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# The effects of cognitive and emotional question content and environmental complexity on direction of gaze aversion during interviews.

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# THE EFFECTS OF COGNITIVE AND EMOTIONAL QUESTION CONTENT AND ENVIRONMENTAL COMPLEXITY ON DIRECTION OF GAZE AVERSION DURING INTERVIEWS

by

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## ABSTRACT

The effects of cognitive and emotional question content, and environmental complexity upon ocular behaviour were studied.

Although the findings did not support previous research concerning lateral gaze aversion, one interesting result suggests that emotionality and difficulty of questions may have a curvilinear effect upon lateral eye movements analogous to the classic Yerkes-Dodson anxiety curve.

The findings do seem to support previous research which found that people tend to look up more for difficult questions, and suggest that difficulty is an important dimension to consider when studying ocular behaviour.

## PREFACE

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# CHAPTER I

## INTRODUCTION

Although the eyes have long been recognized as an essential part of human interaction, most studies of ocular behaviour have been concerned with only one aspect, whether or not a person maintained a glance directly at the eyes of another. These studies suggest that the extent to which a person looks another in the eyes reflects his personality (Duke, 1968; Bakan, 1971), his moment-to-moment feelings (Kinsbourne, 1972; Libby, 1971), and his ongoing intentions or expectations (Kendon, 1967). More recently, however, another aspect of ocular behaviour has received attention, the direction in which one's gaze is averted when one looks away from the eyes of another. Two major planes of directional responses have been studied; lateral gaze aversions, that is, look-aways to the right or the left, and vertical gaze aversions, or look-aways in an up or down direction.

### Lateral Gaze Aversions

Two major possible determinants of direction of lateral gaze aversion have been identified: internal factors which may function independently of the looker's physical environment, and external or environmental factors. The major hypothesized internal determinant of direction of lateral gaze aversion is the relative dominance of the left or right cerebral hemisphere; the major external determinant is the location of physical objects in one's surroundings. Studies of each of the two determinants are reviewed in the following sections.

The Cerebral Dominance Hypothesis

Traditionally, the concept of cerebral dominance has implied a single dominant hemisphere, that being the left hemisphere because of its leading role played in language and analytic processes in the right-handed person. However, Bakan (1971) discusses the "double dominance" model of the brain, in which each hemisphere is dominant with respect to different functions.

In fact, studies by Sperry and Gazzaniga, who were the first to study the split brain in man, suggest that the right hemisphere is not only capable, but sophisticated in some specialized functions. For example, Gazzaniga (1967) reports that right-handed patients, in whom the corpus callosum was cut, were able to arrange blocks to match a picture design and draw a cube in three dimensions with the left hand, while the right hand, deprived of information from the right hemisphere, could not perform these tasks.

According to the double dominance model of the brain that Bakan proposes, it is believed that the left hemisphere dominates in such functions as verbal and analytic processing, abstract, rational and objective thinking; while the right hemisphere dominates in pre-verbal and concrete thinking, and spatial patterning. Studies of split brain patients, in whom the corpus callosum connecting the right and left hemisphere of the brain were severed, generally support the double dominance hypothesis, but not for all functions suggested by Bakan.

Gazzaniga (1971) provides anectodal evidence that in generating emotional reaction, the right hemisphere is at least on par with the left. One patient in whom the corpus callosum was cut reacted with smiles and laughter to a nude picture whether the picture was presented to the right or left hemisphere; although when it was presented

to the right hemisphere she could not verbally describe what she had seen, as she could when it was presented to the left.

There are two possible ways in which hemispheric dominance may manifest itself:

1. In any person's total psychological functioning, one hemisphere may be relatively more dominant than the other. (Bakan, 1971)

If, for example, the left hemishpere is more dominant, the particular individual is likely to be consistently more competent at verbal, analytical tasks than at tasks involving spatial patterning and musical abilities. Presumably such individuals may also be relatively less emotional than those in whom the right hemisphere is more dominant. Persons in whom the right hemisphere is dominant should be relatively better in spatial patterning and musical abilities than left-hemispheric persons.

It has been customary to identify a given individual's dominant hemisphere by determining handedness, footedness, eye dominance, and so on. This is because each hemisphere receives input predominantly from the opposite side of the body, or in the case of vision, from the opposite visual field. However, Day (1967) and Duke (1968) report that during face-to-face interviews, individuals have a tendency to turn their eyes consistently in one horizontal direction rather than the other, making it possible to classify most people as left-movers or right-movers. Bakan (1971) proposes that direction of lateral eye movement is an individual characteristic, in that it reveals the relatively more dominant hemisphere in any person's total psychological functioning. In support of this reasoning he finds that in comparing right-movers and left-movers, right-movers tend to have higher mathematical scores on the scholastic aptitude test, are more likely to choose "hard" college majors, make career choices earlier, and prefer "cooler" colors; while left-movers tend to have

more vivid imaginations, major in "soft" areas, and be more musical and more religious.

2. Some stimuli may activate the left hemisphere more than the right, while other stimuli may activate the right hemisphere more than the left.

Ongoing cognitive activity of a hemisphere may be reflected both by the electrical activity as detected by EEG (Doyle, Ornstien, Galin, 1973), and by lateral gaze aversions in the opposite direction. Thus, Kocel, Galin, Ornstein, and Merrin (1972) found verbal and mathematical questions to elicit more eye movement to the right than spatial and musical questions. Kinsbourne (1972) found similar results. Kocel and her associates concluded that any tendency of an individual to move his eyes consistently in one direction, that is, to be a left-mover or a right-mover, is strongly modified by moment-to-moment cognitive activity demanded by the question. Emotional questions also seem to activate the right hemisphere more than the left, resulting in lateral gaze aversions to the left, (Schwartz, Davidson, Maer, and Bromfield, 1973).

The Environmental Hypothesis

The idea that the external environment of an individual will effect his behaviour has been employed repeatedly in psychological studies. The association between lateral gaze aversion and physical environment may also be manifested in two ways:

1. Different personalities may react differently to the same environmental setting.

For example, a person having low self-esteem may search for ways to leave an embarrassing situation, while a high self-esteem person may not. Libby and Yaklevich (1973) found direction of lateral gaze aversion to reflect individual differences. Subjects who rated high on abasement looked more often to the left and less often to the

right than subjects low on abasement. They suggested that since a door was on the subject's left, the low self-esteem person might have been attracted to it as an escape route; or it may have attracted eye gaze simply because it was a complex object useful for drawing the subject's attention away from an uncomfortable situation.

2. The physical environment may be the main determinant of a response to particular stimuli, regardless of personality.

Libby (1971) found that gaze aversions in the right-left direction were related to the affective content of interview questions. Embarrassing questions elicited more eye movements to the left than nonembarrassing questions. Again, the door on the subject's left may have symbolized escape, or may have been the only object in the subject's visual field, thus attracting attention. The presence of an escape route or door on one side or the other has been further investigated by Myszka (personal communication, 1974).

