WORD ASSOCIATIONS AND THE BILATERAL ELECTRODERMAL RESPONSES
OF HIGH AND LOW REPRESSIVE FEMALES AS MEASURED BY
THE MMPI R FACTOR SCALE

by
Peggy J. Poe

A dissertation submitted in partial fulfillment
of the requirements for the degree

of
DOCTOR OF PHILOSOPHY

in
Psychology

Approved:

UTAH STATE UNIVERSITY
Logan, Utah
1982
ACKNOWLEDGMENTS

I would like to express my appreciation to Dr. William Dobson for his assistance in the organization and development of this dissertation and for his help and encouragement throughout my doctoral program.

I express a special appreciation also to Dr. Glenn Latham for his helpful editorial reviews and to Dr. Keith Checketts for his time and assistance in the analysis of my dissertation data.

A very special thanks is extended to Dr. Michael Bertoch and Dr. Elwin Nielsen for their patience, understanding and support throughout my program and for the efforts put forth in the development of this material.

I am very indebted to my friend Dr. Sebastian Striefel for his time-consuming chapter reviews and particularly for his patience, support and friendship throughout my program.

Peggy J. Poe
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>ii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>v</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>vi</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>vii</td>
</tr>
<tr>
<td>Chapter</td>
<td></td>
</tr>
<tr>
<td>I.  INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>7</td>
</tr>
<tr>
<td>Purpose</td>
<td>11</td>
</tr>
<tr>
<td>Hypotheses</td>
<td>12</td>
</tr>
<tr>
<td>II.  A REVIEW OF THE LITERATURE</td>
<td>14</td>
</tr>
<tr>
<td>EDA as a Measure of Hemispheric Activation</td>
<td>20</td>
</tr>
<tr>
<td>EDA in Normal Subjects</td>
<td>23</td>
</tr>
<tr>
<td>Implications of Autonomic Asymmetries</td>
<td>26</td>
</tr>
<tr>
<td>Repression and Sexual Functioning</td>
<td>28</td>
</tr>
<tr>
<td>Sexual Functioning and Hemisphere Control</td>
<td>30</td>
</tr>
<tr>
<td>III.  METHOD</td>
<td>33</td>
</tr>
<tr>
<td>Subjects</td>
<td>33</td>
</tr>
<tr>
<td>Measures and Apparatus</td>
<td>33</td>
</tr>
<tr>
<td>MMPI R Factor Scale of Repression</td>
<td>33</td>
</tr>
<tr>
<td>Electrodermal Activity</td>
<td>35</td>
</tr>
<tr>
<td>Verbal/Spatial Stimuli</td>
<td>36</td>
</tr>
<tr>
<td>WAT</td>
<td>37</td>
</tr>
<tr>
<td>Procedure</td>
<td>39</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>40</td>
</tr>
<tr>
<td>IV.  RESULTS</td>
<td>41</td>
</tr>
<tr>
<td>V.  DISCUSSION</td>
<td>58</td>
</tr>
<tr>
<td>Effects of Tones</td>
<td>59</td>
</tr>
<tr>
<td>Effects of Verbal/Spatial Question Task</td>
<td>61</td>
</tr>
<tr>
<td>Effects of the Word Association Test</td>
<td>64</td>
</tr>
<tr>
<td>Omitted Responses of WAT</td>
<td>67</td>
</tr>
</tbody>
</table>
Table of Contents (continued)

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-post WAT Baseline Levels</td>
<td>68</td>
</tr>
<tr>
<td>Effect of Intermittently Monitored Baseline Levels</td>
<td>68</td>
</tr>
<tr>
<td>Effects of Repression on Sexual Functioning</td>
<td>69</td>
</tr>
<tr>
<td>Implications for Future Research</td>
<td>70</td>
</tr>
<tr>
<td>Summary</td>
<td>74</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>76</td>
</tr>
<tr>
<td>APPENDICES</td>
<td>86</td>
</tr>
<tr>
<td>Appendix A: Functions Attributed to Differential</td>
<td>87</td>
</tr>
<tr>
<td>Hemispheric Control</td>
<td></td>
</tr>
<tr>
<td>Appendix B: Questions</td>
<td>89</td>
</tr>
<tr>
<td>Appendix C: Word Association Test</td>
<td>91</td>
</tr>
<tr>
<td>Appendix D: Sexual Activity Questionnaire</td>
<td>93</td>
</tr>
<tr>
<td>Appendix E: Experimental Design</td>
<td>95</td>
</tr>
<tr>
<td>VITA</td>
<td>97</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Individual Responses and Right/Left Differences (uhmos)</td>
<td>42</td>
</tr>
<tr>
<td>2. Number of Subjects Showing a Right/Left (EDA) Response Bias</td>
<td>43</td>
</tr>
<tr>
<td>3. Mean Group Scores for Right and Left Hands for Amplitude, Frequency, and Frequency of Spontaneous Fluctuations of EDA</td>
<td>45</td>
</tr>
<tr>
<td>4. Mean EDA Amplitude Levels (uhmos)</td>
<td>47</td>
</tr>
<tr>
<td>5. Means and Standard Deviations of EDA Response Amplitudes to the Word Association Test (WAT)</td>
<td>48</td>
</tr>
<tr>
<td>6. Mean Response Latencies from Word Association Test</td>
<td>49</td>
</tr>
<tr>
<td>7. Group Frequency of Left and Right Omitted Responses to the Word Association Test (WAT)</td>
<td>50</td>
</tr>
<tr>
<td>8. Comparison of Left/Right Baselines for Five Successive Blocks by Level of Repression</td>
<td>55</td>
</tr>
<tr>
<td>9. Comparison of Baseline 1 with Baseline 5 (Pre-Post) by Left and Right Hand</td>
<td>56</td>
</tr>
<tr>
<td>10. Sexual Functioning Category of High and Low Repressed Subjects as Measured by the Sexual Activity Questionnaire</td>
<td>57</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Group right/left hand difference scores in response latencies to neutral and sexual words of the Word Association Test (WAT)</td>
<td>51</td>
</tr>
<tr>
<td>2.</td>
<td>Comparison of group left/right hand baseline measures of EDA across tasks</td>
<td>53</td>
</tr>
<tr>
<td>3.</td>
<td>Comparison of left and right hand scores of EDA between high and low repressed subjects in each task condition</td>
<td>54</td>
</tr>
</tbody>
</table>
ABSTRACT

Word Associations and the Bilateral Electrodermal Responses of High and Low Repressive Females as Measured by the MMPI R Factor Scale

by

Peggy J. Poe, Doctor of Philosophy
Utah State University, 1982

On the basis of the MMPI R Factor Scale, 16 subjects were classified as high repressed and 14 as low repressed. Subjects were compared on patterns of bilateral differences in skin conductance as a function of three cognitive tasks intended to produce specific manipulations in the relative activation of the two cerebral hemispheres. Tasks 1 and 2 examined the effects of Verbal (left hemisphere) and Spatial (right hemisphere) tasks on amplitudes of electrodermal responses. Task 3 examined the effects of the presentation of double-entendre and asexual stimulus words (designed to produce an emotional stimulus) on the high and low repressed groups. Results showed no tasks were accompanied by significant bilateral differences in electrodermal activity although high repressed subjects showed a consistent tendency toward greater amplitudes in both hands to the sexual portion of the word task. These findings are in direct
contradiction to research suggesting that hemisphere activation is task dependent, but support the theoretical postulation of "hemisphericity" (the individual preference for the use of one hemisphere or the other). Subsequent to the tasks, each subject completed a Sexual Activity Questionnaire to determine categories of orgasmic or non-orgasmic. These data proved to be highly related to the personality variables of high and low repression. All subjects self-reported to be orgasmic \((n = 3)\) scored in the low repressed group. Of 16 subjects self-reported to be non-orgasmic, 11 (69%) scored in the high repressed group. These findings argue strongly that sexual conflicts in high repressors leads to psychosomatic sexual dysfunctions as postulated by traditional psychoanalytic theory. Present findings were discussed in terms of the relationships between personality, repression, and sexual conflict and how these variables influence electrodermal functioning. Implications for future research and theoretical complexities in the interpretation of the present results suggesting support for the "hemisphericity" postulation were also discussed.

(98 pages)
CHAPTER I

INTRODUCTION

Scientists have long believed the left hemisphere of the brain to be dominant for speech, writing, and other symbolic functions (Broca, 1861; Dax, 1836). Evidence is abundant showing the left hemisphere to be actively involved in such functions as arithmetic, analytical tasks, abstract thinking, time discrimination, and logical reasoning for which words are the usual method of expression (Bogen, 1969; Day, 1964; Kocel, Galin, Ornstein, & Merrin, 1972). Until recently, the right hemisphere was considered to be passive or nondominant, with evidence accumulating only in the last few years that the right hemisphere plays an active role in such nonverbal functions as spatial perception, body image functions, imagery, recognition of melodies, recognition of faces, and for such perceptual-motor functions as drawing and block design (Doyle, Ornstein, & Galin, 1974; Fisher, 1958; Hecaen, 1970; Sperry, 1968; Sperry & Gazzaniga, 1967). There are also data that support association of the right hemisphere with creativity, depression, emotionality, repressed or unconscious processes, and a holistic mode of conceptualization (Bogen & Bogen, 1969; Myslobodsky & Horesh, 1977; Schwartz, Davidson, & Maer, 1975).

Studies which have examined the localization of behavioral functions in the human nervous system have used a number of different approaches. These techniques make use of lateralized input and output modes, capitalizing on partially separate pathways in the intact nervous system. They include procedures such as dichotic presentation
of auditory stimuli, tachistoscopic presentation of visual stimuli to
the left and right visual half-fields, monitoring the direction of
conjugate lateral eye movements during various types of mental
activity, and bilateral recordings of electroencephalogram (EEG)
evoked potentials during the performance of various tasks thought to
engage the hemispheres differentially.

Studies of patients with unilateral brain damage and cerebral
disconnection ("split-brain") have provided the basis for our present
understanding of lateral specialization of function (Bogen, 1969;
Hecaen, 1970). In humans, the two cerebral hemispheres appear to be
specialized for different cognitive functions, and when they are
surgedally disconnected, they each appear conscious, but unaware of the
other; i.e., two separate conscious minds in one head. Not only are
they separate minds, but because of their different specializations,
they are different minds (dissociation phenomenon) (Levy, Trevarthen, &
Sperry, 1972). Only recently, with the development of more
sophisticated physiological equipment, has the study of how these two
half-brains cooperate or interfere with each other in normal intact
subjects been investigated (Berlucchi, Heron, & Hyman, 1971; Doyle et
al., 1974; Galin & Ornstein, 1972; Gardiner & Walter, 1977; Kleinman,

Compelling evidence suggests a similarity between the dissociation
phenomenon seen in commissurotomy ("split-brain") patients and the
specialization of the two hemispheres for different cognitive modes.
Specifically, certain aspects of right hemisphere functioning appear to
be congruent with mental processes that are repressed, unconscious, and
unable to directly control behavior (Galin, 1975). Additionally,
observations of commissurotomy patients suggest that the isolated right hemisphere can engage in emotional responses and goals quite divergent from the left and that the split hemispheres can experience reinforcing events independently of each other (Gazzaniga, 1970).

In spite of their different modes of organization, under normal conditions the functions of the two hemispheres appear to follow the well-integrated system of reciprocal inhibition so characteristic of human nervous system function. However, since stimulation of callosal fibers (connecting the two half-brains) can inhibit as well as excite neuronal discharge in the contralateral cortex, it has been proposed that certain kinds of left hemisphere activity may directly suppress certain kinds of right hemisphere action (Bogen & Bogen, 1969). It is also possible that this activity may prevent access of the products of right hemisphere activity to the left hemisphere, or vice versa.

Determination of which hemisphere will have control is unclear. One possibility, following the theory of reciprocal inhibition, is that they "take turns," depending on the situational demands. That is, when one is "on," it inhibits the other. Or, perhaps it inhibits the other only partially, making use of only one or more of the subsystems of the other, but rendering the remainder of the hemisphere incapable of sustaining its own plan of action (Doyle et al., 1974; Galin & Ornstein, 1972).

If under usual conditions, one hemisphere dominates over the other in an alternating fashion with each of them maintaining independent consciousness, what factors determine which hemisphere will be "on"? Split-brain studies have provided two possible answers: one could be
called "resolution by speed," that is, the hemisphere that solves the problem first gets to the output channel first. Sperry (1968) found that while postoperative behavior of commissurotomy patients was dominated by the major (left) hemisphere, the right hemisphere dominated behavior in the facial recognition task. Recognition of faces requires a perception of the gestalt and is relatively resistant to verbal description (Hecaen, 1962). Therefore, it could be that the disconnected right hemisphere might be better than the left at recognizing faces.

A second determinant of which hemisphere gets control could be called "resolution by motivation," that is, the one that cares more affects the outcome. Based on studies involving split-brain monkeys which showed that each hemisphere could be taught separately a visual discrimination task, reinforced for the correct response, and then retrained using different reward conditions, Gazzaniga (1970) concluded that "cerebral dominance in monkeys is quite flexible and subject to the effects of reinforcement ... the hemisphere which is most successful in earning reinforcement comes to dominate" (p. 418). This may apply to humans as well. Galin (1975) proposes, "As the left hemisphere develops its language capability in the second and third year of life, it gains a great advantage over the right hemisphere in manipulating its environment and securing reinforcements. It seems likely that this is the basis for the left hemisphere's suzerainty*.

---

*Suzerain: a dominant state controlling the foreign relations of a vassal state, but allowing it sovereign authority in its internal affairs (Webster, 1975).
in overt behavior in situations of conflict with the right hemisphere" (p. 575).

The above considerations suggest that in non-neurologically damaged people, under certain conditions mental events in the right hemisphere can become disconnected functionally from the left hemisphere (by inhibition or neuronal transmission across the corpus callosum) and can continue a life of their own. That is, parts of the transmission from one hemisphere to the other can be selectively and reversibly blocked.

