

4-1-1961

# A continuation of the study of the effect of contact lenses, spectacle prescriptions, and unaided vision on the horizontal motion and form fields

Peter McC Towne  
*Pacific University*

Earl P. Schmitt  
*Pacific University*

---

## Recommended Citation

Towne, Peter McC and Schmitt, Earl P., "A continuation of the study of the effect of contact lenses, spectacle prescriptions, and unaided vision on the horizontal motion and form fields" (1961). *College of Optometry*. 229.  
<https://commons.pacificu.edu/opt/229>

This Thesis is brought to you for free and open access by the Theses, Dissertations and Capstone Projects at CommonKnowledge. It has been accepted for inclusion in College of Optometry by an authorized administrator of CommonKnowledge. For more information, please contact [CommonKnowledge@pacificu.edu](mailto:CommonKnowledge@pacificu.edu).

---

A continuation of the study of the effect of contact lenses, spectacle prescriptions, and unaided vision on the horizontal motion and form fields

**Abstract**

A continuation of the study of the effect of contact lenses, spectacle prescriptions, and unaided vision on the horizontal motion and form fields

**Degree Type**

Thesis

**Rights**

Terms of use for work posted in CommonKnowledge.

---

### Copyright and terms of use

If you have downloaded this document directly from the web or from CommonKnowledge, see the “Rights” section on the previous page for the terms of use.

**If you have received this document through an interlibrary loan/document delivery service, the following terms of use apply:**

Copyright in this work is held by the author(s). You may download or print any portion of this document for personal use only, or for any use that is allowed by fair use (Title 17, §107 U.S.C.). Except for personal or fair use, you or your borrowing library may not reproduce, remix, republish, post, transmit, or distribute this document, or any portion thereof, without the permission of the copyright owner. [Note: If this document is licensed under a Creative Commons license (see “Rights” on the previous page) which allows broader usage rights, your use is governed by the terms of that license.]

Inquiries regarding further use of these materials should be addressed to: CommonKnowledge Rights, Pacific University Library, 2043 College Way, Forest Grove, OR 97116, (503) 352-7209. Email inquiries may be directed to: [copyright@pacificu.edu](mailto:copyright@pacificu.edu)

A CONTINUATION OF THE STUDY  
OF THE EFFECT OF CONTACT LENSES,  
SPECTACLE PRESCRIPTIONS, AND UNAIDED VISION  
ON THE HORIZONTAL MOTION AND FORM FIELDS

CLINIC YEAR THESIS  
SPRING, 1961

Submitted by  
Peter McC. Towne and Earl P. Schmitt

## ACKNOWLEDGEMENTS

We wish to express our appreciation to Dr. George Edworthy and Dr. Robert Franz who completed an original work in this area during their clinic year<sup>1</sup>, and from whom we obtained much of the data for this study.

Gratitude is owed to Dr. Detleff T. Jans, professor in charge of visual fields, under whose direction this thesis was completed, and to Dr. Donald C. West, professor in charge of contact lenses. Thanks are also extended to the many clinicians and patients in the contact lens clinic for their cooperation during the accumulation of data for this thesis.

E P S

P M T

## INDEX

Introduction	1
Problem	2
Apparatus	3
Procedure	4
Organization of Data	6
Key to Data in Table I	7
Table I: Data	8
Results of Statistical Analysis	11
Graphical Presentation of Statistical Analysis	12
Supplementary Studies	13
Graphical Presentation of Supplementary Study of the Very Low and Medium Myopic Subjects	15
Discussion	16
Conclusions	19
References	21
Appendix	22

## INTRODUCTION

The late Dr. Theodore Brombach, under the sponsorship of the National Eye Research Foundation, undertook a study of the effect of contact lenses on the peripheral form and motion fields in the horizontal meridian as compared to the form and motion fields through conventional spectacle lenses. Much of the data used by Dr. Brombach was obtained through the cooperation of the Pacific University College of Optometry contact lens clinic and visual fields laboratory.

Using the same data supplied to Dr. Brombach, George Edworthy and Robert Franz made an independent study of the "Effect of Contact Lenses, Spectacle Prescription, and Unaided Vision on the Horizontal Motion and Form Fields" for their clinic year thesis. This present work is a continuation of that study in which the data of Edworthy and Franz was incorporated with our own so as to obtain a greater number of cases from which to draw conclusions.

Since the inception of this work, the optometric profession has suffered a profound loss with the passing of Dr. Brombach. It is to his memory, therefore, that the authors dedicate this project.

## PROBLEM

The central problem of this thesis was to compare the form and motion fields in the horizontal meridian when taken through spectacle lenses, contact lenses, and with unaided vision. In order that as large a sampling as possible could be used, the Edworthy-Franz<sup>2</sup> data was added to that obtained during the present investigation for the final statistical evaluation.

As secondary points of interest, brief studies were made in the following categories:

1. The age of patients who were fitted with contact lenses in the clinic.
2. The sex of these patients.
3. The refractive status of the patients who were fitted. The classification of the refractive status was based upon that of Irvin Borish.<sup>3</sup>
4. A comparison of relative field changes in the O. D. temporal and motion fields of the very low and medium myopic subjects.



## APPARATUS

1 - Standard Brombach perimeter mounted on an adjustable table with seven foot candles of illumination on the perimeter arc.

1 - Stool, adjustable in height.

1 - Target, white, round, 5 mm diameter.

1 - Occluder.

Recording charts as needed.

## PROCEDURE

A separate data sheet was used for each subject.\* Prior to any testing procedure, the patient's name, age, sex, and occupation were recorded. Information pertinent to the following areas was also noted: unaided visual acuity; contact lens prescription; visual acuity through the contact lenses; how long the contact lenses had been worn by the patient; the daily wearing time for the lenses (a minimum of eight hours continuous wearing time was desired); how long the lenses had been in place at the time of testing; the spectacle prescription; and the visual acuity through the spectacle lenses.

The patient was next seated in front of a standard Brombach perimeter, and was properly positioned in the instrument. Form and motion fields were then determined for each eye in the clinically accepted manner. No attempt was made to ritualize the examination procedure. The left eye was tested initially as often as the right. In most instances, the subjects were first examined while wearing their contact lenses. An effort was made to randomize the subsequent testing between the fields through spectacle lenses and the fields with unaided vision in an effort to negate a possible learning situation.

The technique used for the motion fields was that of bringing a vertically oscillating five millimeter white target in from the periphery to

---

\*See Appendix

the point of first recognition of a moving object. Fixation was maintained on the central target at all times, and the non-fixing eye was occluded. A random initial test of nasal and temporal fields was used. When the patient observed the moving target in the periphery he tapped lightly on the table, and the angular measurement was noted on the record form. After the motion field for that eye was determined under a given testing condition, the form field was obtained. The angular measurement of the form field was obtained by bringing the same five millimeter target in from the invisible periphery to the visible, the patient tapping when he recognized a round white object. This value was then recorded in the appropriate place on the data sheet. Fields for the other eye were then obtained in like manner.