## Vertical Gaze Aversions

Although vertical gaze aversions have received much less attention in studies of direction of look-aways than lateral gaze aversions, there is no reason to assume that they are less important. There is evidence that vertical gaze aversions are related to cognitive demands. Libby (1971) reported that subjects tended to look up more when asked difficult questions as opposed to medium or easy questions. In an attempt to replicate previous findings involving lateral gaze aversions, Ehrlichman, Weiner and Baker (unpublished) found that their data revealed significant differences only in the vertical direction of eye movement. However, they did not take difficulty of the questions into consideration, a dimension, which, according to Libby's findings, may have affected their results.

These studies suggest the importance of employing the variables of difficulty and up-down look-aways in any study in which a clear and accurate model of ocular behaviour is desired.

## Objectives of Present Study

The major aim of the present research was to further study the hemispheric dominance hypothesis and the environmental hypothesis.

Investigation of the hemispheric dominance hypothesis was undertaken by assessing the relative effects of questions representing three different dimensions upon ocular behaviour. These dimensions were:

a) emotionality - embarrassing vs. nonembarrassing,

b) cognition type - verbally oriented vs. spatially oriented, and

c) cognition intensity - difficult vs. easy.

The environmental hypothesis was approached by introducing "environmental complexity", in the form of object location in the experimental setting, as a between subjects variable. This made it possible to investigate the possibility that complexity in the visual field serves to draw an individual's attention away from an uncomfortable situation.

If eye movement reflects the differential demands made upon the two halves of the brain, and if emotion is largely a right hemisphere function, then embarrassing questions were expected to lead to more left gaze aversions than nonembarrassing questions. If effects of emotion are situationally dependent, direction of gaze aversion was expected to change with the relative complexity of the subject's environment on her right or left side.

According to the view that gaze aversions reflect cognitive demands, eye movement should be more leftward for spatially oriented questions and more rightward for

verbally oriented questions, regardless of the situation. Of course, in view of the hemispheric dominance model which states that eye movement reveals an individual's more dominant hemisphere, it might be expected that subjects emerge as right-movers and left-movers, regardless of the specific cognitive demands of the questions.

Cognition intensity was also expected to have an effect; more upward gaze aversions were expected in response to difficult questions, as opposed to lateral gaze aversions in response to easy questions.

Complexity in the environmental setting was varied across conditions. According to the environmental hypothesis, more left gaze aversions were expected when the environment to the subject's left was more complex, and more right gaze aversions when the environment to the subject's right was more complex; and an equal number of left-right gaze aversions or more gazes directed straight ahead when both sides were bare. Of course, the environmental situation would have no effect on gaze aversion if a strict hemispheric dominance hypothesis prevailed.

## CHAPTER II

## METHOD

### Subjects

The subjects were sixty female University of Windsor summer students, ranging in age from the late teens to the fifties. Six of these sixty subjects were left-handed, with the following distribution of left-handed subjects across conditions: one in the first condition, in which a bookcase and wall picture were to the subject's right; two in the second condition, in which the objects were on the subject's left; and three in the third condition in which the objects were absent.

### Questions

Forty-eight questions, designed to tap the dimensions of emotion, cognition type, and cognition intensity, were selected to be experimental questions. Specifically, half the questions were embarrassing, and half nonembarrassing; half were verbally or language oriented, and half were spatially oriented; and half were difficult and half easy. Therefore, there were eight different types of questions, with six questions of each type.

The search for questions to represent the various dimensions began with a review of questions used by previous investigators. Although this did provide a useful supply of questions and also of examples of questions, it seems that many of those used in other studies simply did not represent the required dimensions as well as they might have. For example, Ehrlichman, Weiner, and Baker (unpublished) labelled the following questions as verbal:

"Briefly, what is the meaning of this common proverb: A rolling stone gathers no moss", and

"What word is this the best definition of: A yellow elongated fruit".

Although these questions do have a verbal aspect, it seemed possible that they might also have a spatial aspect, equally strong.

To avoid such ambiguities, an imagery scale (Paivio, Yuille, and Madigan, 1968) was consulted to determine the imagery of the words used in the questions that were being considered for the present study. Careful thought and selection resulted in a list of 128 questions from which forty-eight experimental questions could be chosen.

The final choice of these forty-eight experimental questions was based on pilot tests and ratings. The initial 128 questions were presented to ten pilot subjects and their responses were timed. These subjects were then asked to rate each of the questions on three semantic differential scales, (see Appendix A). These ratings indicated each pilot subject's perception of the emotionality, cognition type and cognition intensity of each question. For the question to be retained as an experimental question, it had to be rated within two scale points of the extreme it was intended to represent by seven out of ten pilot subjects. For example, for a question to be considered embarrassing, it had to obtain a one or a two on a seven point scale with "embarrassing" at the low end of the scale, at least seven times.

An additional criterion was employed in choosing questions to represent the dimension of cognition intensity. Here it was also required that the response time of seven out of ten of the pilot subjects exceeded seven seconds.

The forty-eight experimental questions are listed in Appendix B.

## Apparatus

The experiment took place in a simple 10' 11" x 19' 10" room in which plain curtains hung on the two walls that were to the subject's right and left. Two doors led into the room, one on each side at the back. The subject entered through the door that was to the left of the chair in which she sat; she was also aware that the experimenters entered through the door on the right.

However, the subject was seated so that both doors were behind her and out of her field of vision. Further, in case she turned her head, she was prevented from seeing either door by a screen that stood in back of the chair in which she sat.

Three experimental conditions were set up. In the first condition, the physical environment of the experimental setting included a book-case and a rather complex picture, "Hallucinogenic Toreador", by Salvador Dali, on the subjects' right, with no such objects on the subject's left; in the second condition, these objects were on the subject's left only. In the third condition, these objects were removed from the room, so that the subjects' physical environment was plain and balanced on the right and left.

Directly in front of the subject's chair was the chair in which the interviewer sat. Behind the interviewer's chair was a table which held a Sony Videocorder camera, Model AVC-34000, concealed behind the grill of a 26" x 10" loudspeaker cabinet. A video-recorder Sony Videocorder, Model AV-3650, which was just outside the room, recorded the ocular behaviour of the subject. A Sony transister Video Monitor, Model CMV-110U,

connected to the camera was also in the room, but was placed out of sight of the subject behind the speaker cabinet, with the one exception noted below.

## Procedure

The experiment was in the form of a structured interview with each subject. Each subject was asked fifty-four questions, the first six of which were presented in a fixed order and were intended to accustom the subject to the interview procedure. The forty-eight experimental questions were presented in a different, randomized order to each subject, with the restriction that not more than three questions of one kind appeared together.

The experiment was carried out by two graduate student experimenters, a twenty-five year old male, and a twenty-four year old female. The male experimenter met the subject and introduced her to the experimental procedure. He explained that he was helping the second experimenter carry out her research, which involved testing different interview techniques. The subject was told that she was not personally being evaluated in any way; rather, that she was being asked to evaluate a particular type of interview, which in her case was a face-to-face interview situation.