The conditions under which the two hemispheres of an ordinary person could begin to function as if they had been surgically disconnected can best be understood by examining the differential effect of a single input on each hemisphere. If, for instance, a mother presents to her child one message verbally ("I love you"), but another facially ("I hate you"), each of the child's hemispheres is exposed to the same sensory input, but because of their relative specializations, each emphasizes only one of the messages (Levy et al., 1972). The left will focus on the verbal cues because it cannot extract information from the facial gestalt efficiently; the right will focus on the nonverbal cues because it cannot understand the words. In effect, a different and conflicting input has been delivered to each hemisphere. In this situation, the two hemispheres might decide on opposite responses to the input, the left to "approach," and the right to "flee."
Because of the high stakes involved, each hemisphere might be able to maintain its consciousness and resist the inhibitory influence of the other side. The left hemisphere seems to win control of the output channels most of the time, but if the left is not able to turn off the right completely, it may settle for disconnecting the transfer of the conflicting information from the other side. The mental process, cut off in this way from the left hemisphere consciousness that is directing overt behavior, may nevertheless continue a life of its own. The memory of the situation, the emotional concomitants, and the frustrated plan of action may all persist, affecting subsequent perception and forming the basis for expectations and evaluations of future input. (Galin, 1975, p. 576)

This theory provides a neurophysiological mechanism for at least some instances of repression, and an anatomical locus for unconscious mental events. If repression in normal people is to some extent produced by a functional disconnection of right hemisphere mental processes because of conflict, the expression of unconscious events might be revealed in whatever output channels are not preempted by the left hemisphere, such as in dreams, psychosomatic symptoms, or autonomic nervous system asymmetries (Galin, 1975).

The present study will be concerned with electrodermal activity (EDA) as a mode of autonomic nervous system expression. In studies of normal humans, Varni, Doerr, and Franklin (1971) concluded: "Asymmetry of autonomic activity is typical rather than atypical. The cerebrum participates extensively in visceral control, and asymmetrical cerebral activity may be reflected through asymmetrical autonomic activity" (p. 393). As a sign of lateral cerebral specialization, autonomic activity may well be even more useful than the often used EEG alpha asymmetry measure, because the EEG can sample only those areas near the outside of the brain (Doyle et al., 1974; Galin & Ornstein, 1972).
Autonomic variables probably measure those deep areas of the brain that are not accessible to the scalp EEG (Wang, 1964).

When anxiety responses are experimentally induced by stress or conflict, the particular indices by which such responses are to be evaluated must be specified. Electrodermal response measures (EDA or GSR) of autonomic nervous system (ANS) activity have been frequently employed for this purpose, since ANS arousal is generally considered to be an important attribute of anxiety (Freud, 1936; Malmo, 1959; Martin, 1960; Silverman, 1957).

Statement of the Problem

One relatively new autonomic measure of differential hemispheric functioning is bilateral electrodermal activity (EDA). First discovered in 1879, EDA has, for many years, been found to vary as a function of many kinds of behavioral manipulations (see Prokasy & Raskin, 1973, for reviews). Differences in electrodermal arousal have, until recently, been interpreted as a reflection of differences in the nature or degree of activation of only "global" psychological processes such as general motor activity, attention, or motivation (Edelberg, 1961; Freeman, 1948; Roberts, 1974; Smith, 1967; Sokolov, 1963). Evidence in support of these views, however, was gathered almost exclusively in studies in which EDA was recorded from a single site—the assumption being made that the location of this site made little, if any, difference in the results obtained.

Recent studies have indicated that EDA may, under certain conditions, be affected differently in different sides of the body by the same experimental manipulation (Varni, 1975). Originally examined
in schizophrenic patients, asymmetries in bilateral EDA were attributed to a dysfunction of the temporal-limbic system of the left hemisphere (Gruzelier, 1973). Later studies, using normal subjects, found evidence of contralateral hemispheric control of reactive EDA (Ketterer & Smith, 1977; Myslobodsky & Rattok, 1975). As is found in other measures of relative hemispheric activation, verbal tasks evoked more reactive EDA in the right hand, and spatial and emotional tasks evoked more EDA in the left hand.

Consideration of the neurophysiological basis of EDA and results of recent research suggest strongly that these bilateral differences in response amplitudes, recorded from both sides of the body simultaneously, are indeed a reflection of differential activation of the two hemispheres (Bloch, 1965; Flor-Henry, 1969; Wang, 1964; Wilcott, 1969). Evidence for contralateral inhibition of electrodermal activity comes from reports that unilateral hemispheric damage produces an increase in sweating and skin conductance on the contralateral side (Holloway & Parsons, 1969) and that unilateral hemispheric stimulation inhibits the contralateral electrodermal response to an arousing stimulus (Wilcott, 1969). By taking advantage of known differences in cognitive specialization between the two hemispheres, differential activation of the two hemispheres by behavioral manipulations should lead to a lower level of electrodermal arousal on the side contralateral to the more activated hemisphere than on the ipsilateral side.

If, as postulated, "conflict" differentially activates or inhibits the two hemispheres (Galin, 1975), presentation of stimulus material from a known source of conflict should result in an asymmetrical response amplitude of EDA recorded simultaneously from both hands.
For the individual, of course, the nature of "conflict" varies widely. However, one of the most consistently described sources of human conflict arises from issues concerning sexual attitudes and behaviors (Fisher, 1973; Kinsey, Pomeroy, Martin & Gebhard, 1953; Masters & Johnson, 1970; McCary, 1973; Shope, 1975). Particularly in today's changing society, pervasive new value systems challenge attitudes formed in earlier developmental stages by parents and/or caretakers who were influenced by still another set of values. Numerous theories have been developed in an attempt to explain the biological and social repercussions of human sexual behavior and to describe coping mechanisms used by individuals caught in these conflicts.

In an attempt to eliminate from consciousness those feelings or thoughts that give rise to unpleasant affect, some individuals deny an event by either making a statement to the contrary or by failing to acknowledge that the event has occurred. For those who rely on this coping mechanism or "repression," the conflict that could produce the unpleasant feeling is neither consciously identified nor accepted (Rapaport, 1974). Repression of sexual conflicts and inhibitions concerning sexual behavior have been consistently described by workers in the field as being responsible for sexual difficulties—especially for females (Kaplan, 1975; Masters & Johnson, 1966, 1970).

According to a developmental theory of personality formation, repression is a result of the classical Freudian Oedipal conflict. Desires for the mother as a sexual object, incest fantasies, curiosity about sex, and any ideation that is likely to be a reminder of these
threatening desires are pushed out of consciousness. This individual is then left with a sexual urge devoid of its object associations—but pressing for release. The sexual nature of this situation is not recognized by the individual, but is experienced as a mixture of anxiety, apprehension, and guilt.

The resulting personality style is characterized by affect that is often out of context and always out of proportion to the environmental or social stimulus. These individuals display dramatic and attention-seeking behavior, emotional excitability and over-reactivity, self-centeredness, an appearance of being unconcerned ("la belle indifference"), a global approach to events which are grasped in their totality by visual impressions rather than by logical detail, lack of ability to make precise verbal descriptions, naivete, a boastfully seductive presentation of self, and a provocativeness or sexualization of non-sexual relationships often combined with sexual dysfunctions or fears (Rogers & Solomon, 1973).

Upon observation, there appears to be a striking similarity between the characteristics of those individuals who display this personality pattern and some of the dissociative phenomena which have, in past research, been attributed to isolated right hemisphere functioning (see Appendix A). Whether this similarity is indicative of differential hemispheric processing, or a "cut off" response of one hemisphere or the other under the conditions of conscious or unconscious conflict in such an individual, is the investigative goal of this project.
Theoretically, it has generally been assumed that sexual stimuli serve as anxiety elicitors for persons with this personality style. Since high "repressors" presumably cope with anxiety by attempts to avoid the anxiety-producing stimulus and its consequences, while low repressors cope with anxiety by attempts to approach and master the conflicts and its consequences, there should be predictable differences between the two groups in their responses to a variety of sexual stimuli. Thus, given stimulus materials that permit either an anxiety-arousing interpretation or an anxiety-reducing interpretation, high repressors should theoretically engage in a non-threatening interpretation.

A series of studies (Galbraith, 1968; Galbraith, Hahn, & Lieberman, 1968; Galbraith & Mosher, 1968; Galbraith & Wynkoop, 1976) has shown that a list of double-entendre words with alternative sexual or asexual meanings permits a psychometric ordering of individuals along a dimension of verbal sexual responsivity. These responses appear to be the result primarily of response inhibition-facilitation rather than individual differences in familiarity with the sexual connotations of the stimulus words. Because the stimulus words serve both as anxiety elicitors and potentially ambiguous stimuli, the list meets several criteria for testing hypotheses concerning conflict and repression. This word-association test (WAT) will be used in the proposed study.

Purpose

The purpose of the proposed study is to examine EDA response and latency asymmetries of high repressed versus low repressed females to determine whether differences in responding exist on these measures.
Hypotheses

It is hypothesized that:

1. Subjects show no individual response biases to the presentation of a non-lateralized tone sequence, as measured by amplitude, frequency, and frequency of spontaneous fluctuations of EDA.

2. Subjects scoring in the High Repressor (HR) group show no greater left/right response asymmetries in EDA to the presentation of the tone stimulus than subjects scoring in the Low Repressor (LR) group, as measured by amplitude, frequency of response, and frequency of spontaneous fluctuations.

3. Subjects show no increasing intrapsychic anxiety as measured by changes in amplitude, frequency of response, and frequency of spontaneous fluctuations for the last seven presentations of the tones over the first seven presentations.

4. Subjects show no group differences in EDA during the presentation of the Verbal/Spatial Question task with all subjects showing greater right hand amplitude of EDA during performance of the Verbal task and greater left hand amplitude during performance of the Spatial task.

5. Subjects scoring in the High Repressor (HR) group show no greater left/right response asymmetries in EDA to the presentation of conflict (Sexual words) than subjects scoring in the Low Repressor (LR) group, as measured by response amplitudes and latencies.
6. Subjects scoring in the High Repressor (HR) group show no greater frequency of omitted (0) verbal responses on the Word Association Test (WAT) than subjects scoring in the Low Repressor (LR) group.

7. Subjects scoring in the High Repressor (HR) group show no increasing intrapsychic inhibitory anxiety during presentation of the Word Association Test (WAT) as measured by stabilized baseline levels.

8. Subjects scoring in the High Repressor (HR) group show no differences in posttest EDA arousal levels as compared to initial tonic arousal levels subsequent to the presentation of the Word Association Test (WAT) than will subjects scoring in the Low Repressor (LR) group.

9. Subjects scoring in the High Repressor (HR) group show no increased frequency of self-reported sexual dysfunction than subjects scoring in the Low Repressor (LR) group as measured by the Sexual Activity Questionnaire.
CHAPTER II

A REVIEW OF THE LITERATURE

The brain of higher animals, including man, is a double organ, consisting of right and left hemispheres connected by an isthmus of nerve tissue called the corpus callosum. In vertebrates, each sensory half-field is projected to the contralateral hemisphere (Gross & Mishkin, 1963). That is, neural pathways carrying information from one side of the body and one-half of the visual field cross over and connect only with the opposite side of the brain. Likewise, the major pathways are crossed, and the left hemisphere controls movements on the right side of the body.

Historically, investigators have long been intrigued by the search for localization of function in the nervous system. Rolando (1809) first used electrical stimulation of the animal brain in an unsuccessful attempt to find where movements originated. Flourens (1823) performed the first experiments on the effects of animal behavior of surgically extirpating parts of the brain. He found that partial destruction of the cortex had no effect on behavior and that the whole cerebrum had to be removed in order to interfere with perceptual processes and voluntary movements.

In 1836, Dax noticed that speech was often disturbed in patients who had suffered strokes or other damage to the left side of the brain. Later, Broca (1861) claimed that speech was controlled by a small area of cortex in the left hemisphere.
With the demonstration of left hemisphere localization of a human function as important as speech, the less dramatic defects of right hemisphere damage passed unnoticed as early neurophysiologists became increasingly preoccupied with left hemisphere activity.

A later study by Weisenberg and McBride (1935) revealed the left hemisphere to be dominant for motor activity in right-handed individuals and the reverse to be true for left-handed individuals. This finding supported the then widely prevalent concept of cerebral dominance which distinguishes between the major and minor (or passive) hemisphere functionally.

Until recently, hemisphere functioning in the human cortex could be evaluated only by integrating information gained through controlled laboratory studies with findings obtained from brain-injured patients. Methodological difficulties, lack of sophistication of measuring and recording devices, the inability to determine accurately the precise extent and locus of lesions, and the functional and anatomical differences between humans and animals permitted an inconclusive interpretation of results at best.

Nevertheless, both the discovery of major functional differences between the two cerebral hemispheres of the human brain and the first major steps toward identifying the specific functions mediated by each hemisphere have been accomplished primarily through the study of patients with unilateral brain damage (Bogen, 1969; Hecaen, 1970).

A major advance in the study of lateral differentiation of function in the human brain came with the first surgical disconnections of the left and right hemispheres (Gazzaniga, Bogen, & Sperry, 1962,
1965; Sperry & Gazzaniga, 1967). This "split-brain" procedure involved the sectioning of the corpus callosum, the band of fibrous nerve tissue connecting the two halves, producing subjects whose hemispheres have been completely isolated from each other except for the connection of the lower brainstem, thus permitting the functions of each hemisphere to be investigated separately using a series of highly specialized tests. These were designed to show the extent that interhemispheric transfer of visual and tactile information would be impaired after the surgical procedure. Since the optic chiasm, responsible for vision, remains intact in such patients, any visual stimulus passes from each eye to both hemispheres. That is, input to each eye is transmitted to both hemispheres. Utilizing this information, Sperry and Gazzaniga (1967) found that a picture tachistoscopically flashed to the patients' right visual field resulted in an immediate ability to identify it verbally. The same picture flashed to the left visual field, however, resulted in the patients' inability to identify anything but a flash. Experiments involving tactile information show a similar pattern.

