Biographical Sketches

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ANDREW J. CROSS (1855-1925)

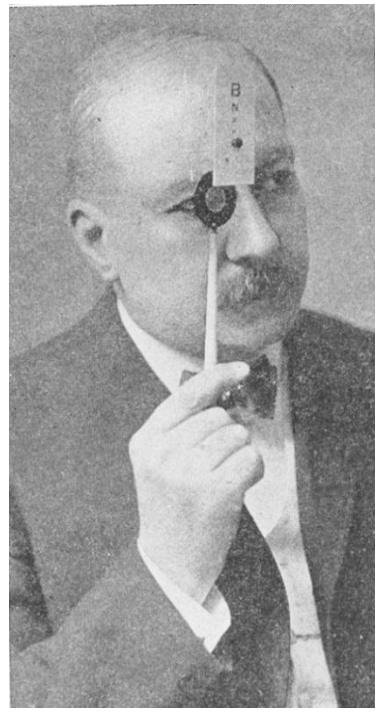


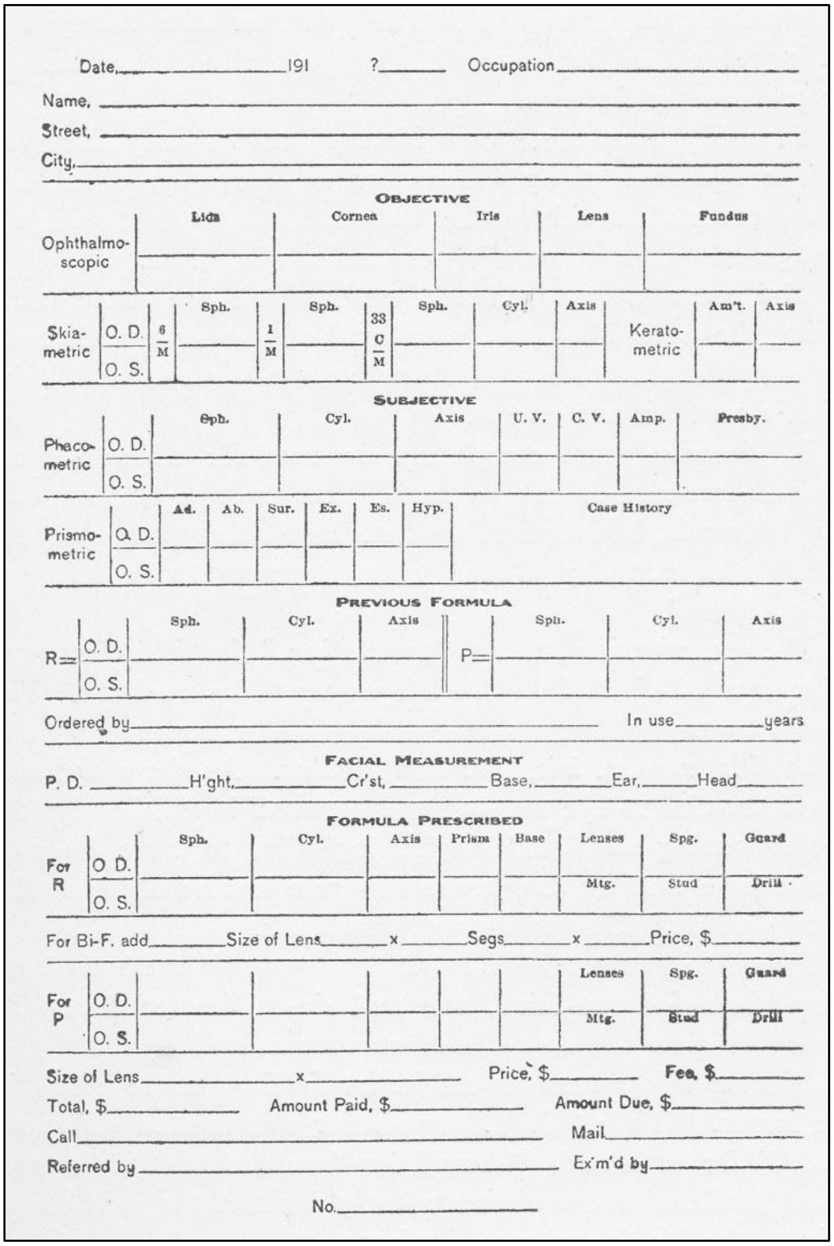
Figure 1. A.J. Cross and the mirror used for retinoscopy with an attachment he developed with a fixation target for dynamic retinoscopy. (from Cross AJ. A System of Ocular Skiametry. New York: Frederick Boger Publishing, 1903:41.)