The subject was then informed that the camera was inside the loudspeaker cabinet and that the interview would be recorded. To inform her as to exactly what information the experimenters were receiving from the camera, she was shown her picture on the monitor, which was brought out from behind the loudspeaker cabinet for a moment for that purpose. The subject was assured that the tape would be erased once it was reviewed for any information that might be useful in studying the interview

situation. She was informed that the camera was not in full view so that it would not be too distracting for her, especially since she was to look at the interviewer rather than the camera during the questioning.

The male experimenter then went on to explain the interview procedure. The subject was told that she would be asked questions, some of which would seem personal and possibly embarrassing, and some of which would be difficult. She was informed that she did not have to answer any question that she did not wish to answer. She was also told that many of the questions had no one correct answer. Just before leaving the room, the male experimenter told the subject that she would be asked to fill out a rating scale after the interview.

At this point, the female experimenter, (the interviewer) entered the room and introduced herself to the subject. She then gave the subject the following, more detailed instructions for the interview procedure:

> "First of all, I would like you to make yourself as comfortable as possible and then remain in that position throughout the interview. That's just so that your head doesn't move too much to the left and right so that you stay in view of the camera.
>
> "Secondly, I'd like you to speak loudly and clearly, and I'll try to do the same thing because I can ask each question only once. I cannot repeat any question. Perhaps it would be helpful to think of me as a machine that says the question once and cannot say it again.
>
> "Although there is no time limit, please try to answer each question as soon as you can and as briefly as you can. Again, if you feel you cannot or should not answer a particular question - just say so - that will be allright."

"If there is more than one part to an answer, for instance, if I should ask you to list a number of things, I would like you to try and think of the whole answer first before you speak, rather than pausing and speaking and pausing and speaking. In general, though, just listen to the question, think it over and then answer to the best of your ability.

"There is one more thing that is rather important. I want you to look at me while I am asking a question. I don't care where you look during your answer, that's up to you. But during the question, that's all during the time I'm speaking, I'd like you to be looking directly at me. And once you finish your answer, I won't begin a new question until you look at me again.

"Okay. That's all I have to say before we begin. Do you have any questions about the procedure? Well, then we will begin. There are six warm-up questions first and if they go smoothly, we'll just continue with the other questions without a break."

If there were any questions the experimenter answered them, keeping as close as possible to the preceding script, but satisfying herself that the subject understood the procedure.

During the interview, the interviewer followed a consistent procedure for her own eye movements. The questions were written on index cards, which the interviewer used to identify the question to be asked next. Each question was memorized by the interviewer, so that after looking down at the cards to identify it, she made eye contact with the subject, and continued eye contact throughout the question and through the subject's response.

After the interview, the subject was taken into another room where she was carefully debriefed by the female experimenter (the interviewer). The debriefing involved telling the subject more about the research and why it was being conducted, and responding to questions

and comments by the subject. After the debriefing, the subject was asked to rate each of the forty-eight questions on a semantic differential scale, assessing the subject's perception of the relative emotionality, cognition type, and cognition intensity of the questions. (See Appendix A). This provided three dependent variables which will be referred to as emotionality rating, cognition type rating, and cognition intensity rating.

From the videotape, trained observers recorded each subject's ocular response to each question, by tracing the direction of her first eye movement after the initial eye contact made with the interviewer at the beginning of the question. The observers traced the eye movement in a one inch circle divided into eight sections. (See Appendix C).

These ocular response scores were classified into the following categories:

1. Maintains: Score 1 if the subject maintained eye contact throughout the duration of the question and her response; score 0 if she did not;

2. Directional response in vertical plane: Score 1 if subject's first eye movement after initial contact is up; -1 if down; 0 if neither occured;

3. Directional response in horizontal plane; Score 1 if first eye movement after initial contact is to the right; -1 if to the left; 0 if neither occured;

4. Closed: Score 1 if subject's first ocular behavior after initial contact was to close her eyes; score 0 if not.

Note that scores in the vertical plane were not mutually exclusive of those in the horizontal plane.

Rather a directional response was coded as either up or down, unless it was directly in the right or left plane, and as right or left unless it was directly up or down.

Scores for the dependent variables were summed over the six questions within each of the eight blocks of questions, providing each subject with eight sets of scores. There were seven dependent variables in each of the eight sets, formed as follows:

1. Maintains: Sum of the maintains scores. Possible score range: 0-6, where 0 indicates no maintains at all, and 6 indicates that eye contact was maintained on each question;

2. Ups-Downs: Sum of the up and down scores. Possible score range: -6 to 6, where -6 indicates all downs, and 6 indicates all ups;

3. Right-Left: Sum of the right and left scores. Possible score range, -6 to 6, where -6 indicates all lefts, and 6 indicates all rights;

4. Closed: Sum of the closed scores. Possible score range: 0-6, where 0 indicates no eye closures and 6 indicates closure on each question;

5. Emotional Rating: Possible score range: 6-42 where 6 indicates all questions were extremely embarrassing and 42 indicates all questions were extremely nonembarrassing;

6. Cognition Type Rating: Possible score range: 6-42, where 6 indicates all questions were extremely verbal and 42 indicates all questions were extremely spatial;

7. Cognition Intensity Rating: Possible score range; 6-42, where 6 indicates all questions were extremely easy and 42 indicates all questions were extremely difficult.

Four observers were used to record the ocular responses for all sixty subjects. The first two observers scored together until they had scored at least ten subjects, and until they agreed on at least forty-three out of forty-eight scores on five consecutive scoring attempts. These trained observers then repeated the same procedure with the other two observers. Checks were made regularly to insure continued agreement.

# CHAPTER III

## RESULTS

The effects of questions and object location upon subjects' behaviour was analysed by means of analyses of variance, with three levels of picture location (right, left, and no picture) as a between-subject factor; and two levels each of the three within subjects factors, all of which concerned classifications of the questions. These within subjects factors were:

1. emotionality - embarrassing vs. nonembarrassing questions;
2. cognition type - verbal vs. spatial questions, and
3. cognition intensity - easy vs. difficult questions.

The dependent variables were of two kinds:

1. Ratings of semantic qualities of questions to assess validity of question type, (three variables); and
2. Ocular behaviour, (four variables).

Table I gives the results for the seven separate analyses of variance conducted upon the seven dependent variables. Table 2 gives the means corresponding to each significant analysis of variance component for the same seven variables. Each table is divided into two sections corresponding to the two different kinds of dependent variables. Each kind of dependent variable will be discussed in turn.

# TABLE 1

Effects of Object Location, Emotionality, Cognition Type and Cognition Int
Emotionality Ratings. Cognition Type Ratings, and Cognition Intensity Rati
Ups-Downs, Rights-Lefts, and Closed.

