movement phenomenon relating to attention, thought and anxiety. Perceptual and Motor Skills, 1964, 19, 443-446.
- Day, M. An eye-movement indicator of type and level of anxiety: Some clinical observations. Journal of Clinical Psychology, 1967, 23(4), 438-444. (a)
- Day, M. An eye-movement indicator of individual differences in the psychological organization of attentional processes and anxiety. The Journal of Psychology, 1967, 66, 51-62. (b)

- Day, M. Attention, anxiety and psychotherapy. Psychotherapy: Theory, Research and Practice, 1968, 5(3), 146-149.
- Duke, J. Lateral eye-movement behavior. Journal of General Psychology, 1968, 78, 189-195.
- Eiduson, B. Scientists: Their psychological world. New York: Basic Books, 1962.
- Fischer, K. Lateral eye-movement as related to marital selection and adjustment. Unpublished Master's Thesis, Michigan State University, 1971.
- Friedman, H. Perceptual regression in schizophrenia: An hypothesis suggested by the use of the Rorschach test. Journal of Projective Techniques, 1953, 17, 171-185.
- Gardner, R., Holzman, P., Klein, G., Linton, H., & Spence, D. Cognitive control: A study of individual consistencies in cognitive behavior. Psychological Issues, 1959, I, Whole No. 4.
- Hemmendinger, L. Developmental theory and the Rorschach method. In M. A. Rickers-Ovsiankina (Ed.), Rorschach psychology. New York: Wiley, 1960, pp. 58-80.
- Holt, R. Gauging primary and secondary processes in Rorschach responses. Journal of Projective Techniques, 1956, 20, 14-25.
- Holt, R. Manual for the scoring of primary process manifestations in Rorschach responses. Research Center for Mental Health, New York University, 1970.
- Holt, R., & Havel, J. A method for assessing primary and secondary process in the Rorschach. In M. A. Rickers-Ovsiankina (Ed.), Rorschach psychology. New York: Wiley, 1960, pp. 263-315.
- James, W. Pragmatism: A new name for some old ways of thinking. New York: Longmans, Green, 1907.
- Kris, E. Psychoanalytic explorations in art. New York: International Universities Press, 1952.
- Kuder, G. F. Kuder preference record--vocational. Chicago: Science Research Associates, 1934-1956.

- Schimek, J. Cognitive style and defenses: A longitudinal study of intellectualization and field independence. Journal of Abnormal Psychology, 1968, 73(6), 575-580.
- Shapiro, D. Neurotic styles. New York: Basic Books, 1965.
- Siegel, S. Nonparametric statistics for the behavioral sciences. New York: McGraw-Hill, 1956.
- Snow, C. P. The two cultures and the scientific revolution. New York: Cambridge University Press, 1959.
- Werner, H. Comparative psychology of mental development. (Rev. ed.) Chicago: Follet, 1948.
- Witkin, H. Individual differences in the ease of perception of embedded figures. Journal of Personality, 1950, 19, 1-15.
- Witkin, H., Dyk, R., Faterson, H., Goodenough, D., & Karp, S. Psychological differentiation. New York: Wiley, 1962.
- Witkin, H., Goodenough, D., & Karp, S. Stability of cognitive style from childhood to young adulthood. Journal of Personality and Social Psychology, 1967, 7(3), 291-300.
- Witkin, H., Lewis, H., Hertzman, M., Machover, K., Meissner, P., & Wagner, S. Personality through perception. New York: Harper, 1954.
- Zytowski, D., Mills, D., & Paepe, C. Psychological differentiation and the Strong Vocational Interest Blank. Journal of Counseling Psychology, 1969, 16(1), 41-44.

APPENDICES

APPENDIX A

FEEDBACK FOR 309 B RESEARCH:

PERSONALITY--PERCEPTUAL

APPENDIX A

FEEDBACK FOR 309 B RESEARCH: PERSONALITY--PERCEPTUAL

This research is attempting to relate projective test responses, occupational or academic interests and performance on simple, perceptual tests. No questions of "good" or "bad" performance--on any aspect of the research--are involved. The experimenter is attempting to clarify differences which may exist in interpretative responses associated with anticipated or actual academic majors in undergraduate students. The Rorschach or "inkblot" test (on which a huge literature is available) has been used to provide some of the data.

