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DAYDREAMING AND LATERALITY OF EYE-MOVEMENTS

A Test of Brain Asymmetry, Cognitive-Affective and Arousal Models

by

BONNIE B. MESKIN

A dissertation submitted to the Graduate Faculty in Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York.

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This manuscript has been read and accepted for the Graduate Faculty in Psychology in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

July 13, 1972
date

Jerome L. Singer
Chairman of Examining Committee

July 13, 1972
date

Florence L. Denmark
Executive Officer

Alden Wessman

Harold Wilensky

Harold Basowitz

Gertrude Schmeidler

Supervisory Committee

Abstract

DAYDREAMING AND LATERALITY OF EYE-MOVEMENTS

A Test of Brain Asymmetry, Cognitive-Affective and Arousal Models

by

Bonnie B. Meskin

Advisor: Professor Jerome L. Singer

This study explores the relationship between certain personality variables to the direction and frequency of eye-movements while processing simple and complex information in a dyadic interaction. Subjects were classified according to their degree of awareness and acceptance of their own daydreaming, internally-generated thoughts and memories. Forty-eight male subjects were selected on the basis of Byrne's Repression-Sensitization Scale and six scales from Singer and Antrobus' Imaginal Processes Inventory that survey positive attitudes and frequency of positive-vivid daydreaming. Twenty-four subjects were classified as inner acceptant and 24 subjects were classified as less inner acceptant.

In a face-to-face interview, each subject was asked 32 questions which demanded complex memory searches of a thought provoking and/or imaginative nature and 16 questions which demanded easily available information of a factual nature. A complete between subjects counterbalanced design included a female interviewer present during part of the interview and absent during part of the interview, and a complex painting hung on the wall to the right or left facing the subject.

These conditions were designed to replicate, extend and refine Bakan's 1969 study in which he found 75% consistency in the first lateral eye-movement shift away from the interviewer to be to the right or left for an individual. Bakan explained his results in terms of the left hemisphere of the brain being dominant for right eye-movers and the right hemisphere of the brain being dominant for left eye-movers with respective personality functioning. Three other models were tested in order to pin down the processes of daydreaming and fantasy and their relationship to the processes of attention. They were: (1) Cognitive Model which states that for processing of imagery, thoughts and memories, a person may have to gate out external stimulation via eye-movements so as to be able to concentrate on internal processes and not have to process new material because of limited channel space, (2) Cognitive-Affective Model which states that the face is a source of information about emotions and therefore a heavy load of information is conveyed by the face of one individual to another. A shift away from the face of another in order to process internally-generated material is necessary, (3) Arousal Model states that amount of search effort only is what determines eye-movements.

Bakan's results of consistency in eye-movement direction were replicated. In the extension part of the present study, subjects did consistently move their eyes in their dominant direction when asked questions requiring sampling of complex memory material. Both groups of subjects shifted their gaze significantly less often when responding to questions requiring sampling of easily available memory material. Right movers were significantly inner rejectant and shifted to the left in the absence of E. Left movers were significantly inner

acceptant and shifted to the left more with E present than absent. This points to the strong possibility that processes governing visual daydreaming and fantasy are controlled by the right hemisphere. A person may have to shift his gaze away from the face of an interviewer in order to clear channel space for internal processing. The less the internal search effort the less the amount of eliminating external stimulation. The painting used in this study was not compelling enough to produce shifting away from it when processing extended searches.

The cognitive-affective model as well as the functional asymmetry of the brain model are the strongest in predicting these results. The activation hypothesis is too general a notion. Future research on daydreaming and fantasy processes and the processes of attention must examine personality disposition toward internal experiences, direction of eye-movements, and interpersonal interaction.

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INTRODUCTION

The present study falls within the more general area of inquiry on the role of daydreaming and fantasy processes in personality and the relationship of such processes to processes of attention. The scientific interest in this area of study is quite recent. It is an outgrowth of the rise of cognitive theory and affect theory, and of developments in neurophysiology and computor simulation. The classical study of attention and consciousness is now receiving renewed study through theories of cognition, which realize man's informational processing abilities and through extended affect theories of motivation. Pursuit or avoidance of various areas of exploration for each individual combined with his capacity for paying attention to stimuli while consulting past experience in order to consider alternatives reveals that personality development and specifically daydreaming experience may relate to how and why certain individuals handle situations in which external stimulation varies in unique ways. Some may become bored and restless with little external stimulation and others may indulge in daydreaming which allows them to enjoy the time spent in monotonous environments. With highly interesting environments, the amount of attention paid to ongoing thoughts may vary according to the individual. There are men who live lives predominated by action and others by thought. These personality differences as revealed in daydreaming, reflection, and fantasy processes are inextricably interwoven with differences in focus of attention.

This study is an attempt to understand how the processing of

internal thoughts, fantasies, images and retrieved memory information goes on while an individual is awake, with eyes open, responsive in some way to the stimuli in his environment, when alone or involved in a dyadic exchange. The nature of cognition, the way in which each person processes information, demands examination of the interactions between the personality the individual brings to a situation and the environmental conditions he meets.

The normal adult in the course of having to shift his attention from the processing of material in his visual environment to the processing of material from some internal long term or short term storage system must find the way to reduce environmental stimulation. Recent research suggests that the important characteristic of one's capacity to process information is evident in the shifting eye-movements he makes, when gating out external stimulation in order to focus in on internal thoughts, (Singer, 1966; Singer and Antrobus, 1965; Greenberg, 1970). Singer and his collaborators have focused primarily upon the presence and absence of eye shifts in order to concentrate on elaborate fantasy and internal activity.

Quite recently, Bakan (1969, 1971) notes that important individual cognitive and personality differences may play a role in the ability of a person to withdraw into fantasy or reflection. From a personality standpoint, Bakan found dramatic confirmation for the phenomenon of a shift in direction of gaze of an individual when responding to questions calling for complex material of an imaginative or thought provoking nature. This shift in gaze away from the interviewer was consistently to the right or left in the majority of responses an individual made.

When Bakan examined individuals with left direction shifting, he found them to have greater hypnotic susceptibility, higher production of alpha in the EEG, more capability in verbal than in quantitative scores on SATs, and were more likely classical-humanist majors than individuals with right direction eye shift. These "left movers" reported more vivid imagery than "right movers" who seemed to focus more on the external environment. Left movers also preferred "warm" colors (red and yellow), music, religion and were more prone to asthma. The right mover is more analytic, preferring mathematics and logic and more prone to migraine headaches. Bakan attributes the predominance of movement to the left with greater dominance of the right hemisphere of the brain. It has been speculated that this hemisphere of the brain controls the more pre-verbal, pre-logical, subjective, intuitive, global, synthetic modes of thought and response. The left hemisphere indicated by shift to the right may be the dominant controller of rational, objective, analytic modes of thought and response.

Cognitive and personality styles play an important role in determining how much attention is paid to processing internal material or external material and this may be evident in the shifting of the eyes. These relative preferences may govern a whole set of interactions with the environment (Singer and Singer, 1971). Some people match alternative responses against a great variety of long term memory information. Others do not do an exhaustive search of their long term memory. Broadbent would call the first style "long sampling" and the latter style would be referred to as "short sampling." Long samplers may need to eliminate external stimulation more than short samplers because long samplers do extensive searching in long term memory

storage and channel space needs to be freed in order for lengthy exploration of long term storage. Mobbs (1968) found that while engaging in an imaginative task, the introvert (paralleling Bakan's description of the left mover and Singer's description of the thinking introvert) spent much less time looking at the experimenter. Singer, Greenberg, and Antrobus (1971) suggest that a shift of the eyes occurs in order to "gate out" irrelevant or competing visual input while processing daydreams or making extended searches in the long term memory storage system.

Thus far two models may explain the information processing of extended and minimal searches in the memory storage systems and direction of eye-movement. Two other models, an extension of the cognitive processing model and an activation or arousal theory may better explain the data than the brain model or the cognitive model.

The present study will attempt to pin down specifically the conditions under which lateral eye-movement and frequency of eye-movements occur in order to understand oculomotor adjustment during internally-produced cognitive processes. In so doing, it will test the four models by manipulating personality variables and conditions. In the following chapter, all four models are discussed in detail. Briefly, they are:

1. Bakan's Functional Asymmetry of the Brain Model: A person because of constitutional or long-standing habituation in style of processing may rely on visual material and therefore, may shift his eyes to the right or the left. This stylictic difference of a relatively more active left hemisphere would be indicated by right eye-movements when reflecting. A relatively more active right

hemisphere would be indicated by left eye-movements when reflection is called for.

2. Cognitive or Information Processing Model: For processing of imagery, thoughts and memories, a person may have to gate out external stimulation via eye-movements so as to be able to concentrate on internal processes and not have to process new material because of limited channel space.

3. Cognitive-Affective Model: The face is a source of information about emotions and therefore a heavy load of information is conveyed by the face of an individual. A shift away from the face of another in order to process internally-generated material because of the face's heavily loaded communication impact is necessary.

4. Activation or Arousal Model: Amount of search effort determines frequency of eye-movements regardless of direction.

Because Bakan's results are so striking, the present study will not only extend his research but also will attempt to replicate his 1969 study.

CHAPTER I

THEORETICAL AND RESEARCH OVERVIEW OF FOUR MODELS: RATIONALE FOR THE STUDY

Bakan's Functional Asymmetry of the Brain Model

Only recently has hemispheric functioning received attention because the hemispheres of the brain appeared physically identical and gross differences in behavior due to damage to one of the hemispheres was not observed. Broca (1861-1865 in Erlichman, 1971) challenged this idea of functional duplicates by regarding the speech center as being in the major or dominant hemisphere, that is to say the left hemisphere in right-handed persons. Hemispheric asymmetry seemed evident. This dominant left hemisphere seemed to be the one that specialized in the higher mental functions. This was the accepted view until the 1930's. Interest was renewed in this controversy because evidence that the right hemisphere also had specific specialization accumulated. This evidence came from four types of studies: subjects who had unilateral brain damage, patients who had their hemispheres surgically disconnected as treatment for epilepsy, normals who had stimuli presented differentially to the left and right hemispheres and studies which measure activity of the hemispheres by electrical recording (EEG and evoked potentials). The reader is referred to Bogen (1969) and Erlichman's unpublished doctoral dissertation for more detailed information. However, a historical perspective of the dichotomous functions proposed as associated with lateralization of the hemispheres of the brain is given in Table 1.

TABLE 1

DICHOTOMOUS FUNCTIONS PROPOSED AS ASSOCIATED WITH

LATERALIZATION OF THE HEMISPHERES OF THE BRAIN

	LEFT HEMISPHERE	RIGHT HEMISPHERE
	"RIGHT MOVER"	"LEFT MOVER"
Jackson (1864)	Expression	Perception
Jackson (1874)	Audito-articular	Retino-ocular
Jackson (1876)	Propositionizing	Visual imagery
Weisenberg & McBride (1935)	Linguistic	Visual or kinesthetic
Anderson (1951)	Storage	Executive
Humphrey & Zangwill (1951)	Symbolic or propositional	Visual or imaginative
McFie & Piercy (1952)	Eduction of relations	Eduction of correlates
Milner (1958)	Verbal	Perceptual or non-verbal
Semmes, Weinstein, Ghent, Teuber (1960)	Discrete	Diffuse
Zangwill (1961)	Symbolic	Visuospatial
Hacaen, Ajuriaguerra, Angelergues (1963)	Linguistic	Pre-verbal
Bogen & Gazzaniga (1964)	Verbal	Visuospatial
Levy-Agresti and Sperry (1968)	Logical or analytic	Synthetic perceptual
Bogen (1969)	Propositional	Appositional

(Modified from J. E. Bogen, 1969.)

Bakan's (1969) model stems from the physiological research by Robinson (1968), Sperry (1967, 1968), Cohen et al. (1968), Mountcastle (1962), Hecaen and Ajuriaguerra (1964), Liske et al. (1967), and Haber (1968) all in Bakan, (1969). These studies showed that hemispheric asymmetries do exist. The mechanism underlying this, Kinsbourne (1971) suggests, is that activation of a hemisphere automatically sets up an attention bias orienting the organism to the side contralateral to that hemisphere. Therefore, when a subject expects verbal stimuli requiring activity in the left hemisphere, there is an observable eye-movement orientation to the right.

Bakan suggests that the right or left eye-movements found by Day (1964, 1968) and Duke (1968) are controlled contralaterally by activity in Brodmann's area 8. Easier triggering of activities in the hemisphere opposite to the direction of eye-movement depends on individual differences. Differences in ease of triggering dominant or non-dominant hemispheres determines if a person is a left eye-mover or right eye-mover. Stimulation in the oculomotor areas of the contralateral hemisphere of the cerebral cortex produces these movements. According to Kinsbourne (1971) orientation to the right during verbal thought indicates that verbal thought triggers left hemisphere activity. Imagery which is considered spatial thought triggers the right hemisphere, behaviorally manifested by orientation to the left. A relatively more active right hemisphere is indicated by left eye-movement direction. A relatively more active left hemisphere is indicated by right eye-movement direction. Overt functions in relation to the mechanism of hemispheric dominance would be a host of behaviors. They are as follows:

For right movers this implies a functional syndrome of:

1. more verbal
2. less hypnotic susceptibility
3. greater interest in scientific subjects
4. greater interest in mathematics
5. less EEG recorded alpha activity
6. thought processes tend toward the analytic, abstract and temporal
7. more logical
8. characteristically rational, objective and active
9. more tense
10. tend more towards euphoria
11. propositional in orientation
12. focuses on external environment
13. higher quantitative scores on the scholastic aptitude test
14. prefer cool colors
15. make career choices earlier
16. more visually alert to changes in the environment.

For left movers this implies a functional syndrome of:

1. greater use of imagery (pre-verbal activities)
2. greater hypnotic susceptibility
3. greater interest in humanistic subjects
4. less interest in mathematics
5. greater EEG recorded alpha activity
6. thought processes tend toward the synthetic, concrete and spatial

7. more creative
8. characteristically emotional, subjective and passive
9. more relaxed
10. tend more towards depression
11. appositional in orientation
12. focus on internal processes
13. higher verbal scores on the scholastic aptitude test
14. more sociable
15. prefer warm colors
16. greater fluency in writing
17. tend to have more vivid imagery
18. more musically inclined
19. better recollection of melodies and faces

There is little data except for Bakan's that support these correlations. Bakan was the first to speculate and suggest the relationship between hemispheric functioning and cognitive and personality variables. Bakan obtained his data by asking five reflective questions. On the basis of first eye-movement made after the questions had been asked he classified his subjects. Both sex and human judgment errors were not controlled for. The mechanics of jotting down a subject's eye-movement direction are distracting to both the experimenter and the subject. This is a rather weak method of scoring. The environment is not described in his study and may have introduced variation. He did not evaluate responses that showed no shifting. Bakan's work grew out of the studies next reviewed.

In 1964, Merle Day, serving on a treatment team for chronically hospitalized male schizophrenics, observed that when you ask a man a

question which requires reflective thought or affective self-expression, he will make a right or left lateral eye-movement in which he breaks eye contact momentarily as he answers the question. If repeated observations are made, the individual can be reliably classified as a right or left mover. Further observations indicated that individual differences in direction related to clinically observable and physiologically measurable differences in organization of attention (Day, 1967). The movement does not occur when very simple questions of fact are asked. Children do not seem to display the movement until the child becomes capable of delayed recall. Highly significant is this apparent relationship between delayed recall and shifting eye-movement direction. One very relevant clinical observation made by Day bears directly on shifting attention inward, away from the external world. Schizophrenics begin to make the eye-movement direction shift only when they relate less narcissistically to the therapist. Day finds that the right-mover shows an "externalized actively responsive distribution of attention" whereas the left-mover shows an "internalized, subjective, passively verbally expressive distribution of attention."

Duke (1968) undertook a research documentation of some of Day's clinically based observations. Duke used 53 volunteer students from psychology classes. Thirty-one females and 22 males were given an orally administered questionnaire either by Duke or a female assistant. Sex differences were not held constant, a variable not taken into account. Five questions were simple fact and five required reflection. Subjects' eye-movements were noted on the spot. Duke found that lateral eye-movements occur more often in response to reflective than to factual questions. He found that when his subjects made lateral

eye-movements, they shifted their eyes consistently in one direction rather than the other. Duke's subjects averaged 86% of their lateral eye-movements in the same direction. Males more consistently than females turned their eyes more often in one direction. The group of individuals did not prefer one direction over the other and no bias in direction was found for the sex difference. Day made claims that Duke did not test: eye-movement reduction if a person is anxious or embarrassed, that in overtly symptomatic schizophrenics movements disappear, that rapport increases amount of movement, that movements do not appear until three years of age, and that the phenomenon appears when the subject asks himself the reflective questions covertly. Day and Duke do not refer to the eye-shift phenomenon as relating to functional asymmetry of the brain. Bakan, who followed up their work, called attention to the functional asymmetry of the brain.

The Present Study and its Relationship to Bakan's Study

The present study will be a replication of the dyadic situation in Bakan's 1969 study of "Hypnotizability, laterality of eye-movements and functional brain asymmetry." Subjects were required to respond to five reflective questions while sitting facing the interviewer. However, the present study will also refine and extend the conditions to include questions asked with no interviewer present, a manipulation of a painting from one wall to hanging on another wall which will provide extra external stimulation while the subject is responding, and the content of questions asked will tap long and short term memory.

Inner-Acceptance and Inner-Rejection as Personality Styles

Subjects will be chosen on the basis of Fusella's unpublished draft doctoral dissertation (1972) classification system of inner

acceptant and inner rejectant people. Also, subjects will be identified as field-dependent or independent after the interview on the basis of Witkin's (1965) work. The rationale for these cognitive and personality variables to be used is that just as Bakan found that Day's description of a left mover was strikingly parallel to Hilgard's description of the good hypnotic subject, so does the author find striking parallels between the left mover and the inner acceptant person who also may have a cognitive differentiation different from the right mover.