A.J. Cross was born in Antwerp, New York in 1855 and started doing optometric work in Visalia, California in 1876.[1] After stops in several cities in the northwestern and then eastern United States, in 1889 he established an optometry practice in New York city. In 1898, Cross was elected president of the New York State Society of Optometrists. He was instrumental in the effort to establish an optometry licensure law in New York State. In the 1929 book *History of Optometry*, Arrington devoted a four page chapter to Cross in which he said that Cross "came to be known as the Grand Old Man of Optometry, - an appellation which he richly earned; for it will hardly be disputed that no single man gave of himself more fully and freely to the cause of optometry, and none had more valuable gifts to give."[1]

In 1900-1901, Cross was president of the American Association of Opticians, the organization that became the American Optometric Association.[2] He was an instructor in the optometry school at Columbia University from 1911 to 1924. He also worked on the invention of a monocentric bifocal lens.[1] To quote Arrington again, Cross "had a genius for expounding optical theories and facts in a way that made them simple to grasp, and study under him was a pleasure."[1]

A.J. Cross is probably best known as being the primary developer of early dynamic retinoscopy procedures. He wrote two books on retinoscopy. The first, *A System of Ocular Skiametry*, (181 pages) was published in 1903. In the preface, Cross acknowledged that ophthalmologists Edward Jackson and James Thorington cycloplegic had written useful monographs on retinoscopy, but "nearly all medical writers having, naturally, written from the standpoint of physicians, that 'the use of a reliable cycloplegic is always indicated,' it has remained for opticians to devise ways and means for accurately applying the principles of this test without resorting to the use of local toxicants of any kind. This small volume has therefore been prepared for the purpose of pointing out new and better paths in practical optometry, as well as the re-blazing of old ones..."[3]

In the 1903 book, Cross explained instrumentation and procedures for retinoscopy, optical principles, dynamic retinoscopy, and illustrative cases. He described the appearance of the retinoscopic reflex in spherical refractive errors and astigmatism, this being before the advent of streak retinoscopy. He also described the scissors movement sometimes seen on retinoscopy. Figure 1 shows him doing retinoscopy with an attachment he developed for dynamic retinsocopy.


Date, ______ 191 ? ______ Occupation ______
Name, ______
Street, ______
City, ______

OBJECTIVE

	Lids	Cornea	Iris	Lens	Fundus
Ophthalmoscopic					

Skiametric		6/M Sph.	1/M Sph.	33 C/M Sph.	Cyl.	Axis	Keratometric	Am't.	Axis
	O. D.								
	O. S.								

SUBJECTIVE

Phacometric		Sph.	Cyl.	Axis	U. V.	C. V.	Amp.	Presby.
	O. D.							
	O. S.							

Prismometric		Ad.	Ab.	Sur.	Ex.	Es.	Hyp.	Case History
	O. D.							
	O. S.							

PREVIOUS FORMULA

R=		Sph.	Cyl.	Axis	P=	Sph.	Cyl.	Axis
	O. D.							
	O. S.							