SEMANTIC DIFFERENTIAL RATINGS

| | | | EMOTIONALITY | | COGNITION TYPE | | COGNITION INTENSITY | | MAINTA |
|---|---|---|---|---|---|---|---|---|---|
| | | df | MS | F | MS | F | MS | F | MS |
| OBJECT LOCATION | (L) | 2 | 137.16 | <1 | 384.26 | 3.75** | 91.46 | <1 | 21.01 |
| EMOTIONALITY | (E) | 1 | 9100.21 | 93.71******* | 49.41 | <1 | 561.17 | 17.14****** | 14.01 |
| COGNITION TYPE | (V) | 1 | 240.83 | 14.41****** | 26700.83 | 469.40******* | 708.10 | 28.78******* | 10.80 |
| COGNITION INTENSITY | (D) | 1 | 63.08 | 3.39* | 1732.80 | 101.44******* | 5380.10 | 149.04******* | 122.01 |
| SUBJECTS (S) (WITHIN L) | | 57 | 200.78 | | 102.57 | | 126.72 | | 8.97 |
| LE | | 2 | 450.51 | 4.64*** | 98.04 | 2.71* | 158.29 | 4.74*** | 1.19 |
| LV | | 2 | 35.36 | <1 | 13.78 | <1 | 23.19 | <1 | 2.71 |
| EV | | 1 | 2.13 | <1 | 3575.21 | 179.39******* | 33.60 | <1 | 3.67 |
| LD | | 2 | 46.80 | 2.51* | 26.23 | <1 | .91 | <1 | 5.88 |
| ED | | 1 | 14.01 | <1 | 10.21 | <1 | 994.75 | 39.64******* | 43.20 |
| VD | | 1 | 294.53 | 23.79******* | 30.00 | <1 | 277.55 | 14.79****** | .75 |
| SE | (L) | 57 | 97.11 | | 36.21 | | 32.73 | | 1.16 |
| SV | (L) | 57 | 16.71 | | 56.88 | | 24.61 | | 1.90 |
| SD | (L) | 57 | 18.63 | | 17.08 | | 39.10 | | 1.18 |
| LEV | | 2 | 34.06 | 2.43* | 31.05 | <1 | 16.13 | <1 | .68 |
| LED | | 2 | 6.93 | <1 | 20.81 | <1 | 51.72 | <1 | 1.62 |
| LVD | | 2 | 5.73 | <1 | 7.49 | <1 | 34.26 | <1 | .19 |
| EVD | | 1 | 300.84 | 20.74******* | 23.41 | <1 | 52.67 | <1 | .00 |
| SEV | (L) | 57 | 14.02 | | 19.93 | | 13.70 | | .83 |
| SED | (L) | 57 | 20.91 | | 13.18 | | 25.09 | | .74 |
| SVD | (L) | 57 | 12.38 | | 15.24 | | 18.77 | | 1.19 |
| LEVD | | 2 | 34.23 | <1 | 17.28 | <1 | 18.02 | <1 | 1.74 |
| SEVD | (L) | 57 | 14.51 | | 16.74 | | 20.71 | | .71 |

Note: * p<.10 ***** p<.005
** p<.05 ****** p<.001
*** p<.025 ******* p<.0001
**** p<.01

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# TABLE 1

ty, Cognition Type and Cognition Intensity on Three Semantic Differentials: Ratings, and Cognition Intensity Ratings; and on Four Ocular Responses: Maintains,

| | | | | OCULAR RESPONSES | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DIFFERENTIAL RATINGS | | | | | | | | | | | |
| OGNITION TYPE | | COGNITION INTENSITY | | MAINTAINS | | UPS-DOWNS | | RIGHTS-LEFTS | | CLOSED | |
| MS | F | MS | F | MS | F | MS | F | MS | F | MS | F |
| 84.26 | 3.75** | 91.46 | <1 | 21.01 | <1 | 15.08 | <1 | 107.44 | <1 | .86 | <1 |
| 49.41 | <1 | 561.17 | 17.14****** | 14.01 | 12.12****** | 24.75 | 5.66*** | 1.01 | <1 | .13 | 3.71** |
| 00.83 | 469.40******* | 708.10 | 28.78******* | 10.60 | 5.67*** | 1.75 | <1 | 1.88 | <1 | .21 | 2.46* |
| 32.80 | 101.44******* | 5380.10 | 149.04******* | 122.01 | 103.04******* | 269.85 | 75.99******* | .33 | <1 | .83 | <1 |
| 02.57 | | 126.72 | | 8.97 | | 51.80 | | 50.62 | | .23 | |
| 98.04 | 2.71* | 155.29 | 4.74*** | 1.19 | <1 | 10.91 | 2.49* | 2.40 | <1 | .33 | <1 |
| 13.78 | <1 | 23.19 | <1 | 2.71 | <1 | 24.85 | 4.56*** | 8.79 | <1 | .21 | <1 |
| 75.21 | 179.39******* | 33.60 | <1 | 3.67 | 4.44** | .47 | <1 | 2.41 | <1 | .33 | <1 |
| 26.23 | <1 | .91 | <1 | 5.88 | 4.96*** | 6.40 | <1 | 9.78 | 2.39* | .16 | 3.09* |
| 10.21 | <1 | 994.75 | 39.64******* | 43.20 | 58.22******* | 101.75 | 29.49******* | 40.83 | 12.60****** | .33 | <1 |
| 30.00 | <1 | 277.55 | 14.79****** | .75 | <1 | .20 | <1 | .30 | <1 | .83 | <1 |
| 36.21 | | 32.73 | | 1.16 | | 4.38 | | 3.45 | | .36 | |
| 56.88 | | 24.61 | | 1.90 | | 5.45 | | 3.65 | | .85 | |
| 17.08 | | 39.10 | | 1.18 | | 3.81 | | 4.09 | | .51 | |
| 31.05 | <1 | 16.13 | <1 | .68 | <1 | 3.68 | <1 | .48 | <1 | .83 | <1 |
| 20.81 | <1 | 51.72 | <1 | 1.62 | <1 | .31 | <1 | .77 | <1 | .33 | <1 |
| 7.49 | <1 | 34.26 | <1 | .19 | <1 | 1.40 | <1 | 9.49 | 2.92* | .83 | <1 |
| 23.41 | <1 | 52.67 | <1 | .00 | <1 | 3.85 | <1 | 1.63 | <1 | .33 | <1 |
| 19.93 | | 13.70 | | .83 | | 4.60 | | 3.41 | | .56 | |
| 13.18 | | 25.09 | | .74 | | 3.45 | | 3.24 | | .38 | |
| 15.24 | | 18.77 | | 1.19 | | 5.55 | | 3.25 | | .57 | |
| 17.28 | <1 | 18.02 | <1 | 1.74 | 2.47* | .60 | <1 | 2.65 | <1 | .83 | <1 |
| 16.74 | | 20.71 | | .71 | | 4.81 | | 4.01 | | .11 | |