Due to the large amount of data collected, information concerning results will not be available for some time. If more detailed information is desired, please feel free to contact me. In any event, thank you for your interest and participation.

Michael R. Barnat

APPENDIX B

DISTRIBUTION OF HANDEDNESS

APPENDIX B

DISTRIBUTION OF HANDEDNESS*

Non-Right Handed:	$\frac{(LM)}{2}$	$\frac{(RM)}{8}$	$\frac{Total}{10}$
Non-Right Handed:	$\frac{Male}{7}$	$\frac{Female}{3}$	10
Left Handed:	$\frac{(LM)}{2}$	$\frac{(RM)}{3}$	5
Left Handed:	$\frac{Male}{4}$	$\frac{Female}{1}$	5

*N = 96

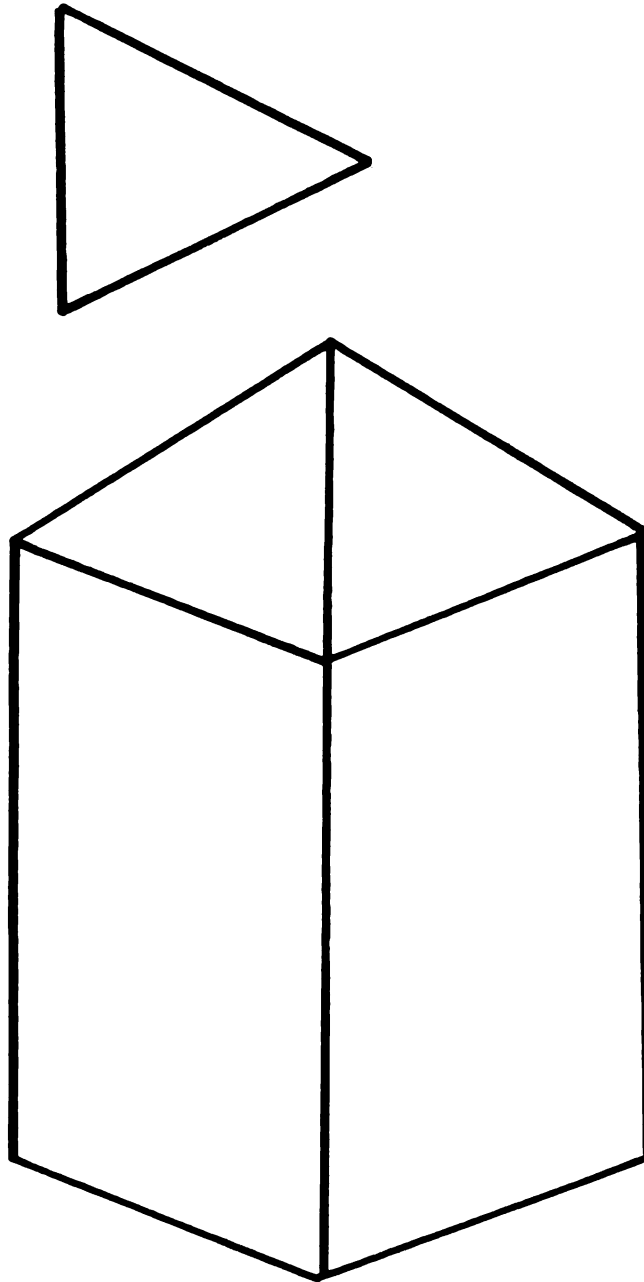
APPENDIX C

EMBEDDED FIGURES DESIGNS

APPENDIX C

EMBEDDED FIGURES DESIGNS

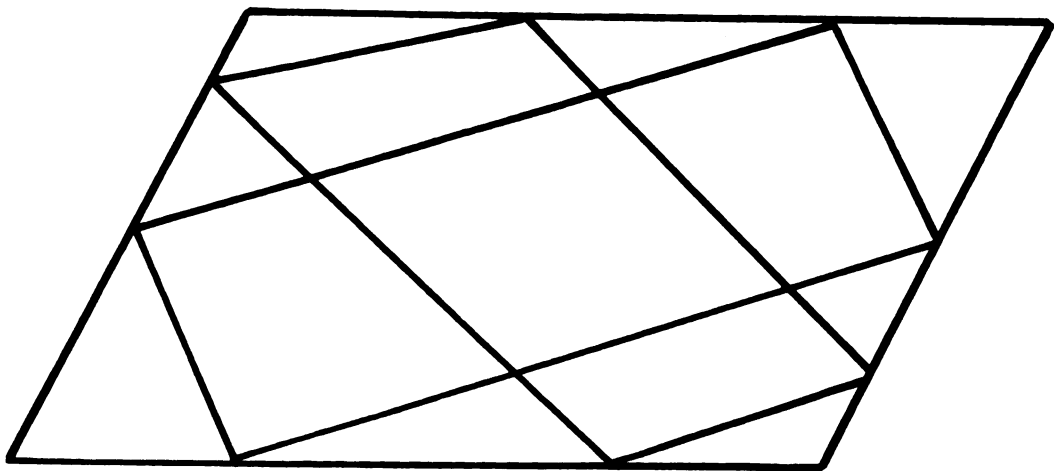
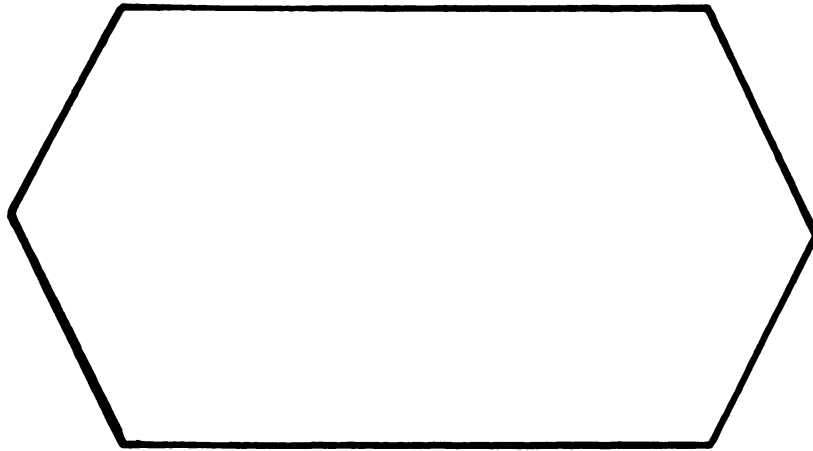
A. Practice figures



APPENDIX C--Continued

EMBEDDED FIGURES DESIGNS

B. Test figure