Although it has long been recognized that the two cerebral hemispheres are specialized for different functions, it was assumed that each was somewhat dependent on the other to maintain some integration of function. One of the most surprising findings coming from the split-brain studies of Sperry and others was the apparent viability of two completely separate "minds." These findings are summarized by Levy et al. (1972):

Recent commissurotomy studies have shown that the two disconnected hemispheres, working on the same task, may process the same sensory information in distinctly different ways, and that the two modes
of mental operation, involving spatial synthesis for the right and temporal analysis for the left, show indications of mutual antagonism. The most remarkable effect of sectioning the cerebral commissures continues to be the apparent lack of change with respect to ordinary behavior. [They] . . . exhibit no gross alterations of personality, intellect, or overt behavior two years after operation. Individual mannerisms, conversation, temperament, strength, vigor, and coordination are all largely intact and seem much as before surgery. Despite this outward appearance of general normality in ordinary behavior, specific tests indicate functional disengagement of the right and left hemispheres with respect to nearly all cognitive activities. Learning and memory are found to proceed quite independently in each separated hemisphere. Each hemisphere seems to have its own conscious sphere for sensation, perception, ideation, and other mental activities and the whole inner realm of gnostic experience of the one is cut off from the corresponding experiences of the other hemisphere--with only a few exceptions. (p. 66)

Split-brain procedures had the advantage of permitting for the first time, interhemispheric comparisons of asymmetries in the same individual, but the few patients who had become candidates for such a procedure were severe epileptics preoperatively, raising criticism that postoperative effects could be more related to the disease process than the surgical intervention.

Only recently, with the development of more sensitive and sophisticated recording equipment, have techniques been devised to investigate hemispheric specialization and interaction in the normal intact brain. Electroencephalogram (EEG) recordings, tachistoscopic presentation of stimuli to the visual fields, bilateral recording of evoked potentials, and monitoring the direction of conjugate lateral eye movements (CLEMs) have supplied evidence for asymmetries of function during the performance of various tasks.
Numerous investigators, utilizing EEG techniques on subjects during the performance of verbal and spatial tasks, have consistently shown a higher alpha (idling) amplitude over the right hemisphere during the verbal tasks, and more alpha over the left hemisphere during the spatial tasks. Thus, the hemisphere expected to be less active in the task demonstrated more of the idling rhythm (Doyle et al., 1974; Galin & Ornstein, 1972; Gardiner & Walter, 1977).

Tachistoscopic presentations of stimuli to the left and right visual fields have shown hemispheric asymmetries in reaction time and discriminatory processes (Berlucchi et al., 1971; Kleinman et al., 1976; Kleinman & Little, 1973).

Recently CLEMs have been used as an indicator of asymmetric hemispheric activation. It had been observed (Teitabaum, 1954) that when a subject is faced by a questioner, he usually breaks eye contact following the presentation of a question and moves his eyes either to the right or to the left. In a later investigation of this phenomenon by Day (1964), it was observed that this eye movement response is associated with the transition from an internal to an external direction of attention, such as when a subject is asked to answer a question which requires reflection (e.g., mental arithmetic). Duke (1968) found the movement to be characteristic in direction for the individual on repeated observations, and that most individuals could be classified as right-movers or left-movers unrelated to sex, handedness, or eye dominance variables. He also found that right-movers and left-movers differ in a wide variety of psychological and physiological characteristics such as attentional differences, language usage, brain
wave pattern, muscular tone, and response to psychotherapy. Among the characteristics of the left-mover is a greater tendency to focus attention on internal subjective experiences. The right-mover, on the other hand, shows a greater tendency to external focus of attention than left-movers. For instance, Bakan and Shotland (1969) found that right-movers performed better than left-movers on tasks that required visual attention, but the left-movers reported clearer visual imagery (Bakan, 1969). Later studies by Bakan (1969; 1971) have shown that right-movers tend to have higher quantitative scores on the Scholastic Aptitude Test, and left-movers tend to have higher verbal scores; that left-movers show greater fluency in writing; and that right-movers are more likely to major in science/quantitative areas in college and left-movers are more likely to choose the social sciences/humanities areas.

Although Bakan proposed the direction of CLEMs indicated relative predominance of one of the two cerebral hemispheres regardless of the content of the problem put to the subject, later investigations (Kinsbourne, 1972; Kocel et al., 1972) showed that direction of the movement was related to problem type: subjects showed a significant tendency to move their eyes to the right for verbal problems and to the left for spatial problems.

In a study designed to determine whether direction of CLEMs is an enduring individual personality trait or a function of the type of reflective problem presented to the subject, Gur and Gur (1975) found that under anxiety-provoking conditions such as the face-to-face interview technique used by Bakan, the subject may tend to rely on the
hemisphere that is more compatible with his usual cognitive style. But in an impersonal testing situation (the experimenter behind the subject), anxiety would be minimal, allowing hemispheric information-processing to proceed according to problem type.

EDA as a Measure of Hemispheric Activation

Most recently in the study of hemisphere specialization, bilateral differences in skin conductance response amplitude appear to provide yet another index of relative hemispheric activation.

First observed by Vigouroux (1879), electrodermal activity (EDA) has been found for many years to vary as a function of many kinds of behavioral manipulations (see Prokasy & Raskin, 1973, for reviews). Differences in electrodermal arousal have been taken to reflect differences in the nature or degree of activation of global psychological processes, such as general motor activity (Freeman, 1948; Smith, 1967), attention (Edelberg, 1961; Sokolov, 1963), or motivation (Roberts, 1974). Evidence in support of these views has been gathered almost exclusively in studies in which EDA has been recorded from a single site. Few studies have compared EDA taken simultaneously from different limbs.

Recent studies, however, have indicated that EDA may, under certain conditions, be affected differently in different sides of the body by the same experimental manipulation. Varni (1975) reported that in a classical conditioning situation in which the unconditioned stimulus was a shock to the hand, evidence of the classically conditioned electrodermal response was obtained only unilaterally from
the hand that had been previously shocked. Additionally, several investigators have provided evidence that patients with certain psychiatric diagnoses exhibit marked bilateral differences in electrodermal reactivity. Gruzelier and Venables (1972) discovered that the electrodermal orienting response of schizophrenic patients either did not occur or was slow to habituate when an auditory stimulus was presented repeatedly. They also reported that schizophrenic patients who did respond had higher response amplitudes, shorter latencies, and more rapid recovery times than did normal controls. They suggested that these findings might be evidence of temporal-limbic dysfunctions, since it is known that ablation of certain areas of the limbic system can impair skin conductance responses (Bagshaw, Kimble, & Pribram, 1965; Douglas & Pribram, 1966), and that electrical stimulation of the amygdala can increase electrodermal activity. It has been reported (Flor-Henry, 1969) that epileptic patients with tumors of the left temporal lobe exhibit schizophrenic-like symptoms, and that epileptic patients with tumors of the right temporal lobe exhibit affective disorders. Holloway and Parsons (1969) found that unilateral brain damaged patients had high palmar skin conductance levels on the hand contralateral to the hemisphere that was damaged.

Gruzelier (1973) examined bilateral skin conductance orienting responses and levels in two groups of schizophrenics which he termed responders and nonresponders. Responders were those schizophrenics who had electrodermal orienting responses to a series of tones. The orienting responses in these patients were either slow to habituate or did not habituate at all. Nonresponders were those schizophrenics who
showed little or no orienting response to a series of tones. Gruzelier found bilateral asymmetries of skin conductance levels in both responders and nonresponders, with responders having higher skin conductance levels in the right hand and nonresponders having higher skin conductance levels in the left hand. Responses obtained from the left hand, and responses obtained from the right hand were also slower to habituate. It was suggested that the opposite direction of asymmetry of skin conductance levels in responders and nonresponders, as well as the bilateral response asymmetries of responders, may be associated with extreme states of arousal caused by limbic dysfunctions.

Gruzelier and Venables (1973) examined the electrodermal orienting responses of schizophrenic responders and nonresponders to non-signal and signal tones. They found that when the tones acquired signal value, both responders and nonresponders exhibited electrodermal orienting responses to the tones. As in the previous study, only responders exhibited significant orienting responses to non-signal tones. Since it had been shown that patients with frontal lesions do not show orienting responses to signal stimuli, Gruzelier concluded that these findings provided evidence to support the proposition that schizophrenic responding and nonresponding were not related to frontal lobe involvement. Lateral asymmetries of skin conductance levels and responding in the directions previously reported were also found in this study, suggesting that electrodermal activity is mediated by the limbic structures in the hemisphere ipsilateral to the hand from which electrodermal activity is being recorded, and that asymmetries of skin conductance levels and responses may be related to dysfunctions of the limbic structures of the left hemisphere.
In a recent study, Gruzelier and Hammond (1976) replicated the earlier findings and examined other measures of lateralized neuropsychological deficits in schizophrenic patients. They reported that schizophrenic patients showed a number of deficits of cognitive functioning on the Wechsler Adult Intelligence Scale, most of which occurred on the verbal measures and not on the spatial measures of the test. These results supported earlier findings (Klonoff, Fibiger, & Hutton, 1970) of lateralized deficits on the WAIS in schizophrenic patients. Gruzelier interpreted these and earlier findings as evidence of a dysfunction of the temporal-limbic system of the left hemisphere. It was suggested that the dysfunction resulted in low arousal states in some schizophrenic patients (nonresponders), and in high arousal states in others (responders). Gruzelier (1977) reported that when chlorapromazine (a drug used in the treatment of schizophrenic patients) was administered to schizophrenic patients, bilateral asymmetries of skin conductance levels were reduced. Gruzelier found that chlorapromazine had its main effect by maintaining an equilibrium arousal state, lowering the level of arousal of responders and heightening the arousal level of nonresponders.

EDA in Normal Subjects

Asymmetries in electrodermal activity have also been investigated in normal subjects. Gruzelier (1973) did not find any significant asymmetries in normal subjects, but earlier investigations (Fisher, 1958; Obrist, 1963) reported asymmetries of electrodermal activity recorded from identical sites on the right and the left hands of normal subjects, but did not associate these asymmetries with hemispheric
functions. Myslobodsky and Rattok (1975) examined bilateral electrodermal activity as a function of task differences. They found that there was more reactive electrodermal activity in the right hand during verbal and numerical tasks, and more reactive electrodermal activity in the left hand during emotional-visual-imagery tasks. They explained these findings, which were contrary to the findings of Gruzelier (1973), by suggesting that since Gruzelier used only indifferent stimuli, the use of meaningful stimuli evoked the asymmetries. They also tentatively concluded, contrary to Gruzelier, that their findings were evidence of contralateral hemispheric control of electrodermal activity. In a later study, Myslobodsky and Rattok (1977) replicated these findings.

Myslobodsky and Horesh (1977) have recently examined bilateral electrodermal activity in normals and in depressive patients. It had been found that barbiturization of the left hemisphere led to depressive states, and that barbiturization of the right hemisphere led to manic states (Rossi & Rosandini, 1967; Terzian, 1964). Myslobodsky gave normal and depressive subjects tasks which were similar in content to the questions used by Schwartz et al. (1975) which contained the following categories: verbal-nonemotional, verbal-emotional, spatial-nonemotional, and spatial-emotional. He measured electrodermal activity and lateral eye movements (LEMS) in all subjects. He also looked at sex differences in reactive electrodermal activity in normals, since previous research had indicated that there were sex differences in hemispheric lateralization (Kimura, 1969; Krashen, 1975). Normal subjects exhibited LEMs in the directions reported by Schwartz
et al. (1975). Also, normal subjects showed more electrodermal activity in the right hand during verbal tasks, and more electrodermal activity in the left hand during spatial tasks, which supported the previous findings (Myslobodsky & Rattok, 1975, 1977). Overall, the spatial-emotional questions evoked more electrodermal activity in the left hand than did any of the other types of questions. Sex differences were also found in normal subjects. The visual-emotional tasks evoked more electrodermal activity in the left hand of male subjects as compared to female subjects.

All depressive subjects exhibited predominantly left-going LEMs throughout all task conditions. When the depressive patients were classified as either endogenous or reactive depressives, it was found that patients with endogenous depression had consistently higher reactive electrodermal activity in the left hand during all task conditions. Patients who had reactive depression were found to have lower levels of electrodermal activity overall. In these patients, higher levels of electrodermal activity were found in the right hand during emotional tasks. Myslobodsky concluded that the findings were evidence of contralateral control of electrodermal activity in normals as was found in earlier studies. He also suggested that the depressive subjects had a right hemisphere dysfunction, in which that hemisphere was in a rigid state of arousal, as indicated by the stereotyped responses found regardless of task type. To explain the ipsilateral control exhibited by patients with reactive depression, he suggested that in these subjects there might be a selective failure of crossed electrodermal pathways to operate, and that this would result in the predominant influence of uncrossed electrodermal pathways.
Implications of Autonomic Asymmetries

Consideration of the neurophysiological basis of EDA suggests that these bilateral differences are probably not unusual. Electrodermal activity is regulated in part by cortical centers (Bloch, 1965; Wang, 1964), and although the evidence remains inconclusive, it appears that both excitatory and inhibitory centers are found at the cortical level. Additionally, it appears that the influence of excitatory centers may be shown bilaterally (Wang, 1964), whereas the influence of inhibitory effects are manifested primarily on the contralateral side.

Although an abundance of psychophysiological data is becoming available suggesting that psychopathology has certain autonomic and central nervous system concomitants (Hare, 1970), investigators probing quantitative comparisons in normal individuals have also uncovered an increasingly large range of correlates in the areas of cognitive, physiological, and personality functions.

Using the continuum of "bigness" versus "smallness," Fisher (1958) hypothesized that the more clearly an individual distinguishes the right and left sides in his body image, the greater the probability that he differs in physiological reactivity on the two sides of his body. This proposal was based on the conclusion that individuals most resist the perception of novelty or distortion in those body areas about which they have the greatest anxiety or conflict (Wittreich & Radcliffe, 1955). Results showed the body-image variable to be significantly related to directionality of bilateral galvanic skin response reactivity in the right-handed group but not in the left-handed group. Also noted was the tendency for skin response
reactivity to be greater on the side perceived as the smaller. These findings are considered by the author to have significance for the further study of psychosomatic relationships.

The effects of anxiety and conflict on various measures of hemispheric activation have been noted from the earliest investigations. Day (1964) postulated that directionality of eye movements reflected personal ways of handling anxiety. Day further noted that under conditions of high anxiety, the eye movement phenomenon was greatly reduced or abolished.