TABLE 2

Mean Ocular Responses and Ratings Corresponding to Each Significant Analysis of Variance Component

| | DIFFERENTIAL RATINGS | | | OCULAR RESPONSES | | | |
|---|---|---|---|---|---|---|---|
| | EMOT* | COG* TYPE | COG* INT* | MAIN-TAINS | UPS-DOWNS | RIGHT-LEFT | CLOS-ED |
| Picture Location-Right | 29.13 | 24.53 | 18.83 | 1.95 | -1.33 | -.87 | .0 |
| -Left | 29.60 | 23.97 | 18.19 | 1.46 | -.79 | -.75 | .14 |
| -None | 29.81 | 26.80 | 19.60 | 1.24 | - .81 | .61 | .03 |
| Emotionality-Nonembarrassing | 33.20 | 24.81 | 17.82 | 1.72 | -1.20 | -.29 | .04 |
| -Embarrassing | 24.43 | 25.45 | 19.99 | 1.38 | - .75 | -.38 | .07 |
| Cognition Type-Verbal | 26.14 | 17.67 | 20.11 | 1.40 | -1.04 | -.40 | .03 |
| -Spatial | 29.55 | 32.59 | 17.64 | 1.70 | - .92 | -.27 | .08 |
| Cognition Intensity-Easy | 28.48 | 27.03 | 15.55 | 2.05 | -1.75 | -.33 | .06 |
| -Difficult | 29.21 | 23.23 | 22.25 | 1.05 | - .20 | -.35 | .05 |
| LE: Right-Nonembarrassing | 33.02 | 24.65 | 18.33 | 2.09 | -1.45 | -.84 | .0 |
| -Embarrassing | 25.22 | 24.21 | 19.33 | 1.81 | -1.21 | -.90 | .0 |
| Left-Nonembarrassing | 32.55 | 23.89 | 17.66 | 1.73 | -1.31 | -.58 | .11 |
| Embarrassing | 25.65 | 24.06 | 18.71 | 1.19 | - .26 | -.93 | .16 |
| None-Nonembarrassing | 34.02 | 25.70 | 17.47 | 1.35 | - .85 | .54 | .0 |
| -Embarrassing | 21.60 | 28.09 | 21.91 | 1.14 | - .78 | .68 | .01 |
| LV: Right-Verbal | 28.24 | 17.39 | 19.60 | 1.65 | -1.94 | -.94 | .0 |
| -Spatial | 30.01 | 31.67 | 18.05 | 2.25 | -1.73 | -.80 | .0 |
| Left-Verbal | 28.53 | 16.25 | 19.63 | 1.38 | -1.05 | -.58 | .09 |
| -Spatial | 30.66 | 31.70 | 16.75 | 1.54 | -1.53 | -.93 | .19 |
| None-Verbal | 27.64 | 19.39 | 21.13 | 1.18 | -1.13 | .31 | .01 |
| -Spatial | 27.99 | 34.40 | 18.26 | 1.31 | - .50 | .90 | .04 |
| EV: Nonemotional-Verbal | 32.56 | 24.63 | 19.30 | 1.48 | -1.23 | -.28 | .03 |
| -Spatial | 33.84 | 35.00 | 16.34 | 1.96 | -1.18 | -.30 | .05 |
| Emotional-Verbal | 23.72 | 20.72 | 20.93 | 1.52 | - .84 | -.52 | .04 |
| -Spatial | 25.27 | 30.18 | 19.07 | 1.44 | - .66 | -.25 | .10 |
| LD: Right-Easy | 28.61 | 26.05 | 15.44 | 2.50 | -2.11 | -.88 | .0 |
| -Difficult | 29.64 | 23.01 | 22.20 | 1.40 | - .55 | -.86 | .0 |
| Left-Easy | 29.84 | 26.30 | 14.93 | 1.75 | -1.36 | -.49 | .18 |
| -Difficult | 29.36 | 21.65 | 21.45 | 1.16 | - .21 | -1.01 | .10 |
| None-Easy | 27.00 | 28.75 | 16.29 | 1.91 | -1.79 | .38 | .0 |
| -Difficult | 28.63 | 25.04 | 23.10 | .58 | - .16 | .84 | .01 |
| ED: Nonemotional-Easy | 32.67 | 26.57 | 13.03 | 2.53 | -2.44 | .01 | .05 |
| -Difficult | 33.73 | 23.06 | 22.61 | .92 | - .03 | -.59 | .03 |
| Emotional-Easy | 24.30 | 27.50 | 18.08 | 1.58 | -1.07 | -.67 | .07 |
| -Difficult | 24.68 | 23.41 | 21.89 | 1.18 | - .43 | -.10 | .09 |
| VD: Verbal-Easy | 26.99 | 19.83 | 16.01 | 1.92 | -1.82 | -.42 | .04 |
| -Difficult | 29.28 | 15.53 | 24.22 | .88 | - .26 | -.38 | .03 |
| Spatial-Easy | 29.97 | 34.24 | 15.10 | 2.19 | -1.69 | -.24 | .06 |
| -Difficult | 29.13 | 30.91 | 20.27 | 1.21 | - .14 | -.31 | .08 |
| EVD: Nonembarrassing | | | | | | | |
| Verbal-Easy | 32.03 | 16.85 | 14.08 | 2.30 | -2.38 | -.07 | .03 |
| -Difficult | 33.08 | 12.40 | 24.52 | .67 | - .08 | -.50 | .02 |
| Spatial-Easy | 33.30 | 36.25 | 11.98 | 2.75 | -2.50 | -.08 | .07 |
| -Difficult | 34.38 | 33.72 | 20.70 | 1.17 | - .15 | -.68 | .03 |
| Embarrassing | | | | | | | |
| Verbal-Easy | 21.95 | 22.80 | 17.93 | 1.53 | -1.25 | -.77 | .05 |
| -Difficult | 25.48 | 18.65 | 23.93 | 1.10 | - .43 | -.27 | .03 |
| Spatial-Easy | 26.65 | 32.20 | 18.22 | 1.63 | - .88 | -.57 | .08 |
| -Difficult | 23.88 | 28.17 | 19.85 | 1.25 | - .43 | .07 | .12 |

## Ratings of Semantic Qualities of Questions

The major purpose of the ratings was to determine whether or not the experimental questions successfully represented the intended dimensions of emotion, cognition type, and cognition intensity. That is, were the questions classified as embarrassing, actually perceived as more embarrassing by the subjects? Were the questions defined as verbal and as spatial so distinguished by the subjects? Similarly, were the questions labelled as easy rather than difficult actually perceived in that manner by the subjects?

As the first section of Table I shows, the results confirm the accuracy of the classification of the questions. More detailed information on these effects is found in Table 2. For emotionality ratings, the effect of emotionality is significant at well beyond the .0001 level. When average emotionality ratings for each question were computed and ranked, twenty of the twenty-four questions ranked by subjects as more embarrassing were among the questions originally classified as more embarrassing.

For ratings of cognition type, the effect of cognition type is also significant beyond the .0001 level. When average verbal-spatial ratings for each question were computed and ranked, twenty-two of the twenty-four questions ranked by the subjects as more spatial than verbal were among the questions originally classified as more spatial.

For ratings of cognition intensity, the difficulty effect is again significant beyond the .0001 level. When average ratings for this dimension were computed and ranked, seventeen out of the twenty-four questions ranked by the subjects as more difficult were among the ones originally classified as more difficult. It will be recalled that for this dimension only, in addition to the pilot subjects' ratings, average response times were used as a criterion in choosing the questions.