## ORGANIZATION OF DATA

The following section includes the data gathered from a total of seventy-nine clinic subjects. The first thirty of these subjects, as recorded in Table I, were examined by the authors. An example of the data sheet used may be found in the appendix. The remaining cases represent those subjects previously tested by Drs. Edworthy and Franz.

When incorporating the Edworthy-Franz data, one case (their number 20) was found to be incomplete in that no motion or form fields were recorded through spectacle lenses. To facilitate statistical procedures, this single case was dropped from the total data used by the authors.

The data incorporated in Table I has been coded. The key to this coding appears on the following page.

The formulae used for the statistical evaluation in this project will be found on page 11 entitled "Results of Statistical Analysis".

## KEY TO DATA IN TABLE I, PAGE 8

- Column Nr:      0. Case Number  
                   1. Sex  
                   2. Age  
                   3. OS Sphere Power, Spectacles (minus cylinder form)  
                   4. OD Sphere Power, Spectacles (minus cylinder form)
- Visual Acuities
5. OS with Contact Lenses  
                   6. OD with Contact Lenses  
                   7. OS with Spectacle Lenses  
                   8. OD with Spectacle Lenses  
                   9. OS Unaided  
                  10. OD Unaided
- Motion Field with Contact Lenses
11. OS Temporal  
                  12. OS Nasal  
                  13. OD Nasal  
                  14. OD Temporal
- Motion Field with Spectacle Lenses
15. OS Temporal  
                  16. OS Nasal  
                  17. OD Nasal  
                  18. OD Temporal
- Motion Field Unaided
19. OS Temporal  
                  20. OS Nasal  
                  21. OD Nasal  
                  22. OD Temporal
- Form Field with Contact Lenses
23. OS Temporal  
                  24. OS Nasal  
                  25. OD Nasal  
                  26. OD Temporal
- Form Field with Spectacle Lenses
27. OS Temporal  
                  28. OS Nasal  
                  29. OD Nasal  
                  30. OD Temporal
- Form Field Unaided
31. OS Temporal  
                  32. OS Nasal  
                  33. OD Nasal  
                  34. OD Temporal

TABLE I

## DATA

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
1	F	24	-1.37	-1.12	20	20	40	30	200	200	97	62	62	90	92	60	50	91	92	62	62	92	90	57	60	87	89	59	48	85	87	60	59	90
2	F	21	plano	4.50	20	60	20	80	20	400	95	55	64	90	94	55	55	91	97	61	60	97	93	51	60	84	84	53	50	90	86	60	56	87
3	M	24	- .50	- .50	15	15	20	20	80	80	95	61	62	96	96	63	60	94	95	64	64	94	84	60	58	86	87	59	58	84	85	59	59	85
4	F	21	-3.50	-4.12	20	20	20	20	400	400	95	59	55	91	91	63	60	89	95	62	58	94	87	50	49	85	85	59	61	87	82	57	53	89
5	F	15	-1.00	-1.50	15	15	20	20	25	100	95	55	52	94	94	52	49	94	93	55	55	94	90	50	51	90	91	51	50	89	91	47	51	90
6	M	27	-5.50	-5.00	15	15	20	20	300	300	92	65	62	93	93	66	68	95	94	60	62	97	90	61	58	90	89	62	60	91	90	56	60	95
7	M	21	- .50	- .50	15	15	15	15	30	25	98	65	60	99	91	59	57	95	96	69	60	95	90	58	54	89	85	54	54	89	89	54	54	87
8	M	13	-4.25	-3.50	20	15	30	30	500	400	90	62	58	98	92	51	58	94	87	56	60	94	85	58	55	90	91	50	55	90	86	54	59	93
9	F	17	-4.00	-4.25	15	15	30	30	400	400	96	56	56	96	90	61	55	94	95	60	55	93	83	51	55	89	81	52	49	87	89	52	53	89
10	M	20	-1.75	-1.75	15	15	15	15	100	100	91	63	58	93	92	58	56	90	88	56	56	92	89	59	53	87	85	54	50	79	84	49	50	86
11	M	18	-2.25	-1.50	15	15	15	15	200	80	93	53	53	94	94	52	42	94	95	53	52	92	95	50	52	93	90	50	40	90	91	52	50	90
12	M	19	-6.50	-6.25	20	20	30	30	300	300	87	56	42	78	87	58	48	85	88	52	52	62	82	50	35	65	80	52	42	78	83	50	44	55
13	F	15	-8.25	-8.00	15	15	40	40	400	400	86	56	51	91	87	61	55	86	83	51	51	80	84	53	50	86	81	57	50	84	80	46	42	76
14	F	20	-3.75	-4.00	15	15	20	20	300	300	82	52	56	86	86	61	62	89	90	60	60	90	77	49	54	84	80	58	60	85	87	58	57	87
15	M	19	-2.50	-3.00	15	15	20	20	200	200	95	58	56	91	91	64	60	91	90	61	58	91	86	56	54	80	87	62	54	90	89	58	57	89
16	F	20	-2.75	-1.75	20	20	20	20	200	200	97	60	56	96	91	51	50	93	89	55	50	86	90	55	54	86	85	47	48	76	85	48	45	75
17	M	23	/.50	/.75	15	15	15	15	15	15	95	55	48	94	95	50	46	94	98	56	53	93	90	50	45	85	85	46	41	88	86	46	50	87
18	M	35	-8.50	-8.75	15	15	20	20	300	300	81	54	53	86	89	62	67	88	85	54	53	85	71	47	50	83	86	58	64	85	82	52	50	83
19	F	15	-3.00	-3.00	15	15	80	60	300	300	91	60	56	90	91	64	57	88	89	60	60	90	86	60	56	85	87	59	55	86	87	57	56	86
20	M	18	-4.00	-3.50	15	15	20	20	100	100	92	60	60	93	91	64	65	93	91	60	58	93	85	56	55	85	87	60	62	89	87	56	56	90
21	F	16	-2.00	-2.75	15	15	15	25	200	200	94	58	60	92	90	61	55	92	92	59	53	91	89	55	56	90	87	58	51	89	89	54	50	86
22	M	19	-6.75	-9.00	15	15	20	20	300	300	83	66	44	91	93	68	52	91	81	60	52	90	80	60	38	83	87	62	50	89	75	58	46	86
23	M	17	-1.00	-1.00	15	15	15	15	40	40	93	53	53	87	80	51	55	92	89	56	54	91	86	48	50	85	86	49	52	87	84	53	51	87
24	M	30	-1.00	- .50	15	15	15	15	60	60	89	60	55	89	85	54	54	96	84	62	56	90	85	53	51	85	82	50	51	93	81	58	51	86
25	M	25	- .50	-1.00	15	15	15	15	40	80	91	55	60	94	91	53	52	93	91	56	56	92	86	53	58	89	85	50	51	91	87	50	54	88