Ordered by ______ In use ______ years

FACIAL MEASUREMENT

P. D. ______ H'ght, ______ Cr'st, ______ Base, ______ Ear, ______ Head ______

FORMULA PRESCRIBED

For R		Sph.	Cyl.	Axis	Prism	Base	Lenses / Mtg.	Spg. / Stud	Guard / Drill
	O. D.								
	O. S.								

For Bi-F. add ______ Size of Lens ______ x ______ Segs ______ x ______ Price, $ ______

For P							Lenses / Mtg.	Spg. / Stud	Guard / Drill
	O. D.								
	O. S.								

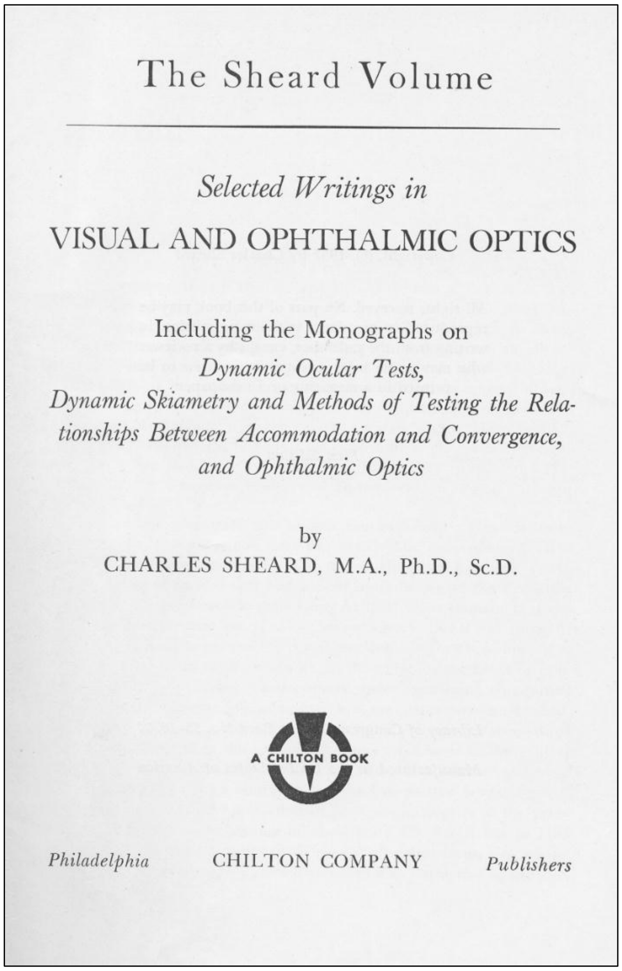
Size of Lens ______ x ______ Price, $ ______ Fee, $ ______
Total, $ ______ Amount Paid, $ ______ Amount Due, $ ______
Call ______ Mail ______
Referred by ______ Ex'm'd by ______
No. ______

Figure 2. The recording form used by Cross. (from Cross AJ. Dynamic Retinoscopy in Theory and Practice, 2nd ed. New York: A. Jay Cross Optical Company, 1915:145.)

Cross published the first edition of *Dynamic Skiametry in Theory and Practice* in 1911 and a 218 page second edition in 1915. In the preface to the first edition, he suggested that: "The progress made in optometry during the past decade has perhaps been influenced by no one division more than it has by that of Dynamic Skiametry..."[4] He was apparently motivated to produce the second edition due to a change in his thinking about accommodation and convergence. In the preface to the second edition he stated that "he now has reason to believe that the visual organs in their effort to meet individual requirements adjust accommodation and convergence in a manner to give the fusion sense the greatest possible aid."[5] As an example, he noted that in exophoria there can be an accommodative excess that can cause some amount of hyperopia to be latent.

The second edition of *Dynamic Skiametry in Theory and Practice* elaborates much of the same material as in the 1903 book, but goes into more detail on dynamic retinoscopy. Figure 2 shows the record blank that Cross presented in the second edition. There are blanks for retinoscopy at 6 meters, 1 meter, and 33 centimeters. In the illustrative cases section of the second edition, he listed dynamic retinoscopy findings done variously at 40 inches (1 m), 20 inches (50 cm), 16 inches (40 cm) and 13 inches (33 cm).