Using an inventory developed by Gleser and Ihilevich (1974) to measure individual differences in modes of defense, an investigation was conducted to determine whether the characteristic modes of coping with conflict differed between those whose eye movement directionality preference was to the right or to the left. Gur and Gur (1975) proposed that left-movers would score higher in defenses that internalized conflict in a holistic and preverbal way, and right-movers would score higher in defenses that externalize conflict and utilize verbalizations. Results confirmed the hypothesis and showed left-movers to score significantly higher in the defense cluster associated with repression, denial, negation, and reaction formation which deal with conflict by responding in a positive or neutral way to a frustrating object. Since degree of repression has been found to be related to psychosomatic symptomatology (Perkins & Reyher, 1971; Reyher, 1958; Reyher & Basch, 1970; Sommerschield & Reyher, 1973), it was further hypothesized that left-movers would report a larger amount of psychosomatic symptomatology (headaches, ulcers, etc.). Administration
of a physical health questionnaire showed this to be the case. Left-movers reported an average of 9.5 psychosomatic symptoms (SD 4.99), and right-movers reported an average of 5.5 symptoms (SD 2.88).

In a review of the literature, Galin (1975) noted parallels between some of the mental processes of the surgically disconnected right hemisphere and the Freudian concepts of primary process thinking and repression. Freud postulated that repressed thoughts were inaccessible to conscious recall or direct verbalization, and that "this separate realm of the mind operates under its own rules, pursues its own goals, affects the viscera, and is indirectly observable in consciously directed behavior" (p. 574) (slips of the tongue, etc.). In these respects, Galin noted a similarity between the functioning of the isolated right hemisphere and mental processes that are repressed, unconscious, and unable to directly control behavior. Galin proposes that in normal intact people, mental activities in the right hemisphere can become functionally disconnected from the left hemisphere (by direct inhibition of the neuronal transmission across the corpus callosum) and function independently. This hypothesis suggests a neurophysiological mechanism for understanding repression and describes a theoretical locus for the concept of unconscious mental processes.

**Repression and Sexual Functioning**

Repression has been linked to symptoms in many bodily processes under the regulatory control of the autonomic nervous system. Digestion, respiration, cardiovascular functions, etc. are similarly innervated by the visceral nerves and are thus subject to impairment by
emotional and cognitive factors. That is, these functional systems are all subject to psychosomatic disorders.

Another of the important bodily processes mediated by the autonomic nervous system is human sexual functioning. Although numerous theories have been developed in an attempt to account for human sexual behavior, except for Freud whose theory is explicitly sexually oriented, most explanations have simply expanded general personality or social constructs and incorporated them into a framework of sexuality. These theories can roughly be divided into biological, social, or learning-oriented, depending on the emphasis involved.

Regardless of the origin of the motivation behind sexual functioning, however, it is generally agreed that sexual behavior for the individual can be highly inhibited.

Repression of sexual conflicts and inhibitions concerning sexual behavior have been consistently described by workers in the field as being responsible for sexual difficulties—especially orgasmic disorders in females. Masters and Johnson (1970), echoing the opinions of the majority of workers in the area of sexuality, have summarized:

Sociocultural influence more often than not places a woman in a position in which she must adapt, sublimate, inhibit, or even repress her natural capacity to function sexually in order to fulfill her genetically assigned role (i.e., breeding). Herein lies a major source of woman's sexual dysfunction. (p. 68)

The history of the scientific study of female sexuality is a short but growing one. Emphasis in the literature has been placed most heavily on those cultural factors and conditions which alter learned aspects of sexual responsiveness, resulting in a lag in the study of
the quantitative physiological and cerebral phenomena influencing sexual arousal and performance.

**Sexual Functioning and Hemisphere Control**

Despite the obvious complexities involved in the interaction of the cerebral hemispheres in human functioning, recent investigations consistently support the existence of functional differences in the mediation of specific activities. Schwartz et al. (1975), in an attempt to show that the right hemisphere is specialized for the regulation of emotional processes, succeeded in differentiating affective processes from cognitive processes, using eye movements as an indicator of hemisphere involvement.

Recent evidence also suggests that the two hemispheres function at different levels of arousal, the left hemisphere functioning at a higher level than the right. If, as hypothesized, the two hemispheres are differentially connected with the subcortical portions of the brain associated with arousal, this would explain why EEG alpha waves (associated with a relaxed, low arousal state) are found in greater quantity over the right hemisphere.

Altered states of consciousness (dreaming, hypnosis, meditation, etc.) are also associated with relaxation or low arousal. These states are usually also characterized by the absence of logical verbalization, a characteristic of left hemisphere function. This suggests that these altered states of consciousness may be associated to a greater extent with the functioning of the right hemisphere.

Sexual climax has also been associated with a unique state of consciousness which involves a certain loss of contact with immediate
external reality. Fisher (1973) has speculated that the "blurring" of consciousness might elicit fears of object loss, and thus be related to orgasmic dysfunction in women. Kaplan (1975) states that "good" sex requires a calm emotional state and "abandonment" to the erotic experience. Shope (1968) found that the degree to which a subject can control her movements and her thinking near the end of intercourse significantly differentiated the orgasmic from the nonorgasmic females.

Cohen, Rosen, and Goldstein (1976), using EEG amplitude asymmetries as a measure of hemispheric activation during sexual orgasm, noted that alpha waves are replaced in the right hemisphere by a 4 Hz activity while they are minimally affected in the left hemisphere. They interpreted this phenomenon as indicating a dissociation between the right and left EEG, with the change in the right of a magnitude great enough to suggest a predominant change in that hemisphere.

In a study of college females by Shope (1975), 98% of the orgasmic women reported experiencing sexually-oriented fantasies during periods when they were not engaging in sexual activity. In contrast, only 80% of the nonorgasmic women fantasized during nonsexual periods. Orgasmic women were also found to be more able to focus on the sexual experience and to be less annoyed or interrupted by outside noises or other distractions during intercourse. Differences between orgasmic and nonorgasmic women in an earlier Shope study (1968) reflected the importance of attitudes as the mediators of orgasmic responsiveness. Besides the ability to focus on the sexual experience, the effects of inhibitory and excitatory self-control on the potential for orgasm were
clear: no woman who consciously maintained inhibitory control throughout intercourse, whether this control was over her thinking, movement, or experiencing her partner's caresses, was able to achieve orgasm. Even beginning intercourse with the intention of conscious, inhibitory control almost invariably cancelled orgasm, despite the fact that some degree of intentional control is lost during sexual activity. Orgasm was thus highly correlated with either the inability or the refusal to maintain conscious inhibitory control over cognition and physical movements during intercourse.

In a similar respect, orgasmic potential would thus seem to be related to the ability to "shift" from a state described by some as characteristic of left hemisphere functioning (conscious cognitive control), to that state often associated with right hemisphere functioning (involuntary affective reactions, loss of inhibition and control, abandonment to altered states of awareness, id processes, etc.) (Bogen, 1969).

It is not, as yet, known whether the two hemispheres in the normal brain may each subserve characteristic defensive styles or affective processes. Likewise, whether such a "shift" actually occurs and its possible relationship to repression in general can only be hypothesized. To the extent that bilateral differences are observed in an autonomic measure such as electrodermal activity during the performance of certain behaviors, these differences may reflect, in part, the relative contributions of the two hemispheres to these behaviors. Furthermore, to the extent that the different specialization of the two hemispheres can be determined, bilateral electrodermal differences may eventually serve as a useful index of psychological processes.
CHAPTER III

METHOD

Subjects

Thirty right-handed, female subjects between the ages of 20 and 32 were selected from 134 volunteers obtained from the student population enrolled at Southern Illinois University. Willingness to cooperate in the experiment was assessed only after the nature of the study had been fully explained. The appropriate consent form was signed and the study approved by the Human Subjects Committee prior to the initiation of any experimental procedure.

Measures and Apparatus

MMPI R Factor Scale of Repression

The Minnesota Multiphasic Personality Inventory (MMPI) Welsh A & R Factor Scale (entitled "Health and Opinion Survey" for the purposes of the experiment) was administered to all volunteers to determine subject classification categories. Based on a factor analysis of the MMPI, Welsh (1956) developed the A & R (anxiety and repression) scales to reflect the first two major sources of variance common to the scales in the clinical profile of the MMPI. Each A or R scale value is converted into a T-score appropriate for the sex of the subject. Assignment to subject categories was determined by dividing each score distribution into thirds by cutting one-half standard deviation above and below the mean or at a T-score of 45 and below and 55 and above (Welsh, 1965). By means of these cutting scores, separation into high and low groups has led to a fairly extensive list of differentiating attributes.
ascribed to these subjects. The R scale consists of 40 items measuring health and physical symptoms, lack of self-insight, the extent to which an individual inhibits unacceptable impulses, and the extent to which an individual blocks from awareness knowledge of these unacceptable impulses (Duckworth, 1979; Welsh, 1965). For the purposes of this experiment, only the R factor scale was scored. Using the standardization norms developed by Welsh, only those volunteers scoring \( \leq 15, T\text{-score} \leq 45; \text{or} \geq 20, T\text{-score} \geq 55 \) were eligible to participate in the experiment.

The basic MMPI item pool has been utilized to construct many supplementary scales (Dahlstrom, Welsh, & Dahlstrom, 1975). These scales vary considerably in what they were designed to measure, in the care with which they were constructed, and the extent to which they have been cross-validated. When scores on the basic validity and clinical scales of the MMPI were factor-analyzed, two major dimensions emerged consistently (Block, 1965; Eichman, 1961; Welsh, 1956). The second of these two factors (R) has consistently shown high positive loadings for standard MMPI scales 1, 2, and 3 and a high negative loading for scale 9. In a study of 47 graduate students from Ball State University, these correlations were 0.27, 0.32, 0.26, and -0.41 respectively. A similar study involving 50,000 non-psychiatric outpatients of the Mayo Clinic showed similar correlational findings for normal populations.

In an early evaluation of the R scale (Block & Bailey, 1955), high R males were seen as people who readily made concessions and sidestepped trouble or disagreeable situations rather than face
unpleasantness of any kind. In this study, the males revealed a raw score mean of 13.2 and a standard deviation of 4.3. The R scale has continued to consistently discriminate personality traits of denial, lack of insight, and overcontrol of needs and impulses between high and low values on the scale. Established raw score means are currently 15.5 for males and 17.3 for females (Hathaway & Briggs, 1967).

**Electrodermal Activity**

After subject classification categories were determined by the MMPI R scale, bilateral electrodermal activity (EDA) was recorded simultaneously from the two hands by Autogen 3000 Feedback Dermographs. Electrical properties of the skin have been utilized for many years in the assessment of human emotional activity, arousal mechanisms, and stimulus response characteristics. This measurement is based on the relative ability of the skin, via the activity of the sweat glands, to conduct a minute electrical current between two electrodes attached to the surface of the skin. The disadvantages encountered in the older "constant current" methods of electrodermal monitoring (formerly called galvanic skin response) have been eliminated by recent improvements in electrodermal instrumentation which now utilize a "constant voltage" method of measurement. Sophisticated filters have been designed to minimize electrical interference from radio waves, the concurrent use of other monitoring devices, etc. Furthermore, the use of the "constant voltage" method (skin conductance) shows greater significance from the standpoint of psychophysiological correlation than the "constant current" (skin resistance) measures. Skin resistance exhibits an inverted, nonlinear relationship in proportion to the
number of conducting sweat glands, while skin conductance is directly proportional and therefore consistently relevant. Such technological advances have greatly reduced excessive current density accumulation and non-psychophysiological artifact stimulation of the sweat glands which have contributed in the past to measurement inaccuracies.

For the EDA measurement, silver/silver chloride electrodes were attached by adhesive collars to the palmar surfaces of the distal phalanges of the index and ring fingers of each hand. Bio-Gel Electrode Paste served as the conducting medium. The skin was cleaned with soap and water prior to electrode attachment. Additional Autogenic Type Direct-Average Couplers were connected to a Sony tape recorder. When an auditory stimulus was presented by the recorder, the pen for this channel was deflected.

The experiment began with a series of habituation trials. Stimuli, previously recorded on a cassette tape, were 16 tones, each of three-second duration, separated by random intervals of eight to 18 seconds. A resting baseline was then recorded.

Verbal/Spatial Stimuli

Following habituation, a series of 10 questions developed by Schwartz et al. (1975) were then presented as a non conflict-producing stimulus. Consisting of five verbal and five spatial portions, these questions were designed to elicit left and right hemisphere activity respectively. For example, "What is meant by the proverb: one today is worth two tomorrows?"; or, "In the painting, Mona Lisa is the woman facing towards the left or the right?" (Exact questions can be found in Appendix B.) A response interval of 10 seconds was allowed before
the beginning of each question. A set of instructions was also recorded, informing each subject that she would have a "short period of time" (10 seconds) to think about the question but that she should not answer out loud. The instructions also informed the subject that she should discontinue answering the question when she heard the word "ready," since the next question was to be presented immediately.

WAT

Following completion of the verbal and spatial questions, with recording devices still intact, a word-association test (WAT) was presented on the cassette tape. The WAT consisted of 20 stimulus words, 10 of which were double-entendre words reported to possess considerable sexual connotations (Galbraith, 1968). Each double-entendre word, in addition to possessing sexual meaning, also contained nonsexual meaning to which it is reported to be easy to associate.

In addition to the sexual words, the WAT also contains 10 words predominantly lacking any sexual meaning (Russell & Jenkins, 1954). The 10 sexual words and the 10 neutral words and their serial placement in the WAT can be found in Appendix C. Prior to the presentation of the first word, a prerecorded set of instructions informed each subject that after hearing the word "ready," the stimulus word was to be presented immediately. Upon hearing the stimulus, the subject was instructed to respond out loud with the first word that came to her mind. Bilateral electrodermal responses were recorded for the initial 10-second interval after the presentation of each word to determine reactivity to the sexual or neutral stimulus content. Each subject's exact verbal response was recorded by the experimenter. A posttest resting baseline was monitored after the presentation of the group of
stimulus words. Thirty seconds after the presentation of the final stimulus word, resting level EDA was sampled three times at 30-second intervals. Previous studies have shown that low repressed subjects exhibit an initial increase in EDA arousal or responsivity immediately after the presentation of conflictual or sexual stimuli, but a subsequent drop in reaction after the initial few seconds (within 30 seconds for those subjects exposed to stimuli at 10-second intervals). High repressors, conversely, react with progressively increasing intensity levels of intrapsychic anxiety for up to five minutes as shown by EDA responses and difficulties on associative recall tasks after the presentation of the WAT, in spite of lower levels of subjective arousal in a self-report inventory (Galbraith & Mosher, 1968; Mosher & Abramson, 1977; Perkins & Reyher, 1971).