TABLE I (cont.)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	
26	F	22	-1.25	-	.50	15	15	30	25	100	100	96	62	58	94	96	60	60	95	96	60	58	95	91	61	53	91	92	58	56	91	92	58	55	91	
27	F	19	-3.75	-3.75		20	20	30	25	400	400	93	55	56	95	90	70	59	91	92	62	56	94	86	53	54	90	88	64	52	83	89	58	55	88	
28	M	25	-	.50	-	.50	15	15	15	15	15	96	62	63	96	97	62	63	95	97	62	65	95	91	60	60	93	96	60	60	94	95	60	62	93	
29	M	18	-2.37	-3.00		15	15	20	20	200	200	90	55	53	89	88	56	55	95	85	56	51	87	84	50	48	85	85	53	50	91	80	51	47	81	
30	F	23	-4.75	-4.75		15	15	15	15	200	200	87	56	62	91	88	60	66	92	87	56	59	89	81	52	58	85	84	54	61	88	85	54	54	86	
31	F	22	-1.25	-1.50		15	20	20	20	300	300	88	60	55	89	86	49	52	87	86	55	57	85	84	58	48	84	80	46	45	83	81	50	50	77	
32	F	18	-2.75	-2.50		15	15	15	15	100	100	85	56	56	89	87	61	54	80	85	59	56	85	81	55	42	81	84	59	43	58	79	57	54	84	
33	M	24	-5.00	-5.50		15	15	20	20	400	400	87	51	46	89	81	56	53	82	82	52	47	78	70	46	39	71	56	47	46	55	51	42	37	59	
34	M	20	-1.50	-1.25		25	30	20	20	100	200	87	55	47	84	84	59	50	86	84	56	56	85	65	54	42	72	68	51	48	60	68	49	54	67	
35	M	26	-1.50	-1.25		15	15	20	20	70	80	87	56	52	87	88	56	54	88	90	57	55	87	73	49	39	76	76	48	45	80	82	53	52	82	
36	F	16	-5.50	-4.50		20	20	20	20	300	300	91	57	57	91	85	65	52	86	89	58	57	87	82	51	55	81	80	60	50	78	80	52	52	80	
37	M	40	-	.75	-	.75	15	15	15	40	40	87	60	63	89	90	62	57	87	90	62	57	87	76	57	54	72	84	60	54	80	82	57	50	84	
38	F	18	<del>4.25</del>	<del>4.00</del>		15	15	15	15	40	30	93	66	54	95	94	53	52	95	95	62	59	95	86	57	45	90	85	51	46	86	89	57	53	88	
39	M	36	-3.00	-2.75		20	20	15	15	200	200	85	55	50	85	83	50	61	85	82	54	54	75	35	25	44	30	50	36	31	48	32	25	27	40	
40	F	18	-2.00	-2.00		15	15	60	60	200	200	91	62	57	89	91	55	56	92	91	68	62	92	75	53	53	66	76	51	53	76	71	56	52	80	
41	M	24	-	.25	plano	20	20	20	20	40	30	90	58	52	92	90	62	49	90	90	56	55	90	84	52	48	82	78	49	45	78	73	47	47	73	
42	M	18	-2.25	-2.75		20	15	15	15	200	200	90	54	58	89	89	56	52	88	91	54	53	88	86	51	51	85	82	52	48	80	86	51	48	83	
43	M	20	-2.50	-2.50		15	15	20	20	400	400	91	56	55	89	87	56	60	89	85	56	57	88	82	51	52	75	83	51	53	82	77	52	53	74	
44	M	24	-	.75	-	.75	15	15	20	20	50	50	93	58	51	89	87	50	49	90	88	56	47	90	70	48	42	75	71	45	41	76	75	47	43	70
45	M	16	-	.75	-	.50	20	20	40	40	60	60	90	49	53	87	91	53	51	87	94	50	51	92	67	44	45	62	74	40	40	67	67	41	41	69
46	F	19	-3.00	-3.50		20	20	15	15	150	150	74	50	45	85	76	48	52	80	81	50	47	78	46	34	40	74	50	38	36	58	45	32	28	39	
47	F	23	-2.50	-3.00		15	15	15	15	200	200	93	61	53	89	91	61	58	85	90	59	55	91	80	53	49	81	86	57	51	80	87	55	50	87	
48	M	41	-2.00	-2.00		15	15	15	15	200	200	87	59	52	88	91	60	53	88	92	58	51	89	82	56	48	83	89	56	48	83	86	55	48	86	
49	M	23	-4.50	-4.25		10	10	15	15	400	400	95	56	59	95	89	56	64	87	90	57	59	92	89	50	54	90	75	53	59	74	81	53	50	87	
50	F	43	<del>2.25</del>	<del>2.25</del>		15	15	15	15	20	30	92	54	60	92	92	56	59	92	91	54	52	91	80	48	54	78	72	48	51	75	68	49	46	64	
51	M	23	-4.00	-3.75		15	15	20	20	200	200	88	58	57	92	90	54	53	89	89	56	52	88	74	48	49	78	72	42	43	70	78	46	44	75	
52	F	31	<del>.75</del>	<del>.75</del>		20	15	20	20	80	80	85	63	63	92	87	59	57	88	90	61	63	89	75	55	55	80	82	53	54	85	82	54	58	82	