Although the questions were classified successfully, the ratings of the questions yielded some important surprises. Questions classified as different in terms of one of the three dimensions often differed significantly, though not as strongly, in terms of one or more of the other two dimensions. There were also some significant interactions. In view of the careful selection of questions for this study, taking particular pains to avoid apparent ambiguities in the work of other investigators, these effects will be taken into account in the interpretation of significant affects upon ocular variables, which are of primary interest in the study.

## Ocular Behaviour

The second section of Table I reveals a number of interesting main and interaction effects of the independent variables upon ocular behavior. Once again, these effects are detailed in Table 2.

The location of the bookcase and wall picture had no main effect on the subjects' ocular behaviour. Contrary to the environmental hypothesis, complexity in the environment, then, did not directly account for any significant differences in ocular behaviour.

Emotionality of the questions affected three of the variables; maintains, up-downs, and closures. Subjects maintained eye contact significantly less when the questions were embarrassing than when they were nonembarrassing ($p<.001$). Although subjects tended to close their eyes very infrequently, they did close their eyes significantly more during the embarrassing questions than during the nonembarrassing questions ($p<.05$). These results do not seem surprising in view of what embarrassed behaviour is thought to involve in our culture. It does seem surprising that subjects tended to look down more

during the nonembarrassing questions ($p<.025$). This seems reasonable, however, when the cognitive intensity ratings are examined -- subjects rated the embarrassing questions as more difficult than the nonembarrassing questions. ($p<.001$).

Contrary to the hemispheric dominance view held by such investigators as Kocel and her associates (1972) and Kinsbourne (1972), emotionality of the questions had no main effect on horizontal gaze aversions. That is, the present data does not support the view that the right hemisphere is dominant for emotionality and will be activated by emotional questions thus producing leftward movements of the eye.

Cognitive type affected only one of the four ocular variables, maintains. Contrary to the hemispheric dominance hypothesis, it failed to affect lateral gaze aversions, nor did it affect vertical gazes or closures.

Subjects maintained eye contact more during the spatial questions than during the verbal questions ($p<.025$). Perhaps this result may be at least partially explained by the fact that spatial questions were rated as significantly more easy than verbal questions ($p<.001$).

The failure to find verbal-spatial effects in right minus left scores seemed to require further analysis since some investigators (eg. Gur, Gur, and Harris, unpublished) have suggested that under the conditions of the present experiment, in which the interviewer was face-to-face with the subject, subjects would consistantly look to the right or to the left about seventy-five per cent of the time.

If this left-mover or right-mover dichotomy were to hold for the present subjects, it might help to clarify the absence of question cognition type upon right-left scores. When the right-left scores are summed over all questions for each subject and arranged in a frequency

distribution, the distribution is similar to a normal curve. (See Table 3). Thus, it is clear that the subjects in this study cannot be classified into right and left movers.

Cognitive intensity affected two of the ocular variables, maintains, and vertical gaze aversions.

Although over all the questions there were significantly more downward looks than upward looks ($p<.005$), there were more upward looks for difficult questions than for easy questions ($p<.0001$). This is consistant with Libby (1971). Also subjects maintained eye contact more when the questions were easy ($p<.0001$). Since, when subjects looked away, they looked more frequently down than up, one might expect more downward looks to result from difficult questions, for which there were more gaze aversions (less maintains). Obviously, such was not the case. Thus the data strongly supports the notion that question difficulty leads to upward looks.

The above main effects must, of course, be considered in light of the interaction effects on ocular behaviour. There were significant interactions for all six two-way interactions:

1. Location of objects with emotionality (LE),
2. Location of objects with cognition type (LV),
3. Emotionality with cognition type (EV),
4. Location of objects with cognition intensity (LD),
5. Emotionality with cognition intensity (ED),
6. Cognition type with cognition intensity (VD).

There was one three-way interaction involving emotionality, cognition type and cognition intensity (EVD).

Although location of objects in the subjects' environment did not directly affect ocular behaviour, it did interact with each of the other independent variables.

T A B L E 3

Frequency Distribution of Right-Left Scores Summed Over All Questions for Each Subject

| Class Interval | Frequency |
|---|---|
| 16 — 17 | 1 |
| 14 — 15 | 0 |
| 12 — 13 | 0 |
| 10 — 11 | 0 |
| 8 — 9 | 2 |
| 6 — 7 | 2 |
| 4 — 5 | 4 |
| 2 — 3 | 9 |
| 0 — 1 | 15 |
| - 2 — - 1 | 18 |
| - 4 — - 3 | 4 |
| - 6 — - 5 | 1 |
| - 8 — - 7 | 2 |
| -10 — - 9 | 1 |
| -12 — -11 | 0 |
| -14 — -13 | 1 |
| Total | 60 |

emotionality, cognition type and cognition intensity to produce significant effects. When object location interacts with cognition type, the results show that when the objects are on their right, subjects look down more during the spatial questions, but when the objects are on the left or absent, there are more downward looks during verbal questions. This effect, significant at the .025 level, was not expected.

The interaction involving object location and cognition intensity was also unexpected. It too was significant at the .025 level. Although subjects maintained eye contact more during the easy questions than during the difficult questions, this difference was significantly greater when the objects were on the right.

The third interaction involving object location was with emotionality. It did not affect any of the four ocular variables; but rather two of the rating variables, emotionality ratings and the cognition intensity ratings. When there are no objects on either right or left, the embarrassing questions were rated more difficult and embarrassing than in any other condition; and the nonembarrassing questions were rated less difficult and embarrassing then in any other condition. These effects were significant at the .025 level.

Emotionality interacted with two factors, cognition type and cognition intensity to produce significant effects. When emotionality interacted with cognition type, the results show that subjects maintained eye contact significantly more during the spatial question primarily when the questions were nonembarrassing ($p<.05$). This interaction effect between emotionality and cognition type is consistent with the fact that nonembarrassing spatial questions were rated by the subjects as more spatial than embarrassing spatial questions; and the main

effects show that subjects maintained eye contact more during spatial questions.

Emotionality interacted with cognition intensity to produce highly significant effects on three of the four ocular dependent variables. They were maintains, up-downs, and rights-lefts. The interaction between emotionality and cognition intensity on maintains produced an effect similar to that of emotionality and cognition type. That is, the subjects maintained eye contact more during the easy questions than during the difficult questions, mainly when the questions were nonembarrassing ($p<.0001$). Here again the significant difference seems to be within the nonembarrassing questions. The ratings of the questions again support this effect - there was a significantly greater difference in the difficulty ratings of the easy and difficult questions when the questions were nonembarrassing than when they were embarrassing. Thus, the main effect of cognition intensity on maintains--that subjects maintain eye contact more during easy questions - must be qualified. The effect is particularly strong when the questions are not emotional.