At the conclusion of the presentation of the taped material and the recording of the posttest baseline measure, the subject was disconnected from the recording apparatus. Isolated in a separate room, she was asked to fill out a short Sexual Activity Questionnaire (see Appendix D). This self-report questionnaire was designed to reveal the presence of sexual difficulties in highly repressed females, thus validating the presentation of sexual material as a conflict-eliciting stimulus to this group. To ensure confidentiality, random four-digit numbers were used for identification rather than names. The questionnaire and the recordings were numerically matched for later comparison. With anonymity assured, the self-report inventory was expected to be a reliable indicator of sexual response levels.
Procedure

Based on the Welsh R Factor classification, subjects were divided into two groups. Group A consisted of those females whose scores were considered indicative of a highly repressed group (≥20, $t$ score ≥55). Group B consisted of those females who scored in the low repression group (≤15, $t$ score ≤45).

After being informed of her rights as a subject, given an explanation of the nature of the study, and asked to sign the appropriate consent form, each subject was tested individually using the electrodermal response apparatus. Each subject, after washing and drying her hands, was seated comfortably and the electrodes were attached to both hands. After informing her that instructions were to be presented on the tape, headphones were placed on the subject and the resting baseline pretest was monitored for five minutes. The tape-recorded material was then played.

Following the presentation of the habituation tones, the verbal/spatial questions, the word-association test (WAT), and the recording of posttest two-minute baselines, the subject was disconnected from the recording apparatus and asked to fill out the Sexual Activity Questionnaire in the privacy of the next room. She was instructed not to put her name on the questionnaire but to place it, folded, in a designated envelope. All questionnaires were placed, unopened, in this envelope until all subject data had been collected, at which time all questionnaires were opened and numerically matched with the corresponding physiological data.
Data Analysis

The data were analyzed by conducting a series of analyses of variance (ANOVAs) (see Appendix E). In one analysis, the personality variable was a between-subject variable consisting of contrasted groups of subjects scoring either high or low on an inventory designed to measure the degree to which repression is utilized as a defense mechanism. High repression versus low repression groups were compared in asymmetries of bilateral electrodermal response as a measure of relative left and/or right hemisphere activation.

The data were further analyzed using a repeated measures analysis of variance for unbalanced designs with the two factors of the personality variable (repressed and nonrepressed) as the two between-subject factors and the two factors of the hand variable (left or right) as the two within-subject factors.

To analyze the associative latencies (i.e., reaction times) to the Word Association Test (WAT), the mean reaction time to the nearest 1/20th of a second was calculated for each subject to the 10 sexual stimulus words and the 10 neutral words. Means and standard deviations of these subject means were than calculated to determine if significant increments in associative latencies were produced by either the high repressed or low repressed groups.
CHAPTER IV

RESULTS

The first hypothesis stated that subjects show no individual response biases to the presentation of a non-lateralized tone sequence, as measured by changes in amplitude, frequency, and frequency of spontaneous fluctuations of electrodermal activity (EDA).

A t test for the difference between two independent means of amplitude, frequency, and frequency of spontaneous fluctuations of EDA in the left hands and the right hands were not statistically significant (t = .296, p < .05; t = .54, p < .05; t = .79, p < .05); thus, the first hypothesis was accepted. In conducting this analysis, difference scores were calculated for each subject for the stimulus tones to reflect the relative amplitude of EDA responses, frequency, and frequency of spontaneous fluctuations from left to right palms. The scores were computed for the 15 repetitions of the stimulus tones by subtracting the mean amplitude, frequency, and frequency of spontaneous fluctuations of right palmar responses from the mean amplitude, frequency, and frequency of spontaneous fluctuations of left palmar responses. The resulting scores, expressed in uHms and frequency counts, were used for the analysis of both between-subject and between-group comparisons (see Table 1).

In the analysis focused upon individual differences of response amplitudes, it was noted that even when presented with a non-lateralized tone, subjects varied markedly in terms of the relative responsiveness of the palms. Taking the mean amplitude of responses
Table 1
Individual Responses and Right/Left Differences (uhmos)

<table>
<thead>
<tr>
<th>Subject</th>
<th>RX a</th>
<th>LX b</th>
<th>D c</th>
<th>Frequency</th>
<th>Frequency of spontaneous fluctuations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R</td>
<td>L</td>
</tr>
<tr>
<td>1</td>
<td>.086</td>
<td>.133</td>
<td>-.047</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>.180</td>
<td>.166</td>
<td>.014</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>.066</td>
<td>.086</td>
<td>-.020</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>.933</td>
<td>1.050</td>
<td>-.117</td>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>.030</td>
<td>.020</td>
<td>.010</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>.040</td>
<td>.093</td>
<td>.053</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>7</td>
<td>.510</td>
<td>.310</td>
<td>.200</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>8</td>
<td>.000</td>
<td>.053</td>
<td>-.053</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>9</td>
<td>.253</td>
<td>.306</td>
<td>.053</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>10</td>
<td>.153</td>
<td>.130</td>
<td>.023</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>11</td>
<td>.140</td>
<td>.053</td>
<td>.087</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>12</td>
<td>.100</td>
<td>.030</td>
<td>.500</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>13</td>
<td>.170</td>
<td>.046</td>
<td>.124</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>14</td>
<td>.155</td>
<td>.070</td>
<td>.085</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>15</td>
<td>.066</td>
<td>.073</td>
<td>-.007</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>16</td>
<td>.000</td>
<td>.020</td>
<td>-.020</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>17</td>
<td>.184</td>
<td>.214</td>
<td>-.030</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>18</td>
<td>.130</td>
<td>.084</td>
<td>.046</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>19</td>
<td>.866</td>
<td>.491</td>
<td>-.491</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>20</td>
<td>.006</td>
<td>.006</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td>.040</td>
<td>.106</td>
<td>-.066</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>22</td>
<td>.020</td>
<td>.040</td>
<td>-.020</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>23</td>
<td>.106</td>
<td>.033</td>
<td>.073</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>24</td>
<td>.330</td>
<td>.100</td>
<td>.230</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>25</td>
<td>.233</td>
<td>.100</td>
<td>.133</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>

Note. A negative sign indicates the predominance of left-hand responses. Five subjects are not represented because of flat (0) EDA recordings.

aRight-hand responses.

bLeft-hand responses.

cDifference between left- and right-hand responses.
from each site to the 15-tone presentations, it was observed that the right palm was more reactive for 13 subjects, the left palm was more reactive for 11 subjects, and no difference was noted in one subject. Five subjects' responses to the tone presentation were not scorable because of flat EDA recordings (see Table 2). (Some individuals require more intense stimulation to elicit EDA.) There was also considerable variation in the degree to which one palm was more reactive than the other. This may be expressed as the ratio by which the mean amplitude of responses from the more reactive palm exceeded the mean amplitude of responses from the less reactive palm. These ratios ranged between .00 and .50 uhmos. The group mean left-right differences in amplitude at response onset was 0.515 uhmos. The mean proportion of left/right differences to the mean conductance level of the hand of lower conductance was 13% ($\frac{L-R}{\text{hand of lower conductance}}$).

Table 2

<table>
<thead>
<tr>
<th>Hand of greater responsivity</th>
<th>Amplitude</th>
<th>Frequency</th>
<th>Frequency of spontaneous fluctuations</th>
</tr>
</thead>
<tbody>
<tr>
<td>LHR$^a$</td>
<td>11</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>RHR$^b$</td>
<td>13</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Flat</td>
<td>5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(Symmetrical)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No difference</td>
<td>1</td>
<td>12</td>
<td>8</td>
</tr>
</tbody>
</table>

$^a$Left-hand responsive subjects.

$^b$Right-hand responsive subjects.
In terms of individual differences in response frequencies, subjects again varied markedly in the relative responsiveness, the right palm being more reactive in 10 subjects, the left palm being more reactive for eight subjects, and responses being symmetrical for the remaining 12 subjects. Again, of the 12, five were symmetrical because of flat EDA from both hands. In only two subjects did the left/right frequency of response reactivity change the directionality of the individual bias as determined by left/right amplitude comparisons.

Frequency of spontaneous fluctuations varied markedly between subjects, and left/right differences ranged from 0 to 22. The right palm was more reactive for 10 subjects, the left palm showed more reactivity for 12 subjects, and the remaining eight subjects showed no asymmetries.

The second hypothesis stated that subjects scoring in the High Repressor group show no greater left/right response asymmetries in EDA to the presentation of the tone than subjects scoring in the Low Repressor group, as measured by amplitude, frequency, and frequency of spontaneous fluctuations. This analysis focused on whether consistency of a particular asymmetry of response was related to assignment to either the high or low repression groups as measured by the MMPI R Factor Scale. This comparison was made using a one-way analysis of variance (ANOVA) of amplitude, frequency, and frequency of spontaneous fluctuations. The mean difference score for the EDA amplitude asymmetries and the response frequencies did not differ significantly between the High and Low repression groups (p<.05) (see Table 3). Although not statistically significant, Table 3 shows a marked tendency
Table 3
Mean Group Scores for Right and Left Hands for Amplitude, Frequency, and Frequency of Spontaneous Fluctuations of EDA

<table>
<thead>
<tr>
<th>Non-lateralized tone</th>
<th>Level of repression</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Proportion of explained variance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>X</td>
<td>SD</td>
<td>N</td>
<td>Low</td>
<td>X</td>
</tr>
<tr>
<td>Baseline 1</td>
<td>Left</td>
<td>9.2</td>
<td>9.8</td>
<td>16</td>
<td>7.7</td>
<td>8.2</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>9.6</td>
<td>9.4</td>
<td>16</td>
<td>9.5</td>
<td>7.2</td>
</tr>
<tr>
<td>Amplitude</td>
<td>Left</td>
<td>.11</td>
<td>.13</td>
<td>16</td>
<td>.15</td>
<td>.27</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>.17</td>
<td>.24</td>
<td>16</td>
<td>.15</td>
<td>.23</td>
</tr>
<tr>
<td>Frequency</td>
<td>Left</td>
<td>5.0</td>
<td>3.5</td>
<td>16</td>
<td>5.9</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>5.1</td>
<td>5.5</td>
<td>16</td>
<td>7.0</td>
<td>5.9</td>
</tr>
<tr>
<td>Frequency of spontaneous fluctuations</td>
<td>Left</td>
<td>8.1</td>
<td>7.6</td>
<td>16</td>
<td>17.3</td>
<td>20.8</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>9.0</td>
<td>9.7</td>
<td>16</td>
<td>11.0</td>
<td>12.8</td>
</tr>
</tbody>
</table>
of increased frequencies of spontaneous fluctuations in the left hands of the Low Repressed subjects. Previous research has indicated that such a degree of difference may have practical if not statistical significance in terms of implications. Aside from this tendency, the second hypothesis was supported.

The third hypothesis stated that subjects show no increasing intrapsychic anxiety as measured by changes in amplitude, frequency of response, and frequency of spontaneous fluctuations for the last seven presentations of the tones over the first seven presentations. In this analysis to determine whether the difference scores were influenced by repetitions of the stimuli, the means for the first and last seven presentations of the tones were compared. An ANOVA of the separate mean magnitude scores for each palm which comprised the difference scores indicated no significant changes in level of responding from either palm from the first to the last seven presentations of the tones (p<.05). A further ANOVA for comparison of High and Low Repression groups to frequency of response and frequency of spontaneous fluctuations also did not approach significance (p<.05). Thus, the third hypothesis was accepted.

The fourth null hypothesis which stated that subjects show no group differences in EDA during the presentation of the Verbal/Spatial question task was supported in that the hypothesis was nonsignificant at the .05 level as determined by a one-way ANOVA. Table 4 presents mean EDA amplitude levels in the two hands during Verbal and Spatial tasks for the High Repressed group and the Low Repressed group. Although the data of Table 4 suggest that mean amplitude levels were
Table 4
Mean EDA Amplitude Levels (uhmos)

<table>
<thead>
<tr>
<th>Group</th>
<th>Verbal</th>
<th></th>
<th>Spatial</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Left hand</td>
<td>Right hand</td>
<td>Left hand</td>
<td>Right hand</td>
</tr>
<tr>
<td></td>
<td>X   SD</td>
<td>X   SD</td>
<td>X   SD</td>
<td>X   SD</td>
</tr>
<tr>
<td>High repressed</td>
<td>.30 (.36)</td>
<td>.29 (.39)</td>
<td>.29 (.43)</td>
<td>.27 (.35)</td>
</tr>
<tr>
<td>(n = 16)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low repressed</td>
<td>.26 (.35)</td>
<td>.33 (.37)</td>
<td>.25 (.43)</td>
<td>.23 (.35)</td>
</tr>
<tr>
<td>(n = 14)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>.28 (.35)</td>
<td>.31 (.38)</td>
<td>.27 (.43)</td>
<td>.25 (.35)</td>
</tr>
</tbody>
</table>

slightly higher for the High Repressed group than for the Low Repressed group, these small differences did not prove statistically significant.

The fifth null hypothesis stated that subjects scoring in the High Repressor group show no greater left/right response asymmetries in EDA to the presentation of conflict (sexual words) than subjects scoring in the Low Repressor group, as measured by response amplitudes and latencies. In a one-way ANOVA of the effects of amplitude of response to the sexual and neutral words in the Word Association Test for High Repressed and Low Repressed groups, no F ratio approached statistical significance. Table 5 shows the means and standard deviations of the sexual and neutral scores of the High Repressed group and the Low Repressed group. Both groups responded to the neutral words with
Table 5
Means and Standard Deviations of EDA Response Amplitudes to the Word Association Test (WAT)

<table>
<thead>
<tr>
<th>Group</th>
<th>Sexual words</th>
<th></th>
<th>Neutral words</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>SD</td>
<td>X</td>
<td>SD</td>
</tr>
<tr>
<td>High repressed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left</td>
<td>.83</td>
<td>(.58)</td>
<td>.62</td>
<td>(.42)</td>
</tr>
<tr>
<td>Right</td>
<td>.97</td>
<td>(.83)</td>
<td>.66</td>
<td>(.42)</td>
</tr>
<tr>
<td>Low repressed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left</td>
<td>.67</td>
<td>(.55)</td>
<td>.61</td>
<td>(.62)</td>
</tr>
<tr>
<td>Right</td>
<td>.77</td>
<td>(.61)</td>
<td>.66</td>
<td>(.58)</td>
</tr>
</tbody>
</table>

similar mean amplitude responses. High Repressed subjects, however, showed a tendency toward greater reactivity of both hands to the sexual words than did the Low Repressed group.