TABLE I (cont.)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	
26	F	22	-1.25	-	.50	15	15	30	25	100	100	96	62	58	94	96	60	60	95	96	60	58	95	91	61	53	91	92	58	56	91	92	58	55	91			
27	F	19	-3.75	-3.75		20	20	30	25	400	400	93	55	56	95	90	70	59	91	92	62	56	94	86	53	54	90	88	64	52	83	89	58	55	88			
28	M	25	-	.50	-	.50	15	15	15	15	15	96	62	63	96	97	62	63	95	97	62	65	95	91	60	60	93	96	60	60	94	95	60	62	93			
29	M	18	-2.37	-3.00		15	15	20	20	200	200	90	55	53	89	88	56	55	95	85	56	51	87	84	50	48	85	85	53	50	91	80	51	47	81			
30	F	23	-4.75	-4.75		15	15	15	15	200	200	87	56	62	91	88	60	66	92	87	56	59	89	81	52	58	85	84	54	61	88	85	54	54	86			
31	F	22	-1.25	-1.50		15	20	20	20	300	300	88	60	55	89	86	49	52	87	86	55	57	85	84	58	48	84	80	46	45	83	81	50	50	77			
32	F	18	-2.75	-2.50		15	15	15	15	100	100	85	56	56	89	87	61	54	80	85	59	56	85	81	55	42	81	84	59	43	58	79	57	54	84			
33	M	24	-5.00	-5.50		15	15	20	20	400	400	87	51	46	89	81	56	53	82	82	52	47	78	70	46	39	71	56	47	46	55	51	42	37	59			
34	M	20	-1.50	-1.25		25	30	20	20	100	200	87	55	47	84	84	59	50	86	84	56	56	85	65	54	42	72	68	51	48	60	68	49	54	67			
35	M	26	-1.50	-1.25		15	15	20	20	70	80	87	56	52	87	88	56	54	88	90	57	55	87	73	49	39	76	76	48	45	80	82	53	52	82			
36	F	16	-5.50	-4.50		20	20	20	20	300	300	91	57	57	91	85	65	52	86	89	58	57	87	82	51	55	81	80	60	50	78	80	52	52	80			
37	M	40	-	.75	-	.75	15	15	15	15	40	40	87	60	63	89	90	62	57	87	90	62	57	87	76	57	54	72	84	60	54	80	82	57	50	84		
38	F	18	4.25	4.00		15	15	15	15	40	30	93	66	54	95	94	53	52	95	95	62	59	95	86	57	45	90	85	51	46	86	89	57	53	88			
39	M	36	-3.00	-2.75		20	20	15	15	200	200	85	55	50	85	83	50	61	85	82	54	54	75	35	25	44	30	50	36	31	48	32	25	27	40			
40	F	18	-2.00	-2.00		15	15	60	60	200	200	91	62	57	89	91	55	56	92	91	68	62	92	75	53	53	66	76	51	53	76	71	56	52	80			
41	M	24	-	.25	plano	20	20	20	20	40	30	90	58	52	92	90	62	49	90	90	56	55	90	84	52	48	82	78	49	45	78	73	47	47	73			
42	M	18	-2.25	-2.75		20	15	15	15	200	200	90	54	58	89	89	56	52	88	91	54	53	88	86	51	51	85	82	52	48	80	86	51	48	83			
43	M	20	-2.50	-2.50		15	15	20	20	400	400	91	56	55	89	87	56	60	89	85	56	57	88	82	51	52	75	83	51	53	82	77	52	53	74			
44	M	24	-	.75	-	.75	15	15	20	20	50	50	93	58	51	89	87	50	49	90	88	56	47	90	70	48	42	75	71	45	41	76	75	47	43	70		
45	M	16	-	.75	-	.50	20	20	40	40	60	60	90	49	53	87	91	53	51	87	94	50	51	92	67	44	45	62	74	40	40	67	67	41	41	69		
46	F	19	-3.00	-3.50		20	20	15	15	150	150	74	50	45	85	76	48	52	80	81	50	47	78	46	34	40	74	50	38	36	58	45	32	28	39			
47	F	23	-2.50	-3.00		15	15	15	15	200	200	93	61	53	89	91	61	58	85	90	59	55	91	80	53	49	81	86	57	51	80	87	55	50	87			
48	M	41	-2.00	-2.00		15	15	15	15	200	200	87	59	52	88	91	60	53	88	92	58	51	89	82	56	48	83	89	56	48	83	86	55	48	86			
49	M	23	-4.50	-4.25		10	10	15	15	400	400	95	56	59	95	89	56	64	87	90	57	59	92	89	50	54	90	75	53	59	74	81	53	50	87			
50	F	43	2.25	2.25		15	15	15	15	20	30	92	54	60	92	92	56	59	92	91	54	52	91	80	48	54	78	72	48	51	75	68	49	46	64			
51	M	23	-4.00	-3.75		15	15	20	20	200	200	88	58	57	92	90	54	53	89	89	56	52	88	74	48	49	78	72	42	43	70	78	46	44	75			
52	F	31	0.75	0.75		20	15	20	20	80	80	85	63	63	92	87	59	57	88	90	61	63	89	75	55	55	80	82	53	54	85	82	54	58	82			



TABLE I (cont.)

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
53	F	20	-2.75	-3.25	40	25	20	20	200	200	90	52	55	89	90	48	56	86	90	50	55	88	78	46	48	73	80	46	54	78	82	47	52	81
54	M	29	-.50	-.50	15	15	15	15	20	20	90	51	58	94	90	50	60	88	90	43	55	90	82	47	54	90	80	46	52	85	82	40	42	88
55	M	31	-1.00	-1.00	15	15	20	20	40	40	92	60	54	84	92	55	53	85	93	56	56	90	64	50	41	48	75	48	46	60	78	50	50	65
56	M	30	-3.50	-3.25	20	20	20	40	200	200	94	58	58	93	90	55	61	90	89	66	58	89	84	54	53	88	85	52	57	85	84	63	55	86
57	M	14	-6.00	-6.00	15	15	40	40	400	400	90	55	58	90	89	56	57	82	87	50	52	78	80	44	51	75	81	51	52	75	73	44	43	68
58	F	20	-3.25	-4.12	15	15	15	20	400	400	90	61	58	92	90	58	60	92	90	62	60	90	81	56	50	78	81	54	56	78	80	59	56	81
59	M	21	-9.25	-9.50	15	15	25	20	400	400	83	50	51	82	75	47	53	76	80	50	48	80	70	47	45	76	68	44	48	67	67	42	43	73
60	F	17	-.87	-1.00	20	20	20	20	100	100	90	60	50	90	90	56	56	90	90	56	60	90	50	38	38	60	53	35	32	58	57	38	30	46
61	M	18	-1.75	-2.50	25	20	20	20	80	200	88	60	41	84	91	60	56	83	87	59	57	88	84	51	28	76	79	45	50	71	83	50	48	77
62	M	18	-1.50	-1.50	20	20	20	20	60	60	94	57	53	92	94	55	55	94	94	52	54	90	50	41	28	65	64	47	43	56	50	38	32	45
63	M	27	5.75	6.25	15	15	15	15	25	25	92	60	60	94	94	45	43	93	93	59	52	92	84	54	56	86	85	43	40	87	79	50	50	76
64	F	17	-2.50	-1.75	20	20	20	20	100	80	92	65	64	92	90	50	60	92	90	60	65	90	85	59	59	87	80	48	58	84	85	48	60	80
65	F	21	-3.37	-4.37	15	15	15	15	200	200	88	60	55	86	86	59	63	85	82	60	57	82	64	38	30	58	62	42	53	62	65	45	43	60
66	M	27	-2.25	-3.25	15	15	20	20	200	200	90	60	55	90	85	60	54	90	90	60	60	90	60	30	30	55	42	35	32	57	47	32	32	55
67	M	31	-4.50	-4.50	15	15	20	20	300	300	85	51	52	85	87	55	55	87	87	48	50	85	70	38	34	64	68	41	42	72	72	40	43	72
68	F	20	-6.25	-5.25	20	20	20	20	400	400	90	50	56	80	88	54	52	84	86	50	45	84	72	42	46	60	70	44	40	62	70	35	40	55
69	F	43	-4.37	-4.25	15	15	20	20	200	200	93	60	54	92	90	60	58	92	90	55	54	92	87	58	48	85	75	55	55	75	75	50	48	85
70	F	17	-2.62	-2.62	20	20	20	20	100	100	95	60	55	92	90	65	60	87	90	58	58	90	50	50	25	30	44	34	20	35	35	30	25	45
71	M	40	-2.87	-2.50	20	20	15	15	200	200	90	55	50	93	90	60	60	90	93	67	58	92	30	12	18	20	15	10	15	15	18	18	15	20
72	M	27	-.25	-.50	15	15	15	15	25	25	93	60	57	88	87	53	53	90	92	60	57	91	89	57	55	83	85	51	48	86	86	57	55	89
73	M	26	-3.50	-5.00	15	15	20	20	400	400	90	52	55	90	87	55	55	90	88	52	52	92	75	48	38	60	60	38	38	62	35	33	32	42
74	M	18	-1.75	-2.25	15	15	15	15	80	80	92	57	57	92	92	56	55	90	90	54	56	88	85	54	52	84	78	49	50	82	80	40	47	72
75	M	27	-4.00	-4.00	15	15	15	15	200	200	89	58	62	89	88	62	60	90	86	54	58	88	80	52	44	78	68	47	47	62	67	42	40	59
76	M	34	-7.00	-7.00	15	15	20	20	400	400	86	50	53	92	84	55	52	85	84	50	54	83	78	42	45	76	81	54	45	84	76	45	49	80
77	M	22	-1.00	-.25	15	15	15	15	60	60	93	57	55	94	90	54	53	92	90	56	53	92	75	46	45	74	66	47	43	75	73	45	44	76
78	M	15	-3.00	-2.50	20	20	15	15	200	200	94	54	55	91	94	60	50	94	95	56	54	92	82	48	47	80	83	50	45	83	80	45	49	84
79	M	19	-2.75	-3.00	20	20	20	20	80	80	95	52	56	92	90	55	57	90	92	52	55	92	88	51	54	86	85	50	54	87	90	51	48	86