These same two independent variables, emotionality and cognition intensity, interacted to produce an effect on dependent variable, ups-downs, at the .0001 level. Once again the main effect of cognition type on the vertical gaze aversions seems to take place within the nonembarrassing questions. That is, subjects look down more during easy questions and up more during difficult questions if the questions are nonembarrassing. This is consistent with the previously noted fact that the easy questions were rated more difficult when the questions were nonembarrassing - taken together with the main effect that people look up relatively more for difficult questions.

The effects of the interaction between emotionality

and cognition intensity upon lateral gaze aversions did not follow the same pattern as it did with the two previously mentioned dependent variables. It is especially intriguing as it is the only effect in the whole study upon lateral gaze aversions, the main focus of the entire study. Here, it appears that when the questions were nonembarrassing, subjects looked to the left more when the questions were difficult; but when the questions were embarrassing, they looked to the left more when the questions were easy ($p<.005$). This highly significant finding does not support either viewpoint of the hemispheric dominance hypothesis. Instead, it draws our attention clearly to the fact that question difficulty is a crucial mediator of the effects of question emotionality upon lateral gaze aversion. It suggests that emotionality and difficulty may combine to produce anxiety, and that lateral eye movements may reflect the classic Yerkes-Dodson (1908) curvilinear relationship between problem involvement and anxiety. That is, easy nonembarrassing questions are insufficiently motivating; difficult embarrassing questions are overwhelmingly debilitating; but either easy embarrassing or difficult nonembarrassing questions produce active involvement and maximal problem solving. Could it be that left-looking during an interview reflects that moderate degree of anxiety associated with efficient problem solving?

The final significant interaction was a three way interaction between emotionality, cognition type and cognition intensity ($p<.0001$). It affects only one of the seven dependent variables, the emotionality ratings. Embarrassing questions are rated as especially embarrassing when they are also verbal and easy. This finding again points to the importance of controlling questions for relevant dimensions in studies of this kind.

## CHAPTER IV

## DISCUSSION

The study casts a fresh light on research concerning the effects of different kinds of questions upon ocular behaviour. Its most important finding concerns the pervasive effects of question difficulty. More difficult questions clearly produce more upward looking than easy questions - a finding that appears independently of the equally important finding that people simply maintain less eye contact in response to difficult questions. Both these findings strongly support earlier results reported by Libby (1971).

The results for cognitive intensity appear singularily important in view of the fact that other investigators (Ehrlichman, Weiner and Baker, unpublished; Gur Gur and Harris, unpublished; Kinsbourne, 1972; Kocel, Galin, Ornstein and Merrin, 1972) have not secured cognitive intensity ratings from their subjects and report effects due to a priori judgement of question dimension. In fact, as the ratings in this study show, difficulty interacts with other dimensions — such interactions could account for much of the interactive effects of question dimension upon the ocular variables reported in their studies. Specifically, cognitive intensity interacted with emotionality and with cognitive type to affect maintainance of eye contact, and other variables. These effects would be difficult to explain without knowledge of the relationships among ratings.

The results for question emotionality are also of interest, supporting earlier findings by Exline, Gottheil, Paredes, and Winklemeier (1968), and Libby (1971), that embarrasing questions, too intimate for the quality of a

relationship, lead to less eye contact. Moreover, the results raise the interesting issue that subjects may respond to the situation in a cognitive, as well as emotional way, and that the cognitive dimension may prevail upon ocular behaviour. Specifically the embarrassing questions were rated as more difficult and produced more upward, rather than downward looks - contrary to suggestions made by Tomkins and McCarter (1964) and Goffman (1956) that embarrassment provokes feelings of shame and results in downward looks. This may be so in other circumstances, but apparently not under the conditions of the present study.

The third main finding that spatial questions result in more maintainence of eye contact may also be partially explained by the fact that the spatial questions were rated easier; but of course, it is possible that it is easier to visualize spatial effects than to formulate verbal responses while looking in the eyes of another - an hypothesis which requires further investigation.

The fact that the condition in which the objects were located to the right of the subject lead to more downward looks on spatial questions and to a greater cognition intensity effect on maintainence of eye contact than the other two conditions is difficult to explain. It does seem strong enough to merit further investigation.

The curvilinear interpretation of the emotionality by cognitive intensity interaction upon lateral eye movements seem to be a major consideration and may well be the most important finding of the study if verified by future research. When questions were easy the straightforward results obtained by other investigators (Libby, 1971; Schwartz, Davidson, Maer, and Fromfield, 1973) were replicated. That is, embarrassing questions produced more left looking than nonembarrassing questions. But when questions were difficult the opposite effect occured.

Thus, the similarity to the Yerkes-Dodson anxiety curve comes to mind. Easy, nonembarrassing questions and difficult, embarrassing questions may represent extremes of too little and too much anxiety for effective performance. The remaining two combinations - easy and embarrassing, and difficult and nonembarrassing - may correspond to intermediate degrees of anxiety. Future research then, should explore whether right-left looking reflects too little, just enough or too much involvement in the interview situation.

One interesting finding in this study serves to confirm an implicit working assumption in our society. That is, an interview in which it is desirable that the questions be embarrassing and difficult as possible for the interviewee, should take place in a bare room. In this study when the room was bare, (objects absent), embarrassing questions were rated as more embarrassing and more difficult than the embarrassing questions in either of the other two conditions. This is consistant with the fact that police interrogations almost always take place in bare or scarcely furnished rooms.

Since none of the independent variables provided any effects on lateral gaze aversions that support either view of the hemispheric dominance hypothesis it is interesting to consider some reasons why this study may not have been ideal in obtaining such results. Firstly, Baken (1971) states that women are more likely than men to avert their eyes in both directions; therefore, women are not as easily divided into right-movers and left-movers. Baken warns that it is more difficult to find differences between female right and left movers than between male right and left movers. Thus, the fact that the present study used only female subjects may account

for the lack of replication. However, if it is so that there are such great differences between the sexes in hemispheric lateralization, studies based on these differences may prove a fruitful course to follow in studying the mysteries of the human brain.

Secondly, Gur, Gur and Harris (unpublished) have provided evidence that question content will not determine eye movement in a face-to-face situation, but only in a situation in which the subject is not interacting face-to-face with the interviewer. The interview in the present study was, of course, face-to-face, and this might account for the lack of support for this view of the hemispheric dominance hypothesis. However, the same investigators also state that during a face-to-face interview, subjects will move their eyes consistantly in one direction regardless of the demands made upon the brain, thus emerging into right-movers and left-movers. This study does not support that finding although here again it must be pointed out that these investigators employed male subjects, while the subjects in the present study were female.

A third possible reason why no significant results involving lateral gaze aversions were found might involve the fact that six of the sixty subjects were left-handed. In general, it seems that left-handers are less well lateralized than right-handers (Kinsbourne 1972); therefore, it is more difficult to find consistent differences in the lateral eye movements of left-handed people. However, it is imporbable that the small number of left-handed people in this study could have eliminated any effect that question content might have had on the data, or any emergence of the subjects into right-movers and left-movers. This consideration becomes even more unacceptable in the light of the previously mentioned study by Gur, Gur, and Harris (unpublished). They obtained

significant differences between right and left eye movements even though seventeen out of forty-nine of their subjects were left-handed.