Left movers as described variously by Day, Duke, and Bakan have a rich subjective internal life, are interested in the life of the mind and accept impulses from within (Bakan, 1971). An inner acceptant life style allows the person to use both inner and outer reality as sources of information. As delineated by Schonbar (1965) sensitization and vivid imagery are components of the inner acceptant life style. In a pilot study by Fusella (1971, unpublished study in Fusella, 1972), subjects were classified as inner acceptant or inner rejectant in regard to their own internal thoughts. Byrne's Repression-Sensitization (R-S) Scale (Byrne, Barry, and Nelson, 1963) and the Shortened Form of the Betts Questionnaire upon Mental Imagery (QMI) (Sheehan, 1967) had been administered in an earlier study by Fusella (1970) to 200 undergraduates. Twenty repressers and 20 sensitizers were selected to participate in rating imagery vividness to 10 familiar objects and also to imagine 35 items on the QMI.

It was found both in this earlier study and the pilot study by Fusella that sensitizers manifested more vivid imagery than repressers. The extreme represser seemed to be ideationally limited with limited experiences of imagery, whereas the sensitizer seemed to have freer

cognitive functioning and therefore more vivid imagery. An individual with an inner rejectant life style limits himself to outer information. Repression and weak imagery are components of the inner rejectant life style (Schonbar, 1965). Singer (Antrobus, 1970) finds that the "high daydreamer," our inner acceptant life style, does have a high priority for attending to ongoing material from long term memory based on factor analytic studies and other correlation work (Singer and Antrobus, 1963; Singer and Schonbar, 1961).

To test if a left mover was one who has subjective experiences, and one who accepts impulses from within and is therefore a good hypnotic subject, Bakan administered the Stanford Hypnotic Susceptibility Scale (Form C) to 46 undergraduates. An experimenter then interviewed each student, watching the direction of his first CLEM (conjugate-lateral eye-movement) in response to five reflective questions. Left movers did tend to have the highest hypnotic susceptibility scores. In another study, Bakan and Svorad (1967 in Bakan, 1971) found electroencephalograph recordings or brain wave differences between right and left movers. Left movers had more alpha waves (relaxation or low arousal state) than right movers (52 per cent of the time for left movers vs. 20 per cent of the time for right movers). Bakan also found that right movers tended to have less vivid imagery than left movers based on response to a single question. By deduction, the left movers would seem to be more likely to be what Fusella and Singer term the high daydreamer or inner acceptant person, whereas the right mover would seem to be the more likely to repress and not be accepting of internal cognitive processes and therefore would be more inner rejectant with less vivid imagery.

The implication of Bakan's work is that a person who makes left CLEMS has in his total psychological functioning a relatively more dominant right hemisphere. Thus, the personality of this left mover is more likely to reflect the style of right hemisphere functioning; the personality of a right mover is more likely to reflect the style of left hemisphere functioning (See pp. 9-10). The present study will attempt to answer the question posed by Bakan, i.e. "Could daydreaming be associated to a greater extent with the functioning of the right hemisphere?" (1971, p. 67). The way in which the present study will do this is to use the inner acceptant life style and inner rejectant life style as variables in testing if the left mover is more inner acceptant than the right mover.

Stevan Harnad (1971) extended Bakan's work with a special interest in creativity and its relationship to the non-dominant right hemisphere. He states that the picture that emerges from Bakan's work is one that depicts the "right mover as the one adapted to man's high level environment, the rational mathematician, the objective scientist, whereas the left mover appears to be a soft-headed arty sort, in a subjective world of visual images and alpha waves, readily influenced by hypnosis" (p. 1.).

Harnad interviewed 32 mathematicians at Princeton University. Participants were classified as dominant-movers if their eyes swept in the same direction as their handedness and as non-dominant movers if their eyes swept in the direction opposite to their handedness, when they began to reflect upon their answers to nine questions. Thirteen subjects were dominant-movers and 19 were non-dominant movers. Non-dominant movers were the more "creative" and "intuitive"

mathematicians. Harnad interprets their creativity in terms of their being able to unbind ideas from conventional combinations and form novel and original combinations. The dominant-mover mathematicians are the rational, objective, "hard-headed" ones. Harnad based these interpretations on assumptions that the difference between the two types of mathematicians lies in which hemisphere predominantly governs their reflection, creativity residing in the non-dominant hemisphere.

Field-Independence and Field-Dependence

Silverman, Adeval, and McGough (1966 in Conklin, Muir, and Boersma, 1968) found that their left-handed subjects (right hemisphere dominant for speech and therefore left movers) were more field dependent. Perception for this individual is strongly dominated by the overall organization of the field. There is a consistent tendency for experience to be global and diffuse. For the field independent person, experience is delineated and structured. Witkin and his collaborators have accumulated a vast amount of research on this cognitive differentiation dimension. If we are to relate Harnad's description to Witkin's we may conclude that field independence and dependence may relate to brain asymmetries which seem to show up in lateral eye-movement direction. Field dependent individuals tend to have a relatively undifferentiated body concept, rely on external sources for definitions of their social and psychological attitudes, and seem to use repression and denial as defenses. Field independent individuals use internal frames of reference (Conklin, Muir, and Boersma, 1968). Of the several eye-movement studies reported recently (see Conklin, Muir, and Boersma, 1968, for a review of these) only one suggested the possibility of a relationship between eye-movements and Witkin's field independence and

dependence cognitive styles. This study however was interested as were all the others in learning tasks and ocular motility. None bear directly on the present study. However, this dimension's relationship to eye-movements, information processing and personality will be explored for the first time in the present study.

In summary, the author's replication and extension of Bakan's 1969 study, therefore, will be:

Replication: dyadic situation involving 5 reflective questions

Extension and refinement:

1. no interviewer present
2. manipulation of environmental stimulation (picture)
3. extended and minimal memory search
4. cognitive dimension of FI & FD
5. personality dimension:

Inner Acceptance	and	Inner Rejection
a. left mover		a. right mover
b. rich, subjective internal life		b. active, attention to external life.
c. life of the mind		c. de-emphasizes life of the mind
d. accepts inner impulses		d. relies on external social attitudes
e. uses inner and outer reality as sources of information		e. ideationally limited to external sources of information
f. sensitizer		f. represser
g. vivid imagery		g. weak imagery
h. high daydreamer		h. low familiarity with daydreaming
i. uses intellectualization as defense against threat		i. uses denial as defense against threat

This study is not testing Bakan's interpretation of brain functioning. Rather, since his results are remarkable with regard to the consistency of left and right eye-movements, this study is designed to ascertain if these results are reliable. Generally speaking, predictions from Bakan's model would be that if direction of eye-movement is a function of hemispheric dominance and therefore of the person's brain, his direction of eye-movement should remain unchanged by environmental influence. If he is a left mover then it would seem that he would also be more inner acceptant and would differ in field-independence-dependence from the right-mover. Specifically, the inner acceptant personality should show consistent left eye-movement regardless of whether an interesting and stimulating painting is on the left wall or the right wall and whether or not the experimenter is present or absent. These consistent eye-movement directions, if Bakan's results are reliable, should show up in the replication part of the present study, i.e. when the experimenter is present and during reflection-demanding questions.

Cognitive or Information Processing Model

During the rise of behaviorism, the study of cognition was relatively neglected. The response a subject made seemed to be able to be explained directly by the input history of the subject. As Antrobus (1970) states, the cognitive approach attempts supraordinate models that organize the processes of attention, perception, language, thought, problem solving, memory and retrieval, imagery, fantasy, creativity, and altered states of consciousness within a single integrated system.

Channel Space in Cognitive Theory

Bramwell (1927 in Bakan, 1971) made an observation that when a

student was asked a question by his teacher, he looked up to the ceiling. The teacher was quite peeved because the answer was not to be found on the ceiling. However, Bramwell thought that the student did this in order to have channel space available. Therefore, by looking up to the ceiling, the student eliminated interfering visual stimuli, psychologically ridding himself of his environmental stimulation. This may reflect the inability to think about more than one thing at a time.

Horowitz (1970) found that results of studies using the signal detection analysis in the area (Segal and co-workers, 1970) of perception occupy overlapping channels for cognitive processing. The issue of perception as separate from imagery, reality experiences as opposed to unrealistic experiences, is circumvented by information processing theory. Antrobus and Singer (1970), Brooks (1967, 1968), and Segal (1970) suggest that experience is a constant flux and not separated into separate input channels. Inner experiences (memories, images, thoughts, feelings) are drawn from long term memory and independent of external stimulation (immediate environmental objects) (Singer, 1966). Overloading necessitates gating out of irrelevant stimuli so that stimulus independent thought is possible (Antrobus, Singer, Goldstein and Fortgang, 1970). Formal experiments (Singer, 1966; Singer and Antrobus, 1965; Greenberg, 1970) suggest that for a person to engage in imagery he may have to keep his eyes relatively still or focused at infinity so as to be able to concentrate on internal processes and not have to process new material (Singer, 1971).

The cognitive model holds that there is a continual coding of old and new information. This stored material may become available when focal attention shifts away from external processing. This

material competes with the processing of environmental information. For example, overlearned material of the room one is in may be gated out or set on a low recurrence cycle (Singer in Antrobus, 1970). If continual reprocessing occurs, as Singer suggests, competition for available processing channels between new information from the outside and cycles of ongoing internal memory occurs. Therefore, during processing of readily available or easily retrieved material, hereafter called minimal search, the shift away from the external world need not be as great as during reflective searching in the long term storage, hereafter called extended search. Singer (1970) proposes that if a central processor operates with a set to focus on external material or internal material, there is a basis for individual differences in cognitive style or skill in pacing oneself between attention to the material one generates within himself and environmental information.

From this model would not a person direct his eyes so as to withdraw attention from the external environment in order to focus on the least stimulating or most blank field when asked to reflect on a question? Specific to this study, it would be predicted that a person will move his eyes in the opposite direction of where a painting, with complex color variation, many figures, and many busy endeavors portrayed, is hanging, in order to process the answer to extended search questions. An extension of this information processing model is:

Cognitive-Affective Model

The person engaged in conversation with another person is taking in new information and has little channel space available for shifting attention to long term memory material. If the face is a source of information about emotions, which has been showed experimentally by

Izard (1971) and Ekman (1969, 1971 in Izard, 1971) then there is a heavy load of information conveyed by the face of one individual to another individual. Tomkins (1962, 1963) integrates the image making capacity of man with a differentiated affect system. The affects may serve as self-reward or punishment. Interaction in a dyadic situation is constantly being influenced by facial or bodily gestures of another listening to us. Thus, the face plays a significant role in communication of reinforcing stimulation from one's social environment. A slight change from a smile to boredom or disgust can influence one so that we are constantly on the lookout for these nuances. Hence, staring at a face limits channel space for doing complex long term memory searches or engaging in fantasy. Tomkins (1970) proposes that affects are functions of the information processing capacities of the person so that the "different affects are aroused as a consequence of the rate of stimulation increase, stimulation persistence, and stimulation decrease," (Singer and Singer, 1971; Tomkins and Izard, 1965). Therefore, a persons' ability to deal with new stimulus information in a variety of situations is within Tomkins' proposal. In this way, Singer thinks that Tomkins' theory represents an integration of an information processing system with a complex emotional structure which communicates positive or negative information to the individual. The subtleties of affective communication via the face were studied by Exline, Schuette and Gray (1965 in Izard, 1971). One set of subjects answered personal questions producing embarrassment and a different set of subjects answered innocuous questions about their recreational activities. The dependent variable was the amount of time subjects returned the interviewer's gaze. Subjects asked the less

embarrassing questions looked significantly more at the interviewer. Exline et al. do not make clear the direction of the gaze or the information load carried by the face.

The subtleties of the face as having high information load will be explored in the present study by the condition of the experimenter present during part of the interview and absenting himself during another part. Predictions from this model are possible with regard to eye-movements under each condition. If the face is a complex stimulus source and has a heavily loaded communication impact, a shift away from the face is necessary to process internal information. In a dyadic interaction, shifting gaze away from an interviewer will be greater than shifting gaze away from a focal point without an interviewer present.

The personality variable of inner acceptance and inner rejection is most important. An inner acceptant person might shift away from the interviewer more than an inner rejectant person in order to avoid complicating stimulation while processing, and, as in the above study cited, may be more prone to embarrassment. However, the field dependent person may take in the face of the interviewer which may block his ability to reflect. There should, therefore, be a difference between inner acceptant and inner rejectant groups when the experimenter is present but when it is not necessary to process facial information the difference between the groups should decrease.

A fourth model may be considered to explain the eye-movement process. It is conceivable that shift of gaze is a function of a very general psychophysiological effect.

Activation or Arousal Model

It is possible that the amount of search effort alone would be

sufficient to explain amount of shifting. It is possible that a manifestation behaviorally of a greater search effort or of more energy expended may be blinking or rapid shifting of the eyes. This would be a manifestation of the general activation or arousal of the physiological system of the organism. Therefore, the only condition affecting eye-movements would be the content of the questions. Extended search questions may require greater search effort than minimal search questions and thus there would be more frequent eye-movement shifts with extended search questions across groups. The processing task itself would determine frequency of eye-movement shifting regardless of environmental changes or personality variables. Direction of eye-movements would not be consistent. Duffy's (1963) formulation that behavior varies in direction and intensity would be upheld. The former would be the goal direction of the person and the latter would be in the activity or response. Motivation is determined, therefore, to a great extent by the arousal level of the organism. It is possible that eye-movements reflect differential arousal levels. In this case, eye-movement frequency would show whether or not the individual, depending on the high or low degrees of activation demanded by the questions, was responding based on arousal only. No relevant research has dealt specifically within this area of inquiry.

Considering these four models, the personality variables, and the conditions, it is possible that degree of memory search may interact with the habitual tendencies a person brings to the situation to effect direction of eye-movements. Whether or not any of the models are upheld, replication of a previous experiment is a worthy scientific endeavor in its own right. We may be able to pin down specifically

the conditions under which lateral eye-movement occur in order to understand oculomotor adjustment during internally-produced cognitive processes also.

In summary then, the hypotheses to be tested in the present study are as follows:

Can Bakan's results be replicated by showing that shift in gaze away from the experimenter will be consistently to the right or left in about 75% of a subject's responses to the following questions: (1) How many letters are there in anthropology? (2) How many letters are there in Washington? (3) If you were elected president what would be your first act to help solve the racial problems in this country? (4) with your eyes open try to have an image of a man crying. Rate the clarity of the image on a scale from one (no image) to five (very clear, just like real). A second part to the replication should show that left movers significantly differ from the right movers in vividness of imagery with left movers having more vivid imagery.

If Bakan's model holds then:

(1) eye-movement direction is a function of hemispheric dominance so direction of eye-movement will remain unchanged by environmental influences, i.e. experimenter present or absent; picture on left or right wall.

(2) left eye movers should show this consistent eye-movement direction across all conditions when reflection is called for.

(3) right eye movers should show this consistent eye-movement direction across all conditions when reflection is called for.

(4) left movers would be more likely to be inner acceptant than right movers who would be more likely to be inner rejectant.

(5) left movers will prefer warm colors.

(6) left movers will have more vivid imagery than right movers.

(7) field independence will be correlated with either directional preference.

If cognitive or information processing model holds then:

(1) a person will move his eyes in an opposite direction of where the painting is hanging when processing extended search questions.

(2) a person will not shift his eyes in an opposite direction of where the painting is hanging when processing minimal search questions.

If the cognitive-affective model holds then:

(1) if the face is indeed a complex and competing stimulus source and a shift of the eyes away from the interviewer will take place when reflection is called for.

(2) shifting the eyes away from the interviewer will be greater when the interviewer is present and less shifting of the eyes away from a focal point will take place when the interviewer is absent.

(3) an inner acceptant person will shift his eyes away more from the interviewer than an inner rejectant person.

(4) an inner acceptant person will have more eye-shifts than an inner rejectant person when the interviewer is present.

(5) the inner rejectant and the inner acceptant people will not differ in frequency of eye-shifts when the interviewer is not present.

(6) the inner rejectant and inner acceptant people will not differ in eye-shifting frequency on minimal search questions.

<u>If the activation or arousal model holds then</u>:

(1) the greater the search effort, the greater the number of eye-shifts across groups and all other conditions except extended and minimal search questions.

(2) emotionally charged imagery questions and future planning imagery questions should produce more eye-shifting than minimal search, easily retrieved material.

(3) no consistent eye-movement direction should occur.

CHAPTER II

METHOD

Subjects

Two measures of inner acceptance and inner rejection were administered to 134 male psychology undergraduates aged 17 to 24 at The City College of New York. Scores were ranked and arranged from high to low. Students with ranks below and above the median for the entire sample were then selected. From this group, 24 subjects who scored below the median on both measures were contacted and were in the Inner Rejectant group. Twenty-four subjects who scored above the median on both measures were contacted and were in the Inner Acceptant group. (See Appendix F for actual scores.) There were no significant other subject variables in which subjects differed. These 48 subjects were paid for their participation in the half hour interview and the taking of the Rod and Frame test after the interview. All males were chosen because they show more consistent eye-movement behavior than females (Bakan, 1971).

Experimenters

Two female experimenters served as the interviewer and the administrator of the Rod and Frame test. Both were "blind" as to which group each subject was in. Both experimenters had previous training in pilot work carried out on five subjects.

Instruments

Byrne's Repression-Sensitization (R-S) Scale (Byrne, Barry, and Nelson, 1963) and six scales from the "Imaginal Processes

Inventory" (Singer and Antrobus, 1963, 1971) were given.