To analyze response latencies (reaction times), the mean reaction time for each group to the 10 sexual stimulus words and the 10 neutral words was calculated. Means and standard deviations of these group means were than calculated and are reported in Table 6. Although no F ratio approached statistical significance, a simple inspection of Table 6 shows a clear difference between the response latencies to the sexual
### Table 6
Mean Response Latencies from Word Association Test

<table>
<thead>
<tr>
<th>Word number</th>
<th>Sexual words</th>
<th>Neutral words</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HR</td>
<td>LR</td>
</tr>
<tr>
<td></td>
<td>X</td>
<td>SD</td>
</tr>
<tr>
<td>2</td>
<td>.06</td>
<td>.17</td>
</tr>
<tr>
<td>4</td>
<td>.06</td>
<td>.24</td>
</tr>
<tr>
<td>6</td>
<td>.25</td>
<td>.75</td>
</tr>
<tr>
<td>7</td>
<td>.05</td>
<td>.19</td>
</tr>
<tr>
<td>10</td>
<td>.11</td>
<td>.29</td>
</tr>
<tr>
<td>12</td>
<td>.10</td>
<td>.26</td>
</tr>
<tr>
<td>14</td>
<td>.09</td>
<td>.18</td>
</tr>
<tr>
<td>15</td>
<td>.02</td>
<td>.12</td>
</tr>
<tr>
<td>16</td>
<td>.07</td>
<td>.03</td>
</tr>
<tr>
<td>17</td>
<td>.09</td>
<td>.12</td>
</tr>
<tr>
<td>18</td>
<td>.06</td>
<td>.12</td>
</tr>
<tr>
<td>19</td>
<td>.12</td>
<td>.19</td>
</tr>
</tbody>
</table>

Total mean sexual words = .06 (.12)

<table>
<thead>
<tr>
<th></th>
<th>Neutral words</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
</tr>
<tr>
<td>1</td>
<td>.11</td>
</tr>
<tr>
<td>3</td>
<td>.05</td>
</tr>
<tr>
<td>5</td>
<td>.00</td>
</tr>
<tr>
<td>8</td>
<td>.12</td>
</tr>
<tr>
<td>9</td>
<td>.01</td>
</tr>
<tr>
<td>11</td>
<td>.04</td>
</tr>
<tr>
<td>13</td>
<td>.06</td>
</tr>
<tr>
<td>16</td>
<td>.07</td>
</tr>
<tr>
<td>17</td>
<td>.09</td>
</tr>
<tr>
<td>19</td>
<td>.10</td>
</tr>
</tbody>
</table>

Total mean neutral words = .04 (.14)
and neutral stimulus words. High Repressors show a small but consistent tendency toward greater left/right latency asymmetries (difference scores) than do the Low Repressors. This trend is particularly noticeable in the Sexual Word task as can be seen in Figure 1. Since neither EDA response amplitudes nor latencies were statistically significant, the fifth null hypothesis was supported.

The sixth null hypothesis stated that subjects scoring in the High Repressor group show no greater frequency of omitted (0) verbal responses on the Word Association Test than subjects scoring in the Low Repressor group. In the analysis to determine whether a group difference existed in terms of frequency of omitted verbal responses on the Word Association Test, the null hypothesis was supported. No difference was found between groups as shown by the ANOVA results presented in Table 7 ($df = 28$, $p<.05$).

<table>
<thead>
<tr>
<th>Table 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Frequency of Left and Right Omitted Responses to the Word Association Test (WAT)</td>
</tr>
<tr>
<td>----------------------------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>X</td>
</tr>
<tr>
<td>Left omitted responses</td>
</tr>
<tr>
<td>Right omitted responses</td>
</tr>
</tbody>
</table>
Figure 1. Group right/left hand difference scores in response latencies to neutral and sexual words of the Word Association Test (WAT).
The seventh null hypothesis which stated that subjects scoring in the High Repressor group show stabilized baseline levels of EDA during the presentation of the Word Association Test was supported in that the hypothesis was nonsignificant at the .05 level as determined by a one-way ANOVA. Although statistically nonsignificant, Figures 2 and 3 show a tendency for the High Repressor group to begin responding at an increased rate at the point of Baseline 4 (the beginning of the Word Association Test) whereas the Low Repressor group maintains a more slowly incremental increase in EDA.

To compare differences in posttest arousal levels with initial tonic arousal levels as posited by the eighth hypothesis, a further analysis examined the development of bilateral amplitude response differences during the course of the experiment. The experimental task session was divided into five successive blocks. Baselines were recorded for each block and EDA amplitudes were examined as a function of blocks. Table 8 shows the mean amplitude score of the High and Low repressed groups for each of the five blocks. An ANOVA shows that no group differences exist in terms of changes from initial tonic arousal levels to posttest arousal levels. However, as can be seen in Table 8, amplitude levels for both groups increased incrementally throughout the experimental session. These changes were highly significant ($p < .001$) in terms of pre-post test comparisons using a correlated $t$ test to determine the difference (see Table 9). In addition to the above findings, these results indicate that observable bilateral differences in response amplitudes were present from the start of the session and that the amplitude differences did not change significantly as a function of task for either group.
Baselines were presented before each task condition.

Figure 2. Comparison of group left/right hand baseline measures of EDA across tasks.
Figure 3. Comparison of left and right hand scores of EDA between high and low repressed subjects in each task condition.
Table 8
Comparison of Left/Right Baselines for Five Successive Blocks by Level of Repression

<table>
<thead>
<tr>
<th></th>
<th>High repressed (n = 16)</th>
<th>Low repressed (n = 14)</th>
<th>Alpha level significance</th>
<th>% variance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>SD</td>
<td>X</td>
<td>SD</td>
</tr>
<tr>
<td>B/L1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left (TBLL)</td>
<td>9.2</td>
<td>9.8</td>
<td>7.7</td>
<td>8.2</td>
</tr>
<tr>
<td>Right (TBLR)</td>
<td>9.6</td>
<td>9.4</td>
<td>9.5</td>
<td>7.2</td>
</tr>
<tr>
<td>B/L2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left (V BLL)</td>
<td>9.6</td>
<td>8.7</td>
<td>8.3</td>
<td>8.2</td>
</tr>
<tr>
<td>Right (VBLR)</td>
<td>10.0</td>
<td>8.7</td>
<td>9.1</td>
<td>7.1</td>
</tr>
<tr>
<td>B/L3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left (SBLL)</td>
<td>10.2</td>
<td>10.1</td>
<td>8.7</td>
<td>8.0</td>
</tr>
<tr>
<td>Right (SBLR)</td>
<td>10.1</td>
<td>9.5</td>
<td>10.0</td>
<td>7.3</td>
</tr>
<tr>
<td>B/L4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left (NBLL)</td>
<td>11.4</td>
<td>11.9</td>
<td>11.1</td>
<td>9.7</td>
</tr>
<tr>
<td>Right (NBLR)</td>
<td>11.3</td>
<td>11.3</td>
<td>11.5</td>
<td>7.5</td>
</tr>
<tr>
<td>B/L5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left (BLSL)</td>
<td>14.9</td>
<td>14.0</td>
<td>12.1</td>
<td>10.5</td>
</tr>
<tr>
<td>Right (BLSR)</td>
<td>15.8</td>
<td>15.1</td>
<td>13.7</td>
<td>9.6</td>
</tr>
</tbody>
</table>

Summary Data for Table 8
Comparison of Initial Tone Arousal Level (Baseline 1) with Post Arousal Level (Baseline 5) by Level of Repression

<table>
<thead>
<tr>
<th></th>
<th>HR</th>
<th>LR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline 1</td>
<td>X = 9.4 (SD = 9.6)</td>
<td>X = 8.6 (SD = 7.7)</td>
</tr>
<tr>
<td>Baseline 5</td>
<td>X = 15.3 (SD = 14.5)</td>
<td>X = 12.9 (SD = 10.9)</td>
</tr>
</tbody>
</table>
Table 9
Comparison of Baseline 1 with Baseline 5 (Pre-Post) by Left and Right Hand

<table>
<thead>
<tr>
<th></th>
<th>Left</th>
<th></th>
<th>Right</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \bar{X} )</td>
<td>SD</td>
<td>N</td>
<td>( \bar{X} )</td>
</tr>
<tr>
<td>BL1 (Pre)</td>
<td>8.5</td>
<td>9.0</td>
<td>30</td>
<td>9.6</td>
</tr>
<tr>
<td>BL5 (Post)</td>
<td>13.6</td>
<td>12.3</td>
<td>30</td>
<td>14.8</td>
</tr>
</tbody>
</table>

Alpha level .0001*

*Significant.

The ninth null hypothesis which stated that subjects scoring in the High Repressor group show no more sexual dysfunction than subjects scoring in the Low Repressor group was not supported in terms of the data available. Chi square analysis shows these numbers to be statistically significant in terms of the relationship to the repression variable \( (X^2 = 13.538, p < .001) \). Table 10 shows how these frequencies are distributed. All of the subjects scoring in the Orgasmic group also scored in the Low Repressor group. In addition, of the 16 subjects scoring in the Non-Orgasmic group, 11 (69%) also scored in the High Repressor group.
<table>
<thead>
<tr>
<th>Group</th>
<th>Orgasmic</th>
<th>Non-orgasmic</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>High repressed (HR)</td>
<td>0</td>
<td>11 (69%)</td>
<td>5</td>
</tr>
<tr>
<td>Low repressed (LR)</td>
<td>3</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Total N</td>
<td>3</td>
<td>16</td>
<td>11</td>
</tr>
</tbody>
</table>
Across all analyses, the most consistent result is that asymmetries of electrodermal activity are noted in some individuals in the resting state and persist for that individual regardless of the nature of the task presented. This finding is in direct contrast to research showing that hemisphere activation is task-dependent.

The present data adds support to research beginning to accumulate supporting Bogen's (1972) proposition that there exists an individual built-in preference or "bias" for the use of one hemisphere or the other (Gur & Gur, 1975, 1977; Levy, 1982; Smokler & Shevrin, 1979).

An attempt to link the bias phenomenon with the personality variables of high and low repression was not successful. Although small but provocative tendencies appear consistently throughout the data, statistically significant lateralized responses (right or left) were rare events.

These results do not support the hypothesis of a relationship between the lateralization of EDA and the verbal/spatial material of a task nor the stressful nature of a conflict situation. Furthermore, these results did not provide additional information on the difficult problem involving the theoretical question of direct or crossed control pathways of EDA. The influence of certain stimuli or of certain situations on the laterality of EDA results are not congruent in the present literature. Effect of the nature of the stimulus (sound, light, shock) induces left lateralization of EDA only in the case of
shock according to Fuhrer (1971), while Wyatt and Tursky (1969) observed a predominance of EDA responses on the left for sound, but not for shock. Myslobodsky and Rattok (1977) found that in verbal tasks, subjects tended to give more responses on the right, the opposite occurring with visual tasks. Such data led these authors to discuss the possibility of both ipsilateral and crossed control of EDA operating at the same time. Although most studies support the theory of crossed control, Culp and Edelberg (1966), Stern (1968), Fuhrer (1971), Ehrlichman and Weinberger (1978), and Smokler and Shevrin (1979) all presented results congruent with ipsilateral control. Such results are representative of the lack of consistency on this issue in the literature. Unfortunately, because no task-related EDA asymmetries reached statistically significant proportions, the present study was unable to lend support for either hypothesis.

Effects of Tones

Researchers measuring EDA typically employ an adaptation phase in which a conditioned stimulus is repeatedly presented, sometimes 10 or 20 trials, in an attempt to habituate the response to the conditioned stimulus and thus create a neutral stimulus with which the effects of later presented stimuli can be compared. Results of the present study confirm the statistical symmetry of EDA to a neutral stimulus as reported by Gruzelier and Venables (1973). However, a close scrutiny of the individual data clearly shows that a nonlateralized stimulus, such as a binaurally presented series of tones, systematically influences the relative amplitude of EDA recorded concurrently from the left and right palms for some subjects. An interesting finding was
that subjects were impressively consistent in exhibiting larger responses from one palm than the other to repeated presentations of the tones regardless of whether the variable measured was amplitude, frequency, or frequency of spontaneous fluctuations. In addition, only two subjects changed right-left directionality during the tone presentation. These results support the postulations of those researchers who suggest that each individual possesses a hemispheric bias. Such asymmetry would not be expected to occur presuming the tones to be neutral, non task-specific, and binaurally presented if hemisphere arousal was task-dependent (Burstein, 1977). The assumption of the neutrality of the tone stimulus in producing the orienting response has been challenged, however. Sokolov (1963) has stated that as stimulus intensity increases, there is a shift from orienting behavior to defensive behavior. The defense response (DR) may be differentiated from the orienting response (OR) in that it displays more resistance to habituation, and may even exhibit response increments across trials. In a study using 12 presentations of a 1000 hz tone of 45, 60, 75, 90, or 105 db, Turpin and Siddle (1979) failed to differentiate ORs and DRs in terms of EDA. The implication for the present study is that the neutral tones may have had goal or aversive effects on some subjects, therefore arousing defensive rather than habituation behavior. Assuming this possibility, characteristic defensive styles evidenced by slight asymmetries may thus be a further support of the individual bias theory.