Certainly there is reason for further, more refined research in the study of ocular behaviour. This study suggests two possible methods of improvement. Firstly, investigators should take cognition intensity (difficulty of question) into account when designing or choosing their questions. There seems to be no doubt that question difficulty will influence ocular response, either directly or by interacting with other independent variables.

Secondly, perhaps investigators should obtain the subjects' ratings of the questions; this information would indicate to the experimenters just how successfully they had choosen their questions to represent the intended dimensions. Ideally, this type of research should continually be searching for "pure" questions; that is, questions that are rated by subjects as significantly different in terms of one dimension, and one dimension only. More concern for the questions used could only lead to more accurate interpretations of the effects of question content upon ocular behaviour.

# APPENDIX A

## SEMANTIC DIFFERENTIAL SCALES

Instructions: "Here is a list of the questions I asked you, (subjects were given a list of the questions), although they are not in the same order as they were during the interview, I would like you to rate each question on each of these three scales; that is, whether it was easy or difficult, embarrassing or nonembarrassing, and verbal or spatial. That means you'll be rating each question three different times, so that you'll have three circled numbers across each row. (The experimenter continually pointed to the relevant places on the scales as she gave the instructions). In this corner is a guide you can refer to. So if you circle a "2" in the first column, that means you found the question very easy. Let's look at another column - if you circle a '5' in the third column, that means you found the question somewhat spatial; if you circle a '6' that means you found the question very spatial. I would like you to try and use the whole range of the scale. Okay, do you understand how to use the scale?

"Now let me explain to you what is meant by verbal and spatial. Spatial indicates that images, pictures, or patterns were brought to mind. Verbal on the other hand, indicates that your mind simply searched for words or logic. Do you understand?

"So now that you've heard all the questions, go ahead and rate each one of them as best you can - trying to remember how you felt about each question at the time it was presented to you during the interview."

If the subject failed to understand any part of the instructions, the experimenter continued to explain that particular point until she was satisfied that the subject understood what she was to do.

The following page is an example of the semantic differential scales used in this study.

1 & 7 = extremely
2 & 6 = very
3 & 5 = somewhat
4 = neutral

| Question # | Easy-Difficult | Embarrassing-Unembarrassing | Verbal-Spatial |
|---|---|---|---|
| 1 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 2 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 3 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 4 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 5 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 6 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 8 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 9 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 10 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 11 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 12 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 13 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 14 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 15 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 16 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 17 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 18 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 19 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 20 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 21 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 22 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 23 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 24 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 25 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 26 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 27 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 28 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 29 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 30 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 31 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 32 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 33 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 34 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 35 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 36 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 37 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 38 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 39 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 40 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 41 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 42 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 43 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 44 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 45 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 46 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 47 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |
| 48 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 | 1 2 3 4 5 6 7 |

APPENDIX F

EXPERIMENTAL QUESTIONS

Nonemotional Verbal Easy:

1. What does COD mean?
2. What part of speech is 'the'?
3. What would you do if you lost a book that belonged to one of your friends?
4. What would you do if you went to the store for bread and they didn't have any?
5. What are the advantages of paying bills by cheque?
6. What day comes before Wednesday?

Nonemotional Verbal Difficult:

7. What is the meaning of the word 'time'?
8. Define the word 'economics'.
9. Define the word 'ability'.
10. Finish this sentence--"Ability is native, education is_____".
11. Tell me five verbs beginning with 'R'.
12. Make up a sentence using the words 'exchange' and 'stock'.

Nonemotional Spatial Easy:

13. Try to form a mental picture of what I am going to tell you and tell me when the picture is as clear as you can get it: "A Forest".
14. Try to form a mental picture of what I am going to tell you and tell me when the picture is as clear as you can get it: "An Ocean Liner."
15. Imagine a rectangle. Draw a line from the upper left hand corner to the lower right-hand corner. What two figures do you now have?
16. How are a piano and a violin alike?

17. Try to form a mental picture from the following quote and tell me when the picture is as clear as you can get it: "A birdie with a yellow bill hopped upon my window sill".

18. Try to form a mental picture from the following quote and tell me when the picture is as clear as you can get it: "Is this a dagger which I see before me, the handle toward my hand".

Nonemotional Spatial Difficult:

19. In pictures of Napoleon, which hand does he hold in his coat?

20. How many points are there on the Maple leaf in the Canadian Flag?

21. How many corners are there in a solid cube?

22. Name two small letters which go below the line of print like the letters p and y.

23. What is a letter that goes below the line of print in small writing and above the line in small printing?

24. Which angle is greater: the smaller angle formed by the hands of a clock at 2:45 or the smaller angle formed by the hands of a clock at 2:30?

Emotional Verbal Easy:

25. What is a four letter word beginning with 'f'?

26. Make up a sentence using the words 'thigh and kissed'.

27. What do you do to attract someone to whom you are sexually attracted?

28. If you are, or were to have a sexual relationship with someone, how often would you like to engage in sexual activity?

29. How often do you use underarm deodorants?

30. Compared with most people, how would you rate yourself on intelligence.

Emotional Verbal Difficult:

31. What is the most embarrassing word I could say to you?

32. What is the most embarrassing word do you think you could say to me?

33. What aspect of your personality do you dislike or regard as a handicap?

34. What was your first impression of me?

35. Why do you think lesbian relationships are considered by some people to be as satisfying as heterosexual relationships?

36. When was the last time you told a lie to someone close to you?

Emotional Spatial Easy:

37. What do you think is the average length of an erect penis?

38. Try to form a mental picture from the following quote and tell me when the picture is as clear as you can get it: "They grunted together, Karen squirming backward in the damp earth, Shar grinding himself against her."

39. Try to form a mental picture from the following quote and tell me when the picture is as clear as you can get it: "She heaved and hurdled, arched and cried, clawed me, kissed me, even gave a shriek once...".

40. Try to form a mental picture from the following quote and tell me when the picture is as clear as you can get it: "He could stand it no longer, he cried out, he sobbed helplessly against her tensed face..."

41. If you are engaged in an intimate sexual experience with someone, do you prefer the lights to be on or off?

42. What are you most afraid of?

Emotional Spatial Difficult:

43. What part of your body do you like to expose to men?

44. What part of your body do you like to hide from men?

45. Describe the scene of the most embarrassing experience you were ever in.

46. Try to get a clear picture in your mind of what I am going to tell you and tell me when it is as clear as you can get it: "A sexual orgy in your own room or apartment".

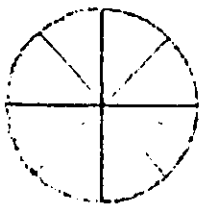
47. Think of your best female friend. What would you do if she expressed a desire to have a sexual relations with you?

48. Imagine you are out with a man for the first time. You notice his fly is open. What would you do?

## APPENDIX C

### OCULAR MOVEMENT SCORE SHEET

Below is an example of the one inch circles in which subjects' eye movements were recorded by the observers:



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