The repression-sensitization dimension of defense mechanisms refers to those responses used to avoid anxiety arousing stimuli and their consequences. At one end of the continuum is the use of repression and denial and at the sensitizing extreme is the use of intellectualization and obsessive behaviors which attempt to reduce anxiety by controlling the stimuli and consequences attendant upon the anxiety arousing nature of them. The sensitizer presumably will tend to ruminate about the threat, verbalize its impact and thereby attempt to neutralize and gain control of its threatening implications. The represser, however, will tend to deny that the threatening stimulus exists and will block the aversive awareness of it. The R-S Scale (Byrne et al., 1963) was developed according to this view of repression-sensitization as a unidimensional categorization. The R-S Scale consists of 127 items taken from the MMPI. Byrne (1964) reports evidence to attest to its construct validity and high reliability. Repressers and sensitizers have been found to differ in the expected direction when variables such as reported anxiety, self description, memory and perception are considered. Fusella (1970) reports that sensitizers have more vivid imagery than repressers. In addition, the sensitizer is much more aware of his internal thoughts than the represser and would seem to have more familiarity with his cognitive processes. Scores on the R-S Scale can range from 0 to 127 with higher scores indicating sensitization.

In two different factor analytic studies of "The Imaginal Processes Inventory" (Singer and Antrobus, 1963, 1972) four patterns or styles of daydreaming emerged. These are: (1) Anxious, Poorly

Controlled Thought or Neurotic Absorption in Daydreaming, (2) Obsessional Emotional Daydreaming, (3) Positive-Vivid Daydreaming, and (4) Controlled Thoughtfulness. The last two were viewed as styles of daydreaming falling within the normal range. The first two were viewed as neurotic patterns, the first being hysterical and the second being obsessional.

Some of the scales that contributed to Positive-Vivid Daydreaming were visual imagery in daydreams (e.g. "Visual scenes are an important part of my dreams"), absorption in daydreaming (e.g. "I tend to get pretty wrapped up in my daydreaming"), auditory imagery in daydreaming (e.g. "The sounds I hear in my daydreams are clear and distinct"), positive reactions in daydreams (e.g. "My daydreams often leave me with a warm, happy feeling"), daydreaming frequency (e.g. "I daydream many different times during the day"). The items and scales which load on this factor suggest that high scorers are those who accept, enjoy and are aware of their internal environments. Singer and Schonbar (1961) found that high daydreamers accept their inner experience and have greater self awareness than those who score low. Repression correlated negatively in their study with high daydreaming scores. Therefore, a total of eighty items combining six scales were used: Scale 1-Daydreaming Frequency, Scale 3-Absorption in Daydreaming, Scale 4-Acceptance of Daydreaming, Scale 5-Positive Reactions in Daydreaming, Scale 7-Visual Imagery in Daydreams and Scale 8-Auditory Imagery in Daydreams. Scores could range from 80 to 400 with higher scores indicating positive vivid daydreaming. How experienced a person is with his own imaginal process influences whether or not he needs to block out all other sources of stimulation and how aware he is of his

cognitive processes. The measures appear in Appendix A. The correlation between these two measures was .37 ($p < .01$) on the 134 male Ss.

Apparatus

AV-3600 Sony Videocorder, Avc-3200 Sony Video Camera, tripod, zoom lens, electronic viewfinder mounted atop the camera, CVM 110U portable monitor, and a TV receiver were used. Magnetic tapes with a reel for accommodating tapes for an hour's length and a unidirectional condenser microphone and earphones were used. Standard Sony equipment wiring was used. An intercom system connected microphones and earphones between an inner, soundproof room and a larger adjoining outside room.

Physical situation

The subject sat two feet away from and directly in front of the interviewer. The subject was always facing the interviewer when the interviewer was present. When the interviewer was not present, the subject faced the camera. The camera mounted on a tripod remained stationary behind the interviewer's chair. Whether or not the interviewer was present, the room remained stimulus free except for the painting which was hung on the wall behind the interview chair of the experimenter, to the left or right field of vision of the subject. Earphones were worn by the subject throughout the entire interview. The room was soundproof. The camera was focused on the subject's head though the subject did not know this. The microphone was 1 foot from the subject and 1 foot from the experimenter. The painting was a 31" by 44" print of "Repas de Noce" by Jan Brueghel. The inner room in which the interview took place was 8' by 15' and during rest

periods the subject entered an adjoining room which was 15' by 16'. (See the diagram on the following page).

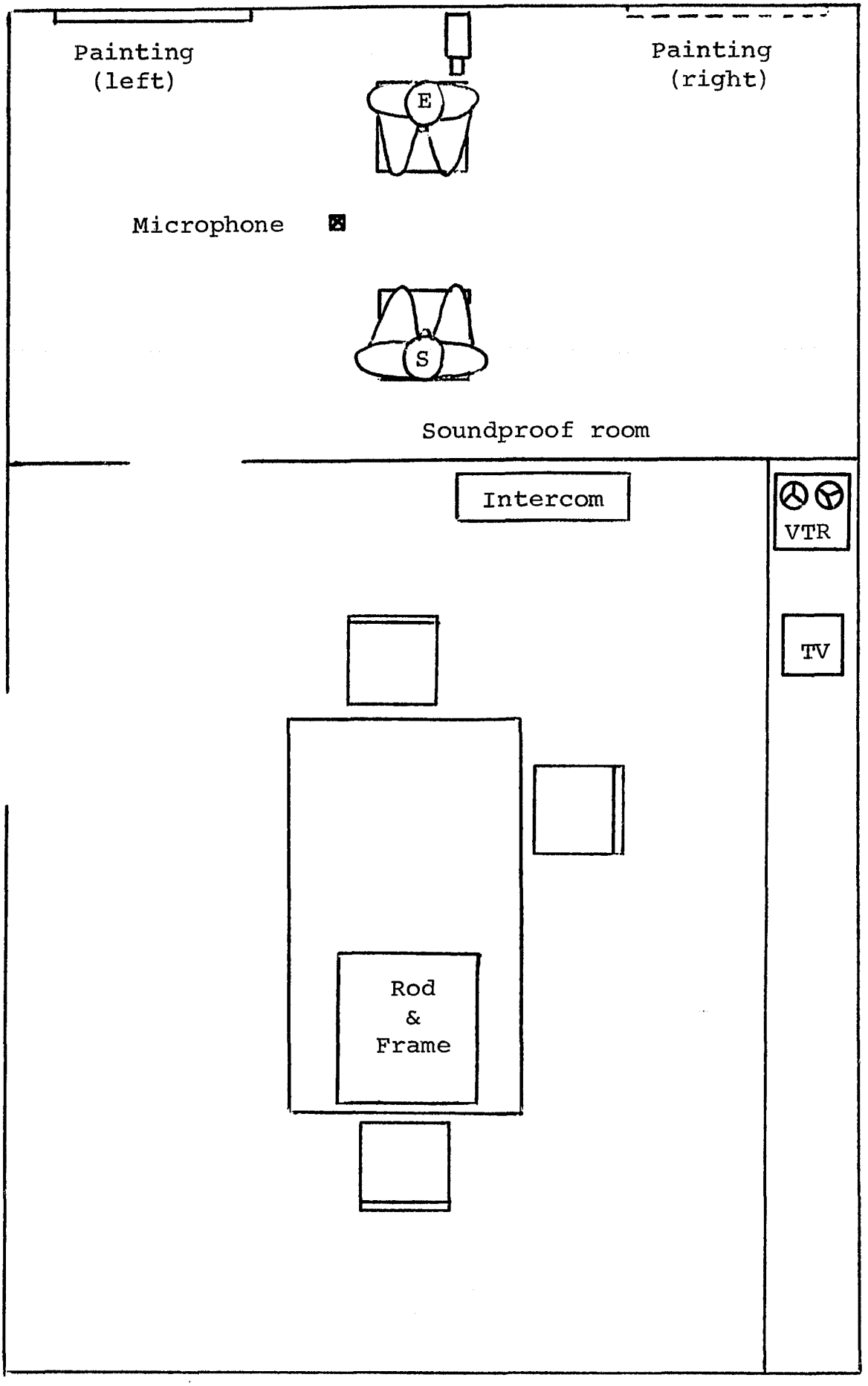
Procedure

Each subject was run through four different conditions twice. One subject from each group, i.e. inner rejectant or inner acceptant was given the same order of conditions by a third experimenter who wrote down the subjects and the conditions to be given. This was given to the two female experimenters without knowledge of which group the subject was in. A complete between subject counterbalanced design was used. The four conditions were:

1. with the interviewer and the Brueghel print on the left wall
2. with the interviewer and the Brueghel print on the right wall
3. without the interviewer and the Brueghel print on the left wall
4. without the interviewer and the Brueghel print on the right wall.

These four conditions were repeated. During each condition, six questions were asked. Two of these six questions tapped long term memory storage demanding past, well-established memories and thoughts. Two other questions demanded easily retrieved factual information. One question was a future planning imagery question which necessitated complex and thought provoking processing of past, well-established material in combination with new thoughts. The sixth question was a rating of vividness of a visual negatively emotionally charged image. Different forms of these six questions were given in each condition. Therefore, there were eight forms of each question. The entire interview consisted of 48 questions. These questions were tested in two different pilot studies to make sure that the question was tapping

EXPERIMENTAL SEATING ARRANGEMENT (LOOKING DOWN FROM CEILING)



the dimension it was intended to tap. The following questions were given:

Different forms of the same questions:

EXTENDED SEARCH QUESTIONS:

How many letters are there in:

A. anthropology
B. Washington
C. sociology
D. psychology
E. establishment
F. introduction
G. politics
H. astrology

A. Describe how Lee Harvey Oswald was shot.
B. Who was Johnson's vice president?
C. What is your earliest memory?
D. As a child, what was your favorite toy?
E. What color was your first bike?
F. Describe your favorite elementary school teacher.
G. How much allowance were you given in the eighth grade?
H. What were the color of the living room walls where you lived before now?

MINIMAL SEARCH QUESTIONS:

A. How many days in a year?
B. What is your favorite color?
C. How old are you?
D. Which season do you like best?
E. What is your mother's first name?
F. How many inches in a yard?
G. How many quarters in a dollar?
H. How tall are you?

A. What color are your eyes?
B. How many rooms are there in your apartment?
C. What's your highest degree from school?
D. What street do you live on?
E. What's your favorite hobby?
F. What makes you smile?
G. How much do you weigh?
H. How many sisters and brothers do you have?

FANTASY - Future Planning

If you

A. were president, what would be your first act to help solve the racial problems of this country?
B. had the ability to become invisible in the future, what would you do that you couldn't do now?
C. won a million dollars in the lottery, how would you spend the money?
D. were dean of a large university, how would you organize the educational program?
E. were a senator, how would you represent the people?
F. were a teacher, how would you motivate your students to learn?
G. were a doctor, how would you organize a program of medical care for the poor?
H. were in a government position, how would you decide who received financial aid?

FANTASY - Emotionally Charged Negative Imagery

With your eyes open try to have an image of:

A. a man crying
B. a woman crying
D. an ill person who could not leave his bed
E. garbage all over the streets
F. a person with a bloody nose
G. two cars crashing in a head on collision
H. an angry mob

Rate the clarity of the image on a scale from 1 (no image) to 5 (very clear, just like real).

These questions were given in random order of dimension within each condition providing two extended search, two minimal search, one future planning and one emotionally charged image question in each condition. The questions were given in the same order to all subjects regardless of order of conditions the subject received.

Specifically, the following took place. The subject entered the large outside room. The experimenter asked him to fill out some forms so as to make sure the subject was right handed. The subject was

unaware of the reason for this and viewed it as part of the procedure in order to receive payment for his time (which it was also used for). Then the subject and the experimenter entered the small soundproof room. The experimenter told the subject to take the seat with the earphones laid upon it. The subject was then told to make himself comfortable and place the earphones on while the experimenter focused the camera and made sure that all equipment was working properly. The painting was on the wall dictated by the first condition. The experimenter also left the room and spoke through the microphone in the outside room to assure that the subject could be heard and could hear. On re-entering the inner room, the experimenter sat in the chair opposite the subject and gave him the following directions: "You are going to be asked some questions. Before answering, take your time to allow the answer to evolve into a picture in your mind. Allow yourself time to experience a full answer before verbalizing it. They say your answer. Try to look at me when I am in the room or straight ahead into the camera lens when I am not in the room with you. At 7 pre-determined times during the interview you will be asked to leave this room and go into the adjoining room for 2 minutes. Just go outside and relax. Are there any questions?". The interview then proceeded according to the pre-designated order of conditions. During the two minute rest period, the experimenter switched the painting from wall to wall. All subjects noted this obvious change. After the last question was given, the subject was told that this was the end of this part. Both experimenter and subject then entered the larger room and the subject was told to take the seat in front of the large white box.

Portable Rod And Frame Apparatus (RFT)

A vast amount of research has been done on the basis of Witkin's concept of field dependence (Conklin, Muir, and Boersma, 1968). The Rod and Frame Test is one of the key tests of the field-dependence dimension. The portable RFT is of table-top size and the Darro model was used. The standard inspection procedure was used. Oltman (1968) found high correlations between this portable RFT and the previous standard apparatus. The ease of administering and the shortened amount of time necessary were decisive factors for choosing this instrument. The subject was given the following instructions:

> "In this next part, we want to find out how well you can determine the upright-the vertical- under various conditions. In this box you will see a square frame and within this frame you will see a rod. It is possible for me to tilt the frame to the left or the right. I can also tilt the rod to the left or right. I can tilt the frame alone or the rod alone; or I can tilt them both at the same time, either to the same side or to opposite sides. When I open the curtain at the beginning of each trial, I want you to tell me whether the rod and frame are straight up and down or whether they are tilted, and if so, in which direction they are tilted. Tell me whether the rod and frame are straight with the wall of this room or whether they are tilted. Are there any questions?"

The score the subject received was the absolute sum of deviations from zero degrees. When all 48 subjects had been tested, scores were arranged from low to high. Subjects scoring above the mean of 30.28 were field dependent and those scoring below the mean were field independent.

The subject was then told that the interview was over. Any questions he had were answered as fully as possible without giving away too much information which might reach the other experimental subjects.

Rating of Tapes

When all 48 subjects had been run the taped records of the interview were scored for first eye movement made and number of shifts made by the subject. Half of the subjects were rated by a second judge and reliability in scoring eye-movements between judges showed 87% agreement which eliminated the need for all 48 subjects to be second rated. Raters were told the following:

> "I am interested in the span of processing. This is the period between the end of the question being asked until the subject has clearly formulated an answer and verbalizes his already thought out answer. A S may begin to verbalize 'umh' or repeat the question aloud or do a variety of 'thinking' verbalizations and still be processing or formulating an answer. Call in another rater if you are uncertain. Make sure enough of the question has been asked so that you are certain the S is thinking out an answer. Then watch the T.V., looking at the S's very first shift. Note if it is left or right of if there is no eye-movement. Also note where the S was looking right before he shifted his gaze. Count the number of shifts from the first shift until the subject verbalizes his formulated answer. Note important personality, cognitive and individual characteristics."

This rating procedure allowed for precision in scoring unlike the scoring done in all other studies in which the interviewer noted the eye-movement while the interview was in progress. Raters were trained and experienced from previous pilot work done on 16 female subjects. Practice rating training sessions occurred on this study's pilot work as well. In all cases, raters were observing first lateral saccade following the question. Only in some cases did a rater not wait until the interviewer fell silent in order to score first lateral saccades. In these cases, enough of the question had been asked and due to the same form of the question appearing earlier in the interview, the subject began processing an answer before the last

words of the question. In these cases, agreement between raters was obtained.

CHAPTER III

RESULTS

Replication of Bakan's results

In the 1969 study of "Hypnotizability, laterality of eye movements and functional brain asymmetry" Bakan asked 28 males and 18 females five reflective questions for the purpose of observing eye-movement direction in a fact to face situation. The questions used were:

1. How many letters are there in the word ANTHROPOLOGY?
2. Tell me an English word that starts with L and ends with C.
3. If you were elected president what would be your first act to help solve the racial problems of this country?
4. How many letters are there in the word WASHINGTON?
5. With your eyes open try to have an image of a man crying (for female Ss - of a woman crying). Rate the clarity of the image on a scale from one (no image) to five (very clear, just like real).

The direction of the very first lateral movement following the question was recorded if an observable movement occurred. Lateral movements with a vertical component were scored in terms of lateral direction. Subjects were then classified as right or left movers on the basis of the direction of the majority of movements, these movements of necessity being away from the examiner. Forty-two Ss were classifiable and 4 were not. Twenty-two Ss made movements in the same direction on every trial, and the average of about 75 to 85 per cent of each subject's lateral eye-movements were in the same

direction (Bakan, 1969).

Therefore, in order for Bakan's results to be replicated in the present study, the results should fall within the center of Bakan's distribution. The mean of his distribution for actual number of right shifts on the five trials was 2.0 and the standard deviation was 2.34. In the present study, one of the questions asked by Bakan was eliminated because of letter frequency dissimilarities for different forms of the same questions needed under the three other conditions used. However, subjects were classified as right or left movers in exactly the same manner as Bakan classified his subjects, i.e. the direction of the majority of movements. (See Appendix C).

Of the 48 subjects in the present study, all males, 36 moved consistently in the same lateral direction. Thirteen of these made movements in the same direction on every trial. Twenty-one were left movers and 15 were right movers. The present results do fall within the center of Bakan's distribution. There is no significant difference between the distributions. Bakan's results of consistent eye-movement direction are confirmed and replicated. (See Appendix E for a list of the 48 subjects with their directionality scores on each of Bakan's questions asked).

