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A normative study of students selected at random on the combined prism and sphere rock test

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A normative study of students selected at random on the combined prism and sphere rock test

Abstract

A normative study of students selected at random on the combined prism and sphere rock test

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Harold M. Haynes

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A NORMATIVE STUDY
OF STUDENTS SELECTED AT RANDOM
ON THE COMBINED PRISM AND SPHERE ROCK TEST

A THESIS
PRESENTED TO THE FACULTY
OF
PACIFIC UNIVERSITY
BY
HOWARD A. DONALDSON
PHILIP R. RICKER
STANLEY E. SAMUELIS

IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE
DOCTOR OF OPTOMETRY

JANUARY 1962

DEDICATION

This thesis is dedicated to the profession of Optometry and to the students in Optometry for their use clinically.

We would also like to recognize Harold M. Haynes, O.D., for the help and guidance given during this research.

HAD, PRR, SES.

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STATEMENT OF PROBLEM

This research represents a normative study of the binocular rock reaction time to sphere combined with prism.

This clinical study is one of a series designed to investigate accommodation and convergence reaction time under various experimental conditions.

In this study the stimulus to accommodation and convergence was simultaneously varied while the test distance was held constant. Two previous studies in this series¹ studied the reaction time of relative accommodation¹ and convergence². (prism and sphere rock).

This study was designed to study the performance of a group of young adults on this new clinical reaction time test. The test was suggested from the lectures of Professor Harold K. Haynes.

¹Milne, Small, and Torbert; "The H.M.H. Plus and Minus Binocular Rock Test, a Normative Study"; June, 1961.

²Berreth and Smith; "A Normative Study of Students Selected at Random on the H.M.H. Prism Rock Test"; June, 1960.

EXPERIMENTAL PROCEDURE

101 subjects were tested. These subjects fall within the age range of 17 to 33 years and were selected at random from the Pacific University Campus. Of the 101 subjects given the test, 17 were females and 84 were males. All individuals who saw diplopic through the test lenses or who had visual training within the last six months were excluded from the study. Also excluded were those unable to clear and single the 20/20 line of the reduced Snellen Chart through their habitual prescription.

In two previous studies, the lens rock test¹ and prism rock test², the number of flips were counted by the person administering the test. But in this study, the subject kept a verbal count of his flips as he progressed through the test. This factor may have influenced the results for comparison purposes with the two above mentioned studies.

¹Milne, Small, and Torbert; "The H.M.H. Plus and Minus Binocular Rock Test, a Normative Study"; June, 1961.

²Berreth and Smith; "A Normative Study of Students Selected at Random on the H.M.H. Prism Rock Test"; June, 1960.

EQUIPMENT

The equipment consisted of a Keystone Van Orden Flipper, one reduced Snellen Chart, one pair of plus 2.00 lenses combined with 6 prism diopters base in, in each lens, one pair of minus 2.00 lenses combined with 6 prism diopters base out, in each lens, one lens gauge, one PD rule and one stop watch.

TESTING PROCEDURE

1. The shaft of the Van Orden Flipper was set at 16 inches.
2. The near PD was taken on each patient and the instrument was set accordingly.
3. The subject's habitual Rx was worn. The subject was allowed to look through the test lens at the 20/20 line of the reduced Snellen Chart to see if the letters of the line were single and clear.
4. The instructions for the testing was then given and demonstrated to the subject. (See instructions, page 5).
5. The stimulus sequence was from plano to +2.00 combined with 6^Δ BI O.D. and +2.00 combined with 6^Δ BI O.S. to plano, which represents one cycle. On the minus and base out phase, the stimulus sequence was from plano to -2.00 combined with 6^Δ BO O.D. and -2.00 combined with 6^Δ BO O.S. to plano.
6. The order of stimulation was varied alternately from subject to subject, one being given plus and base in first and the next given minus and base out first.
7. The subject was allowed to flip the lenses when he could see the letters single and clear. He counted out loud each flip so the number of flips could be recorded after 30, 60, 90, and 120 seconds.

INSTRUCTIONS

1. "Can you read all the letters in the bottom row?"
2. "Read the letters aloud to me."
3. "Flip the lenses into place."
4. "Is the bottom row single and clear?"
5. If the subject reports the bottom row single and clear then he was asked, "did you see the row of letters jump to the side or did you see two rows slide into one?"
6. "The purpose of this test is to see how many times a minute you can flip the lenses in and out while keeping the bottom line single and clear."
7. "As you are flipping the lenses as fast as you can keeping the bottom row single and clear, count aloud each time you flip the lenses."
8. "The main thing to remember is to wait until the letters are clear and there is only one line present before you flip the lenses."
9. "If the line jumps from side to side with each flip, be sure and tell us."
10. "Continue flipping the lenses until you are told to stop."

RESULTS

There were 101 subjects given the test, with a total of 97 successfully completing the 2 minute periods of both phases. Of the 4 who failed, 2 saw diplopic on the plus and base in phase through the test lenses and 2 saw diplopic on the minus and base out phase through the test lenses.

Table I shows the mean, mode, median and standard deviation for each 30 second interval during the 120 second experimental interval of each phase.

Graph I shows a comparison of the change in response on the first 30 seconds with the plus and base in, to the change in response with the minus and base out.

Graph II shows a comparison of the change in response on the second 30 seconds with the plus and base in, to the change in response with the minus and base out.

Graph III shows a comparison of the change in response on the third 30 seconds with the plus and base in, to the change in response with the minus and base out.

Graph IV shows a comparison of the change in response on the fourth 30 seconds with the plus and base in, to the change in response with the minus and base out.

Graph V gives the comparison of the means and standard deviations as a function of time on the plus and base in phase.

Graph VI gives the comparison of the means and standard deviations as a function of time on the minus and base out phase.

Scattergram I shows the relationship and correlation coefficient of the first minute of plus and base in compared to the second minute of plus and base in.

Scattergram II shows the relationship and correlation coefficient of the first minute of minus and base out compared to the second minute of minus and base out.

Scattergram III shows the relationship and correlation coefficient of the first minute of plus and base in compared to the first minute of minus and base out.

Scattergram IV shows the relationship and correlation coefficient of the second minute of plus and base in compared to the second minute of minus and base out.

SUMMARY

A sample of 101 college students selected at random were used to study their reactions to the H.M.H. Combined Prism and Sphere Rock Test. A graphical and statistical analysis of the data is presented.

TABLE I

THE
 MEAN, MODE, MEDIAN, AND STANDARD DEVIATION,
 FOR EACH 30 SECOND INTERVAL
 (Number of flips)

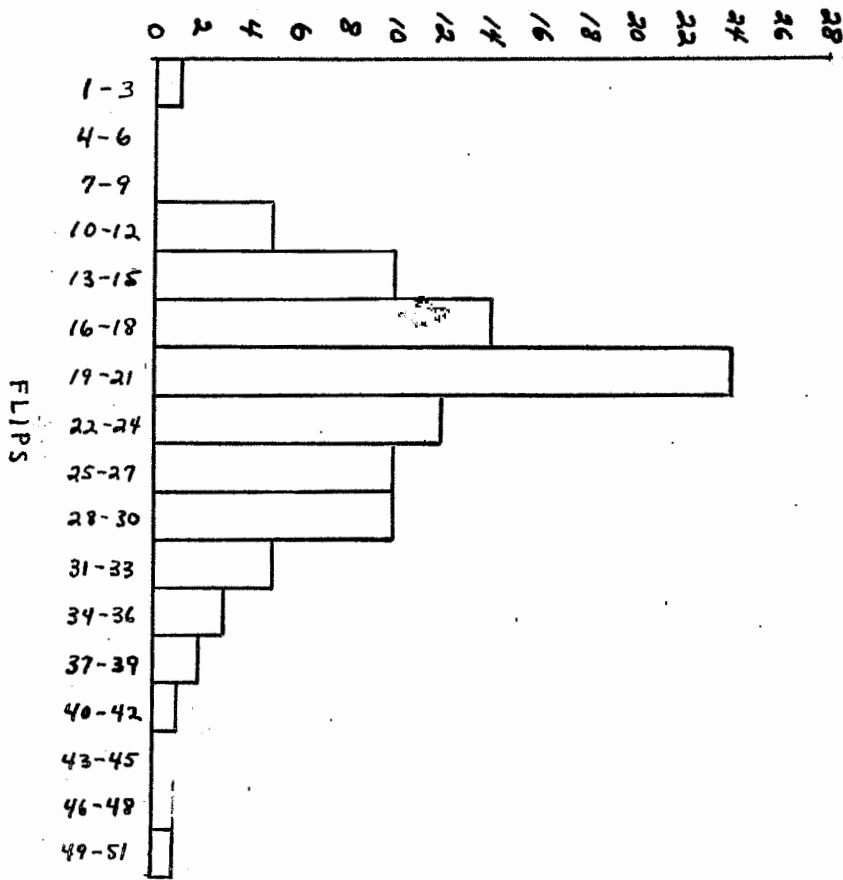
PLUS AND BASE IN

	MEAN	MODE	MEDIAN	SIGMA
1st.30 sec.	22.16	20	20	7.29
2nd." "	22.22	20	20	7.14
3rd." "	22.16	20	20	7.89
4th." "	22.43	20	20	7.38

MINUS AND BASE OUT

	MEAN	MODE	MEDIAN	SIGMA
1st.30 sec.	23.93	20	23	7.62
2nd." "	25.19	23	23	8.52
3rd." "	25.52	23	26	8.88
4th." "	25.82	26	26	9.00

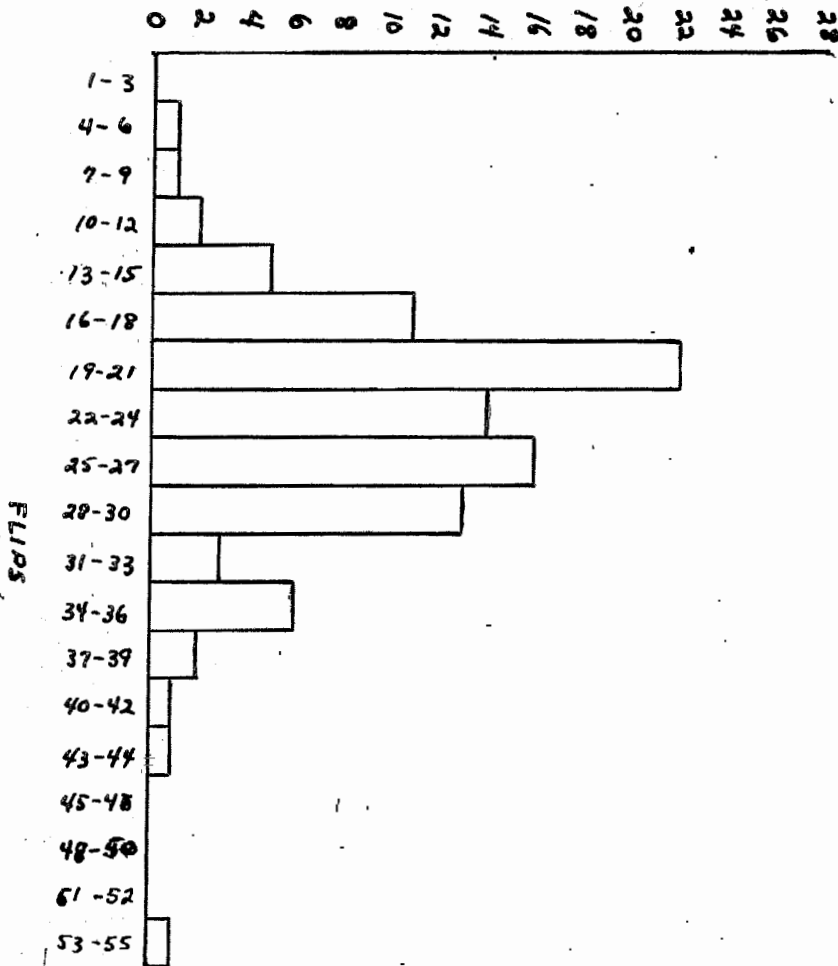
Number of Subjects



First Thirty Seconds of Plus and Base In

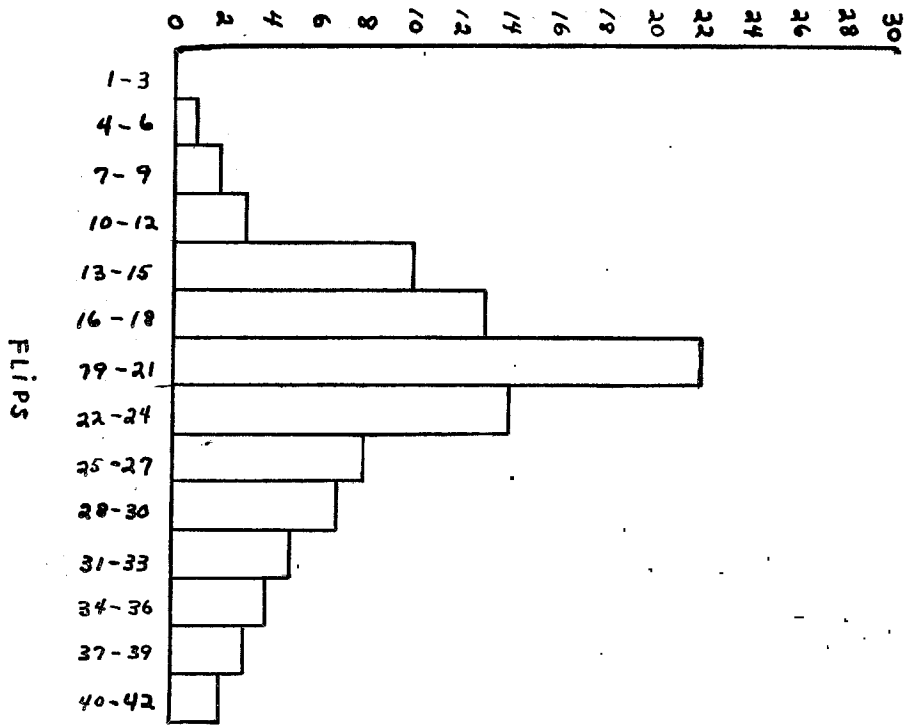
Graph I

NUMBER OF SUBJECTS



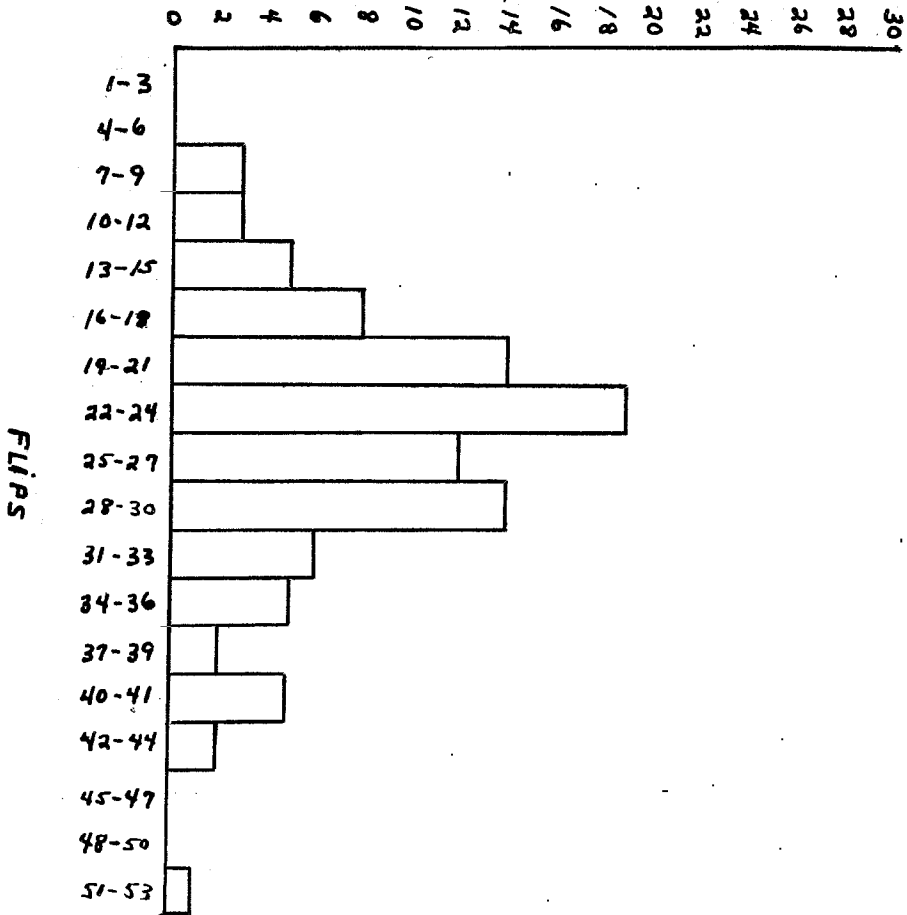
First Thirty Seconds of Minus and Base Out

Number of subjects



Second Thirty Seconds of Plus and Base In

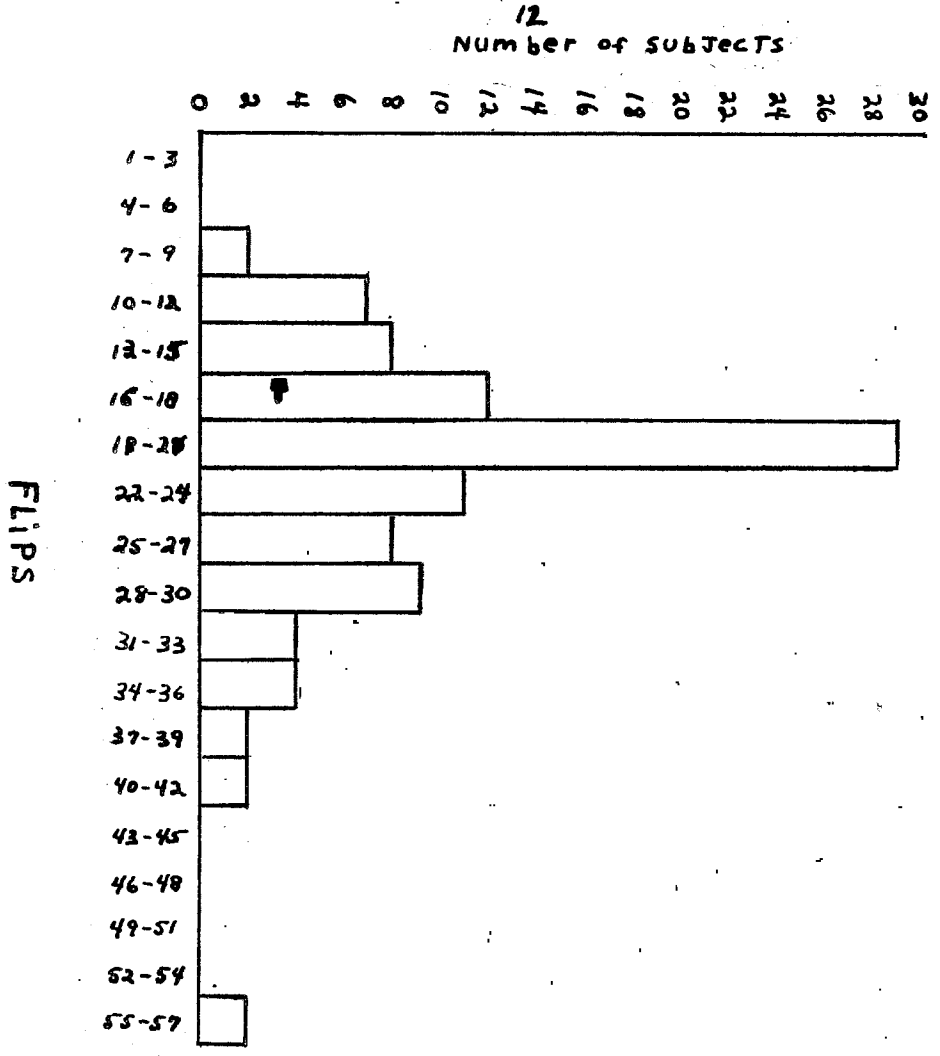
Number of subjects



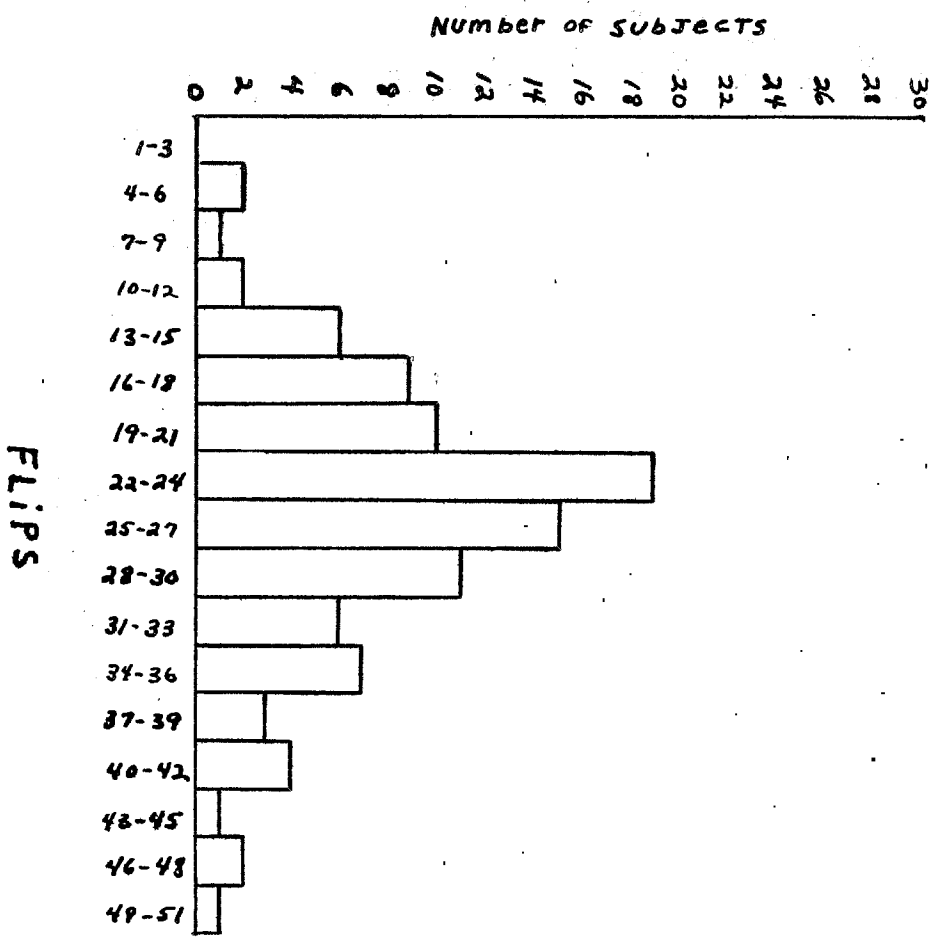
Second Thirty Seconds of Minus and Base out

Graph III

Third Thirty Seconds of Plus and Base In

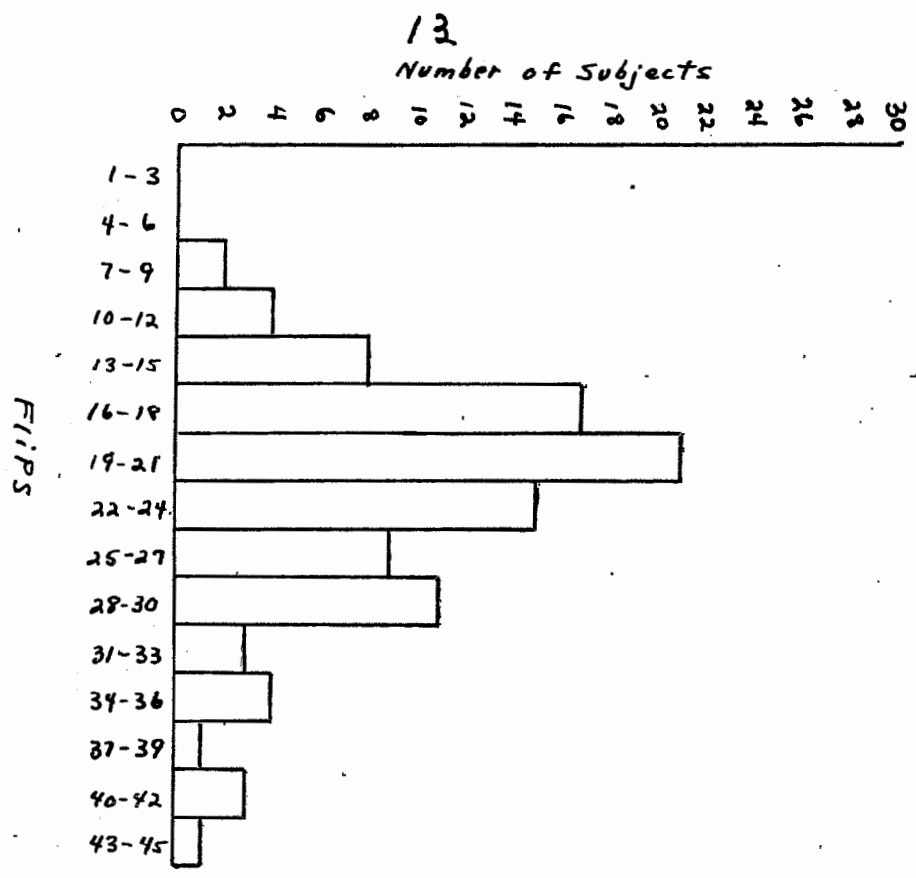


Third Thirty Seconds of Minus and Base Out

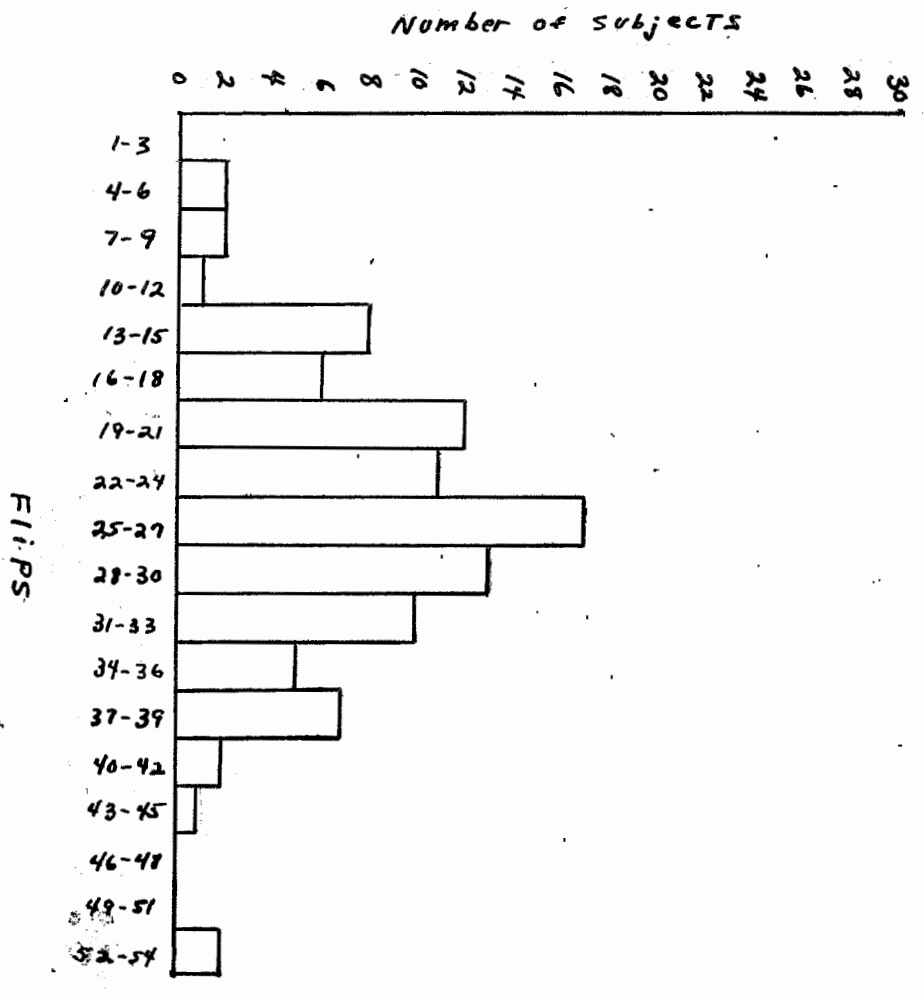


Graph IV

Fourth Thirty Seconds of Plus and Base In

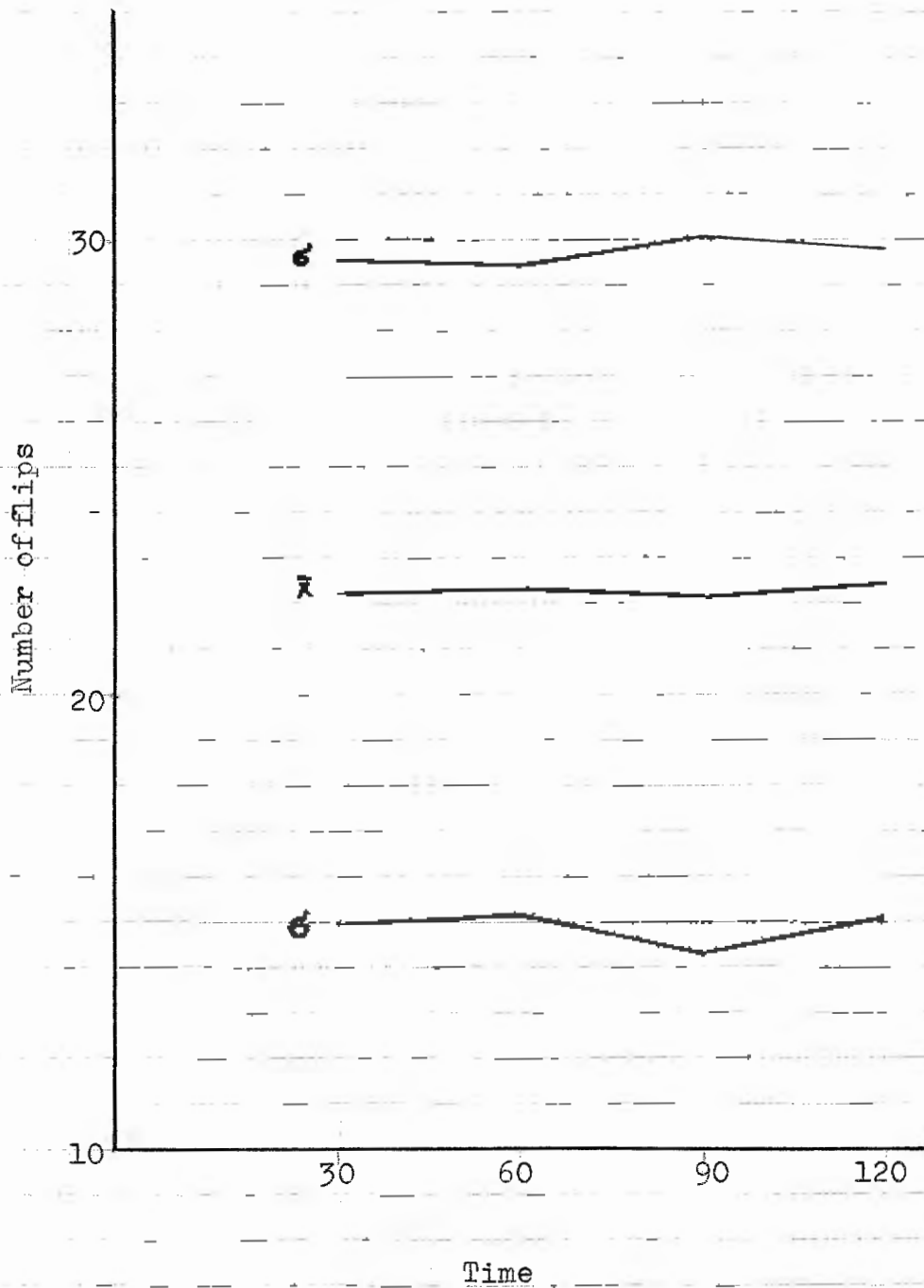


Fourth Thirty Seconds of Minus and Base Out



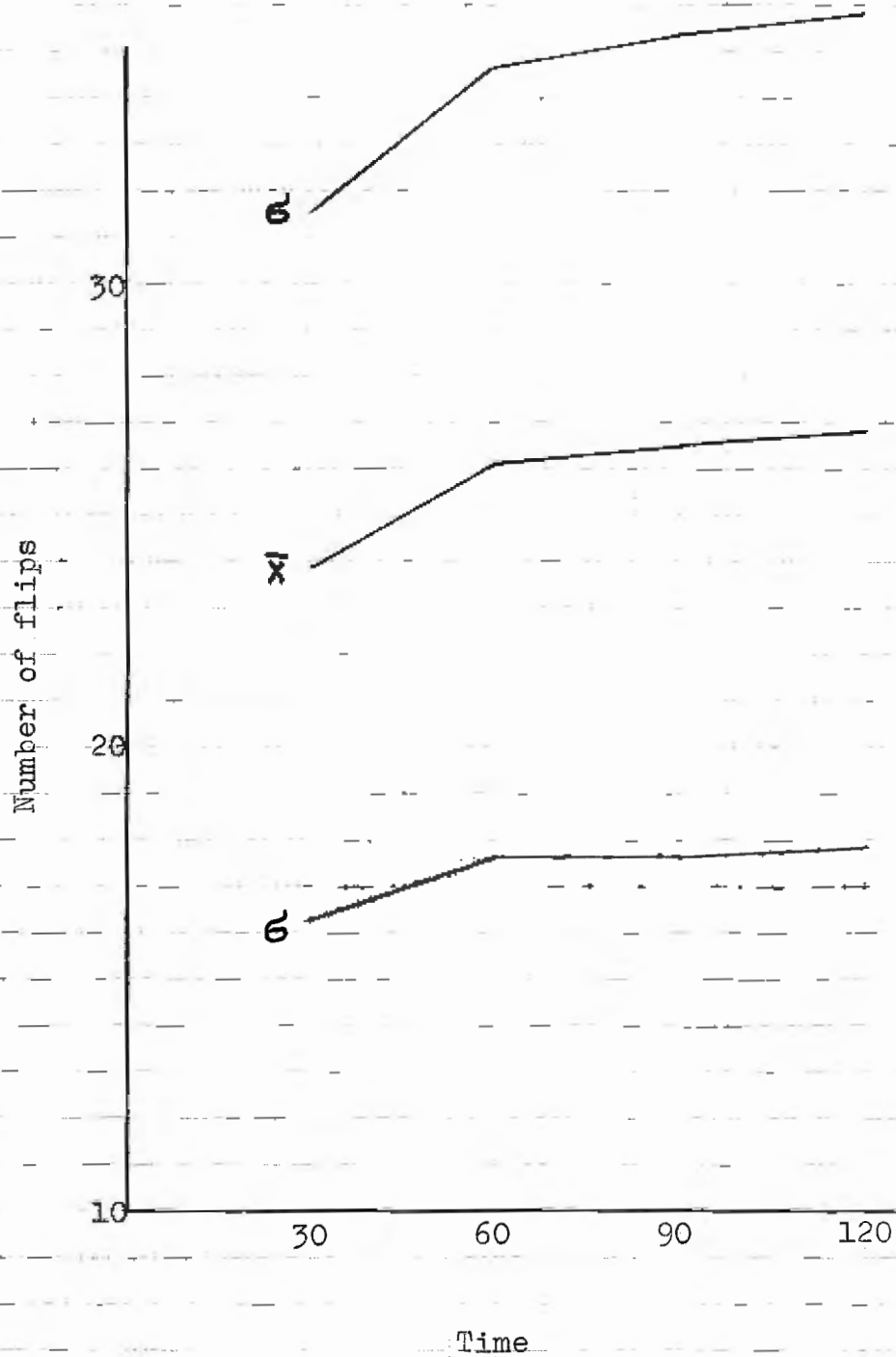
GRAPH V

COMPARISON OF THE MEAN AND STANDARD
DEVIATIONS AS A FUNCTION OF TIME ON
THE PLUS AND BASE IN PHASE.



GRAPH VI

COMPARISON OF THE MEAN AND STANDARD
DEVIATIONS AS A FUNCTION OF TIME ON
THE MINUS AND BASE OUT PHASE.



SCATTERGRAM III

FIRST MINUTE OF PLUS AND BASE IN
 COMPARED TO THE FIRST MINUTE OF
 MINUS AND BASE OUT

class		First Min. Minus and Base out																						
d	f	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	
	fd	0	1	1	4	8	20	42	98	196	392	784	1568	3136	6272	12544	25088	50176	100352	200704	401408	802816	1605632	f(d _x d _y)
	fd ²	0	1	4	16	64	360	1512	7840	42112	229376	1254400	6720000	35943680	194790400	1054924800	5716640000	30422784000	160212480000	845670400000	4418560000000	23224832000000	121232000000000	
40	19	1	19								1												171	
38	18	1	18																	1			306	
36	17	2	34											1	1								459	
34	16	0	0																				0	
32	15	5	75	1125					1		1	1		1		1							810	
30	14	4	56	784					1	1				1	1								560	
28	13	3	39	507							1	1								1			481	
26	12	7	84	1008						1	2	1		1						1	1		948	
24	11	12	132	1452				1	1	1	5	3								1			1232	
22	10	7	70	700	1				1	1	1	1	2										570	
20	9	16	144	1296	1			1	4	6				4									1170	
18	8	14	112	896		1		1	2	1		2	2	1	2	1						1	1064	
16	7	8	56	392			1	2	1	2	1										1		420	
14	6	8	48	288			1	2	2	1		1					1						342	
12	5	5	25	125			1	1	1		2												130	
10	4	2	8	32			1			1													48	
8	3	1	3	9			1																9	
6	2	0	0	0																			0	
4	1	0	0	0																			0	
2	0	1	0	0			1																0	

$Ef(a_{xy}) = 8720$

$r = .390$

97
 925
 9877