APPENDIX D

ACADEMIC MAJOR PREFERENCES

APPENDIX D

ACADEMIC MAJOR PREFERENCES

<u>(LM) Male</u>		<u>(RM) Male</u>	
<u>S#</u>	<u>Major</u>	<u>S#</u>	<u>Major</u>
99	Psych	100	NP ^a
93	Radio-TV	95	Accounting
92	Science	94	Person. Admin.
91	Prelaw--Poly Sci	89	NP ^a
90	NP ^a --Psych	88	NP ^a
87	Packaging	78	NP ^a --Psych
86	Business	75	NP ^a --Theater Science
85	Psych	73	NP ^a --Eng Lit
65	Pre-Law	72	Fisheries--History
64	Home Econ.		Teaching
62	NP ^a	71	Social Science--PreLaw
61	Pre-Law	70	Philosophy
59	Pre-Dental	69	Business Admin.
58	Engineering	68	Pre-Medical
57	NP ^a --Psych	67	NP ^a --Psych
54	Pre-Law	60	Psych
53	Psych	55	History Education
52	Math Educ.	50	Social Science
51	Honors College--Science	44	Pre-Medical
49	Law	43	Criminal Justice
41	Anthropology	42	Advertising
40	Chemistry	37	Law
31	Psych	18	Business
26	Psych	16	Finance
		13	Sociology