Direction of lateral eye movements and clarity ratings of imagery:

The last question presented to subjects required that they have an image. Following the report of an image they were asked to rate the clarity of the image on a scale from one (no image) to five (very clear just like real). The mean clarity rating of left movers in Bakan's study was 3.5 and that of right movers was 3.1, ($p < .10$), suggesting clearer reported imagery for the left movers. For this

one imagery question, in the present study, left movers rated their imagery with a mean of 3.2 and right movers rated their imagery with a mean of 3.5. This difference is not significant at .10 level of a two tailed t test. Bakan's suggested relationship on this one imagery question he had employed in his study, was not confirmed in the present study.

Extension and Refinement of Bakan's Study

Directionality as Dependent Variable: The dependent variables were left, right or no shift as possibilities for direction of first lateral eye-movement. Because left, right and no shift are possibilities for very first eye-movement made after a question was asked, and these cannot be ordered, a separate analysis of variance for each was done. In understanding the data, the three separate analyses must be considered together. The measure used was number of first eye-movements pooled across the four extended search questions and separately pooled across the four minimal search questions which were used for each level of the other independent variables, i.e. experimenter and painting.

Specifically, there were two other independent variables with two levels each. They were experimenter and painting. The experimenter could be present or absent. The painting could be on the left or right wall. Therefore, there are four possible combinations of the various levels of each factor. They are:

1. E present/painting left
2. E present/painting right
3. E absent/painting left
4. E absent/painting right.

Within each of these conditions, two extended search questions and two

minimal search questions were posed. Since each of these conditions was repeated, a total of four extended search questions and four minimal search questions were responded to with first lateral eye-movement being to the right or left or no lateral eye-movement occurring, on each question. Responses were pooled so that if a subject, for example, moved laterally to the left on three out of the four questions and on the fourth question moved to the right, it was noted under the two separate analyses for initial left eye-movements as three and under initial right eye-movements as one out of a possible four. The same procedure occurred if any of the four possible responses was no shift in gaze direction.

One future planning question and one emotionally charged imagery question was also posed within each condition. Since conditions were repeated, a total of two future planning questions and two emotionally charged imagery questions were responded to with first lateral eye-movement to the right or left or no lateral eye-movement occurring. The same procedure as stated above for minimal vs. extended search questions occurred. However, no analysis of variance included these fantasy questions. The hypotheses proposed involved relationships between fantasy questions and single other variables.

The vertical component of eye-movement direction, i.e. up or down was looked at secondarily but no formal analysis was done because this dependent variable did not appear to have any consistency beyond chance appearance in the sample, and no specific hypotheses were made regarding it.

The hypotheses to be tested with regard to directionality required that the subjects be divided into right or left eye-movement

groups, in order to test the effects of the independent variables. To repeat, the independent variables were: (1) experimenter present, experimenter absent; (2) picture on right wall, picture on left wall; (3) dimension of questions which were questions demanding complex thought provoking cognitive processes and questions demanding minimal and easily retrievable information; and (4) left vs. right movers.

Subjects were divided into right movers and left movers on the basis of at least 60% of their first eye-movement direction on all 48 questions as well as at least 60% of their first lateral eye-movement direction on all 32 extended search questions being in the same direction. This basis of classification differs from the basis Bakan used. Bakan classified his subjects according to the direction of the majority of movements. When replicating his work, the same method as Bakan's was used. However, in refining his work, it was considered more sound to change the classification system. Since a subject now had to reach a 60% criterion, his eye-movement direction had to be consistent beyond a majority level alone, leading to higher reliability. A subject could not merely score one or two eye-shifts in the same direction above the opposite direction and be considered a left mover or right mover. Therefore, the number of right and left movers in the replication part of the study differs from the number of right and left movers in the extension and refinement part of the study because of more sound and stronger methodological controls. Of the 48 subjects, 42 subjects were classifiable. Six subjects did not reach the 60% criterion and were not included in the analyses of variance. There were 14 left movers and 28 right movers making up the 42 subjects in the analyses of variance. (See Appendix E for a table of actual

directional scores for each subject.)

Analyses of Variance on Directionality as Dependent Variable

Because there were twice as many right movers as left movers, the analysis of variance was carried out both on a weighted basis where actual number of right and left movers were used in determining significance, and on an unweighted basis where harmonic means were used in tests of significance. In this latter case the two groups, though unequal in size, are treated as equal. Since the results were virtually identical with the two analyses, the weighted analysis of variance is presented. (The way the data were coded appears in Appendix B.) Number of shifts made in the direction being considered were pooled across the different forms of the same questions within each condition.

Initial Left Shifts (Average for Pooling of Four Questions)

Table 2 presents the results of the analysis of variance, weighted means solution for initial left shifts. The significant difference ($p < .001$) for dominant direction reflects the redundancy between the means of each group for determining whether an individual was a right or left mover. Right movers on the average shifted to the left .69 times out of the four forms of the same questions whereas to be expected left movers on the average shifted to the left 2.46 times out of the four questions. The significant effect for extended vs. minimal search questions ($p < .001$) demonstrates that on the average more left shifts occur for both groups following extended search questions. The mean for extended search questions being 1.61 as opposed to the mean for minimal search questions being .95. The interaction between question dimension and the dominant direction is significant ($p < .001$). (See Figure 1.) As can be seen from the figure

TABLE 2

WEIGHTED ANALYSIS OF VARIANCE FOR

NUMBER OF INITIAL LEFT SHIFTS

Source	SS	df	MS	F	P
Between Subjects	(298.95)	(41)			
A=Dominant direction	232.18	1	232.18	139.09	.001*
SS/Groups	66.77	40	1.67		
Within Subjects	(282.75)	(294)			
B=Extended-Minimal Search Questions	36.01	1	36.01	57.73	.001*
BA	9.29	1	9.29	14.89	.001*
B SS/Group	24.95	40	.62		
C=Painting on Left/Right Wall	1.19	1	1.19	1.33	NS
CA	.18	1	.18	.20	NS
C SS/Group	35.88	40	.90		
D=E Present/ No E	2.01	1	2.01	1.84	NS
DA	19.00	1	19.00	17.38	.001*
D SS/Group	43.74	40	1.09		
BC	.05	1	.05	.09	NS
BCA	.04	1	.04	.07	NS
BC SS/Group	21.17	40	.53		
BD	.01	1	.01	.02	NS
BDA	.43	1	.43	.65	NS
BD SS/Group	26.31	40	.66		
CD	2.33	1	2.33	3.07	NS
CDA	.00	1	.00	.00	NS
CD SS/Group	30.42	40	.76		
BCD	.05	1	.05	.07	NS
BCDA	.18	1	.18	.24	NS
BCD SS/Group	29.52	40	.74		
Total	581.70	335			

* Significant

NS=Not Significant

the difference between extended and minimal search questions is greater for left movers (1.13) than for right movers (.42). This suggests that left movers shifted more to the left for both types of questions. Right movers shift more to the right for both types of questions (See Figure 3). Both groups shift in their directional preferences more for extended search questions than minimal search questions.

In this analysis no significant effects were associated with the position of the painting nor were any main effects associated with the presence or absence of the experimenter. There was however an interaction between the dominant direction and the presence or absence of the experimenter. (See Figure 2.) This analysis must be considered along with the analysis of initial right shifts. The left movers made more left shifts when the experimenter was present (2.71 as compared to 2.20 when E was absent) whereas the right movers made fewer left shifts when the experimenter was present (.45). Right movers move their eyes to the right in E's presence. This right mover group made more left shifts when the experimenter was not present in the room (.94). All other interactions were not significant. Initial right shifts are taken into account in the next analysis.

Initial Right Shifts (Average for Pooling of Four Questions)

Table 3 presents the results of the analysis of variance, weighted means solution for initial right shifts. The significant difference ($p < .001$) for dominant direction reflects the redundancy between the means of each group and the way in which it was determined if an individual was a right or left mover. Left movers on the average shifted to the right .41 times out of the four questions whereas as to be expected right movers on the average shifted to the

GROUP MEANS FOR INITIAL LEFT SHIFTS

FOR DOMINANT DIRECTION AND DIMENSIONS OF QUESTIONS

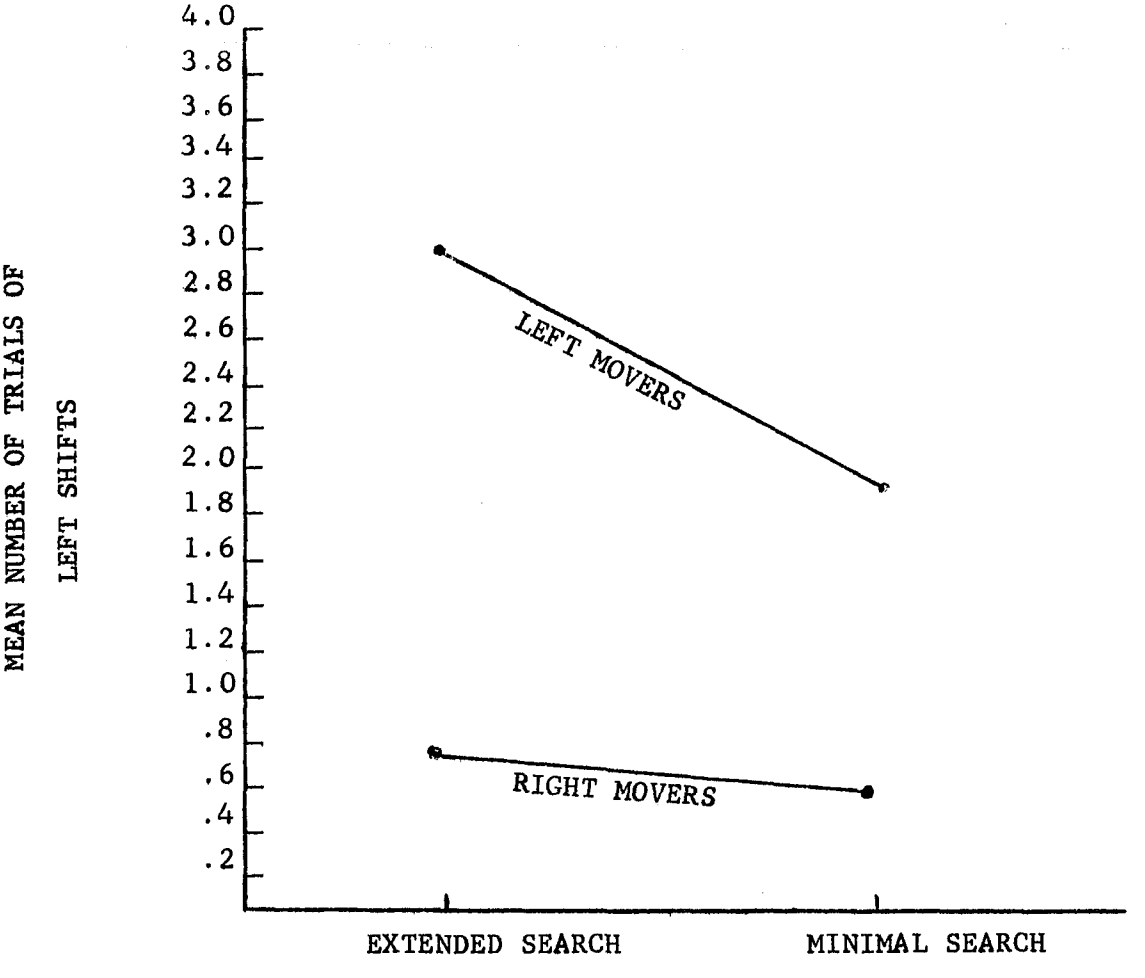


FIGURE 1

GROUP MEANS FOR INITIAL LEFT SHIFTS

FOR DOMINANT DIRECTION AND EXPERIMENTER PRESENT OR ABSENT

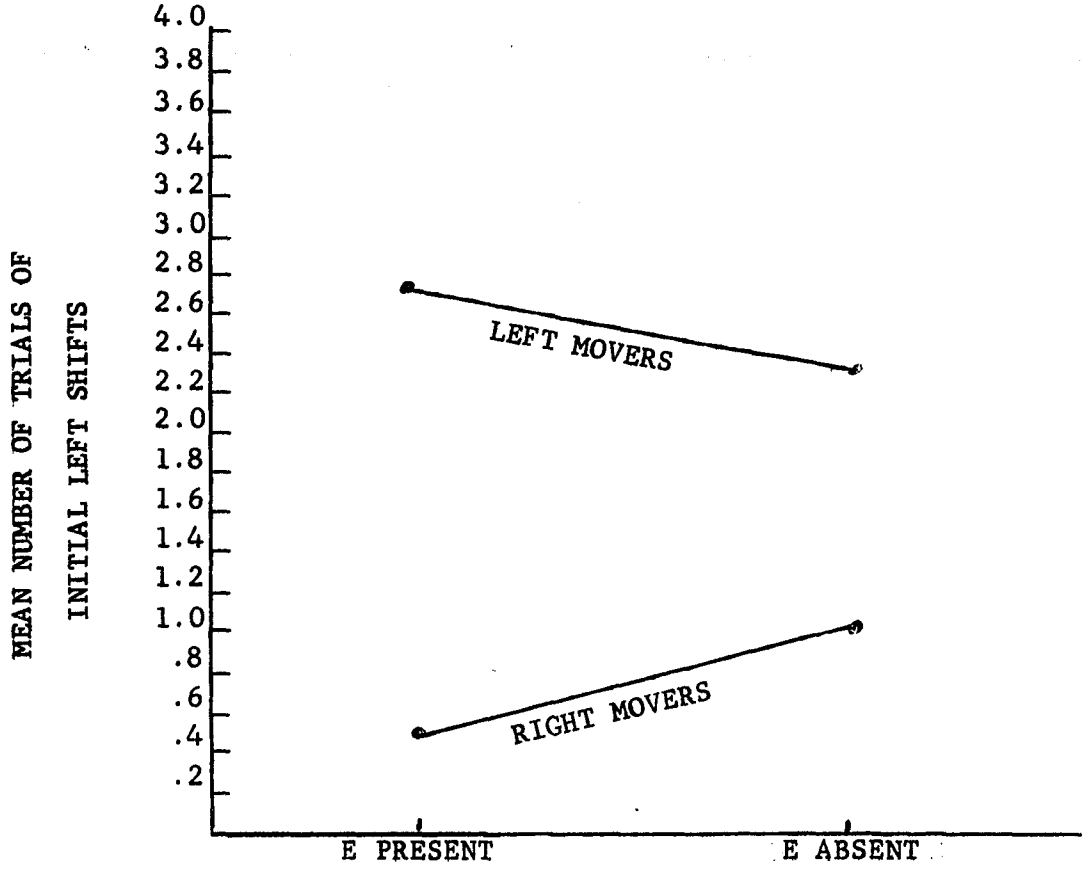


FIGURE 2

right 2.21 times out of the four questions. The significant effect for extended vs. minimal search questions ($p < .001$) demonstrates that on the average more right shifts occur for both groups following extended search questions, the mean for extended search questions being 1.96 as opposed to the mean for minimal search questions being 1.25. The interaction between question dimension and the dominant direction is significant ($p < .001$). (See Figure 3.) As can be seen from the figure the difference between extended and minimal search questions is greater for right movers than for left movers. There were no picture effects that were significant, however the significant experimenter effect indicates that overall more right shifts were made when the experimenter was present than when he was not present. The significant interaction ($p < .01$) indicates that effects of the absence of the experimenter were much stronger for right movers than for left movers. There was almost no difference for the left movers. (See Figure 4.) In considering these results, the reader should keep in mind that they are like a mirror image of the analysis on initial left shifts because of subjects being right movers and left movers. The results, therefore, must be combined so that they are not contradictory.