The present study failed to confirm a relationship between individual response biases to the tones and the personality variables
of high or low repression in defense styles. Using lateral eye movements to index hemispheric activation, Smokler and Shevrin (1979) found significantly more left-looking (right hemisphere activity) among hysterical personality subjects than among the obsessive-compulsive style subjects. Since repression is traditionally recognized as a primary defense mechanism of the hysterical personality style, a similar right hemisphere activation would be expected in the results of the present study. An earlier study (Gur & Gur, 1977) also showed a predominance of left-lookers among those subjects who scored high in repression and denial on the Defense Mechanism Inventory (Gleser & Ihilevich, 1969, 1974). The incongruence between these earlier studies and the present results may possibly be due to the differences in hemispheric measure. Although lateral eye movements and EDA have both been used extensively as an index of hemispheric activation, no evidence exists in the current literature to suggest that the two indices are comparable.

**Effects of Verbal/Spatial Question Task**

These results do not support the hypotheses of a relationship between the lateralization of EDA and the verbal/spatial material of a task. It is also of interest that no interaction was found between question content and personality style. This raises an issue concerning validity of the questions as hemispherically linked and a further issue concerned with differential processing of question content in strong examples of personality styles. Since previous researchers have successfully differentiated left/right hemisphere activation based on the same test questions (Myslobodsky & Rattok, 1977; Schwartz et al.,
the possibility of the strong personality style overriding the
effect of the task must be further evaluated. This possibility is
further supported by data from Smokler and Shevrin (1979) using lateral
eye movements as an index of hemispheric activation. No effect for
question content was found in their groups of strongly obsessive-
compulsive and hysterical personalities. If the assumption is made
that question content is a valid way of eliciting certain patterns of
hemispheric activation, then present results suggest that personality
style may be one factor that can alter the usual balance of hemispheric
activation in certain cognitive activities.

Although Smokler and Shevrin (1979) found no significant effects
for sex in their groups of male and female subjects, sex was not taken
into account in many of the previous studies of response asymmetries
and only right-handed males were used in several. Evidence at the
neurological and physiological levels has accumulated suggesting that
there may be more hemispheric integration (as opposed to specificity of
function) in women and left-handers than in right-handed men. Speci-
fically, language function seems to be represented more bilaterally,
and in particular, the normally non-verbal right hemisphere is more
like the left in its linguistic capacities. For instance, women emerge
from left brain surgery with less speech impairment than men. In
addition, both women and left-handers demonstrate difficulties in
performing spatial tasks when compared to male right-handers. This is
thought to be a consequence of bilateral language preempting some of
the specialization of the right hemisphere (Galin, 1975). A more
recent study (McGlone, 1980) to investigate sex differences in brain
asymmetry found that males show significantly poorer spatial performance with right than with left hemisphere damage; and significantly poorer verbal performance with left than with right side damage. Side of damage proved to be irrelevant for female performance. Evidence continues to accumulate showing consistent sex differences in brain organization and personality characteristics. How these two are related to observed cognitive and affective differences and physiological responses between males and females, however, remains unclear.

This emerging sex difference consideration, rather than negating the value of the present study involving all-female subjects, may offer implications for the validation of continuing research in this area. If hemispheric functions are indeed more integrated in females in general, the answer to the issue may still revolve around the central thesis of the present study: that repression and denial might be related to the inability or the refusal to shift from a state of left hemisphere functioning to a state associated with right hemisphere functioning, or vice versa.

One factor which was not controlled in the present study using an all-female sample was the importance of the state of the individual in terms of the fluctuations in level of arousal characteristic of the menstrual cycle. Physiological variations throughout the cycle are relatively well-documented, and include hormonal changes, fluctuations of monoamine oxidase activity, weight gain and/or sodium retention, and changes in the relative dominance of the two divisions of the autonomic nervous system (Wineman, 1971). Since many studies have shown
convincing correlations between specific behaviors and certain phases of the menstrual cycle, it seems likely that some fluctuations or response amplitudes of EDA may have been related to these cyclic changes affecting level of arousal (Asso & Beech, 1975).

Age was also not taken into consideration in the present investigation although the age range among the female subjects did not exceed 12 years. However, some evidence exists to suggest that the age factor may have some relevance to asymmetry findings. Gruzelier and Venables (1974), in their study of verbal versus visual task EDA in depressives and normals, found a positive correlation between age and right hand EDA in the normal group. In the endogenous depression group, a negative correlation between age and left hand EDA was noted. This finding reflects, perhaps, a higher degree of left hemisphere involvement in visuo-spatial analysis with age, or an age-dependent lessening of right hemisphere involvement in visuo-spatial analysis (Brown & Jaffe, 1975).

Effects of the Word Association Test

Although not statistically significant, trends in the present study support the assumption that verbal presentation of sexual words interspersed with neutral words appears to be an effective means of inducing a conflict response in research attempting to elicit perceptual reactions to sexual content. The use of the WAT in this study thus adds to the evidence from previous research that this instrument can be a valuable tool in the study of perceptual defense phenomenon (Galbraith, 1968; Galbraith et al., 1968; Galbraith & Lieberman, 1972; Galbraith & Mosher, 1968; Kerr & Galbraith, 1975).
Inspections of Tables 5, 6, and 7 show a clear (but not significant) trend in the predicted directions for both amplitude and latency responses for the High Repressed and Low Repressed groups. Although both groups showed similar reactivity to both measures of the neutral words, the HR group showed greater amplitude reactivity in both hands to the sexual words. In terms of latencies of response, again the HR group showed a small but consistent trend toward greater asymmetry, particularly in the sexual word task. These findings suggest that sexual material tends to elicit more activation in the HR group. An interesting observation from these data is that the small but increased activity for the HR group is greatest in the right hand. Because the right hand supposedly reflects left hemisphere activation (if one assumes a contralateral theory of control), the opposite hemisphere would be expected to be activated because of the emotional content of the material (Schwartz et al., 1975). One possible answer to this dilemma may be that the neural pathways are ipsilateral rather than crossed as asserted by several researchers (Culp & Edelberg, 1966; Ehrlichman & Weinberger, 1978; Fuhrer, 1971; Smokler & Shevrin, 1979; Stern, 1968). Another possible reason for apparent left hemisphere activation may be a methodological artifact. In order to be able to count omitted responses on the WAT, subjects were instructed to respond aloud to each presented word. Since verbal activities have been linked to the left hemisphere, these data may reflect this activation (Bogen, 1969; Day, 1964, 1967; Kocel et al., 1972). This possibility is further supported by observation of Figures 2 and 3 that the LR group also showed a very slight response bias in the right hand. Although
left hemisphere activation due to verbalization may be reflected in the amplitude data, latency data should remain unaffected since it measures only the time required for information to be transmitted from one hemisphere to the other. Since latency times are slightly greater and more erratic for the HR group, this suggests that the material may have been more conflict-producing for this group. This assumption, if accurate, supports the finding of Galbraith and Lieberman (1972) that high repressors exposed to the sexual content in the WAT unconsciously expend much psychic energy to deny and avoid overt sexual inferences to that material. This coping mode may well be expressed on a physiological measure such as the electrodermal response. Whether these slight latency asymmetries reflect an attempt of one hemisphere to block the conflict-producing stimulus from the other hemisphere remains unclear.

In spite of the trends noted above, the present investigation did fail to statistically confirm the existence of greater left/right asymmetries in EDA in the HR group as hypothesized, and HRs did not show significant measurable indications of increasing anxiety during performance as was expected. Left/right asymmetries, some of which were highly significant, were found in both groups but did not seem to be related to scores on the MMPI R Factor Scale. Although this scale has considerable reported validity indicators (see Apparatus), it possibly does not measure the degree of repression which might show some effects on electrodermal response measures. In concordance with this possibility, some authors have argued that a high degree of repression results in inhibition of normal responses and only when the repression and denial processes begin to weaken does the individual
begin to experience psychosomatic symptomatology and anxiety (Reyher & Basch, 1970; Sommerschield & Reyher, 1973). Although subjects selected for the HR group in the present study did score in the highly repressed section of the MMPI R Factor Scale, all of them were essentially in the low end of this category. A more symptomatic population such as a clinical rather than university student sample may be more appropriate to answer the research questions asked in the present study. In addition, the MMPI R Factor Scale has recently been challenged as an accurate index of repression. Duckworth (1979) suggests that the scale more adequately measures conscious suppression rather than repression, which is usually considered an unconscious phenomenon. If validity of the MMPI R Factor Scale is a questionable issue, replication of the present experiment utilizing an instrument designed to measure frequency of psychosomatic or conversion symptoms might result in a finding of EDA asymmetries to a different degree or direction than would be found in non-symptomatic subjects.

Omitted Responses of WAT

In terms of the measurement of omitted responses on the WAT, both groups surprisingly showed almost identical results. While not devoid of inconsistencies, most previous studies have generally shown avoidance of sexual responses by high sex-quilt subjects and repressors (Byrne, 1964; Galbraith, 1968). This finding of equal omitted responses by both groups appears at first glance to be totally incongruent with the theory of denial and avoidance by high repressed persons. A closer look suggests that perhaps repressors orient themselves to interpret and respond asexually to the WAT and consequently
display no further difficulty in associating either asexual (i.e., neutral) or double-entendre words (Galbraith & Lieberman, 1972). According to this theory, repressors might be expected to exhibit more difficulty (as reflected by omitted verbal responses) in responding to inescapably sexual, as opposed to double-entendre stimulus words.

**Pre-Post WAT Baseline Levels**

Again, as described below, no significant increases or decreases in pre-post baseline levels were noted between High and Low Repressed groups. A slight tendency toward an increase of responding at the pretest baseline level by the HR group suggests support for the logic stated above. That is, HRs, after an initial reaction to the sexual material, orient themselves to respond asexually to the presented sexual or double-entendre material.

**Effects of Intermittently Monitored Baseline Levels**

Not unpredictably, baseline levels increased incrementally for both groups throughout the task session. Pre-post level measures were highly significant in a temporal comparison for all subjects but were not found to be related to High or Low Repression. An interesting but nonsignificant increase for the HR group was noted at the point of Baseline 5. This is the final baseline measure subsequent to the presentation of the Word Association Test—hypothetically a stress situation for the HR group. This tendency is consistent with the previously observed tendencies showing a stable (though nonsignificant) pattern of slightly greater reactivity of EDA in other comparisons in the present study. In the field of hospitalized patient studies, some
types of persons have been classified as skin conductance responders or nonresponders (Venables, 1973; 1977). The class of nonresponders, for instance, apparently forms a considerable portion of the adult schizophrenic population. Other researchers have documented overall electrodermal response differences between psychopaths and normals. One major finding has been that psychopaths often show a lower frequency of spontaneously occurring EDRs than do nonpsychopaths, especially during strong stimulation (Hare, 1975). Such studies represent an increasing amount of psychophysiological data suggesting that various forms of psychopathology have certain autonomic and central nervous system concomitants (Steinberg & Schwartz, 1976). The extent to which these concomitants are related to various personality disorders is just beginning to be researched. The above noted tendencies in the present study suggest that a more pathologically repressed group such as could be found in a clinical population might possibly show such group differences under identical research conditions.

Effects of Repression on Sexual Functioning

Findings from the Sexual Activity Questionnaire, although limited statistically by a small number of subjects in each cell, nevertheless showed significance in the chi square analysis. In traditional and current theory, high repressed states are characterized by increases in psychosomatic symptomatology. That is, repression is conceptualized as a pattern of excitation and inhibition throughout the brain caused by the anxiety of drive arousal. This pattern of excitation and inhibition produces hyper- and hypo-functions (psychosomatic symptoms)
in bodily processes and alterations in cognitive processes instead of being directly expressed as conscious apprehension of the anxiety-producing drive (Reyher & Basch, 1970). The present study supports the theory that sexual dysfunction is a psychosomatic symptom common to the personality style which utilizes excess repression as a defense mechanism.

**Implications for Future Research**

Substantial evidence exists in the literature demonstrating functional task differences of the cerebral hemispheres in virtually all right-handed people. However, the present data support another equally strong line of research which suggests that under certain circumstances, individual differences emerge in the preferred use of one particular hemisphere. "Hemisphericity" is the postulated tendency of an individual to respond habitually to different tasks either in a manner characteristic of the right hemisphere (spatial-holistic-emotional) or the left hemisphere (logical-verbal-unemotional) (Bogen, 1972). Subjects in the present experiment were exposed to verbal, spatial, and emotional tasks--each of which has elicited differential hemispheric activation in prior research. More data are needed to determine why such divergent results are being reported by researchers using similar subjects, instruments to elicit task mode activation, and operational procedures. Slight methodological discrepancies may well provide an answer to this question. For instance, in the study of lateral eye movements, it was noted that eye movements to reflective questioning elicited the appropriate left or right hemisphere activation only when the experimenter remained outside the room or
turned his back to the subject. Conversely, with the examiner in the face-to-face position, subjects' eye movements tended to reflect an individual preference for right or left movement regardless of task (Gur & Gur, 1977).

If a stable preference for hemisphericity does exist, as is suggested by the present study, varying patterns of hemisphericity might show markedly different psychological profiles. Some support for linking the hysterical personality style and right hemisphericity appears in research by Stern (1968) and Galin, Diamond, and Braff (1977). Results of the present experiment also tend to support such a link although the tendencies noted did not reach statistical significance. Further research designed to strengthen the crucial factors of subject selection and exposure to conflict-producing stimuli is needed. As noted in an earlier section, a clinical rather than university population may be more appropriate for study. The present data also suggest that subject categories based on orgasmic capacity versus dysfunction may well differentiate personality characteristics and defense styles in terms of EDA. The relationship between sexual orgasm and hemisphere activation has been reported previously in the literature. Cohen et al. (1976), using EEG amplitude asymmetries as a measure of hemispheric activation during sexual orgasm, noted that alpha (idling) waves are replaced in the right hemisphere by a 4 Hz activity while they are minimally affected in the left hemisphere. They interpreted this phenomenon as indicating a dissociation between the right and left EEG, with the change in the right of a magnitude great enough to suggest a predominant change in that hemisphere. Such
evidence is particularly interesting in terms of the scientific data available concerning usual patterns of EEG activity in the human cortex. Research suggests that the two hemispheres usually function at different levels of arousal, the left hemisphere functioning at a higher level than the right. If, as generally hypothesized, the two hemispheres are differentially connected with the subcortical portions of the brain associated with arousal, this would explain why EEG alpha waves (associated with a relaxed, low arousal state) are found in greater quantity over the right hemisphere.