## RESULTS OF STATISTICAL ANALYSIS

1. A statistical evaluation on the basis of ungrouped data was undertaken. In the statistical workup, the following formulae were used:

a) Arithmetic Mean: 
$$\frac{\sum X}{N}$$

b) Standard Deviation: 
$$\sqrt{\frac{\sum X^2}{N} - \left(\frac{\sum X}{N}\right)^2}$$

2. The results of the computations were as follows:

	MOTION FIELD	FORM FIELD
a) Contact Lenses		
OS Temporal	90.53 sd 4.17	78.54 sd 8.86
OS Nasal	57.32 sd 4.11	50.30 sd 8.10
OD Nasal	55.27 sd 4.84	48.03 sd 8.73
OD Temporal	90.44 sd 3.84	77.80 sd 14.02
b) Spectacle Lenses		
OS Temporal	89.46 sd 3.82	77.63 sd 13.15
OS Nasal	57.03 sd 5.11	50.11 sd 8.26
OD Nasal	55.65 sd 5.02	48.48 sd 9.25
OD Temporal	89.47 sd 4.03	77.38 sd 13.89
c) Unaided Vision		
OS Temporal	89.58 sd 4.08	76.99 sd 14.22
OS Nasal	56.97 sd 2.82	49.14 sd 8.60
OD Nasal	55.62 sd 4.16	48.03 sd 8.81
OD Temporal	88.96 sd 5.37	76.67 sd 15.12