Combining the Results of Analyses of Initial Directional Shifts

In considering the two analyses of variance thus far, the effects of E's presence and absence and his effect on direction of initial shifts for left movers and right movers are as follows:

Left movers make the same number of right shifts whether E is present or absent. When E is absent, left movers make fewer left shifts than when E is present. Right movers also make fewer shifts in their directional right preference when E is absent. When E is absent, right

TABLE 3

WEIGHTED ANALYSIS OF VARIANCE FOR

NUMBER OF INITIAL RIGHT SHIFTS

Source	SS	df	MS	F	P
Between Subjects	(334.64)	(41)			
A=Dominant direction	240.48	1	240.48	102.16	.001*
SS/Groups	94.16	40	2.35		
Within Subjects	(351.50)	(294)			
B=Extended-Minimal Search Questions	42.86	1	42.86	45.97	.001*
BA	17.36	1	17.36	18.62	.001*
B SS/Group	37.29	40	.93		
C=Painting on Left/Right Wall	.76	1	.76	.85	NS
CA	.29	1	.29	.33	NS
C SS/Group	35.95	40	.90		
D=E Present/No E	37.33	1	37.33	23.54	.001*
DA	16.72	1	16.72	10.54	.01 *
D SS/Group	63.45	40	1.59		
BC	.19	1	.19	.45	NS
BCA	.02	1	.02	.06	NS
BC SS/Group	16.79	40	.42		
BD	.19	1	.19	.29	NS
BDA	.38	1	.38	.59	NS
BD SS/Group	25.93	40	.65		
CD	.76	1	.76	1.16	NS
CDA	.01	1	.01	.01	NS
CD SS/Group	26.23	40	.66		
BCD	.05	1	.05	.07	NS
BCDA	.02	1	.02	.03	NS
BCD SS/Group	28.93	40	.72		
Total	686.14	335			

*Significant

NS=Not Significant

GROUP MEANS FOR INITIAL RIGHT SHIFTS

FOR DOMINANT DIRECTION AND DIMENSIONS OF QUESTIONS

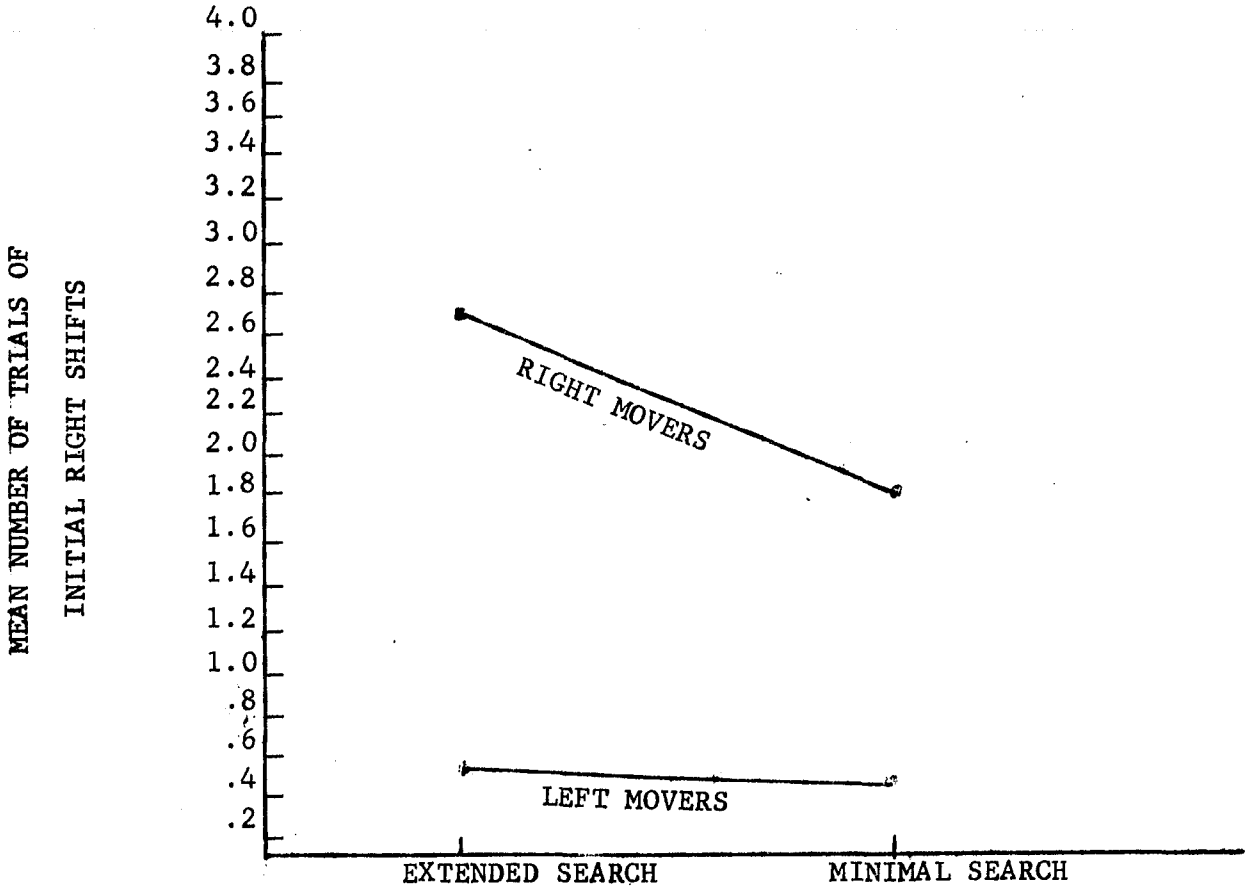


FIGURE 3

GROUP MEANS FOR INITIAL RIGHT SHIFTS

FOR DOMINANT DIRECTION AND EXPERIMENTER PRESENT OR ABSENT

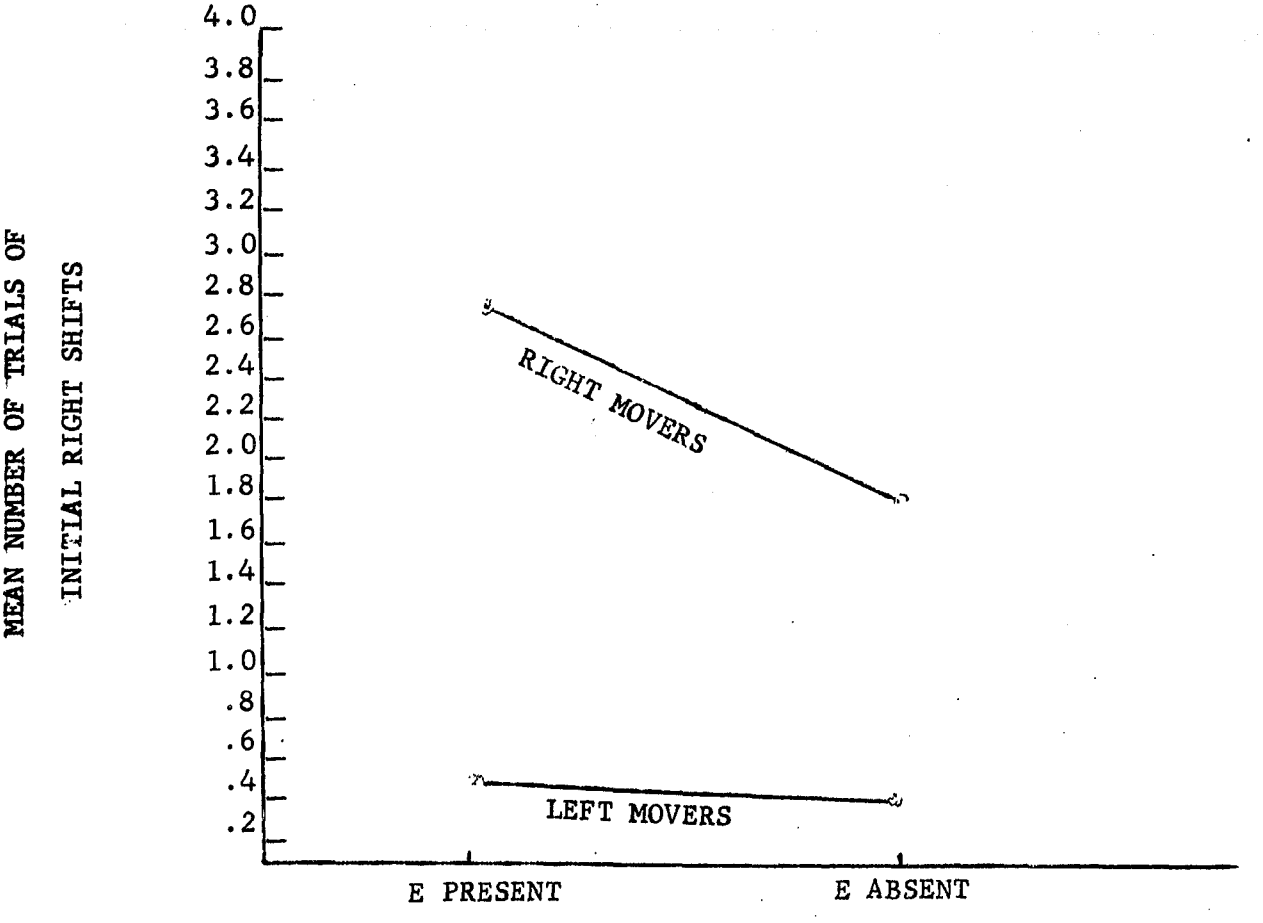


FIGURE 4

movers make more left shifts than when E is present.

In all cases, left movers move more to the left than right movers and right movers move more to the right than left movers. This is a function of the classification system used.

In general, these results support the cognitive-affective model to the extent that it is more likely a shift away from E in a subject's preferred direction when E is present will take place. When there is no E, subjects do not need to shift their gaze as often. The reader should keep in mind that the interaction results reflect that E's presence is more distracting to both groups when they are processing memory searches. Both groups shift more in their directional preference initially with the task of extended search questions rather than the task of minimal search questions.

Number of No Shifts (Average for Pooling of Four Questions)

Table 4 presents the results of the analysis of variance, weighted means solution for initial no eye-movement made as the dependent variable. There is no difference between right and left movers in overall tendency not to shift their eyes while processing information. There is a very substantial significant difference not to shift on extended and minimal search questions (means are .42 for extended search questions and 1.79 for minimal search questions). Failure to shift occurs four times as frequently on minimal search questions than on extended search questions. Similarly, the failure to shift is much more frequent in experimenter's absence for both groups. (Means for experimenter present is .85 but for experimenter absent the mean no shifts is 1.36). All other main effects and interactions were not significant.

TABLE 4

WEIGHTED ANALYSIS OF VARIANCE FOR

NUMBER OF INITIAL NO SHIFTS

Source	SS	df	MS	F	P
Between Subjects	(110.98)	(41)			
A=Dominant direction	.02	1	.02	.01	NS
SS/Groups	110.96	40	2.77		
Within Subjects	(368.38)	(294)			
B=Extended Minimal	158.81	1	158.81	186.99	.001*
BA	1.34	1	1.34	1.58	NS
B SS/Group	33.97	40	.85		
C=Painting on Left/Right Wall	.07	1	.07	.15	NS
CA	1.01	1	1.01	2.06	NS
C SS/Group	19.54	40	.49		
D=E Present/No E	21.50	1	21.50	21.99	.001*
DA	.01	1	.01	.01	NS
D SS/Group	39.12	40	.98		
BC	.00	1	.00	.01	NS
BCA	.02	1	.02	.06	NS
BC SS/Group	17.10	40	.43		
BD	.50	1	.50	.57	NS
BDA	.02	1	.02	.03	NS
BD SS/Group	35.60	40	.90		
CD	.24	1	.24	.45	NS
CDA	-.00	1	-.00		
CD SS/Group	21.38	40	.53		
BCD	.00	1	.00	.01	NS
BCDA	.15	1	.15	.33	NS
BCD SS/Group	17.97	40	.45		
Total	479.35	335			

*Significant

NS=Not Significant

Analysis of Variance on Frequency as Dependent Variable

The measure used for the analysis on frequency is the number of shifts made while a subject is processing an answer, regardless of the direction of the shifts made. This included the first eye-movement and all subsequent ones before a subject began to verbalize his response.

Weighted Means Analysis of Variance for Number of Shifts

Table 5 has the summary of the analysis of variance of the independent variables with frequency of shifts as the dependent variable. There was one very significant effect which was due to the difference between extended and minimal search questions. There were many more shifts for extended search questions (10.44) than for minimal search questions (mean of 3.93).

In summary, the analyses of variance demonstrate a significant effect for the dimension of questions, there being more shifts regardless of direction for extended search questions than for minimal search questions. There were more shifts in directional preference when the experimenter was present than when the experimenter was absent. Thus, interactions between the dominant direction of the groups and these dependent variables were significant. There were no picture effects that were significant, nor an overall difference in frequency of shifts for the two groups.

Specifically in reference to the hypotheses proposed, the analyses of variance used to test each prediction will now be stated with the results.

Bakan's model allows for the prediction that direction of eye-movement will remain unchanged by environmental influences i.e. experimenter present or absent; picture on left or right wall.

TABLE 5

WEIGHTED ANALYSIS OF VARIANCE FOR NUMBER OF SHIFTS

REGARDLESS OF DIRECTION

Source	SS	df	MS	F	P
Between Subjects	(3149.56)	(41)			
A=Dominant direction	6.09	1	6.09	.08	NS
SS/Groups	3143.47	40	78.59		
Within Subjects	(9751.00)	(294)			
B=Extended-Minimal Search Questions	3562.00	1	3562.00	101.46	.001*
BA	22.16	1	22.16	.63	NS
B SS/Group	1404.34	40	35.11		
C=Painting on Left/Right Wall	10.00	1	10.00	.65	NS
CA	.11	1	.11	.01	NS
C SS/Group	617.89	40	15.45		
D=E Present/No E	8.67	1	8.67	.35	NS
DA	10.50	1	10.50	.43	NS
D SS/Group	981.83	40	24.55		
BC	3.46	1	3.46	.19	NS
BCA	8.13	1	8.13	.44	NS
BC SS/Group	744.91	40	18.62		
BD	4.31	1	4.31	.28	NS
BDA	.00	1	.00	.00	NS
BD SS/Group	622.18	40	15.55		
CD	.32	1	.32	.02	NS
CDA	34.37	1	34.37	1.78	NS
CD SS/Group	771.32	40	19.28		
BCD	18.07	1	18.07	.81	NS
BCDA	33.50	1	33.50	1.50	NS
BCD SS/Group	892.93	40	22.32		
Total	12900.56	335			

*Significant

NS=Not Significant

Specifically, left eye movers should show this consistent eye-movement direction across all conditions when reflection is called for and right eye movers should show this consistent eye-movement direction across all conditions when reflection is called for. The dominant direction and experimenter present/absent interaction was significant. Subjects moved more in their dominant direction and there was no difference in their non-dominant direction. Therefore, this prediction is supported by the data.

Cognitive or information processing model allows for the prediction that a person will move his eyes in an opposite direction of where the painting is hanging when processing extended search questions but will not shift his eyes in an opposite direction of where the painting is hanging when processing minimal search questions. No painting effects were significant in all four analyses of variance. Therefore, the predictions made with reference to this model were not supported by the present study's data.

Cognitive-Affective model holds that the face will be a complex and competing stimulus source and a shift away from the interviewer will take place when reflection is called for. The extended/minimal search question effects in the anslyses of variance on number of shifts support this hypothesis. The second hypothesis was that shifting away from the interviewer would be greater when the interviewer was present and less shifting away would take place when the interviewer was absent. The experimenter present/no E effects in the analysis of number of initial directional shifts supports this hypothesis.

The Activation or Arousal model holds that the greater the search effort, the greater the number of shifts across groups and all other

conditions except extended and minimal search questions. The extended/minimal search questions effects in the analysis on frequency of shifts regardless of direction supports this hypothesis. The prediction that no consistent eye-movement direction would occur was not upheld since subjects did consistently move in their dominant direction. This model cannot account for the directionality consistency in gaze shift.

Correlation Analysis (All 48 subjects were used in this analysis)

The variables of future planning imagery questions and emotionally charged present imagery questions, inner acceptance vs. inner rejection and field independence and dependence were tested in a correlation matrix. The hypotheses proposed related these variables to single other variables. Subsidiary findings of correlations not hypothesized, although significant, are suggestive and need replication. They are to be taken cautiously, because by chance alone because so many correlations were done they might have turned up significant.

Inner Acceptant vs. Inner Rejectant

Table 6 gives all the correlations of this personality dimension of inner acceptant vs. inner rejectant styles of functioning with regard to ~~internal~~ thoughts and images. The reader is referred to Appendix B for the manner in which this information was coded. (See Appendix D for means and standard deviations of the R-S, IPI and RFT.)

The positive, significant correlation of .42 ($p < .01$) between rating of vividness of an image on the eight questions posed during the interview and inner acceptance/rejection reveals that the more vivid an image was rated by a subject (eight times), the more likely he was in the inner acceptant group. The lower the image vividness for the person, the more likely he was inner rejectant.

TABLE 6

CORRELATIONS OF INNER ACCEPTANCE

AND INNER REJECTION VARIABLE

WITH OTHER MEASURES

Other Measures	Correlation	P (Two Tailed Test)
Vividness of Imagery Rating	.42	.01*
Dominant direction all items	-.34	.01*
Warm color preference	.03	NS
Number of errors	.24	NS
Field dependence-independence	-.04	NS
Dominant direction reflection items	-.26	NS

*Significant

NS=Not Significant

The negative correlation between inner acceptance and inner rejection and the dominant direction on all questions of .34 reflects that the more inner acceptant a person is the more likely he is to be a left mover and the more inner rejectant a person is the more likely he is to be a right mover. (Right mover is indicated by a high score and left mover is indicated by a low score for directionality vs. a high score for inner acceptance and a low score for inner rejection).

The significant correlations found on number of shifts when the experimenter was present, the painting was on the left and a future planning question was asked is suggestive and needs replication, ($r = .32$, $p < .01$). The significant correlation between number of shifts, on future planning questions when the experimenter was absent and the painting was on the right wall, suggests that the inner acceptant person made more shifts than the inner rejectant person, ($r = .31$, $p < .05$). These correlations by chance alone may have been significant. Analysis of the content of answers is important to clarify whether these suggestive correlations reveal fruitful future avenues of study.

Qualitative Analysis of Content of Answers to Questions

The suggestive finding that inner acceptant people seem to look away from E's face or a focal point may represent shyness. More likely, in analyzing qualitatively the content of responses, this may show that inner acceptant subjects were matching their question against a great variety of long term memory information while inner rejectant subjects were more prone to give cursory responses. Broadbent's terminology would call the style of the inner acceptant person "long sampling" and the style of the inner rejectant person "short sampling." The inner

acceptant subjects shifted more when E was present but also produced more detailed or imaginative responses. The inner rejectant person gave more cliche or automized answers implying "short sampling." They do not seem to take the trouble to do an exhaustive search which would take up channel space and force them in most cases to look away from the face of E.

Descriptions given by raters of subjects in the inner acceptant group were markedly different from descriptions of subjects in the inner rejectant group. No knowledge of which group the subject was in was available to raters. Twenty out of 24 inner rejectant subjects' responses were described as follows: "succinct, little playfulness or pleasure in imaging was revealed by short verbalization." Examples are: "My favorite elementary school teacher was a nun. She was strict."; "In the future if I could become invisible, I'd do nothing."; "I don't know what I'd do if I could be invisible."; "I never thought about being invisible."; "My earliest memory was at the age of 3. I can't describe it."; "If I won the lottery I'd spend the money lavishly."