^aNo Preference

APPENDIX D--Continued

ACADEMIC MAJOR PREFERENCES

<u>(LM) Female</u>		<u>(RM) Female</u>	
<u>S#</u>	<u>Major</u>	<u>S#</u>	<u>Major</u>
84	Advertising	108	Nursing
83	English	106	Home Econ.
82	NP ^a	105	Biological Science
66	Journalism	104	Bio-chemistry
39	NP ^a --Pre-Dental	103	Elem. Educ.
38	Biological Science	101	Audiology--Speech Sci.
36	Special Educ.	98	Special Education
35	Medic. Tech.--Psychol.	97	NP ^a
34	Art Practice	96	Recreation
33	Medical Technology	80	Nursing
32	NP ^a --Audiology	79	English Humanities
30	Home Economics	76	Criminal Justice
27	English	74	NP ^a
25	Psychology	63	Psychology
24	Social Work	56	Math
23	Advertising	29	Spanish
20	NP ^a --Social Work	28	Nursing
19	Elementary Educ.	22	Special Education
14	Art--Psychology	17	Interior Design--Advert.
11	NP ^a --Food-Nutrition	12	Psychology
10	NP ^a --Social Work	8	Nursing
9	Psychology	3	Social Work
7	Nursing	2	NP ^a --Social Work
4	NP ^a --Psychology	1	Journalism

^aNo Preference

APPENDIX E

**MEANS AND STANDARD DEVIATIONS, KUDER (FORM CM:
OCCUPATIONAL PREFERENCES) IN PERCENTILES**

TABLE E.1

Means and Standard Deviations, Kuder (Form CM:
Occupational Preferences) in Percentiles

	Male				Female			
	<u>LM</u>		<u>RM</u>		<u>LM</u>		<u>RM</u>	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Outdoor	35.2	23.4	42.6	23.6	45.9	27.2	56.1	24.1
Mechanical	22.0	18.2	23.7	16.6	43.2	26.0	44.2	26.2
Computational	36.0	31.5	36.4	34.4	42.5	29.7	42.7	26.1
Scientific	44.1	31.0	42.8	28.4	48.5	26.6	56.7	29.3
Persuasive	57.4	24.7	57.3	26.2	55.8	27.6	49.1	24.7
Artistic	59.1	28.2	61.6	34.7	69.4	23.7	70.3	19.1
Literary	56.5	30.7	65.3	28.3	46.4	32.3	43.6	25.8
Musical	65.6	24.7	68.2	32.0	57.1	29.5	54.7	31.8
Soc. Serv.	71.4	21.2	65.6	28.3	65.2	32.5	72.7	28.4
Clerical	31.6	28.3	32.3	32.5	22.1	18.3	16.5	19.6

APPENDIX F

MEANS AND STANDARD DEVIATIONS:
RORSCHACH VARIABLES

TABLE F.1

MEANS AND STANDARD DEVIATIONS:
RORSCHACH VARIABLES

	Male				Female			
	<u>LM</u>		<u>RM</u>		<u>LM</u>		<u>RM</u>	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Productivity (R)	27.7	4.5	26.1	5.2	26.9	4.3	27.9	5.3
Latency (seconds)	13.2	8.4	15.7	13.1	12.5	7.4	12.0	11.0
Word frequency	31.8	31.3	31.9	12.4	31.6	12.0	33.8	9.6
Organization (Z)	10.0	5.2	10.9	4.4	9.6	2.9	10.4	5.4
Good Form (F+%)	69.3	11.6	71.1	12.6	69.7	11.6	70.8	11.7
Lambda (F%)	62.6	12.3	63.5	17.7	56.9	12.8	60.3	13.4
Popular (P%)	21.7	7.1	23.9	7.0	23.4	8.6	21.4	7.4
Color (C)	.9	1.4	1.1	1.3	1.3	1.3	1.2	1.4
Form-Color (FC)	.6	.5	.7	.7	.8	.6	.5	.4
Color-Form (CF)	.8	.5	1.1	1.2	1.3	1.3	.9	1.0
Sum Color Responses	2.4	1.5	2.9	2.3	3.5	2.1	2.6	2.1
White space (S%)	6.0	4.7	8.6	4.9	8.0	6.5	6.4	4.9
Wholes (W%)	22.3	13.3	25.7	11.0	24.2	10.8	25.0	9.3
Part (D%)	68.8	11.4	68.9	9.0	70.3	9.8	69.0	8.9
Rare detail (Dd%)	6.6	6.8	3.9	4.4	5.2	3.5	5.4	5.8
Holt:								
Sum Pri Pro Content	11.4	3.8	11.5	5.2	10.2	3.9	10.7	6.3
Sum Pri Pro Formal	6.8	3.4	7.8	5.5	7.7	5.2	7.6	5.6
Sum Control/ Defense	24.2	8.3	26.5	8.8	21.2	6.8	23.7	11.3

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