3. The statistical results are graphically portrayed on Charts IA and IB on page 12.

GRAPHICAL REPRESENTATION OF MOTION AND FORM FIELD MEANS

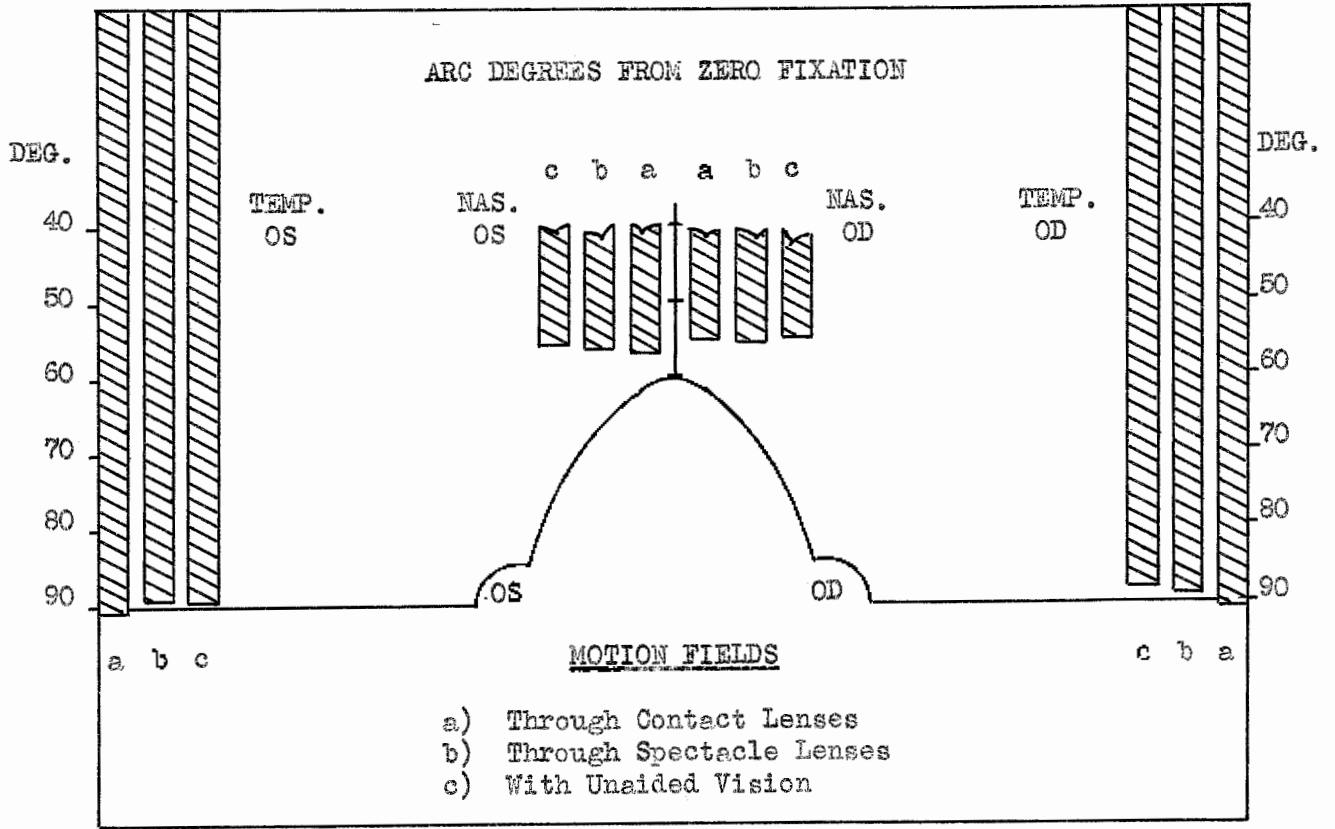


CHART I-A

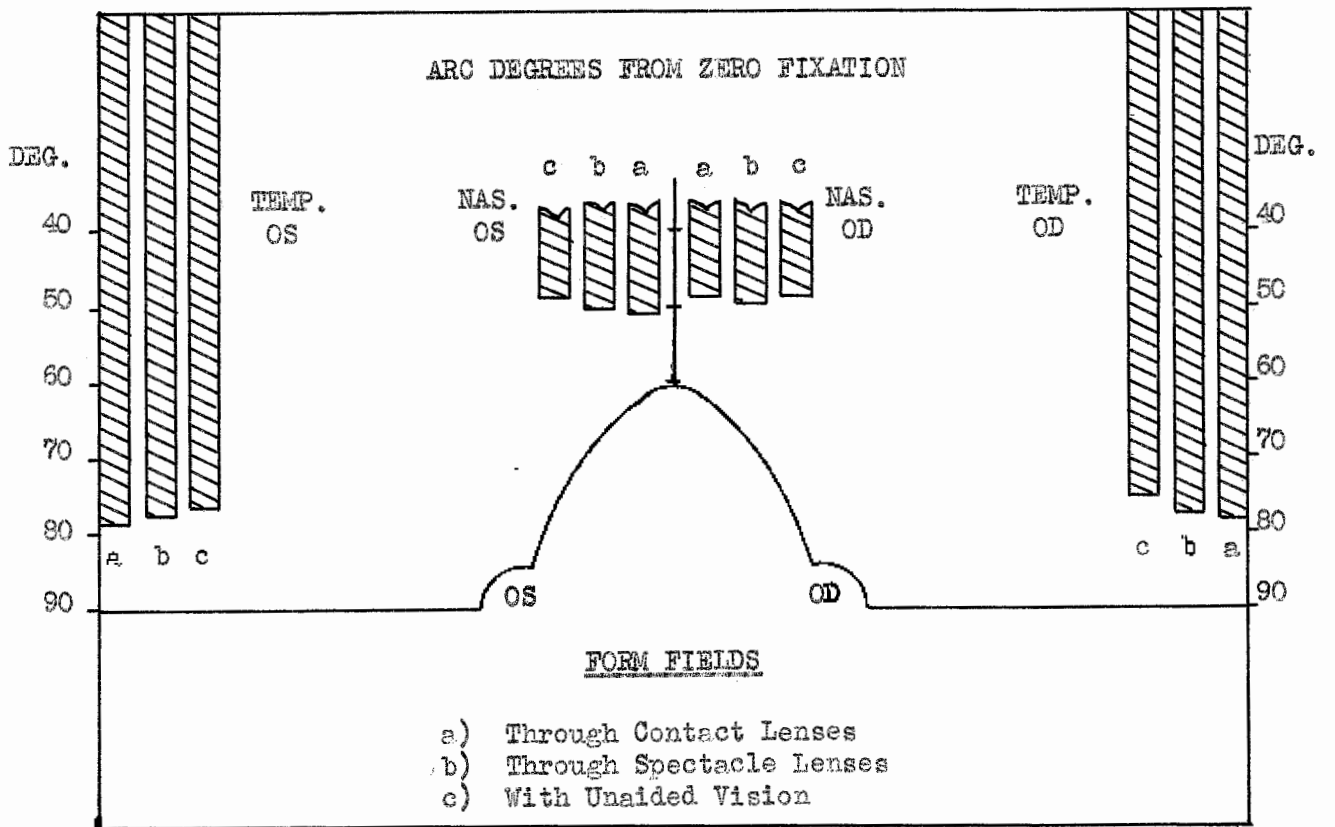


CHART I-B

## SUPPLEMENTARY STUDIES

Supplementary studies of the age groups, the sex, and the refractive status of the test subjects were made. The following is a tabulation of the results of these studies.

1.	Age Group	Frequency
	10 - 15	7
	16 - 20	31
	21 - 25	20
	26 - 30	9
	31 - up	12

2.	Sex	Frequency
	Male	49
	Female	30

3. The classification of the refractive status as given by Irvin M. Borish<sup>4</sup> was used, and the number of cases falling into this classification is as follows:

	Classification	Frequency
a) Hyperopia	Low ( $\nearrow$ .25 to $\nearrow$ 3.00)	3
	Medium ( $\nearrow$ 3.00 to $\nearrow$ 5.00)	2
	High ( $\nearrow$ 5.00 on up)	1
b) Myopia	Very Low ( 0.00 to -1.00)	15
	Low (-1.00 to -3.00)	29
	Medium (-3.00 to -6.00)	22
	High (-6.00 to -10.00)	7
	Very High (-10.00 on up)	0

4. Two areas were arbitrarily selected by the authors to determine the advantages which might accrue to the higher refractive states within the classifications given above. Because this study was supplementary to the primary purpose of this project, the data was not worked up in its entirety but a sampling of the OD Temporal field of the very low and the medium myopes was undertaken. Results of the OD temporal motion and form fields of the very low and medium myopic subjects were as follows:

- a) Very Low (Case Numbers: 3, 7, 23, 24, 25, 28, 37, 41, 44, 45, 54, 55, 60, 72, 77)

	MOTION FIELD	FORM FIELD
1) Contact Lenses	91.20 sd 4.04	78.20 sd 13.68
2) Spectacle Lenses	90.93 sd 4.03	80.20 sd 10.92
3) Unaided Vision	91.27 sd 1.33	79.20 sd 11.12

- b) Medium (Case Numbers: 4, 6, 8, 9, 14, 20, 27, 30, 33, 36, 46, 47, 49, 51, 56, 57, 58, 65, 67, 69, 73, 75)

	MOTION FIELD	FORM FIELD
1) Contact Lenses	90.95 sd 1.85	79.95 sd 9.04
2) Spectacle Lenses	88.82 sd 4.44	76.64 sd 11.17
3) Unaided Vision	88.82 sd 5.67	77.14 sd 13.60

c) These statistical results are graphically portrayed on Charts IIA and IIB on page 15.