Altered states of consciousness (dreaming, hypnosis, meditation, etc.) are also associated with relaxation or low arousal. These states are usually also characterized by the absence of logical verbalization (a characteristic of left hemisphere function). This suggests that these altered states of consciousness may be associated to a greater extent with the functioning of the right hemisphere.

Sexual climax has also been associated with a unique or "altered" state of consciousness which involves a certain loss of contact with immediate external reality. Fisher (1973) has speculated that the "blurring" of consciousness might elicit fears of object loss, and thus be related to orgasmic incapacity in women. Kaplan (1975) states that good sex requires a calm emotional state and "abandonment" to the erotic experience. Shope (1968) found that the degree to which a subject can control her movements and her thinking near the end of intercourse significantly differentiated the orgasmic from the non-orgasmic females.

The above observations suggest that orgasmic capacity may be related to the ability to "shift" from a state described by some as
characteristic of left hemisphere functioning (conscious cognitive control), to that state often associated with right hemisphere function (involuntary affective reactions, loss of inhibition and control, abandonment to an altered state of awareness, id processes, etc.) (Bogen, 1969). Since this postulation basically describes the theory of repression under investigation in the present study, future research designed to further explore this area may find the orgasmic/non-orgasmic subject variables to be a differentiating factor in studies of hemisphere function.

In addition to subject variables in future research, methods of hemisphere measurement need further assessment and clarification in terms of applicability of results to information gained from other measures. For instance, EDA as a measure of autonomic activity is considered a useful measure of hemisphere activation (Galin, 1975; Levy, 1982). However, in spite of extensive use, the important question of whether electrodermal neural pathways are ipsilateral or contralaterally controlled remains unclear due to diverse data gathered from different methods. Research is needed to establish validity, reliability, and interreliability of EDA, lateral eye movements, EEG evoked potentials, tachistoscopic presentation of stimuli to one hemisphere or the other, peripheral blood flow measures, etc. Research results utilizing all of these methods are often reported as comparison studies. Recent technological advances, however, have led to the introduction of highly sophisticated equipment which can reportedly determine hemisphere activation by monitoring blood flow to the hemispheres (Dabbs, 1980). Although the assumption cannot be made as
yet that blood flow indexes the importance of an area of the brain, this possibility cannot be ignored. Future studies utilizing advanced technological devices in the search for localization of cognitive functions may well prove present methods and apparatus to be primitive and obsolete.

Regardless of the method of investigation, preferential use of certain hemispheric capacities is probably only one of many individual differences in brain function that may have concomitants in individual personality or defense styles. Such differences are undoubtedly the products of combined biochemical, physiological, and environmental forces. Alteration of these patterns by psychotherapy, drugs, or biofeedback may improve integration of these processes. Such changes, when measurable, could provide a way of monitoring change in therapy and result in a greater understanding of the process or mechanisms involved.

Summary

The principal findings of the present experiment can be summarized briefly. Under conditions of the resting pretest baseline and the presentation of the nonlateralized tone sequence, most subjects showed only slight asymmetries between left- and right-hand EDA. Cognitive tasks (verbal and spatial) intended to produce specific differences in the relative activation of the two hemispheres were accompanied by a similar pattern of bilateral electrodermal differences on both tasks as well as the nonlateralized tones. This finding is in direct contrast to research showing that hemisphere activation is task dependent. The present data add support, however, to research accumulating supporting
Bogen's (1972) theory of "hemisphericity." An attempt to link the hemisphericity phenomenon with the personality variables of high or low repression, however, was not successful. Presentation of double-entendre and asexual words (Word Association Test) in an attempt to produce differences in hemisphere activation under conditions of conflict also did not significantly differentiate the two groups. However, the high repressed group showed a small but consistent tendency toward greater asymmetries, particularly in the double-entendre (sexual) word task. This tendency suggests that sexual material does tend to elicit defensive behavior in persons who utilize repression as a defense mechanism. The analysis of the effects of repression on sexual dysfunction further supports this postulation in that all of the subjects self-reported to be orgasmic (n = 3), also scored in the low repressed group. Of 16 subjects self-reported to be non-orgasmic, 11 (69%) scored in the high repressed group. These data suggest that sexual conflicts in the high repressed group leads to psychosomatic sexual dysfunctions as postulated by traditional psychoanalytic theory.

Although the present study failed to show statistically that repression is to some extent subserved by a functional disconnection of right hemisphere mental processes, observed tendencies toward greater bilateral EDA differences in the high repressed group appears to indicate that this area continues to be a profitable direction for developing research and theory.
REFERENCES


Bakan, P. The eyes have it. Psychology Today, 1971, 4, 64-69.


Berlucchi, G., Heron, W., & Hyman, R. Simple reaction times of ipsilateral and contralateral hand to lateralized visual stimuli. Brain, 1971, 94, 419-430.


Flourens, P. Physical research on the properties and functions of the nervous system in vertebrates. Archives Generales de Medecine, 1823, 2, 321-374.


Fuhrer, M. J. Effects of unilateral stimuli on the magnitude and latency of bilaterally recorded skin conductance response. Psychophysiology, 1971, 8, 740-748.


Galin, D. Implications for psychiatry of left and right cerebral specialization. Archives of General Psychiatry, 1975, 31, 572-583.


Gruzelier, J. H., & Venables, P. H. Skin conductance orienting activity in a heterogeneous sample of schizophrenics. The Journal of Nervous and Mental Disease, 1972, 155, 277-287.


Kerr, B. J., & Galbraith, G. G. Latencies of sexual and asexual responses to double-entendre words as a function of sex guilt and social desirability in college females. Psychological Reports, 1975, 37, 991-997.


Levy, J. Presentation to Utah State University, Logan, Utah, July 28, 1982.


Smith, A. Speech and other functions after left hemispherectomy. Journal of Neurological and Neurosurgical Psychiatry, 1967, 29, 467-471.


Wyatt, R., & Tursky, B. Skin potential levels in right and left-handed males. Psychophysiology, 1969, 6, 133-137.
APPENDICES
Appendix A

Functions Attributed to Differential Hemisphere Control
Functions Attributed to Differential
Hemispheric Control*

Left hemisphere

Analytical activity
Logical thinking
Objectivity
Verbal processes
Time perception
Control of body activity
"Catastrophic reaction"
  (in patients with right hemisphere lesions)
External focus of attention
Choice of science/math majors in college
High math scores on SAT
Need for less sleep
Tendency to use defense mechanisms which respond to conflict by attacking object
Sympathetic body processes

Right hemisphere

Unconscious processes
Repression
Subjectivity
Emotional processes
Spatial processes
Id processes
Disordered recognition--delusions
Conversion symptoms
Internal focus of attention
Hypnotic susceptibility
Humanities majors in college
High verbal score on SAT
Clearer visual imagery
More EEG alpha activity (frequency and amplitude)
Fluency in writing
Sociability
Alcoholism (males)
More religious (self-report)
Body image functions
Recognition of faces, melodies
Creativity
Tendency to use defense mechanisms which respond to conflict in a neutral or indifferent manner (repression, denial, negation, reaction-formation)
Psychosomatic symptomatology
Global or gestalt mode of conceptualization
EEG changes during sexual orgasm (to a degree suggesting a dissociation between left and right hemispheres)
Parasympathetic body processes
"Indifference reaction" to illness (in patients with left hemisphere lesions)

*Represents research findings as suggested by recent studies of hemispheric localization of function, and evidence surrounding the tendency of individuals to show a "preference" for either right or left hemisphere modes of cognition (and various personality correlates of these biases).
Appendix B

Questions
Questions

Verbal

1. What is meant by the proverb: "One today is worth two tomorrows"?

2. What is the main difference between the meanings of the words "recognize" and "remember"?

3. Do you use the word "logical" or "rational" more often?

4. What is meant by the proverb: "All's well that ends well"?

5. What is the meaning of the word "time"?

Spatial

1. Visualize the keyboard of a typewriter. In which corner of the keyboard is the letter "p"?

2. Imagine a rectangle. Draw a line from the upper left hand corner to the lower right hand corner. What two figures do you have now?

3. Picture the Statue of Liberty and tell me in which hand is she holding the torch.

4. Picture a circular telephone dial. As you face the dial, which number appears farthest to the left?

5. In the painting "Mona Lisa," is the woman facing towards the left or the right?
Appendix C

Word Association Test
Word Association Test

Order of Presentation: (Double-entendre and neutral words)

<table>
<thead>
<tr>
<th>Word</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHAIR</td>
<td>1</td>
</tr>
<tr>
<td>RUBBER</td>
<td>2</td>
</tr>
<tr>
<td>TABLE</td>
<td>3</td>
</tr>
<tr>
<td>BLOW</td>
<td>4</td>
</tr>
<tr>
<td>OCEAN</td>
<td>5</td>
</tr>
<tr>
<td>NUTS</td>
<td>6</td>
</tr>
<tr>
<td>PRICK</td>
<td>7</td>
</tr>
<tr>
<td>SALT</td>
<td>8</td>
</tr>
<tr>
<td>STREET</td>
<td>9</td>
</tr>
<tr>
<td>SCREW</td>
<td>10</td>
</tr>
<tr>
<td>LAMP</td>
<td>11</td>
</tr>
<tr>
<td>CRACK</td>
<td>12</td>
</tr>
<tr>
<td>SPIDER</td>
<td>13</td>
</tr>
<tr>
<td>SUCK</td>
<td>14</td>
</tr>
<tr>
<td>BANG</td>
<td>15</td>
</tr>
<tr>
<td>STOVE</td>
<td>16</td>
</tr>
<tr>
<td>CITY</td>
<td>17</td>
</tr>
<tr>
<td>BALLS</td>
<td>18</td>
</tr>
<tr>
<td>RIVER</td>
<td>19</td>
</tr>
<tr>
<td>LAY</td>
<td>20</td>
</tr>
</tbody>
</table>
Appendix D

Sexual Activity Questionnaire
Sexual Activity Questionnaire

Please check only the items that apply to you:

☐ I feel that I have had enough sexual experience to be able to rate my own sexual responsiveness level well.

☐ I usually or always experience orgasm during sexual intercourse without additional manual clitoral stimulation by either myself or my partner.

☐ I usually or always experience orgasm during sexual intercourse as long as I receive additional clitoral stimulation from either myself or my partner.

☐ I rarely or never experience orgasm during sexual intercourse with my partner, with or without additional manual stimulation.

☐ I rarely or never experience orgasms during sexual intercourse with a partner. This disturbs me and affects my happiness:

___ not at all; ___ a little; ___ moderately; ___ very much

☐ I do not feel that I have had enough sexual experience to complete this questionnaire.

Additional comments, if any:
Appendix E

Experimental Design
<table>
<thead>
<tr>
<th></th>
<th>Non-Orgasmic</th>
<th>Orgasmic</th>
<th>Low Repressed</th>
<th>High Repressed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Right</strong></td>
<td>Right</td>
<td>Left</td>
<td>Right</td>
<td>Right</td>
</tr>
<tr>
<td><strong>Left</strong></td>
<td>Left</td>
<td>Right</td>
<td>Left</td>
<td>Left</td>
</tr>
</tbody>
</table>

**Tones**
- Band
- EDA
- ORs

**Questions**
- Verbal
- Amp.
- Bl.
- Lat.
- O.R.
- O.R.

**Word Association Test (WAT)**
- Neutral
- Sexual
VITA

Peggy J. Poe

Candidate for the Degree of

Doctor of Philosophy

Dissertation: Word Associations and the Bilateral Electrodermal Responses of High and Low Repressive Females as Measured by the MMPI R Factor Scale

Major Field: Psychology

Biographical Information:

Personal Data: Born at Cape Girardeau, Missouri, February 27, 1944, daughter of William H. and Evelyn Poe; children--Jeffrey, Trent, Joseph, Todd, and Justin.

Education: Attended elementary school in Belleville, Illinois, graduated from Belleville Township High School in 1962, received the Bachelor of Arts degree from Southern Illinois University, Edwardsville, with a double major in psychology and sociology in 1976; 1978 completed the requirements for the Master of Arts degree in Adult-Clinical psychology at Southern Illinois University; 1982 completed the requirements for the Doctor of Philosophy degree at Utah State University, Logan, with a major in psychology.

Professional Experience: 1976-77, Clinical practicum at Student Development Services, Southern Illinois University; 1977-78, Clinical practicum at Tri-County Mental Health Center, Carrollton, Illinois; 1978-79, Clinical practicum at the Exceptional Child Center, Utah State University, Logan; 1979-80, Clinical practicum at Bear River Community Mental Health Center, Logan, Utah; Psychology intern at Bear River Community Mental Health Center, Logan, 1980-81; Mental Health Specialist position at Bear River Community Mental Health Center, 1981 through the present.

Research and Related Experience: 1976-78, Research assistant, Psychology Department, Southern Illinois University, Edwardsville; 1978-79, Biofeedback assistant, Exceptional Child Center, Utah State University; 1979-80 Research assistant, Exceptional Child Center.

Teaching Experience: 1977, Teaching assistant in graduate psychology at Southern Illinois University, Edwardsville; 1978, Co-instructor in graduate psychology at Southern Illinois University.
Grantsmanship: 1979, Co-principal Investigator, Psycho-Educational Evaluation of Students at Intermountain School, funded by Bureau of Indian Affairs, $24,903, Exceptional Child Center, Utah State University; 1980, participant writer of Rural Utilization of Resources Available to Local Education Agencies, funded $113,197. by BEH for the Exceptional Child Center, Utah State University; 1980, participant writer of A Rural Educational Model for Moderately to Severely Handicapped Children 0-5, funded $72,758. by BEH for the Exceptional Child Center Satellite Program at Missoula, Montana.

Honors and Awards: Dean's List, Southern Illinois University, Edwardsville, 1973-78; Member Dean's College, Southern Illinois University, 1974-76; Candidate representative from Southern Illinois University for Danforth Foundation Fellowship, 1976; Magna Cum Laude, Southern Illinois University, 1976.

Professional Affiliations: Member: American Psychological Association; Association for the Advancement of Behavior Therapy; Society for Psychophysiological Research; Utah Psychological Association.