CHARLES SHEARD (1883-1963)


The Sheard Volume

Selected Writings in

VISUAL AND OPHTHALMIC OPTICS

Including the Monographs on

Dynamic Ocular Tests,

Dynamic Skiametry and Methods of Testing the Relationships Between Accommodation and Convergence, and Ophthalmic Optics

by

CHARLES SHEARD, M.A., Ph.D., Sc.D.

A CHILTON BOOK

Philadelphia CHILTON COMPANY *Publishers*

Figure 3. Some of Sheard's most important journal and monograph publications were collected in the 1957 Sheard Volume. It was hardcover book of 467 pages, sponsored by committees of 10 ophthalmologists, 10 opticians, and 12 optometrists and more than 400 patrons and sponsors.

Charles Sheard was born in Dolgeville, New York. He earned degrees in physics from St. Lawrence University (A.B., 1903), Dartmouth College (M.A., 1907), and Princeton University (Ph.D., 1912). From 1907 to 1919, he was on the physics faculty of The Ohio State University.[6] In 1914, he became the first Director of Ohio State's Applied Optics program as its optometry school was then known. In 1919, Sheard took a position as head of the division of ocular interests in charge of professional and scientific work at the American Optical Company in Southbridge, Massachusetts.[7] While he was at American Optical, he founded a short-lived but quality journal, *American Journal of Physiological Optics*.[8] From 1924 to 1949, Sheard was Professor of Biophysics at the University of Minnesota and Director of physics and biophysical research at the Mayo Clinic in Rochester, Minnesota. After that he was a lecturer in physiological and ophthalmic optics in the Department of Ophthalmology at Tulane University. In 1952-53, he was interim Dean at the Los Angeles College of Optometry.

Hofstetter[9] observed that throughout his career, Sheard "retained his undying interest in the optometry profession's welfare and responded vigorously to every frequent invitation and opportunity to be of service on commissions, councils, and committees in a variety of advisory, academic, and organizational roles and as a frequent lecturer on optometric educational programs." Although Sheard's formal education was in physics, he became proficient enough in optometry to achieve licensure in more than one state.[9] Among his many contributions to optometry were his helping to found the American Academy of Optometry and a great deal of work to raise optometric educational standards.[10,11]

Sheard's work was recognized by awards from organizations from several different fields. Among the awards he received were the Distinguished Service Medal in Optometry (1930), Ward Burdick Medal from the American Society of Clinical Pathologists (1947), Honor Award from the American Academy of Ophthalmology and Otolaryngology (1951), Beverly Myers Nelson Award of the Foundation for Education in Ophthalmic Optics from the American Board of Opticianry (1951), Honorary Life Member of the American Academy of Optometry (1953), and the Tillyer Medal from the Optical Society of America (1957).[6,7] He also received honorary doctorate degrees from St. Lawrence University (1930) and the Los Angeles College of Optometry (1953).

Sheard published more than 250 papers.[6] He wrote extensively about ocular accommodation and convergence, dynamic retinoscopy, optometric testing procedures, and ophthalmic optics. His name is associated with a guideline he recommended[12] for assessing strain on fusional vergence, now known as Sheard's criterion. He also published papers on dark adaptation, effects of radiant energy, applications of spectrophotometry to biology and medicine, and the physiology of temperature regulation. Sheard was the author of several books, including *Dynamic Ocular Tests* (1917), *Physiological Optics* (1918), *Ocular Accommodation* (1920), *Dynamic Skiametry and Methods of Testing the Accommodation and Convergence of the Eyes* (1920), *Transmission of Radiant Energy by Ophthalmic Glasses* (1921), and *Life-Giving Light* (1933). Some of his most noted writings were collected in *The Sheard Volume: Selected Writings in Visual and Ophthalmic Optics* (1957).