GRAPHICAL REPRESENTATION OF MOTION AND FORM FIELD MEANS OF VERY LOW AND MEDIUM MYOPIC SUBJECTS IN THE O.D. TEMPORAL HORIZONTAL MERIDIAN

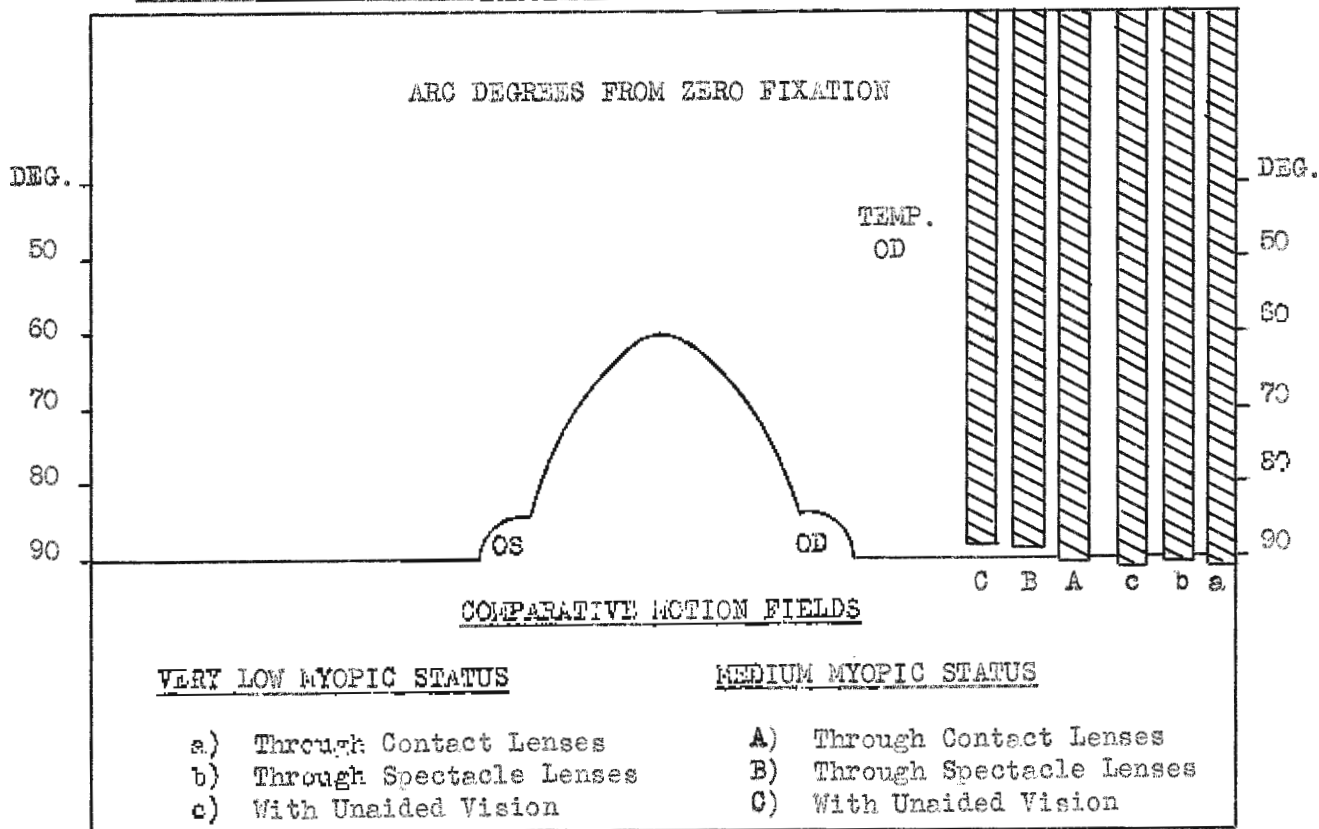


CHART II-A

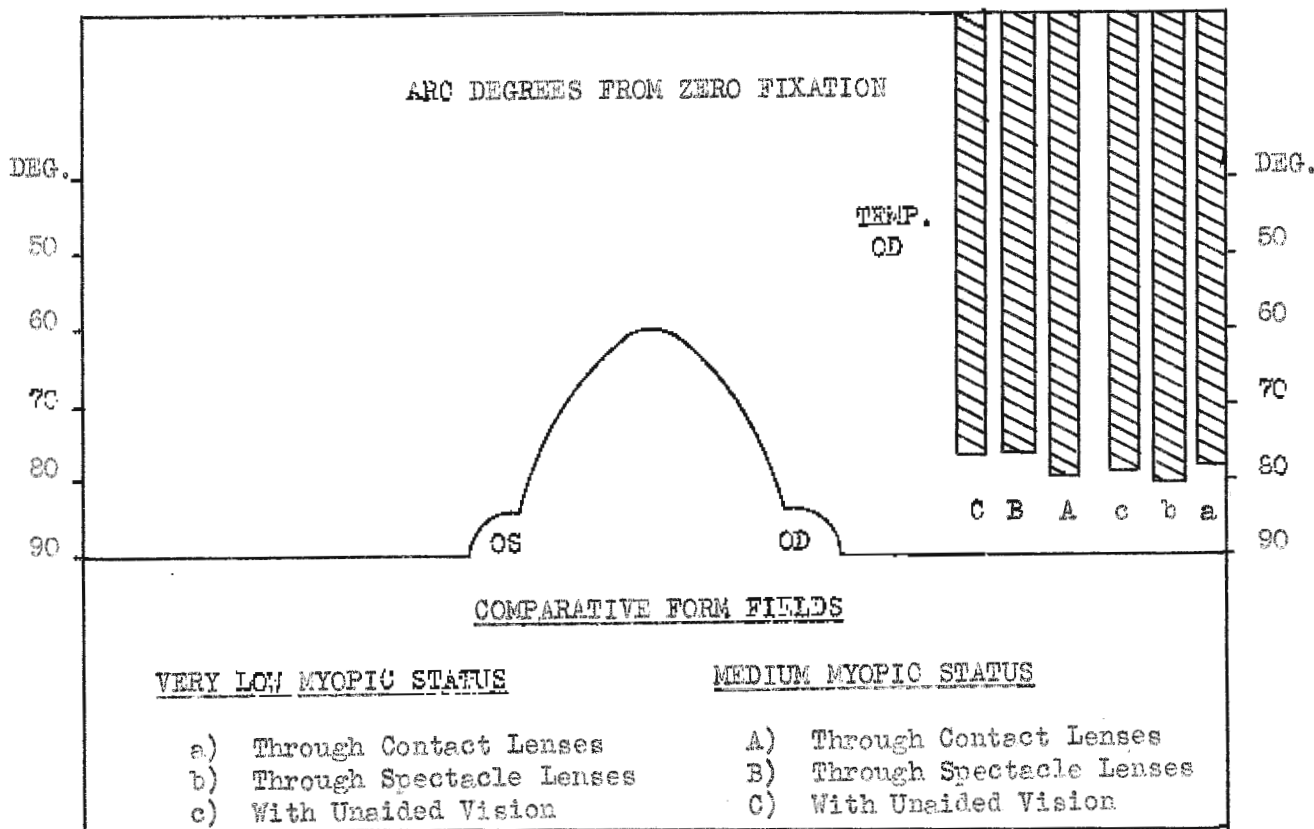


CHART II-B

## DISCUSSION

1. The formulae utilized for the computations were those commonly accepted for analysis of ungrouped data. The authors are aware that these formulae may place undue emphasis on extreme values, and hence may not give results which are absolutely typical of the data<sup>5</sup>.

2. A very slight increase of the temporal motion fields of both eyes through contact lenses was observed over the motion fields taken through spectacle lenses and with unaided vision.

3. There was a slight increase of the OS nasal motion field through the contact lenses as compared to the fields through the spectacle lenses and with unaided vision. Conversely, there was a slight decrease of the OD nasal motion field through contact lenses as compared with the same fields taken through spectacle lenses and with unaided vision.

4. A slight increase of the temporal form fields of both eyes through contact lenses was noted as compared with the temporal form fields taken through spectacle lenses and with unaided vision.

5. A slight increase of the OS nasal form field was observed over the same fields taken through spectacle lenses and with unaided vision. The OD indicated a small decrease of the nasal form field through contact lenses, as compared with the nasal form field taken through spectacle lenses. However, no change was recorded between the OD nasal form field through contact lenses and that taken with unaided vision.

6. By inspection, a comparison was made of the greatest increase in the motion and form fields through contact lenses and spectacle lenses. Similarly, the greatest decrease was also noted. The results are as follows:

- a) Greatest increase in motion field:  $9^{\circ}$  for case #32.
- b) Greatest increase in form field:  $16^{\circ}$  for cases #33, 46, 49.
- c) Greatest decrease in motion field:  $7^{\circ}$  for cases #12, 24.
- d) Greatest decrease in form field:  $13^{\circ}$  for case #12.

7. An arbitrary age grouping of the test subjects was made in five year intervals. The largest percentage of subjects tested fell in the sixteen-to-twenty year age group.

8. Of those subjects tested, the greater percentage were male.

9. The majority of those patients seeking contact lens therapy during the course of this project were found to have a refractive status of low to medium myopia. Of these, the low myopic refractive group predominated.

10. The OD temporal motion field of the very low myopic subjects was compared to the same field of the medium myopic subjects. Through contact lenses it was found that the medium myopic subjects showed a larger OD temporal field increase than did the very low myopic subjects.

11. The very low myopic subjects demonstrated a decrease in the OD temporal form field through the contact lenses. The medium myopic subjects, on the other hand, showed an increase in the OD temporal form field.



12. A natural corollary to this thesis would be a study of peripheral acuity as measured through contact lenses, spectacle lenses, and with unaided vision.