In contrast, inner acceptant subjects (15 out of 24) were prone to give elaborate answers. Raters described them, again without knowledge of which group the subject was in, as "expressive, emotionally responsive, seems to find pleasure in memories." Examples are: "The color of my first bike was red. I can remember the first time I tried to ride it. I thought everyone knew it was my first time. I was scared but I wobbled by all the gazing eyes and within a few hours I was riding with my head in the air. It felt great." It can be recalled that the question only asked for the color of the person's first bike. When one subject was asked for the number of rooms in his

house, he responded with "If I could close my eyes I could get a crystal clear image of my house. Well, let me see,"(the subject's eyes seemed to be scanning his house, moving from room to room). Long sampling is significantly associated with the inner acceptant group. Short sampling is significantly associated with the inner rejectant group (Chi square = 12.72, df = 1, $p < .001$). This needs replication since it is based on qualitative descriptions by raters.

With reference to the hypotheses proposed about inner acceptance and inner rejection, the correlations reveal the following:

If Bakan's model is to be supported then left movers would be more likely to be inner acceptant than right movers who would be more likely to be inner rejectant. This is supported. If the cognitive-affective model is to hold then an inner acceptant person should shift away from the interviewer more than an inner rejectant person. This was suggested by the correlation on future questions when the interviewer was present, the inner acceptant person made a greater number of shifts than the inner rejectant person. It needs replication. The inner acceptant person, by the qualitative analysis, may be trying to process more complex material or be more interested in getting a vivid image and therefore may shift away from the face more than an inner rejectant person. The inner acceptant person seemed to block out the experimenter more than the inner rejectant person.

Inner acceptant and inner rejectant groups did not differ on extended search or minimal search or emotionally charged present imagery questions. Inner acceptance and inner rejection was not related to warm color preference, number of errors made or field-dependence and independence.

Field-dependence and independence

Table 7 presents the correlations of the cognitive differentiation dimension with other measures relevant to the present study. The more field independent a person is the fewer the number of shifts he makes on extended search questions, when the experimenter is present and the painting is on the right wall, ($r = -.29$, $p < .05$). This is suggestive only as is the relationship between FI and FD and number of shifts for emotionally charged present imagery questions, when the experimenter was present and the painting was on the left wall, ($r = -.36$, $p < .01$). Replication is necessary. This suggests that a field independent person may be processing internal material by gating out the E's face therefore being less field dependent. The field independent, inner acceptant person may shift less than the field dependent, inner acceptant person. This suggests that the field-independent, inner acceptant person might be able to use other mechanisms for gating out the face of another person in order to process extended search questions. Or, these correlations may suggest that the field-independent, inner acceptant person is less concerned with the nuances of another's face than the field dependent person. This is certainly worthy of further investigation. Since these high correlations may have occurred by chance, they must be considered tentatively and with caution.

Left Movers and Right Movers

Table 8 presents all the correlations of this dimension of dominant direction of first eye-movement shift when a person is responding to questions that draw on long term well established

TABLE 7

CORRELATIONS OF THE FIELD INDEPENDENCE

AND DEPENDENCE VARIABLE WITH OTHER MEASURES

Other Measures	Correlations	P (Two Tailed Test)
Dominant direction all items	.01	NS
Dominant direction reflection items	.03	NS
Inner Acceptance-Inner Rejection	-.04	NS

*Significant

NS=Not Significant

TABLE 8

CORRELATIONS OF LEFT MOVERS

AND RIGHT MOVERS WITH OTHER MEASURES

Other Measures	Correlation		P (Two Tailed Test)
R-S score	-.42	(-.35)	.01*
IPI score	-.28	(-.21)	.06*
Rod and Frame score	-.22	(-.22)	NS
Warm Color Preference	.18	(.13)	NS
Vividness of Imagery Rating	.15	(.18)	NS
Dominant direction reflection items	.96		.01*
Inner Acceptance-Inner Rejection	-.34	(-.26)	.01*

*Significant

NS=Not Significant

Note: Correlations in parentheses are for dominant direction reflection items and other variables listed. The others are for dominant direction on all items.

material, easily retrievable information, future planning imagery and emotionally charged present imagery. Subjects were classified on the basis of at least 60 per cent of their first eye-movements being in the same direction on all items as well as on items that only called for reflection. Only 3 subjects scored neither direction on all items but on reflection items reached the 60 per cent criterion. They were put in the left mover or right mover group on the basis of reflection items only. Six subjects remained unclassifiable. However, the correlation to be most accurate was run on all 48 subjects. It can be seen from the table that there was a significant negative correlation on left and right dominant direction for all items and the R-S score. The more a person is a right mover, the more likely he will score low or on the repression end of the R-S scale. The correlation between dominant direction on all items and the IPI did reach significance. The direction shows that the more a person is a right mover, the more likely he will score lower on the IPI and be less of a daydreamer than a left mover. The dominant direction on all items was highly significantly correlated with the dominant direction on reflection items only. Left movers significantly fell into the inner acceptant group and right movers significantly fell into the inner rejectant group. There were 17 people out of 24 that were right movers and inner rejectant. There were 10 people out of 24 that were left movers and inner acceptant.

The left mover and right mover dimension on reflection items only show slightly lower correlations than when all items were taken into account but the significance and directions were identical.

If Bakan's model holds then left movers would be more likely to

be inner acceptant than right movers who would be more likely to be inner rejectant. This is supported. The left movers should prefer warm colors. It can be recalled that warm colors were reds and yellows whereas cool colors were blues and greens. One of the questions posed to subjects was "What is your favorite color?" These responses were coded. (See Appendix D). The trend was in this direction but was not significant. Left movers should have more vivid imagery than right movers. The reverse occurred but this relationship did not reach significance. Field independence seemed to be correlated with right movers but this also was not significant.

Correlated t test

The one hypothesis not answered by the other analyses is that if the activation or arousal model holds then emotionally charged imagery questions and future planning imagery questions should produce more shifting than the easily retrieved material. See Table 9 for the sum of the means from the correlation matrix. It can be seen immediately that future planning questions which were the most complex since they required both searching long term memory systems and re-arranging the information in a new form required on the average many more shifts (Σ means 36.6) as opposed to approximately half as many on the minimal search questions (Σ means 15.7). The emotionally charged present imagery questions required slightly more shifts than the minimal search questions but not as many as the future planning questions (Σ means 18.7). The extended search questions required the most amount of shifting (Σ means 41.1). The statistical test ($t = 1.74$, df 3) between minimal search and future questions did not reach significance but the trend is in the direction predicted. Since

TABLE 9

MEANS AND STANDARD DEVIATIONS FOR

NUMBER OF SHIFTS ON MINIMAL SEARCH,

FUTURE, PRESENT, AND EXTENDED SEARCH QUESTIONS

Question Dimension	Mean	Standard Deviation
Extended Search		
E/painting left	9.3	5.7
No E/painting left	10.4	7.4
E/painting right	10.7	6.4
No E/painting right	10.6	6.4
SUM	41.1	
Minimal Search		
E/painting left	3.9	2.5
No E/painting left	3.6	3.5
E/painting right	3.8	4.2
No E/painting right	4.4	4.3
SUM	15.7	
Future Planning		
E/painting left	10.8	10.2
No E/painting left	8.2	6.2
E/painting right	9.0	8.3
No E/painting right	8.8	7.7
SUM	36.6	
Present Imagery		
E/painting left	5.2	3.3
No E/painting left	4.1	3.9
E/painting right	5.0	3.0
No E/painting right	4.4	4.0
SUM	18.7	

this test did not reach significance, and in the analysis of variance on number of shifts for extended vs. minimal search questions the effect was significant, the other comparisons would also have been in the predicted direction but would not have reached significance. Amount of time a subject spends in processing information may be related to frequency of shifts he made. This needs to be studied in future research.

Summary of Results

Replication of Bakan's results showed that his 1969 study was replicated in consistency of lateral eye-movement direction. However, on the one rating of imagery question, higher vividness of imagery rating on this one question was not associated with left movers.

Extension of Bakan's model: Direction of eye-movement did remain unchanged by environmental influences. Left movers showed this consistent eye-movement direction across all conditions when reflection was called for and right eye movers showed this consistent eye-movement direction across all conditions when reflection was called for. The experimenter's absence affected right movers more (See p. 44-46). Left movers were more likely to be inner acceptant than right movers, who tended to be more inner rejectant. Left movers did not prefer warm colors and did not show more vivid imagery than right movers. Field independence was not correlated with either left or right movers.

Cognitive or Information Processing Model: A person did not move his eyes in an opposite direction of where the painting was hanging when processing complex, extended search questions. A person did not keep his eyes in the same direction of the picture when processing simple, minimal search questions.

The Cognitive-Affective Model: The face is a complex and

competing stimulus source and a shift away from the interviewer did take place when reflection was called for. Shifting was greater when the interviewer was present than when the interviewer was not present. The inner acceptant person did shift away from the interviewer more on future questions than the inner rejectant person.

Qualitatively, the inner rejectant person gave cliché and/or succinct responses whereas the inner acceptant person seemed to do a more exhaustive search. These findings are suggestive and need replication. Is "channel space" taken up by exhaustive searches done by an inner acceptant which may produce more shifting away from E's face or a focal point? The inner rejectant and inner acceptant person did not differ in shifting frequency on minimal search questions.

The Activation or Arousal Model: This model was supported because the greater search effort demanded by extended search questions produced a greater number of shifts across groups and conditions. The model was supported in that questions demanding more complex searches of the long term storage memory system were more demanding a task than obtaining easily retrieved material. However, no consistent eye-movement direction should have occurred. That it did occur, points to the weakness of this activation theory for predicting the specific consistent directionality effect. It cannot explain this behavior since high arousal should produce inconsistent eye-movement direction because of the intensity of the effort.

The main findings of the study are as follows:

MAIN FINDINGS

REPLICATION FINDINGS

BAKAN'S RESULTS	PRESENT STUDY'S RESULTS
Consistent direction of 1st lateral eye-movement during reflection in a face-to-face situation.	Replicated
Left movers rate the image of a man crying as more vivid than right movers.	Left movers did not rate the image of a man crying as more vivid than right movers

EXTENSION OF BAKAN'S STUDY - TEST OF ALTERNATIVE MODELS

I. Functional Asymmetry of the Brain Model was supported.

1. Ss moved their eyes in a consistent direction when reflecting.

2. Right movers tended to be inner rejectant. Left movers tended to be inner acceptant.

3. Inner acceptant Ss rated their imagery as more vivid than inner rejectant Ss.

II. Cognitive-Affective Model was supported.

1. Ss shifted their eyes in their directional preference which was away from E.

2. Right movers shifted to the left more when E was absent than when E was present.

3. Ss shifted their gaze more during extended searches than during minimal searches.

III. Activation or Arousal Model was partially supported.

1. Ss shifted their eyes more frequently regardless of direction during extended searches than during minimal searches.

2. There was a consistent direction effect which does not support the activation notion.

IV. The Cognitive Model was not supported. The painting did not influence shift in eye gaze. The cognitive model would probably have been supported if a higher-information load stimulus field had been employed.

CHAPTER IV

DISCUSSION

Daydreaming and the Right Hemisphere

Bakan asks if daydreaming could be associated to a greater extent with the functioning of the right hemisphere. From the results of the present study, the answer seems to be that since right movers are predominantly inner rejectant of their internal train of thoughts, the left hemisphere is associated to a lesser extent with daydreaming and retrieval of long term memories. The right mover adapts to his environment rationally and objectively. He is not in a world of subjective inner experiences. Repression and denial are used in service of reality issues and functions. His focus is on external sources of information and he has low familiarity with daydreaming. His alertness to changes in the environment, in the present study, to the presence of another person, was sufficiently distracting for right movers to abandon memory searches of an imaginative and/or thought provoking nature. This showed up in right movers initially shifting sometimes to the left when the interviewer was absent. With this "obstacle" removed the right mover searches his mind, i.e. daydreaming in the right hemisphere. The experimenter's presence seemed to affect left movers more than right movers. Left movers shifted more to the left when the experimenter was present than when he was absent. It would seem that left movers do more of a search because they respect their internal lives more than right movers, therefore the effect of extended search questions was greater than for minimal search questions.

Possibly, then, the right hemisphere stores long term information of the nature of daydreaming, fantasies and reminiscences.

Personality Styles and Information Processing

If left movers are governed in their psychological functioning by the right hemisphere, they would also be inner acceptant according to the results of the present study. Therefore, they more willingly sample various stored information considering alternatives and would be what Broadbent would consider a "long processor." The implication is that a search within the right hemisphere takes place if daydream-like information is called for. We know from the study that people who have a rich inner life, and enjoy searching their long term memory system manifest processing of information by shifting their gaze to the left. It would seem that the left looker would tend to daydream more in his daily life though it be full of environmental distractions. The right looker, in the study shifted to the left on extended search questions when the experimenter was absent more than when the experimenter was in the room. The right mover scans his long term memory, processing, only, the necessary information, and is not as willing to search his long term memory as much as the left looker when the external environment distracts him. He would be a "short sampler" searching for the most available response (Broadbent's terminology is used here). He pays more attention to the external world and its changes. Therefore, the right looker would seem to pay maximal attention to the face of another and be less inclined to daydream. Mobbs (1968) found that extraverts cathect the outer world and desire social approval. In contrast, the introvert, who is primarily interested in his inner world, does not need so much feedback

as to how others are receiving him, whether the channel of communication is open and look less at another person. It would seem that the right mover tends toward extraversion while the left mover tends toward introversion. A further study is necessary to determine how strong this relationship is. Exline and Messick (1967) found that with the absence of verbal reinforcement, the amount a person looks at another reflects the extent to which he is on the lookout for information from them. Since the right looker is more usually on the look-out rather than look-in, the interviewer's high information load, inhibited him from searching long term memory even though he does not do this with acceptance usually.

For left movers, the face of another is somewhat distracting, but their skill and ease of functioning "within two realities at the same time" as one subject reported, is less disturbed or affected by the experimenter's presence or absence. Thus, for both right movers and left movers more initial shifts in either right or left direction occur when another person is present. This means that for both groups on both extended and minimal memory searches, the face of the other person may be blocked out. It carries information about emotions and is a complex, heavily loaded, informational stimulus source. However, for both groups, there is a greater need to block out the interviewer's face on extended processing tasks than on minimal processing tasks. The extended search effort produces a greater number of shifts than minimal memory searches.

The amount of arousal a task demands showed by frequency of shifting reveals that it is less effortful to retrieve readily factually available information than long term memory material. It

would seem that the effect of another person makes the search task a higher or lower information load task depending on the habitual or personality characteristics of the individual. For the left mover, with another person present, searching his long term memory remains about as effortful as with no one else present. Amount of time subjects take to process information was variable. Frequency of shifts may show a relationship between extended searches and more frequent shifts as well as more time needed to process an answer. Future research is necessary.

The trend of left movers having more shifts to the left on extended search questions and right movers having more shifts to the right on extended search questions may indicate that the left lookers are more accepting of extensive long term memory searches than are right lookers. With the experimenter absent, there is a great increase in left and right shifts for right movers. Right movers seem to allow themselves to focus on inner processes momentarily, without external distractions, but it is of lower value in their hierarchy than for a left mover.

Both groups do not need a shift in order to recall minimal search material. This is supported by the study's findings that both groups have equal amounts of no shifts under all conditions and no shift responses occur more frequently for minimal search questions than for extended search questions. The few no shift responses occurring for extended search questions may indicate that for some individuals some of the extended search questions were easily retrieved from their memory banks. Failure to shift is much more frequent in the experimenter's absence for both groups. This may indicate that less shifts of attention away from external stimulation are necessary when

there is less environmental stimulation. A shift is not always necessary in order to retrieve information. Change of focus is necessary if compelling environmental visual stimulation interferes with channel space available. The painting had no effect because it would seem not to have had a compelling visual stimulation quality. A more stimulating environment with lights going on and off, a T.V. set on, and many paintings on the walls, may interfere more with inner processing and the same results might occur as did with the experimenter's presence. A future study utilizing such compelling stimulation may be able to confirm if inner processing can be interfered with by external environmental changes regardless of inner acceptance or rejection.

Cognitive-Affective Framework

"An increase in the rate of operating on either internal or external channels leads to a reduction in the rate of operating on the alternate channel. When the information rate is high enough one presumably cannot, except under very special circumstances, process the information in parallel fashion." (Singer, 1971, p.2.) The face of another human being carries a high information load and when internal processing occurs, this external source of information must be blocked out, i.e. shift in gaze away from the source of high information. When the task demands long term information retrieval, external stimulation of high information load will be gated out. Some central system can inhibit in various ways the processing of new information through the eyes in order to maintain a balance of processing material from long term storage and short term storage. The frequency of shifting increases with the amount of search effort. The direction of the first shift is consistently to the right or left implicating that the brain

has a dual dominance depending on the personality of the individual. The gating out of external stimulation is greater whenever the individual is required to engage in a long term memory operation (such as imagery, future planning, reminiscenses) than in a simple memory task (such as a recall of repetitive, well-established information as one's name or age.) A reduction in visual stimulation is necessary to produce gating out for the processing of extended search material whereas for the processing of minimal search material higher visual awareness is maintained by allowing the admission of certain types of external stimulation while gating out others, i.e. the painting but not another's face. One, when looking with the mind's eye, shifts the real eye's focus. (Singer, 1971.)

Izard, (1971) thinks the emotions, unlike sensation, perception, thought and memory have a public aspect, the primary form of which is facial expression. This study strongly suggests that thought and memory may also have a public aspect or representation. This public representation of ongoing reflective thought may be demonstrated by direction of shift of gaze. It may obviously also interact with personality type in determining the likelihood of a shift away from the face of another and also in indicating the direction of that shift.

Implications of This Study for Theory

After one reviews the data supporting the various models, one can see that the activation hypothesis as measured by eye-movement frequency seems to be weaker than the other models because the activiation hypothesis cannot account for the directionality consistency found. Activation is too general a notion and it does not allow for the prediction of the very specific left or right eye-movement phenomenon. Bakan's model does allow for this consistent direction effect. However,

his model does not explain why eye-movements should increase when another person is present or why a right mover will shift to the left when another person is not present. The only model that does predict the influence of another person on internal thought processing as measured by shift in gaze, is the cognitive-affective model. This model explains the communication impact of the face in terms of channel space. Staring at the face of another person will limit channel space for complex, extended memory searches or fantasy.