In *Dynamic Ocular Tests* (1917, 143 pages), Sheard listed 18 tests as a routine battery of tests in a clinical vision examination. The tests included case history, ophthalmoscopy and external eye examination, keratometry, static and dynamic retinoscopy, amplitude of accommodation, visual acuity, subjective refraction, version tests, dissociated phorias, fusional vergence ranges, and relative accommodation.[13] Later Sheard expanded the list to 20 tests.[14] It appears that Sheard's list of 18 tests was modified to form the "21 point examination" emphasized throughout most of the twentieth century by the Optometric Extension Program as a routine vision examination.[15,16]

Sheard's 1918 book *Physiological Optics* (513 pages) is a reprint of material Sheard published in volume XIII of the *American Encyclopedia of Ophthalmology*. Sheard characterized it as "a collection of the old and new scientific facts that have bearing upon the practical work of the refractionist and eye-practitioner."[17] He said that he followed Helmholtz's organization in *Handbuch der Physiologischen Optik* in arranging the material "into three general portions – (1) the passage of light into the eye or the dioptrics of the eye, (2) the functions of the retina and (3) the interpretations and appreciation of the outer world through the sense of light."[18]

Sheard's *Dynamic Skiametry and Methods of Testing Accommodation and Converence* (1920, 108 pages) was also a reprinting of material originally published in the *American Encyclopedia of Ophthalmology*. He discussed theory, procedure, and clinical application of dynamic retinoscopy. Sheard contrasted his procedure for dynamic retinoscopy from that of A.J. Cross. He noted that when Cross observed a lag of accommodation as indicated by a with motion, he added plus lenses until the reflex reversed to an against motion. In contrast, Sheard added plus lenses to the first neutral.[19] Thus Sheard added plus to the low neutral point whereas Cross added plus to the point just past high neutral.

Ocular Accommodation (1920, 76 pages) was an "optometrical course of study" published by the Department of Education of the American Optometric Association. Topics included mechanism of accommodation, determination of far point of accommodation (subjective refraction), determination of near point of accommodation and amplitude of accommodation, testing procedures, symptoms, systemic conditions affecting accommodation, and accommodative anomalies. Illustrative cases were presented. Testing procedures discussed were amplitude of accommodation by push up and minus lens methods, cross cylinder tests, and dynamic retinoscopy. Sheard also described a method for objective determination of amplitude of accommodation in which the examiner moves closer with the retinoscope and observes the retinoscopic reflex as a near target was pushed closer to the patient, as illustrated in Figure 4. When the reflex switches from against motion to neutral the objective near point of accommodation is reached.[20] Sheard also noted that accommodative conditions will often improve when proper correction of refractive error is provided, but that dynamic retinoscopy and other tests will help to disclose whether additional lens treatment is needed to achieve normal near point function.[21]

Sheard's book *Life-Giving Light* (1933, 174 pages) is a collection of eight popular science essays on light and life and their interrelations. The essay topics include artificial lighting, light sensitive cells and the sense of vision, the electromagnetic spectrum, radiant energy, microscopes and telescopes, sunlight and photosynthesis, sunlight and vitamins, and the mystery of the nature of life.

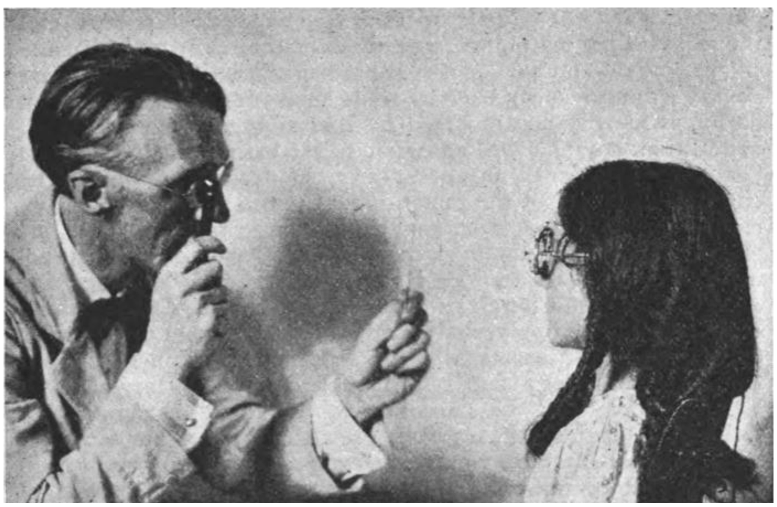


Figure 4. Procedure for objective determination of the amplitude of accommodation. As a near point object is pushed up closer to the patient, the examiner observes where the retinoscopic reflex switches from against motion to neutral, at which point the objective near point of accommodation is reached. (From Sheard C. Ocular Accommodation. Hartford, CT: American Optometric Association Department of Education, 1920:58.)

ARTHUR MARTEN SKEFFINGTON (1890-1976)

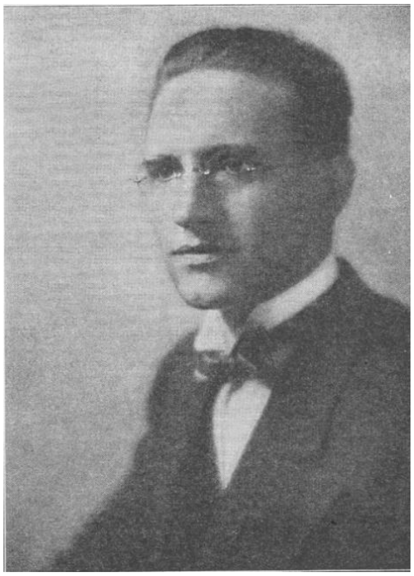


Figure 5. A.M. Skeffington in about 1928. (From: Skeffington AM. Procedure in Ocular Examination. Chicago: A.J. Cox, 1928)

A.M. Skeffington (Figures 5 and 6) was born in Kansas City, Missouri. After attending Nashotah Theological Seminary in Nashotah, Wisconsin, he enrolled in the Needles Institute of Optometry in Kansas City.[22] After graduating from the Needles Institute in 1915, he entered optometry practice in Kearney, Nebraska.[23] In 1926, he closed his office and associated with E.B. Alexander in providing educational opportunities to practicing optometrists.[24,25] That association led to the founding of the Optometric Extension Program (OEP) in 1928, with Skeffington becoming its Director of Education and serving in that capacity until 1976. It appears that such a position was ideally suited to his desire to improve the information available to practicing optometrists.[24]

As OEP Director of Education, Skeffington traveled widely across the United States, lecturing to optometric groups and conferring with optometrists as well as with authorities from various disciplines such as psychology, education, neuroscience, and physiology. He used information gained from such interchanges to build a broad concept of vision in which vision was the dominant sense for acquiring information and directing movement. He emphasized that vision care was more than just care of the eyes because vision involved not only ocular function but also integration with the other senses as well as with neural and cognitive function. He stressed environmental influences on the development and adaptation of the visual system. Because of these concepts and his fervent promotion of them through his lectures and his writings, he is frequently referred to as the Father of Behavioral Optometry.[26,27]

Hoare[28] observed that Skeffington did "impose upon optometry a sense of urgency in the upgrading of the practice patterns of the profession. Skeffington's sheer force, and his appeal to his audiences, marked him as a natural leader." Skeffington received honorary doctorate degrees from Northern Illinois College of Optometry (1929) and Pacific University (1958) and the Apollo Award from the American Optometric Association (1961).[23]

Books authored by Skeffington were *Procedure in Ocular Examination* and *Differential Diagnosis in Ocular Examination*. In *Procedure in Ocular Examination* (1928, 118 pages), Skeffington discussed testing procedures for a routine vision examination. There was no coverage of alternative procedures or diagnosis. Tests described included case history, direct ophthalmoscopy, keratometry, static and dynamic retinoscopy, subjective refraction, dissociated phorias, fusional vergence ranges, cross cylinder tests, visual fields, cyclophoria testing, and cover test. Although the later OEP 21 point examination had base-out vergence ranges performed before base-in ranges, at this time Skeffington was advocating doing the base-in testing before base-out,[29] as is generally taught today.

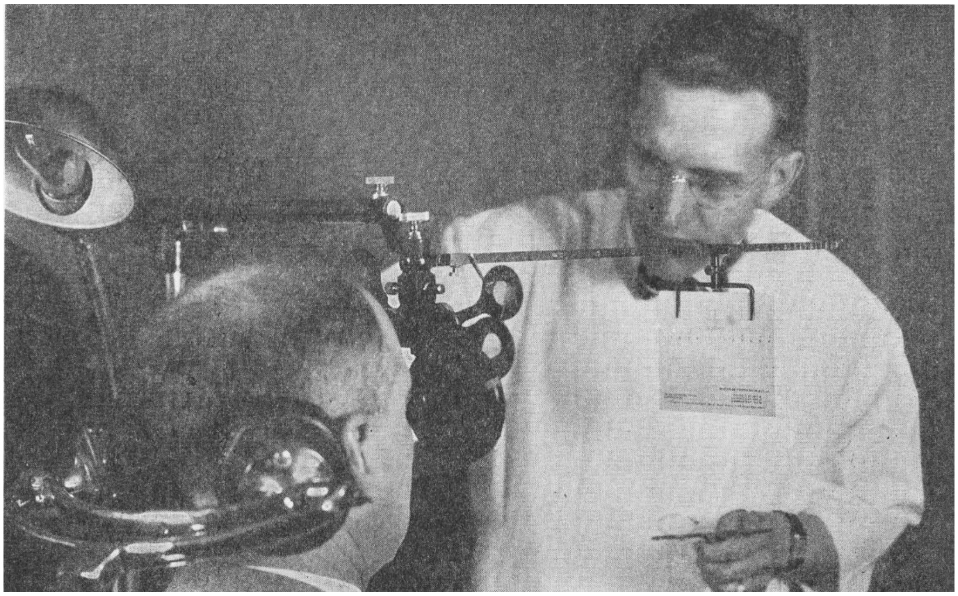


Figure 6. A.M. Skeffington doing near testing. (From: Skeffington AM. Procedure in Ocular Examination. Chicago: A.J. Cox, 1928:100.)

In *Differential Diagnosis in Ocular Examination* (1931, 200 pages), the emphasis was on diagnosis of accommodation and vergence conditions along with some background theory. The beginnings of the OEP examination and analysis procedure can be seen here. Here the examination consists of 18 tests rather than the later 21 points. The minus lens amplitude (#19) and the relative accommodation tests (#20 and #21) are not yet included, and the fusional vergence ranges include only break and recovery points.[30] The addition of the blur points on the fusional vergence ranges is usually credited to Louis Jaques and George Crow.[24] An early version of the OEP "check, chain, and type" analysis procedure is also presented in this book.

Skeffington wrote numerous serial publications for OEP, which OEP subsequently collected in several softcover monographs, including *Analytical Optometry* (1938-1951), *Practical Applied Optometry* (1951-1958), *Introduction to Clinical Optometry* (1964-1965), *Optometry in Theory and Practice* (1964-1965), and *The Best of Skeffington* (1974). Two of these were also edited and reissued after his death – *Introduction to Clinical Optometry* (1988, 52 pages) and *Practical Applied Optometry* (1991, 113 pages), which both dealt with clinical application of OEP analysis of the results of the 21 point examination routine and related theoretical background.

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