## CONCLUSIONS

1. Although the average horizontal form and motion fields through contact lenses were larger than the same fields taken through spectacle lenses and with unaided vision, this average increase was less than two degrees nasally and temporally in all instances.

2. Fields were usually taken through the contact lenses before those of the spectacle lenses or the unaided vision. A more randomized technique, wherein the contact lens fields were taken other than first, might produce slightly altered results than shown in this project.

3. Of the subjects tested, 64.6% were in the sixteen to twenty-five year old age groups.

4. Male subjects comprised 62.0% of those tested for this project.

5. A refractive status of from -1.00 to -6.00D comprised 64.6% of the subjects of this thesis. A status of greater than -6.00D was noted for 0.09% of the subjects. The number of hyperopic subjects equaled 0.08% of the total.

6. As shown above, the form and motion fields in the horizontal meridian through contact lenses averaged less than two degrees larger than those same fields taken through spectacle lenses and unaided vision. However, those subjects classed as medium myopes showed an average increase of three degrees in the OD temporal form and motion fields through contact lenses, as compared to the same fields taken through spectacle lenses and with unaided vision.

7. Supplementary studies showed that those patients of medium myopic refractive status enjoyed a greater relative increase in horizontal form and motion fields in the OD temporal meridian through contact lenses as compared to the same fields taken through spectacle lenses and with unaided vision than those subjects classed as very low myopic status.

## REFERENCES

1. Edworthy, George, and Robert Franz: A Study of the Effect of Contact Lenses, Spectacle Prescription, and Unaided Vision on the Horizontal Motion and Form Fields, unpublished clinic year thesis, Pacific University Library, 1960.
2. Ibid.
3. Borish, Irvin: Clinical Refraction, second edition, Professional Press, Chicago, Illinois, 1954, pp 24 & 36.
4. Ibid.
5. Arkin, Herbert, and Raymond Colton: Statistical Methods, Barnes and Noble, Inc., New York, 1950, pp 11 & 33.

## APPENDIX

NAME \_\_\_\_\_ CASE NO. \_\_\_\_\_ DATE \_\_\_\_\_

AGE \_\_\_\_\_ SEX \_\_\_\_\_ OCCUPATION \_\_\_\_\_ V.A. w/o Rx OD 20/  
OS 20/

WITH CONTACTS

Rx O.D. \_\_\_\_\_ V.A. 20/

O.S. \_\_\_\_\_ V.A. 20/

Patient has been wearing contacts for \_\_\_\_\_ months.

Patient wears contacts daily \_\_\_\_\_ hours.

Patient wore contacts \_\_\_\_\_ hours before fields.

	O.S.	MOTION	O.D.
Temp. _____	Nasal _____	FORM	Nasal _____ Temp. _____

Temp. _____	Nasal _____		Nasal _____ Temp. _____
-------------	-------------	--	-------------------------

WITHOUT CONTACTS

Rx O.D. \_\_\_\_\_ V.A. 20/

O.S. \_\_\_\_\_ V.A. 20/

	O.S.	MOTION	O.D.
Temp. _____	Nasal _____	FORM	Nasal _____ Temp. _____

Temp. _____	Nasal _____		Nasal _____ Temp. _____
-------------	-------------	--	-------------------------

WITHOUT Rx

	O.S.	MOTION	O.D.
Temp. _____	Nasal _____	FORM	Nasal _____ Temp. _____

Temp. _____	Nasal _____		Nasal _____ Temp. _____
-------------	-------------	--	-------------------------

CASE HISTORY: