AN ANALYSIS OF BIORHYTHMS AND THE EFFECT ON THE PERFORMANCE OF THE TWENTY LEADING LADY GOLF PROFESSIONALS OF 1975

## by

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AN ANALYSIS OF BIORHYTHMS AND THE EFFECT ON THE PERFORMANCE OF THE TWENTY LEADING LADY GOLF PROFESSIONALS OF 1975

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## DEDICATION

This study is dedicated to my father, the late Bernard H. Jano.

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## TABLE OF CONTENTS

Page
DEDICATION ..... ii
ACKNOWLEDGMENTS ..... iii
LIST OF TABLES ..... viii
LIST OF GRAPHS ..... ix
ABSTRACT ..... $\mathbf{x}$
Chapter
I. INTRODUCTION ..... 1
Statement of the problem ..... 3
Sub-problems ..... 3
HYPOTHESES ..... 4
EFINITION OF TERMS ..... 4
Above Average Performance Score ..... 4
Amplitude ..... 5
Average or Above Average Bio- rhythmic Performance ..... 5
verage Score ..... 5
Below Average Biorhythmic Performance ..... 5
Below Average Performance Scores ..... 5
Bionomy ..... 6
Biorhythm ..... 6
Circadian Rhythm ..... 6
Composite ..... 6
Discharge Phase ..... 7
Endogen ..... 7
Emotional Cycle ..... 7
Exogen ..... 7
Half Periodic Day ..... 8
Intellectual Cycle ..... 8
Linear Oscillator ..... 8
Mixed Rhythm ..... 8
Negative Phase ..... 8
Performance Scores ..... 9
Period ..... 9
Phase ..... 9
Physical Cycle ..... 9
Positive Phase ..... 9
Regenerative Phase ..... 9
Sine Curve ..... 10
Zeitgeber ..... 10
DELIMITATIONS ..... 10
LIMITATIONS ..... 11
II. REVIEW OF RELATED LITERATURE ..... 12
THE MASTER CONTROLLER--TWO VIEWS ..... 12
HISTORICAL BACKGROUND OF BIORHYTHMS ..... 25
CHARACTERISTICS OF THE CYCLES ..... 31
Physical Cycle ..... 31
Emotional Cycle ..... 32
Intellectual Cycle
B. DEVIATIONS FROM GOLFER'S PERFORMANCE SCORE AVERAGES • • • • • • • • •
C. PRINT-OUTS FOR THE ORIGINAL BIORHYTHM CYCLES OF THE TOP TWENTY GOLFERS FOR THE YEAR 1975 • • • • •
D. MIXED BIORHYTHM CYCLE: TREATMENT GROUP INDICES

## Table

## Page

1. Descriptive Statistics of the Physical Cycle for Three Treatment Groups.
2. Analysis of Variance of the Physical Cycle of 1336 Performance Scores and Biorhythmic Potentials for Three Treatment Groups
3. Analysis of Variance of the Emotional Cycle of 1336 Performance Scores and Biorhythmic Potentials for Three Treatment Groups59
4. Descriptive Statistics of the Emotional Cycle for Three Treatment Groups ..... 60
5. Analysis of Variance of the Intellectual Cycle of 1336 Performance Scores and Biorhythmic Potentials for Three
Treatment Groups . . . . .
Descriptive Statistics of the Intellectual Cycle for Three Treatment Groups62
6. Descriptive Statistics of the Mixed Cycle for Three Treatment Groups
7. Analysis of Variance of the Mixed Cycle of 1336 Performance Scores and Biorhythmic Potentials for Three
Treatment Groups
Graph Page1. Mean Deviations of Golf Scores fromGor's fromGolfer's Average for the PhysicalCycle Indices . . . . . . . . .58
8. Mean Deviations of Golf Scores from Golfer's Average for the Emo-tional Cycle Indices . . . . .Golfer's Average for the Intel-lol stare for the Intellectual Cycle Indices . . . . . .
9. Mean Deviations of Golf Scores fromGolfer's Average for the MixedCycle Indices65

## abstract

The purpose of this study was to analyze the
differences among four computations of conventional biorhythmic efficiency indices and performance score indices of twenty lady professional golfers. The subjects consisted of the top twenty money winners of the Ladies Professional Golf Association for the year 1975. Each subject's birthdate and daily tournament scores were collected from the LPGA. The golfer's physical, emotional, intellectual and mixed biorhythms were calculated for the year 1975. These calculations were classified as one, two or three for average/ above average biorhythmic efficiency, below average biorhythmic efficiency and critical biorhythmic efficiency according to the conventional biorhythm theory.

For the days the golfers performed in a tournament, deviations were established from each golfer's mean performance score for the year 1975. Data from the biorhythm calculations and performance score deviations were analyzed through the analysis of variance for the one-way design. Differences between biorhythmic calculations and actual performances were determined.

The findings of this study were as follows

1. There was no significant difference among the treatment groups of the physical cycle according to the
conventional biorhythm theory analyzed by the one-way analysis of variance.
2. There was no significant difference among the treatment groups of the emotional cycle according to the conventional biorhythm theory analyzed by the one-way analysis of variance.
3. There was no significant difference among the reatment groups of the intellectual cycle according to the conventional biorhythm theory analyzed by the one-way analysis of variance
4. There was no significant difference among the treatment groups of the mixed cycle according to the conventional biorhythm theory analyzed by the one-way analysis of variance
5. As displayed by the four computations of $F$ ratios, the analysis of variance disclosed non-significant differences between performance scores and biorhythmic fficiencies of average/above average, below average and critical according to the conventional biorhythm method of interpretation.

The following conclusions were drawn from the study:

1. A review of current literature indicated that intrinsic and extrinsic variables may have influenced the performance of the golfers enough to overwhelm the potential outcomes of the biorhythms
2. The results of the study, analyzed by utilizing the analysis of variance for one-way design, inferred that
the four rhythmic cycles did not have a significant effect on the performances of the top twenty lady golfers.

Chapter I

## INTRODUCTION

Physical educators and coaches have often questioned why a player performs differently from day to day. A welltrained athlete can break a world record one day and the following day perform poorly. Physical educators and coaches may question the teaching and coaching techniques; however, with this disparity in performance, the instructor or coach may also observe differences in the physical, emotional and intellectual behaviors of the player on a daily basis. Could these three behaviors influence the physical performances of a well-trained athlete?

Fluctuations of behavior were noted circa the time of Hippocrates. The philosophical physician instructed
students and colleagues to consider treatment according to good and bad days of the patients. ${ }^{1}$

Before the nineteenth century, it was recognized that man had days that alternated from good to bad. However, no one asked why. Extensive research had already taken place in biology and zoology to describe the regular rhythmical processes of single-cellular and multi-cellular
${ }^{1}$ George $S$. Thommen, Is This Your Day? (New York: Crown Publishers, 1973), p. 13.
organisms based on the twenty-four hour clock. ${ }^{2}$ These circadian rhythms are inborn within the individual.
. . That is, the period is not learned, or imprinted upon organisms by the twenty-four daynight light and temperature cycles produced by the rotation of the earth. ${ }^{3}$

Swoboda thought there must also be a rhythm pattern in man to cause fluctuations in behavior. This investigator said,
from the best of health does not prevent
man from feeling unwell at times, or less cheerful than he is normally. ${ }^{4}$

Fliess, a Berlin surgeon, theorized in the early 1900s that man had two cycles, the physical or male cycle consisting of twenty-three days and the emotional or female cycle consisting of twenty-eight days. A third cycle called the intellectual cycle was introduced later. ${ }^{5}$ Thus, the theory of the biorhythm and bionomy was derived. ${ }^{6}$

This study was designed to help the investigator determine how much emphasis should be placed on the biorhythm theory to performance in golf. If the biorhythmic study was applicable, the statistical analysis of the

[^0]biorhythms could possibly inform the individual of the upcoming highs, lows, and critical days so activities could be adapted accordingly.

If this theory were conducive to determining
potentials of behavior and performance, biorhythmical charting, if applied, should benefit the golfer to better enhance the performance during competitive situations. ${ }^{7}$

## Statement of the problem

The purpose of this study was to compare the
differences among the biorhythmic patterns to the competitive performances of the top twenty money winners in the Ladies Professional Golf Association for the year 1975.

## Sub-problems

Several sub-problems were considered while
conducting the study:

1. Selecting the subjects and tournaments used in the study.
2. Recording the deviation of the golfer's daily performance scores during competition from each individual's 1975 average score.
3. Calculating and classifying each subject's physical, emotional, intellectual and mixed biorhythms.
4. Organizing and analyzing of the data.
${ }^{7}$ Ibid., p. 27.

## HYPOTHESES

The hypotheses tested in this investigation were:

1. Individual performances, as classified from 1975 scoring averages, were not significant to the interpretation of the biorhythmic statistics in the physical cycle.
2. Individual performances, as classified from 1975 scoring averages, were not significant to the interpretation of the biorhythmic statistics in the emotional cycle.
3. Individual performances, as classified from 1975 scoring averages, were not significant to the interpretation of the biorhythmic statistics in the intellectual cycle.
4. Individual performances, as classified from 1975 scoring averages, were not significant to the interpretation of the biorhythmic statistics in the mixed cycle.
5. Individual performances, as classified from 1975 scoring averages, were not significant to the midine critical point interpretation in the three original cycles.

## DEFINITION OF TERMS

## Above Average Performance Score

$H_{1}$ through $H_{5}$ used the classification of numerical scores higher than the yearly average score to designate above average performance scores.

## Amplitude

Amplitude was the height of an oscillation. ${ }^{8}$

## Average or Above Average Bio-

 rhythmic PerformanceAll points at least one point above the midine were
interpreted as being average or above average biorhythmic performance for classification purposes

## Average Score

Average score was the mathematical average of all
the performance scores of an individual golfer for the year 1975.

## Below Average Biorhythmic

 PerformanceAll points below the expected average biorhythmical positions on the sine curve scale were designated as being the expected below average biorhythmic performances in the cycles.

## elow Average Perfor-

 mance Scores$H_{1}$ through $H_{5}$ utilized the classification of numerical scores lower than the yearly average score to designate below average performance scores.

[^1]
## Bionomy

A psychological prediction of the rhythmical cycles in man was called bionomy. ${ }^{9}$

## Biorhythm

Biorhythm was the theory related to the life cycles of physical, emotional, and intellectual behavior in man. 10

## Circadian Rhythm

A circadian rhythm was a cycle consisting of twentyone to twenty-eight hours. ${ }^{11}$

## Composite

The composite was the ". . . algebraic sum of values
assigned to each day of each cycle. . ." that took into
account personality types. ${ }^{12}$

## Critical

The critical day occurred when the first and last days of the cycle crossed the midine or when a cycle

[^2]crossed from positive to negative or vice versa. ${ }^{13}$ For the purposes of this study, $H_{5}$ utilized the above conventional interpretation to define the critical position. ${ }^{14}$

## Discharge Phase

A discharge phase was a time of increased effi-
ciency. ${ }^{15}$

## Endogen

An endogen was one of the two main categories of biological rhythms which originated its response within the organism. It was also known as the "active system."16

## Emotional Cycle

This cycle was also referred to as the feminine
or sensitivity cycle and was composed of twenty-eight
days. ${ }^{17}$

## Exogen

An exogen was one of the two main categories of biological rhythms which originated its responses outside

[^3]${ }^{17}$ Thommen, op. cit., p. 53.
of the organism. It was also known as the "passive system."18

## Half Periodic Day

The point when the cycle switches from positive to negative phase and was also referred to as the critical day. ${ }^{19}$

## Intellectual Cycle

This cycle was concerned with creativity and cognitive abilities. It consisted of thirty-three days. ${ }^{20}$

## Linear Oscillator

An alternation of two energy stores in a sine wave pattern was a linear oscillator. ${ }^{21}$

## Mixed Rhythm

For the purpose of this study, all the three cycles were examined together by taking an average of the three cycles on each day

## Negative Phase

All points below the midline were in the negative phase.
${ }^{18}$ Colquhoun, op. cit., p. 18.
${ }^{19}$ Thommen, op. cit., p. 57.
${ }^{20}$ Ibid., p. 55.
${ }^{21}$ Colquhoun, op. cit., p. 3.

## Performance Scores

Daily golf scores of each subject during competition were the performance scores.

## Period

A period was a completed cycle or could also be referred to as half-periodic or critical phase of a cycle. ${ }^{22}$

Phase
A phase was a section of the complete cycle. ${ }^{23}$

## Physical Cycle

This cycle was concerned with physical endurance and was composed of twenty-three days. ${ }^{24}$

## Positive Phase

All points above the midline were in the positive phase.

## Regenerative Phase

The regenerative phase was a time of lessened efficiency. 25

[^4]
## Sine Curve

A sine curve was a linear oscillator ${ }^{26}$ which showed discharging or plus half periods on the top half of the graph above the horizontal line and the recharging or minus half periods on the lower half of the graph below the horizontal line. The height and width of the curves were determined for each individual. 27

## Zietgeber

Zeitgeber was the German term given to describe
the synchronization of a circadian rhythm. ${ }^{28}$

## DELIMITATIONS

The delimitations of this study were as follows:

1. This investigation encompassed the 1975 golf tournaments of the Ladies Professional Golf Association. The top twenty money winners for the 1975 ladies tour were the subjects of this investigation. Performance scores of each tournament were collected beginning on January 18 , 1975 and ending on December 14, 1975.
2. Biorhythmic statistical calculations were performed for the physical, emotional, and intellectual

[^5]cycles. The birthdates of the top twenty money winners in 1975 were used to perform the biorhythmic statistical calculations for the physical, emotional, and intellectual cycles. From these calculations, averages were computed in order to disclose the mixed rhythm cycle.

## LIMITATIONS

There were elements within the study that may have deterred the results of the investigation. The limitations were as follows:

A total of thirty-three official and unofficial tournaments were scheduled by the LPGA for the year 1975. The United States Open Tournament was deleted from the study because the daily scores were not given in the LPGA Player Guide 1976. Also, the Colgate European Ladies Open was eliminated because of an error by the investigator in the final organization of the data.

Other circumstances the investigator did not make allowances for were atmospheric conditions during each day of play, golf course conditions and individual golf course ratings. These situations could have been a contingent factor to the player's behavior and golf score.

## Chapter II

## REVIEW OF RELATED LITERATURE

The review of literature revealed a scarcity of completed research pertaining to the use of biorhythm statistics in athletics. The review was divided into four sections. The first section reviewed the two main hypotheses of the origin of rhythms. The historical background of the biorhythm theory was contained in the second section. The third section disclosed the many characteristics of the biorhythm cycles, while the fourth section was concerned with studies related to demonstrating how biorhythms have been used in medicine, industry and athletics.

THE MASTER CONTROLLER--TWO VIEWS

At the moment of conception, when the sperm penetrates the ovum, the cycle of life begins within the womb of the mother. ". . . Cycles lasting only microseconds to the 90 -minute cycles seen in sleep, cycles of about a week, monthly, seasonal, and even annual rhythms . . ." occur within the living organism. ${ }^{1}$ However, what and where was this "Master Clock" that started these rhythms of life?

[^6]The term biorhythm was a Greek word for "life-beat. It was linked with the fine arts of music and verse. Thommen makes the analogy ". . . that Nature is the composer; man, as a human being is the instrument upon which Nature plays her rhapsodies; man, as a scientist, is the listener . . ."2

Biorhythm is based upon what scientists referred to as biological rhythms since the age of Aristotle. ${ }^{3}$ Hippocrates also noticed the "good" and "bad" days of his patients and treated them accordingly. ${ }^{4}$ Therapies used by the early Greeks were called "metasyncrasies." The treatments involved the partaking of the same three foods and exercises at intervals of every seven days in order to fluctuate with the different moods. ${ }^{5}$

Biological rhythms occur regularly at all levels
of the plant and animal kingdoms, from the single-celled to the multicellular organisms. ${ }^{6}$ However, biological rhythm research began in the discipline of botany in the eighteenth century. Twenty-four hour circadian movements were first observed in leaves and flowers. During this time, Mead,

[^7]${ }^{4}$ Thommen, op. cit., p. 13.
${ }^{5}$ Luce, op. cit., p. 8.
${ }^{6}$ Brown, op. cit., p. 8.
a British physician, reported the significance of the sun and moon orbits to the outbreak of illnesses. ${ }^{7}$

It appears there are many rhythms and perhaps many clocks under the direction of a master controller which coordinates the ebb and flow of complex functions such as internal secretions, metabolism of food and chemicals, sleeping and waking, fluctuation in mood, and even the division of cells. 8 Painstaking scientific experiments in the areas of chemical, psychological and behavioral rhythms were not endeavored until several decades ago. ${ }^{9}$

Cloudsley-Thompson, one of the major authorities on biological rhythms gave three hypotheses of how biological rhythms were derived. "'They are learned. They are inherited. They depend on reactions to cosmic stimuli.'" In 1961, Cloudsley-Thompson stated that the precision of the "clocks" originated through the decisive method of natural selection. ${ }^{10}$ However, the two most recognized schools of thought are predicated upon the endogenous clock hypothesis and the exogenous clock hypothesis. ${ }^{11}$

[^8]A central problem here is to establish whether or not any observed behavioural [sic] rhythm is generated by the organism itself and gets locked or entrained to the environmental periodicity at a particular phase or whether it is the external rhythm which causes the periodicity in the organism directly. 12

The endogenous clock hypothesis, also known as the "active system," was the basis for the first school of thought. Whether there is only one biological clock or many clocks that act as their own timing device is still unknown. ${ }^{13}$

The second hypothesis of inheritance was based on the work of Hastings. His supposition was that the environmental conditions had no effect on the organisms. Instead, it was the independent metabolism constituents of the cells that created the rhythms of the organism. The cells for millions of years adjusted to good and bad conditions until the organisms could predict these periods through a metabolic timer. ${ }^{14}$ Hasting's partiality leans toward the first school of thought, but does not disregard the second school completely. ${ }^{15}$

Dewey is biased toward the endogenous clock. This
researcher wrote,
${ }^{12}$ W. P. Colquhoun, Biological Rhythms and Human Performance (New York: Academic Press, 1971), p. 7 .
${ }^{13}$ Arehart, loc. cit.
14 Brown, op. cit., pp. 12, 22 .
${ }^{15}$ Arehart, op. cit., p. 179.
. . . these 'clocks' (still not located if they do exist) are strictly internal devices uninfluenced from the outside . . . or affected by outside from the
forces. 16

Pauly and Schwing, from the University of Arkansas Medical Center, studied fifty different rhythms in their patients, the aged and military volunteers. These doctors' investigations confirmed that their research was toward the endogenous school of thought. ${ }^{17}$

Another investigation demonstrated that plants fluctuate according to light intensity. These observations were reported by Hamner of the University of Southern California. Hamer stated that his bias was oriented more toward the first school of thought; however, external forces could not be disregarded. ${ }^{18}$

Hoagland developed the "chemical clock" theory in
1931 at Clark University and later explored the relationship between human physiology and psychological behavior. Hoagland supported the internal theory and was one of the first scientists to promote biological rhythms as a reliable source to describe human behavior.

Much of the overt behavior of organisms is determined by the interrelations between chemical events within the cells and groups of cells, quite
$\qquad$
${ }^{16}$ Edward R. Dewey, Cycles, The Mysterious Forces that Trigger Events (New York: Hawthorne Books, Inc., 1971), p. 38:
${ }^{17}$ Arehart, loc. cit. $\quad{ }^{18}$ Ibid.
${ }^{19}$ Willis, "Rationale for Biorhythm Cycles," op. cit., p. 3.

Furlong stated that man has an inner clock ". .
that was not regulated by such external stimuli as night and day or changing temperature." According to Furlong, everything changes: mental alertness, tastes, odors, music, moods and feelings. 20

Bünning, of the University of Tübingen, Germany,
theorized that most biological rhythms, if not all of them, function because of internal devices. "Considering the fact that $D N A$ carries life's genetic code; . . . then too it may well provide the biorhythm patterns." ${ }^{21}$ Bünning believed that the "master clock" in the upper hierarchy of the animal kingdom lay within the central nervous system. ${ }^{22}$

Bünning, in the 1930 s , found that the periods repeated rhythmically at interspaces of approximately twenty-four hours.

Organisms have the ability, that is, to draw energy from a constant source and convert it into more useful alternating cycles, which are then displayed as rhythmic phases of activity like the hands of a clock returning to midnight once each day. 23

[^9]
## Ehert, et al.,

. . . visualizes very long DNA molecules at
the heart of the time keeping [sic] sequence, and refers to them as chronons.
The rate of construction of the DNA molecule could be visualized ". . . as functioning like the escapement of a watch . . ."--totally devoid of external forces acting upon it. ${ }^{24}$

In 1950, Kramer expounded on the Bünning hypothesis. Through his study of migratory flights of birds, Kramer originated the idea that birds ascertained direction throuh use of the sun's seasonal path across the sky. However, because of the continuous movement of the sun, Kramer observed the birds making adjustments ". . . through the use of an internal clock." ${ }^{25}$

Many scientists (Lehmann, Blake, Willis, Hoagland, and Monroe ${ }^{26}$ ) believed that diurnal temperatures can determine performances or efficiencies to a high degree. Lehman found in his studies that from six a.m. to between nine and eleven a.m. efficiencies increased; therefore, there were
$\qquad$
24Willis, "Rationale for Biorhythm Cycles," loc. cit.

$$
25 \text { Ward, op. cit., p. } 184
$$

${ }^{26}$ Diego Pupo Nogueira, "Accidents during Work and Time of the Day," Industrial Medicine, 40:6:28-29, and Time of the Day," Industrial Medicine, 40:6:28-29, September Science, 9:6:350, September-December 1967; se also Willis, "Rationale for Biorhythm Cycles," op. cit., p. 6; see also Luce, op. cit., p. 5.
fewer accidents. A decrease occurred around noon or a little after and again rose until its second high occurred around three and four in the afternoon. The majority of accidents developed around midday. ${ }^{27}$

From the studies of Hoagland and Monroe, an indi-
vidual could be categorized as a "night hawk" or an "early bird" by the high points in temperatures. Someone whose temperature was subnormal when first waking up could be categorized as a "night hawk," or the least active in the morning hours. A person who awakened with normal temperature reading would be in the category of the "early bird" or the most active during the morning hours. ${ }^{28}$

Other ideas of the "master controller's" origins, according to the intrinsic viewpoint, were seen in studies of hormonal dependencies. According to Still, the adrenal glands played an important role in determining the fluctuations in the emotional cycle. The increase and decrease of adrenal steroids during this cycle was first reported in 1948.

The importance of adrenal hormones to the up-and-down waves or physical and mental processes has tempted scientists to search for the central controller, or master biological clock, in the adrenal glands. ${ }^{2}$

Research was begun recently on determining the real purpose of the glial cells which encompassed the neurons.

[^10]The supposition that these cells not only feed the nerve cells but ". . . may be very important in the electrical wave transmission of the brain, for they appear to modulate the excitability of the neurons" ${ }^{30}$ was considered.

In this same area of study of the relationship of the nervous system to fluctuations in behavior, Beeker, Brachman, and Friedman discussed their findings in the New

## York State Journal of Medicine.

Since the cranial Direct Current potential appeared to be a particularly important parameter in the state of consciousness or level of irritability in the human being, the possibility that it was the controlling mechanism for biological cyclic behavior was considered. In a preliminary study the transcranial D.C. potentials of two normal subjects and two schizophrenic patients was determined daily for a period of two months. A definite cyclic pattern was evident in all four subjects, with a periodicity of approximately 28 days, and with all four following similar cycles. ${ }^{31}$

The second school of thought, the exogenous hypothesis, contends that the "master controller" was not internal in the organism. The pacemaker was caused by external or exogenous forces such as electromagnetic fields, temperature and light. ${ }^{32}$ Frank A. Brown, Professor at Northwestern University, experimented in 1957. Through the studies conducted, Brown's viewpoint leaned more toward this school of thought. Brown believed that under strictly controlled experimental conditions the organisms

[^11]. . . were using subtle, rhythmic geophysical forces--those that easily permeated the barriers forces--those that easily permeated the barrier
of an experimental set up-as an informational input to time their overt rhythmic processes. 33

This scientist found from experiments conducted that
the cycles followed a pattern based on the twenty-four hour
day and the human female menstrual cycle of approximately twenty-nine and one-half day rhythm. ${ }^{34}$ According to Brown,
it is these rhythmical cycles that regulate our physical,
emotional, and intellectual behaviors to any time zone on
the earth during jet travel. Brown stated,
. . . that at half-monthly intervals there is
increased activity during the late morning hours.
Here then is a remarkably precise, persistent,
semimonthly rhythm in running activity. 3
Further support of extrinsic factors controlling the
rhythms of organisms have persisted through the centuries in astrology.
. . . Scientists have not yet proved that
living creatures are not influenced in their cyclic variations by subtle forces emanating from the planets, sun, moon, and the earth itself.

Brown is a believer of these cosmic forces of the moon's phases, sunspots' radiational and gravitational forces emanating from the earth itself. ${ }^{36}$ "'All research to date

[^12]shows the influence of geophysical factors on rhythms, yet only some research suggests an internal factor. " 37

Becker, an orthopedic surgeon at the Veterans Administration Hospital in Syracuse, New York, stated the postulation of electromagnetic forces as being the key to the "master controller" has only been accepted in the past five years. In Becker's studies, it was found that the molecular make-up of the organism acts as electrical conductor and that different charges causing changes in the body's physiology could cause changes in the epiphyseal area of the skeletal system. ${ }^{38}$

Burr of Yale University said that the circuitry of the brain regulates the processes of the body. According to Burr, the brain is really an intricate magnetic field. A gland found in the brain called the pineal gland acts in lower animals as a third eye. Because it is close to the surface in these lower animals, light affects it and is ". . . believed to be a coupling device regulating the phase relations among biological rhythms." Scientists believe that in the human the optic nerve somehow triggers the pineal gland to function as in the lower animals. ${ }^{39}$

In studies of bird flights of Kramer, the sun's light influenced the flight patterns of the birds.

[^13]Therefore, ". . . intensity of illumination might influence the activity and physiological rhythms of man, as it does influence birds." 40

Luce stated that ". . one of the most potent and ubiquitous triggers of biological rhythms is light--visible light from the sun and moon . . ."41 In a study performed on nineteen females' menstrual cycles to determine illumination during the fourteenth through seventeenth nights of the cycle, the investigation showed significance. "The result over the course of a hundred-monthly [sic] cycles was the regularization of their cycles to 29.5 days, the synodical period of the moon."42

Colquhoun stated that a woman's psyche and soma are affected by the menstrum. Colquhoun noted in his investigation that there were two periods in which disturbances were observed in the physiological and psychological activity of the female subject. "One was the premenstrual phase, which was accompanied by irritability and tension; the other occurred around the time of ovulation . . ." Reports by Benedek and Rubenstein in 1939 explained the

[^14]time of ovulation as being a mitigated period for the female. ${ }^{43}$

Along with the possibilities of the moon's influence on the menstrual cycle is the evidence that seventeen percent more babies are born on waxing phases than on wanning phases of the lunar cycle. Death rates due to tuberculosis seemed to occur more during the full moon. ${ }^{44}$

However, the most powerful external force that could be the "controller" of behavior may be totally social in nature. In a study in 1965 by Reinberg et al., the report showed that seven women who lived in two different tents in a cavern functioned differently according to the tents lived in. Even inherited rhythms, said Luce, seemed to be brought out by the influences of social Zeitgebers such as a baby urinating regularly as it grows older or developing Huntington's Chorea genetic disease. ${ }^{45}$

The belief that there was only one "master controller" regulating the different fluctuations in behavior has lost popularity. "It is abundantly clear that healthy living things are not only internally rhythmic; they are also synchronized with their environment." ${ }^{46}$ Until otherwise

[^15]proven, this eclectic viewpoint will remain the basis of explanation of the origin of the "master controller."

## HISTORICAL BACKGROUND OF BIORHYTHMS

While the biologist and zoologist researched the reasons the lower species of the plant and animal kingdoms behave the way they do, two men in Europe looked at man's behavior in the same area. Swoboda, a psychologist at the University of Vienna and Fliess, a practicing physician in Berlin proposed theories circa the late 1800 s on human behavior. ${ }^{47}$

After collecting data for over twenty years, Fliess charted the fluctuations of attitudes and health ${ }^{48}$ of these thousands of patients through reports of accidents, illnesses, marriages, divorces, etc. ${ }^{49}$ These findings were published in the book The Relationship between the Nose and the Female Sex Organs from the Physiological Aspect. Fliess' breakthrough linked twenty-three and twenty-eight day cycles with changes in the mucosal lining of the nose. Fliess related nasal irritation to neurotic symptoms and sexual abnormalities. ${ }^{50}$ Fliess stated that, "'Every person,

[^16]I maintained, is really bisexual. Their component is keyed to the male cycle of 23 days, the female of a cycle of 28 days.'" 51

Fliess also believed that these cycles were innate and would persist throughout the individual's existence. According to Fliess the two main cycles mentioned above were inherent in man and were measured by tracing diseases and deaths back to birth. 52

Fliess wrote about all his findings in the papers, "The Course of Life" in 1906, "Of Life and Death" in 1909, and "The Year of the Living" in 1925. According to Fliess, his intimate friend, Sigmund Freud, disclosed some of Fliess' ideas to Hermann Swoboda who published them as his own findings. 53

In 1897 Swoboda began extensive research to follow up his observations of the philosopher Herbart's studies on the variations of humans' physical and emotional performances. 54 By 1902 , Swoboda confirmed that what Fliess had stated about the twenty-three day physical cycle and twenty-eight day emotional cycle was also similarly

[^17] American, 215:1:108, July 1966.

52 Thommen, op. cit., p. 12.
53 Gardner, op. cit., p. 109.
54 Harold R. Willis, "Biorhythm and Its Relationship to Human Error," (proceedings of the Sixteenth Annual Meeting of the Human Factors Society, Santa Monica California, October 17-19, 1972), p. 274.
accepted. 55 Swoboda dedicated much of the work at the University of Vienna to demonstrate that illnesses; heart attacks and deaths would occur on periodic and halfperiodic days, calculated according to the physical and emotional cycles. Swoboda performed computations with a slide rule that was designed specifically for biorhythms. All his findings were reported in the paper, "The Periodicity in Man's Life," ${ }^{56}$ and the book, Das Siebenjahr (The Year of the Seven). ${ }^{57}$ Swoboda's book contained five
hundred and seventy-six pages of statistical computations of the twenty-three and twenty-eight day cycles of gener-
ations. A great loss occurred in 1945 when the Russian
troops confiscated the documents which to this date have
never been recovered. ${ }^{58}$
Both Swoboda and Fliess used mathematics in an effort to prove rhythmicity of the physical and emotional cycles.

The irony of their quest was that this very use
of mathematics helped largely to defeat their
attempts to gain wide acceptance for the very
conclusions that mathematics helped them to reach. ${ }^{59}$

[^18]Two pioneers in biorhythmic statistics were Frueh, a Swiss and Judt of Bermen, Germany. Frueh developed a vertical graph in which the positive phases of the cycles were designated by the following colors: red for the physical cycle, blue for the emotional cycle and green for the intellectual cycle. The negative phases of all the cycles were not indicated by color. In 1939, Frueh published books explaining the biorhythmic calculations and statistical tools used. 60

Judt, a doctor of engineering and mathematics in the 1920 s, investigated the performances of athletes in sports. This researcher designed tables which demonstrated the significance of the date of birth to the day of the sports events. ${ }^{61}$

The sine curve model was first designed in the 1950s. By using this type of instrument, relative changes in all cycles can be observed on a daily basis. Calculators of a dial type have also been used; however, the sine curve charting was the most commonly used today. ${ }^{62}$

A third cycle called the intellectual cycle was added by the modern Fliessian cult. ${ }^{63}$ Teltscher of the University of Innsbruch, Austria in the 1920 s recorded
${ }^{60}$ Ibid., pp. 29, 45.
${ }^{61}$ Ibid., p. 28.
62 Ibid., p. 45.
${ }^{63}$ Gardner, loc. cit.
this third cycle which consisted of thirty-three days. 64
Teltscher studied five thousand high school and university
students to determine whether there was a pattern of
dullness and alertness.
His charts corroborated the Fliess twenty-three
day and twenty-eight day cycles, but also found
a thirty-three day intellectual cycle of memory,
alertness and reasoning powers. 65
Hersey, a psychology professor, along with Bennett,
an endocrinologist at the University of Pennsylvania,
conducted research in 1928 and 1932 on workers in railroad shops. 66 "Daily records were kept of their conversation, mood, outlook, physical condition, and work efficiency." These researchers saw a fluctuation of ability of thirtythree days. In later studies of Hersey, reports of patterns of four to six week rhythms of emotional fluctuations were observed. All these findings were in Hersey's books, Workers' Emotions in Shop and Home and Zest for Work. 67

A fourth cycle that has been recently used in biorhythmic statistics has its origins from all the previous cycles mentioned. A statement from Biorhythm Information in 1973 explains the validity of this new cycle.

[^19]We are now feeling the necessity of extending our researches farther afield and conducting them into so called 'pattern analyses,' that is the analysis into patterns and combinations of three rhythms. In practical field, it is far more important and useful to learn the meanings of the plusperiods of each rhythm and to make the most of its benefits than to make researches on 1 y concerning


The most recent of books written on the biorhythm theory in 1975, called Biorhythms: How to Live with Your Life Cycles, by Barbara 0 'Neil and Richard Phillips, explains and demonstrates this new "cycle." These authors call this fourth cycle the composite. O'Neil and Phillips explain the cycle as ". . . both a refinement and a further explanation of the biorhythm chart. The composites offer a significant view of changes in energy levels."69

For the composite, the type of personality toward which one leans must be known. Phillips developed nine questions to determine whether the person was more the emotional, intellectual or physical type. Therefore, through algebraic calculations, a single line was developed from all three original cycles. By this means, the cycle predicts the personality types of the individual. ${ }^{70}$

The use of the discovered theories of the original
three biorhythms (emotional, physical, intellectual)

[^20]accomplished most of its development and improvement mainly in Europe and Japan

The Biorhythmic Center Basel, Basle, Switzerland states; Analysis at the Swiss Federal School of Technology, Zurich, Switzerland, have confirmed the natural regularity of the sequences . . .' The statistical analysis and verification of bio rhythm was done by Prof. Dr. H. L. LeRoy, at the Laboratorium for Biometric and Populations genetic.

However, today biorhythms are demonstrated to
consist of three natural cycles and one more cycle determined by the algebraic sum of the three original cycles. These four cycles make up the biorhythm theory of today.

## CHARACTERISTICS OF THE CYCLES

Each cycle was unique and different from the other
cycles in periodic number of days and behavior pattern fluc-
tuations. The basic characteristics of each cycle are as
follows:

## Physical Cyc1e

This cycle is also referred to as the male cycle.
It controls the masculine characteristics of ". . . physical
strength, confidence, aggressiveness and endurance." ${ }^{72}$
According to Fliess, this cycle is initiated by the motor cells of the skeletal muscles. ${ }^{73}$

[^21]73 Thommen, op. cit., p. 51.

The physical cycle is divided into half periodic phases of eleven and one-half days each. The first phase of the cycle is known as the ". . . ascending or discharge period." During this period, the individual feels and performs his/her best. ${ }^{74}$ An athlete should do intensive training during this phase. 75

The recharging period constitutes the second half
of the cycle. Physical energy and endurance is at a low point and the individual is more susceptible to tire easily. Discounting this effect of the negative position on conditioned athletes, Thommen states that,

> All other things being equal, a trained athlete
if he has not overtrained prior to the contest. 76

## Emotional Cycle

Sensitivity is the key to this cycle and so it is sometimes referred to as the female or sensitivity cycle. The cycle characterizes ". . . feelings, intuition, creativity, love, cooperation, cheerfulness."77 Therefore, the physical cycle ". . . seems to influence not only your emotional outlook but your reactive ability as well."78

[^22]According to the Japanese, any type of contest or public display and teamwork would be at its highest degree of efficiency for the individual at the peak of this cycle. ${ }^{79}$

Twenty-eight days was the length of the emotional
cycle.
-. . The 28-day rhythm is composed of four seven-day weeks, the weekday that one was born on will always repeat on the first and on the fifteenth day of this rhythm.

Laird stated in 1935 that emotional energy is
expanded and replenished in "regular" cycles running between four to five weeks. Laird said that this emotional energy could be demonstrated as being high when the individual had restless sleep and low when the individual slept well. ${ }^{81}$

Correlations of the emotional cycle to the lunar
month and also the female menstrual cycle have been observed. 82 In the seventeenth century, Sanctorius, a physician, originated the theory that there was a resembling menstrual cycle in the male. Sanctorius based his theory on findings that the male fluctuated in weight from one to two pounds in similar monthly cycles as those found in females. ${ }^{83}$
${ }^{79}$ Willis, "Biorhythm Analysis," op. cit., p. 3.
$80_{\text {Thommen, }}$ op. cit., p. 53.
81 Donald A. Laird, "The Secret of Your Ups and Downs," Reader's Digest, 27:15-16, August 1935.
${ }^{82}$ Hans J. Wernli, Biorhythm (New York: Crown Publishers, Inc., 1961), p. 19.
${ }^{83}$ Mackenzie, op. cit., p. 20.

A study was performed by Hersey demonstrating the emotional fluctuations found in the male.

His conclusion was that although the emotional
cycles of individual men vary with the individual from sixteen days to sixty-three days, the average length for men is about five weeks. 84

As in the physical cycle, the emotional cycle is divided into half periods. An individual is more outgoing and happy during the discharging periods of the first fourteen days of the cycle. ${ }^{85}$ The second half of the cycle is the recharging phase in which the individual is more impressionable to irritations or stressful situations. ${ }^{86}$

The emotional cycle was not to be confused with the woman's menstrual cycle.

The female of our species also has an emotional cycle of approximately five weeks, but hers is complicated by two other cycles. . . [menstrual] and a fourteen day cycle of amorousness.

This proclivity of sexual desires was discovered in the 1930 s by Marie Stopes. ${ }^{87}$

## Intellectual Cycle

The most recent of the three original biorhythm cycles is the thirty-three day intellectual cycle. "Teltscher's associates and also certain doctors ascribed
the phenomenon to a secretion of the thyroid gland." Origin of the cycle is believed to be found in the brain cells. ${ }^{88}$

In 1945, Hersey and Bennet, endocrinologists, demonstrated the prevalence of a "change of mood rhythm" lasting thirty-three days. Rostant, a French scientist, stated that intellectual abilities are predetermined by the "'. . .

9,000,000,000 pyramidal cells in the cerebral cortex . . .'" According to Rostant, these pyramidal cells develop from a thirty-three cell division of a single cell. ${ }^{89}$

The first half period of sixteen and one-half days
is the discharging phase. The characteristics are demon-
strated through the individual's ability to memorize and respond more easily than during the recharging phase of the second half period. 90 The discharging phase of this cycle, according to the Japanese, should be used by the individual
to venture into business experiments, discussions, deci-
sions, studies demanding memorization and examinations. 91
Thommen has found ". . . that the 33-day intellectual rhythm has a minor, or at least only a contributory influence on human error, accident, or death."92

[^23][^24]
## Composite Cycle

In 1975, Phillips presented a new method of design which demonstrates a general representation of the combination of the three previous cycles. ". . . The composite represents the algebraic sum of values assigned to each day of each cycle." General personality types can be found by administering nine questions developed by Phillips. The results of these questions divides the individuals into four categories (physical, intellectual, emotional and average personality classes). These categorizations are determined by the individual selecting one of the three answers designated by $A, B$ or $C$ of each question. If the individual chooses at least five answers from one of the three categories, this person is considered as having the characteristics of that particular personality type. "Other combinations mean you are average with a tendency toward the category where most of your choices lie." Through use of the table from $0^{\prime} N e i l$ and Phillips, a single line can be developed from the mixtures of the three original rhythms. Therefore, it can possibly show the amplitudes of the high and low phases of the total behavior of the individual. 93

## Critical Phase

Critical days occur in each of the three cycles and can be compared with the blowing out of an electric light

[^25]bulb. The explosion is caused because of a weakened filament that can not take the charge of the current being turned on or turned off. 94

The critical day, also known as the switch-point
day, periodic or half periodic day, is that point when the curve crosses the midine from positive to negative or negative to positive. This phase in the cycle ". . . presents a brief moment of equilibrium with no stress, and at this point people are accordingly, most vulnerable."95

According to Thommen, susceptibility to accidents,
illnesses or errors can be increased if two or all the cycles are at the critical point. Thommen et al. found that the potential for error and accident was definitely increased whenever the physical critical day coincided with another critical cycle. These double critical mixtures occur six times a year. ${ }^{96}$ Once a year all three cycles are at zero. 97

There appears to be little agreement concerning what constitutes the critical days. The three theories are as follows:
${ }^{94}$ Thommen, op. cit., p. 57.
95 Willis, "The Effect of Biorhythm Cycles," op. cit., p. 15.
${ }^{96}$ Thommen, op. cit., p. 53.
${ }^{97}$ Willis, "The Effect of Biorhythm Cycles," op. cit., p. 3.

1. Mackenzie and Thommen believed that the critical days occur only at the beginning, midpoint and ending of each cycle. In other words, only when the cycle crosses the horizontal line does a state of flux exist ${ }^{98}$ during the twenty-four hour span. ${ }^{99}$ These days occur approximately once every six days. 100
2. Ault, Kincade and Willis proposed another view on the duration of the critical phase. According to Ault and Kincade, the critical phase was
'. . . the time which includes the day, and a 12 hour period either side of the day during which, the curve or curves cross the zero line

Willis stated that a high percentage of accidents, flare-ups and intellectual mishaps happen within the twenty-four hour switch point period or ". . . very near to it, for the particular cycle involved." 102
3. The third viewpoint, held by Wernli and Anderson, agreed with the hypothesis held by Mackenzie and Thommen. However, Wernli and Anderson postulated that a critical potential could also exist when any two or more

[^26]cycles crossed at points in the regenerative phase other than the midline, 103 and the closer to the midine, the more critical the potential could be. 104

## RELATED StUDIES

Investigations have been performed in Japan, Europe and the United States to determine if biorhythmic critical days were a major factor in the cause of accidents, illnesses or individual human errors. In Europe, the practice of using the biorhythm theory to increase efficiency and reduce personal injury and error has been used quite extensively in air and land traffic services, athletics and by the medical profession. 105

The first use of biorhythmic statistics in business was accepted in Japan in the late sixties. The Omi Railway and Transportation Company of Hikone, Japan used the biorhythm theory to reduce the accidents of their bus drivers. ". . . They reported that they reduced their accident rate to almost zero in one year, and had achieved $2,000,000$ kilometers without an accident . . ." The company claimed this reduction as a result of telling the employees of the critical days. ${ }^{106}$ A study in German factories using
${ }^{103}$ Wernli, op. cit., p. 18. $\quad 104{ }^{\prime}{ }^{\prime}$ Neil, op. cit., p. 54.
${ }^{105}$ Arehart, "Biorhythm . . . to Spot Accident Prone Periods," op. cit., p. 101.
${ }^{106}$ Willis, "The Effect of Biorhythm Cycles," op. cit., p. 1.
biorhythmic statistics revealed that the critical day was the site of eighty-three percent of the acidents. ${ }^{107}$

In the 1960 s in the United States, Anderson investigated accidents that occurred in industry. The findings showed that seventy percent of over three hundred accidents that occurred coincided with the individual's critical day. In a second investigation between 1970 and 1972 , ninety percent of one thousand cases of accidents studied fell on the critical day. ${ }^{108}$

Willis researched in the areas of industry, traffic control and athletics. In Willis' studies, biorhythms had been found to be a significant factor in the cause of accidents, deaths and results of athletic contests. 109

The most recent research conducted in the United States was by Dr. Douglas E. Neil of the Naval Postgraduate School in California and the United States Air Force. Neil's research of the significance of human performance and biorhythms

> indicated that such analysis of accident claims, is significant in terms of the low phase and the critical day.

107 Rose Mary Rummel, "Individual and Team Biorhythms and Performances in the 1975 AIAW National Basketball Championships," 1975 (Madison College, Harrisonburg, Virginia), p. 2.
$108^{\prime}$ 'Neil, op. cit., p. 53.
${ }^{109}$ Willis, "The Effect of Biorhythm Cycles," op. cit., p. 2.

However, to find out how each of the cycles related to actual performance, Neil conducted a controlled investi-
gation on an information-processing task.

> Analysis revealed that of fourteen ooserved cycle changes, nine fell within one day of the critical times in one of the biorhythmic cycles.

United Airlines in 1973 worked with Neil in an
investigation of employees' accidents and errors. The employees were made aware of their biorhythmic critical days for a three-month period. According to United authorities, there was a reduction of injuries. It was also found that pilots were less influenced by the critical days (probably because of the intensive training), while the maintenance crews were more sensitive to these periods. ${ }^{111}$

The Air Police at Kasuga Base in Japan reported in 1970 that through their research investigations, biorhythms proved to be very reliable. Out of one thousand and sixtysix self-caused cases, fifty-nine percent were on critical days. In three hundred and fifty-five cases in industry, critical days showed fifty-nine percent reliability. In the aerospace accident reports, out of seventy-two cases, sixty-seven percent occurred on critical days. ${ }^{112}$

In medicine, evidence has been gathered to substantiate the relationship between deaths and the regenerative

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1100'Neil, op. cit., pp. 57-58.
111Ibid., pp. 59-60.
112Willis, "Biorhythm Analysis," loc. cit.
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phase of the physical cycle and the critical days of all the cycles.

It has also been found that medication or other medical treatment may be imposed which prevents the person from expiring during a critical or negative period.

Therefore, the probability that the percentage of deaths on critical-negative phases would be much higher if medical science was not used to help increase the life of the patient.

Not many research investigations on biorhythms and athletic performance have been written after the first book was published on Biological Rhythms and Performances in Sports in the 1920 s by Judt of Germany. ${ }^{114}$ A reason for
a lack of interest in this area could be attributed to the insignificance of the biorhythmic statistics to performances of the athlete. O'Neil and Phillips stated in the book,

Biorhythms: How to Live with Your Life Cycles, that
Athletes concentration on training and condi-
tioning, and on finding and maintaining the game face--that intangible quality of being properly
susceptible to the extremes of biorhythmic
susceptible to
However, in the past five years more research has begun both in individual and team biorhythmic performances. ${ }^{116}$

[^27]Many examples of sport figures have been biorhythmically charted in the three available books on biorhythms by $0^{\prime}$ Neil and Phillips, Wernli and Thommen. From the chartings, many showed significance of the critical days and high and low phases to failures and successes of the athlete's performance.

Examples of this are Lauer losing in the steeplechase in 1959. Lauer was charted as being in a critical physical stage. Connolly, in the 1960 01ympics in the hammer throw, lost by a large margin of his own previous world record. He was at a triple critical period. ${ }^{117}$

Palmer, who had won the British Open in 1962, was in a triple high phase during this tourney. Palmer met failure a few weeks later in the PGA Tournament. According to the biorhythm chart, Palmer was at the triple low phase during this week of play. 118

In boxing, there appears to be a high correlation between biorhythms and the performances of the boxers winning the bouts. In the fights between Patterson and Johansson in 1960, the biorhythms could have been used as predictors of the winner in all fights except the final fight. However, Johansson, who lost even though the biorhythm chart showed greater efficiency than Patterson's, stated that he had not trained right before his bout. 119

[^28]Spitz displayed performances "when a man can do no wrong" at the 1972 0lympic Games in swimming. Spitz was in
a discharge phase in both his physical and emotional cycles during the 01ympic competition. ${ }^{120}$

In $0^{\prime} N e i l$ and Phillips' book, they gave examples of biorhythmic charting of athletes that showed little or no significance to biorhythms and performance.

> A comparison of the charts for Jesse Owens, olga Korbut, and Muhammad Ali indicates that critical days and lows do not guarantee mistakes or failure; the charts for Johnny Miller, Billiie Jean King, and George Foreman show that highs do not necessarily mean success. We must keep in mind that in all these equations, training is crucial, and a certain amount of circumspection in interpretation is needed to allow for its effects.

Out of this investigator's search of literature on studies of athletic performance and its relativity to biorhythmic statistics, only six studies from four different sport areas were considered relevant to this investigator's area of research. These studies are discussed briefly in the following paragraphs.

In the sport of football, two studies were found by this investigator. The results of games in 1972 and 1973 in the college and professional football teams were investigated by Wallerstein and Roberts of California. By

[^29]combining individual biorhythm cycles into team cycles
Wallerstein and Roberts predicted performances of the offense and defense. 122

The study "Predictive Powers in Bio-Rhythm Analysis
in the Performance of Football Players" by Case at Missouri Southern State College in 1973 showed the application of biorhythmic statistics to predicting performances in football at Missouri Southern State College. The findings of this study demonstrated that of three hundred and fiftyfive games, one hundred and forty-two ran congruent to the predicted scores. Of the true performance scores, one hundred and thirty-one of these scores were better than the predicted scores. Eighty-two of the true performance scores were worse than the predicted scores. The predicted scores showed seventy-seven percent being equal to or better than the ranked performances established by the coach. 123 The evaluation of performances for the offense and defense of the football team was near a ninety percent preciseness. 124

In the sport of gymnastics, Gunthard, the Swiss
National Gymnastics Coach used biorhythmic statistics at

[^30]the World Championships in Ljubljana. Gunthard predicted that his team would win twenty-four points. The Swiss team won, in reality, eighteen points. Two points were lost due to an injury (which occurred on this gymnast's critical physical day). Gunthard's prediction demonstrated eightytwo percent accuracy. ${ }^{125}$

Swimming was the next area in which two studies were read by this investigator. The first study was conducted on the Rochester Swim Club by Herring. Four groups of forty male swimmers were investigated. Group A was allowed to review their biorhythm charts prior to each day. In Group B, only the coach was allowed to see the charts before each day. Group $C$ swimmers and not the coach were allowed to see their charts prior to each day. Group D's biorhythmic charting was not calculated until the end of the season. The physical cycle demonstrated the most influence on the times with the emotional cycle showing significance too. "On all swimmers tested, the practice times followed the biothythm curves with 90 percent accuracy. The meet times followed the curves with sixty percent accuracy."126

The second study investigated in the area of swimming was conducted in 1975 at Appalachian State University in Boone, North Carolina by Larson and Thomas. These

[^31]investigators predicted the top twelve swimmers of the 1975 Men's Southern Conference Swim Championships in five of the events. Twenty-five percent were predicted in the five hundred yard freestyle, fifty-eight percent in the two hundred individual medley, twenty-nine percent in the fifty yard freestyle, seventy-seven percent in the 400 yard individual medley and fifty-eight percent were predicted in the two hundred yard freestyle. The results found that the emotional cycle had a significant bearing on the proficiency of the prediction. 127

The final study reviewed by this investigator was in the sport of basketball. "Individual and Team Biorhythms and Performances in the 1975 AIAW National Basketball Championships" was the subject of investigation by Rummel of Madison College in Virginia. Rummel's study contained two hypotheses. The first hypothesis was to compare the women's individual and team performances. The other hypothesis was to determine if injuries showed significance with a critical or negative phase to the day of the injury; however, no injuries occurred. Performances were taken from the game statistics and ranked good or poor according to seasonal averages. Overall, the results demonstrated approximately eighty-five percent of both the individual

[^32]and team biorhythmic predictions as being related to individual and team performances. ${ }^{128}$

## SUMMARY OF RELATED LITERATURE

In reviewing the literature, two views of the origin of the "master controller" were described: the endogenous clock hypothesis and the exogenous clock hypothesis. ${ }^{129}$ The subsequent literature dealt with the historical background of the biorhythm theory and the characteristics of the cycles. Studies in traffic services, medicine and athletics were described. The investigations made by the traffic services suggested that the employees should be forewarned of the critical days. ${ }^{130}$ More accidents occurred on the employees' critical days than any other day of work. ${ }^{131}$ A lack of interest in the area of biorhythmic statistics and performances of the athlete suggested the rationale for only six recent studies performed on biorhythms and athletic performances. Five studies were reviewed in which the biorhythms were utilized to predict the final consequence of the contests. A large percentage

[^33]of the predictions were reported as significant in one or all of the three cycles. ${ }^{132}$

One study utilized the biorhythm theory to influence
the coach and players positively or negatively in practice
and in competitive situations. Significance on perfor-
mance outcomes was demonstrated in the physical and
emotional curves. ${ }^{133}$

[^34]
## Chapter III

## PROCEDURES

This study was divided into four distinct sub-
problems: (1) selection of subjects and tournaments,
(2) tabulation of the deviation of the golfer's daily golf scores from each individual's 1975 average score, (3) calculation and classification of each subject's physical, emotional, intellectual and mixed biorhythms, and (4) treatment of the data.

## SUBJECTS AND TOURNAMENTS

Subjects were selected from the Ladies Professional Golf Association. Only the top twenty money winners of the year 1975 designated by the LPGA were considered for the purposes of this study. ${ }^{1}$

A total of thirty-three official and unofficial tournaments were scheduled by the Ladies Professional Golf Association for the year 1975. However, the United States Open Tournament was deleted from the study because the daily scores were not given in the LPGA Player Guide 1976. Also, the Colgate European Ladies Open was eliminated because of
$1_{\text {Becky }}$ Madeira, ed., LPGA Player Guide 1976 (New

York: LPGA Office, 1976), p. 8.
an error by the investigator in the final organization of the data. The total number of potential tournaments to be played by the twenty lady golfers was reduced to thirty-one. Each of the twenty lady golfers did not play in all of the thirty-one tournaments. The most tournaments played by any one golfer was twenty-six. The least tournaments played by any one golfer was seventeen.

## DAILY DIFFERENTIAL

The 1975 final scoring averages for each golfer were taken from the LPGA Player Guide 1976. ${ }^{2}$ Each golfer's rounded off average score was utilized by the investigator to determine the deviation from the mean of all daily golf scores played in competition. (See Appendix B, p. 80.)

In golf the object of the game is to take as few strokes as possible in completing eighteen holes. Therefore, the lower the score, the better the golfer has performed. For the purposes of this study, a negative sign was given to the deviation number when the daily score demonstrated a lower numerical value than the mean score. A positive sign was given to the deviation number when the daily score demonstrated a higher numerical value than the mean score. The researcher also referred to these negative and positive signs as being below average and above average, respectively.

[^35]
## BIORHYTHM CLASSIFICATION

Each golfer's physical, emotional and intellectual cycles of the biorhythms were calculated by the Univac Seventy-Forty-Six computer at the Appalachian State University Data Processing Center. Data cards necessary for key punching consisted of four frontal cards, twenty subject cards and two sign-off cards. The card essential for dispatching computer execution of the selected program was the second frontal card. This card was demonstrated as /EXEC \$FAC.O.BIOR.

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For each golfer, a data card was prepared which
``` included the birthdate and name. Responding to the birthdates, the computer statistically printed out the three biorhythmic cycles according to each given day of the twelve months. Switch-point periods were distinguished on a daily basis by exhibiting plus and minus signs. (See Appendix \(C\), p. 101.)

The mixed biorhythm was calculated by the investigator because the computer was not programmed for this rhythm. The investigator computed the mean of the three biorhythms (physical, emotional and intellectual) for a given day to determine the amplitude of the point on the mixed curve. Mixed rhythm points were calculated for each of the tournament days.

In classifying the three original cycles, the investigator used the conventional biorhythmic curve
interpretation as stated by Thommen et al. \({ }^{3}\) Three treatment groups were employed to distinguish average/above average
biorhythmic efficiency, below average biorhythmic efficiency and the critical day of the four rhythms. These categories were demonstrated by the figures 1,2 , and 3 . (See Appendix C, p. 101.)

The computer was only programmed to assign amplitude points for complete twenty-four hour days. The theorized critical day for the physical and intellectual cycles was demonstrated as being the eleven and one-half day in the physical cycle and the sixteen and one-half day in the intellectual cycle. Therefore, the exact critical day at the half periodic point for the physical and intellectual cycles was not recorded on the print-out by the computer. (See Appendix C, p. 101.)

Days above the periodic day, classified as average and above average biorhythmic efficiency, included: one through ten in the physical cycle, one through thirteen in the emotional cycle and one through fifteen in the intellectual cycle. The days classified as below average biorhythmic efficiency were exhibited as negative signs below the periodic day. This phase consisted of thirteen through twenty-two days in the physical cycle, fifteen through twenty-seven days in the emotional cycle and

\footnotetext{
\({ }^{3}\) George \(S\). Thommen, Is This Your Day? (New York: Crown Publishers, 1973).
}
eighteen through thirty-two days in the intellectual cycle. (See Appendix C, p. 101.)

The investigator did not determine the cycle of the mixed biorhythm. Therefore, the mixed rhythm was classified by positive and negative points in lieu of days. All points demonstrating a zero in two decimal places were rounded off to the nearest tenth for the purposes of determining the critical phase in the mixed rhythm. Using the above procedure, the points ranging from . 000 through . 049 were delimited to the critical phase of the mixed cycle. (See Appendix D, p. 162.)

\section*{TREATMENT OF THE DATA}

The organization and analysis of the data consisted of the distribution of the performance score deviations for each tournament day corresponding to the day of the three biorhythmic efficiency treatment groups. An analysis of variance for one-way design, program BMD.V. \(\emptyset 1\), was executed on the ninety/sixty computer at the Appalachian State University Data Processing Center.

The three treatment groups were (1) the average and above average biorhythmic efficiency group, (2) the below average biorhythmic efficiency group, and (3) the critical biorhythmic group. Separate ANOVAs were computed for the physical, emotional, intellectual and mixed rhythms.

The mean and standard deviation were found, along
with an \(F\)-ratio, for the physical, emotional, intellectual
and mixed cycles. These three components were analyzed to statistically test the null hypotheses.

\section*{Chapter IV}

\section*{PRESENTATION AND ANALYSIS}

\section*{OF DATA}

The presentation and analysis of data were arranged according to the different biorhythmic cycles, namely, the physical cycle, the emotional cycle, the intellectual and the mixed cycles. Within each section were found descriptive statistics, analysis of variance for the one-way design and a graph displaying the mean deviations of golf scores for the individual cycle. Comparisons of the differences among the four biorhythmic patterns to the competitive performances of the three treatment groups (average/above average, below average and critical) of the top twenty money winners in the Ladies Professional Golf Association for the year 1975 were disclosed in the chapter.

\section*{PHYSICAL CYCLE}

The mean for the average/above average index was .1667; for below average, the mean value was -.0082; and, for critical, . 0333 was the mean. Observable differences in the treatment groups which may have occurred by chance were demonstrated. (See Table 1, p. 57.) The mean score

Table 1
Descriptive Statistics of the Physical Cycle for Three Treatment Groups
\begin{tabular}{lccc} 
Treatment Group & M & S.D. & Sample Size \\
\hline 1 (Average and Above & .1667 & 2.8737 & 578 \\
\begin{tabular}{c} 
Average Index)
\end{tabular} & -.0082 & 3.0278 & 608 \\
\begin{tabular}{c} 
(Below Average \\
Index)
\end{tabular} & .0333 & 2.5604 & 150 \\
\hline (Critical Index) & &
\end{tabular}
for treatment group one (average/above average performance) displayed a positive value which inferred poor performance instead of average/above average performance), the mean score displayed a negative value which inferred average or above average performance instead of below average performance. (See Graph l, p. 58.) The differences among the treatment groups for the physical cycle failed to reject \(H_{1}\). Table 2 discloses the non-significant F-ratio of . 5449 (See Table 2, p. 59.)

Graph 1
Mean Deviations of Golf Scores from Golfer's Average for the Physical Cycle Indices
above average scores (High Scores)

AVERAGE

BELOW AVERAGE SCORES
(Low Scores)
\begin{tabular}{ccc} 
INDEX 1 & INDEX 2 & INDEX 3 \\
(Average/ & (Below & (Critical \\
Above & Average & Efficiency) \\
Average & Efficiency) & \\
Efficiency) & &
\end{tabular}

\section*{Table 2}

Analysis of Variance of the Physical Cycle for 1336 Performance Scores and Biorhythmic Potentials for Three Treatment Groups
\begin{tabular}{lrrrrr}
\hline \hline \begin{tabular}{l} 
Source \\
Oariation
\end{tabular} & \multicolumn{1}{c}{ SS } & df & \multicolumn{1}{c}{ MS } & F & p \\
\hline Between Groups & 9.2452 & 2 & 4.6226 & & \\
Within Groups & 11240.4530 & 1325 & 8.4834 & \(.5449 *\) & N.S. \\
TOTAL & 11249.6950 & & & & \\
\hline
\end{tabular}
\({ }^{*}\) A

EMOTIONAL CYCLE

Table 3 displayed a non-significant F-ratio of 2.6525 at the .05 level of confidence for the three biorhythmic efficiency indices. (See Table 3 below.) The

Table 3
Analysis of Variance of the Emotional Cycle of 1336 Performance Scores and Biorhythmic Potentials for Three Treatment Groups
\begin{tabular}{lrrrrr}
\hline \hline \begin{tabular}{c} 
Source \\
of Variation
\end{tabular} & \multicolumn{1}{c}{ SS } & df & \multicolumn{1}{c}{ MS } & \multicolumn{1}{c}{ F } & p \\
\hline Between Groups & 46.6518 & 2 & 23.3259 & & \\
Within Groups & 11713.4530 & 1332 & 8.7939 & \(2.6525 *\) & N.S. \\
TOTAL & 11760.1010 & 1334 & & & \\
\hline
\end{tabular}
.05 level.
means for the average and above average index, the below average index and the critical index were as follows: treatment group one, -. 1877, treatment group two, . 1919 and treatment group three, . 1375. (See Table 4 below.) Table 4

Descriptive Statistics of the Emotional Cycle for Three Treatment Groups
\begin{tabular}{lccc}
\hline \hline Treatment Group & M & S.D. & Sample Size \\
\hline 1 (Average and Above & -.1877 & 2.9285 & 667 \\
\begin{tabular}{l} 
Average Index)
\end{tabular} & .1919 & 3.0731 & 589 \\
2 \begin{tabular}{l} 
(Below Average \\
Index)
\end{tabular} & .1375 & 2.4064 & 80 \\
\hline
\end{tabular}

Gross differences between indices one and two were demonstrated in Graph 2. Expected negative values for average/above average efficiencies and performance scores and positive values for below average and critical efficiencies and performance scores were observed in all three treatment indices for the emotional cycle. (See Graph 2, p. 61.) However, the investigator failed to accept the observation as being significant because of the non-
significant F-ratio. (See Table 3, p. 59.)

INTELLECTUAL CYCLE

A non-significant \(F-r a t i o\) of .5239 was obtained among the three indices. The result denoted that no

Graph 2
Mean Deviations of Golf Scores from Golfer's Average for the Emotional Cycle Indices

ABOVE AVERAGE SCORES High Scores)

AVERAGE

BELOW AVERAGE SCORES
(Low Scores)

\(\begin{array}{ccc}\text { INDEX 1 } & \text { INDEX 2 } & \text { INDEX } 3 \\ \text { (Average/ } & \text { (Below } & \text { (Critical } \\ \text { Above } & \text { Average } & \text { Efficiency) } \\ \text { Average } & \text { Efficiency) } & \end{array}\)
differences existed between intellectual biorhythmic efficiency and performance scores. (See Table 5 below.) The

\section*{Table 5}

Analysis of Variance of the Intellectual Cycle of 1336 Performance Scores and Biorhythmic Potentials for Three Treatment Groups
\begin{tabular}{lrrrrr}
\hline \hline \begin{tabular}{c} 
Source \\
of Variation
\end{tabular} & \multicolumn{1}{c}{ SS } & df & MS & F & p \\
\hline Between Groups & 8.9127 & 2 & 4.4564 & & \\
Within Groups & 11339.2810 & 1333 & 8.5066 & \(.5239 *\) & N.S. \\
TOTAL & 11348.1910 & 1335 & & & \\
\hline
\end{tabular}
*An F-ratio of 2.99 required for significance at the .05 level.
means for the three indices were . 1168, -.0288 , and -.1092 , respectively. These three indices were demonstrated in Table 6 below. Differences of the treatment indices

\section*{Table 6}

Descriptive Statistics of the Intellectual Cycle for Three Treatment Groups
\begin{tabular}{lccc}
\hline \hline Treatment Group & M & S.D. & Sample Size \\
\hline \(\mathbf{1 \quad \text { (Average and Above }}\)\begin{tabular}{l} 
Average Index)
\end{tabular} & .1168 & 2.8938 & 591 \\
2 (Below Average & -.0288 & 3.0059 & 626 \\
\(\quad\)\begin{tabular}{l} 
Index)
\end{tabular} & -.1092 & 2.5237 & 119 \\
\hline
\end{tabular}
(average/above average index, below average index and critical index) disclosed visual inversed distinctions;
therefore, the investigator accepted \(H_{3}\). (See Graph 3, p. 64.)

\section*{MIXED CYCLE}

The rhythm that evolved from the mathematically averaged biorhythms displayed -.0394, . 0776 , and . 4554 for the means of the average/above average index, the below average index, and critical index. (See Table 7 below.)

\section*{Table 7}

Descriptive Statistics of the Mixed Cycle for Three Treatment Groups
\begin{tabular}{lccc}
\hline \hline Treatment Group & M & S.D. & Sample Size \\
\hline 1 (Average and Above & & & \\
Average Index) & -.0394 & 2.8395 & 635 \\
2 (Below Average Index) & .0776 & 3.0029 & 589 \\
3 (Critical Index) & .4554 & 2.9344 & 112 \\
\hline
\end{tabular}

The analysis of the data for the mixed rhythm revealed an observable expected similarity of the treatment groups according to the conventional interpretation of the positive and negative phases of the biorhythmic curves. The third treatment index (critical phase) demonstrated an observable expected deviation from the second treatment group according to the conventional critical point interpretation. (See Graph 4, p. 65.) However, a non-significant F-ratio of 1.4016 was obtained as designated in Table 8, p. 66.

Graph 3
Mean Deviations of Golf Scores from Golfer's Average for the Intellectual Cycle Indices

Graph 4
Mean Deviations of Golf Scores from Golfer's Average for the Mixed Cycle Indices

ABOVE AVERAGE SCORES
(High Scores)

AVERAGE

BELOW AVERAGE SCORES
(Low Scores)


Table 8
Analysis of Variance of the Mixed Cycle of
1336 Performance Scores and Biorhythmic
Potentials for Three Treatment Groups
\begin{tabular}{lrrrrr}
\hline \hline \begin{tabular}{c} 
Source \\
of Variation
\end{tabular} & SS & df & MS & F & p \\
\hline Between Groups & 23.9000 & 2 & 11.9500 & & \\
Within Groups & 11288.6790 & 1324 & 8.5262 & \(1.4016 *\) & N.S. \\
TOTAL & 11312.5780 & 1326 & & & \\
\hline
\end{tabular}
*An F-ratio of 2.99 required for significance at the .05 level.

\section*{Chapter V}

SUMMARY, FINDINGS, DISCUSSION OF THE FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

\section*{SUMMARY}

The primary purpose of the study was to ascertain if there was a significant difference between performance scores and biorhythm efficiencies (average/above average phase, below average phase and critical phase) of the top twenty lady golfers. The computations were analyzed according to the conventional method of interpreting the biorhythm theory through the one-way analysis of variance.

The subjects consisted of the 1975 top twenty money winners of the Ladies Professional Golf Association. The golfer's original biorhythms (physical, emotional and intellectual cycles) for the year 1975 were computed from the individual's birthdate. The fourth cycle, the mixed cycle, was computed by calculating the average of the three original biorhythms for the given day. Daily performance scores were gathered from thirty-one tournaments for the year 1975. Each golfer's daily score was classified according to the deviation from the individual's 1975 performance score average.

The differences of the four biorhythmic cycles to golf performance scores were computed by the one-way analysis of variance. The F-ratios, computed for the three treatment groups (average/above average, below average and critical indices), of each cycle was analyzed to determine if there was a significant difference between performance scores and biorhythms.

\section*{FINDINGS}

The findings of this study were as follows:
1. There was no significant difference among the treatment groups of the physical cycle according to the conventional biorhythm theory analyzed by the one-way analysis of variance.
2. There was no significant difference among the treatment groups of the emotional cycle according to the conventional biorhythm theory analyzed by the one-way analysis of variance.
3. There was no significant difference among the treatment groups of the intellectual cycle according to the conventional biorhythm theory analyzed by the one-way analysis of variance.
4. There was no significant difference among the treatment groups of the mixed cycle according to the conventional biorhythm theory analyzed by the one-way analysis of variance.
5. As displayed by the four computations of \(F\) ratios, the analysis of variance disclosed non-significant differences among performance scores and biorhythmic efficiencies of average/above average, below average and critical according to the conventional biorhythm method of interpretation.

\section*{DISCUSSION OF THE FINDINGS}

It was the assumption of the study that one or all biorhythmic cyclic potentials would affect the performance scores of the lady golfers to a significant degree. However, the results of the study failed to reject the hypotheses at the .05 level of confidence for the physical, emotional, intellectual and mixed cycles.

Two factors must be considered in the findings of the study. An initial consideration that was not determined was the personality of each golfer. Interpretations of biorhythms should have entertained distinctions of not only introversion and extroversion, but also age and health. \({ }^{1}\) Another constituent that should have been deliberated was the nature of the sport. The game of golf required outside play; therefore, the golfers were constrained to subdue the environmental inclemencies.
\(\mathbf{1}_{\text {Barbara }}{ }^{\prime}\) 'Neil and Richard Phillips, Biorhythms: How to Live with Your Life Cycles (Pasadena: Ward Ritchie Press, 1975), p. 47 .

Unlike Thommen's book, \(0^{\prime} N e i l\) and Phillips discussed the failures of biorhythmic predictions in athletics:
... Critical days and lows do not guarantee mistakes or failure . . and highs do not necessarily mean success. We must keep in mind that in all these equations, training is crucial, and a certain amount of circumspection in interpretation is needed to allow for its effects. \({ }^{2}\)

Kitchens stated that the conventional biorhythm theory, based on the sine curve equation \(y=\) sine \(x\), was an inaccurate instrument for distinguishing varying biorhythmic efficiencies. Kitchens posited there was a more appropriate equation for explaining the amplitudes of the biorhythm theory. According to Kitchens, compact fluctuations at the midline would demonstrate a separation of the sine curve. This junction would explain the critical phase of the cycles and would be more conducive to the interpretation of the biorhythm theory. \({ }^{3}\)

The performance scores did not display a significant deviation from zero (average performance) to reject the null hypotheses. The investigator concurred with \(0^{\prime} N e i l\) and Phillips that the athletes' concentration during competitive situations ". . . tends to make them as a group less susceptible to the extremes of biorhythmic influence. \({ }^{4}\)

\section*{\(2_{\text {Ibid. }}\)}
\({ }^{3}\) Statement by Larry Kitchens, Assistant Professor of Mathematical Sciences, personal interview, Appalachian State University, Boone, North Carolina, July 26,1976 .

4o'Neil, op. cit.

\section*{CONCLUSIONS}

The following conclusions were drawn from the study:
1. A review of current literature indicated that
intrinsic and extrinsic variables may have influenced the performance of the golfers enough to overwhelm the potential outcomes of the biorhythms.
2. The results of the study, analyzed by utilizing the analysis of variance for one-way design, inferred that the four rhythmic cycles did not have a significant effect on the performances of the top twenty lady golfers.

\section*{RECOMMENDATIONS}

The following recommendations were proposed:
1. To conduct case studies on the top twenty money
winners of the Ladies Professional Golf Association and take into consideration health, age and personality.
2. To conduct a similar study utilizing the composite cycle developed by Phillips.
3. To conduct a similar study employing nonprofessional golfers as the selected population for the study.
4. To conduct a similar study and control the variables of climatic conditions and difficultness of the golf courses on which the golfers played.

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APPENDIX A
1975 Final Money List
\begin{tabular}{|c|c|c|}
\hline Rank & Name & \begin{tabular}{l}
Total \\
Money \\
Won
\end{tabular} \\
\hline 1 & Sandra Palmer & \$94,805.20 \\
\hline 2 & JoAnne Carner & \$80,119.72 \\
\hline 3 & Carol Mann & \$72,350.56 \\
\hline 4 & Sandra Haynie & \$65,895.03 \\
\hline 5 & Judy Rankin & \$74,347.81 \\
\hline 6 & Jane Blalock & \$64,673.40 \\
\hline 7 & Donna C. Young & \$58,100.05 \\
\hline 8 & Kathy McMullen & \$41,984.36 \\
\hline 9 & Kathy Whitworth & \$53,603.15 \\
\hline 10 & Sandra Post & \$47,015.60 \\
\hline 11 & Suzie McAllister & \$37,829.04 \\
\hline 12 & JoAnn Washam & \$40,529.29 \\
\hline 13 & Carole Jo Skala & \$33,545.04 \\
\hline 14 & Pat Bradley & \$46,684.32 \\
\hline 15 & Amy Alcott & \$33,256.98 \\
\hline 16 & Jocelyne Bourassa & \$29,252.36 \\
\hline 17 & Betsy Cullen & \$27,919.05 \\
\hline 18 & Sue Roberts & \$27,573.61 \\
\hline 19 & Debbie Austin & \$22,062.77 \\
\hline 20 & Joyce Kazmierski & \$35,435.92 \\
\hline
\end{tabular}

\title{
from Golfer's Performance Score
} Average for C. Mann

\section*{APPENDIX B}

DEVIATIONS FROM GOLFERS' PERFORMANCE
SCORE AVERAGES
\begin{tabular}{|c|c|c|c|c|}
\hline Dates of Tourneys & \multicolumn{4}{|r|}{\[
1 \text { Deviation from Average (72) }
\]} \\
\hline January 31February 2 & -1 & -1 & -1 & \\
\hline February 7-9 & 2 & 0 & -3 & \\
\hline March 27-29 & 2 & 2 & 2 & \\
\hline April 17-20 & 1 & 0 & -1 & -1 \\
\hline April 25-27 & 0 & 0 & -1 & \\
\hline May 2-4 & 0 & 4 & 1 & \\
\hline May 23-25 & 1 & -4 & -3 & \\
\hline May 29 thru June 1 & -1 & 5 & 0 & 0 \\
\hline June 6-8 & 5 & 1 & 0 & \\
\hline June 13-15 & -1 & 0 & 2 & \\
\hline June 27-29 & -3 & 4 & -3 & \\
\hline July 4-6 & 4 & 1 & 9 & \\
\hline Ju1y 11-13 & -6 & -2 & 1 & \\
\hline July 25-27 & -4 & -6 & 0 & \\
\hline August 15-17 & -3 & -1 & 0 & \\
\hline August 22-24 & -3 & 1 & 1 & \\
\hline September 5-7 & -5 & -2 & -1 & \\
\hline September 19-21 & 9 & 1 & 4 & \\
\hline October 17-19 & 9 & 1 & 4 & \\
\hline November 14-16 & 7 & 8 & 5 & \\
\hline November 21-23 & -1 & 0 & -2 & \\
\hline December 5-7 & 6 & 5 & 0 & \\
\hline December 13-14 & 4 & 4 & & \\
\hline
\end{tabular}

\section*{APPENDIX B-2}

Deviation from Golfer's Performance Score Average for S. Palmer


APPENDIX B-3
Deviation from Golfer's Performance Score Average for J. A. Carner


\section*{APPENDIX B-4}

Deviation from Golfer's Performance Score Average for S. Haynie


Deviation from Golfer's Performance Score Average for J. Rankin


APPENDIX B-6
Deviation from Golfer's Performance Score Average for J. Blalock


\section*{APPENDIX B-7}

Deviation from Golfer's Performance Score Average for D. Young


APPENDIX B-8
Deviation from Golfer's Performance Score Average for \(K\). McMullen


APPENDIX B-9
Deviation from Golfer's Performance Score Average for K. Whitworth
\begin{tabular}{|c|c|c|c|c|}
\hline Dates of Tourneys & 1 & Deviation 2 & from Average 3 & (73) \\
\hline January 18-19 & -2 & 0 & & \\
\hline \begin{tabular}{l}
January 31- \\
February 2
\end{tabular} & -1 & -3 & 0 & \\
\hline February 7-9 & 3 & -5 & 1 & \\
\hline February 21-23 & -3 & 5 & 1 & \\
\hline April 17-20 & 4 & -4 & 1 & 6 \\
\hline April 25-27 & 2 & 1 & 3 & \\
\hline May 9-11 & -1 & 0 & -2 & \\
\hline May 23-25 & 0 & -5 & -3 & \\
\hline May 29-June 1 & -3 & -3 & 2 & 0 \\
\hline June 13-15 & 0 & 1 & 1 & \\
\hline June 20-22 & -4 & 3 & -2 & \\
\hline June 27-29 & 5 & -2 & -1 & \\
\hline Ju1y 25-27 & -1 & -6 & 1 & \\
\hline August 15-17 & 0 & -1 & -3 & \\
\hline August 22-24 & -2 & -3 & -3 & \\
\hline September 5-7 & -1 & 4 & -2 & \\
\hline September 12-14 & -1 & -1 & -4 & \\
\hline September 19-21 & 2 & 2 & 3 & \\
\hline October 23-26 & 6 & -1 & 6 & 1 \\
\hline November 14-16 & 3 & 3 & 1 & \\
\hline
\end{tabular}

\section*{APPENDIX B-10}

Deviation from Golfer's Performance Score Average for S. Post
\begin{tabular}{|c|c|c|c|c|c|}
\hline Dates of Tourneys & 1 & \[
\begin{array}{r}
\text { Deviation } \\
2
\end{array}
\] & from Average 3 & (73) & 4 \\
\hline January 18-19 & -1 & 2 & & & \\
\hline \begin{tabular}{l}
January 31- \\
February 2
\end{tabular} & -2 & -4 & 1 & & \\
\hline February 7-9 & -2 & 2 & -5 & & \\
\hline February 21-23 & 0 & -7 & -4 & & \\
\hline March 21-23 & -1 & 1 & 3 & & \\
\hline March 27-29 & -1 & 0 & -4 & & \\
\hline April 17-20 & 1 & -2 & -1 & & 2 \\
\hline April 25-27 & -1 & -3 & 0 & & \\
\hline May 2-4 & -4 & 1 & 0 & & \\
\hline May 9-11 & 6 & 1 & 4 & & \\
\hline May 23-25 & -3 & -3 & 0 & & \\
\hline May 29-June 1 & 0 & 0 & 3 & & 0 \\
\hline June 6-8 & 3 & 0 & 6 & & \\
\hline June 13-15 & 2 & 4 & 5 & & \\
\hline June 20-22 & 1 & -2 & -5 & & \\
\hline June 27-29 & 2 & -2 & 1 & & \\
\hline July 11-13 & -2 & -1 & 1 & & \\
\hline July 25-27 & -1 & 2 & 2 & & \\
\hline August 15-17 & 0 & -1 & -1 & & \\
\hline August 22-24 & -1 & 0 & -4 & & \\
\hline October 17-19 & 2 & 2 & 4 & & \\
\hline November 14-16 & 1 & 4 & 0 & & \\
\hline November 21-23 & 0 & 0 & 0 & & \\
\hline December 5-7 & 2 & 3 & 5 & & \\
\hline
\end{tabular}

\section*{APPENDIX B-11}

Deviation from Golfer's Performance Score Average for S. McAllister
\begin{tabular}{|c|c|c|c|c|c|}
\hline \begin{tabular}{l}
Dates of \\
Tourneys
\end{tabular} & 1 & Deviation 2 & from Average 3 & (74) & 4 \\
\hline \[
\begin{aligned}
& \text { January } 1- \\
& \text { February } 2
\end{aligned}
\] & -2 & -3 & -5 & & \\
\hline February 7-9 & 2 & -4 & -3 & & \\
\hline February 21-23 & -2 & -5 & 0 & & \\
\hline March 21-23 & -4 & 0 & 6 & & \\
\hline March 27-29 & -1 & -1 & -3 & & \\
\hline April 25-27 & -2 & 3 & 5 & & \\
\hline May 2-4 & -2 & -2 & 2 & & \\
\hline May 9-11 & -2 & -2 & -1 & & \\
\hline May 23-25 & -2 & 1 & 1 & & \\
\hline May 29-June 1 & 0 & 1 & 9 & & 3 \\
\hline June 13-15 & 3 & 0 & 7 & & \\
\hline June 20-22 & -2 & -3 & -1 & & \\
\hline June 27-29 & 4 & 1 & 2 & & \\
\hline Ju1y 4-6 & -2 & -4 & -4 & & \\
\hline Ju1y 11-13 & -2 & 0 & 0 & & \\
\hline Ju1y 25-27 & -2 & -6 & -4 & & \\
\hline August 15-17 & 0 & 2 & -2 & & \\
\hline August 22-24 & -2 & 0 & -4 & & \\
\hline September 5-7 & -1 & -3 & 0 & & \\
\hline September 12-14 & 6 & -3 & 2 & & \\
\hline September 19-21 & 1 & 4 & 1 & & \\
\hline October 17-19 & 4 & 0 & 3 & & \\
\hline October 23-26 & 1 & 2 & -4 & & 1 \\
\hline November 14-16 & 5 & 3 & 5 & & \\
\hline November 21-23 & -3 & -4 & -2 & & \\
\hline December 5-7 & 1 & 0 & 2 & & \\
\hline
\end{tabular}

\section*{APPENDIX B-12}

Deviation from Golfer's Performance Score Average for J. A. Washam


APPENDIX B-13
Deviation from Solfer's Performance Score Average for C. J. Skala
\begin{tabular}{|c|c|c|c|c|}
\hline Dates of Tourneys & 1 & Deviation & from Average 3 & (74) \\
\hline \begin{tabular}{l}
January 31- \\
February 2
\end{tabular} & -3 & -3 & -3 & \\
\hline February 7-9 & 2 & -3 & -3 & \\
\hline March 21-23 & 2 & -1 & 5 & \\
\hline April 17-20 & 0 & -4 & 1 & -6 \\
\hline May 23-25 & -3 & -4 & -6 & \\
\hline May 29-June 1 & -1 & 4 & -4 & 0 \\
\hline June 6-8 & 2 & 0 & 2 & \\
\hline June 27-29 & 0 & -2 & -1 & \\
\hline July 4-6 & -2 & 1 & -2 & \\
\hline July 11-13 & -4 & -3 & -4 & \\
\hline July 25-27 & 0 & 0 & -3 & \\
\hline September 5-7 & 0 & 0 & 4 & \\
\hline September 12-14 & 2 & 2 & 5 & \\
\hline September 19-21 & 3 & 2 & 3 & \\
\hline October 17-19 & 0 & 4 & 2 & \\
\hline October 23-24 & 3 & 4 & & \\
\hline
\end{tabular}

APPENDIX B-14

\section*{Deviation from Golfer's Performance Score Average for P. Bradley}
\begin{tabular}{|c|c|c|c|c|c|}
\hline \multirow[t]{2}{*}{Dates of Tourney} & \multicolumn{2}{|r|}{Deviation} & \multirow[t]{2}{*}{\[
\begin{gathered}
\text { Average } \\
3
\end{gathered}
\]} & \multicolumn{2}{|l|}{\multirow[t]{2}{*}{(73) 4}} \\
\hline & 1 & 2 & & & 4 \\
\hline January 31- & & & & & \\
\hline February 2 & 2 & -2 & 1 & & \\
\hline February 21-23 & 0 & -3 & -2 & & \\
\hline March 21-23 & 5 & -3 & 2 & & \\
\hline March 27-29 & 2 & -3 & -1 & & \\
\hline April 25-27 & -2 & -2 & -1 & & \\
\hline May 2-4 & -3 & -1 & -1 & & \\
\hline May 9-11 & 0 & 3 & 4 & & \\
\hline May 23-25 & -4 & 0 & 0 & & \\
\hline May 29-June 1 & 2 & -1 & 0 & & 6 \\
\hline June 6-8 & 4 & -1 & 3 & & \\
\hline June 13-15 & 3 & 2 & 0 & & \\
\hline June 20-22 & 1 & 1 & 0 & & \\
\hline June 27-29 & 5 & -1 & -2 & & \\
\hline July 11-13 & 0 & 0 & -4 & & \\
\hline July 25-27 & 1 & 5 & 4 & & \\
\hline August 15-17 & 0 & -1 & -4 & & \\
\hline August 22-24 & -2 & 1 & 3 & & \\
\hline September 5-7 & -3 & 0 & 6 & & \\
\hline September 19-21 & -1 & 0 & 3 & & \\
\hline October 17-19 & 5 & 0 & 1 & & \\
\hline October 23-26 & 1 & -4 & 3 & & 0 \\
\hline November 14-16 & 6 & 1 & 0 & & \\
\hline November 21-23 & -5 & -4 & 0 & & \\
\hline December 5-7 & 0 & -2 & -1 & & \\
\hline December 13-14 & 3 & 5 & & & \\
\hline
\end{tabular}

\section*{APPENDIX B-15}

Deviation from Golfer's Performance Score Average for A. Alcott
\begin{tabular}{|c|c|c|c|c|}
\hline Dates of Tourneys & \multicolumn{4}{|r|}{Deviation from Average (74)} \\
\hline January 31February 2 & -1 & -2 & 2 & \\
\hline February 7-9 & 1 & -2 & -2 & \\
\hline February 21-23 & -6 & -6 & -3 & \\
\hline Apri1 17-20 & 2 & -1 & -3 & - \\
\hline April 25-27 & -5 & -1 & -4 & \\
\hline May 2-4 & -1 & -3 & 0 & \\
\hline May 9-11 & 0 & -4 & 5 & \\
\hline June 6-8 & 0 & -1 & 2 & \\
\hline June 13-15 & -2 & -1 & 8 & \\
\hline June 20-22 & -1 & -5 & -1 & \\
\hline June 27-29 & 0 & -3 & 1 & \\
\hline Ju1y 11-13 & -1 & -3 & -4 & \\
\hline July 25-27 & 1 & 0 & -3 & \\
\hline August 22-24 & -3 & -5 & -3 & \\
\hline September 5-7 & -3 & -3 & 3 & \\
\hline September 12-14 & 6 & -1 & -2 & \\
\hline September 19-21 & -2 & 2 & 1 & \\
\hline October 17-19 & 3 & 1 & 3 & \\
\hline November 14-16 & 3 & 4 & -2 & \\
\hline December 5-7 & 4 & 0 & 1 & \\
\hline
\end{tabular}

\section*{APPENDIX B-16}

Deviation from Golfer's Performance Score Average for B. Cullen


APPENDIX B-17
Deviation from Golfer's Performance Score Average for J. Buerassa
\begin{tabular}{|c|c|c|c|c|}
\hline Dates of Tourneys & \multicolumn{4}{|r|}{Deviation
1} \\
\hline \begin{tabular}{l}
January 31- \\
February 2
\end{tabular} & -1 & 3 & -1 & \\
\hline February 7-9 & -5 & -2 & 0 & \\
\hline February 21-23 & -2 & -1 & 3 & \\
\hline March 21-23 & 0 & 7 & 3 & \\
\hline April 17-20 & -4 & -5 & -2 & 0 \\
\hline April 25-27 & 2 & 1 & 0 & \\
\hline May 2-4 & -3 & 3 & -3 & \\
\hline May 9-11 & -4 & 0 & 3 & \\
\hline May 23-25 & -3 & -5 & -6 & \\
\hline May 29-June 1 & -1 & -1 & -3 & -2 \\
\hline June 6-8 & -3 & 0 & 1 & \\
\hline June 13-15 & 0 & 0 & 0 & \\
\hline June 27-29 & -4 & -1 & -3 & \\
\hline July 11-13 & -3 & -5 & -4 & \\
\hline July 25-27 & 2 & -5 & -3 & \\
\hline August 15-17 & -2 & -7 & -6 & \\
\hline August 22-24 & -2 & 1 & -2 & \\
\hline September 5-7 & 3 & 0 & 2 & \\
\hline September 12-14 & 1 & 2 & 3 & \\
\hline September 19-21 & -2 & 6 & 1 & \\
\hline October 17-19 & 0 & 8 & 5 & \\
\hline October 23-26 & -5 & -1 & -4 & 2 \\
\hline November 14-16 & 1 & 1 & 2 & \\
\hline
\end{tabular}

\section*{APPENDIX B-18}

Deviation from Golfer's Performance Score Average for \(S\). Roberts
\begin{tabular}{|c|c|c|c|c|c|}
\hline Dates of Tourneys & 1 & \[
\begin{array}{r}
\text { Deviation } \\
2
\end{array}
\] & from Average 3 & (74) & 4 \\
\hline \begin{tabular}{l}
January 31- \\
February 2
\end{tabular} & 2 & -2 & 0 & & \\
\hline February 7-9 & -2 & 3 & 2 & & \\
\hline February 21-23 & -2 & 1 & -1 & & \\
\hline June 1 & 3 & & & & \\
\hline June 6-8 & -2 & -1 & 3 & & \\
\hline June 13-15 & 2 & 4 & 6 & & \\
\hline June 20-22 & 0 & -4 & -3 & & \\
\hline June 27-29 & -1 & -2 & -2 & & \\
\hline Ju1y 11-13 & 2 & -3 & 0 & & \\
\hline July 25-27 & -1 & 2 & 0 & & \\
\hline August 15-17 & -2 & -4 & 1 & & \\
\hline August 22-24 & 5 & 2 & 0 & & \\
\hline September 5-7 & -4 & 5 & -1 & & \\
\hline September 12-14 & 6 & 0 & 4 & & \\
\hline November 14-16 & 8 & -2 & 6 & & \\
\hline November 21-22 & 6 & 1 & & & \\
\hline
\end{tabular}

Deviation from Golfer's Performance Scor Average for D. Austin
\begin{tabular}{|c|c|c|c|c|}
\hline Dates of Tourneys & 1 & \[
\begin{array}{r}
\text { Deviation }
\end{array}
\] & from Average (74) & 4 \\
\hline February 21-23 & 0 & -4 & 1 & \\
\hline March 21-23 & 3 & 2 & 2 & \\
\hline March 27-29 & -2 & -2 & -2 & \\
\hline April 17-20 & -2 & -4 & -1 & 4 \\
\hline April 25-27 & -5 & 2 & -2 & \\
\hline May 2-4 & -1 & 1 & -2 & \\
\hline May 9-11 & 2 & 2 & 5 & \\
\hline May 23-25 & -2 & 1 & -2 & \\
\hline May 29-June 1 & 6 & 2 & 5 & 1 \\
\hline June 6-8 & 2 & -2 & 4 & \\
\hline June 20-22 & -6 & -2 & -2 & \\
\hline July 4-6 & -4 & -1 & 1 & \\
\hline Ju1y 11-13 & 0 & -6 & -2 & \\
\hline July 25-27 & -1 & 4 & 3 & \\
\hline August 15-17 & 1 & -1 & -3 & \\
\hline August 22-24 & -2 & -1 & 5 & \\
\hline September 5-7 & 0 & 1 & 7 & \\
\hline September 12-14 & 1 & -1 & 6 & \\
\hline November 14-16 & 8 & 3 & 2 & \\
\hline November 21-23 & 1 & -1 & -1 & \\
\hline December 5-7 & 5 & -1 & 4 & \\
\hline
\end{tabular}

\section*{APPENDIX B-20}

Deviation from Golfer's Performance Score Average for J. Kazmierski


\section*{APPENDIX C}

PRINT-OUTS FOR THE ORIGINAL BIORHYTHM CYCLES OF THE TOP TWENTY GOLFERS FOR THE

YEAR 1975

\section*{KEY}
1. Average/Above Average Efficiency = Positive Values on Print-outs.
2. Below Average Efficiency = Negative Values on Print-outs.
3. Critical Efficiency \(= \pm 0.000, \pm .136, \pm .095\) on Print-outs.







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Mixed Biorhythm Cycle: Treatment Group Indices--C. Mann
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & Mixed Cycle & \[
\begin{gathered}
\text { Treatment } \\
\text { Group* } \\
\hline
\end{gathered}
\] \\
\hline January 31 & . 205 & 1 \\
\hline February 1 & . 182 & 1 \\
\hline February 2 & . 160 & 1 \\
\hline February 7 & . 065 & 1 \\
\hline February 8 & . 037 & 3 \\
\hline February 9 & . 002 & 3 \\
\hline March 27 & . 327 & 1 \\
\hline March 28 & . 354 & 1 \\
\hline March 29 & . 353 & 1 \\
\hline April 17 & . 349 & 1 \\
\hline April 18 & . 410 & 1 \\
\hline April 19 & . 443 & 1 \\
\hline April 20 & .445 & 1 \\
\hline April 25 & . 007 & 3 \\
\hline April 26 & -. 134 & 2 \\
\hline April 27 & . 271 & 2 \\
\hline May 2 & -. 656 & 2 \\
\hline May 3 & -. 626 & 2 \\
\hline May 4 & -. 558 & 2 \\
\hline May 23 & -. 270 & 2 \\
\hline May 24 & -. 421 & 2 \\
\hline May 25 & -. 547 & 2 \\
\hline May 29 & -. 705 & 2 \\
\hline May 30 & -. 654 & 2 \\
\hline May 31 & -. 572 & 2 \\
\hline June 1 & -. 465 & 2 \\
\hline June 6 & . 188 & 1 \\
\hline June 7 & . 293 & 1 \\
\hline June 8 & . 378 & 1 \\
\hline June 13 & . 461 & 1 \\
\hline June 14 & . 420 & 1 \\
\hline June 15 & . 367 & 1 \\
\hline June 27 & -. 253 & 2 \\
\hline June 28 & -. 289 & 2 \\
\hline June 29 & -. 322 & 2 \\
\hline July 4 & -. 392 & 2 \\
\hline July 5 & -. 370 & 2 \\
\hline July 6 & -. 331 & 2 \\
\hline
\end{tabular}

Mixed Biorhythm Cycle: Treatment Group Indices--C. Mann (Continued)
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & \[
\begin{aligned}
& \text { Mixed } \\
& \text { Cycle }
\end{aligned}
\] & \[
\begin{gathered}
\text { Treatment } \\
\text { Group* } \\
\hline
\end{gathered}
\] \\
\hline Ju1y 11 & . 114 & 1 \\
\hline July 12 & . 234 & 1 \\
\hline July 13 & . 353 & 1 \\
\hline July 25 & -. 082 & 2 \\
\hline July 26 & -. 261 & 2 \\
\hline July 27 & -. 432 & 2 \\
\hline August 15 & . 793 & 1 \\
\hline August 16 & . 720 & 1 \\
\hline August 17 & . 608 & 1 \\
\hline August 22 & -. 219 & 2 \\
\hline August 23 & -. 366 & 2 \\
\hline August 24 & -. 486 & 2 \\
\hline September 5 & . 263 & 1 \\
\hline September 6 & . 329 & 1 \\
\hline September 7 & . 367 & 1 \\
\hline September 19 & -. 232 & 2 \\
\hline September 20 & -. 211 & 2 \\
\hline September 21 & -. 168 & 2 \\
\hline October 17 & -. 046 & 2 \\
\hline October 18 & . 053 & 1 \\
\hline October 19 & . 148 & , \\
\hline November 14 & -. 108 & 2 \\
\hline November 15 & -. 110 & 2 \\
\hline November 16 & -. 115 & 2 \\
\hline November 21 & -. 110 & 2 \\
\hline November 22 & -. 083 & 2 \\
\hline November 23 & . 043 & 1 \\
\hline December 5 & . 409 & 1 \\
\hline December 6 & . 318 & 1 \\
\hline December 7 & . 202 & 1 \\
\hline December 13 & -. 669 & 1 \\
\hline December 14 & . 761 & 1 \\
\hline
\end{tabular}
*Treatment group was utilized for ANOVA.

APPENDIX D-2
Mixed Biorhythm Cycle: Treatment Group Indices--S. Palmer
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & Mixed Cyc1e & \[
\begin{aligned}
& \text { Treatment } \\
& \text { Group* }
\end{aligned}
\] \\
\hline February 7 & . 327 & 1 \\
\hline February 8 & . 140 & 1 \\
\hline February 9 & -. 045 & 2 \\
\hline March 21 & -. 249 & 2 \\
\hline March 22 & -. 300 & 2 \\
\hline March 23 & -. 344 & 2 \\
\hline March 27 & -. 368 & 2 \\
\hline March 28 & -. 325 & 2 \\
\hline March 29 & -. 262 & 2 \\
\hline April 17 & -. 299 & 2 \\
\hline April 18 & -. 386 & 2 \\
\hline April 19 & -. 449 & 2 \\
\hline April 20 & -. 482 & 2 \\
\hline April 25 & -. 227 & 2 \\
\hline April 26 & -. 119 & 2 \\
\hline April 27 & -. 008 & 3 \\
\hline May 2 & . 353 & 1 \\
\hline May 3 & . 353 & 1 \\
\hline May 4 & . 325 & 1 \\
\hline May 9 & -. 076 & 2 \\
\hline May 10 & -. 161 & 2 \\
\hline May 11 & -. 232 & 2 \\
\hline May 23 & . 410 & 1 \\
\hline May 24 & . 443 & 1 \\
\hline May 25 & . 445 & 1 \\
\hline May 29 & . 141 & 1 \\
\hline May 30 & . 007 & 3 \\
\hline May 31 & -. 134 & 2 \\
\hline June 1 & -. 274 & 2 \\
\hline June 6 & -. 656 & 2 \\
\hline June 7 & -. 626 & 2 \\
\hline June 8 & -. 558 & 2 \\
\hline June 13 & . 186 & 1 \\
\hline June 14 & . 352 & 1 \\
\hline June 15 & . 502 & 1 \\
\hline June 20 & . 739 & 1 \\
\hline June 21 & . 573 & 1 \\
\hline June 22 & . 552 & 1 \\
\hline June 27 & -. 270 & 2 \\
\hline June 28 & -. 421 & 2 \\
\hline June 29 & -. 547 & 2 \\
\hline July 11 & . 188 & 1 \\
\hline July 12 & . 293 & 1 \\
\hline July 13 & . 378 & 1 \\
\hline
\end{tabular}

Mixed Biorbythm Cycle: Treatment Group Indices--S. Palmer (Continued)
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & Mixed Cycle & \[
\begin{gathered}
\text { Treatment } \\
\text { Group* }
\end{gathered}
\] \\
\hline July 25 & . 058 & 2 \\
\hline July 26 & . 003 & 3 \\
\hline July 27 & -. 047 & 2 \\
\hline August 15 & . 115 & , \\
\hline August 16 & . 234 & 1 \\
\hline August 17 & . 353 & 1 \\
\hline August 22 & . 696 & 1 \\
\hline August 23 & . 677 & 1 \\
\hline August 24 & . 622 & 1 \\
\hline September 5 & -. 851 & 2 \\
\hline September 6 & -. 810 & 2 \\
\hline September 7 & -. 724 & 2 \\
\hline September 12 & . 136 & 1 \\
\hline September 13 & . 327 & 1 \\
\hline September 14 & . 498 & 1 \\
\hline September 19 & . 793 & 1 \\
\hline September 20 & . 720 & 1 \\
\hline September 21 & . 608 & 1 \\
\hline October 23 & -. 230 & 2 \\
\hline October 24 & -. 232 & 2 \\
\hline October 25 & -. 211 & 2 \\
\hline October 26 & -. 168 & 2 \\
\hline November 14 & -. 397 & 2 \\
\hline November 15 & -. 411 & 2 \\
\hline November 16 & -. 402 & 2 \\
\hline November 21 & -. 046 & 2 \\
\hline November 22 & . 053 & 1 \\
\hline November 23 & . 148 & 1 \\
\hline December 5 & . 020 & 3 \\
\hline December 6 & -. 045 & 2 \\
\hline December 7 & -. 101 & 2 \\
\hline December 13 & -. 185 & 2 \\
\hline December 14 & -. 168 & 2 \\
\hline
\end{tabular}
*Treatment group was utilized for ANOVA.

APPENDIX D-3
Mixed Biorhythm Cycle: Treatmen Group Indices--J. A. Carner
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & Mixed Cycle & \[
\begin{gathered}
\text { Treatment } \\
\text { Group* }
\end{gathered}
\] \\
\hline February 7 & -. 208 & 2 \\
\hline February 8 & -. 271 & 2 \\
\hline February 9 & -. 331 & 2 \\
\hline February 21 & . 267 & 1 \\
\hline February 22 & . 411 & 1 \\
\hline February 23 & . 543 & 1 \\
\hline March 27 & . 897 & 1 \\
\hline March 28 & . 804 & 1 \\
\hline March 29 & . 670 & 1 \\
\hline April 17 & . 206 & 1 \\
\hline April 18 & . 292 & 1 \\
\hline April 19 & . 353 & 1 \\
\hline April 20 & . 387 & 1 \\
\hline April 25 & . 231 & 1 \\
\hline April 26 & . 165 & 1 \\
\hline April 27 & . 102 & 1 \\
\hline May 2 & -. 066 & 2 \\
\hline May 3 & -. 062 & 2 \\
\hline May 4 & -. 048 & 2 \\
\hline May 9 & . 034 & 3 \\
\hline May 10 & . 031 & 3 \\
\hline May 11 & . 017 & 3 \\
\hline May 23 & -. 159 & 2 \\
\hline May 24 & -. 099 & 2 \\
\hline May 25 & -. 029 & 3 \\
\hline May 29 & . 259 & 1 \\
\hline May 30 & . 308 & 1 \\
\hline May 31 & . 339 & 1 \\
\hline June 1 & . 35 & 1 \\
\hline June 6 & . 124 & 1 \\
\hline June 7 & . 044 & 3 \\
\hline June 8 & . 073 & 1 \\
\hline June 13 & -. 278 & 2 \\
\hline June 14 & -. 272 & 2 \\
\hline June 15 & -. 248 & 2 \\
\hline June 20 & . 027 & 3 \\
\hline June 21 & . 078 & 1 \\
\hline June 22 & . 117 & 1 \\
\hline June 27 & . 065 & 1 \\
\hline June 28 & . 013 & 3 \\
\hline June 29 & -. 044 & 3 \\
\hline July 11 & . 270 & 1 \\
\hline July 12 & . 355 & 1 \\
\hline Ju1y 13 & . 422 & 1 \\
\hline
\end{tabular}

Mixed Biorhythm Cycle: Treatment Group
Indices--J. A. Carner (Continued)
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & Mixed Cycle & \[
\begin{gathered}
\text { Treatment } \\
\text { Group* }
\end{gathered}
\] \\
\hline July 25 & -. 612 & 2 \\
\hline July 26 & -. 701 & 2 \\
\hline July 27 & -. 753 & 2 \\
\hline August 15 & . 338 & 1 \\
\hline August 16 & . 131 & 1 \\
\hline August 17 & -. 082 & 2 \\
\hline August 22 & -. 849 & 2 \\
\hline August 23 & -. 887 & 2 \\
\hline August 24 & -. 877 & 2 \\
\hline September 5 & . 648 & \\
\hline September 6 & . 665 & 1 \\
\hline September 7 & . 649 & 1 \\
\hline September 19 & -. 302 & 2 \\
\hline September 20 & -. 323 & 2 \\
\hline September 21 & -. 333 & 2 \\
\hline November 14 & . 258 & 1 \\
\hline November 15 & . 115 & 1 \\
\hline November 16 & -. 031 & 3 \\
\hline November 21 & -. 499 & 2 \\
\hline November 22 & -. 502 & 2 \\
\hline November 23 & -. 472 & 2 \\
\hline December 5 & . 303 & 1 \\
\hline December 6 & . 238 & 1 \\
\hline December 7 & . 153 & 1 \\
\hline December 13 & -. 345 & 2 \\
\hline December 14 & -. 361 & 2 \\
\hline
\end{tabular}
*Treatment group was utilized for ANOVA.

\section*{APPENDIX D-4}

Mixed Biorhythm Cycle: Treatment Group Indices--S. Haynie
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & \begin{tabular}{l}
Mixed \\
Cyc1e
\end{tabular} & \[
\begin{gathered}
\text { Treatment } \\
\text { Group* }
\end{gathered}
\] \\
\hline January 31 & -. 173 & 2 \\
\hline February 1 & -. 127 & 2 \\
\hline February 2 & -. 067 & 2 \\
\hline February 7 & . 254 & 1 \\
\hline February 8 & . 280 & 1 \\
\hline February 9 & . 281 & 1 \\
\hline March 27 & . 402 & 1 \\
\hline March 28 & . 556 & 1 \\
\hline March 29 & . 678 & 1 \\
\hline April 17 & -. 481 & 2 \\
\hline April 18 & -. 422 & 2 \\
\hline April 19 & -. 353 & 2 \\
\hline April 20 & -. 277 & 2 \\
\hline April 25 & . 069 & 1 \\
\hline April 26 & . 119 & 1 \\
\hline April 27 & . 162 & 1 \\
\hline May 2 & . 304 & 1 \\
\hline May 3 & . 322 & 1 \\
\hline May 4 & . 337 & 1 \\
\hline May 23 & -. 575 & 2 \\
\hline May 24 & -. 511 & 2 \\
\hline May 25 & -. 418 & 2 \\
\hline May 29 & . 151 & 1 \\
\hline May 30 & . 306 & 1 \\
\hline May 31 & . 449 & 1 \\
\hline June 1 & . 570 & 1 \\
\hline June 13 & -. 372 & 2 \\
\hline June 14 & -. 503 & 2 \\
\hline June 15 & -. 604 & 2 \\
\hline June 27 & . 399 & 1 \\
\hline June 28 & . 471 & 1 \\
\hline June 29 & . 508 & 1 \\
\hline July 11 & -. 344 & 2 \\
\hline July 12 & -. 332 & 2 \\
\hline July 13 & -. 300 & 2 \\
\hline July 25 & . 213 & 1 \\
\hline July 26 & . 114 & 1 \\
\hline July 27 & . 021 & 3 \\
\hline August 15 & . 566 & 1 \\
\hline August 16 & . 552 & 1 \\
\hline August 17 & . 509 & 1 \\
\hline
\end{tabular}

Mixed Biorhythm Cycle: Treatment Group Indices--S. Haynie (Continued)
\begin{tabular}{lcc}
\hline \begin{tabular}{c} 
Dates of \\
Tourneys
\end{tabular} & \begin{tabular}{c} 
Mixed \\
Cycle
\end{tabular} & \begin{tabular}{c} 
Treatment \\
Group
\end{tabular} \\
\hline August 22 & -.029 & 3 \\
August 23 & -.153 & 2 \\
August 24 & -.265 & 2 \\
\hline September 5 & -.007 & 3 \\
September 6 & .070 & 1 \\
September 7 & .137 & 1 \\
\hline September 19 & .190 & 1 \\
September 20 & .175 & 1 \\
September 21 & .158 & 1 \\
\hline November 14 & .896 & 1 \\
November 15 & .910 & 1 \\
November 16 & .876 & 1 \\
\hline November 21 & .156 & 1 \\
November 22 & -.032 & 3 \\
November 23 & -.211 & 2 \\
\hline December 5 & -.037 & 2 \\
December 6 & .076 & 1 \\
December 7 & .174 & 1 \\
\hline
\end{tabular}
*Treatment group was utilized for ANOVA.

APPENDIX D-5
Mixed Biorhythm Cycle: Treatment Group Indices--J. Rankin
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & \begin{tabular}{l}
Mixed \\
Cycle
\end{tabular} & \[
\begin{gathered}
\text { Treatment } \\
\text { Group* }
\end{gathered}
\] \\
\hline January 18 & . 595 & 1 \\
\hline January 19 & . 736 & 1 \\
\hline January 31 & -. 479 & 2 \\
\hline February 1 & -. 629 & 2 \\
\hline February 2 & -. 741 & 2 \\
\hline February 7 & -. 633 & 2 \\
\hline February 8 & -. 494 & 2 \\
\hline February 9 & -. 333 & 2 \\
\hline February 21 & -. 329 & 2 \\
\hline February 22 & . 213 & 1 \\
\hline February 23 & . 093 & 1 \\
\hline March 21 & -. 251 & 2 \\
\hline March 22 & -. 252 & 2 \\
\hline March 23 & -. 233 & 2 \\
\hline March 27 & . 011 & \\
\hline March 28 & . 123 & 1 \\
\hline March 29 & . 172 & 1 \\
\hline April 17 & -. 289 & 2 \\
\hline April 18 & -. 248 & 2 \\
\hline April 19 & -. 197 & \\
\hline April 20 & -. 014 & 3 \\
\hline April 25 & . 095 & 1 \\
\hline April 26 & . 113 & 1 \\
\hline April 27 & . 119 & 1 \\
\hline May 2 & . 055 & 1 \\
\hline May 3 & . 045 & 1 \\
\hline May 4 & . 042 & 3 \\
\hline May 9 & . 150 & 1 \\
\hline May 10 & . 183 & 1 \\
\hline May 11 & . 211 & 1 \\
\hline May 23 & -. 485 & 2 \\
\hline May 24 & -. 550 & 2 \\
\hline May 25 & -. 630 & 2 \\
\hline May 29 & -. 416 & 2 \\
\hline May 30 & -. 290 & 2 \\
\hline May 31 & -. 140 & 2 \\
\hline June 1 & . 028 & 3 \\
\hline June 6 & . 788 & 1 \\
\hline June 7 & . 857 & 1 \\
\hline June 8 & . 881 & 1 \\
\hline June 13 & . 323 & 1 \\
\hline June 14 & . 113 & 1 \\
\hline June 15 & -. 107 & 2 \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & Mixed Cycle & \[
\begin{gathered}
\text { Treatment } \\
\text { Group * }
\end{gathered}
\] \\
\hline June 20 & -. 944 & 2 \\
\hline June 21 & -. 990 & 2 \\
\hline June 22 & -. 983 & 2 \\
\hline June 27 & -. 268 & 2 \\
\hline June 28 & -. 047 & 2 \\
\hline June 29 & . 173 & 1 \\
\hline July 11 & . 186 & 1 \\
\hline July 12 & . 008 & 3 \\
\hline July 13 & -. 161 & 2 \\
\hline August 15 & . 096 & 1 \\
\hline August 16 & . 065 & 1 \\
\hline August 17 & . 024 & 2 \\
\hline August 22 & -. 264 & 2 \\
\hline August 23 & -. 317 & 2 \\
\hline August 24 & -. 360 & 2 \\
\hline September 5 & . 358 & 1 \\
\hline September 6 & . 428 & 1 \\
\hline September 7 & . 473 & 1 \\
\hline September 12 & . 302 & 1 \\
\hline September 13 & . 200 & 1 \\
\hline September 14 & . 088 & 1 \\
\hline December 5 & -. 603 & 2 \\
\hline December 6 & -. 506 & 2 \\
\hline December 7 & -. 390 & 2 \\
\hline December 13 & . 322 & 1 \\
\hline December 14 & . 390 & 1 \\
\hline
\end{tabular}
*Treatment group was utilized for ANOVA.

APPENDIX D-6
Mixed Biorhythm Cycle: Treatment Group Indices--J. Blalock
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & \begin{tabular}{l}
Mixed \\
Cycle
\end{tabular} & \[
\begin{gathered}
\text { Treatment } \\
\text { Group* }
\end{gathered}
\] \\
\hline January 31 & . 480 & 1 \\
\hline February 1 & . 542 & 1 \\
\hline February 2 & . 573 & 1 \\
\hline February 7 & . 361 & 1 \\
\hline February 8 & . 276 & 1 \\
\hline February 9 & . 190 & 1 \\
\hline February 21 & -. 256 & 2 \\
\hline February 22 & -. 261 & 2 \\
\hline February 23 & -. 265 & 2 \\
\hline March 21 & -. 285 & 2 \\
\hline March 22 & -. 400 & 2 \\
\hline March 23 & -. 493 & 2 \\
\hline March 27 & -. 573 & 2 \\
\hline March 28 & -. 511 & 2 \\
\hline March 29 & -. 421 & 2 \\
\hline April 17 & -. 308 & 2 \\
\hline April 18 & -. 362 & 2 \\
\hline April 19 & -. 387 & 2 \\
\hline April 20 & -. 381 & 2 \\
\hline April 25 & -. 008 & 3 \\
\hline April 26 & . 091 & 1 \\
\hline April 27 & . 182 & 1 \\
\hline May 2 & . 290 & 1 \\
\hline May 3 & . 229 & 1 \\
\hline May 4 & . 146 & 1 \\
\hline May 9 & -. 355 & 2 \\
\hline May 10 & -. 417 & 2 \\
\hline May 11 & -. 450 & 2 \\
\hline May 29 & . 164 & 1 \\
\hline May 30 & . 003 & \\
\hline May 31 & -. 160 & 2 \\
\hline June 1 & . 317 & 1 \\
\hline June 6 & -. 712 & 2 \\
\hline June 7 & -. 681 & 2 \\
\hline June 8 & -. 614 & 2 \\
\hline June 13 & . 067 & 1 \\
\hline June 14 & . 215 & 1 \\
\hline June 15 & . 348 & 1 \\
\hline June 27 & -. 0006 & 3 \\
\hline June 28 & -. 097 & 2 \\
\hline June 29 & -. 182 & 2 \\
\hline
\end{tabular}

Mixed Biorhythm Cycle: Treatment Group Indices-J. Blalock (Continued)
\begin{tabular}{lrc}
\hline \begin{tabular}{l} 
Dates of \\
Tourneys
\end{tabular} & \begin{tabular}{c} 
Mixed \\
Cycle
\end{tabular} & \begin{tabular}{c} 
Treatment \\
Group
\end{tabular} \\
\hline July 11 & -.208 & 2 \\
July l2 & -.174 & 2 \\
July l3 & -.138 & 2 \\
\hline August 22 & .900 & 1 \\
August 23 & .911 & 1 \\
August 24 & .873 & 1 \\
\hline September 5 & -.832 & 2 \\
September 6 & -.808 & 2 \\
September 7 & -.240 & 2 \\
\hline September 12 & .014 & 3 \\
September 13 & .179 & 1 \\
September 14 & .326 & 1 \\
\hline September 19 & .573 & 1 \\
September 20 & .517 & 1 \\
September 21 & .433 & 1 \\
\hline November 21 & .025 & 3 \\
November 22 & .025 & 3 \\
November 23 & .065 & 1 \\
\hline December 5 & .064 & 1 \\
December 6 & .087 & 1 \\
December 7 & .117 & 1 \\
\hline December 13 & .228 & 1 \\
December 14 & .200 & 1 \\
\hline
\end{tabular}
*Treatment group was utilized for ANOVA.

APPENDIX D-7
Mixed Biorhythm Cycle: Treatment Group Indices--D. Young
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & Mixed Cycle & \[
\begin{gathered}
\text { Treatment } \\
\text { Group* }
\end{gathered}
\] \\
\hline January 31 & . 433 & 1 \\
\hline February 1 & . 185 & 1 \\
\hline February 2 & . 216 & 1 \\
\hline February 7 & -. 272 & 2 \\
\hline February 8 & -. 308 & 2 \\
\hline February 9 & -. 317 & 2 \\
\hline March 21 & -. 102 & 2 \\
\hline March 22 & -. 178 & 2 \\
\hline March 23 & -. 2211 & 2 \\
\hline March 27 & -. 316 & 2 \\
\hline March 28 & -. 290 & 2 \\
\hline March 29 & -. 249 & 2 \\
\hline April 17 & . 087 & 1 \\
\hline April 18 & . 117 & 1 \\
\hline April 19 & . 150 & 1 \\
\hline April 20 & . 183 & 1 \\
\hline April 25 & . 199 & 1 \\
\hline April 26 & . 152 & 1 \\
\hline April 27 & . 087 & 1 \\
\hline May 2 & -. 400 & 2 \\
\hline May 3 & -. 485 & 2 \\
\hline May 4 & -. 550 & 2 \\
\hline May 9 & -. 416 & 2 \\
\hline May 10 & -. 290 & 2 \\
\hline May 11 & -. 140 & 2 \\
\hline May 29 & -. 707 & 2 \\
\hline May 30 & -. 848 & 2 \\
\hline May 31 & -. 945 & 2 \\
\hline June 1 & -. 991 & 2 \\
\hline June 27 & -. 598 & 2 \\
\hline June 28 & -. 626 & 2 \\
\hline June 29 & -. 621 & 2 \\
\hline July 4 & -. 245 & 2 \\
\hline July 5 & -. 142 & 2 \\
\hline July 6 & -. 045 & 2 \\
\hline July 11 & . 243 & 1 \\
\hline July 12 & . 255 & 1 \\
\hline July 13 & . 255 & 1 \\
\hline August 15 & . 270 & 1 \\
\hline August 16 & . 359 & 1 \\
\hline August 17 & . 428 & 1 \\
\hline
\end{tabular}
\begin{tabular}{lrc}
\hline \begin{tabular}{l} 
Dates of \\
Tourneys
\end{tabular} & \begin{tabular}{c} 
Mixed \\
Cycle
\end{tabular} & \begin{tabular}{c} 
Treatment \\
Group*
\end{tabular} \\
\hline August 22 & .386 & 1 \\
August 23 & .302 & 1 \\
August 24 & .200 & 1 \\
\hline September 5 & -.203 & 2 \\
September 6 & -.105 & 2 \\
September 7 & -.005 & 2 \\
\hline September 19 & -.126 & 2 \\
September 20 & -.203 & 2 \\
September 21 & .264 & 1 \\
\hline October 17 & -.717 & 2 \\
October 18 & -.690 & 2 \\
October 19 & -.621 & 2 \\
\hline October 23 & -.030 & 3 \\
October 24 & .154 & 1 \\
October 25 & .332 & 1 \\
October 26 & .493 & 1 \\
\hline November 14 & -.675 & 2 \\
November 15 & -.905 & 2 \\
November 16 & -.507 & 2 \\
\hline November 21 & .125 & 1 \\
November 22 & .232 & 1 \\
November 23 & .322 & 1 \\
\hline December 5 & .116 & 1 \\
December 6 & .065 & 1 \\
December 7 & .016 & 3 \\
\hline
\end{tabular}
*Treatment group was utilized for ANOVA.

Mixed Biorhythm Cycle: Treatment Group Indices--K. McMulien (Continued)
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & Mixed Cycle & \[
\begin{gathered}
\text { Treatment } \\
\text { Group* } \\
\hline
\end{gathered}
\] \\
\hline June 27 & . 023 & 3 \\
\hline June 28 & -. 013 & 3 \\
\hline June 29 & -. 061 & 2 \\
\hline July 4 & -. 316 & 2 \\
\hline July 5 & -. 334 & 2 \\
\hline July 6 & -. 330 & 2 \\
\hline July 11 & . 037 & 3 \\
\hline July 12 & . 161 & 1 \\
\hline July 13 & . 286 & 1 \\
\hline Ju1y 17 & . 651 & 1 \\
\hline July 18 & . 671 & 1 \\
\hline July 19 & . 653 & 1 \\
\hline Ju1y 20 & . 595 & 1 \\
\hline August 15 & . 921 & 1 \\
\hline August 16 & . 824 & 1 \\
\hline August 17 & . 684 & 1 \\
\hline August 22 & -. 304 & 2 \\
\hline August 23 & -. 482 & 2 \\
\hline August 24 & -. 63 & 2 \\
\hline September 5 & . 209 & 1 \\
\hline September 6 & . 325 & 1 \\
\hline September 7 & . 417 & 1 \\
\hline September 12 & . 472 & 1 \\
\hline Sepbember 13 & . 418 & 1 \\
\hline September 14 & . 352 & 1 \\
\hline September 19 & . 008 & 3 \\
\hline September 20 & -. 042 & 3 \\
\hline September 21 & -. 082 & 2 \\
\hline October 17 & . 497 & 1 \\
\hline October 18 & . 502 & 1 \\
\hline October 19 & . 481 & 1 \\
\hline November 14 & . 438 & 1 \\
\hline November 15 & . 378 & 1 \\
\hline November 16 & . 296 & 1 \\
\hline November 21 & -. 214 & 2 \\
\hline November 22 & -. 282 & 2 \\
\hline November 23 & -. 326 & 2 \\
\hline December 5 & . 345 & 1 \\
\hline December 6 & . 328 & 1 \\
\hline December 7 & . 281 & 1 \\
\hline
\end{tabular}
*Treatment group was utilized for ANOVA.

APPENDIX D-9
Mixed Biorhythm Cycle: Treatment Group Indices--K. Whitworth
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & Mixed Cyc1e & \[
\begin{aligned}
& \text { Treatment } \\
& \text { Group* }
\end{aligned}
\] \\
\hline January 18 & -. 844 & 2 \\
\hline January 19 & -. 859 & 2 \\
\hline January 31 & . 783 & 1 \\
\hline February 1 & . 813 & 1 \\
\hline February 2 & . 801 & 1 \\
\hline February 7 & . 243 & 1 \\
\hline February 8 & . 0823 & 1 \\
\hline February 9 & -. 075 & 2 \\
\hline February 21 & -. 246 & 2 \\
\hline February 22 & -. 158 & 2 \\
\hline February 23 & -. 074 & 2 \\
\hline April 17 & -. 567 & 2 \\
\hline April 18 & -. 667 & 2 \\
\hline April 19 & -. 727 & 2 \\
\hline April 20 & -. 746 & 2 \\
\hline April 25 & -. 278 & 2 \\
\hline April 26 & -. 116 & 2 \\
\hline April 27 & . 047 & 1 \\
\hline May 9 & . 026 & 3 \\
\hline May 10 & -. 094 & 2 \\
\hline May 11 & -. 200 & 2 \\
\hline May 23 & . 235 & \\
\hline May 24 & . 282 & 1 \\
\hline May 25 & . 305 & 1 \\
\hline May 29 & . 134 & \\
\hline May 30 & . 042 & 3 \\
\hline May 31 & -. 056 & 2 \\
\hline June 1 & -. 155 & 2 \\
\hline June 13 & . 206 & 1 \\
\hline June 14 & . 313 & 1 \\
\hline June 15 & . 403 & 1 \\
\hline June 20 & . 449 & 1 \\
\hline June 21 & . 372 & 1 \\
\hline June 22 & . 374 & 1 \\
\hline June 27 & -. 302 & 2 \\
\hline June 28 & -. 387 & 2 \\
\hline June 29 & -. 449 & 2 \\
\hline July 25 & . 095 & 1 \\
\hline July 26 & . 077 & 1 \\
\hline July 27 & . 055 & \\
\hline August 15 & . 120 & 1 \\
\hline August 16 & . 267 & 1 \\
\hline August 17 & . 411 & 1 \\
\hline
\end{tabular}

Mixed Biorhythm Cycle: Treatment Group Indices--K. Whitworth (Continued)

\section*{APPENDIX D-10}

Mixed Biorhythm Cycle: Treatment Group Indices--S. Post
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & Mixed Cycle & Treatment Group* \\
\hline January 18 & -. 290 & 2 \\
\hline January 19 & -. 311 & 2 \\
\hline January 31 & . 063 & 1 \\
\hline February 1 & . 066 & \\
\hline February 2 & . 062 & 1 \\
\hline February 7 & . 057 & 1 \\
\hline February 8 & . 075 & 1 \\
\hline February 9 & . 101 & 1 \\
\hline February 21 & . 017 & 3 \\
\hline February 22 & -. 090 & 2 \\
\hline February 23 & -. 205 & 2 \\
\hline March 21 & -. 048 & 2 \\
\hline March 22 & -. 272 & 2 \\
\hline March 23 & -. 483 & 2 \\
\hline March 27 & -. 988 & 2 \\
\hline March 28 & -. 992 & 2 \\
\hline March 29 & -. 095 & 2 \\
\hline April 17 & . 054 & 1 \\
\hline April 18 & -. 108 & 2 \\
\hline April 19 & -. 254 & 2 \\
\hline April 20 & -. 377 & 2 \\
\hline April 25 & -. 539 & 2 \\
\hline April 26 & -. 487 & 2 \\
\hline April 27 & -. 415 & 2 \\
\hline May 2 & . 075 & 1 \\
\hline May 3 & . 125 & 1 \\
\hline May 4 & . 160 & 1 \\
\hline May 9 & .176 & 1 \\
\hline May 10 & . 166 & 1 \\
\hline May 11 & . 158 & 1 \\
\hline May 23 & . 039 & 3 \\
\hline May 24 & -. 018 & 3 \\
\hline May 25 & -. 082 & 2 \\
\hline May 29 & -. 334 & 2 \\
\hline May 30 & -. 373 & 2 \\
\hline May 31 & -. 396 & 2 \\
\hline June 1 & -. 398 & 2 \\
\hline June 6 & -. 099 & 2 \\
\hline June 7 & . 003 & 3 \\
\hline June 8 & . 107 & 1 \\
\hline June 13 & . 452 & 1 \\
\hline June 14 & . 453 & 1 \\
\hline June 15 & . 428 & 1 \\
\hline
\end{tabular}

Mixed Biorhythm Cycle: Treatment Group Biorhythm Cycle: Treatment
Indices--S. Post (Continued)
\begin{tabular}{lrc}
\hline \begin{tabular}{c} 
Dates of \\
Tourneys
\end{tabular} & \begin{tabular}{c} 
Mixed \\
Cycle
\end{tabular} & \begin{tabular}{c} 
Treatment \\
Group*
\end{tabular} \\
\hline June 20 & .009 & 3 \\
June 21 & -.094 & 2 \\
June 22 & -.187 & 2 \\
\hline June 27 & -.346 & 2 \\
June 28 & -.304 & 2 \\
June 29 & -.242 & 2 \\
\hline July 11 & -.099 & 2 \\
July 12 & -.012 & 3 \\
July 13 & -.753 & 2 \\
\hline July 25 & .280 & 1 \\
July 26 & .183 & 1 \\
July 27 & .495 & 1 \\
\hline August 15 & -.435 & 2 \\
August 16 & -.266 & 2 \\
August 17 & -.080 & 2 \\
\hline August 22 & .734 & 1 \\
August 23 & .807 & 1 \\
August 24 & .837 & 1 \\
\hline October 17 & -.322 & 2 \\
October 18 & -.232 & 2 \\
October 19 & -.125 & 2 \\
\hline November 14 & -.493 & 2 \\
November 15 & -.332 & 2 \\
November 16 & -.154 & 2 \\
\hline November 21 & .621 & 1 \\
November 22 & .690 & 1 \\
November 23 & -.717 & 1 \\
\hline December 5 & -.599 & 2 \\
December 6 & -.473 & 2 \\
December 7 & & 2 \\
\hline
\end{tabular}
*Treatment group was utilized for ANOVA.

\section*{APPENDIX D-11}

Mixed Biorhythm Cycle: Treatment Group Indices--S. McAllister
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & \begin{tabular}{l}
Mixed \\
Cycle
\end{tabular} & Treatment Group* \\
\hline January 31 & -. 717 & 2 \\
\hline February 1 & -. 785 & 2 \\
\hline February 2 & -. 810 & 2 \\
\hline February 7 & -. 332 & 2 \\
\hline February 8 & -. 154 & 2 \\
\hline February 9 & . 031 & 3 \\
\hline February 21 & . 143 & 1 \\
\hline February 22 & -. 010 & 3 \\
\hline February 23 & -. 156 & 2 \\
\hline March 21 & -. 297 & 2 \\
\hline March 22 & -. 304 & 2 \\
\hline March 23 & -. 285 & 2 \\
\hline March 27 & . 005 & 3 \\
\hline March 28 & . 105 & 1 \\
\hline March 29 & . 201 & 1 \\
\hline April 25 & . 304 & 1 \\
\hline April 26 & . 357 & 1 \\
\hline April 27 & . 389 & 1 \\
\hline May 2 & . 264 & 1 \\
\hline May 3 & . 203 & 1 \\
\hline May 4 & . 141 & 1 \\
\hline May 9 & -. 096 & 2 \\
\hline May 10 & -. 119 & 2 \\
\hline May 11 & -. 134 & 2 \\
\hline May 23 & -. 255 & 2 \\
\hline May 24 & -. 243 & 2 \\
\hline May 25 & -. 216 & 2 \\
\hline May 29 & . 045 & 1 \\
\hline May 30 & . 142 & 1 \\
\hline May 31 & . 245 & 1 \\
\hline June 1 & . 347 & 1 \\
\hline June 13 & -. 186 & 2 \\
\hline June 14 & -. 364 & 2 \\
\hline June 15 & -. 530 & 2 \\
\hline June 20 & -. 886 & 2 \\
\hline June 21 & -. 823 & 2 \\
\hline June 22 & -. 714 & 2 \\
\hline June 27 & . 268 & 1 \\
\hline June 28 & . 478 & 1 \\
\hline June 29 & . 664 & 1 \\
\hline July 4 & . 944 & 1 \\
\hline July 5 & . 848 & 1 \\
\hline June 6 & . 707 & 1 \\
\hline
\end{tabular}

Mixed Biorhythm Cycle: Treatment Group Indices--S. McAllister (Continued)
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & \begin{tabular}{l}
Mixed \\
Cycle
\end{tabular} & Treatment Group* \\
\hline July 11 & -. 323 & 2 \\
\hline July 12 & -. 512 & 2 \\
\hline July 13 & -. 669 & 2 \\
\hline July 25 & . 761 & 1 \\
\hline July 26 & . 749 & 1 \\
\hline July 27 & . 512 & 1 \\
\hline August 15 & -. 150 & 2 \\
\hline August 16 & -. 112 & 2 \\
\hline August 17 & -. 087 & 2 \\
\hline August 22 & -. 055 & 2 \\
\hline August 23 & -. 071 & 2 \\
\hline August 24 & -. 088 & 2 \\
\hline September 5 & . 249 & 1 \\
\hline September 6 & . 290 & 1 \\
\hline September 7 & . 316 & 1 \\
\hline September 12 & . 178 & 1 \\
\hline September 13 & . 102 & 1 \\
\hline September 14 & . 019 & 3 \\
\hline September 19 & -. 334 & 2 \\
\hline September 20 & -. 358 & 2 \\
\hline September 21 & -. 360 & 2 \\
\hline October 17 & -. 005 & 3 \\
\hline October 18 & . 066 & 1 \\
\hline October 19 & . 139 & 1 \\
\hline October 23 & . 317 & 1 \\
\hline October 24 & . 308 & 1 \\
\hline October 25 & . 272 & 1 \\
\hline October 26 & . 210 & 1 \\
\hline November 14 & . 633 & 1 \\
\hline November 15 & . 740 & 1 \\
\hline November 16 & . 809 & 1 \\
\hline November 21 & . 479 & 1 \\
\hline November 22 & . 299 & 1 \\
\hline November 23 & . 100 & 1 \\
\hline December 5 & -. 424 & 2 \\
\hline December 6 & -. 233 & 2 \\
\hline December 7 & -. 034 & 3 \\
\hline
\end{tabular}
*Treatment group was utilized for ANOVA.

APPENDIX D-12
Mixed Biorhythm Cycle: Treatment Group Indices--J. Washam
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & Mixed Cycle & \[
\begin{gathered}
\text { Treatment } \\
\text { Group* }
\end{gathered}
\] \\
\hline January 31 & . 648 & 1 \\
\hline February 1 & . 766 & 1 \\
\hline February 2 & . 845 & 1 \\
\hline February 7 & . 542 & 1 \\
\hline February 8 & . 362 & I \\
\hline February 9 & . 159 & 1 \\
\hline February 21 & -. 481 & 2 \\
\hline February 22 & -. 295 & 2 \\
\hline February 23 & -. 097 & 2 \\
\hline March 27 & -. 004 & 3 \\
\hline March 28 & . 036 & 3 \\
\hline March 29 & . 075 & 1 \\
\hline April 17 & -. 267 & 2 \\
\hline April 18 & -. 374 & 2 \\
\hline April 19 & -. 467 & 2 \\
\hline April 20 & -. 542 & 2 \\
\hline April 25 & -. 491 & 2 \\
\hline April 26 & -. 390 & 2 \\
\hline April 27 & -. 265 & 2 \\
\hline May 2 & . 453 & 1 \\
\hline May 3 & . 558 & 1 \\
\hline May 4 & . 632 & 1 \\
\hline May 23 & -. 233 & 2 \\
\hline May 24 & -. 107 & 2 \\
\hline May 25 & . 021 & 3 \\
\hline May 29 & . 380 & 1 \\
\hline May 30 & . 403 & 1 \\
\hline May 31 & . 394 & , \\
\hline June 1 & . 356 & 1 \\
\hline June 13 & -. 229 & 2 \\
\hline June 14 & -. 145 & 2 \\
\hline June 15 & -. 046 & 2 \\
\hline June 27 & . 016 & 3 \\
\hline June 28 & -. 118 & 2 \\
\hline June 29 & -. 249 & 2 \\
\hline July 11 & . 145 & 1 \\
\hline July 12 & . 286 & 1 \\
\hline July 13 & . 412 & 1 \\
\hline July 25 & -. 166 & 2 \\
\hline July 26 & -. 278 & 2 \\
\hline July 27 & -. 371 & 2 \\
\hline
\end{tabular}

Mixed Biorhythm Cycle: Treatment Group Indices--J. Washam (Continued)
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & Mixed Cycle & \[
\begin{gathered}
\text { Treatment } \\
\text { Group } 8 \\
\hline
\end{gathered}
\] \\
\hline August 15 & . 258 & 1 \\
\hline August 16 & . 268 & 1 \\
\hline August 17 & . 277 & 1 \\
\hline August 22 & . 280 & 1 \\
\hline August 23 & . 265 & 1 \\
\hline August 24 & . 239 & 1 \\
\hline September 5 & -. 617 & 2 \\
\hline September 6 & -. 623 & 2 \\
\hline September 7 & -. 598 & 2 \\
\hline September 19 & . 874 & 1 \\
\hline September 20 & . 872 & 1 \\
\hline September 21 & . 823 & 1 \\
\hline November 14 & . 105 & 1 \\
\hline November 15 & . 050 & 1 \\
\hline November 16 & -. 002 & 3 \\
\hline November 21 & -. 085 & 2 \\
\hline November 22 & -. 057 & 2 \\
\hline November 23 & -. 018 & 3 \\
\hline December 5 & -. 016 & 3 \\
\hline December 6 & -. 090 & 2 \\
\hline December 7 & -. 161 & 2 \\
\hline December 13 & -. 307 & 2 \\
\hline December 14 & -. 266 & 2 \\
\hline
\end{tabular}
*Treatment group was utilized for ANOVA.

\section*{APPENDIX D-13}

Mixed Biorhythm Cycle: Treatment Group Indices--C. J. Skala
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & \begin{tabular}{l}
Mixed \\
Cycle
\end{tabular} & \[
\begin{gathered}
\text { Treatment } \\
\text { Group* }
\end{gathered}
\] \\
\hline January 31 & -. 502 & 2 \\
\hline February 1 & -. 472 & 2 \\
\hline February 2 & -. 412 & 2 \\
\hline February 7 & . 119 & 1 \\
\hline February 8 & . 214 & 1 \\
\hline February 9 & . 288 & 1 \\
\hline March 21 & -. 497 & 2 \\
\hline March 22 & -. 390 & 2 \\
\hline March 23 & -. 262 & 2 \\
\hline April 17 & -. 358 & 2 \\
\hline April 18 & -. 320 & 2 \\
\hline April 19 & -. 276 & 2 \\
\hline April 20 & -. 229 & 2 \\
\hline May 23 & -. 71 & 2 \\
\hline May 24 & -. 639 & 2 \\
\hline May 25 & -. 531 & 2 \\
\hline May 29 & . 158 & 1 \\
\hline May 30 & . 351 & 1 \\
\hline May 31 & . 530 & 1 \\
\hline June 1 & . 687 & 1 \\
\hline June 6 & . 855 & 1 \\
\hline June 7 & . 603 & 1 \\
\hline June 8 & . 598 & 1 \\
\hline June 27 & . 433 & 1 \\
\hline June 28 & . 564 & 1 \\
\hline June 29 & . 658 & 1 \\
\hline July 4 & . 525 & 1 \\
\hline July 5 & . 403 & 1 \\
\hline July 6 & . 266 & 1 \\
\hline July 11 & -. 335 & 2 \\
\hline July 12 & -. 390 & 2 \\
\hline July 13 & -. 416 & 2 \\
\hline July 25 & . 147 & 1 \\
\hline July 26 & . 130 & 1 \\
\hline July 27 & . 099 & 1 \\
\hline September 5 & . 190 & 1 \\
\hline September 6 & . 213 & 1 \\
\hline September 7 & . 219 & 1 \\
\hline September 12 & . 077 & 1 \\
\hline September 13 & . 038 & 3 \\
\hline September 14 & . 004 & 3 \\
\hline
\end{tabular}

Mixed Biorhythm Cycle: Treatment Group Indices--C. J. Skala (Continued)
\begin{tabular}{lcc}
\hline \begin{tabular}{l} 
Dates of \\
Tourneys
\end{tabular} & \begin{tabular}{c} 
Mixed \\
Cycle
\end{tabular} & \begin{tabular}{c} 
Treatment \\
Group*
\end{tabular} \\
\hline September 19 & -.004 & 3 \\
September 20 & .025 & 3 \\
September 21 & .058 & 1 \\
\hline October 17 & .639 & 1 \\
October 18 & .726 & 1 \\
October 19 & .775 & 1 \\
\hline October 23 & .543 & 1 \\
October 24 & .386 & 1 \\
\hline
\end{tabular}
*Treatment group was utilized for ANOVA.

\section*{APPENDIX D-14}

Mixed Biorhythm Cycle: Treatment Group Indices--P. Bradley
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & \begin{tabular}{l}
Mixed \\
Cycle
\end{tabular} & \[
\begin{gathered}
\text { Treatment } \\
\text { Group* }
\end{gathered}
\] \\
\hline January 31 & . 205 & 1 \\
\hline February 1 & . 340 & 1 \\
\hline February 2 & . 382 & 1 \\
\hline February 21 & -. 716 & 2 \\
\hline February 22 & -. 626 & 2 \\
\hline February 23 & -. 502 & 2 \\
\hline March 21 & -. 168 & 2 \\
\hline March 22 & -. 063 & 2 \\
\hline March 23 & . 042 & 3 \\
\hline March 27 & . 303 & 1 \\
\hline March 28 & . 306 & 1 \\
\hline March 29 & . 282 & 1 \\
\hline April 25 & . 074 & 1 \\
\hline April 26 & -. 051 & 2 \\
\hline April 27 & -. 174 & 2 \\
\hline May 2 & -. 525 & 2 \\
\hline May 3 & -. 515 & 2 \\
\hline May 4 & -. 478 & 2 \\
\hline May 9 & -. 018 & 3 \\
\hline May 10 & . 087 & 1 \\
\hline May 11 & . 182 & 1 \\
\hline May 23 & . 086 & 1 \\
\hline May 24 & . 039 & 3 \\
\hline May 25 & -. 003 & 3 \\
\hline May 29 & -. 107 & 2 \\
\hline May 30 & -. 124 & 2 \\
\hline May 31 & -. 142 & 2 \\
\hline June 1 & -. 161 & 2 \\
\hline June 6 & -. 283 & 2 \\
\hline June 7 & -. 303 & 2 \\
\hline June 8 & -. 316 & 2 \\
\hline June 13 & -. 166 & 2 \\
\hline June 14 & -. 084 & 2 \\
\hline June 15 & . 013 & 3 \\
\hline June 20 & . 55 & 1 \\
\hline June 21 & . 622 & 1 \\
\hline June 22 & . 667 & 1 \\
\hline June 27 & . 375 & 1 \\
\hline June 28 & . 22 & 1 \\
\hline June 29 & . 045 & 1 \\
\hline July 11 & -. 442 & 2 \\
\hline July 12 & -. 236 & 2 \\
\hline July 13 & -. 016 & 3 \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & \begin{tabular}{l}
Mixed \\
Cycle
\end{tabular} & \[
\begin{gathered}
\text { Treatment } \\
\text { Group* }
\end{gathered}
\] \\
\hline July 25 & . 372 & 1 \\
\hline July 26 & . 161 & 1 \\
\hline July 27 & -. 054 & 2 \\
\hline August 15 & . 535 & 1 \\
\hline August 16 & . 529 & 1 \\
\hline August 17 & . 494 & 1 \\
\hline August 22 & . 084 & 1 \\
\hline August 23 & . 0003 & 3 \\
\hline August 24 & -. 071 & 2 \\
\hline September 5 & -. 012 & 3 \\
\hline September 6 & -. 016 & 3 \\
\hline September 7 & -. 030 & 3 \\
\hline September 19 & . 025 & 3 \\
\hline September 20 & . 090 & 1 \\
\hline September 21 & . 156 & 1 \\
\hline October 17 & . 138 & 1 \\
\hline October 18 & . 172 & 1 \\
\hline October 19 & . 189 & 1 \\
\hline October 23 & . 090 & 1 \\
\hline October 24 & . 038 & 3 \\
\hline October 25 & -. 016 & 3 \\
\hline October 26 & -. 067 & 2 \\
\hline November 14 & . 014 & 3 \\
\hline November 15 & -. 114 & 2 \\
\hline November 16 & -. 245 & 2 \\
\hline November 21 & -. 660 & 2 \\
\hline November 22 & -. 647 & 2 \\
\hline November 23 & -. 595 & 2 \\
\hline December 5 & . 864 & 1 \\
\hline December 6 & . 800 & 1 \\
\hline December 7 & . 691 & 1 \\
\hline December 13 & -. 462 & 2 \\
\hline December 14 & -. 635 & 2 \\
\hline
\end{tabular}
*Treatment group was utilized for ANOVA.

Mixed Biorhythm Cycle: Treatment Group Indices--A. Alcott
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & \begin{tabular}{l}
Mixed \\
Cycle
\end{tabular} & \[
\begin{gathered}
\text { Treatment } \\
\text { Group* } \\
\hline
\end{gathered}
\] \\
\hline January 31 & -. 434 & 2 \\
\hline February 1 & -. 377 & 2 \\
\hline February 2 & -. 298 & 2 \\
\hline February 7 & . 202 & 1 \\
\hline February 8 & . 274 & 1 \\
\hline February 9 & . 323 & 1 \\
\hline February 21 & -. 284 & 2 \\
\hline February 22 & -. 278 & 2 \\
\hline February 23 & -. 245 & 2 \\
\hline April 17 & -. 276 & 2 \\
\hline April 18 & -. 120 & 2 \\
\hline April 19 & . 035 & 3 \\
\hline April 20 & . 172 & 1 \\
\hline April 25 & . 581 & 1 \\
\hline April 26 & . 577 & 1 \\
\hline April 27 & . 548 & 1 \\
\hline May 2 & . 087 & 1 \\
\hline May 3 & . 006 & 3 \\
\hline May 4 & -. 067 & 2 \\
\hline May 9 & -. 286 & 2 \\
\hline May 10 & -. 306 & 2 \\
\hline May 11 & -. 319 & 2 \\
\hline June 6 & . 138 & 1 \\
\hline June 7 & -. 02 & 3 \\
\hline June 8 & -. 184 & 2 \\
\hline June 13 & -. 786 & 2 \\
\hline June 14 & -. 810 & 2 \\
\hline June 15 & -. 792 & 2 \\
\hline June 20 & -. 146 & 2 \\
\hline June 21 & . 047 & 1 \\
\hline June 22 & . 237 & 1 \\
\hline June 27 & . 817 & 1 \\
\hline June 28 & . 812 & 1 \\
\hline June 29 & . 762 & 1 \\
\hline July 11 & -. 651 & 2 \\
\hline July 12 & -. 604 & 2 \\
\hline July 13 & -. 524 & 2 \\
\hline July 25 & . 330 & 1 \\
\hline July 26 & . 253 & 1 \\
\hline July 27 & . 162 & 1 \\
\hline August 22 & -. 315 & 2 \\
\hline August 23 & -. 378 & 2 \\
\hline August 24 & -. 418 & 2 \\
\hline
\end{tabular}
\begin{tabular}{lrc}
\hline \begin{tabular}{c} 
Dates of \\
Tourneys
\end{tabular} & \begin{tabular}{c} 
Mixed \\
Cyc1e
\end{tabular} & \begin{tabular}{c} 
Treatment \\
Group*
\end{tabular} \\
\hline September 5 & .405 & 1 \\
September 6 & .436 & 1 \\
September 7 & .443 & 1 \\
\hline September 12 & .169 & 1 \\
September 13 & .082 & 1 \\
September 14 & -.004 & 3 \\
\hline September 19 & -.272 & 2 \\
September 20 & -.281 & 2 \\
September 21 & -.275 & 2 \\
\hline October 17 & .402 & 1 \\
October 18 & .357 & 1 \\
October 19 & .288 & 1 \\
\hline November 14 & .827 & 1 \\
November 15 & .686 & 1 \\
November 16 & .508 & 1 \\
\hline December 5 & .654 & 1 \\
December 6 & .738 & 1 \\
December 7 & & 1 \\
\hline
\end{tabular}
*Treatment group was utilized for ANOVA.
Biorhythm Cycle: Treatment Group Indices--B. Cullen
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & Mixed Cycle & Treatment
Group* \\
\hline January 18 & . 603 & 1 \\
\hline January 19 & . 533 & 1 \\
\hline January 31 & -. 333 & 2 \\
\hline February 1 & -. 333 & 2 \\
\hline February 2 & -. 326 & 2 \\
\hline February 7 & -. 237 & 2 \\
\hline February 8 & -. 213 & 2 \\
\hline February 9 & -. 184 & 2 \\
\hline March 27 & . 114 & 1 \\
\hline March 28 & -. 030 & 3 \\
\hline March 29 & -. 169 & 2 \\
\hline April 17 & . 237 & 1 \\
\hline April 18 & . 153 & 1 \\
\hline April 19 & . 056 & 1 \\
\hline April 20 & -. 045 & 2 \\
\hline May 9 & . 420 & 1 \\
\hline May 10 & . 119 & 1 \\
\hline May 11 & . 214 & 1 \\
\hline May 23 & -. 390 & 2 \\
\hline May 24 & -. 262 & 2 \\
\hline May 25 & -. 119 & 2 \\
\hline May 29 & . 422 & 1 \\
\hline May 30 & . 512 & 1 \\
\hline May 31 & . 572 & 1 \\
\hline June 1 & . 602 & 1 \\
\hline June 13 & . 351 & 1 \\
\hline June 14 & -. 387 & 2 \\
\hline June 15 & -. 405 & 2 \\
\hline June 20 & -. 276 & 2 \\
\hline June 21 & -. 228 & 2 \\
\hline June 22 & -. 181 & 2 \\
\hline June 27 & . 024 & 3 \\
\hline June 28 & . 060 & 1 \\
\hline June 29 & . 097 & 1 \\
\hline July 4 & . 304 & 1 \\
\hline July 5 & . 344 & 1 \\
\hline July 6 & . 378 & 1 \\
\hline July 11 & . 349 & 1 \\
\hline July 12 & . 286 & 1 \\
\hline July 13 & . 202 & 1 \\
\hline August 15 & -. 604 & 2 \\
\hline August 16 & -. 750 & 2 \\
\hline August 17 & -. 853 & 2 \\
\hline
\end{tabular}

Mixed Biorhythm Cycle: Treatment Group Indices--B. Cullen (Continued)
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & Mixed Cycle & \[
\begin{gathered}
\text { Treatment } \\
\text { Group* } \\
\hline
\end{gathered}
\] \\
\hline August 22 & -. 651 & 2 \\
\hline August 23 & -. 488 & 2 \\
\hline August 24 & -. 303 & 2 \\
\hline September 5 & . 402 & 1 \\
\hline September 6 & . 265 & 1 \\
\hline September 7 & . 122 & 1 \\
\hline September 12 & -. 390 & 2 \\
\hline September 13 & -. 416 & 2 \\
\hline September 14 & -. 412 & 2 \\
\hline September 19 & -. 107 & 2 \\
\hline September 20 & -. 030 & 2 \\
\hline September 21 & . 037 & 1 \\
\hline October 17 & . 221 & 1 \\
\hline October 18 & . 167 & 1 \\
\hline October 19 & . 101 & 1 \\
\hline October 23 & -. 201 & 2 \\
\hline October 24 & -. 260 & 2 \\
\hline October 25 & -. 304 & 2 \\
\hline October 26 & -. 329 & 2 \\
\hline November 14 & . 037 & 3 \\
\hline November 15 & . 004 & 3 \\
\hline November 16 & -. 020 & 3 \\
\hline November 21 & . 025 & 3 \\
\hline November 22 & . 057 & 1 \\
\hline November 23 & . 090 & 1 \\
\hline December 5 & -. 379 & 2 \\
\hline December 6 & -. 433 & 2 \\
\hline December 7 & -. 466 & 2 \\
\hline
\end{tabular}
*Treatment group was utilized for ANOVA.

\section*{APPENDIX D-17}

Mixed Biorhythm Cycle: Treatment Group Indices--J. Bourassa
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & Mixed Cycle & Treatment Group* \\
\hline January 31 & . 360 & 1 \\
\hline February 1 & . 317 & 1 \\
\hline February 2 & . 264 & 1 \\
\hline February 7 & -. 024 & 2 \\
\hline February 8 & -. 065 & 2 \\
\hline February 9 & -. 096 & 2 \\
\hline February 21 & -. 247 & 2 \\
\hline February 22 & -. 255 & 2 \\
\hline February 23 & -. 255 & 2 \\
\hline March 21 & -. 867 & 2 \\
\hline March 22 & -. 900 & 2 \\
\hline March 23 & -. 886 & 2 \\
\hline April 17 & -. 857 & 2 \\
\hline April 18 & -. 881 & 2 \\
\hline April 19 & -. 857 & 2 \\
\hline April 20 & -. 788 & 2 \\
\hline April 25 & -. 028 & 3 \\
\hline April 26 & . 140 & 1 \\
\hline April 27 & . 290 & 1 \\
\hline May 2 & . 590 & 1 \\
\hline May 3 & . 550 & 1 \\
\hline May 4 & . 485 & 1 \\
\hline May 9 & -. 002 & 3 \\
\hline May 10 & -. 085 & 2 \\
\hline May 11 & -. 152 & 2 \\
\hline May 23 & -. 042 & 3 \\
\hline May 24 & -. 045 & 2 \\
\hline May 25 & -. 055 & 2 \\
\hline May 29 & -. 115 & 2 \\
\hline May 30 & -. 119 & 2 \\
\hline May 31 & -. 113 & 2 \\
\hline June 1 & -. 095 & 2 \\
\hline June 6 & . 140 & 1 \\
\hline June 7 & . 197 & 1 \\
\hline June 8 & . 248 & 1 \\
\hline June 13 & . 288 & 1 \\
\hline June 14 & . 241 & 1 \\
\hline June 15 & . 178 & 1 \\
\hline June 27 & -. 243 & 2 \\
\hline June 28 & -. 172 & 2 \\
\hline June 29 & -. 093 & 2 \\
\hline
\end{tabular}

Mixed Biorhythm Cycle: Treatment Group Indices--J. Bourassa (Continued)
\begin{tabular}{lrc}
\hline \begin{tabular}{l} 
Dates of \\
Tourneys
\end{tabular} & \begin{tabular}{c} 
Mixed \\
Cycle
\end{tabular} & \begin{tabular}{c} 
Treatment \\
Group*
\end{tabular} \\
\hline July ll & .015 & 3 \\
July 12 & -.046 & 2 \\
July l3 & -.100 & 2 \\
\hline July 25 & .300 & 1 \\
July 26 & .316 & 1 \\
July 27 & .307 & 1 \\
\hline August 15 & .333 & 1 \\
August 16 & .494 & 1 \\
August 17 & .633 & 1 \\
\hline August 22 & .741 & 1 \\
August 23 & .629 & 1 \\
August 24 & .479 & 1 \\
\hline September 5 & -.736 & 2 \\
September 6 & -.595 & 2 \\
September 7 & -.424 & 2 \\
\hline September 12 & .506 & 1 \\
September 13 & .637 & 1 \\
September 14 & .230 & 1 \\
\hline September 19 & .603 & 1 \\
September 20 & .481 & 1 \\
September 21 & .342 & 1 \\
\hline October 17 & .272 & 1 \\
October 18 & .302 & 1 \\
October 19 & .328 & 1 \\
\hline October 23 & .363 & 1 \\
October 24 & .342 & 1 \\
October 25 & .305 & 1 \\
October 26 & .251 & 1 \\
\hline November 14 & .243 & 1 \\
November 15 & .588 & 1 \\
November 16 & & 1 \\
\hline
\end{tabular}
*Treatment group was utilized for ANOVA.

\section*{APPENDIX D-18}

Mixed Biorhythm Cycle: Treatment Group Indices--S. Roberts
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & \[
\begin{aligned}
& \text { Mixed } \\
& \text { Cycle }
\end{aligned}
\] & \[
\begin{gathered}
\text { Treatment } \\
\text { Group* }
\end{gathered}
\] \\
\hline January 31 & . 043 & 3 \\
\hline February 1 & -. 043 & 3 \\
\hline February 2 & -. 124 & 2 \\
\hline February 7 & -. 313 & 2 \\
\hline February 8 & -. 298 & 2 \\
\hline February 9 & -. 269 & 2 \\
\hline February 21 & . 056 & 1 \\
\hline February 22 & . 050 & 1 \\
\hline February 23 & . 046 & 1 \\
\hline June 6 & . 164 & 1 \\
\hline June 7 & . 149 & 1 \\
\hline June 8 & . 123 & 1 \\
\hline June 13 & -. 150 & 2 \\
\hline June 14 & -. 218 & 2 \\
\hline June 15 & -. 281 & 2 \\
\hline June 20 & -. 377 & 2 \\
\hline June 21 & -. 335 & 2 \\
\hline June 22 & -. 273 & 2 \\
\hline June 27 & . 207 & 1 \\
\hline June 28 & . 171 & 1 \\
\hline June 29 & . 371 & 1 \\
\hline July 11 & -. 265 & 2 \\
\hline July 12 & -. 323 & 2 \\
\hline July 13 & -. 356 & 2 \\
\hline Ju1y 25 & . 262 & 1 \\
\hline July 26 & . 247 & 1 \\
\hline July 27 & . 208 & 1 \\
\hline August 15 & . 536 & 1 \\
\hline August 15 & . 564 & 1 \\
\hline August 17 & . 557 & 1 \\
\hline August 22 & . 025 & 3 \\
\hline August 23 & -. 140 & 2 \\
\hline August 24 & -. 304 & 2 \\
\hline September 5 & . 112 & 1 \\
\hline September 6 & . 300 & 1 \\
\hline September 7 & . 472 & 1 \\
\hline September 12 & . 821 & 1 \\
\hline September 13 & . 762 & 1 \\
\hline September 14 & . 663 & 1 \\
\hline November 14 & . 714 & 1 \\
\hline November 15 & . 718 & 1 \\
\hline November 16 & . 685 & 1 \\
\hline
\end{tabular}
\begin{tabular}{lcc}
\hline Dates of & \begin{tabular}{c} 
Mixed \\
Cycle
\end{tabular} & \begin{tabular}{c} 
Treatment \\
Grourneys
\end{tabular} \\
\hline November 21 & .043 & 3 \\
November 22 & -.136 & 2 \\
\hline
\end{tabular}
*Treatment group was utilized for ANOVA.

\section*{APPENDIX D-19}

Mixed Biorhythm Cycle: Treatment
Group Indices--D. Austin
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & Mixed Cyc1e & Treatment Group* \\
\hline February 21 & -. 323 & 2 \\
\hline February 22 & -. 208 & 2 \\
\hline February 23 & -. 364 & 2 \\
\hline March 21 & -. 073 & 2 \\
\hline March 22 & . 041 & 3 \\
\hline March 23 & . 162 & 1 \\
\hline March 27 & . 536 & 1 \\
\hline March 28 & . 295 & 1 \\
\hline March 29 & . 557 & 1 \\
\hline April 17 & . 112 & 1 \\
\hline April 18 & . 300 & 1 \\
\hline April 19 & . 469 & 1 \\
\hline April 20 & . 620 & 1 \\
\hline April 25 & . 763 & 1 \\
\hline April 26 & . 664 & 1 \\
\hline April 27 & . 531 & 1 \\
\hline May 2 & -. 464 & 2 \\
\hline May 3 & -. 578 & 2 \\
\hline May 4 & -. 659 & 2 \\
\hline May 9 & -. 538 & 2 \\
\hline May 10 & -. 432 & 2 \\
\hline May 11 & -. 311 & 2 \\
\hline May 23 & . 386 & 1 \\
\hline May 24 & . 349 & 1 \\
\hline May 25 & . 307 & 1 \\
\hline May 29 & . 124 & 1 \\
\hline May 30 & . 078 & 1 \\
\hline May 31 & . 032 & 3 \\
\hline June 1 & -. 016 & 3 \\
\hline June 6 & -. 281 & 2 \\
\hline June 7 & -. 334 & 2 \\
\hline June 8 & -. 383 & 2 \\
\hline June 20 & . 262 & 1 \\
\hline June 21 & . 390 & 1 \\
\hline June 22 & . 506 & 1 \\
\hline July 4 & -. 311 & 2 \\
\hline July 5 & -. 473 & 2 \\
\hline July 6 & -. 610 & 2 \\
\hline July 11 & -. 730 & 2 \\
\hline July 12 & -. 629 & 2 \\
\hline July 13 & -. 493 & 2 \\
\hline July 25 & . 556 & 1 \\
\hline July 26 & . 436 & 1 \\
\hline July 27 & . 295 & 1 \\
\hline
\end{tabular}
\begin{tabular}{lrc}
\hline \begin{tabular}{l} 
Dates of \\
Tourneys
\end{tabular} & \begin{tabular}{c} 
Mixed \\
Cyc1e
\end{tabular} & \begin{tabular}{c} 
Treatment \\
Group*
\end{tabular} \\
\hline August 15 & .315 & 1 \\
August 16 & .302 & 1 \\
August 17 & .264 & 1 \\
\hline August 22 & -.136 & 2 \\
August 23 & -.209 & 2 \\
August 24 & -.264 & 2 \\
\hline September 5 & .405 & 1 \\
September 6 & .427 & 1 \\
September 7 & .420 & 1 \\
\hline September 12 & .028 & 3 \\
September 13 & -.088 & 2 \\
September 14 & -.200 & 2 \\
\hline November 14 & .313 & 1 \\
November 15 & -.061 & 1 \\
November 16 & -.791 & 3 \\
\hline November 21 & -.868 & 2 \\
November 22 & -.901 & 2 \\
November 23 & .924 & 2 \\
\hline December 5 & .984 & 1 \\
December 6 & .991 & 1 \\
December 7 & & 1 \\
\hline
\end{tabular}
*Treatment group was utilized for ANOVA.

APPENDIX D-20
Mixed Biorhythm Cycle: Treatment Group Indices--J. Kazmierski
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & \[
\begin{aligned}
& \text { Mixed } \\
& \text { Cycle }
\end{aligned}
\] & \[
\begin{gathered}
\text { Treatment } \\
\text { Group* }
\end{gathered}
\] \\
\hline January 31 & . 317 & 1 \\
\hline February 1 & . 389 & 1 \\
\hline February 2 & . 448 & 1 \\
\hline February 7 & . 407 & 1 \\
\hline February 8 & . 324 & 1 \\
\hline February 9 & . 219 & 1 \\
\hline March 21 & . 091 & 1 \\
\hline March 22 & . 182 & 1 \\
\hline March 23 & . 255 & 1 \\
\hline March 27 & . 290 & 1 \\
\hline March 28 & . 229 & 1 \\
\hline March 29 & . 146 & 1 \\
\hline April 17 & . 623 & 1 \\
\hline April 18 & . 634 & 1 \\
\hline April 19 & . 606 & 1 \\
\hline April 20 & . 541 & 1 \\
\hline April 25 & -. 160 & 2 \\
\hline April 26 & -. 317 & 2 \\
\hline April 27 & -. 457 & 2 \\
\hline May 2 & -. 681 & 2 \\
\hline May 3 & -. 614 & 2 \\
\hline May 4 & -. 514 & 2 \\
\hline May 9 & . 215 & 1 \\
\hline May 10 & . 348 & 1 \\
\hline May 11 & . 459 & 1 \\
\hline May 23 & -. 097 & 2 \\
\hline May 24 & -. 182 & 2 \\
\hline May 25 & -. 251 & 2 \\
\hline May 29 & -. 369 & 2 \\
\hline May 30 & -. 364 & 2 \\
\hline May 31 & -. 350 & 2 \\
\hline June 1 & -. 328 & 2 \\
\hline June 6 & -. 174 & 2 \\
\hline June 7 & -. 138 & 2 \\
\hline June 8 & -. 099 & 2 \\
\hline June 13 & . 165 & 1 \\
\hline June 14 & . 231 & 1 \\
\hline June 15 & . 298 & 1 \\
\hline June 20 & . 512 & 1 \\
\hline June 21 & . 503 & 1 \\
\hline June 22 & . 470 & 1 \\
\hline June 27 & -. 046 & 2 \\
\hline June 28 & -. 194 & 2 \\
\hline June 29 & -. 342 & 2 \\
\hline
\end{tabular}

Mixed Biorhythm Cycle: Treatment Group Indices--J. Kazmierski (Continued)
\begin{tabular}{|c|c|c|}
\hline Dates of Tourneys & \begin{tabular}{l}
Mixed \\
Cycle
\end{tabular} & \[
\begin{gathered}
\text { Treatment } \\
\text { Group* }
\end{gathered}
\] \\
\hline July 4 & -. 795 & 2 \\
\hline July 5 & -. 783 & 2 \\
\hline July 6 & -. 730 & 2 \\
\hline July 11 & . 034 & 3 \\
\hline July 12 & . 233 & 1 \\
\hline July 13 & . 424 & 1 \\
\hline August 22 & . 210 & 1 \\
\hline August 23 & -. 272 & 2 \\
\hline August 24 & -. 307 & 2 \\
\hline September 5 & . 165 & 1 \\
\hline September 6 & . 141 & 1 \\
\hline September 7 & . 100 & 1 \\
\hline September 12 & -. 192 & 2 \\
\hline September 13 & -. 230 & 2 \\
\hline September 14 & -. 251 & 2 \\
\hline September 19 & -. 067 & 2 \\
\hline September 20 & . 011 & 3 \\
\hline September 21 & . 093 & 1 \\
\hline November 14 & -. 300 & 2 \\
\hline November 15 & -. 400 & 2 \\
\hline Navember 16 & -. 2185 & 2 \\
\hline November 21 & -. 511 & 2 \\
\hline November 22 & -. 416 & 2 \\
\hline November 23 & . 290 & 1 \\
\hline December 5 & . 668 & 1 \\
\hline December 6 & . 511 & 1 \\
\hline December 7 & . 323 & 1 \\
\hline December 13 & -. 848 & 2 \\
\hline December 14 & -. 944 & 2 \\
\hline
\end{tabular}
*Treatment group was utilized for ANOVA.

\section*{vITA}
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[^6]:    ${ }^{1}$ Gay G. Luce, Biological Rhythms in Human and Animal Physiology (New York: Dover Publications, Inc., 1971), p. 46 .

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    $35_{\text {Brown, op. cit., pp. } 18, ~}^{22}$.
    ${ }^{36}$ Still, op. cit., pp. 18, 21.

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    $$
    38 \text { Ibid., p. 179. }{ }^{39} \text { Still, op. cit., pp. } 22,52 .
    $$

[^14]:    ${ }^{40}$ Luce, op, cit., p. 141.
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