Since eye-movement direction on the first shift in gaze, would appear to be constitutional and modifiable by personality and environmental factors, Bakan's model is the stepping-stone for classification but it is the cognitive-affective model which is the strongest in pinning down processes rather than structures. Gating out of external stimulation is necessary to process extended memory searches. The cognitive-affective theory is flexible and allows for the integration of personality factors with the processes of fantasy and their relation to the processes of attention. Shifts in focus can be predicted if we know whether the person is familiar with his internal train of thought, which hemisphere of his brain is dominant and the task he is called upon to perform in the presence or absence of other human beings. It is clear that for certain cognitive activities that emphasize memories, complex, past-well established material and fantasy processes, subjects, who are awake and confronted in a dyadic situation with something of high information load capacity, will eliminate the effect of the stimulus with high information load by shifting eye-movements in order to attend to internally generated material.

Implications of This Study for Clinical Practice

The nature of human personality may be better understood in terms of the dimension of the capacity for internal experience. "Individuals differ in self-awareness, imagery available, interest in or capacity to report fantasy, freedom from dependence on the stimulation of the environment so as to look inward, and fear or suspicion of internally-generated material." (Singer, 1971, p. 85). The determination of whether a person is a right or a left mover can initially enable a psychologist to have some very tenable working hypotheses regarding the acceptance or rejection of inner experiences of the people he is studying.

Further, if a psychologist wishes to explore daydreaming and fantasy processes, the knowledge that eye-movents increase when a person is confronted with the high stimulus qualities of a human face would necessitate the elimination of anything they might take up channel space and interfere with an individual's reporting of fantasy and other internally generated material. The psychologist's approach would therefore be determined in large part by initial screening of left and right movers. For example, if the psychologist assesses that a person is a right mover, he could reasonably assume that the person has a tendency towards inner rejection and will in all likelihood focus on the external environment as a means of avoiding internally generated material. In the case of a left mover, the tendency towards inner acceptance in its extreme form may be absorption in his own thoughts to the exclusion of interpersonal contact. The capacity for dwelling with positive satisfaction, as one subject described,

"I use daydreaming to shift my moods, like when I'm miserable about something, I just think of a pleasant image and my mood changes. I'm very different from my sister who dwells on sad things and can't seem to get herself out of it," opens up the whole relationship of affect and cognitive processing. The cognitive-affective theory is the framework from which to generate hypotheses.

The changes a patient may make from total self-absorption to interpersonally relating to the world may be charted by any change in consistent eye-movement direction. If the person is not capable of delayed recall it will show up in the lack of consistent eye-movements. Day (1967) found that schizophrenics who became less narcissistic began to have these consistent eye-movements whereas when self-absorbed there was little consistency in eye-movement directionality. Selective inattention becomes important in a cognitive sense in understanding a person's ability to reflect or deny internal experiences. The skill of daydreaming is important in the development of self-expression and in dyadic relationships. The implications of this research may be examined in two brief analyses of one left mover-inner acceptant S and the contrast with a right mover-inner rejectant S.

Mr. P. was casually dressed in a colorful, open-collared shirt, vest and matching pants. His wavy hair was shoulder length and well-kempt. Mr. P. is a tall (6'), lean (140 lbs.) young man of 20 years of age. He gives one the impression of an intense, serious young man who at the same time can relax, smile freely and warmly, and enjoy with a great deal of pleasure relating to others as well as allowing himself to know what internally-generated material he is producing.

Mr. P. was born in Puerto Rico, and came to the United States when he was 3 years old, with his parents and his brother and sister.

During the interview, Mr. P. took a relatively long time in responding, thinking out his answers carefully, ruminating about alternatives, emotionally responsive to the impact of the questions, the surroundings and the interviewer. He kept his gaze on the interviewer while the questions were posed, but while processing an answer, he gazed away from the interviewer, usually to the left. He did not shift his eyes a great deal while he was formulating an answer but rather seemed to hold a steadfast gaze on the blankest field he could find, usually the ceiling or the floor.

Cognitively, Mr. P. is field-independent and displays a "long sampler" style. He is articulate and matches his responses against alternatives from his long term memory storage system. He does not usually accept easily available information but rather chooses to search his memory store further. Therefore, when orienting towards his internal environment he eliminates external stimulation by shifting his gaze relying on internal frames of reference. When imaging, he tries very hard to "see" the image, being honest about how clearly he can see the image. When processing information that requires sampling of past, well-established material and introducing new ideas, he states with acceptance of himself, "This is going to take time." He then sits back comfortably in his chair to think out an answer.

Emotionally responsive, Mr. P's facial expressions usually reflected the affective impact of the question. Sadness and happiness are readily displayed. Anger is less well realized for him and images

of an angry mob and a bloody nose are not allowed as clear visualization as a man and/or woman crying. In his responses to several questions, personal contact was emphasized. Knowing what others need, feel and desire was of significance to him so that he might establish fruitful relationships without losing his own identity. His earliest memory was of walking down the hall in his home in Puerto Rico, seeing his mother in a chair in the living room and walking towards her. His favorite elementary school teacher is described vividly as a dark haired, tall, dark-eyed woman with red lipstick. His father is described as generous with money, whenever Mr. P. needed money. He is interested in individual differences and would teach or represent these differences by getting to know each individual. He enjoyed imagining what he would do if he could be invisible. In more structured, analytic tasks, he found the tasks rather difficult, and often erred, smiling as if he accepted his dislike for the task but was trying.

Mr. P. seemed to have a rich, subjective internal life, accepting inner impulses, using inner and outer reality as sources of information. He has vivid imagery and likes to daydream. He may use intellectualization as a defense, being a sensitizer. He is a left mover making use of imagery and tending toward synthetic, concrete and spatial thought processes. Mr. P. is characteristically emotional, subjective and passive. He is relaxed and sociable.

Mr. C. was conservatively dressed in a solid colored, open-collard shirt with dark pants. His hair was short and close-cropped. Mr. C. is 5'8" tall and weighs 148 lbs. Mr. C. appears cooperative, serious, and business-like. The willingness with which he approached

the interview was with a determined attitude to get the tasks done with as much precision and sureness as possible. He was straightforward, succinct, and articulate.

During the interview, Mr. C. took a relatively short time in responding with the most easily retrieved memory material that came into his mind. He kept his gaze on the interviewer and shifted slightly away towards the right usually.

Cognitively, Mr. C. is field-independent and displays a "short sampler" style. He gives short, unimaginative but accurate responses. When imaging, he quickly assesses the vividness of the image, but he gives the impression of not capturing the fullness of the image but rather a glimpse of it. He is very adept at analytic tasks and seems to find pleasure in being able to do such tasks quickly and corrently.

Emotionally, he seems more comfortable with feelings of anger but less comfortable with sadness. He is able to get "slight images, nothing very clear." His earliest memory was at 5 years old but he did not describe it. He is ordered, clear, and succinct in his other responses. Some of his responses were so succinct and undescriptive, that one knew he'd get the task done in as swift and parsimonious a manner as possible. For example, he supposes he'd spend his lottery winnings on luxury items. In response to the question about Oswald, Mr. C. said, "Lee Harvey Oswald was taken out of prison and was shot in the stomach." If Mr. C. was president, he'd unite the people to see one another's views. When asked, "What makes you smile?", Mr. C. responded, "Anything that pleases me."

One is left with the impression that Mr. C. would be cooperative in answering questions but many questions would need to be posed in

order to obtain a fuller understanding of the depth of his personality. A model airplane was his favorite toy. The pleasure in analyzing, putting together little parts to form an unembellished fine product would seem to describe Mr. C's relationship to his internally-generated material as well as his relationships to others.

Mr. C. seemed to de-emphasize the life of the mind and was ideationally limited to realistic flights of fancy. He would seem to use denial as a defense being less inner acceptant and more verbal and logical in his thought processes than Mr. P. He is characteristically rational and objective.

With a cognitive-affective model, psychologists may better understand and plan out in ordered fashion, the best way to search out and pin down reflective and fantasy processes within personality and the relationship of such internal processing to selective attention.

Suggestions for Further Research

Limitations of Present Study

Male subjects were used therefore excluding valuable information on female subjects. Questions may be re-grouped according to verbal, quantitative and spatial thought within extended vs. minimal search dimensions in order to investigate direction of eye-shift and the more specific task-demands. Data on subjects who showed no directional preference should be analyzed and not discarded. Even more refined millimeter measurements of distance of eye-movements should be taken into account as well as angle of regard. Analysis of word count and a rating system of content of responses may reveal differences in responses between groups.

More specifically, in this study, the Breughel painting "Repas

de Noce" did not provide enough of a stimulus-pull because even though it has many characters involved in varied activities, it did not seem to hold the attention of subjects. They noticed its positional change rather than the innate interest of the painting itself. It seems that the next step in this research would be the use of a more compelling and competitive visual stimulus to determine if the same channel space hypothesis holds.

The same study should be repeated with female subjects because in pilot work, females tended to be left movers. However, Duke (1968) found no sex differences. A study of this nature would determine if males as a group are both right and left movers, whereas females tend toward more inner acceptance as a group. Can women have more training in the development of daydreaming, i.e. right hemispheric functioning?

Additional questions that need to be answered through further experimentation are:

1. Would field independent-inner acceptant people gate out E's face more than field dependent-inner acceptant people when processing internal material? These groups of Ss should be interviewed using extended search questions. Shift in gaze away from interviewer should be noted and differences between groups analyzed.

2. How does facial expression in a dyadic situation affect daydreaming and fantasy processes and changes in focus of attention as revealed through eye-movements? An E should in a controlled manner change his expression from a blank expression to a smile and then to a frown while asking questions. Analysis of eye-movements might reveal differences.

3. Can norms for left and right movers and inner acceptance and

rejection be established to help identify diagnosis? Large numbers of subjects should be tested using the measures in the present study and scores arranged along a normative distribution with standard scores.

4. Would eye-movement direction change as a person becomes more inner acceptant and less inner rejectant or vice versa? This may be assessed in a controlled before and after session using some imagery exploration technique.

5. Can training of eye-movement, much like alpha training, take place? Ss who are right or left movers may be instructed to look in the opposite of their directional preference and the effects of this appraised through extended search question responses.

6. If amount of time is held constant for the span of processing, what effects might this have? Right and left movers should have a free time and a 3 second interval to process an answer to extended search vs. minimal search questions. Content of responses and number of shifts should be analyzed, under the different time intervals.

7. What relationship might exist between first lateral saccade and the direction of the saccades that follow this first one? A chart should be kept on all eye-movements made. Consistency or lack of it in the direction of these eye-movements might reveal some interesting new avenues of support for the arousal model.

APPENDICES

APPENDIX A

Code No. _____

Name _____

Sex _____

Age _____

Year _____

Phone No. _____

We are asking your cooperation in responding to a three-part questionnaire about your inner experiences, your images, dreams and daydreams. Your cooperation is necessary if psychologists are to be able to gather information on the personal experiences we may all have which can later serve as bases for understanding the range of human thought. You can be assured that your anonymity will be preserved. Future use of this data will only make use of code numbers and the list of names will be destroyed at the end of the initial research period. It is possible that some of you may be requested to participate in future research in connection with this project. Those of you who are called will be paid for your participation and appointments will be made at your convenience.

Thank you in advance

OPINION SURVEY

This survey consists of numbered statements. Read each statement and decide whether it is true as applied to you or false as applied to you. If a statement is TRUE or MOSTLY TRUE, as applied to you, place a T in the space corresponding to the number of the statement. If a statement is FALSE or NOT USUALLY TRUE, as applied to you, place an F in the proper space. Remember to give YOUR OWN opinion of yourself. Do not leave any blank spaces.

_____ 1. I wake up fresh and rested most mornings.

_____ 2. My hands and feet are usually warm enough.

_____ 3. My daily life is full of things that keep me interested.

_____ 4. There seems to be a lump in my throat much of the time.

_____ 5. Once in a while I think of things too bad to talk about.

_____ 6. At times I have fits of laughing and crying that I cannot control.

_____ 7. I feel that it is certainly best to keep my mouth shut when I am in trouble.

_____ 8. I find it hard to keep my mind on a task or job.

_____ 9. I seldom worry about my health.

_____ 10. I have had periods of days, weeks, or months when I couldn't take care of things because I couldn't get going.

_____ 11. My sleep is fitful and disturbed.

_____ 12. Much of the time my head seems to hurt all over.

_____ 13. I am in just as good physical health as most of my friends.

_____ 14. I prefer to pass by school friends, or people I know but have not seen for a long time, unless they speak to me first.

_____ 15. I am almost never bothered by pains over the heart or in my chest.

_____ 16. I am a good mixer.

_____ 17. I wish I could be as happy as others seem to be.

_____ 18. Most of the time I feel blue.

_____ 19. I am certainly lacking in self-confidence.

_____ 20. I usually feel that life is worthwhile.

_____ 21. It takes a lot of argument to convince most people of the truth.

_____ 22. I think most people would lie to get ahead.

_____ 23. I do many things which I regret afterwards (I regret things more or more often than others seem to).

_____ 24. I have very few quarrels with members of my family.

_____ 25. My hardest battles are with myself.

_____ 26. I have little or no trouble with my muscles twitching or jumping.

_____ 27. I don't seem to care what happens to me.

_____ 28. Much of the time I feel as if I have done something wrong or evil.

_____ 29. I am happy most of the time.

_____ 30. Some people are so bossy that I feel like doing the opposite of what they request, even though I know they are right.

_____ 31. Often I feel as if there were a tight band about my head.

_____ 32. I seem to be about as capable and smart as most others around me.

_____ 33. Most people will use somewhat unfair means to gain profit or an advantage rather than to lose it.

_____ 34. Often I can't understand why I have been so cross and grouchy.

_____ 35. I do not worry about catching diseases.

_____ 36. I commonly wonder what hidden reason another person may have for doing something nice for me.

_____ 37. Criticism or scolding hurts me terribly.

_____ 38. My conduct is largely controlled by the customs of those about me.

_____ 39. I certainly feel useless at times.

_____ 40. At times I feel like picking a fist fight with someone.

_____ 41. I have often lost out on things because I couldn't make up my mind soon enough.

_____ 42. It makes me impatient to have people ask my advice or otherwise interrupt me when I am working on something important.

_____ 43. Most nights I go to sleep without thoughts or ideas bothering me.

_____ 44. I cry easily.

_____ 45. I cannot understand what I read as well as I used to.

_____ 46. I have never felt better in my life than I do now.

_____ 47. I resent having anyone take me in so cleverly that I have had to admit that it was one on me.

_____ 48. I do not tire quickly.

_____ 49. I like to study and read about things that I am working at.

_____ 50. I like to know some important people because it makes me feel important.

_____ 51. It makes me feel uncomfortable to put on a stunt at a party even when others are doing the same sort of things.

_____ 52. I frequently have to fight against showing that I am bashful.

_____ 53. I seldom or never have dizzy spells.

_____ 54. My memory seems to be all right.

_____ 55. I am worried about sex matters.

_____ 56. I find it hard to make talk when I meet new people.

_____ 57. I am afraid of losing my mind.

_____ 58. I frequently notice my hand shakes when I try to do something.

_____ 59. I can read a long while without tiring my eyes.

_____ 60. I feel weak all over much of the time.

_____ 61. I have very few headaches.

_____ 62. Sometimes, when embarrassed, I break out in a sweat which annoys me greatly.

_____ 63. I have had no difficulty in keeping my balance in walking.

_____ 64. I wish I were not so shy.

_____ 65. I enjoy many different kinds of play and recreation.

_____ 66. In walking I am very careful to step over sidewalk cracks.

_____ 67. I frequently find myself worrying about something.

_____ 68. I hardly ever notice my heart pounding and I am seldom short of breath.

_____ 69. I get mad easily and then get over it soon.

_____ 70. I brood a great deal.

_____ 71. I have periods of such great restlessness that I cannot sit long in a chair.

_____ 72. I dream frequently about things that are best kept to myself.

_____ 73. I believe I am no more nervous than most others.

_____ 74. I have few or no pains.

_____ 75. I have difficulty in starting to do things.

_____ 76. It is safer to trust nobody.

_____ 77. Once a week or oftener I become very excited.

_____ 78. When in a group of people I have trouble thinking of the right things to talk about.

_____ 79. When I leave home I do not worry about whether the door is locked and the windows closed.

_____ 80. I have often felt that strangers were looking at me critically.

_____ 81. I drink an unusually large amount of water every day.

_____ 82. I am always disgusted with the law when a criminal is freed through the arguments of a smart lawyer.

_____ 83. I work under a great deal of tension.

_____ 84. I am likely not to speak to people until they speak to me.

_____ 85. Life is a strain for me much of the time.

_____ 86. In school I found it very hard to talk before the class.

_____ 87. Even when I am with people I feel lonely much of the time.

_____ 88. I think nearly anyone would tell a lie to keep out of trouble.

_____ 89. I am easily embarrassed.

_____ 90. I worry over money and business.

_____ 91. I feel anxiety about something or someone almost all the time.

_____ 92. I easily become impatient with people.

_____ 93. Sometimes I become so excited that I find it hard to get to sleep.

_____ 94. I forget right away what people say to me.

_____ 95. I usually have to stop and think before I act even in trifling matters.

_____ 96. Often I cross the street in order not to meet someone I know.

_____ 97. I often feel as if things were not real.

_____ 98. I have a habit of counting things that are not important such as bulbs on electric signs, and so forth.

_____ 99. I have strange and peculiar thoughts.

_____100. I have been afraid of things or people that I knew could not hurt me.

_____101. I have no dread of going into a room by myself where other people have already gathered and are talking.

_____102. I have more trouble concentrating than others seem to have.

_____103. I have several times given up doing a thing because I thought too little of my ability.

_____104. Bad words, often terrible words, come into my mind and I cannot get rid of them.

_____105. Sometimes some unimportant thought will run through my mind and bother me for days.

_____106. Almost every day something happens to frighten me.

_____107. I am inclined to take things hard.

_____108. I am more sensitive than most other people.

_____109. At periods my mind seems to work more slowly than usual.

_____110. I very seldom have spells of the blues.

_____111. I wish I could get over worrying about things I have said that may have injured other people's feelings.

_____112. People often disappoint me.

_____113. I feel unable to tell anyone all about myself.

_____114. My plans have frequently seemed so full of difficulties that I have had to give them up.

_____115. Often, even though everything is going fine for me, I feel that I don't care about anything.

_____116. I have sometimes felt that difficulties were piling up so high that I could not overcome them.

_____117. I often think, "I wish I were a child again."

_____118. It makes me feel like a failure when I hear of the success of someone I know well.

_____119. I am apt to take disappointments so keenly that I can't put them out of my mind.

_____120. At times I think I am no good at all.

_____121. I worry quite a bit over possible misfortunes.

_____122. I am apt to pass up something I want to do because others feel that I am not going about it in the right way.

_____123. I have several times had a change of heart about my life work.

_____124. I have a daydream life about which I do not tell other people.

_____125. I have often felt guilty because I have pretended to feel more sorry about something than I really was.

_____126. I feel tired a good deal of the time.

_____127. I sometimes feel that I am about to go to pieces.

DAYDREAMING QUESTIONNAIRE

PART A

There are 12 questions in Part A. Each question has 5 possible answers corresponding to the numbers 1 through 5. For each question, circle the answer which is most true or appropriate for you. Please note that when we use words like "daydreams" we are using popular terminology for which there is no official definition. You may have a particular idea of what you mean by a daydream or fantasy. Try to answer these items as they seem most to apply to you. Make a distinction between thinking about an immediate task you're performing, e.g. working. doing schoolwork and daydreaming which involves thoughts unrelated to a task you are working on or else thoughts that go on while you are getting ready for sleep or on a long bus or train ride.

1. I daydream
    1. infrequently.
    2. once a week.
    3. once a day.
    4. a few times during the day.
    5. many different times during the day.

2. Daydreams or fantasies make up
    1. no part of my waking thoughts.
    2. less than 10% of my waking thoughts.
    3. at least 10% of my waking thoughts.
    4. " " 25% " " " "
    5. " " 50% " " " "

3. As regards daydreaming, I would characterize myself as
    1. someone who never daydreams.
    2. someone who very rarely engages in daydreaming.
    3. someone who tends toward occasional daydreaming.
    4. someone who tends toward moderate daydreaming.
    5. an habitual daydreamer.

4. I recall or think over my daydreams
   1. infrequently.
   2. once a week.
   3. once a day.
   4. a few times during the day.
   5. many different times during the day.

5. When I am not paying close attention to some job, book, or TV, I tend to be daydreaming
   1. 0% of the time.
   2. 10% of the time.
   3. 25% of the time.
   4. 50% of the time.
   5. 75% of the time.

6. Instead of noticing people and events in the world around me, I will spend approximately
   1. 0% of my time lost in thought.
   2. less than 10% of my time lost in thought.
   3. 10% of my time lost in thought.
   4. 25% of my time lost in thought.
   5. 50% of my time lost in thought.

7. I daydream at work (or school)
   1. infrequently.
   2. once a week.
   3. once a day.
   4. a few times during the day.
   5. many different times during the day.

8. Recalling things from the past, thinking of the future, or imagining unusual kinds of events occupies
   1. 0% of my waking day.
   2. less than 10% of my waking day.
   3. 10% of my waking day.
   4. 25% of my waking day.
   5. 50% of my waking day.

9. I lose myself in active daydreaming
   1. infrequently.
   2. once a week.
   3. once a day.
   4. a few times during the day.
   5. many different times during the day.

10. Whenever I have time on my hands I daydream
    1. never.
    2. rarely.
    3. sometimes.
    4. frequently.
    5. always.

11. When I am at a meeting or show that is not very interesting, I daydream rather than pay attention
    1. never.
    2. rarely.
    3. sometimes.
    4. frequently.
    5. always.

12. On a long bus or train ride I daydream
    1. never.
    2. rarely.
    3. occasionally.
    4. frequently.
    5. a great deal of the time.

PART B

All of the items in Part B are statements about daydreams or daydreaming. Indicate to what extent each item applies to you or is true for you by circling the appropriate answer. Allow yourself some time for each item in order to examine your thoughts but do not spend too long trying to get the exact answer. The scale is again one which goes from 1 to 5. Thus, 5 stands for "Definitely true" and 1 for "Definitely false." 2, 3, and 4 are the intermediate steps. Circle that number which you feel is the most appropriate for that particular statement. Check the scale to make certain your response is what you mean it to be. Do this for each item.

Scale:

Definitely true - 5; Usually true - 4; Sometimes true, sometimes false - 3; Usually false - 2; Definitely false - 1

13. The voices of people who are important to me sound very clear when I daydream about them. 5 4 3 2 1

14. My fantasies often consist of black-and-white or color images. 5 4 3 2 1

15. As a child, I was a constant daydreamer. 5 4 3 2 1

16.	Daydreams accomplish nothing more than a temporary escape and just avoid things that must be done.	5 4 3 2 1
17.	If something is really on my mind I often brood on it for hours on end.	5 4 3 2 1
18.	I can see the people or things in my daydreams as if they were moving around.	5 4 3 2 1
19.	My imagination often goes around and around in the same circle.	5 4 3 2 1
20.	When a child, I would often create a great fantasy world for myself.	5 4 3 2 1
21.	I can often "see" a large number of things or people in my fantasies.	5 4 3 2 1
22.	I feel guilty about my daydreams.	5 4 3 2 1
23.	During a daydream, I sometimes feel a very strong sense of excitement.	5 4 3 2 1
24.	I do not really "see" the objects in a daydream.	5 4 3 2 1
25.	Daydreams are unreal and seldom come true.	5 4 3 2 1
26.	I become so affected by my daydreams that they will subsequently determine my mood.	5 4 3 2 1
27.	I seldom have the same daydream more than once.	5 4 3 2 1
28.	Sometimes a daydream will make me so upset that I feel like crying.	5 4 3 2 1
29.	My daydreams often cheer me up when I feel blue.	5 4 3 2 1
30.	The "pictures in my mind" seem as clear as photographs.	5 4 3 2 1
31.	I often daydream about events that happened over a year ago.	5 4 3 2 1
32.	My fantasies usually provide me with pleasant thoughts.	5 4 3 2 1
33.	My daydreams often leave me with a warm, happy feeling.	5 4 3 2 1
34.	When I have an unusually enjoyable daydream, I try to prevent it from coming to an end.	5 4 3 2 1
35.	Daydreaming never solves any problems.	5 4 3 2 1

36.	Daydreaming in an adult is really childish.	5 4 3 2 1
37.	I sometimes have a very clear, lifelike picture of what I am imagining.	5 4 3 2 1
38.	Sometimes a thrill goes up my spine as I reflect on a great amount of triumph and achievement.	5 4 3 2 1
39.	Daydreams are more likely to arouse pleasant than unpleasant emotion within me.	5 4 3 2 1
40.	I find my daydreams are worthwhile and interesting to me.	5 4 3 2 1
41.	Something that has happened during the day often goes over and over in my mind.	5 4 3 2 1
42.	I usually feel content and quite excited after a daydream.	5 4 3 2 1
43.	During a daydream, voices seem to come in loudly and clearly and then fade.	5 4 3 2 1
44.	I can hear conversations between myself and other people very clearly in my mind during a daydream.	5 4 3 2 1
45.	My daydreams are usually accompanied by the sounds of the subjects of my daydreams.	5 4 3 2 1
46.	The scenes of my daydreams are never longer than brief flashes.	5 4 3 2 1
47.	Because daydreaming often takes me away from my work, I try to avoid it even when I have no specific task to complete.	5 4 3 2 1
48.	The "scenes" in my daydreams are sort of fuzzy and unclear.	5 4 3 2 1
49.	A daydream can bring a smile to my face.	5 4 3 2 1
50.	In a daydream, I can hear a tune almost as clearly as if I were actually listening to it.	5 4 3 2 1
51.	Sometimes sounds I've heard in the past come into my mind during a daydream as if I could almost hear them again.	5 4 3 2 1
52.	Sometimes my imagination keeps coming back to the same things over and over again, no matter how much I try to change the subject.	5 4 3 2 1
53.	When people speak in my daydreams, I cannot really hear their voices.	5 4 3 2 1

54.	A really original idea can sometimes develop from a really fantastic daydream.	5 4 3 2 1
55.	I can still remember scenes from recent daydreams.	5 4 3 2 1
56.	Daydreaming is normal for adults as well as for adolescents and children.	5 4 3 2 1
57.	Visual scenes are an important part of my daydreams.	5 4 3 2 1
58.	I often have the same daydream over and over again.	5 4 3 2 1
59.	Daydreaming is a common experience for great scientists and artists as well as for the average person.	5 4 3 2 1
60.	I feel very emotional during my daydreams.	5 4 3 2 1
61.	I feel badly about daydreaming because it may indicate a weakness in character.	5 4 3 2 1
62.	My daydreams are often stimulating and rewarding.	5 4 3 2 1
63.	I can be aroused and excited by a daydream.	5 4 3 2 1
64.	I often have some kind of emotional reaction to my daydreams which lasts for a long time afterward.	5 4 3 2 1
65.	A piece of music sometimes runs through my head as clearly as if I were listening to it on a transistor radio.	5 4 3 2 1
66.	Some of my daydreams are so powerful that I just can't take my attention away from them.	5 4 3 2 1
67.	My daydreams are mostly made up of thoughts and feelings rather than visual images.	5 4 3 2 1
68.	My daydreams often leave me with feelings of sadness.	5 4 3 2 1
69.	Some of my daydreams are so striking that I keep on thinking about them after they are over.	5 4 3 2 1
70.	When I do hear voices in my thoughts, they are not really very clear or recognizable.	5 4 3 2 1
71.	A daydream can complete change my mood.	5 4 3 2 1
72.	The fewer daydreams one has, the more time there is to really "live."	5 4 3 2 1
73.	I sometimes seem to be able to hear the characters in my fantasies talking to one another.	5 4 3 2 1

74.	I can hear music with shades of both softness and loudness in my daydreams.	5 4 3 2 1
75.	I often relive happy or exciting experiences in my daydreams.	5 4 3 2 1
76.	A "happy" daydream helps me to "snap out of" a spell of unhappiness.	5 4 3 2 1
77.	I tend to get pretty wrapped up in my daydreaming.	5 4 3 2 1
78.	The sounds I hear in my daydreams are clear and distinct.	5 4 3 2 1
79.	My daydreams seldom repeat themselves.	5 4 3 2 1
80.	The "scenes" in my daydreams are so vivid and clear to me that my eyes seem actually to follow them.	5 4 3 2 1

APPENDIX B

CODING SYSTEM FOR DATA

Dominant direction all items (60%)

0 = left
1 = neither
2 = right

Dominant direction reflection items (60%)

0 = left
1 = neither
2 = right

Inner Acceptant = 2

Inner Rejectant = 1

Field Dependent = 1

Field Independent = 2

Warm color preferred = 1
Neither warm nor cold = 0
Color color preferred = 2

Rating of vividness of imagery = sum

Errors made in verbal response = number

APPENDIX C

SUBJECTS WITH DIRECTIONALITY SCORES ON BAKAN'S FOUR QUESTIONS

Subject	(Classification)*	First Question (Anthropology)	Second Question (If president)	Third Question (Man image)	Fourth Question (Washington)
1	R	left	right	right	no shift
2	N	right	right	left	left
3	L	left	left	left	left
4	R	right	right	right	left
5	N	left	right	left	right
6	R	left	right	right	right
7	L	left	left	left	left
8	R	left	right	right	right
9	N	right	left	left	right
10	N	right	left	left	right
11	R	right	right	right	right
12	R	right	right	no shift	right
13	R	right	right	left	right
14	L	right	left	left	no shift
15	R	left	right	right	right
16	L	right	left	no shift	no shift
17	L	left	left	left	left
18	R	right	right	right	left
19	R	right	right	right	right
20	L	left	no shift	left	left
21	N	right	left	left	right
22	L	left	left	left	left
23	L	left	right	left	left
24	L	left	left	left	no shift
25	L	left	left	left	left
26	R	right	right	no shift	left
27	N	left	left	right	right
28	L	no shift	left	left	left
29	N	right	left	right	left
30	L	left	left	left	right
31	L	left	left	left	no shift
32	L	left	left	left	left
33	L	left	left	right	left
34	L	left	left	right	left
35	L	left	left	left	left
36	R	right	right	left	no shift
37	N	right	no shift	no shift	no shift
38	N	right	left	right	left

APPENDIX C (cont.)

Subject (Classification)*	First Question (Anthropology)	Second Question (If president)	Third Question (Man image)	Fourth Question (Washington)
39 L	left	left	left	no shift
40 L	left	left	left	no shift
41 L	left	left	no shift	right
42 R	right	left	no shift	right
43 R	right	right	right	right
44 N	right	left	left	right
45 L	left	left	left	left
46 R	right	right	right	right
47 L	left	left	left	left
48 N	left	left	right	right

* Right is R, Left is L, Not classifiable is N based on majority of movements.
MEAN FOR ACTUAL NUMBER OF RIGHT SHIFTS IS 1.5, SD is 1.13.

APPENDIX D

MEANS AND STANDARD DEVIATIONS FOR VARIABLES OF ALL 48 SUBJECTS

Variables	Means	Standard Deviations
R-S	40.81	20.63
IPI	257.38	51.64
RFT	34.58	32.78

APPENDIX E

ACTUAL NUMBER OF LEFT, RIGHT, AND NO FIRST LATERAL EYE-MOVEMENTS FOR EACH SUBJECT ON ALL 48 QUESTIONS

Subject/ Classification*		32 Reflection Items			16 Minimal Search Items		
		Right	Left	No Shift	Right	Left	No Shift
1	R	22	8	2	7	0	9
2	N	13	19	0	9	7	0
3	N	13	17	2	8	3	5
4	R	17	9	6	5	2	9
5	R	21	8	3	5	1	10
6	R	24	8	0	10	5	1
7	L	5	24	3	0	5	11
8	R	24	8	0	14	2	0
9	R	24	5	3	5	1	10
10	R	24	8	0	11	2	3
11	R	22	5	5	7	0	9
12	R	21	6	5	2	2	12
13	R	26	6	0	11	2	3
14	R	17	4	11	3	2	11
15	L	5	23	4	2	9	5
16	R	31	1	0	8	3	5
17	L	10	17	5	5	5	6
18	R	22	8	2	6	5	5

APPENDIX E (cont.)

Subject/ Classification*		32 Reflection Items			16 Minimal Search Items		
		Right	Left	No Shift	Right	Left	No Shift
19	L	23	9	0	0	10	6
20	R	15	7	10	3	2	11
21	N	12	9	11	4	2	10
22	N**	16	15	1	8	1	7
23	R	24	6	2	8	2	6
24	R	16	8	8	3	2	11
25	L	2	30	0	1	11	4
26	R	18	12	2	5	4	7
27	R	24	7	1	6	0	10
28	L	2	26	4	4	4	8
29	R	20	9	3	3	3	10
30	L	3	28	1	0	9	7
31	R	21	9	2	9	2	5
32	L	6	21	5	0	11	5
33	N	13	18	1	2	3	11
34	L	5	26	1	1	7	8
35	R	21	8	3	2	7	7
36	N	3	2	27	1	0	15
37	R	19	12	1	4	2	10
38	L	4	27	1	3	6	7
39	R	21	10	1	10	2	4

APPENDIX E (cont.)

Subject/ Classification*	32 Reflection Items			16 Minimal Search Items		
	Right	Left	No Shift	Right	Left	No Shift
40 L	4	14	14	1	6	9
41 L	6	18	8	2	3	11
42 N	11	16	5	2	3	11
43 R	30	1	1	11	2	3
44 R	16	6	10	1	1	14
45 L	5	25	2	1	9	6
46 R	29	2	1	10	1	5
47 L	1	29	2	2	11	3
48 R	24	7	1	6	2	8

*Classification of subjects as R=right mover, L=left mover, N=neither R nor L, is based on at least 60% of reflection responses being in one consistent direction excluding no shift responses.

**S had 60% right movements on all items.

Note: Ss 1-24 are inner rejectant. Ss 25-48 are inner acceptant.

APPENDIX F

ACTUAL SCORES ON TWO MEASURES OF INNER ACCEPTANCE

Subjects	R-S Scores	IPI Scales Scores	Subjects	R-S Scores	IPI Scales Scores
1	19	200	25	71	326
2	9	179	26	55	323
3	9	214	27	84	282
4	15	184	28	50	325
5	23	222	29	78	419
6	23	218	30	67	387
7	27	172	31	75	256
8	21	234	32	47	291
9	19	220	33	73	285
10	29	217	34	52	282
11	25	214	35	61	253
12	27	232	36	60	314
13	30	241	37	65	268
14	30	195	38	49	268
15	24	223	39	45	270
16	28	237	40	38	365
17	27	220	41	48	294
18	29	237	42	77	298
19	29	234	43	61	281
20	24	239	44	69	254
21	30	245	45	45	276
22	16	207	46	54	268
23	16	193	47	45	270
24	19	241	48	42	281

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